MINISTRY OF HEALTH
DEPARTMENT OF MEDICAL RESEARCH
(LOWER MYANMAR)

ANNOTATED BIBLIOGRAPHY OF TRADITIONAL MEDICINE RESEARCH CARRIED OUT AT DMR (LM) DURING 1965-2011

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Ministry of Health
Department of Medical Research (Lower Myanmar)
Central Biomedical Library

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PREFACE

Throughout recorded history, people of various cultures have relied on traditional medicine. Worldwide, only an estimated ten to thirty percent of human health care is delivered by conventional, biomedically oriented practitioners. The remaining seventy to ninety percent ranges from self-care according to folk principles, to care given in an organized health care system based on traditional medicine. Likewise, in Myanmar health care system, the existence of traditional medicine along with allopathic medicines is well recognized. Myanmar traditional medicine dates back 2,000 years and is well accepted and widely used by the people throughout history. Burma Medical Research Institute since it was established in 1963 had started a program of research on traditional medicinal plants including laboratory screening tests on animal models of herbs with reputed pharmacological properties-such as anti-dysentery, bronchodilator, hypoglycemic effects. A research program for the standardization, pharmacological and toxicological evaluation of traditional drugs and herbal medicines was started in 1984 and Myanmar Traditional Medicine National Formulary has been compiled for 57 numbers of traditional medicine formulations, in each monograph including formulary, therapeutic uses, caution and dosage in Myanmar language.

The Ministry of Health plays a pivotal role in the promotion and maintenance of health of the Myanmar people for ensuring their health and longevity. The ministry also encouraged research on traditional medicinal plants with the objectives of obtaining evidence-based traditional medicine drugs and exploring new traditional medicinal plants. Scientists from the Ministries of Health, Science and Technology and Education gather together to conduct research on traditional medicine and traditional plants during the past decades. An attempt has been made to consolidate all available data on traditional medicine research carried out at the Department of Medicine Research (Lower Myanmar) during the past five decades.

The bibliography is divided into two parts. The first part consists of bibliography itself. Entries are provided with annotations and the titles are arranged alphabetically. Annotations were made based on the abstracts. The second part is "The Subject Index" and "Author Index". MeSH is the authority list used by the National Library of Medicine of the United States of America. Myanmar Traditional Medicine includes many medical materials of plants and animal origin which are not included in MeSH. In such cases, modifications have to be made and new subject headings have been added ie, species of plants as well as their local names. Cross-references are provided where necessary. This bibliography will be of great assistance as a handy reference to traditional medicine practitioners and various researchers in the field of Myanmar Traditional Medicine. Additional information can also be obtained through review articles enlisted.

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Abbreviations

1st Burma Res Congr	- 1st Burma Research Congress
Burma Med Res Counc	- Burma Medical Research Council
Myanmar Health Res Congr	- Myanmar Health Research Congress
Res Pap Reading Session, Med Res Div	- Research Paper Reading Session, Medical Research Division
Burma Res Congr	- Burma Research Congress
Med Res Congr	- Medical Research Congress
Rep Burma Med Res Counc	- Report of Burma Medical Research Council
Myanmar Health Sci Res J	- Myanmar Health Science Research Journal
Burma Med Res Counc; Spec Rep Ser	- Burma Medical Research Council; Special Report Series
2nd Conf Med Spec, MMA	- 2nd Conference Medical Specialty, Myanmar Medical Association
16th Myanmar Military Med Conf	- 16th Myanmar Military Medical Conference
Pharmaceutical Biol	- Pharmaceutical Biology
Union Burma J Life Sci	- Union of Burma Journal of Life Sciences
Southeast Asia Region, Reg Health Forum	- Southeast Asia Region, Regional Health Forum
Int J Crude Drug Res	- International Journal Crude Drug Research

Contents

1. The action of *Desmodium triquetrum* (Lauk-thay-ywet) on the development of *Musca domestica*. Tu, Margaret; Hkun Saw Lwin. 1st *Burma Med Res Conf*, 1965: p6.

   In Burma, *Desmodium triquetrum* (Lauk-thay-ywet) leaves are used to cover ngapi in the belief that this practice renders the ngapi free of fly larvae. Assuming that the larvae found in ngapi were those of *Musca domestica*, studies were initially made on the effect of *Desmodium triquetrum* leaves and extract on (1) eggs of *M. domestica* (2) larvae of *M. domestica* (3) oviposition in *M. domestica*. *D. triquetrum* leaves and extract had no effect on the hatching of *M. domestica* eggs. Both leaf and extract had no action on oviposition in *M. domestica*. Extracts tested had no action on the larve, but the leaf had a lethal effect on the majority of larvae within 24hours. Death appeared to be due finally to dehydration. The initial effects produced were a localisation of the larvae to part of the leaf, usually on the under surface, followed by an exudation of fluid. The mechanism by which the leaf produces the changes in the larvae has yet to be elucidated. Studies were also made on the action of *D. triquetrum* leaf and extract on the development of fly larvae found in Nga-ngapi and Seinsa-ngapi. Extracts tested had no effect on the larvae but the leaf had a lethal effect. The relative proportions of different kinds of fly larvae found in Nga-ngapi and Seinsa-ngapi were studied. Four different kinds of fly larvae were found in batches of Nga-ngapi and Seinsa-ngapi tested viz. *M. domestica* (in comparatively very small numbers), a Borborid species, a calliphorid species and a species of Drosophila. The last three species of fly are a waiting identification.

2. Activation analysis of arsenic in "Khun-hnit-par-shaung" Myanmar indigenous medicine. Than Dar Shwe. Thesis, MSc (Chemistry), University of Yangon, 1988.

   Gamma counter employing 'Bicron' scintillation counter was calibrated for study of ^{75}AS (n, r) ^{76}As reaction. Sources of errors related to gamma attenuation and neutron self-shielding effects were studied. Mass-activity relation for arsenic was determined by gamma counting technique and checked against by both nuclear and chemical methods. 'Khun-hnit-par-shaung' Myanmar indigenous medicine was formulated and the effects of various experimental parameters on medicinal formulations were investigated.

3. Activities of some medicinal plants on *Staphylococcus aureus* isolated from patients with septic wound (Ana-pauk wound) attending Traditional Medicine Hospital, Yangon. Lwin Lwin Cho; Mar Mar Nyein; May Kyi Aung; Win Myint; Mi Mi Htwe; Hla Myint. *Myanmar Health Res Congr*, 2006: p18.

   Three medicinal plants: (*Allium sativum*-single clove garlic), leaves and seeds of Tama (*Azadirachta indica*) and Bizat (*Eupatorium odoratum*) leaves were selected to find out the antibacterial activity on 30 clinical isolates of *Staphylococcus aureus*. Wound swabs and pus samples were collected from patients with septic wound attending Traditional Medicine Hospital, Yangon from January to August, 2005. All extracts of three medicinal plants and fresh juice of Bizat leaves showed no antibacterial activity on *Stphylococcus aureus*. Fresh garlic juice had significant batericidal action on all those isolates. Minimum Inhibitory Concentration (MIC) of fresh garlic juice on those isolates was in the range of 1.3% to 2% (v/v) by agar plate dilution method and minimum bactericidal concentration of fresh garlic juice was in the range of 1.3% to 5% (v/v) by tube dilution method. The findings of this study may be a scientific report for further development of a useful phytomedicine from garlic with specific antibacterial activity.

4. Activity of Traditional Medicine Formulations (TMF-6 & TMF-23). Mar Mar Nyein; Mi Mi Htwe. *Myanmar Health Sci Res J.* 2004; 16(1-3): p18-22.

   The Myanmar Traditional Medicine Formulations (TMF-6 & TMF-23) which are mainly used in diarrhea and dysentery by Myanmar practitioners were selected to determine the antibacterial properties. The ingredients (24 plants) present in it were selected singly and tested for their antibacterial activities. A total of 35 strains of bacteria (*Escherichia coli* = 11; *Staphylococcus aureus* = 3; Salmonella species = 7; Shigella species = 4; *Vibrio cholerae* = 7 and one species each of *Bacillus subtilis*, *Pseudomonas aeruginosa* and *Proteus morganii*) were chosen for testing. Agar disc diffusion was done for screening. It was demonstrated that TMF-6 extract was active on *Escherichia coli* (STLT) and *Vibrio cholerae* (Inaba); TMF-23 extract was active on *E. coli* (STLT), *Staphylococcus aureus* (Ogawa). The extract of the mixture of two TMFs was also found to be active on *E. coli* (LT) and *Vibrio cholerae* (Inaba). Among the 23 plants tested, they were found to be active on one, two or more of the bacteria tested with different patterns.

5. Acute and sub-acute toxicity of *Cuminum cyminum* Linn. (Ziya). seeds on laboratory rats. Mu Mu Sein Myint; May Aye Than; Yin Min Htun; Win Win Maw; Aye Myint Swe; San San Myint; Myint Myint Khine; Phyu Phyu Win. *Myanmar Health Sci Res J.* 2011 August; 23(2): p79-83.

   Cuminim cyminum Linn. (Ziya) seed is one of the most useful spices in Myanmar. It is included in curry powder and some traditional medicine formulations. In acute toxicity test, it was found that there was no toxic symptom in albino mice at the dose of up to 4gm/kg body weight. In subacute toxicity test, three groups of rats were tested orally once daily for 90 days. Group 1 and Group 2 received 3gm/kg and 1gm/kg body weight of seed powder. Group 3 received only 10ml/kg of distilled water and served as control group. On day 91, all three groups were sacrificed and blood was collected for biochemical tests (LFT and urea) and haematological parameters. Internal organs were dissected out; weighted and histopathological examinations were done. Sub-acute toxicity test showed that there were no changes of body weight and organ weight in all three groups. There were no significant changes in LFT, urea, complete picture and platelet count when compared with the control group. In histopathological examinations, squamous metaplasia, necrosis and polymorph infiltration were observed at mucosa of small intestine in some high dose treated rats (3gm/kg body weight). Mild haemorrhage in kidney was also seen in 3 out of 8 rats. There were no significant changes of histopathological examinations in low dose and control groups.

6. Acute and sub-acute toxicity of Lingzhi in animal models. Pharmacology Research Division. *Annual Report 2000.* Yangon: DMR (LM). p75-76.

   Evaluation of the acute and subacute (short-term) toxic effects of a commercially available Lingzhi capsule was carried out. Acute toxicity was conducted on 40 mice divided into groups of 10 mice each. Lingzhi (0.75g/kg body weight, 1.5g/kg body weight, 3g/kg body weight was given to three groups and the fourth group served as the control group. No lethality was found in all the dosages tested. For the subacute toxicity, 18 rats were divided into three groups of 6 rats each (Lingzhi 1g/kg body weight, 0.5g/kg body weight and plain vehicle) were given once daily for 3 months. Gross behaviors of these rats were recorded daily and body weight were recorded once weekly at 3 months, they were sacrificed by dislocation of neck and blood collected for urea, complete picture and liver function tests. Visible pathological changes of vital organs as well as histopathological studies were carried out. Both

Lingzhi tested and control rats showed no pronounced gross or microscopic pathological changes, and blood urea, complete picture and liver function tests were within normal limit.

7. Acute and subacute toxicity of *Millingtonia hortensis* Linn. f. (Aykayit) leaves in animal model. Khine Khine Lwin; Mu Mu Sein Myint; May Aye Than; Min Min Myint Thu; Thaung Hla; Khin Tar Yar Myint; Aung Myint; Ei Ei Soe. *Myanmar Health Sci Res J.* 2011; 23(1): p32-37.

   Millingtonia hortensis Linn. f. (Aykayit) (family-Bignoniaceaae) is a commonly used medicinal plant for the treatment of hypertension in Myanmar. The present study was done to determine the phytochemical constituents, acute and subacute toxicity of *Millingtonia hortensis* Linn. f. dried leaves powder. Acute toxicity study of the dried leaves powder of this plant was carried out in albino mice by using oral route. In subacute toxicity study the dried leave powder of this plant at the doses of 3g/kg and 5g/kg was administered orally to the albino rats daily for 3 months. At the end of 3 months, all the rats were sacrificed. Their blood samples were collected and tested for haematological and biochemical parameters. The internal organs were removed and collected for histopathological studies. It was found that the dried leaves powder contained alkaloids, flavonoids, glycosides, tannin, steroids, phenol, saponin, resin, carbohydrate and amino acid. In the acute toxicity study, it was found that the dried leaves powder was not toxic up to the maximum feasible dose of 8g/kg. In the subacute toxicity study, the dried leaves powder showed no significant changes in body weight, hematological, and biochemical (blood urea, liver, function test) parameters when compared with those of the control group. Histopathological studies of the internal organs of the rats showed no pathological changes. In concliusion, it was found that *Millingtonia hortensis* Linn. f. dried leaves powder did not possess any acute toxic effect in the mice and substance toxic effect in the rats.

8. The acute and subacute toxicity of root of *Butea superba* Roxb. (ပေါက်နွယ်) Fabaceae in animal model. Aung Ko Ko. Thesis, MPharm, Yangon: Military Institute of Nursing and Paramedical Sciences, 2011.

   Butea superba Roxb. is a herbal leguminous plant endemic in Myanmar whose tuberous roots are used for male rejuvenation and the prevention of erectile dysfunction. The present study was done to determine the phytochemical constituents, acute and sub-acute toxicity test of *Butea superba* Roxb. Acute toxicity study of *Butea superba* Roxb. was carried out in albino mice by using oral route. In sub-acute toxicity study, adult male wistar rats were orally treated by 0, 1, 2g/kg BW/day of *Butea superba* Roxb. powder suspension for 3 months (i.e., 90days). On the 90^{th} day, all the rats were sacrificed. Their blood samples were collected and tested for haematological and biochemical parameters. The internal organs were removed and collected for histopathological studies. It was found that the powder contained alkaloid, flavonoid, glycoside, phenolic compound, and tannin, starch, reducing sugar, steroide, α-amino acid and carbohydrate. In the acute toxicity study, it was found that the powder of *Butea superba* Roxb. was not toxic up to the maximum feasible dose of 8g/kg. In the sub-acute toxicity study, the dried root powder at the doses of 1g/kg and 2g/kg showed no significant changes in body weights when compared with those of the control group. The average weights of the internal organs of the animals treated with 1g/kg of the powder showed no difference except significantly increase in the average weight of the lungs ($p<0.0005$), significantly decrease in the average weight of the small intestine ($p<0.000$), the average weights of the brain and colon ($p<0.005$), the average weights of the spleen and left kidney ($p<0.05$), when compared to the

control group. There was no significantly difference in the weights of the internal organs of the rats treated with 2g/kg of the powder when compared with the control except for the increase in relative weights of the testes and epididymus ($p<0.05$) in rats treated with 2g/kg of *Butea superba* Roxb. powder. The group treated with the higher dose of *Butea superba* Roxb. crude drug 2g/kg showed significant ($p<0.05$) higher percentage weight ratio to body of testis than the control and 1g/kg treated groups. Concerning the studies of haematological, there were no significant changes in haematological parameters between the groups of the rats given with 1g/kg and 2g/kg of the dried root powder of this plant and the control group. In this study, there were no significant differences in serum bilirubin, serum alkaline phophatase (ALP) and blood urea but significantly increase in the level of serum alanine aminotransferase (ALT) and serum aspartate aminotransferase (AST) ($p<0.05$) between the rats treated with 1g/kg and 2g/kg doses of the powder suspension of *Butea superba* Roxb. and the control group. The weight and histopathological examination of selected organs showed no significant changes. In the present study, the histolopathological studies of the tissue samples taken from selected organs of the rats treated with the powder of this plant and the control group of rats showed no pathological lesions. The tissues of the testes of 9 rats and the epididymus of 5 rats treated with the low dose (1g/kg) of the powder of *Butea superba* Roxb. showed active spermatogenesis. The tissues of testes and epididymus of all rats treated with the high dose (2g/kg) of the powder of this plant showed active spermatogenesis. The information from this study can be used to explain the application of this plant which has been used to increase sexuality in men. However, the long term use of *Butea superba* Roxb. in high doses may prove toxic to animals and humans.

9. Acute and sub-acute toxicity studies of Traditional Medicine Formulation number 28 (Thetyinnkalat-hsay) on rat model. Khin Phyu Phyu; Lei Lei Win; Mya Malar; Kyawt Kyawt Khaing; Kyi San; Tin Tin Thein; Thaw Zin; Kyaw Zin Thant. *Myanmar Health Sci Res J.* 2011; 23(1): p135-138.

   The purpose of this study is to perform standardization and to find the safety profile of Traditional Medicine Formulation Number 28 (Thetyinnkalat-hsay) on laboratory rat model. TMF-No. 28, an antidiabetic drug, has been used for a long time but its toxicity has not been studied. In an acute toxicity study, TMF-28 was administered orally in three different doses 9.2g/kg body weight (80 times human dose), 4.6g/kg body weight (40 times human does), and 2.3g/kg body weight (20 times human dose), and distilled water as control group using Litchfield and Wilcoxon Method. Animals were observed for any toxic symptoms up to 2 weeks. The results indicated there were no toxic symptoms up to the dose of 9.2g/kg per oral (p.o). In sub-acute toxicity study, this drug was tested at there doses of 2g/kg body weight, 1g/kg body weight and 0.5g/kg body weight (p.0) once daily for 90 days. The animals were sacrificed on the 91st day and various blood biochemical parameters, haematological, and histopathological examinations were done. Sub-acute toxicity showed that there was no decrease in body weight of the internal organs such as heart, liver, lung, kidney, spleen, stomach and intestine were found, when compared with the control group. No significant changes in liver and kidney functions tests, and haematological parameters were observed when compared with the control group. Mild congestion of capillaries and blood vessels were observed in heart, lung and liver of some rats. These findings suggested that dosage of TMF 28 should be carefully selected by performing appropriate clinical trials to ensure maximal safety of this drug.

10. Acute effect of onion (*Allium cepa*) on blood glucose level of diabetic patients. Zaw Myint; Hnin Lwin Tun; Theingi Thwin; Thet Thet Mar; Mie Mie Nwe; Aye Myint Oo; Lwin Zar Maw; Tin Ko Ko Oo; May Thu Kyaw. *Myanmar Health Sci Res J.* 2009; 21(1): p22-25.

    To determine the acute effect of onion on blood glucose levels of diabetic (NIDDM) patients, a self-controlled study was done. It included 20 diabetic patients whose fasting plasma glucose concentration exceeded 126mg/dl. After taking the fasting plasma glucose sample, 50g of oral glucose load was given to the patients and the plasma glucose levels at thirty-minute time intervals up to 2 hours were taken again (OGTT). Then, the same procedure was done after one week at which glucose load and onion (50g) were administered. The results were analyzed by using paired't' test. The mean fasting plasma glucose concentrations of diabetic patients were 147.35±17.18mg/dl *vs*. 149±19.76mg/dl, (p=0.199), respectively. When the glucose onion were administered, the plasma glucose levels were found to be decreased when compared to those levels after giving glucose only; (225.60±27.25mg/dl *vs*. 214.40±33.39mg/dl at 30min; p=0.099), (282.55±31.67mg/dl *vs*. 229.40±37.61mg/dl at 60min; p=0.0001), (270.20±22.48mg/dl *vs*. 194.45±37.26mg/dl at 90min; p=0.0001) and (248.75±20.13mg/dl *v*s. 161.65 30.50mg/dl at 120min; p=0.0001), respectively. This study shows that onion has an acute effect of lowering the plasma glucose levels which could be useful in the management of patients with diabetes mellitus.

11. Acute toxicity test and antibacterial activity of *Terminalia bellirica* Bel. (သစ်ဆိမ့်ဆီ) from the Ministry of Industry (1). Pharmacology Research Division. *Annual Report 2002*. Yangon: DMR (LM). p57.

    Terminalia bellirica Bel. (သစ်ဆိမ့်ဆီ) from Myanmar Foodstuff Production, Ministry of Industry (1), has been tested for the acute toxicity. The following effects were seen in the dose of 33ml/kg body weight in mice. Steatorrhoea was noticed, which were not seen when compared with control eatable oil (ရန်ကုန်ပဲဆီသန့်). So, continue to test this oil in boiled form. The same effects were also seen in same dose in mice. It may be due to its' structure same as castor oil which is purgative activity and its' more potent purgative effect than castor oil. Antibacterial activity of (သစ်ဆိမ့်ဆီ) showed no activity.

12. Acute toxicity testing of artemisinin powder from Myanmar Pharmaceutical Factory. Pharmacology Research Division. *Annual Report 2002*. Yangon: DMR (LM). p57.

    Artemisinin powder from Myanmar Pharmaceutical Factory was tested for the acute toxicity test in mice. The median lethal dose was more than 9g/kg body weight. LD_{50} of artemisinin powder from literatures was 5.9g/kg in mice. It may be due to the impurity or low content of artemisinine. Therefore, it is needed to identify with pure artemisinine standard later.

13. The analgesic and antipyretic effects of ethanolic extract of *Andrographis paniculata* Nees. (Say-khar-gyi) leaves on experimental animals. Thida Tun. Thesis, MMedSc (Pharmacology), Yangon: University of Medicine (2), 2008.

    Andrographis paniculata Nees. (Say-khar-gyi) plant has been used as traditional herb for treating fever, pain, diarrhea, diabetes mellitus, and hypertension and also for various diseases in Myanmar especially in rural area. This plant is commonly known as 'king of bitters' and used for centuries in Asia to treat upper respiratory tract infections, gastrointestinal tract infections and other chronic disease. In this present study, 100gm

of air dried leaves of *Andrographis paniculata* Nees. (Say-khar-gyi) showed reduction of spontaneous motor activity and induction of sleep from dose of 3gm/kg and above that dose. Other autonomic nervous system and central nervous system activities are normal. Analgesic activity was evaluated by using albino mice and tail clip method described by Bianchi and Franceschini (1954). This method was usually used for testing drugs with narcotic activity (Dhawan, 1984). The ethanolic extract of leaves of *Andrographis paniculata* Nees. (Say-khar-gyi) was tested for three doses, 3g/kg, 6g, 6g/kg and 8g/kg orally. These three doses showed significant analgesic effect ($p<0.05$). Subcutaneous morphine (10mg/kg) was used as standard drug. Although the extracts possess analgesic effect, this is inferior to morphine. Antipyretic activity was evaluated in yeast induced pyrexia in albino rat models. In this experiment, antipyretic activity was evaluated by using the method used by Gupta *et al.*, (2003). Fever was induced in albino rats by subcutaneous injection of 20% w/v brewer's yeast suspended in 0.5% methyl cellulose solution. The extract was tested for three doses, 3g/kg, 6g/kg and 8g/kg orally. The dose of 3g/kg did not show significant reduction of fever induced by yeast. But the dose 6g/kg and 8g/kg show significant reduction ($p<0.005$) of pyrexia in albino rats and this antipyretic effect is dose dependent and at the dose of 8g/kg can be compare to standard drug paracetamol 150mg/kg orally. The phytochemical study of the ethanolic extract of leaves of *Andrographis paniculata* Nees. (Say-khar-gyi) was observed that the extract contained alkaloid, flavonoid, glycoside, steroid, tannin, phenol, carbohydrate and proteins. Since, the ethanolic extract of leaves of Say-khar-gyi showed analgesic and antipyretic activities, these activities may be due to one or more of the phytochemical substances from the extract. The time onset of analgesic effect and the time onset of antipyretic effect was not the same and therefore the ethanolic extract of Say-khar-gyi may produce these effects by different mechanisms. But the extracts possess both analgesic and antipyretic activities in dose dependent manner.

14. Analgesic effect of Chin-saw-kha-thee (*Cydonia cathayensis* Hemsl.) on experimentally induced pain in human subjects. May Aye Than; Mu Mu Sein Myint; Aye Than; Kyi Kyi Myint; San San Myint; Thazin Myint; Tin Nu Swe. *Myanmar Health Sci Res J.* 2002; 14 (1-3): p7-11.

    Chin-saw-kha-thee (*Cydonia cathayensis* Hemsl.) from North-east of Shan State of Myanmar is locally claimed to be useful in treatment of gout. In the treatment of gout, there are 2 types of drugs, 1 of which lowers the blood uric acid and the other symptomatic drug of anti-inflammatory or analgesic activity. This study aimed to evaluate the therapeutic analgesic efficacy of Chin-saw-kha-thee on experimentally-induced cold compressor stimulation pain in healthy subjects. The study was conducted at Clinical Research Unit (Traditional Medicine), Department of Medical Research (Lower Myanmar). The study was a controlled, complete crossover single dose design using aspirin as a positive standard drug. Eighteen clinically healthy volunteers participated in this study and was evaluated on the 3 basic pain response parameters namely, pain threshold, pain tolerance and pain sensitivity range. The assay was validated by doing a preliminary reproducibility of the pain response parameters (which coefficient of variation of less than ±15% was selected) on the healthy volunteers before the actual study. Aspirin, 600mg and Chin-saw-kha-thee 10gm (immersed in 150ml of distilled water for a night) showed significant analgesic efficacy in three parameters ($p<0.01$-0.0005) when compared to placebo (water). No side effects were observed in any of these subjects. From this study it was observed that Chin-saw-kha-thee showed analgesic activity.

15. Analysis of arsenic content in "Khun-hnit-par-shaung" Myanmar indigenous medicine. Than Dar Shwe; Myint U. *Myanmar Health Sci Res J.* 1994; 6(3): p139-143.

"Khun-hnit-par-shaung" indigenous Myanmar medicine has been used widely for the treatment of tingling and numbness of extremities, and for a wide variety of the joint disease. It is a mixture of Sein-nee-myin-thwa ($As_2 S_2$), Kyauk-say-dan ($As_2 S_3$), Kant (sulphur), Za-wet-tha (ammonium chloride), Hin-yaing-ni (mercury II sulphate) Let-char (borax), Dotehtar (copper II sulphate) in equal proportion. Arsenic content of Sein-nee-myin-thwa, Kyauk-say-dan and the formulated "Khun-hnit-par-shaung" medicine was analysed by nuclear method. 66.89% of Sein-nee-myin-thwa and 36.37% of Kyauk-say-dan were found to be arsenic. The arsenic content of formulated "Khun-hnit-par-shaung" medicine depends on the heating time during the preparation. The content of arsenic in the mixture becomes higher according to the exposure time of heat.

16. Anthelmintic action of Burmese pineapple (Nanat) on experimental model. Yee Mon Myint; Tha, Saw Johnson; Chit Maung; Aye Than. *Res Paper Reading Session, Med Sci Div*, 1985: p12.

The pineapple *Ananas sativa* juice, 4080mg/ml, effectively killed the *in vitro* test parasite *Ascaris suum* during the experimental period of two days. Potency wise comparison study showed 80mg/ml of the pineapple juice had an anthelminthic activity equivalent to that of 4mM of piperazine. The juice immobilized the test worm leading to death, without any intervening stimulatory phase. On the *in vivo* model using pigs, the pineapple fruit, ingested to a dosage as low as 10g/kg, could purge the intestinal roundworms. Its mechanism of action was found to be due to worm's cuticle digestion by the bromelain content of the fruit, which was averaging 0.29%. The findings together with its clinical significance were discussed.

17. Anthelmintics: Anticholinesterase activities of some medicinal plants. Hla Pe; Tin Win; Khin Khin Su. *Res Paper Reading Session, Med Sci Div,* 1986-87: p4.

It is known that anthelmintic drugs are potent cholinesterase inhibitors. A biochemical system for measurement of anticholinesterase activity of chemical agents and some reputed medicinal plants was established. Some of Burmese medicinal plants were found to be cholinesterase inhibitors. Let-htoke-kyi, an antidysenteric medicinal plant, was found to have high anticholinesterase activity, which can therefore be considered as a potential anthelmintic drug.

18. Anti-amoebic activity of a medicinal plant EH [*Euphorbia hypericifolia* L]. San San Aye; Ye Htut; Aye Than; Aye Kyi; Myo Myint; Hnin Nu Wah. *Myanmar Health Res Congr,* 2004: p22.

Euphorbia hypericifolia L. (EH) is a plant growing wild in Myanmar. It has long been used in Myanmar traditional medicine for the treatment of amoebic dysentery for years. After making morphological and anatomical confirmation, four extracts were prepared in different solvents, namely water, ethyl acetate, 50% and 95% ethanol in varying concentrations and were tested against 20 isolates of *Entamoeba histolytica* for antiamoebic activity, in *in vitro* culture system. The results showed that watery extract, 50% and 95% ethanol extracts of EH had antiamoebic activity. Quercetin was identified as an active principle of EH on phytochemical analysis.

19. Anti-amoebic activity of fruits of *Piper longum* Linn. (Peik-chin) on albino mice. Soe Soe Htwe. Thesis, MMedSc (Pharmacology), Yangon: University of Medicine (2), 2009.

Antiamoebic activity of fruits of *Piper longum* Linn. which are one of popularly used in amoebiasis had not been studied scientifically in Myanmar. (Peik-chin) which was extracted with both aqueous and 95% ethanol was studied in albino mice. The phytochemical analysis of both aqueous and 95% ethanolic extract was done and results showed both extracts contained alkaloid, glycoside, steroids, reducing sugar and carbohydrate. Acute toxicity study of both aqueous and 95% ethanolic extract was done by using albino mice. It was observed that 95% ethanolic extract showed slightly toxic and median lethal dose (LD_{50}) of this extract was 1.9g/kg and its confidence limit was (1.03g/kg to 3.3g/kg). The median lethal dose (LD_{50}) of aqueous extract was 21.3g/kg which means relatively harmless and its confidence limit was (18.7g/kg to 24.3g/kg). The study tested the antiamoebic effect of aqueous and 95% ethanolic extract of fruits of *Piper longum* Linn. on the caecum amoebiasis induced in mice by ($2x10^5$/ml) of trophozoites of *Entamoeba histolytica* (HMI; IMSS) strain. Infection was confirmed on the fourth day through detection of 0.5, 0.25 and 0.125g/kg of extract, and aqueous extract of 9, 6, 3g/kg were administered daily for 4 consecutive days, to albino mice proved to be infected with *Entamoeba histolytica*. The antiamoebic activity of both extracts was compared with a positive control group of infected mice receiving normal saline and a group of non-infected mice. On the 5^{th} day, the mice were sacrificed and the caecum was carefully examined macroscopically for lesions at caecal wall and contents. The antiamoebic activity was expressed as the percent of cured infection. The 95% ethanolic extract, at doses of 0.5g/kg, affect cure in 60% of the mice treated, as compared to 80% with metronidazole. The remaining 2 doses of 0.25 and 0.125g/kg extract showed 40% and 20% effectiveness in treated mice, respectively. The aqueous extract, at doses of 9, 6, 3g/kg showed 40%, 30% and 20% effectiveness in treated mice, respectively. Marked antiamoebic activity of fruits of *Piper longum* Linn. was seen as increased the percent of cured infection in mice treated by both extracts, however, the efficacy is lowered when compared to metronidazole. It was found that the increasing dose of the extracts caused increasing metronidazole. It was found that the increasing dose of the extracts caused increasing effect of cured infection. Therefore, it was shown that both extracts had dose dependent effect. The histopathological findings showed no significant histopathological changes which resembled normal pattern in metronidazole treated group, 0.5g/kg, 0.25g/kg doses of 95% ethanolic extract and 9g/kg and 6g/kg doses of aqueous extract treated group. The histopathological findings of the lowest dose of 95% ethanolic extract (0.125g/kg) and lowest dose of aqueous extract treated mice (3g/kg) showed mucosal sloughing, some focal area of ulceration and infiltration by inflammatory cells. Therefore, the histopathological findings also supported that the extract had the dose dependent effect on percent of cured infection. This study proved scientifically that both aqueous and 95% ethanolic extract of fruits of *Piper longum* Linn. had dose dependent antiamoebic activity. And when compared between 2 extracts, 95% ethanolic extract showed more efficacious in antiamoebic activity but more toxic than aqueous extract.

20. The anti-bacterial actions of some indigenous plant extracts *in vitro* and *in vivo*. Mar Mar Nyein. Thesis, MSc (Zoology), Rangoon Arts & Science University, 1976.

    Twenty-six indigenous plants had undergone an *in vitro* antibacterial screening against 14 test-bacteria. Sixteen of the plants tested showed an inhibitory activity against at least one test bacterium, though there was a variation regarding the size of zones of inhibition. The plant extracts and some antibiotics had been employed in evaluating two *in vitro* methods and two culture media usually used for antibacterial screening. The Kirby-Bauer's method as the *in vitro* testing and the trypticase soy agar as the culture media were found preferable, in the study. The antibacterial spectrum and bacteriostatic or bactericidal effects of the plants were also determined by measuring their Minimum Inhibitory Concentration (MIC). The alkaloid extract of *Stephania hernandifolia* seemed to be the most potent among the plants tested, as it showed a lowest MIC when compared with the results obtained from other plant extracts. According to the MIC determination, the plants showing potency were *Artemesia vulgaris, Coptis teeta, Lawsonia alba, Quisqualis indica, Myristica fragrans* and *Pterocarpus santalinus.* Thus, a very large number of plants are required to undergo the investigations in order to obtain some more plants with high potency, based on the MIC determinations. From the most promising indigenous plants based on their MIC values, four were further selected for *in vivo* specific screening tests, using the *Staphylococcus aureus* infected closed wound model of rats. The four plants were *C. teeta, L. alba, Q. indica* and *S. hernandifolia*. Effectiveness of the test agents were then assessed from three test parameters, ie., viable bacterial count, tensile strength and tissue collagen content. Only *C. teeta* and *S. hernandifolia* were found to possess a promising antibacterial activity plus wound healing. A closed wound with *Staph. aureus* infected model in rats had also been developed for specific screening of wound healing activity. Various products of Kaemferia spp. (bulb powder, benzene extract and 50% alcoholic extract) were included in this study. Out of the various products, the Kaemferia spp. powder in paraffin gave the most promising results.

21. Anti-bacterial activity and chemical constituents of *Euphorbia milii*. Win Myint; Mar Mar Nyein; Aung Myint; Oo Aung; Aye Aye Thein; Nwe Yee Win. *Myanmar Health Res Congr,* 1996: p60.

    Antibacterial activity of *Euphorbia milii* (Kiss-me-quick) was evaluated by *in vitro* screening model. Of the various extracts of leaves tested, polar extracts were observed to be effective on 13 out of 33 species of bacteria. The alcoholic extracts that showed antibacterial activity were further analysed chemically. Three chemical constituents; quercetin, kaempferol, and cyanidin were isolated, identified and quantified by TLC, Co-TLC, paper chromatography, and UV-VIS and IR spectroscopy.

22. Anti-bacterial activity of *Citrus lemon* L. (Lime) and effect of its juice for decontamination of bacteria from different drinking water sources and food specimens. Mar Mar Nyein; Wah Wah Aung; Thin Thin Yu; Khin Saw Mon; Aye Aye Maw; Kyaw Moe. *Myanmar Health Res Congr,* 2006: p53.

    Antibacterial activity of *Citrus lemon* (L.) (Lime juice) was recorded when tested on 35 isolates of pathogenic bacteria isolated from clinical sources with various ailments. They were different species of *Escherichia coli* (ETEC, EPEC, VTEC, EAEC, EHEC & EAAgEc) Salmonella, Shigella, Vibrio, Proteus, Pseudomonas, *Bacillus subtilis* and Staphylococcus. Zone size in diameter from 14 to 30mm was obtained by testing with agar disc diffusion technique. The minimum inhibitory concentration (MIC) was also determined and found to inhibit the bacteria up to 1:64 dilutions. When the juice was treated in contaminated drinking water sources from 12

localities, all bacteria were decomposed soon after the introduction of juice (approximately within 1 minute). Though the growth recovered only after 24hours of treatment, no growth was demonstrated up to 6-8 hours when 10ml of juice was treated with 250ml (1cup) of contaminated water. The rate of growth reflected with the amount of juice used to treat decontamination. Similarly, antibacterial activity was obtained when lime juice was treated in contaminated noodle specimens (10ml/100g of food) which was usually prepared in salads.

23. Anti-bacterial activity of different extracts and essential oil of *Vitex negundo* Linn. (Kyaung-pan-gyi) (ကြောင်ပန်းကြီး) (Verbenaceae) leaves on bacteria causing wound infection. May Phyu Thein Maw. Thesis, MPharm, Yangon: University of Pharmacy, 2011.

    Medicinal plants have recently been received the attention of the pharmaceutical and scientific communities and various publications have documented the therapeutic value of nature compounds in a bid to validate claims of their biological activity. Attention has been drawn to the antimicrobial activity of plants and their metabolites due to the challenge of growing incidences of drug-resistant pathogens. The antibacterial activity of four different extracts (pet ether, ethyl acetate, ethanol (80%), water and essential oil of *Vitex negundo* Linn. Leaves were investigated against some bacteria associated with wound infections (*Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Escherichia coli*) by using modified agar disc diffusion method of Kirby-Bauer. Results showed that only ethanolic (80%) extract showed zone of inhibition on *Staphylococcus aureus* and *Pseudomonas aeruginosa* with 13mm for both organisms. The minimum inhibitory concentrations by broth dilution method were found to be 12.5mg/mL for *Staphylococcus aureus* and 25mg/mL for *Pseudomonas aeruginosa.* Further ethanolic (80%) extract was formulated in the form of ointment and wound healing activity was determined on *Staphylococcus aureus* and *Pseudomonas aeruginosa* induced open wound preparation in rats. Wound healing activity on *Staphylococcus aureus* and *Pseudomonas aeruginosa* induced rats were observed on the 7^{th} day and 9^{th} day. Acute toxicity study was performed according to Organization for Economic Cooperation and Development guideline 420 as a safety test. It was found that acute toxicity of the ethanolic (80%) extract was not classified according to Globally Harmonized Classification system. *Vitex negundo* Linn. is also a carbohydrate rich plant containing 51.75% of its energy value. Phytochemical analysis indicated that it contains valuable phytoconstituents such as alkaloids, flavonoids, glycosides and phenolic groups. The results of this study provide scientific basis for the use of the plant extract in the treatment of skin and wound infection.

24. Anti-bacterial activity of herbs used in traditional medicine formulation as remedies for gastrointestinal disorder (diarrhoea and dysentery). Mar Mar Nyein; Mi Mi Htwe; Aye Than. *Myanmar Health Res Congr*, 2002: p6.

    A total of 44 plants were tested for antibacterial activity by agar disc diffusion assays and some in vivo tests. Different extracts of plants were tested on 12-64 strains of bacteria with known antibiogram and special emphasis on pathogens isolated from diarrhoea/dysentery and gastroenteritis cases. Tested bacterial pathogens include *Bacillus subtilis, Citrobacter freundii, Escherichia coli species, Klebsiella aerogenes, Klebsiella pneumoniae, Plesiomonas shigelloides,* Proteus species, Pseudomonas species, Salmonella species, Shigella species, Staphylococcus species and Vibrio species. Plant extracts which were shown to have antibacterial activity either singly, or to all tested bacterial were *Aegle marmelos, Alpinia galanga, Capparis sepiaris, Cinnamomum inunctum,*

C. zeylanicum, Cuminum cyminum, Curcuma longa, Cyperus rotundus, Dichroa febrifuga, Embelia robusta, Emblica officinalis, Eugenia caryophyllata, E. jambolan, Foeniculum vulgare, Garcinia mangostana, Melia azadirachta, Mesua ferrea, Myristica fragrans, Nigella sativa, Piper betle, P. nigrum, Pinus kesiya, Pterocarpus santilinus, Symplocos racemosa, Terminalia chebula and *Zingiber officinale*. The Minimum Inhibitory Concentration ranges from 15mcg to 200mg/ml with respect to the type of extraction methods. Activity of some plants were proven by *in vivo* tests using infant rabbit assay, infant mouse assay, rabbit ileal loop assay and experimental induced wounds in rats. By testing the antagonism effect by tissue culture toxin assay methods using CHO cells, Hep-2 cells, and vero cells, the activity of plant extract was obtained only by using the limited amount of minimum dose of infection.

25. Anti-bacterial activity of honey, propolis and bee pollen: An *in vitro* study. Phyu Phyu Win; Tin Aye. *Med Res Congr,* 1991: p31.

    An *in vitro* study was carried out to determine the antibacterial activity of honey, propolis (bee glue) and bee pollen. It was found that pure honey is a potent inhibitor of all the pathogens tested. Most pathogenic bacteria failed to grow in honey at a concentration of 30% and above. Propolis was found to have antibacterial activity only against Gram-positive *cocci*, but limited activity against Gram-negative *bacilli*. Propolis can climinate the growth of Gram-positive *cocci* even at a concentration of 10%. Bee pollen has no antibacterial affect on all the pathogens tested. The findings confirm previous reports of antimicrobial properties of these materials.

26. Anti-bacterial activity of MAT/MP009. Pharmacology Research Division. *Annual Report 2002*. Yangon: DMR (LM). p57.

    Aqueous extracts of MAT/MP009 was found to possess antibacterial activity on *Bacillus subtilis, Salmonella typhi, Salmonella paratyphi, E. coli* and *Staphlocoocus aureus* as shown by agar diffusion method. The study was done in collaboration with the Bacteriology Research Division.

27. Anti-bacterial activity of some plants and formulations and determination of Minimum Inhibitory Concentration (MIC) by microtitre plate dilution method. Mar Mar Nyein; Mi Mi Htwe; Ba Han; Ei Ei Khine. *Myanmar Health Sci Res J.* 2006; 18(1): 26-30.

    Traditional Medicine Formulation (TMF-10) [mixture of *Cyperus rotundus* Linn. (မြက်မုန်ညင်း) *Alpinia galanga* Wall. (ပဒဲကောကြီး), and *Piper betle* Linn. (ကွမ်း), and plants *Alpinia galanga* Wall. (ပဒဲကောကြီး), *Acorus calamus* Linn. (လင်းနေ), and *Piper longum* Linn. (ဝိတ်ချင်း)] were tested for their antibacterial activity on 20 different types of bacteria (Escherichia coli=6 types, *Proteus morganii, Shigella boydii, S. dysenteriae, S. flexneri*, *S. sonnei, S. derby, S. krefeld, Staphylococcus aureus; S. epidermidis,Vibrio cholerae* O1, *V. cholerae* O139, *V. cholerae* (Inaba), *V. cholerae* Ogawa and *V. fluvialis*) from clinical sources. The bacteriostatic and bactericidal activities of extracts were tested by microtitre plate dilution method and the optical density was determined by microplate reader. It was found that water extract of TMF had antibacterial activity on 20 different types of bacteria with various inhibition zone sizes ranging from 14 to 26mm. Similarly, water extract of ash and water extract of ash from water extract of *Alpinia galanga* Wall. (ပဒဲကောကြီး) possess antibacterial activity with the zone size of 7-18mm. The asarone and methyl piperate compound obtained from *Acorus calamus* Linn. (လင်းနေ), and *Piper longum* Linn. (ဝိတ်ချင်း), respectively also showed antibacterial activity on *E. coil, S. flexneri,*

S. aureus, and P. aeruginosa. The Minimum Inhibitory Concentration (MIC) of water extracts of TMF-01 was ranging from 0.16 to 0.32mg/ml. Similarly, the MIC of water extract of ash from *Alpinia galanga* Wall. (ပဒဲကော်ကြီး) was 0.16mg/ml and water extract of ash from water extract of *Alpinia galanga* Wall. (ပဒဲကော်ကြီး) ranged from 0.078 to 0.625mg/ml. Moreover, the MIC of asarone from *Acorus calamus* Linn. (လင်းနေ) was 0.06-0.12mg/ml and that of methyl piperate from *Piper longum* Linn. (ပိတ်ချင်း) was 0.03mg/ml.

28. Anti-bacterial properties of essential oils from six medicinal plants. Mar Mar Nyein; Win Myint; Mu Mu Sein Myint; Mya Bwin; Tin Aye. *Myanmar Health Sci Res J.* 1996; 8(2): p62-65.

    The essential oils obtained from six medicinal plants namely Vitex sp. (Kyaung-ban), *Zingiber officinale* (Gyin), *Cymbopogon citratus* (Sabalin), *Curcuma longa* (Nanwin), *Piper nigrum* (Ngayokekoung) and *Coleus aromaticus* (Ziyarywethtu) were tested on 20 strains of bacteria. The bacteria comprised of 9 strains of *Escherichia coli*, 8 strains of *Salmonella*, and one strain each of *Proteus morganii*, *Staphylococcus aureus*, and *Shigella sonnei*. It was observed that *Cymbopogon citratus* and *Coleus aromaticus* were active on most bacteria tested.

29. Anti-bacterial properties of some Myanmar medicinal herbs. Mu Mu Thin. Thesis, MSc (Zoology), University of Yangon, 1998.

    Screening of indigenous plant extracts is carried out from January to December, 1997 by agar disc diffusion technique. The Minimum Inhibitory Concentration (MIC) is carried out using Agar Plate Dilution Method. Extracts of 17 plants *Amarantus spinosus, Brassica napus, Cassia fistula, Cassia siamea, Clerodendrum siphonanthus, Crataeva nurvala, Emblica officinalis, Eugenia caryophyllata, Hydrocotyle asiatica*, *Ipomoea aquatica, Ipomoea reniformis, Momordica charantia, Piper betle, Pinus kesiya, Ricinus communis, Terminalia chebula, Tinospora cordifolia* are tested 16 bacterial strains; five strains of *Escherichia coli*, 4 strains of Shigella and one strain each of *Klebsiella aeruginosa*, *Plesiomonas shigelloides, Proteus morganii, Pseudomonas pyocyanes, Salmonella typhi, Staphylococcus aureus* and *Vibrio cholerae* were isolated from human clinical specimens. It was found that by using 50% ethanolic extraction from four plants *Cassia fistula, Momordica charantia, Piper betle* and *Terminalia chebula* have an antibacterial activity on two to 14 tested bacterial strains. The essential oil of *Pinus kesiya* shows the antibacterial activity on 3 organisms and the plant *Eugenia caryophyllata* shows activity on 15 tested bacteria. The Minimum Inhibitory Concentration ranges from 5mg/ml to 5mg/ml concentration. Fifty percent ethanolic extract and watery extract of the remaining plants did not show any antibacterial activity. Suggestions for future work are outlined.

30. Anti-cholinesterase activities of some anthelmintic agents and some medicinal plants. Tin Win; Hla Pe; Khin Khin Su. *Myanmar Health Sci Res J.* 1994; 6(2): p70-74.

    It is known that anthelmintic drugs are potent cholinesterase inhibitors. A biochemical system for measurement of anticholinesterase activity of chemical agents and some reputed medicinal plants was established. Some of Myanmar medicinal plants were found to be cholinesterase inhibitors. Let-toke-gyi, antidysenteric medicinal plant which was found to contain high anticholinesterase activity, can therefore be considered as a potential anthelmintic drug.

31. Anti-diarrheal activity of *Albizzia lebbeck* Benth. (Anyar-kokko**)** on experimental animals. Pyae Sohn. Thesis, MMedSc (Pharmacology), Yangon: Defense Services Medical Academy, 2009.

    The purpose of the present study was to evaluate scientifically the antidiarrheal effect of *Albizzia lebbeck* by using castor oil-induced diarrheal mice model hence *Albizzia lebbeck* is widely distributed in Myanmar. The dried powder of seeds of *Albizia lebbeck* was extracted with absolute ethanol and was used to obtain 14.8 yield precent ethanolic extract. Dose dependent decrease in frequency, enteropooling and percent intestinal transit of castor oil-induced diarrhea in all 3 tested groups (i.e. six mice of each group receiving ethanolic extract (125mg/kg, 250mg/kg, 500mg/kg) after castor oil administration. The ethanolic extract of seed of *Albizzia lebbeck* cause relaxation of intestinal smooth muscle by possible mechanism of anticholinergic and antihistamine. Acute toxicity study of the extract was performed by using albino mice and LD_{50} was 2.7g/kg and its confidence limit was 1.74g/kg and 4.19g/kg. The ED_{50} of the extract was 310mg/kg and its confidence limit was 184mg/kg and 527mg/kg. General pharmacological screening test of the extract had shown no abnormal changes. The phytochemical analysis of the ethanolic extract of seed of *Albizzia lebbeck* and dried powder of seeds of *Albizzia lebbeck* showed they have alkaloid, flavonoids, polyphenol, glycoside, carbohydrate, steroid, saponin, resin. These findings suggested that ethanolic extract of seed of *Albizzia lebbeck* possessed significant antidiarrheal effect in castor oil-induced antidiarrheal mice model.

32. The anti-diarrheal activity of *Calotropis gigantea* R.Br. (Mayo) on experimental animals. Aye Aye Swe. Thesis, MMedSc (Pharmacology), Yangon: University of Medicine (2), 2006.

    The purpose of the present study was to evaluate scientifically the anti-diarrhoeal effects of *Calotropis gigantea* by using castor oil-induced diarrhoeal mice model. The dried powder of leaves of *Calotropis gigantea* was extracted with both water and 95% ethyl alcohol were used to obtain aqueous extract and 47.5% ethanolic extract, respectively. Dose dependent decrease in castor oil-induced diarrhoea in all 3 tested groups (i.e. 6 mice of each group receiving ethanolic extract 6g/kg, 10g/kg and 12g/kg respectively) at 3 hours and 4 hours after castor oil administration. Only two dose level (i.e. ethanolic extract 10g/kg and 12g/kg) were observed dose dependent decreased in castor oil-induced small intestinal transit and castor oil-induced enteropooling. The ethanolic extract of leaves of *Calotropis gigantea* directly cause relaxation of intestinal smooth muscle by an as yet unknown mechanism. Acute toxicity studies of the extracts were performed by using the albino mice. The results indicated that there was no lethality up to 16g/kg body weight with both aqueous and ethanolic extracts. General pharmacological screening test of both aqueous and ethanolic extracts of *Calotropis gigantea* had shown no abnormal changes. The ED_{50} value of ethanolic extract of *Calotropis gigantea* was 8g/kg and its confidence limit was 5g/kg-12.8g/kg. The phytochemical analysis of both aqueous and ethanolic extract and dried leaves powder of *Calotropis gigantea* showed they have alkaloid, steroid, tannin, resin, glycoside, polyphenol, carbohydrate and reducing sugar. Among these constituents, alkaloid, steroid, tannin and reducing sugar may mediate the anti-diarrhoeal property of *Calotropis gigantea* extract.

33. Anti-diarrheal activity of *Garcinia mangostana* Linn. (Minn-good) on experimental animals. Thet Htun Aung. Thesis, MMedSc (Pharmacology), Yangon: Defense Services Medical Academy, 2011.

The purpose of the present study was to evaluate scientifically the antidiarrheal effect of rinds of *Garcinia mangostana* Linn. (Minn-good) by using castor oil-induced diarrheal on mice model. The dried powder of rinds of *Garcinia mangostana* Linn. was extracted with 70% ethanol and the yield was 10%. Dose dependent decrease in frequency, enteropooling and percent intestinal transit were found in all 3 tested groups receiving ethanolic extract (1g/kg, 2g/kg and 4g/kg) on castor oil-induced diarrhea. The ethanolic extract of rinds of *Garcinia mangostana* Linn. which was caused relaxation of rabbit intestinal smooth muscle. Acute toxicity study of LD_{50} of the extract was done by using albino mice according to the OECD guideline. The ED_{50} of the extract was 0.82g/kg and its upper limit was 1.62g/kg and lower limit was 0.41g/kg. General CNS, ANS screening test of the extract had showed no abnormal changes. The phytochemical analysis of the ethanolic extract and dried powder of rinds of *Garcinia mangostana* Linn. showed that have tannins, alkaloids, flavonoids, polyphenol, glycosides, carbohydrate, steroids, saponin. These findings proved that ethanolic extract of rinds of *Garcinia mangostana* Linn. had significant antidiarrheal effect in castor oil-induced diarrheal mice model.

34. Anti-diarrheal activity of Leik-su-shwe (*Barleria prionitis* L., Acanthaceae) and Nwa-mye-yin (*Cyperus scariosus* R. Br., Cyperaceae) in mice. Khin Sunn Yu; Thaw Zin; Mu Mu Sein Myint; San San Myint; Myint Myint Khine; Hla Myint, Saw; Maung Maung Htay. *Myanmar Health Res Congr*, 2006: p21-22.

In developing countries, the majority of people living in rural; areas almost exclusively use traditional medicines in treating all sorts of disease including diarrhea. It thus becomes important to identify and evaluate commonly available natral drugs as alternative to currently used anti-diarrheal drugs, in terms of both efficacy and safety profile. The objective of the present study was to determine the anti-diarrheal efficacy of Leik-su-shwe (*Barleria prionitis* L., Acanthaceae) and Nwa-mye-yin (*Cyperus scariosus* R.Br., Cyperaceae), which are reputed of having anti-diarrheal properties, on experimental mouse model. A further study on antibacterial activity of these plants was carried out on common diarrhea-causing organisms by Agar Well diffusion methods. The plants were collected from Yangon and Mandalay areas and the dried powdered plant parts of wholeplants were extracted with distilled water. Serial dilutions of 3, 6 and 12g/kg of the extracts were administered to 3 groups of mice which have been induced by castor oil to produce experimental diarrhea. Other groups of mice include a negative control group receiving normal saline and a positive control group receiving the standard anti-diarrheal drug, loparamide. The anti-diarrheal activity was assessed by 3 main parameters, (1) the effect on castor oil induced diarrhea (number and type of stools passed), (2) the effect on castor oil inducd enteropooling (weight and volume of fluid accumulation), and (3) the effect on castor oil induced small intestinal transit (passage of charcoal meal). The results indicated that Nwa-mye-yin (*Cyperus scariosus* R.Br.) posess a marked anti-diarrheal effect against castor oil diarrhea comparable to loparamide as seen by a marked reduction in the number of diarrhea stools ($p<0.02$) and the reduction in the weight and volume of the instestinal fluid accumulation ($p<0.05$), as well as a modest reduction in instestinal transit. In contrast Leik-su-shwe (*Barleria prionitis* L., Acanthaceae) showed less anti-diarrheal activity than the former. The antibacterial activity seen in the two plants indicated their potential usefulness in infective

diarrhesa where non-specific anti-diarrheal agents are contraindicated. The present study signified the anti-diarrheal effect of the extracts and their potential usefulness in a wide range of diarrheal states, whether due to disorders of transit e.g functional diarrheas, radiation diarrheas or due to abnormal secretory mechanisms like in cholera of *E.coli* enterotoxin induced diarrhea.

35. The anti-diarrheal effect of *Aegle marmelos* Linn. (Ok-shit) on experimental animals. Than Htike Win. Thesis, MMedSc (Pharmacology), Yangon: Defense Services Medical Academy, 2011.

    The purpose of the present study was to evaluate scientifically the antidiarrheal effect of *Aegle marmelos* Linn. by using castor oil-induced diarrheal mice model. The dried powder of roots of *Aegle marmelos* (Ok-shit) was extracted with absolute ethanol and obtained ethanolic extract yield 3.3%. *Aegle marmelos* root extract 1g/kg, 2g/kg and 4g/kg body weight produced significant dose-dependent decrease in castor oil (10ml/kg) induced frequency of diarrhea, enteropooling and small intestinal transit of mice. In isolated rabbit intestine, significant dose-dependent intestinal smooth muscle relaxation was found with *Aegle marmelos* root extract 5μg/ml, 10μg/ml and 20μg/ml bath concentrations. But, the possible mechanism of relaxation of intestinal smooth muscle has not been definitely known in this study. Acute toxicity test was done according to Organization for Economic Co-operation and Development guideline 423 and the LD_{50} cut-off value was more than 5g/kg. The ED_{50} of *Aegle marmelos* root extract was 0.8g/kg and its confidence limits were 0.41 and 1.56g/kg. General pharmacological screening test of *Aegle marmelos* root extract 1g/kg, 2g/kg and 4g/kg body weight had shown no abnormal changes. The phytochemical analysis of *Aegle marmelos* root extract showed the presence of alkaloids, flavonoids, steroids/triterpenes, glycosides, tannin, reducing sugar, polyphenol, carbohydrates and amino acids. All these findings suggested that *Aegle marmelos* root extract possessed significant antidiarrheal effect in castor oil-induced diarrheal mice model.

36. The anti-diarrheal effect of *Curcuma longa* Linn. (Na-nwin) on experimental animals. Tin Nwe Oo. Thesis, MMedSc (Pharmacology), Yangon: University of Medicine (1), 2009.

    The purpose of the present study was to evaluate scientifically the antidiarrhoeal effect of *Curcuma longa* Linn. (Na-nwin). The rhizome of this plant has long history for treating diarrhea in Myanmar, as a traditional medicine. However, there is no scientific report on antidiarrhoeal effect of *Curcuma longa* Linn. Therefore, this study is to confirm the antidiarrhoeal activity of *Curcuma longa* Linn. by using the animal models. The albino mice were used for *in vivo* antidiarrhoeal effect and isolated rabbits intestine were used for *in vitro* activity to explore the possible mechanism of action of *Curcuma longa* Linn. The antidiarrhoeal effect of the defatted 70% ethanolic extract *Curcuma longa* was tested by using three methods, (1) castor oil-induced diarrhea, castor oil-induced enteropooling and (3) castor oil-induced small intestinal transit. Dose dependent decreased in castor oil-induced diarrhea was found by counting the stool in all 3 tested groups with the dose of 1.5g/kg, 3g/kg and 6g/kg at 1, 2, 3 and 4hours. Therefore, it showed that *Curcuma longa* Linn, had antidiarrhoeal effect. Dose dependent increase in onset of defecation in minutes was found in all 3 tested groups, 21.5±17.102.5±37 and 150±36 minutes for 1.5g/kg, 3g/kg and 6g/kg respectively, showing that the more the dose,the longer the onset of defecation. *Curcuma longa* extract significantly inhibited castor oil-induced intestinal fluid accumulation. Weight of intestinal contents in grams was 1.2±0.1 in control group and 0.77±0.1 in 1.5g/kg group. Volume of intestinal contents in milliliters was 5.8±1

in control group and 0.57±0.1 in 1.5g/kg group. Therefore, *Curcuma longa* Linn. extract showed antisecretory activity. *Curcuma longa* extract also significantly reduced the castor oil-induced intestinal transit. The percent intestinal transits in centimeters were 98.7±1 in control group and 83.41±1.8 in 1.5g/kg extract group. Therefore, *Curcuma longa* Linn. extract showed antimotility activity. The ED_{50} value in mice model of the defatted 70% ethanolic extract of *Curcuma longa* for antidiarrhoeal activity was 0.94g/kg and its 95% confidence limit was 0.45g/kg and 1.97g/kg. In isolated rabbit intestine, the different doses of *Curcuma longa* (0.15µg/ml, 0.25µg/ml and 0.4µg/ml bath concentraction) were found to cause the dose dependent relaxation of intestinal smooth muscle. Therefore, it showed that the extract of *Curcuma longa* Linn. had relaxation effect on the intestinal smooth muscle. Carbachol and histamine induced contractions of small intestine were abolished by *Curcuma longa* extract showing that *Curcuma longa* Linn. had physiological antagonist effect on carbachol and histamine. The ED_{50} value of the defatted 70% ethanolic extract of *Curcuma longa* was 12.9g/kg and its 95% confidence limit was 11.12g/kg-14.95g/kg. The phytochemical analysis of the defatted 70% ethanolic extract and dried rhizome powders of *Curcuma longa* Linn. showed the same constituents. The chemicals such as, alkaloids, steroids/triterpenes, tannins and reducing sugars proposed to be the chemicals responsible for antidiarrhoeal effect were present in both ethanolic extract and dried powders. In conclusion, this study showed that *Curcuma longa* Linn. has dose dependent antidiarrhoeal effect and not free from toxicity.

37. The anti-diarrhoeal effect of *Ficus hispida* Linn. (Kadut) on experimental animals. Pyae Phyo Paing. Thesis, MMedSc (Pharmacology), Yangon: Defense Services Medical Academy, 2011.

The purpose of the present study was to evaluate scientifically the antidiarrhoeal effect of *Ficus hispida* Linn. (Kadut). Although all parts of this plant are used in Indian traditional medicine for the treatment of various ailments, antidiarrhoeal activity of the leaves of *Ficus hispida* Linn. is not studied scientifically. Therefore, this study is to confirm the antidiarrhoeal activity of *Ficus hispida* Linn. by using the animal models. The albino mice were used for *in vivo* antidiarrhoeal effect and isolated rabbits intestine were used for *in vitro* activity to explore the possible mechanism of action of *Ficus hispida* Linn. Dried powder of leaves of *Ficus hispida* Linn. was extracted with absolute ethanol. General pharmacological screening test of the extract had shown no abnormal changes. The phytochemical analysis of *Ficus hispida* Linn. showed that they have alkaloid, flavonoids, polyphenol, glycoside, carbohydrate, steroid, saponin, resin. Acute toxicity study of the extract was performed by using albino mice and LD_{50} was 2g/kg. The ED_{50} of extract of *Ficus hispida* Linn. was 0.36g/kg and its confidence limit was 0.74g/kg and 0.17g/kg. Dose dependent decrease in frequency, enteropooling and percent intestinal transit of castor oil-induced diarrhoea in all 3 tested groups (i.e. 6 mice of each group receiving ethanolic extract (0.5g/kg, 1g/kg and 2g/kg) after castor oil administration. In isolated rabbit intestine, the different doses of *Ficus hispida* Linn. (5µg/ml, 10µg/ml and 15µg/ml bath concentration) were found to cause the dose dependent relaxation of intestinal smooth muscle. Therefore, it showed that the extract of *Ficus hispida* Linn. had relaxation effect on the intestinal smooth muscle by non-specific mechanism. In conclusion, this study showed that *Ficus hispida* Linn. has dose dependent antidiarrhoeal effect but it is not free from toxicity.

38. Anti-diarrhoeal efficacy of some Burmese Indigenous Drug Formulations in experimental diarrhoeal test models. Aye Than; Kulkarni, H J.; Wut Hmone; Tha, Saw Johnson. *Int J Crude Drug Res*. 1989; 27(4): p195-200.

    Five Indigenous Drug Formulations (IDFs) claimed to have anti-diarrhoeal action were studied with experimental test models namely *in vitro* rabbit ileal preparations as well as *in vivo* test models on mice and rats for gastrointestinal motility and castor oil-induced purgation. Drugs IDF-16 and IDF-35b were found to possess significant anti-diarrhoeal ativity, with experimental antidiarrhoeal indices of 77% and 82%, respectively. Since their raw ingredients are available locally and cheaply, both drugs are appropriate for clinical evaluation.

39. Anti-hepatotoxic substances from *Eclipta alba* (L.) Hassk. (Kyeik-hman). Win Myint. *Myanmar Health Sci Res J*. 1995 April; 7(1): p9-13.

    Three chemical compounds namely wedelolactone, demethyl wedelolactone and luteolin which had been reported to possess hepatoprotective activity were detected from Kyeik-hman (*E. alba*) grown in Myanmar. The active compounds were primarily identified by Thin Layer Chromatography (TLC) by investigating R_f values and colour characteristics viewed under longwave ultra-violet (UV) light. The identification of above active substances was confirmed by UV spectral data analysis in comparison with standard marker or reference data reported in literature.

40. Anti-hyperglycemic activity of the leaves *Gynura procumbens* (Lour.) Merr. Family: Asteraceae. (ပျားစိမ်း). Thura Aung. Thesis, MPharm, Yangon: Military Institute of Nursing and Paramedical Sciences. 2011.

    This study was done during February, 2011 to October, 2011. Before screening of blood sugar lowering effect in rabbit model, the morphological and diagnostic characters of *Gynura procumbens* (Lour.) Merr. were examined. Then phytochemical constituents, physicochemical properties, determination of heavy metals, determination of aflatoxins and pesticide residues, elemental analysis, microbial contamination and acute toxicity of *G. procumbens* (Lour.) Merr. were examined. This medicinal plant *Gynura procumbens* (Lour.) Merr. (Pyar-mee), belongs to the family Asteraceae which was collected from Fame oranic farm, Pyin Oo Lwin Township before this study was conducted. In acute toxicity, albino mice (DDY strain) were used and dried leaves powder of *G. procumbens* (Lour.) Merr. was given in different doses (1g/kg, 2g/kg, 3g/kg and 6g/kg), respectively. After administration of different doses, they were observed within 24hours. Then, the observation was continued to at least two weeks for any toxic and harmful effects due to the dried leaves of *G. procumbens* (Lour.) Merr. It was observed that the dried leaves powder was free from harmful effect and the powder had not toxic effect during the observation period of two weeks with permission dose of 6g/kg. Therefore, the dried leaves powder of *G. procumbens* (Lour.) Merr. possessed no acute toxic effect. In the study of antihyperglycemic activity, the different doses of dried leaves powder (0.75, 1.5, and 3g/kg) were administered by orally in adrenaline-induced hyperglycemic rabbit models. All the three doses showed significantly antihyperglycemic activity at 1hour ($p<0.0005$), 2hour ($p<0.0005$-0.0001), 3hour ($p<0.0005$) and 4hour ($p<0.0005$), respectively when compared with control group. The action of 3g/kg of dried leaves powder was faster than 0.75g/kg and 1.5g/kg of dried leaves powder. The administration of 3g/kg of dried leaves powder similarly lowered sugar level in blood as glibenclamide B.P (4mg/kg). In comparison of percent inhibition of hyperglycemic between two different test agents, 1.5 and 3g/kg of *G. procumbens* (Lour.) Merr dried

leaves powder and glibenclamide B.P., these doses showed no significant differences at 1, 2, 3 and 4hour respectively.

41. Anti-hyperglycemic effect of *Piper betle* Linn. (Kun-ywet) in alloxan induced diabetic rats. Htet Phone Aung. Thesis, MMedSc (Pharmacology), Yangon: Defence Services Medical Academy, 2009.

Piper betle Linn. (Family: Piperaceae) is used in Myanmar traditional medicine as a remedy for various disorders. The aim of the present study was to investigate the antihyperglycemic effect of aqueous extract of *Piper betle* Linn. leaf (Kun-ywet) in diabetic rats. Diabetes was induced in overnight fasted wistar strain albino rats by single intraperitoneal injection of freshly prepared solution of alloxan (100mg/kg) in distilled water. Blood glucose level was determined by using glucometer. The characteristicts of diabetes such as polydipsia, polyuria, hyperglycemia and unexplained weight loss were reported in alloxan induced diabetic rats during the study. There was a rise in blood glucose level significantly, an average of 381.17±41.97mg/dl five days after alloxan injection. Body weight of diabetic rats was reduced an average of 22%. The air dried *Piper betle* Linn. leaves (Kun-ywet) were prepared for aqueous extract. A single oral administration of three doses (1.5g/kg, 3g/kg, 6g/kg) of aqueous extract of *Piper betle* Linn. leaf was given to fasted diabetic rats. Significant reduction of blood glucose level was observed at 2hr , 3hr and 4hr after administration when compared with that of control group ($p<0.05$). Maximal diminution in blood glucose level (49.01% to 55.13%) was recorded after 4hr as compared with that of 0hr ($p<0.001$). Mechanism of action may not on beta cells of islets of Langerhams. In acute toxicity study, LD_{50} was found to be 30g/kg (22.47g/kg–40.05g/kg). LD_{16} was 18.5g/kg and LD_{84} was 47g/kg respectively. Central nervous system depression, muscle paralysis, cyanosis around mouth and nose, pulmonary congestion and gastric erosions were observed in acute toxicity study with lethal dose. No significant untoward effect was reported with effective dose. Concurrent histological studies of the pancreatic islets showed beta cells were necrotic and pyknotic nuclei with a homogenous cytoplasm and alpha cells were unaffected in alloxan induced diabetic rats. Phytochemical analysis of *Piper betle* Linn. showed the presence of alkaloids, flavonoids, tannin, glycosides, polyphenol, saponins, amino acids, carbohydrate, reducing sugar, steroids and terpenes. There was absence of toxic cyanogenic glycoside. It was concluded that the present study clearly showed that aqueous extract of *Piper betle* Linn. leaf has significant antihyperglycemic activity and could be used safely.

42. Anti-hypertensive effect of medicine plant MHT03 on mild to moderate hypertensive patients: A preliminary study. Tin May Nyunt; Ohnmar May Tin Hlaing; Zaw Htet; Ohnmar; Thaw Zin; Khin Chit; Aye Than. *Myanmar Health Res Congr,* 2003: p6-7.

While herbal medicine is the oldest form of medicine extensively practiced in Myanmar, it is still a very young science. *Plantago major* Linn. has been used in the treatment of hypertension for centuries but has not yet been scientifically evaluated in humans. It has also been claimed to be devoid of hazardous side effects which are often experienced by western anti-hypertensive agents during long-term use. With the aim to establish the therapeutic status of *Plantago major* in actual clinical practice, a clinical trial was carried out on 10 mild to moderate hypertensive patients who are attending an outpatient department of Thingangyun Sanpya Hospital, Yangon. After a wash-out period of at least 72hours of stopping western antihypertensive agents, blood pressure was recorded before and four weeks following the administration of

oral *Plantago major* 5 tablets (1.5g) three times a day. Blood pressure monitoring was done at 0, 0.5, 1, 2, 3, 4, 5 and 6hours after the first dose and then weekly using a mercurial sphygmomanometer and the method of American Hypertensive Association. No significant reduction of blood pressure was seen before trial drug given. Reduction of blood pressure was first seen at 0.5-1 hour after the first dose, reaching the maximum at 3-4 hours, and was maintained up to 6hours post-dose. Weekly blood pressure was also maintained within normal limit. The initial blood pressure between 140/90mmHg and 160/90mmHg was controlled with the trial dose 5 tablets (1.5g) and 7 tablets (2.1g) was needed for the initial blood pressure 170/100mmHg. No untoward effects were seen in all the dose ranges studied. The antihypertensive effect of trial drug was proved. Comparative study with other standard drugs and long is conducted in future research.

43. Anti-hypertensive effect of *Plantago major* Linn. whole plant (Ahkyaw-paung-tahtaung) on mild to moderate hypertensive patients. Tin May Nyunt; Khine Khine Lwin; Than Than Aye; May Aye Than; Khin Chit; Thein Kyaw; Ohnmar May Tin Hlaing; Min Wun; Nu Nu Win. *Myanmar Health Sci Res J.* 2007; 19(2): p97-102.

    A clinical trial to determine the antihypertensive effect of medicinal plant, *Plantago major* Linn. (Ahkyaw-paung-tahtaung) (wholeplant) crude powder tablet was carried out on 10 mild to moderate hypertensive patients at the out-patient department (OPD) of Thingungyun Sanpya Hospital and Traditional Medicine Hospital, Yangon. After washout period of 3 days of stopping anti-hypertensive drugs, patients were treated orally with *Plantago major* Linn. whole plant crude powder tablet 3g three times a day daily for 12 weeks. Blood pressure was monitored at 0hr, 0.5hr, 1hr, 2hr, and 3hr after first dose of trial drug. Monitoring of blood pressure and vital signs were done on day 1, day 2, and day 3 and weekly up to 12 weeks. Laboratory investigations such as blood for complete picture, platelet count, random blood sugar level, liver function test, renal function test and ECG were done before and after the study. The results showed that reduction of blood pressure from baseline level was found at (0.5hr-1hr) after the first dose of the trial drug and was maintained up to 3hr post dose. Weekly blood pressures were also maintained within normal limit. After 12 weeks of treatment with this trial drug, it was observed that significant reduction of mean blood pressure was from 150±2.58/98±1.33mmHg (baseline blood pressure) to 129±2.77/86±1.63mmHg ($p<0.001$). This trial drug decreased the mean systolic blood pressure and diastolic blood pressure from baseline level by 21mmHg ($p<0.001$) and 12mmHg ($p<0.001$), respectively. No side effects were observed. Therefore, it can be concluded that *Plantago major* Linn. showed significant antihypertensive effect on mild to moderate hypertensive patients with no side effects.

44. Anti-inflammatory activity of essential oil from some plant ingredients of traditional medicine formulations. May Aye Than; Mu Mu Sein Myint; Khin Myo Naung; Aye Than; Myint Myint Khine; San San Myint; Mya Thet Lwin. *Myanmar Health Res Congr,* 2004: p13.

    Traditional Medicine Formulations (TMF06 and TMF23) in the ratio of 10:3 were used for the treatment of rheumatic arthritis in Myanmar traditional system for years ago, but there was no scientific information about having anti-inflammatory activity in Myanmar. The aim to this study was the aim of this study was to reveal scientific proof on anti-inflammatory properties of reputed plants' constituents, usually claimed to be effective for rheumatic arthritis. Among the ingredients of these TMFs, there plants were constitited as major ingredients, so, the experimental evaluation of this

activity of essential oil of three plants was carried out on carrageenan-induced acute inflammation in *in vivo* rat model by using Plethysmometer. Essential oil of plant MAT MP015, MAT MP016 and MAT MP018 showed significant anti-inflammatory activity ($p<0.05$-0.001) at the dose of 3ml/kg orally. Anti-inflammatory activities of all essential oils of these three plants were observed to be 75.2±1.9%, 46.5±9.4%, 72.8±4.7% mean percent inhibition, respectively, whereas 64.6±5.1% in the standard controls (aspirin 100mg/kg). There were no significant differences in anti-inflammatory activity of essential oil of all plants and between the standard drug, aspirin. In conclusion, these essential oils are the active principle(s) of anti-inflammatory activity of TMF 06 and TMF 23.

45. Anti-inflammatory and anti-plaque activity of Ponna-yeik (*Ixora coccinea* Linn.) leaves extract used as a mouthwash on chronic gingivitis patients. May Aye Than; Moe Wint Oo; Tin Htun Hla; Aye Than; Thein Tut; Mya Thet Lwin. *Myanmar Health Sci Res J.* 2009; 21(1): p26-31.

    Ponna-yeik (*Ixora coccinea* Linn.) is locally claimed to be useful in treatment of toothache and oral diseases as a mouthwash in Myanmar. In Myanmar, 80% of school children had gingivitis and 18% of then had periodonated destruction. Bacterial plague in oral cavity is regarded as the primary local etiological factor in inflammatory disease. Preventing and controlling of periodonated disease would prevent the microbial colonization of plague on the teeth and gingival. There are varieties of antiseptic mouthwashes in modern dental practice, but chlorhexidine gluconate is the most effective anti-plague mouthwash, which is not cheap and easily available. This study with the aim to evaluate the efficacy of Ponna-yeik mouthwash, which was easily available at low cost, was conducted at the Institute of Dental Medicine, Yangon. The study design was randomized controlled clinical trail and chlorhexidine gluconate was used as positive standard drug. Twenty patients with typical chronic gingivitis who participate this study were randomly divided into two groups, 10 patients for 0.2% watery extract of Ponna-yiek mouthwash and 10 patients for 0.2% chlorhexidine mouthwash two times a days for 4 weeks. The plaque score, bleeding on probing supra-gingival plaque formation, staining effect and severity of gingivitis were examined prior to the clinical trail, as baseline and 4 weeks after trial. Both chlorhexidine and Ponna-yiek mouthwashes showed significant effectiveness in plague score, bleeding on probing and severity of gingivitis when compared to before treatment. Staining effects were observed in patients who used chlorhexidine but not in patients who used Ponna-yeik mouthwash. There were no significant differences between two groups in all scores except staining score after 4 weeks of treatment. It was concluded that Ponna-yeik mouthwash revealed anti-inflammation and anti-plague activity without staining.

46. The anti-inflammatory effect of *Lawsonia inermis* Linn. (Dan) on albino rats. Tin Wah Wah Win. Thesis, MMedSc (Pharmacology), Yangon: Institute of Medicine (2), 2005.

    These investigations were performed to find out whether the extracts of *Lawsonia inermis* Linn. (Dan) possess anti-inflammatory activity or not. The dried leaves powder of *L.inermis* was extracted with both water and 95% ethyl alcohol to obtain aqueous extract and 95% ethanlic extract respectively. In order to study to study the anti-inflammatory action of both extracts of *L. inermis* Linn., the experiments were carried out on albino rats of Wister strains. Plethysmometer apparatus was used to measure the volume changes of the rat's paw oedema. Inflammation was induced by sub planter injection of 0.1ml of 1% carrageenan

(in 0.9% normal saline) in right hind paws of albino rats. Anti-inflammatory action of both extracts was detected by using 3 dose levels i.e. 4.5g/kg, 3g/kg, 1.5g/kg body weight, orally. Significant anti-inflammatory action was found with both extracts of Dan. It was found that the anti-inflammatory action of both extracts started to appear with the does of 3g/kg. Crude ethanolic and aqueous extracts has does response relationship of anti-inflammatory acion. The results also showed that anti-inflammatory action of ethanolic extract of Dan was found to be superior to that of aqueous extract. The anti-inflammatory actions of ethanolic extract (4.5g/kg) were significantly superior to that of standard drug, acetylsalicylic acid (300mg/kg) at 4hours after carrageenan injection. At 1hour after carrageenan injection, anti-infammatory action of 3g/kg of ethanolic extract was superior to that of acetylsalicylic acid (300mg/kg). Acute toxucity studies of the extracts were performed by using the albino mice. The results indicated that there was no lethality up to 6g/kg body weight with both aqueous and 95% ethanolic extracts. General pharmacological screening test of both aqueous and ethanolic extracts of Dan on albino rats had shown no abnormal changes. The ED_{50} value of ethanolic extract of Dan was (1.7g/kg) and its confidence limit was (1.2g/kg-2.4g/kg). The ED_{50} of aqueous extract of Dan was (2.15g/kg) and its confidence limit was (1.7g/kg-2.6g/kg). So, it was found that the ED_{50} of ethanolic extract was lower than that of aqueous extract. The phytochemistry of the extracts showed that the aqueous extract contained saponins, tannoids, steroids and amino acids.The ethanolic extract contained tanninoids and steroids. So, it was found that anti-inflammatory action of both extracts of *Lawaonia inermis* Linn. can be due to presence of one or more of compounds in them.

47. Anti-inflammatory effect of some plant extracts. Aye Than; Mu Mu Sein Myint; Tin Myint; Win Myint. *Myanmar Health Res Congr*, 1995: p33.

Nycanthes arbor-tritis Linn. (Saik-balu); *Curcuma longa* Linn. (Nanwin) and *Plantago major* Linn. (Ahkyaw-boung-tahtaung; Mann-sote-ywet; Htaung-khaung-pwa) and (Phar-kyaw-ywet) have long been used in folk medicine as anti-inflammatory agents. Experimental evaluation of anti-inflammatory property of these plants was studied on carrageenin-induced acute inflammation in *in vivo* method using rats. Aqueous extract of *N. arbor-tritis*, *C. longa* and *P. major* showed a significant anti-inflammatory activity ($p<0.005$) at a dose of 3g/kg. Anti-inflammatory activities of these plant extracts were observed to be 56±7.6, 46±8.4 and 51±4.9, respectively, when compared with that of the control group. Thus this study has shown that the tested medicinal plants possess anti-inflammatory activity.

48. Anti-malaria activities and chemical investigation of *Nyctanthes arbor-tristis* Linn. (Seik-pha-leu) and *Adansonia digitata* Linn. (Met-lin). Thet Thet Mar. Thesis, PhD (Chemistry), University of Yangon, 2010.

To find a new antimalarial medicine derived from natural resources, two plant materials, namely bark of *Garcinia pedunculata* Roxb. (Met-lin-chin) and leaves of *Nyctanthes arbor-tristis* Linn. (Seik-pha-leu) were evaluated for their chemical constituents and antimalarial activities. Chromatographic separation of ethyl acetate of *G. pedunculata* provided oleanolic acid acetate (1) (0.020% yield, m.p 230˚C), β-sitosterol (2) (0.009% yield, m.p 135˚C), rubraxanthone (3) (0.083%) yield, m.p 190˚C), garcinone D (4) (0.005% yield, m.p 210˚C), 2,3,6,8-tetrahydroxy xanthone (5) (0.005% yield, m.p 205˚C), and 1,5,6-trihydroxy-4H-xanthene-3,9-dione (6) (0.01% yield, m.p 204˚C), β-sitosterol (2) (0.05% yield, m.p 138˚C) was isolated from ethanolic extract of *N.abor-tristis*. Identification of isolated compounds were done by melting point determination, Co-TLC with authentic samples, spectroscopic

measurements such as UV-Vis, FT-IR, ^{1}H, ^{13}C-NMR, DEPT and HSQC, and mass spectrometry. *In vitro* antimalarial activity was measured via schizontocidal activity using 96 well microtitre plates with fresh isolates of *Plasmodium falciparum* strains. Among the tested plant extracts, ethanolic extract of *N. arbor-tristis* leaves was found to possess the highest schizontocidal activity (IC_{50}=73µg/mL) which was followed by ethyl acetate extract of *G. pedunculata* bark (IC_{50}=226µg/mL) and petroleum ether extract of *N. arbor-tristis* leaves (IC_{50}=272µg/mL). The IC_{50} of isolated compounds were: 3, 18µg/mL; 4, 22µg/mL; 6, 28µg/mL; 5, 62µg/mL; 2, 126µg/mL and 1, 176µg/mL. Compounds 3, 4 and 6 showed moderate activity ($10<IC_{50}<50$µg/mL). The *in vivo* antimalarial activity of plant extracts were carried out in mice infected with *Plasmodium yoelii*, using Peter's 4-day therapeutic test. The does used for testing antimalarial activity of the individual extracts was 500, 250 and 125mg/kg body weigh once a day for four consecutive days. Ethanolic extracts of *N. arbor-tristis* leaves at 500mg/kg x 4 does provided 41.6% inhibition in suppressive test and 34.59% inhibition in therapeutic test. This extract was safe and nontoxic up to 4.0g/kg. This study demonstrated that ethanol extract of *N. arbor-tristis* has promising antimalarial activity. Although ethyl acetate of *G. pedunculata* did not provide satisfactory activity, isolated compounds from this extracts provided moderate activity.

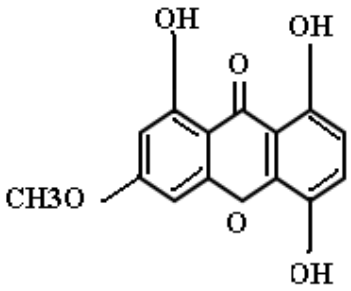
49. Anti-malarial activity and identification of active principal of *Dichroa febrifuga* grown in Pyin Oo Lwin area. Khin Ohnmar Kyaing. Thesis, PhD (Pharmacology), Yangon: University of Medicine (1), 2010.

Myanmar medicinal plant, Yin-pyar, grown in Pyin Oo Lwin area was botanically identified by this study as *Dichroa febrifuga* of hydrangeaceae family. The anti-malarial properties of dry root of Yin-pyar plant were evaluated against rodent malaria, *Plasmodium berghei,* in mouse model by *in vivo* suppressive test and therapeutic test. In the suppressive test treatment started at 3hour after inoculation of parasite when parasitemia was minimal. In the therapeutic test treatment started on the fourth day after inoculation of parasite when parasitemia in mice reached 2.97-3.67%. Effect on human malaria, *Plasmodium falciparum,* was also evaluated by performing *in vitro* continuous cultivation and drug sensitivity assay. In addition active principal was isolated from the most active crude extract by bioassay guidance separation and fractionation using column and thin layer chromatographic methods. The powdered root of Yin-pyar was percolated in four differet solvents namely methanol, 70% ethanol, chloroform and aqua. Out of four extracts methanol, ethanol, and chloroform extracts had promising anti-malarial activity. The highest activity was found with 400mg/kg dose of methanol extract which inhibited 61.35% of parasite growth in suppressive test and 59.8% of those in therapeutic test. The parasite inhibitions of same dose of 70% ethanol extract were 60.63% in suppressive test and 58.8% in therapeutic test. Chloroform extract inhibited 48.08% and 38.88% of parasite growth respectively. Insignificant inhibition was seen with aqueous extract in those tests. In the same experiment, 10mg/kg of chloroquine, control drug inhibited 94.12% of parasite growth in suppressive test and 89.53% in therapeutic test. Methanol extract inhibited growth of *Plasmodium falciparum in vitro* with 50% parasite inhibition (EC_{50}) of 196.25µg/ml. Those of 70% ethanol and chloroform extracts were 205.22µg/ml respectively. Acute toxicity study was carried out to find out the median lethal doses (LD_{50}), 1100mg/kg for methanol extract, 1200mg/kg for 70% ethanol extract, 1400mg/kg for chloroform extracts and 2000mg/kg for aqueous extract. The dose at which a specified toxic effect is not seen was found to be 400mg/kg and was selected as the maximum dose for *in vivo* experiments. From the most active methanol

extract, ethyl acetate soluble and insoluble fractions were separated and *in vivo* and *in vitro* experiments were carried out for their anti-malarial activity. Biologically active ethyl acetate soluble fraction was subjected to further fractionation which resulted three non alkaloid fractions and two alkaloid fractions. Out of five fractions yielded, one fraction (F_5) was found out to be the most active one. The ED_{50} values of F_5 were 10mg/kg in *in vivo* suppressive test. The F_5 inhibited parasite maturation *in vitro*, with ED_{50} of 7.51µg/ml. After purification into one compound from the most active fraction (F_5), was then characterized by physicochemical tests and spectroscopic studies. Finally the active anti-malarial principal isolated from root extract of Yin-pyar (*Dichroa febrifuga)* could be identified as an alkaloid compound, febrifugine. The isolated active principal is a known compound, but the scientific evaluation of anti-malarial activity and identification of active principal from the root of Yin-pyar plants grown in Pyin Oo Lwin area is being reported for the first time and it is an essential basic work in exploring valuable natural source from Myanmar herbal plants for development of new anti-malarial drug.

50. Anti-malarial activity and related chemical constituents of Swertia species which are grown in Kayah State. Khin Phyu Phyu. Thesis, PhD (Chemistry), Mandalay University, 2006.

Pan-kha, an important Myanmar medicinal plant naturally grown in Kayah State was investigated for its chemical constituents and antimalarial activity. It has been utilized by local people as a good remedy to treat malaria. Three species of Pan-kha, namely *Swertia affinis*, *Swertia angustifolia* and *Swertia purpurescens* available in Kayah State were identified botanically. The highest activity was found in ethanol extracts of *Swertia purpurescens* (Whole plant) at the dosage of 20.8g/kg/ day both in suppressive and therapeutic tests when various extracts of these three plant specimens were preliminarily screened for antimalarial activity, using *in vivo* model. The active ethanol extract was observed to have significant antimalarial activity both in *in vivo* model and *in vitro* system. Its antimalarial activity was found starting from the dose of 1000µg/ml (ED90). The active compound from fraction three was identified as a 1,5,8-trihydroxy-3-methoxy xanthone molecule by means of UV, FT, IR, ^{1}H NMR (600 MHz),^{13}C NMR, DEPT, DQF-COSY, EI-mass, HSQC, HMBC and NOE spectroscopic techniques. *Swerita chirata* and xanthone molecules have been known as antimalarial agents in recent years. For the first time this research work indicated that *Swertia purpurescens* possesses antimalarial activity.



51. Anti-malarial activity of selected Myanmar medicinal plants: A profile of *Aristolochia tagala* Cham. (Nga-phone-say) as a natural drug resource. Phyu Phyu Myint. Thesis, PhD (Engineering Chemistry), Yangon Technological University, 2001.

    Eleven plant specimens which are traditionally reputed to cure malaria were investigated for their antimalarial activity by standard *in vitro* and *in vivo* techniques to reveal the true efficacy of these plants. Chemical characterization of the most promising plant extract, resulted from the screening, was to be carried out to explore the useful basic information on the antimalarial chemical skeleton. A total of 44 extracts obtained by extracting 11 plant specimens with various solvents of different polarities were subjected to *in vitro* and *in vivo* experiments. Of the 44 extracts of 11 plant specimens, petroleum ether and alcohol extracts of *Artemisia annua* (Qinghao), chloroform extract of *Coptis teeta* (Khan-tauk), alcohol extract of *Brucea javanica* (Yar-dan-seet), aqueous extract of *Swertia angustifolia* (Shan-say-khar-gyi) and petroleum ether extract of *Arsitolochia tagala* (Nga-phone-say) showed antimalarial activity *in vitro* and/or *in vivo* experiments. Petroleum ether extract of *Aristolochia tagala* (Nga-phone-say) was selected as promising plant extract in view of the availability, cost and safety aspect to study the chemical constituents present there in. Thin layer chromatographic screening of active extract of *Aristolochia tagala* revealed 8 spots when the chromatogram was detected in day light, under ultraviolet light (short and long wave lengths) and by treating with spraying reagent. Out of 8, 5 constituents could be isolated by column and preparative thin layer chromatographic techniques.

52. Anti-malarial activity of Traditional Medicine Formulation-AAC on rodent malaria. Ye Htut; Myint Myint Khine; Kyin Hla Aye; Hla Myint, Saw; Hla Ngwe; Ni Ni. *Myanmar Health Res Congr,* 2003: p26.

    The study was aimed to assess the combined antimalrial activity of Traditional Medicine Formulation-AAC (a mixture of three traditional medicinal plants in the ratio of (10: 5: 3) was prepared into 6 different extract, water partition and water fraction. Four different concentrations of each TMF-ACC preparation were tested for the antimalarial activity on ddy experimental mice by infecting them with rodent malaria parasite *Plasmodium berghei*. Those preparations showed parasite suppression in Suppressive test was further tested for therapeutic effect. It was observed that ethanol extract of TMF-AAC induced parasite suppressions both in Suppressive and Therapeutic test. In Suppressive test, 250mg/kg/day for 4 day course induced 41.22% parasite suppression in terms of control, 500mg/kg/day for 4 day course gave 71.8% and 1000mg/kg/day for 4 day course induced 91.22% suppression, respectively. 500mg/kg/day for 4 day course of petroleum ether extract of TMF-AAC also induced 46.26% suppression, 1000mg/kg/day for 4 day course had 58.48% suppression and 2000mg/kg/day for 4 day course gave 74.84% suppression respectively. When subjected to Therapeutic test, 1000mg/kg/day for 4 day course of ethanol extract induced only 41% parasite suppression and 2000mg/kg/day for 4 day course of petroleum ether extract also gave 42% suppression. The results appeared encouraging for pursuing the study of TMF-ACC.

53. The anti-microbial activities of the extracts of *Terminalia catappa* Linn. (Banda) on some pathogenic microorganisms. Khin Khin Aye; Thet Thet Mar; Zaw Myint; Mie Mie Nwe; Khin Nwe Oo; Lwin Zar Maw. *Myanmar Health Scie Res J*. 2011; 23(1): p6-9.

    The anitimicrobial activity of petroleum ether, chloroform and methanolic axtracts of dried roots of *Terminalia catappa* Linn. was tested on *Escherichia coli.*, *Staphylococcus aureus, Bacillus cereus, Vibrio cholerae, Salmonella typhi* and *Shigella dysenteriae* by agar disc diffusion method. The minimum inhibitory concentration (MIC) of the plant extracts were determined by tube serial dilution method. The chloroform extract and methanolic extract of *Terminalia catappa* Linn. showed prominent antimicrobial activity, while petroleum ether extract showes no antimicrobial activity on tested bacteria. The MIC of methanolic extract exhibited 0.065mg/ml on *Vibrio cholerae* 01 and 0.125mg/ml on other tested bacteria.

54. The anti-microbial activity of essential oil, thymol and formulated thymol cream obtained from *Carum copticum* Benth & Hook. fruit (စမုန်ဖြူ) on certain skin pathogens. Khine Zar Pwint. Thesis, MPharm, Yangon: University of Pharmacy, 2009.

    Carum copticum Benth & Hook. (Samon-phyu) fruits are well known as medicinal plants because of their biological and pharmacological properties. The fruits of *Carum copticum* Benth & Hook. have several therapeutic effects including antiallergic, antibacterial, anthelmintic, antifungal and antispasmodic effects. The essential oils of air-dried samples were obtained by water distillation method. Variation in the quantity and of the essential oil of *Carum copticum* Benth & Hook. at different stages including vegetative, floral budding, flowering and seed set are reported. Thymol was a major compound in the essential oil of *Carum copticum* Benth & Hook. Fractional distillation method was used for the isolation of thymol from this plant. The isolated thymol was confirmed by thin layer chromatography and compared with standard thymol. It was aslo identified by FTIR spectrophotometer. Antimicrobial activity of the essential oils and isolated thymol from this plant were tested on skin pathogens such as *Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa* and *Candida albican*. Then, the antimicrobial activity of standard thymol was also tested on above skin pathogens. Ciprofoloxacin and econazole were used as control antibiotics. Screening of antimicrobial activity of standard thymol and isolated thymol from *Carum copticum* Benth & Hook. were done by agar disc diffusion method. The minimum inhibitory concentration of standard thymol and isolated thymol from *Carum copticum* Benth & Hook. were done by agar plate dilution method and broth dilution method. Minimum bactericidal concentration of standard thymol and isolated thymol from this plant were also determined by broth dilution method. It was observed that essential oil and isolated thymol from *Carum copticum* Benth & Hook. were effective against *S. aureus, E. coli,* and *Candida albicans*, except *Pseudomonas aeruginosa*. MIC of isolated thymol and standard thymol were 100µg/ml for *S. aureus, E. coli* and 50µg/ml was *Candida albicans*. MBC of isolated thymol and standard thymol were 100µg/ml for *S. aureus*, *E. coli* and 50µg/ml was *Candida albican.*

55. Anti-mycobacterial and chemical studies of *Morinda citrifolia* Linn. (Ye-yo). Ti Ti; Khin Chit; Aye Aye Thein; Myint Myint San; Kyi Kyi Myint; Win Maung; Aye Tun. *Myanmar Health Research Congr*, 1999: p5.

    Aqueous and alcoholic extracts of *Morinda citrifolia* (fruit) were tested against *Mycobacterium tuberculosis* on *in-vitro* model. Physico-chemical study was also conducted according to standard procedure. Their anti-mycobacterial activities were compared with standard drug (rifampicin and isoniazid). Aqueous and alcoholic extracts of Ye-yo fruit were found to have anti-mycobacterial activity at 5mg/ml concentration on strain sensitive to isoniazid and rifampicin. These extracts have no inhibitory action on strain resistant to standard drugs. In physiochemical studies, flavonoid, steroid and phenolic compounds were detected in both aqueous and alcohol extracts of Ye-yo fruit. No acute toxicity was found in watery and alcohol extracts of Ye-yo fruit and the median lethal dose was observed to be more than 3gm/kg body weight.

56. Anti-oedema activity of *Nyctanthes arbor-tritis* L., *Curcuma longa* L. and *Plantago major* Linn. Aye Than; Mu Mu Sein Myint; Tin Myint; Win Myint. *Myanmar Health Sci Res J.* 1996; 8(1): p36-40.

    Nyctanthes arbor-tritis Linn. (Seik-balu); *Curcuma longa* Linn. (Nan-win) and *Plantago major* Linn. (Ahkyaw-baung-tahtaung; Mann-sote-ywet; Htaung-khaung-pwa and Phar-kyaw-ywet) have long been used in folk medicine as anti-oedema agents. Experimental evaluation of anti-oedema property of these plants was studied on carrageenan-induced acute oedema in *in vivo* method using rats. Aqueous extracts of *N. arbor-tritis*; *C. longa* and *P. major* showed a significant anti-oedema activity ($p<0.005$) at a dose of 3g/kg. Anti-oedema activities of these plant extracts were observed to be 56±7.6%; 46±8.4% and 51±4.9%, respectively, when compared with that of the control group. Thus, this study has shown that the tested medicinal plants possess anti-oedema activity.

57. Anti-oxidant activity of *Ipomoea batatas* Poir. (Sweet potato) using free radical scavenging activity by DPPH assay. Pharmacology Research Division. *Annual Report 2008*. Yangon: DMR(LM). p96.

    The aim of this study was to determine the physicochemical, phytochemical and antioxidant activity of *Ipomoea batatas* Poir. (Sweet potato). the physicochemical characters were 1cm of swelling index, <100 of foaming index, 2.6% of total ash value, 8% of moisture content, and extractive value of water, ethanol, chloroform, pet-ether, were 26.2%, 3.5%, 8.5% and 0.2% respectively. It contained glycoside, reducing sugar, carbohydrate, steroid/terpenoid, flavonoid, phenolic compound and amino acid. Antioxidant activity of *Ipomoea batatus* Poir. (Sweet potato) was studied using free radical scravenging activity by DPPH assay. The aqueous and ethanolic extract and standard ascorbic acid were tested. The percentage inhibition of free radical formation of ascorbic acid, aqueous extract and ethanolic extract at 1, 2,3,4µg/ml were 63.3%, 78.7%, 82.4%, 91.5%, 57.9%, 67.0%, 75%, 81%, and 56.8%, 60.6%, 61.4%, 62.3% respectively. The IC_{50} of ascorbic acid, aqueous extract and ethanolic extract were 0.18µg/ml, 1.5µg/ml, and 1.2µg/ml respectively.

58. Anti-oxidative active principle isolated from *Thea sinensis* Linn. (Tea) leaves. May Aye Than; Mi Mi Aye; Than Soe; Win Win Maw; Maung Maung Htay. *Myanmar Health Res Congr*, 2006: p22-23.

Antioxidant may play a major role in the prevention of diseases, including cardiovascular and cerebrovascular diseases, some forms of cancer and effective to be long life and anti-aging. Thus, the aim of this study is to evaluate the antioxidant active principle isolated from *Thea sinensis* Linn. (လက်ဖက်) leaves. The different extracts and isolated compounds were determined their antioxidant activity by the inhibition of linoleic acid autoxidation (Thiocyanate method) to detect lipid oxidation, in comparison with the synthetic antioxidant butylated hydroxyanisole (BHA). The chloroform, ethanol, petroleum ether extract, and BHA were significant lowered the autoxidation of linoleic acid when compared with that of control ($p<0.01$–$p<0.0005$). The % inhibition of autoxidative activity of the chloroform, ethanol, petroleum ether extract and BHA were 75.97%, 87.06%, 59.10% and 85.34% respectively, after 14th day incubation. Caffeine (3.9%) from chloroform extract and catechin (0.0438%) and epicatechin (0.075%) from ethanol extract were isolated by column chromatography techique. The isolated compounds were identified by melting point, optical rotation, Thin Layer chromatographic. Ultra violet spectroscopic, Fourier transforms infrared spectroscopic, Mass spectroscopic and ^{1}H Nuclear Magnetic Resonance Spectroscopic methods. The isolated compounds, and BHA were significant lowered the autoxidation of linoleic acid when compared with that of control ($p<0.01$–$p<.005$). Percent inhibition of autoxidative activity of caffeine, catechin and epicatechin were 78.42% and 84.14% respectively. Thus, it was concluded that caffeine, catechin and epicatechin were antioxidative active principle and catechin was the most potent natural antioxidant.

59. Anti-peptic ulcer activity of *Centella asiatica* Linn. (Myin-khwa**)** in Wistar albino rats. Lwin Moe May. Thesis, MMedSc (Pharmacology), Yangon: University of Medicine (1), 2009.

Centalla asiatica Linn. is known as Myin-khwa or Myin-khwa-gyi in Myanmar. The anti-peptic ulcer activity of *Centella asiatica* Linn.on aspirin-induced gastric ulcerations was studied by using the plant extract in appropriate animal models. The adult Wistar albino rats of *Centella asiatica* Linn.were employed in this study. The positive control and negative control used in this study being cimetidine (200mg/kg) and water respectively. The ulcerogenic agent, aspirin as well as the test and control materials were administered by oral route to the test subjects in accordance with the study schedule. The plan of the study comprised two parts, the protective effect and healing effect on aspirin-induced gastric ulcerations. For the protective effect, three doses levels; 1.5gm/kg, 3gm/kg and 6gm/kg body weight were used and their effects on gastric mucosa of aspirin-induced ulcerations were studied. The extract in specified dose was given once a day for four consecutive days. The rats were fasted for 48hour after the last does of extract, 600mg/kg body weight of aspirin was given by oral route as an ulcerogenic agent. After leaving for 4hours which was the time required producing proper gastric ulcerations, the animals were sacrificed and stomachs were opened cut along greater curvature to examine by using magnifying glass. Ulcers were measured using different parameters such as total length, numbers of ulcers and numbers of haemorrhagas. Significant effect of the extract on the ulcers regarding above parameters was observed. The procedures as above were repeated for positive and negative control agents-cimetidine and water. The anti-ulcerogenic effect of extract was dose dependent in nature. The best result was obtained with the highest

dose of 6gm/kg body weight. The anti-peptic ulcer activity of extract was comparable to that of standard drug, cimetidine. For the healing effect of extract on aspirin-induced gastric ulcerations in rats, only the dose of extract, found to be optimal in the first part, was selected and employed. It was 6gm/kg body weight of the extract. It was different for the first as the extract was given after the gastric ulcers had been induced by the ulcerogenic agent, aspirin. In this part, the experimental animals were firsty fasted for 48hours. The extract was given two times, the first after 4hours and the second; 20hours after aspirin had been administered. The rats were sacrified after 4hours after the last dose of extract. Their stomachs were examined as in the first with magnifying glass. As before, cimetidine (200gm/kg) and water used as the positive and negative controls. The plant extract was found to have significant anti-peptic ulcer activity as in the previous part of the study. Consequently, the results in the first part seggested the protective effect and that in the second part suggested the healing effect of the plant extract on the peptic ulcerations induced by aspirin. This protective or healing effect is reflected by whether the extract was given prior to after the administration of the ulcerogenic agent, aspirin. This study suggested that 95% ethanolic extract of *Centella asiatica* Linn. had both protective and healing effect on aspirin-induced acute gastric ulcerations in rats.

60. Anti-peptic ulcer activity of *Curcuma longa* Linn. (Na-nwin) in Wistar albino rats. Ei Ei Mon. Thesis. MMedSc (Pharmacology), Yangon: University of Medicine (1), 2010.

The rhizome of *Curcuma longa* Linn. (Na-nwin) is being used for many years in Myanmar for medicinal purposes. The present study was done to evaluate the anti-peptic ulcer activity of ethanolic extract of rhizome of *Curcuma longa* Linn. on aspirin induced gastric ulceration in wistar albino rats. The dried powder of rhizome of *Curcuma longa* Linn. (Na-nwin) was extracted with 95% ethanol. Cold extraction method was used to increase yield. The yield was 9.2%. The phytochemical analysis was done for both ethanolic extract and dried powder of rhizome of *Curcuma longa* Linn. The ethanolic extract and dried powder contained glycosides, flavonoids, alkaloid, steroids/triterpene, polyphenol, tanninoids, saponin and reducing sugar. Acute toxicity of ethanolic extract was done by using albino mice. It was observed that ethanolic extract was slightly toxic and median lethal dose (LD_{50}) was 11.4gm/kg and its 95% confidence limit was 9.5gm/kg to 13.68gm/kg. The ED_{50} value of ethanolic extract of *Curcuma longa* Linn. (Na-nwin) for anti-peptic ulcer activity on rat was 3.8gm/kg and its 95% confidence limit was 1.58gm/kg to 9.12gm/kg. The anti-peptic ulcer effect of extract was studied on albino rats of both sexes weighing 180 to 200gm. Aspirin was used as ulcerogenic agent and ranitidine was used as positive control drug. The test agents were given by oral route. This study contained two parts, i.e., observing the protective effect and healing effect. To study the protective effect, rats were fasted 48 hours in metabolic cages. Rats were grouped into six. Group 1 served as negative control group, which received only water. Group 2 served as positive control group, which received 150mg/kg ranitidine. Group 3 to Group 6 served as extract treated group, which received four different doses of extract 0.1gm/kg, 0.5gm/kg, 1.5gm/kg and 3gm/kg body weight. One hour after giving the test agents, 600mg/kg body weight of aspirin was given as ulcerogenic agent. After 4hours, rats were sacrificed with chloroform. The rat's stomachs were opened along the greater curvature. The ulcers were measured by using magnifying glass. The different parameters such as total number of ulcers, total length of ulcers and number of hemorrhages were measured. The results showed that ehtanolic extract of rhizome of *Curcuma longa* Linn.

(Na-nwin) reduced all parameters (total number of ulcers, total length of ulcers and number of hemorrhages) compared with negative control group with received only water. *Curcuma longa* Linn. (Na-nwin) has protective effect on aspirin-induced gastric ulceration in rats. It was found that increasing dose of the extract caused increasing protective effect. Therefore, it was shown that the extract had dose dependent protective effect. The efficacy was slightly lower but comparable to ranitidine, the standard drug. To study healing effect, three different doses of extract (0.5gm/kg, 1.5gm/kg and 3gm/kg) were used. In this study, rats were fasted for 48hours in metabolic cages. Rats were grouped into five. The difference from the study of protective effect was that the same dose of ulcerogenic agent aspirin was given first to all groups. After 4hours, three different doses of extract 0.5gm/kg, 1.5gm/kg and 3gm/kg body weight was given to all rats. Second dose was given 20hours later. After 4hours, rats were sacrificed with chloroform. The operative procedure, measured parameters and measuring methods were same as the first part of the study. The results showed that ethanolic extract of rhizome of *Curcuma longa* Linn. (Na-nwin) reduced all parameters compared with negative control group which received only water. But there was no area of hemorrhages. In conclusion, this study proved scientifically that 95% ethanolic extract of rhizome of *Curcuma longa* Linn. (Na-nwin) had both protective and healing effect on aspirin induced gastric ulceration in rats. Both effects were dose dependent in nature.

61. Anti-plasmodial effect of some extracts of *Ocimum sanctum* Linn. (Pinsein-net) in *Plasmodium berghei* infected mice model. Mu Mu Sein Myint; Kyin Hla Aye; Ye Htut; May Aye Than; Khin Tar Yar Myint; Than Than Lwin; Phyu Phyu Win; Thin Thin Aye. *Myanmar Health Res Congr,* 2009: p20-21.

The aim of this study is to evaluate the anti-plasmodial effect of *Ocimum sanctum* Linn. (Pinsein-net) in *in vivo Plasmodium bergheii* infected mice model. *Ocimum sanctum* is known its reputed hypoglycemic, antiasthmatic, antimalarial, antiptretic, antiviral antibacterial effects. Phytochemical analysis, acute toxicity, test of leaf power, aqueous and 50% ethanol of *O. sanctum* leaf were also done. Alkaloids, flavonoids, glycosides, amino acid, polyphenol, reducing sugar, saponin and protein were present in all three tested samples. LD_{50} values were found to be more than 12gm/kg body weight in leaf power, more than 16gm/kg body weight in aqueous and 50% ethanol extracts. Screening of aqueous and 50% ethanol extracts for anti-plasmodial effect on *Plasmodium bergheii* infected mice model was done. Suppressive test was performed according to the method of Peter (1965). The test doses for suppressive effect of both extracts were 6, 9 and 12gm/kg body weight. The result were expressed in terms of percent parasite extracts of 6, 9 and 12gm/kg body weight were 7.14%, 14.94%, 17.53% and 7.2%, 25.54%, 27.38%, respectively. Therefore 50% ethanol extracts was chosen to test for its therapeutic effect. In the therapeutic test, the results were expressed in terms of percent parasite suppression on day 7. Test doses were 9gm/kg, 12gm/kg and 15gm/kg body weight. Of the three doses, 15gm/kg body weight dose showed the highest suppression (23.59%). Therefore, it was concluded that 50% ethanol extract of *Ocimum sanctum* leaves showed mild anti-plasmodial effect.

62. Anti-proliferative and antioxidant activity of some Myanmar medicinal plants. Khin Chit; Moongkarndi, Primchanien; Thongsoi, Jirapan; Thaw Zin; Khine Khine Lwin; Khin Hnin Pwint; Mu Mu Sein Myint; Nilar Aung. *Myanmar Health Res Congr*, 2009: p20.

This study was aimed to identify the antiproliferative and antioxidant activities (*in vitro*) of 9 Myanmar medicinal plant extracts such as *Azadirachta indica* A.Juss. (Tama), *Desmodium triquetrum* DC. (Lauk-they), *Alpinia galanga*. (Ba-de-gaw), *Acorus calamus* (Lin-ne), *Vitis discolour* (Da-bin-taing-mya-nan), *Curcuma comosa* Roxb. (Nanwin-ga), *Millingtonia hortensis* Linn. F. (Aykayit), *Cuminum cyminum* Linn. (Zee-yar) and *Ocimum sanctum* Linn. (Pin-sein-net). This study was a laboratory based analytical study. The antiproliferative activity was determined by using MTT [3-(4, 5-dimethylthiazol-2, 5-diphenyltetrazolium bromide)] method on human ovarian cancer cell line (SKOV3). The DPPH (1.1-dipheny 1-2-picrylhydrazyl) method was used to evaluate the antioxidant activity. In this study, 5 out of 9 plants showed antiproliferative activity (ED_{50}) on human ovarian cancer cell line (SKOV3) at concentrations of 5µg/ml [*Vitis discolour* (Da-bin-taing-mya-nan)], 10µg/ml [*Azadirachta indica* A.Juss. (Tama)], 12µg/ml [*Alpinia galanga*. (Ba-de-gaw)], 35µg/ml [*Acorus calamus*. (Lin-ne)], and 55µg/ml [*Curcuma comosa* Roxb. Nanwin-ga], respectively, and also showed dose dependent effects. Four out of 9 plants showed antioxidant activity (IC_{50}) at concentrations of 20µg/ml [*Azadirachta indica* A.Juss. (Tama)]. 28µg/ml [*Vitis discolour*. (Da-bin-taing-mya-nan)], 48µg/ml [*Ocimum sanctum* Linn. (Pin-sein-net)] and 92µg/ml [*Curcuma comosa* Roxb. (Na-nwin-ga)]. The results of this preliminary study indicated a potential role of medicinal plants in ovarian cancer therapy. However *in vitro* and *in vivo* studies using active compounds from these plants should be continued to evaluate efficacy and safety.

63. Anti-pyretic activity of the Burmese drugs. Aye Than; Soe Lu Gyaw; Mya Bwin; Mya Tu, M. *Rep Burma Med Res Counc*, 1972: p52.

Three indigenous drugs Abain-nyin (အဘိညဉ်), Halleidda-sonna (ဟလိန္ဒုစုန) and Nandwin-ngan-say (နန်းတွင်းငန်းဆေး) were screened for antipyretic activity. Each of these drugs is a mixture of many ingredients of both plant and animal orgin. Abin-nyin was found to be promising drug.

64. Anti-tuberculous activities and chemical investigation of Myanmar traditional medicine used for the treatment of tuberculosis. Hnin Hnin Aye. Thesis, PhD (Chemistry), University of Yangon, 2002.

Myanmar traditional medicine containing Badegawgyi (*Alpinia galanga* Wall.), Kun (*Piper betle* Linn.) and Myet-mou-nyin (*Cyperus rotundus* Linn.) used for the treatment of tuberculosis was analysed. The traditional medicine and its individual constituents were successively extracted with solvents of different polarity. These different crude extracts were screened for the antibacterial activities employing 29 species of bacteria by utilizing agar disk diffusion method. The medicine and its individual constituents indicated antibacterial activities. The antituberculous activities of these different crude extracts were also determined by Ogawa Method (or) Absolute Concentration Method. The pet ether extract and essential oil of the medicine and that of *A. galanga* showed antituberculous activities. Their Minimum Inhibitory Concentrations (MIC) was determined. Eugenol (0.02%) and alpha Terpineol (0.01%) were isolated from the essential oil of *A. galanga* by column and Thin Layer Chromatographic methods and identified by UV, FTIR, HNMR, CNMR,

H-H COSY, C-H COSY, GCMS and EIMS spectroscopic methods. These compounds were then tested for antituberculous activities with sensitive strains and resistant strains of *Mycobacterium tuberculosis*. They indicated the antituberculous or antimycobacterial activities.

65. Anti-ulcer activity of aqueous extract of leaves of *Azadirachta indica* A.Juss. (Neem) on aspirin-induced gastric ulcer in Wistar albino rats. Yee Yee Tin. Thesis, PhD (Pharmacology), Yangon: University of Medicine (2), 2009.

This study was intended to explore the antiulcer activity of the aqueous extract of the leaves of *Azadirachta indica* A.Juss. (Tama) (Neem) on aspirin-induced gastric ulcer in wistar albino rats. The possible mechanism of antiulcer activity of the extract was investigated on pylorus ligation-induced gastric ulcer also in Wistar albino rats. A comparative experimental study design was used in this study. Aqueous extract of the leaves of *Azadirachta indica* A.Juss. at the doses of 1.5,3 and 6g/Kg were administered orally one hour before aspirin 600mg/Kg suspension in 40 albino rats. Ranitidine pretreated group served as the standard drug control group. Ulcer index was measured according to the method of Suzuki *et al* (1976). The pH, volume and acidity of gastric juice were also measured. The possible mechanism for antiulcer activity, whether anti-secretory activity or improving mucosal barrier, was investigated on the pylorus ligation-induced ulcer in 36 hours-fasted wister albino rats according to the method of Shay *et al* (1945). The same parameters as in aspirin-induced ulcer were measured. The ulcer index measurement was done according to the method of Kulkarni. All the doses tested, both in aspirin-induced and pylorus ligation-induced ulcer significantly elevated the gastric adherent mucus ($P<0.05$). Mean ulcer index was also significantly lowered in the group of rats pretreated with aqueous extract ($P<0.05$). Although it elevated the gastric adherent mucus, it did not significantly ruduce both the volume and acidity of gastric juice produced. These findings indicated that the aqueous extract of the leaves of *Azadirachta indica* A.Juss. did not possess gastric antisecretory activity. Phytochemical analysis revealed that there were flavonoids in the extracts. Acute toxicity study of the aqueous extract of *Azadirachta indica* A.Juss. at the doses of 12g/Kg and 24g/Kg was not lethal and did not show any toxic signs within two weeks. These doses were two to four times higher than the highest dose tested for antiulcer activity in this study. In conclusion, aqueous extract of the leaves of *Azadirachta indica* A.Juss. was found to prevent gastric ulceration induced by both aspirin (a potent NSAIDs) and pylorus ligation. The mechanism for antiulcer activity seems to be enhancing mucosal resistance by increasing gastric adherent mucus amount.

66. The anti-ulcerogenic activity of *Plantago major* Linn. Aye Than; Mu Mu Sein Myint; Win Myint; Tin Myint; Su Su Hlaing. *Myanmar Health Sci Res J.* 1996 August; 8(2): p74-77.

Plantago major Linn. (Ahkyaw-baung-tahtaung; Mann-sote ywet; Htaung-khaung-pwa; Sai-kyaw-gyi; Phar-kyaw-ywet) has long been used in official folk medicine for various purposes. Ethnobotanic field survey in Russia has shown that *P. major* (Plantaginaceae) can be used in the treatment of acid-peptic gastritis. So the plant was investigated for the anti-peptic ulcer activity by the previously standardized method using cimetidine. The aqueous extract of air-dried leaves of the plant was found to have a significant anti-ulcerogenic activity against aspirin-induced ulceration in *in-vivo* rat model ($p<0.005$). The reduced ulcer severity was seen by the ulcer index of 8.4+1.0 in the treated group when compared to the ulcer index of 20.6±3.5 in the untreated group, showing a 59% healing activity of the ulcers.

67. Anti-viral assay of Myanmar traditional medicine used for the treatment of hepatitis B virus. Ni Ni Than. Thesis, PhD (Chemistry), University of Yangon, 2001.

An *in vitro* study to identify herbal products with potential use for treatment of hepatitis B infection was undertaken. The ethnolic extracts (1mg/ml to 8mg/ml) of *Eclipta alba* (Kyeik-hman) leaves, *Butea monosperma* (Pauk-pwint) flowers, and *Cassia fistula* (Ngu) bark were tested for the presence of antihepatitis B surface antigen like activity. Different concentrations of the extracts were mixed with serum samples obtained from high titre hepatitis B virus surface antigen (HBsAg) carriers and incubated at 37ºC for 24hours. The incubated samples were screened for HBsAg titres using the enzyme linked immunosorbent assay. Lamivudine was used as a standard drug and lamivudine 5mg/ml showed HBsAg titre reduction to 1/128 (4times). Ethnolic extracts of *Eclipta alba*, *Butea monosperma,* and *Cassia fistula* exhibited 1/32 (16 times), 1/64 (8times), 1/128times (4times) HBsAg titre reductions in test sera samples. Compounds isolated from the plants were further tested. Three pure compounds; butein, monospermonside, and isobutrin were isolated from *Butea monosperma*, and among them isobutrin showed 1/8 (64 times) reduction of HBsAg titre in test serum. Catechin isolated from *Cassia fistula* also demonstrated 1/16 (32times) reduction of HBsAg titre in test sera samples. Thus isobutrin and catechin could be identified as active compounds with potential use in the management of hepatitis B infection. Although some clinical data exists on the use of catechin in management of hepatitis B infection, data on the use of *Cassia fistula* is limited and need to be explored.

68. Bactericidal activity and chemical constituents of Shazaung-tinga-neah. Nwe Yee Win. Thesis, MSc (Chemistry), University of Yangon, 1996.

The main aim of this research was to study the antibacterial activity of Shazaung-tinga-neah which has been reported and used for dysentery in Myanmar indigenous medicines and thus to determine the chemical constituent of active leaf extracts. This research has revealed the specific activity when various extracts of the leaves of *Euphorbia milii* were tested on a total number of 33 species of bacteria. The Minimum Inhibitory Concentration (MIC) of each active extract was also evaluated. Flavonoid compounds were analysed from the hydrolysates obtained from the alcoholic extracts of the leaves. Three chemical constituents, viz., quercetin, kaepferol, and cyanidin were isolated, identified, and quantitated by TLC, Co-TLC, and paper chromatography and UV-visible and IR spectroscopy.

69. Biological response modification property of *Ganoderma lucidum* (Lingzhi) extract. Myo Khin; Ommar Win Naing; San San Oo; Nu Nu Lwin; Kay Khine Soe; Khin May Oo. *Myanmar Health Res Congr,* 2008: p15-16.

The immunoenhancement action of the ethanol exteact of a mushroom wild growing in Myanmar, *Ganoderma lucidum* (Lingzhi), was assessed by determination of antibody to hepatitis B surface antigen (anti-HBs) production in ICR strain mice. DMR plasma derived hepatitis B vaccine diluted to hepatitis b surface antigen (HbsAg) concentration of 1mg/ml was injected intraperitoneally to 20 mice. *G. lucidum* extract at concentration of 4mg/ml, 6mg/ml and 8mg/ml orally, mixed with distilled water was given to three different groups of mice (5 in each group). *G. lucidum* extract was not given to the remaining 5 mice and was regarded as the control group. All mice were sacrificed at 28 days, blood was collected by cardiac puncture, and anti-HBs levels were measured. A significantly higher level of anti-HBs was found in mice receiving *G. lucidum* as compared to those who did not receive *G. lucidum* (2349.63±4.71 lU/ml vs. 575.44±1.99, $p<0.05$, student's "t" test). A dose-

response antibody levels were also found: 1210.6±2.55 lU/ml in mice receiving 0.75mg of *G. lucidum* extract per g body weight, 3863.67±6.41 lU/ml in mice receiving 1.06mg of *G. lucidum* extract per g body weight, and 2773.32±5.94 lU/ml in mice receiving 1.69mg of *G. lucidum* extract per g body weight. It was concluded that *G. lucidum* extract could enhance the production of antibody to hepatitis B vaccine in mice and the effect is dose dependent.

70. Blood sugar lowering effect of *Momordica charantia* L. fruit (Kyet-hingha-thee) in rabbit model. Aye Than; Win Myint; Tin Myint; Mu Mu Sein Myint; Mya Bwin. *Myanmar Health Sci Res J.* 1993 August; 5(2): p72-78.

    In Myanmar, diabetes mellitus can be counted as a single health problem occuring at all ages as reported by various workers. *Momordica charantia* L. fruit (Kyet-hingha-thee) has been reported to possess antidiabetic activity in experimental animal model by various workers. The plant is widely distributed and also cultivated in Myanmar for its edible fruits. Therefore, it was thought that, if it will be worthwhile to investigate and confirm experimentally, whether the fruit grown in Myanmar possess similar hypoglycemic activity. Blood glucose levels of adrenaline-induced diabetic rabbits were determined after oral administration of expressed fruit juice (10ml/kg) which was approximately equivalent to 400mg/kg of the substance singificantly inhibited the hyperglycemic blood glucose level on adrenaline-diabetic rabbits at 2hr.

71. Blood sugar lowering effect of the leaves of *Azadirachta indica* A.Juss. in rabbit model. Sandar Aung. Thesis, MRes (Zoology), Yangon: Dangon University, 2005.

    These investigations were performed to study the acute toxicity, phytochemical constituents and hypoglycaemic effect of *Azadirachta indica* A.Juss (Neem or Tama) leave. The dried tender leaves of neem were extracted with 70% ethnol to get 70% ethnolic extracts of neem leaves. Acute toxicity study was carried out on albino mice (*Mus musculus*) (ddy strain) of both sexes administered orally. The blood sugar lowering effect of ethnolic extract of *Azadirachta indica* was studied on adrenaline-induced hyperglycaemic rabbit model. The experiment was carried out on adult healthy rabbit of J.W strain of both sexes weighing (2.16±0.329kg). Hyperglycemia in rabbit was induced by subcutaneous injection of 0.2ml of adrenaline tartrate (1mg/ml). Glucometer apparatus was used to determine the blood glucose level. The blood sugar lowering effect of standard drug, glibenclamide was also investigated to compare the hypoglycaemic effect of neem extract with that of the standard drug. The results were shown in the figures, tables and plates. The study period was lasted from September 2004 to April 2005. Suggestions for future study were also described.

72. Blood sugar lowering effects of the seeds of *Cuminum cyminum* Linn. in rabbit model. Aung Aung Maw. Thesis, MRes (Zoology), Yangon: Dangon University, 2005.

    This study is to determine phytochemical constituents, acute toxicity and the hypoglycaemic effect. Aqueous extract was extracted from the air dried seeds powder of *Cuminum cyminum* Linn. Qualitative identification tests of the chemical constituents present in the crude powder and aqueous extract were conducted. Alkaloids, flavonoid, glycoside tannin, steroid, phenol, tannin, saponin and amino acid were present whereas resin triterpine and cyanogenic glycoside were absent in the aqueous extract of dried cumin seeds. But crude powder; only triterpine and cyanogenic glycoside were absent. All these doses of aqueous extract of *Cuminum cyminum* Linn. were not toxic up to the maximum dose level of 6g/kg bodyweight. Therefore, the median lethal dose (LD_{5o}) was observed to be more than 6g/kg body

weight. Evaluation of hypoglycaemic effect of aqueous extract 3g/kg bodyweight which was approximately equivalent to 10.9g/kg of the crude powder was carried out on adrenaline-induced diabetic rabbits. It was found that the aqueous extract 3g/kg bodyweight significantly lowered the blood glucose levels at 1hr ($p<0.02$), at 2hr ($p<0.05$) and at 4hr ($p<0.05$) respectively. The standard drug glibenclamide (4mg/kg bodyweight) significantly inhibited the adrenaline-induced blood glucose levels 1hr ($p<0.05$), 2hr ($p<0.05$), at 3hr ($p<0.05$) and at 4hr ($p<0.05$) respectively. The mean blood glucose levels of the test groups administered with aqueous extract of dried cumin seeds and glibenclamide were compared. The two groups were not significantly different.

73. Botanical identification and chemical investigation of Kyet-thahin. Mya Bwin; Win Myint. *Myanmar Health Sci Res J.* 1992; 4(3): p169-175.

    Kyet-thahin an indigenous Myanmar medicinal plant, whose leaves is being claimed by local people to be effective in jaundice, was identified to be *Sauropus albicans* Blume. Phytochemically, it consists of flavonoid compound as a major chemical constituents.

74. A botanical source of Eugenol. Hta Hta Zin. Thesis, MSc (Botany), University of Rangoon; 1983.

    Botanical and chemical studies on 4 species of the genus Cinnamomum are presented in this investigation. These 4 species are *Cinnamomum zeylanicum* Nees, *C. iners* Reinw., *C. javanicum* Blume. and *C.nitidum* Blume. Eugenol content from the cinnamon leaf oil was determined by gas-liquid chromatography and its physico-chemical properties noted. The main constituent of the cinnamon leaf oil was found to be eugenol. This can be used as a substitute for clove oil which is an expensive raw material used in medicine.

75. Botanical study and utilization of Burmese *Sterculia versicolor* Wall. Sandar Kyaing. Thesis, MSc (Botany), University of Rangoon, 1984.

    The morphology and anatomy of the plant *Sterculia versicolor* Wallich. family Sterculiaceae, was investigated. The plant exudate or the gum was collected during the rainy season. The collected gum was granulated and coated with 5% Shellac solution in 95% Ethanol and the prepared shellac-coated granules were used as a bulk laxative. The prepared bulk laxative was administered to persons suffering from constipation. The disintegration time of the prepared granules were also investigated. It was found to be 8-10 minutes in acid, 3-4 minutes in alkali and 6-8 minutes in acid, 3-4 minutes in alkali and 6-8 minutes in neutral solutions.

76. Bronchodilating activity of some traditional medicine formulations on the *in vitro* tracheal ring test model. Aye Than; Aung Naing; Khin Lay Hnin; Irene Hla; Mya Bwin. *Myanmar Health Sci Res J.* 1993; 5(2): p85-90.

    The efficacy of seven reputed bronchodilating traditional medicine formulations were studied on the *in vitro* model of tracheal chain preparation using rabbit and guinea-pig. A new carbachol-induced model was introduced and comparison of its efficacy with normal preparation showed more promising results. Three formulations were found to produce significant relaxation as much as 127±12% 108±18% in rabbit and guinea-pig models respectively.

77. Burmese indigenous medicinal plants: 1. Plants with reputed hypoglycemic action. Mya Bwin; Sein Gwan. *Burma Med Res Counc; Spec Rep Ser.* No. (4); Rangoon: Burma Med Res Inst; 1967.

    Gives the botanical description and distribution of 32 plants, their medicinal uses as described in the local as well as foreign literature and the results of the chemical and pharmacological investigation.

78. Burmese indigenous medicinal plants: 2. Plants with reputed hypotensive and hypertensive action. Mya Bwin; Sein Gwan. *Burma Med Res Counc; Spec Rep Ser*. No. (8); Rangoon: Dept Med Res; 1973.

    The botanical description and distribution of the plant are first given. Secondly, the medicinal uses of the plant as given in the literature of both local and foreign countries are enumerated. Thirdly, the result of the chemical investigations carried out on the plant various research workers are listed. Finally, the results of the pharmacological investigations into the medicinal properties of the plant are furnished.

79. Catalogue of the crude drug museum. Pharmacology Research Division. Yangon: Dept Med Res; 1989.

    All the 48 traditional medicine formulations and their ingredients have been displayed in the Crude Drug Museum, kept in screw-capped wide mouth bottles and arranged in their respective glass almirahs. Ingredients specimens are altogether 134 plants, 23 inorganic, 13 organic and 14 animal materials. The order of specimens displayed was set alphabetically to the Myanmar characters. Write-up cords individually accompany the plant materials, including brief information on the drug. The plant powder of the drug has been placed alongside to show its natural colour. These plant materials have been pharmacognostically characterized and authenticated. The Crude Drug Museum can be used as a reference centre for crude drugs of traditional medicine formulations by students of Traditional Medicine School, interested personnel from various departments of the Ministry of Health and to research worker in traditional medicine.

80. Change of sugar in coconut water. Win Myint; Aung Khin. *Med Res Congr,* 1991: p9.

    Coconut water has been claimed to be an excellent source of water, sugars and minerals and is often used as a replacement fluid. Total content of sugar (about 5g%) in coconut water depends upon the maturity of the coconut. It is necessary to detect the nature of individual sugar in coconut water according to the age of coconut. Coconuts collected in Yangon were investigated by thin layer chromatographic method. 24 numbers of coconuts were analysed for 4 different ages; (3^{rd}, 5^{th}, 7^{th} and 9^{th} month-6 for each stage). The intensities of sugar spots on chromatogram were scanned by densitometer and recorded as peak area (percentage). Relative proportion (in percentage) of individual sugar present at 4 different age of coconut were detected and compared. Glucose and fructose were found to be of high concentration in 3^{rd} and 5^{th} month coconut and low in 7^{th} and 9^{th} month-aged coconut. Sucrose, contraditionally, was lowering content in 3^{rd} and 5^{th} month and higher in 7^{th} and 9^{th} month-aged coconut. Relative total sugar measured by refractometer was observed to be higher in 5^{th} and 7^{th} month-aged coconut than 3^{rd} month (young age) and 9^{th} month (old age).

81. Characterization & evalution of antibacterial activity of phytoconstituents isolated from selected Myanmar medicinal plants. Win Naing, Maung. Thesis, PhD (Chemistry), University of Yangon, 2002.

Myanmar medicinal plants; namely *Piper nigrum* (Nga-yoke-kaung), *Azadirachta indica* (Tama), *Alstonia scholaris* (Taung-me-oke) and *Andrographis paniculata* (Se-ga-gyi) used for the treatment of dysentery and diarrhoea have been analyzed and their active phytoconstituents have been isolated. Thus, polar and non-polar solvent extracts of the above mentioned plants were screened for antibacterial activity by employing agar disk diffusion technique and serial dilution method utilizing 21 pathogenic bacteria. Consequently, ethanol and methanol extracts of *Piper nigrum* exhibited inhibitory activity against *Proteus morganii, Escherichia coli* EHEC, *Shigella dysenteriae*, *Shigella sonnei*, *Bacillus subtilis*, *Vibrio cholerae (*Inaba), *Plesiomonas shigilloides* and *Staphylococcus aureus*. Ethanol extract of *Azadirachta indica* showed inhibitory activity against five types of microorganisms. Similarly, ethanol and methanol extracts of *Alstonia scholaris* indicated inhibitory activity against ten types of microorganisms. However, ethanol extract of *Andrographis paniculata* exhibited inhibitory activity against, *Escherichia coli* LT, and *Staphylococcus aureus* only. Minimum Inhibitory Concentration (MIC) of active extracts from four plants on ten organisms ranged from 0.12mg/cm^3 to be 0.12mg/cm^3 and it was found in ethanolic extract of *Alstonia scholaris*. Ethanolic extracts of *Piper nigrum*, *Andrographis paniculata* and *Azadirachta indica* showed higher MIC value and therefore, possessed low antibacterial activity. The crude ethanolic extract of *Alstonia scholaris* has an antimicrobial activity on *Escherichia coli*, *Bacillus subtilis*, *Salmonella typhi*, *Shigella sonnei*, *Proteus morganii* and *Staphylococcus aureus*, where the MIC value ranged between 0.12-0.25mg/cm^3. The active phytoconstituents from active plant extracts; namely piperine (M.p.125˚C, 1.05% yields) from *Piper nigrum*, nimbolide (M.p.242˚C, 0.31% yield) from *Azadirachta indica*. Echitamine (M.p.288˚C, 0.06% yeild) from *Alstonia scholaris* and andrographolide (M.p. 223˚C, 0.83% yield) from *Andrographis paniculata* were, respectively, isolated by percolation, Soxhlet extraction and calumn chromatographic methods and identified and characterized by melting point determination, Thin Layer Chromatographic method and UV, FTIR, ^{1}H NMR ^{13}CNMR and Mass Spectroscopic methods. Then, the isolated phytocostituents were screened for antibacterial activity by employing agar disk diffusion technique utilizing some pathogenic bacteria such as *Staphylococcus aureus, Escherichia coli* and *Bacillus subtilis.*

82. Chemical and bioactivity studies on Kyauk-thway**.** Than Htut Oo. Thesis, PhD (Chemistry), University of Yangon, 2003.

The main aim of this research was to study the chemical and bioactivity on various kinds of Kyauk-thway samples (including natural kyauk-thway and synthetic kyauk-thway) to improve the production of Myanmar indigenous medicines. In the present research, kyauk-thway samples were collected from local area, local market, prepared from iron are (hematite) and iron salt (ferric sulphate). Morphology of these kyauk-thway samples were studied by SEM. The chemical composition and purity % of these compounds were studied by SEM. The chemical composition and purity % of these compounds were studied by UV, FT-IR, ED-XRF and gravimetric analysis. Generally, kyauk-thway was identified as “ferric ammonium citrate”. It contains. Ferric iron, ammonium iron, citrate iron and water molecules. Iron content in various Kyauk-thway samples were determined by redox titration. The iron % was found to be in the range of 8.70-22.39%. The nitrogen content of these samples were

determined by kjeldahl method and found to be in the range of 5.30-7.69%. The citric acid contents from these samples were analysed by cation exchange method. These were found to be in the range of 10.50-68.50%. Water contents and ash % (S) were found in the range of 8.08-20.63% and 32.12-61.79%. The trace elemental contents were determined by AAS andED-XRF. These were found to be in the range of 0.0340-4.3700% for zinc, 0.0205-0.6200 % for copper, 0.1295-2.0100% for manganese, 0.0510-0.0998% for chromium, 0.164-34.672% for calcium. Toxic elements of lead and arsenic were also determined. Lead contents were found to be in the range of 0.00012-0.00030%. However, arsenic contents were not detected in all samples. The UV spectrum of these samples has a peak at wavelength of maximum absorption (max) of 275nm. Acute toxicity test was made by the method of Litchfield and Wilcoxon. In this test, the value of LD_{50} was found to be 3.5g/kg. Then haemoglobin estimation was determined by Cyanmethaemoglobin method. It was found that amount of haemogolbin was increased in mice blood during one month. By considering all the above facts, the production of Myanmar indigenous medicines may be improved. Thus this research will be of much benefit in the production of high quality indigenous medicines in Myanmar.

83. Chemical and toxicological studies on Kyauk-thway. Win Myint; Aye Aye Thein; Aye Than; Tin Myint; Mu Mu Sein Myint; Kyaw Myint. *Myanmar Health Res Congr,* 1995: p111.

A natural iron rich compound, Kyauk-thway which is being used by local people for the treatment of anaemia was scientifically investigated. Iron contents of threes types of samples named as Kyauk-thway collected from different sources were determined by atomic absorption spectrophotometer. One of them, specified as ferric ammonium citrate which is easily available in market showed maximum content of iron (27.17%). Where acute toxicity of this market, sample was studied, it was observed 100% death at the maximum dose of 6mg/kg. As stated in Pharmacopoeia, ferric ammonium citrate contains 20.5% to 22.5% iron and specific dose for it is 1 to 3 gm for iron-deficiency anaemias. Chemical and toxicological data of locally available iron compound. Kyauk-thway has revealed to contribute for systematic use of it in replacement or supplemental therapy.

84. Chemical aspects of locally produced oral rehydration honey salts. Win Myint; Po Aung, Saw; Mya Bwin; Aung Naing. *Myanmar Health Sci Res J.* 1991; 3(3): p129-132.

Oral rehydration honey salts developed by Department of Traditional Medicine, Ministry of Health, replacing glucose with honey was investigated for its chemical aspects, comparing with standard oral rehydration salts. Three physico-chemical test parameters pH, electrolytes and total reducing sugar contents were tested. pH value of honey salts solution was found to be very similar with standard oral rehydration salts (ORS) solution. There were slight increases in electrolyte concentrations and total reducing sugar contents of honey salts when compared with standard ORS. Results obtained were discussed and recommandation proposed for therapeutic effectiveness of oral rehydration honey mixture preparation.

85. Chemical composition of 'Da-nyin-thee' (Djenkol beans). Sein Gwan. *Burma Res Congr,* 1966: p12.

Proteins of the fruit were isolated by salt solution. The aminoacids present in the acid hydrolysate were identified by the 2 dimensional paper chromatographic techniques. Eleven aminoacids were found viz. lysine, arginine, aspartic acid, glycine, serine, glutamic acid, alanine, threonine, proline, valina and leucine. No sulphur-containing aminoacids were found. In the acids are hydrolysates. Free amino-acids ralso found to be present in the fruit.

86. Chemical composition of home-based fluids commonly used in Myanmar. Win Myint; Hla Pe; Po Aung, Saw; Win Kyi; Khin Aye Than; Mya Bwin. *Myanmar Health Sci Res J.* 1993; 5(3): p115-120.

Rehydration measure should be instituted as early as possible when life threatening dehydration state due to diarrhoea or severe fever is suspected or detected. Home-based fluids are usually given under such circumstance and thus chemical compositions of syrups (n=9), soft drinks (n=5), fresh fruit juices (n=3) and plant decoctions (n=7) were analysed by using published methods and atomic absorption spectrophotometer. High concentrations of total sugars (8.67 to 34.87g/100ml) and free reducing sugars, mainly as glucose and fructose (1.97 to 21.49g/100ml) were detected in syrups and soft drinks. Potassium was found to be rich in plant decoctions (34.08 to 273.10mg/100ml) and sodium in soups (140.0 to 475.0mg/100g). Soft drinks were found to be acidic (pH=2.76 to 3.63) whereas soups and plant decoctions have pH values 5.29 to 8.91. Colours used in syrups and soft drinks were found to be permitted dyes.

87. Chemical constituents of *Catharanthus roseus* Linn. (Apocynaceae) (Thin-baw-mahnyo-ahni). San San Aye. Thesis, MSc (Chemistry), University of Yangon, 1998.

The local name Thin-baw-mahnyo possesses two different species of genus Catharanthus. The botanical name *Catharanthus roseus* was noted for Thin-baw-mahnyo (ahni) and *Catharanthus alba* for Thin-baw-mahnyo (ahpyu). These two plants can be visually differentiated from the colour of flowers. The plants are cultivated for ornamental flowers as well as for indigenous medicinal purposes. Phytochemical investigation of *C. roseus* (Thin-baw-mahnyo-ahni) was carried out in this study. Physicochemical characterization of the dried leaves owder was conducted using the standard analytical procedure described in physicochemical standard of Unani medicine and Myanmar Traditional Medicine Formulary. The coloured pigments, anthocyanin, present in the pinkish-red flower of *C. roseus* was analysed in terms of anthocyanidin. Aglycone compounds, namely petunidin, malvidin and kaempferol were isolated and identified by PC, TLC and UV spectral data. A triterpenoid compounds, ursolic acid was isolated and identified from ethanolic extract of dried leaves powder. Chemical identification was confirmed by comparison between m.p. TLC data, and IR spectral data of isolated and authentic samples. *C.roseus* was reported to be an alkaloid-rich plant. In this study four crude alkaloid extracts obtained by different methods were subjected to alkaloid screening by TLC using two were also isolated and UV spectrum of each was obtained. Since no standard alkaloid was available, the tentative identification of these two alkaloidal compounds from their UV spectral data was reported. Moreover, the quantity of total alkaloids in dried leaves powder was determined and observed to be 1.32. TLC screening of steroidal compounds from leaves was also carried out. The major sterols such as lanosterol, β-sitosterol and stigmasterol which are commonly present in plants

were not detected in *C.roseus*. However, a spot corresponding to a steroid other than the above three was detected in this TLC screening; but futher analysis in needed to fully characterize its structure.

88. Chemical investigation of *Ipomoea batatas* (L.) Lam. (Sweet-potato) (leaves and stem) and study of some pharmacological screening. May Thu Aung. Thesis, PhD (Chemistry), University of Yangon; 2010.

The main aim of this research work is to study some biological activities of *Ipomoea batatas* (L.) Lam. (Sweet-potato) (leaves and stem) and to investigate some bioactive compounds. Compounds MTA-1 (0.001%), MTA-2 (0.003%), MTA-3 (0.004%) and MTA-4 (0.005%) were isolated from petroleum ether extract and ethyl acetate extract by using liquid-liquid extraction and column chromatic method. The isolated compounds were identified by UV, FTIR, ^{1}H NMR and ^{13}C NMR spectroscopy. Compounds MTA-1 and MTA-2 were deduced as β-sitosterol and stigmasterol glucoside. Remaining two compounds such as MTA-3 and MTA-4 were partically identified as phenolic acids such as gentisic and protocatechuic acids respectively by colour reaction and UV spectroscopy. The antimicrobial activity of various crude extracts of leaves powder and stem of *Ipomoea batatas* (L.) Lam. were tested by agar well diffusion method on six species of microorganisms, namely *Bacillus subtilis, Staphylococcus aureus, Pseudomonas aeruginosa, Bacillus pumalis, Candida albican* and *Escherichia coli.* Methanol extract (ID: 13-16mm) of leaves was active against all test strains. Except *Bacillus subtilis*, petroleum ether extract (ID: 10-13mm) and ethyl acetate extract (ID:15-16mm) showed against five strains. Aqueous extract did not show antimicrobial activity. Methanol extract (ID: 10-12mm) of stem showed active against all test strains. Ethyl acetate extract (ID: 9mm) showed activity only against *Bacillus subtilis*. Aqueous extract did not show antimicrobial activity. From above data, crude extracts of leaves showed more significant zone of inhibition than those of stem. Therefore, the crude extracts of leaves may possess higher potency than the crude extracts of stem. The antioxidant activity of crude extracts and isolated compounds from leaves and stem of *Ipomoea batatas* (L.) Lam. were screened by the semi-quantitative Dot-Blot and DPPH staining method. It was found that methanol extract of leaves and stem had the radical scavenging activity at 12.5µg–400µg. *Ipomoea batatas* (L.) Lam. leaves extract showed antioxidant activity up to 25µg (31.25µg/mL) and stem extract showed antioxidant activity up to 50 µg (62.5µg/mL). Compound MTA-3 (gentisic acid) showed antioxidant activity with minimum dry amount of 100µg (125µg/mL) and MTA-4 (protocatechuic acid) showed antioxidant activity with the minimum dry amount of 400µg (500µg/mL) respectively. Antioxidant activity was also measured by spectroscopic DPPH assay on ethyl acetate, methanol and aqueous extracts of *Ipomoea batatas* (L.) Lam. (leaves and stem). From screening of free radical scavenging activity by using spectroscopic DPPH assay, IC_{50} values of ethyl acetate, methanol and aqueous extracts of leaves were found to be 0.94µg/mL, 0.67µg/mL, and 0.90µg/mL respectively and stem were 1.02µg/mL, 0.80µg/mL, 1.78µg/mL respectively. All crude extracts of leaves and stem were more potent than standard, vitamin C (IC_{50} =1.86µg/mL). Among the six crude extracts of *Ipomoea batatas* (L.) Lam. (leaves and stem), radical scavenging activity of methanol extract of leaves (IC_{50}=0.67µg/mL) was found to be the highest radical scavenging activity. Therefore, according to IC_{50} values of crude extracts of leaves and stem, various concentrations of leaves extracts were more potent antioxidant activity than those of stem extracts. From acute toxicity test showed that aqueous and 70% ethanolic extracts of *Ipomoea batatas* (L.) Lam. (leaves and stem)

were free from acute toxic effect. The dosage of 1.5g/kg, 3g/kg and 6g/kg of aqueous and 70% ethanolic extracts of leaves were tested for antihyperglycemic activity on adrenaline-induced rat model. Standard glibenclamide (4mg/kg) was used as positive control. Aqueous extract and 70% ethanolic extract of leaves showed significant blood glucose lowering effect at the dose of 1.5g/kg, 3g/kg and 6g/kg with dose dependent manner. The percent inhibition of blood glucose lowering effect (peak effect) of aqueous extract were 1.88% , 10.24% and 29.22% at the dose of 1.5g/kg , 3g/kg and 6g/kg after 4hours administration of adrenaline respectively. The percent inhibition of blood glucose lowering effect of 70% ethanolic extract were 11.64 %, 26.49% and 40.56% 6g/kg at the dose of 1.5g/kg, 3g/kg and respectively after 4hours administration of adrenaline. The percent inhibition of blood glucose lowering effect of standard glibenclamide was 63.11% at 4hours after administration of adrenaline. From above data, 70% ethanolic extract exhibited more significant antihyperglycemic activity than aqueous extract at the dose of 1.5g/kg, 3g/kg and 6gm/kg after 4hours administration of adrenaline. Based on above investigation, it can be concluded that the aerial parts of *Ipomoea batatas* (L.) Lam. (Sweet potato) leaves and stem contributes to nutritional and traditional medicinal uses in antihyperglycemic and antioxidant action.

89. Chemical studies and pharmacological evaluation of *Orthosiphon aristatus* (Bl.) Miq. Than Than Htay. Thesis, MSc (Botany), University of Yangon; 1995.

The plant *Orthosiphon aristatus* (Bl.) Miq., Tha-gya-ma-geik, is a famous indigenous medicinal plant. It is being reputed and used for hypoglycemic and diuretic activities in Myanmar. The morphology and taxonomy of the vegetative and reproductive parts and anatomy of leaves have been studied. Since the study on chemical constituents present in it and experiment on pharmacological investigation of the plant growing in Myanmar have not been conducted yet, it has been decided to determine for its physico-chemical properties, as well as for its evaluation on hypoglycemia or diuretic activities. The research has revealed the pharmacognostical aspects and pharmacological properties of this plant. Phytochemical investigations on a flovonoid compound, sinensetin and a sterol compound, β-sitosterol have been conducted. Hypoglycemic activity of the watery extract of the plant has been evaluated for its pharmacological property.

90. Chemical studies and some pharmacological activities of *Eclipta alba* (L.) Hassk. Yee Yee Nyunt. Thesis, MSc (Botany), University of Yangon; 1991.

The antihepatotoxic substances, wedelolactone, demethylwedelolactone and luteolin, were identified from extracts of *Eclipta alba* (L.) Hassk. by thin layer chromatography and ultra-violet spectra. Apigenin, which has no antihepatotoxic activity, was also detected by thin layer chromatography. The plant powder and concentrated watery extract when tested on animal models were found to be non-toxic in mice even at 4g/kg and 8g/kg body weight; and found to have antipyretic activity, anti-inflammatory activity, analgesic activity, diuretic activity and induced uterine contraction.

91. Clinical study of Myanmar traditional medicine in the treatment of MDR-TB patients. Than Lwin; Khin Chit; Thaw Zin; Ti Ti; Phyu Phyu Win; Mar Mar Myint; Aye Than; Paing Soe. *Myanmar Health Res Congr,* 2003: p7-8.

With tuberculosis becoming the prioritized health problem and leading cause of death in Myanmar, the increasing resistance to the first-line anti-TB drugs added a greater burden, not only on the individual patients, but also for tuberculosis control in general. Since there are no drugs comparable to first line anti-tuberculosis agents in efficacy against *Mycobacterium tuberculosis*, management of MDR-TB is by second line anti-tuberculosis agents and/or available drugs. However, these second line drugs are extremely expensive, comparably less effective and more toxic than the first-line drugs and a greater defaulter rate and non-compliance make these regimes impracticable. With the aim to overcome these problems, less expensive available western medicine in combination with Myanmar indigenous medicine which have been proven *in vitro* efficacy against *M. tuberculosis*, are tried as a pilot study in ten MDR/Cat-II failure patients. Selected patients were given five Myanmar indigenous medicines along with either kanamycin and quinolone or clofazimine or thiacetazone or all of them. The study has started since September 2001. First and second case had successfully completed treatment and had remained sputum negative since. The remaining 3rd to 8th cases were still on treatment with sputum remaining negative after conversion at 2 to 3 months after treatment. Radiological improvement was obtained in all 8 cases. The 9th and 10th cases were given treatment for (1) month only and not get assessable. All patients tolerated the drugs well and except for mild gastro-intestinal complaints, no serious side effects have been reported. The study indicated that these reputed Myanmar indigenous medicines can become potential anti-TB drugs in future but more detail studies as well as multi-centre trials are still needed before their therapeutic utility will become fully established.

92. Clinical study of traditional medicine in the treatment of (category 1) pulmonary tuberculosis patients. Lwin Ko; Thaw Zin; Khin Chit. *Myanmar Health Res Congr,* 2003: p27.

The extracts of Myanmar traditional herbal plants were formed as tablets and treated to 50 (category 1) pulmonary tuberculosis cases for 6 months. This prospective clinical trial was found sputum convertion in 2 months (20) out of (39) sputum AFB positive cases (68.9%); improvement was seen in (10) out of (16) sputum AFB negative TB cases (62.5%),(3) defaulter and (2) were rejected due to severe malaria. Out of (20) sputum converted cases, (12) i.e. 60% were relapsed 4 months after full course treatment (i.e. 6months) and 3 cases i.e. 30% relapsed from (10) improved sputum AFB (negative) TB cases. This study showed it has definite anti-TB activity, no side effects in 6 months daily treatment and we should continue the treatment more than 6 months.

93. Clinical trial of anti-amoebic potential of traditional herbal drug Yar-dan-tze. Thaung Hla; Maung Maung Wint. *Myanmar Health Res Congr,* 1997: p9.

Clinical trial to determine the anti-amoebic potential of locally grown Yar-dan-tze was carried out on acute amoebic dysentery patients. A total of 100 patients were tested. They were divided randomly into 2 groups. The group tested with Yar-dan-tze received a capsule containing 5 kernels of Yar-dan-tze once a day before going into bed for 5 consecutive days. The second group serves as control and was thus treated with standard drug, Metronidazole (Myanmar Pharmaceutical Factory, 200mg tablets). It was given 2 tablets 3 times daily for 7 days continuously. Blood for complete picture, urea and liver function tests were done before and after

administration of the trial drugs. Side effects were also monitored daily by clinical examination and asking the patients to report if they suffer any unnatural symptom after having the trial drugs. It was found that *Entamoeba histolytica* trophozoites in the stool became negative in both groups at day 4 of the drug administration period. Clinically significant side effects were not provoked by this herbal medicine. It also produced no change in laboratory tests before and after having drugs.

94. Clinical trial of antidiabetic traditional medicine formulation (TMF) No.32. Thaw Zin; Nwe Nwe Win; Win Myint; Khin Aye Than; Tin Mi Mi Naing; Aung Naing; Kyaw Sein; Maung Maung Wint. *Myanmar Health Sci Res J.* 1994 April; 6(1): p11-18.

    Clinical trial to determine the therapeutic efficacy of a traditional antidiabetic drug, TMF-32, was carried out on 6 Type II NIDDM patients who were admitted to the Traditional Medicine Hospital, Yangon. All patients, 3 males and 3 females, had a fasting blood glucose level of more than 150mg% (205.2±35.6) and a 2hour post-prandial blood glucose level of more than 200mg% (323.0±62.09) and were clinically free from complications of diabetes. The study was a complete cross-over design, using tolbutamide as a control and was conducted under strict diabetic diet supplying approximately 2500kcals per day. Hypoglycaemic efficacy calculated from oral glucose tolerance test (OGTT) curves indicated that TMF-32, at doses of 2G and 3G, significantly reduces the blood glucose levels in these patients ($p<0.01$ in both doses). The maximum hypoglycaemic effect was seen at approximately 2 hours after dosing and the duration of action lasted only up to 6 hours. Construction of log. dose-response curves showed TMF-32 of having a hypoglycaemic potency of 73% of tolbutamide but frequent side effects and cost of drug give rise to contradicting questions on whether it may be useful as a standard traditional antidiabetic drug.

95. Clinical trial of hypoglycemic effect of MAT/MP014 seed on healthy volunteers. Clinical Research Unit (Traditional Medicine). *Annual Report 2004.* Yangon: DMR (LM). p95.

    A controlled cross-over clinical trial to determine the hypoglycemic effect of MAT/MP 014 seed (ဝဲနှံ့သာစေ့) was carried out on twelve healthy volunteers. The subjects were tested for oral glucose tolerance test for base line examination. After that the MAT/MP 014 seed powder 5g single doses was given orally and oral glucose tolerance test was done. The mean blood glucose level of control phase showed 5.1±0.1mmol/L at ohr, 7.3±0.2mmol/L at 2hr and 6.7±0.3mmol/L at 4hr respectively and of tested phase showed 5.1±0.1mmol/L at ohr, 6.3±0.3mmol/L at 2hr and 6.4±0.3mmol/L at 4hr respectively. It was also showed significant inhibition at 2hr ($p<0.05$) after 5g of test drugs were administered, when compared to the glucose loaded phase. The untoward side effects were also monitored. No clinically acute side effects such as nausea, vomiting, giddiness etc, were not detected.

96. Clinical trial of indigenous antipyretics: Testing of antipyretic efficacy of five tridtional medicine formulation on TAB-induce pyrexial volunteers. Tha, Saw Johnson; Kyaw Nyein; Aung Naing. *Burma Health Sci Res J*. 1989 April; 1(1): p20-23.

    Two grams each of 5 traditional medicine formulations (TMF), TMF-06, TMF-24, TMF-25, TMF-35A and TMF-35B-orally administered with 150ml of betel leaf preparation, had underwent a clinical trial of antipyretic efficacy on a total of 315 TAB-induced pyrexial Burmese volunteers. Both positive control of acetyl sallicylate 600mg orally and negative control of no drug treatment were included. The trial

design was performed on a single (observer) blind basis. Effectiveness of the agents at the peak of induced pyrexia was observed for three hours. Only TMF-06 possessed the antipyretic efficacy (78-88%) as could be observed in 87-96% of responders, in comparison to those of the acetyl salicylate. Nevertheless, TMF-24 and TMF-35B showed a lesser antipyretic activity. Therefore, TMF-06 was found to be the most recommendable antipyretics to be used at indigenous medicine centres.

97. Clinical trial of indigenous antipyretics-Part I. Testing the antipyretic efficacy of indigenous plant formulation Nos. 24 and 25 on TAB-vaccine-induced pyrexial volunteers. Kyaw Nyein; Aung Naing; Tha, Saw Johnson. *Res Pap Reading Session, Med Sci Div*, 1987: p13.

    A total of 225 persons served as subjects in the clinical trial of indigenous antipyretics-Part I. The aim of the trial was to determine whether the Indigenous Drug Formulation (IDF) Nos. 24 and 25 have any singnificant antipyretic activity. It was a single blind trial (observer blind) with acetyl salicylate as positive control. TAB vaccine was used to induce a satisfactory pyrexial profile. At the 5 hour of induced pyrexia, the subjects were given a single oral dose of 2g of either test drug with 150ml of betel leaf preparation. A negative control group (no drug given) and a positive control group (acetyl salicylate 600mg given) were also established. The temperature lowering effect of IDF-24 was 0.92ºc (46% of the efficacy of acetyl salicylate) in high pyrexial responders and 1.11ºC (70% of the efficacy of acetyl salicylate) in low pyrexial responders. IDF-25, however, did not exhibit any statistically significant antipyretic activity.

98. Clinical trial of indigenous antipyretics-Part II. Testing the antipyretic efficacy of indigenous plant formulation Nos. 6, 35-A and 35-B on TAB-induced pyrexial volunteers. Kyaw Nyein; Aung Naing; Tha, Saw Johnson. *Res Pap Reading Session, Med Sci Div*, 1987: p13-14.

    A total of 120 persons served as subjects in the clinical trial of indigenous antipyretics-Part II. The aim of the trial was to determine whether the Indigenous Drug Formulation (IDF) No.6, 35-A and 35-B have any significant antipyretic activity. It was a double blind trial. TAB vaccine was used to induce a satisfactory pyrexial profile. At the fifth hour of induced pyrexia, the subjects were given a single oral dose of 2g of one of the test drugs with 150ml of betel leaf preparation. The results were compared with the results of the negative and positive control groups established in the clinical trial of indigenous antipyretics-Part I. The temperature lowering effect of IDF-6 & 35-A was 1.76ºC (88% of the efficacy of acetyl salicylate) in high pyrexial responders and 1.23ºC (78% of the efficacy of acetyl salicylate) in low pyrexial responders. The temperature lowering effect of IDF 35-B was 0.96ºC (48% of the efficacy of acetyl salicylate) in high pyrexial responders and 0.93ºC (58% of the efficacy of acetyl salicylate) in low pyrexial responders. IDF 35-A, however, did not exhibit any statistically significant antipyretic activity.

99. Clinical trial of Myanmar traditional medicine in the treatment of new cases of pulmonary tuberculosis in Myanmar. Lwin Ko; Thaw Zin; Khin Chit; Tin Moe Mya; Nyo Nyo Win; Tin Aung; Nwe Ni Lay; Khin Maung Aye; Tin Nu Swe. *Myanmar Health Res Congr,* 2001: p31.

A clinical trial was conducted on 24 newly diagnosed pulmonary tuberculosis patients, attending the No. 1 Military Hospital, who were treated with reputed 5 Myanmar (traditional) medicinal plants showing *in vitro* anti-tuberculosis activity. These plants include: *A. indica* Juss. (Tama), *A. galanga* Willd. (Badegaw), *A. calamus* Linn. (Lin-ne), *D. triquetrium* (Lauk-thay), and *V. discolor* (Da-bin-daing-mya-nan) prepared as crude extracts which was carried out at the Pharmacology Research Division, DMR. This intervention study consists of baseline data such as chest x-ray, sputum for AFB, body weight, and clinical and biochemical data which are to be compared at the start and end of the trial of six months. Preliminary findings during the interim 3 months analysis indicated promising results in more than half of the patients in which 6 out of 11 sputum positive cases showed sputum conversion to negativity; 7 sputum negative but CXR positive cases showed both clinical and CXR improvement. However, 6 patients had to be changed to WHO four-drug DOTS regime because no significant improvement was seen at the end of 3 months. Two cases were excluded because of patient's request and appearance of co-existing falciparum malaria, respectively. The remaining were defaulter cases and could not be followed up. All drugs were found to be well tolerated and side effects were mild as compared to standard anti-tuberculous drugs. Occasional heart burns around the epigastriun was experienced in 25% of the patients but this resolved spontaneously and did not effect compliance. It was concluded that traditional medicine may have a role in treatment of tuberculosis but more in depth studies on patient selection, drug resistant pattern and interaction with standard anti-tuberculous drugs needs to be done before its full therapeutic utility can be justified.

100. Clinical trial of two Myanmar Traditional Medicine Formulations TMF-03A and TMF-21 for diuretic efficacy. Tha, Saw Johnson; Aung Naing; Kyi Minn. *Myanmar Health Sci Res J.* 1989 August; 1(2): p41-44.

Some Traditional medicine formulations (TMF) as diuretics have been in use to treat anarsaca and oedema. Three are distributed at the grass-root level without any report of their toxic effects. The aim of this trial is to scientifically evaluate the diuretic potentials of drug formulations - namely, TMF-03A and TMF-21 using frusemide as positive control.

101. Clinical trial on indigenous anthelminthic drug-03. Kyaw Nyein; Ah Yu; Tha, Saw Johnson. *Res Pap Reading Session, Med Sci Div*, 1985-86: p11.

A total of 67 Burmese children served as subjects in the children trial of Indigenous Anthelminthic Drug-03. This was administered orally and the results showed that the test drug could purge worms in 57% of the moderately worm infested subjects. There is an apparent efficacy of the drug. However, worm load purging capability was found to be 16%. The overall anthelminthic efficacy of the Indigenous Drug-03 is 16% when compared to the efficacy of the classical levotetramisole.

102. Clinical trial on the anthelminthic action of Burmese pineapple, Nanat. Tha, Saw Johnson; Khin Mg Tin; Hla Maung Din. *2nd Conf Med Spec*, Rangoon: MMA; 1983: p43.

A total of 228 Burmese children were employed in clinical trial on the anthelmintic action of local pineapple fruit, by single daily oral administration for 2 consecutive days of the test-fruit, 6g/kg, or the placebo. The pineapple fruit was found to be effective in a significant number of the diseased children by purging the intestinal round worms. Moreover, its anthelminthic action became more and more pronounced with the degree of infestation in the individual children. The findings and their clinical implicationare discussed.

103. Clinical trial to compare the analgesic efficacy of selected traditional medicine formulations (TMF-06, 24, 25) on experimentally induced pain in human subjects. Thaw Zin; May Aye Than; Tin Tin Lay; Aung Naing; Maung Maung Wint. *Myanmar Health Sci Res J.* 1996; 8(1): p41-46.

Forty clinically healthy volunteers participated in the study aimed to evaluate the therapeutic efficacy of three Traditional Medicine Formulations (TMF-06, TMF-24 and TMF-25) on experimentally-induced cold compressor stimulation pain. The rationale underlying the study is that these formulations have been produced locally and used extensively as standard analgesics for pain relief at the Traditional Medicine Hospitals and dispensaries as well as through self-medication over-the-counter-drugs by the local community for many years but has yet received little investigative attention regarding efficacy and safety. The study was a placebo controlled double-blind, complete cross-over single dose design using aspirin (acetyl salicylate) as positive standard and was evaluated on three basic pain response parameters namely, pain threshold, pain tolerance and pain sensitivity range. All three formulations showed a significant analgesic efficacy ($p<0.01$) when compared to placebo (TMF-25 TMF-24 TMF-06). No; adverse effects were noted even when given at maximum recomended dose. It was concluded dose. It was concluded that the 3 TMFs can be used as an alternative to aspirin for the symptomatic relief of mild to moderate pain.

104. Clinical trial to determine the antidiarrhoeal potential of Traditional Medicine Formulations TMFs-16, TMF-35a and TMF-43. Thaw Zin; May Aye Than; Tin Tin Lay; Cho Cho; Tin Ohn; Tin Mi Mi Naing; Win Khine; Maung Maung Wint. *Myanmar Health Sci Res J.* 1994; 6(3): p127-132.

Clinical trial to determine the therapeutic efficacy of three Traditional Medicine Formulations, claimed to have antidiarrhoeal action, were studied on 150 acute diarrhoeal patients admitted to the Infectious Diseases Hospital, Yangon. TMF-16 was found to possess a good antidiarrhoeal action with the antidiarrhoeal index ADI) of 28.71%, which is approximately equal to that of the standard drug, loparamide which had the ADI of 27.94%. TMF-35a also possess a mild to moderate antidiarrhoeal action (ADI=21.5%), but TMF-43 showed little or no antidiarrhoeal action (ADI=9.64%). The clinical significance of the study is that both TMF-16 and loparamide were found to reduce the stool output as well as the amount of fluid replacement required. TMF-16 is well tolerated, available locally and cheaply, and thus, may prove beneficial in the symptomatic relief of non-specific acute diarrhoea.

105. Clinical trial to determine the hypouricaemic potential of *Zizyphus jujuba* kernel. Win Aung; Aye Kyaw; Myo Lwin; Khin Pyone Kyi; Myat Myat Ohn Khin; Than Swe. *Myanmar Health Sci Res J*. 1991; 9(1): p10-14.

Clinical trial to determine the therapeutic efficacy of a traditional herbal drug, *Zizyphus jujuba* kernel reputed for anti-gout action was carried out on 20 healthy volunteers. Using a cross-over design, the subjects were divided into two groups. Group I received standard hypouricaemic drug, allopurinol and Group II was administered *Z. jujuba* kernel for 14 days. After a wash-out period of another 7 days, the drugs were crossed over between the two groups in which Group I was administered *Z. jujuba* kernel and Group II was administered allopurinol for further 14 days again. Blood and urine samples of these subjects were taken at 5 days' intervals throughout the study period for determination of uric acid, creatinine and liver function tests. It was found that *Z. jujuba* shows no abnormalities on kidney and liver function tests. It also possesses neither hypouricaemic nor uricosuric actions.

106. Clinical trial to test the analgesic efficacy of Chin-saw-kha-thee (*Cydonia cathayensis* Hemsl.) on experimentally induced pain in human subjects. May Aye Than; Mu Mu Sein Myint; Aye Than; Kyi Kyi Myint; San San Myint; Thazin Myint; Mar Mar Myint; Myint Thuzar Thant; Tin Nu Swe. *Myanmar Health Res Congr,* 2001: p30.

Chin-saw-kha-thee *(Cyndonia cathayensis* Hemsl.) from North-east of State of Myanmar, is locally claimed to be useful in treatment of gout. In the treatment of gout, there are two types of drugs, one of which lowers the blood uric acid and the other symptomatic drug of anti-inflammatory or analgesic activity. This study aimed to evaluate the therapeutic analgesic efficacy of Chin-saw-kha-thee on experimentally induced cold compressor stimulation pain in healthy subjects. The study was conducted at Clinical Research Unit (Traditional Medicine), Department of Medical Research (Lower Myanmar). The study was a controlled, complete cross-over single dose design using aspirin as a positive standard drug 18 clinically health volunteers participated in this study and was evaluated on the 3 basic pain response parameters namely, pain threshold, pain tolerance and pain sensitivity range. The assay was validated by doing a preliminary reproducibility of the pain response parameters (which coefficient of variation of less than ± 15% was selected) on the healthy volunteers before the actual study. Both aspirin 600mg, and Chin-saw-kha-thee 10gm (immersed in 150 ml of distilled water for a night) significant analgesic efficacy in three parameters ($p<0.01$ to 0.0005) when compared to placebo (water). No side effects were observed in any of these subjects. From this study it was observed that Chin-saw-kha-thee showed analgesic activity.

107. Comparative botanical studies on two species of genus Paederia with special emphasis on chemical constituents of *Paederia foetida* L. and its antioxidant activity. Ohn Mar Than. Thesis, PhD (Botany), University of Yangon; 2007.

Paederia foetida L. and *P. tomentosa* Blume. grown wild in Myanmar were collected from Taungoo and Thandaung Townships. According to the morphological exminations: they were identified as *Paederia foetida* L. and *Paederia tomentosa* Blume. that belong to the family Rubiaceae. These species are used in medicines especially in the treatment of intestinal complaints; problems of stomach, pain in chest and rheumatism. *Paederia foetida* L. is locally believed to have a medicinal activity. The leaves are antirheumatic. A decoction of wholeplant is used in the treatment of abdominal pain; abscesses arthritis; indigestion etc. The morphological and microscopical characters of leaves of *Paederia foetida* L. was investigated and compared with *P. tomentosa*

Blume. to reveal the characters which have not been investigated previously. The different characters found in the two species could supplement the morphological identities of the two species and can be used in standardization of powdered traditional medicine. According to the utilization of local people *P. foetida* L. was used as both medicinally and in daily died. Thus only *P. foetida* L. was emphasized in studying for its chemical constituents, antimicrobial activity and nutritional value. Preliminary phytochemical tests haves been carried out by using leaves and stem of *P. foetida* L. In this study, the main constituents observed were alkaloids, cyanogenic glycosides, saponins, carbohydrates, glycosides, phenolic compounds and amino acids. Physicochemical properties of leaves were examined and the result showed the difference of solubility properties and that the highest yield was obtained from ethanolic extract of leaves of *P. foetida* L. In chemical studies, active constituents were isolated from leaves of *P. foetida* L. by solvent extraction and column chromatographic method. Isolated compounds were identified by spectrophometer techniques such as UV, FTIR. Among isolated compounds, one compound namely OM1 was identified by UV, IR and ^{1}H NMR. Elemental analyses of leaves and stems of *P. foetida* L. were conducted by using energy dispersive x-ray fluorescence (EDXRF) spectrometry to know the concentration of principle elements and trace elements and trace elements that may be presents in plants.

108. Comparative efficacy of TMF-01 *Ageratum conyzoides* Linn. and *Adhatoda vasica* Nees. on patients with chronic bronchial asthma. Thaung Hla; Myat Myat Ohn Khin; Maung Maung Wint. *Myanmar Health Res Congr,* 1996: p88.

Clinical trial to determine the efficacy of Traditional Medicine Formulation No.1 (TMF-01), *Ageratum conyzoides* Linn. *(*Khway-thay-pan-ywet) and *Adhatoda vasica* Nees. (Ma-ya-gyi-ywet) were carried out on chronic bronchial asthma patients. Each drug was tested on 15 patients separately for a period of 21 days during which the benefits and the side effects were monitored clinically and by laboratory methods. The results of 3 groups of patients were analysed and compared to each other. TMF-01 and Khway-thay-pan-ywet were found to be effective in the management of bronchial asthma but the Ma-ya-gyi-ywet was not. The consumption of aminophylline tablets were significantly reduced in patients treated with Khway-thay-pan-ywet (69.51%) and TMF-01 (58.89%). The Ma-ya-gyi-ywet can reduce only 8.4%.

109. A comparative morphology and anatomy of some Myanmar species of the genus Annona. Nyo Nwe Win. Thesis, MSc (Botany), University of Yangon; 1999.

A study has been undertaken on the 4 species of the genus Annona which grown in Yangon District, Pyay District and Kalaw Townships (Southern Shan State). The comparative morphological studies on both the vegetative and reproductive parts and the anatomical studies on the leaves, stems and fruits have been made. The morphological and anatomical characters of the four species studied, namely *Annona cherimolia* Mill., *Annona muricata* Linn., *Annona reticulata* Linn., and *Annona squamosa* Linn., have been described and compared.

110. Comparative studies on morphology of Swertia species. May Aye Than; Ohnmar Tun, Naw; Wah Wah Phaw, Naw; Khin Hla Win. *Myanmar Health Res Congr*, 2006: p57.

Pan-khar (ပန်းခါး) which is also known as ရှမ်းဆေးခါးပင်၊ ရှမ်းဆေးခါးကြီး; and ပွဲတောင်ဟင်းခါး and which is reputed medicinal plants claimed to be effective for various kind of diseases such as, malaria, diabetes mellitus, hepatitis. It is annual of perennial herbs, growing wild in various part of Myanmar, particularly in hilly regions of Shan, Kachin, Chin, Kayah States, Mandalay and Sagaing Divisions. They were very similar to the botanical name of both Indian and European medicinal plant of *Swertia chirayita* Roxb. Due to the differents in vernacular name and similarity in the common features and the medicinal value. But they have different degree of pharmacological activity. Therefore, it is needed to identify. Ten plants specimen from Shan and Kayah States were identified taxonomically. The morphology of these 10 plants specimens from various parts was carefully studied. Six species were identified and the remaining 2 were categorized as varieties. Two specimens of both states were the same category, one was *Swertia tetragona*. Clarke. and from Shan State were *Swertia pulchella* Ham., *S. purpurescens* and *S. decussata* Nimmo. All belong to family of Gentiaceae.

111. Comparative study on effect of Myanmar traditional medicine paste and wax-bath physiotherapy in treatment of osteoarthritis knee in female patients. Khin Win Sein; Khin Myo Hla; May Aye Than; Thein Kyaw. *16th Myanmar Military Med Conf,* 2008: p9.

Female osteoarthritis cases are common clinical problem in Department of Physical Medicine and Rehabilitation, treated by several conservative methods with varying degree of effectiveness. Topical therapy has the obvious advantages of being simple to apply, non-invasive and self-administer by the patient. Among topical medicine, Myanmar traditional medicine paste (Ahtoo-lane-hsay) is a commonly used traditional medicine for arthritis in Myanmar Traditional Medicine Hospital since 1976. It consists of Ginger, Turmeric, Sweet flag and Cinnamon mixed into paste. Although it is said to be effective in osteoarthritis, there has been no scientific study as yet. To determine the effectiveness of Myanmar Traditional Medicine Paste in treatment of osteoarthritis knee; in female patients. A prospective hospital based randomized controlled clinical study was carried out in (110) female osteoarthritis patients who attended the Physical Medicine and Rehabilitation Department, No. (2) Military Hospital between January 2004 to December 2005. Fifty female osteoarthritis knee patients treated with Myanmar Traditional Medicine paste (MTM) were compared with 50 female osteoarthritis knee patients treated with Wax-Bath Physiotherapy (WBP) as a control. Pain, range of movement, muscle power, stiffness and knee functional capacity and quality of life were assessed by appropriate scoring methods in both groups initially and then periodically reassessed up to 3 months. Cinoared to the baseline, both groups showed significant improvement in all measurements, more obvious in first 4 weeks. MTM paste was comparable to Wax-Bath Physiotherapy, without any significant difference between 2 groups. There were no significant side effects such as allergic reactions. There was only mild skin irritation in a few cases. Myanmar Traditional Medicine paste (Ahtoo-lane-hsay) has significant anti-inflammatory and analgesic effect in osteoarthritis knee cases. It can be recommended as an effective, safe, and easy to administer inexpensive alternative therapy for osteoarthritis knee effects of long term analgesic therapy.

112. Comparative study on quantitative determination of eugenol in the essential oil of *Piper betle* Linn. Khin Thidar Lwin. Thesis, MSc (Chemistry), University of Yangon; 1993.

Piper betle Linn. (Kun-ywet or betel leaf) is one of the most famous indigenous medicinal plants in Myanmar. The physical properties such as moisture, total nitrogen content, total alcohol soluble matter, total water soluble matter and microchemical tests on alcohol and water soluble matters were determined. The essential oil of betel leaf was extracted by steam and water distillation. The yield percent were determined depending on the method and quality of betel leaf. The physicochemical characteristics were determined by standard methods of analysis for vegetable oil and fats. Qualitative and quantitative analysis of eugenol, the prime constituent of the essential oil of betel leaf, were determined by two methods namely gas chromatography and TLC densitometry. The elemental contents of betel leaf were determined by atomic absorption spectroscopy. The betel leaf decoction was prepared according to the procedures usually used by traditional practitioners. The type of sugars, the amount of free reducing sugars and the amount of minerals of the betel leaf decoction were determined. The comparison between the betel leaf decoction and the oral rehydration salt solution was also determined.

113. A comparative study on the effects of *Ixora coccinea* (Linn.) (Ponna-yeik) extract and chlorhexidine mouthwashes on chronic gingivitis in young adults. Moe Wint Oo. Thesis, MDSc (Dentistry), Yangon: Institute of Dental Medicine; 2003.

The present study was to investigate the anti-inflammatory and anti-plaque properties of *Ixora coccinea* Linn. (Ponna-yeik extract), in comparison with that of the chlohexidine mouthwash. The present study was performed on sixty young subjects with chronic gingivitis at the Institute of Nursing, Yangon. All subjects were randomly divided into two equal groups with equal sex distribution. One group was assigned to use 0.2% watery extract solution of *Ixora coccinea* Linn. mouthwash and the other used 0.2% chlorhexidine mouthwash for four weeks. Clinical examination and recording of the scores was obtained weekly up to one month. Mean scores of gingival inflammation, bleeding on probing and plaque accumulation were significantly reduced in both groups. Although both chlohexidine and *Ixora coccinea* Linn. mouthwashes had nearly equal effect on bleeding on probing, the former was better than the latter on plaque accumulation and gingivitis. The anti-inflammatory properties of *Ixora coccinea* Linn. was 73.3% to that of chlorhexidine and the anti-plaque properties of *Ixora coccinea* Linn. was 63.5% to that of chlorhexidine.

114. Cultural beliefs and traditional medicine utilization in Myanmar: A model assessment. Thaw Zin; Sein Win; Khin Chit; Tin Mg Lay; Kyi Kyi; Moe Moe Aye; Myint Thuzar Thant; Mya Mya Moe. *Myanmar Health Res Congr*, 2009: p14-15.

Traditional Medicine (TM) is the sum of knowledge, skill and practice-based experiences indigenous to different cultures. Four cultural models are recognized, cultural deficit, cultural conflict, mainstream conformity and cultural distrust models, to exist in a population having different behaviour towards available health care services. To understand the influence of cultural characteristics on traditional medicine utilization, 2 areas; Yangon Division having the least culture beliefs' influence, and Southern Shan state having diverse ethnic minorities, different culture beliefs and healing practices were compared. Community-based, cross-sectional descriptive study using pre-set questionnaires and semi-structured interviews for KAP, cultural beliefs, health care utilization and satisfaction, was carried out. Despite cultural beliefs, allopathic health services were still more available and were more

utilized than TM (67.2-83.2%) irrespective of its location. The main influence on TM being slow effect (64.9%), inaccessible distance (59.8%) and availability of practitioner and drugs (39.9%). However, the majourity of minor ailments encountered were successfully taken care of with available health care facilities, whether it is allopathic or traditional. Self-defined cultural characteristics include race (28.5-81.5%), religion (19.8-45.3%) and spoken language (11.1-28.7%). Although differences in cultural characteristics did not have extreme impact upon TM utilization is in Yangon Division, it became more apparent within the diverse ethnic groups in Southern Shan State, where barriers to health care utilization, like discrimination, ethnic acceptance and trust remained high (29.7-36.5%). The main influencing model was the mainstream conformity model where deep-rooted beliefs in indigenous practices existed, followed by cultural deficit model where lack of knowledge on a health care system and medicine (21.7-27.6%) prohibited its use. Proper health education, exchange of knowledge between different cultures and involvement of ethnic minorities as health providers within the existing health system may help resolve these differences.

115. Cyclic AMP phosphodiesterase inhibitory activity and chemical screening of four medicinal plants. Khin Chit; Win Myint; Kyi Thein; Win Win Maw; Mar Mar Myint; Aye Than; Myo Khin. *Pharm Biol.* 2001; 39(3): p181-183.

Four medicinal plants, *Acorus calamus* Linn., *Alpinia galanga* Willd., *Desmodium triquetrum* DC. and *Vitis discolour* Dalz., were investigated for potential to inhibit cyclilc AMP phosphodiesterase. The alcohol extract of *Desmodium triquetrum* was found to be most active. The chloroform and alcohol extracts of *Desmodium triquetrum* and *Acorus calamus* and the petroleum ether and chloroform extracts of *Alpinia galanga* contain flavonoids. These are possibly the active principles responsible for their anti-bacterial activity.

116. Detection of cyanogenic glycoside in *Acalypha indica* Linn. (Kyaung-hsay-pin). Khin Tar Yar Myint; Mu Mu Sein Myint; Win Myint; May Aye Than; Aye Than; Win Win Maw; Thandar Myint. *Myanmar Health Sci Res J.* 2005; 17(2): p99-103.

Medicinal plants and herbal drugs are being more utilized for health purposes throughout the world, nowadays. In Myanmar also, many of the traditional remedies are accepted and used by a large segment of the population. Generally people believe that herbal medicine are effective and have no toxic effect. Kyaung-yo-they or Kyaung-hsay-pin is one of the well known Myanmar medicinal plants used for bronchodilating and mucolytic activities. Its botanical name has been identified to be *Acalypha indica* L. This plant was reported to contain an exciting compound known as cyanogenic glycoside stated in some literatures. In order to prove the presence of dangerous cyanogenic glycoside in Kyaung-hsay-pin, a highly sensitive color reaction test for cyanogenic glycoside was carried out on the various fresh and dried parts of the plant specimens. It was clearly detected that higher content of cyanogenic glycoside contained in fresh specimen but a little amount in dried parts. Expressed juice of leaves was also tested for its acute toxicity administering orally to mice and rats. The results were compiled and discussed.

117. Detection of food adulterants in commonly used spices from market. May Aye Than; Khine Khine Lwin; Ohnmar Than; Phyu Phyu Win; Nu Nu Win; Aye Aye Mon, Mi; Mar Mar Myint; Ei Ei Soe. *Myanmar Health Res Congr,* 2011. p67.

As defined in The Food Drugs and Cosmetic Acts, the term adulteration involves the content of a product, such as the addition of substances that make it inferior, impure or not genuine and a product that has unprescribed colouring substance or the colouring substance in excess of the prescribed limits. Adulterated foods were dangerous because it may be toxic, can affect health and it could deprive nutrients essential for proper growth and development. Therefore it was needed to detect by using chemical and pharmacognostical standard tests. Nine brands of chilli and turmeric powders, three brands of blacks pepper and cumin powders samples were collected from various markets in Yangon. They were coded and studied for pharmacognostical characteristic of powdered spices microscopically, to find out whether they were pure or genuine. Some chemical tests for sand, soil, and dirt, heavy metal like lead and arsenic as well as for specific colourants (eg. Lead chromate, charcoal, metanil yellow, rhodamine-d and other dye) were also done. It was found that two out of nine chilli powders were contaminated with sand and dirt which can cause stomach problem. One out of three black pepper powders was contaminated with other part of plants materials. Three out of nine turmeric powders were contained corn and rice starch and two out of three turmeric powder showed non permitted colourant like metanil yellow which is highly carcinogenic and can cause hepatocellular carcinoma and Central Nervous System toxicity after chronic ingestion. These results can provide necessary data for public awareness for their harmful effects.

118. Determination of colchicine content in tuber and seed of *Gloriosa superba* family: Liliaceae and effect of temperature on tuber. Nwe Nwe Win. Thesis, MPharm, Yangon: University of Pharmacy; 2009.

Belonging to the good weather and geograghical background, Myanmar possesses a wide variety of plants and some of them are used as medicine. In addition, Myanmar traditional medicine always plays a major part in health of Myanmar people especially in rural areas. Therefore, quality, safety and efficacy of herbal medicines are very important and they depend mainly on their raw materials, medicinal plants. Nowadays, the utilization of herbs as medicine has been promoted with increasing population. To supply the increasing demand of medicines produced by herbs, local production findings from medicinal plants should be adequate. *Gloriosa superba* Linn. Which is widely distributed in Myanmar, is useful not only in medicine but also in agriculture. This local plant, Si-mi-tauk (ဆီမီးတောက်), which belongs to the family Liliaceae, was identified botanically to verify for true *Gloriosa superba* Linn. For the authenticity of plant, its habit, macroscopic and microscopic examination was carried out thoroughly. For standardization, preliminary screening on physicochemical and phytochemical aspects was conducted according to international standard procedures. By referring to the standard substance, colchicine, chromatographic and spectroscopic methods were also applied to marker compounds in it. Moreover, content of active principle of same plant may vary with the different geographical sources, method of cultivation, collection, drying, transportation, storage and production. Colchicine, one of the poisonous substances, is a distinct component in this plant and their content is not the same in different regions. Amount of colchicine in tuber and seed of locally growing *Gloriosa superba* Linn. was estimated by using Thin Layer Chromatographic

scanning densitometer. Amount of colchicine were 0.35-0.36% in seed and 0.26-0.29% in tuber of *Gloriosa superba* Linn. Myanmar Traditional Medicine is experienced based and it should be promoted to scientific based to keep abreast with international level. Experts in this field rely that roasting tuber can remove their toxicity. To verify that, tubers were roasted, then extracted and analyzed their content of colchicine. Colchicine content was decreased as the tuber was roasted at 100°C was 0.21-0.22% and 150°C was 0.19-0.21% respectively. For safety aspect, acute toxicity test on powder of tuber roasted at different temperature were carried out on albino mice. The various doses, 2, 4, 6, 8g/kg were administered for toxicity. LD_{50} value of tuber dried at room temperature was 6.4g/kg and confidence limit was 4.12-9.92g/kg, that of tuber roasted at 100°C was 7.3g/kg and 5.6-9.49g/kg and that of tuber roasted at 150°C was 8g/kg and 6.15-10.40g/kg respectively. The dead animals suffered from diarrhoea and they were dead after twelve hours of administration. It was assumed that the content of colchicine of tuber and their toxic affects decreased by roasting with increasing temperature.

119. Determination of heavy metals in some locally used traditional medicine formulations (TMFs) produced by Vizadara Naya method. Myat Moe; Khine Khine Lwin; Thaw Zin; Khin Chit; Aye Than; Khin Tar Yar Myint; Myint Myint Khine. *Myanmar Health Res Congr*, 2003: p50.

This study was carried out to investigate whether the traditional medicine formulations (TMFs) produced by Vizadara Naya method from private sector contained heavy metals like arsenic, lead, mercury, iron and copper or not. In Myanmar traditional medicine practice, these TMFs produced by Vizadara Naya method were assumed to reduce stress, promote vitality and boost immunity. Wet digestion (i.e. acid digestion) extraction method was used for extraction of heavy metals from the TMFs and was followed by quantitative analysis by Atomic Absorption Spectrophotometer (AAS). Graphite furnace tube method was applied to determine heavy metals such as arsenic, lead, iron, copper and hydride generation method was used to determine mercury. A total of 8 TMFs were investigated. The names of these TMFs were described in code names. It was found that lead, arsenic, mercury, iron, copper levels in TMFHV7 and TMFHV8 (liquid form) were within the limit of permissible level, but the remaining 6 TMFHV showed high concentration of heavy metals namely arsenic, lead and mercury. So, high concentrations of heavy metals in above TMFs can either be due to contamination during manufacturing process or due to the intentional addition of these heavy metals for medicinal purpose. Both high exposure and long term exposure of heavy metals have been shown to cause serious health problems and diseases. Therefore, the presence of heavy metals in these TMFs should be reviewed and studied in detail on animals before they can be assumed safe for community use.

120. Determination of the susceptibility of some bacteria to (3) Burmese drugs. Sein Gwan; Mar Mar Nyein. *Rep Burma Med Res Counc*, 1972; p19.

Water soluble and alcoholic soluble extracts of (၁) အဘိညှဉ် (၂) ဟလိန္ဒ (၃) နန်းတွင်းငန်းဆေ; were used. The test organisms include *Escherichia coli, Klebsiella pneumoniae, Proteus mirabilis, P. vulgaris, Salmonella paratyphi, S. typhi, Shigella boydii, S. fiexneri, S. schmitzi, Staphylococcus aureus, Streptococcus pyogenes* and *Vibrio cholerae* Eltor. Screening of antibacterial drugs was performed by using an ager disc diffusion technique. Determination of antibacterial spectrum was done by the tube dilution technique. The water soluble extract of the three tested drugs had no bactericidal or bacteriostatis action on the tested bacteria up to the concentration of 500mcg/ml of the extract. The alcohol soluble extract of အဘိညှဉ် had a bactercidal action on *Escherichia coli, Klebsiella pneumonia, P. mirabilis, P. vulgaris, S. paratyphi, S. typhi, Vibrio cholerae* Eltor and the minimum inhibitory concentration was found to be 200, 160, 170, 190, 100, 100 and 100µg/ml repectively. The alcoholic extract of ဟလိန္ဒ had a bactericidal action on *C. mirabilis, S. paratyphi, S. boyidi* and *V. cholerae* and minimum inhibitory concentration was found to be 190, 200, 130 and 200µg/ml respectively. The alcoholic extract of နန်းတွင်းငန်းဆေး had a bactercidal action on *S. paratyphi* and *V. cholerae*. The minimum inhibitory concentration was found to be 100 and 200µg/ml respectively.

121. Development of experimental mouse model for testing of anti diarrhoeal agents. Aung Aung Maw. Thesis, PhD (Zoology), Yangon: Dangon University; 2010.

This study was conducted during from June 2006 to January 2010, to develop an experimental mouse model for *in vivo* screening of antidiarrhoeal agents. The experimental mouse model for antidiarrhoeal agents was developed with DDY strain of mice; DDY strain which is the most perferable and easily available to test antidiarrhoeal activity in *in vivo* animal's model. Before screening of antidiarrhoeal activity *in vivo* mouse model, phytochemical tests, physicochemical analysis and acute toxicity test of cumin seeds *(Cuminum cyminum* Linn.*)* were done. Aqueous and 80% ethanolic extracts were extracted from air dried seeds powder of *C. cyminum* Linn. *(*Zi-ya). The dried seeds powder samples (160g) were successive extracted by Soxhlet apparatus and evaporated by rotary evaporator. Four portions were carried out to obtain successive petroleum ether extract, chlorform extract absolute ethanol extract and watery extract. The phytochemical constituent of the crude powder, aqueous and 80% ethanolic extracts of the cumin seeds were conducted. Alkaloids, flavonoids, glycosides, tannins, stenoids, phenols, saponins, and amino acid were present where as tenin, triterpine and cyanogenic glycoside were absent in the aqueous and 80% ethanolic extracts of dried cumic seeds. In crude powder, only triterpine and cyanogenic glycoside were absent. The physicochemical analysis of the crude powder of cumin seeds was tested. Moisture, swelling index, foaming index, chloroform soluble matter, alcohol soluble matter, water soluble matter, petroleum ether soluble matter and total ash were present. Acute toxicity tests of the aqueous and 80% ethanolic extracts of the dried cumin seeds were tested on albino mice (DDY strain). The anti-diarrhoeal effect of the aqueous and the 80 percent ethanolic extracts of cumin seeds was studied by castor oil-induced diarrhoeal test. The experimental results were represented as mean±S.E (Standard Error). Student's "t" test was used for the evaluation of data. *In vitro* antibacterial activity of the aqueous and the 80% ethanolic extract of the dried cumin seeds was carried out by Agar Disc Diffusion Method and Agar plate Dilution Method. These 2 extracts were tested on different

strains of microorganisms. It was found that the 80% ethanolic extract of the cumin seeds showed the antibactrial activity on *Shigella flexneri*. The maximum zone of inhibition of 12mm is noted in *Shigella flexneri*. The Minimum Inhibitory Concentration ranges from 5mg/mL to > 5mg/ml concentration. Aqueous extract has no activity against all seven organisms. The antibacterial activity of 4 fractions of cumin seeds were investigated by Agar Well Diffusion Method. These four extracts were tested on different strains of microorganisms namely *Bacillus subtilis, Staphylococcus aureus, Pseudomonas aeruginosa, Bacillus pumalis, Candida albican* and *Escherichia coli* species. This indicated that the petroleum ether extract, chloroform extract and absolute ethanolic extract of the cumin seeds showed the antibacterial activity on five microorganisms except *B. subtilis.* Watery extract showed *in vitro* activity only on *E.coli*.

122. Development of experimental rabbit model for testing of hypoglycaemic compounds from plant origin. Sandar Aung. Thesis, PhD (Zoology), Yangon: Dagon University; 2010.

This study was done during June 2006 to May 2010. In this study, the experimental rabbit model *Otyctolagus cuniculus* J.W. strain was used because of its good breeding performance and suitabily for this research purpose. The antidiabetic drugs are screened in the rabbit *in vivo* model because they are more sensitive to the drugs than other experimental animals. Before screeing of blood sugar lowering effect (hypoglycaemic effect) in rabbit model, phytochemical consitutents, physichemical parameters and acute toxicity of extracts of *Curcuma longa* Linn. (Turmeric) rhizomes and *Azadirachta indica* A.Juss. (Neem) leaves were examined. The acute toxicity studies of aqueous extract and 50% ethanolic extract of *Curcuma longa* rhizomes were done on albino mice (ddy strain) by using oral route of administration. In the acute toxicity study of aqueous extract of turmeric, it was observed that median lethal dose (LD_{50}) value of aqueous extract of turmeric on albino mice was (8.6g/kg) and its confidence limit was (7.544g/kg-9.804g/kg). In the acute toxicity study of 50% ethanolic extract of turmeric, it was found that the median lethal dose (LD_{50}) value of 50% erhtanolic extract on albino mice was 11.5g/kg and its confidence limit was (8.46g/kg-15.64g/kg). Similarly, the acute toxicity studies of aqueous extract and crude powder of *Azadirachta indica* leaves were carried out on albino mice by using oral route. The acute toxicity studies of aqueous extract and crude powder of *Azadirachta indica* showed no toxic effect up to the maximal feasible dose of 20g/kg and 5g/kg respectively. Therefore, median lethal doses (LD_{50}) of aqueous extract and crude powder of neem leaves were more than 20g/kg and 5g/kg respectively. Blood suger lowering effect (hypoglycaemic effect) of aquous extract (2.5g/kg) and 50% ethanolic extract of turmeric rhizomes (2.5g/kg) were investigated on adrenaline-induced hyperglycaemic rabbit model (*Oryctolagus cuniculus*) J.W. strain by using oral route of administration. The rabbit were induced hyperglycaemic by injecting them with 0.15m/kg (i.e 0.15mg/kg) of adrenaline tartrate subcutaneously. Glucometer apparatus was used to determine the blood glucose level. In this study, it was found that, the aqueous extract of turmeric rhizomes produced significant decrease in blood glucose levels at 1 hr ($P<0.01$), 2hr ($P<0.01$), 3hr ($P<0.05$) after oral administration of the extract. 50% ethanolic extract of turmeric rhizomes produced significant decreased in blood glucose level at 2 hr ($P<0.05$), 3hr ($P<0.01$) and 4hr ($P<0.05$) after oral administration of the extract. Similarly, the hypoglycaemic effect of aqueous extract (5g/kg) and crude powder of neem leaves (1g/kg) were also investigated on adrenaline-induced hyperglycaemic rabbit model. The aqueous extract of neem leaves

(5g/kg) produced significant decrease in blood glucose levels at 2hr ($P<0.05$), 3hr ($P<0.05$) and 4hr ($P<0.05$) after oral administration of the extract. But the crude powder of neem leaves at maximal feasible dose of 1g/kg did not produce significant decrease in blood glucose level on adrenaline-induced hyperglycaemic rabbit model. Hypoglycaemic effect of standard drug, glibencleamide was also investigated to compare the hypoglycaemic effect of these two plant extracts with that of glibenclamide. Standard drug, glibenclamide (4mg/kg) produced significant decreased in blood glucose levels from 2hr up to 4hr ($P<0.05$-$P<0.01$) after oral administraton of the drug. In the comparison of hypoglycaemic effects of turmeric rhizomes extracts and glibenclamide, it was found that the hypoglycaemic effect of the extracts of turmeric rhizomes were the similar to that of glibenclamide. In the comparison between hypoglycaemic effect of aqueous extract of neem leaves and glibenclamide, it was observed that the hyopglycaemic effect of aqueous extract of neem leaves was similar to that of glibenclamide.

123. Development of *in vitro* digestibility assay for Myanmar traditional medicine. Nwe Nwe Yee; Khin Maung Maung; Khin Tar Yar Myint; Ye Hla; Zin Zin Oo; Thuzar Win; Le Le Win; Pa Pa Cho; Yin Yin Aye. *Myanmar Health Res Congr*, 2006: p5.

This research is a "preliminary study" regarding the end product of digestion *in vitro* on traditional medicine. For the sake of simplicity a single medicinal plant is employed as the subject of study. It is based on the premise that different chemical agent would produce different pharmacological actions. Air dried eleven medicinal plants, were extracted either with water of 70% ethanol. These plants were also digested with intestinal digestive enzymes such as natural porcine intestinal enzymes, digestive aids enzyme pancreatin which includes protease, lipase and amylase. Digestive activities of amylase, lipase, protease and pepsin were evaluated according to the standard procedures. *In vitro* digestion of plant powder underwent gastric phase and intestinal phase of digestion. Final products were filtered and dried. Ethanol and aqueous extract of crude powder, enzyme digested products and digestive enzymes were compared by thin layer chromatography. Compounds were identified according to their R, values under UV (Ultra-Violet) 254 and 365 wave lengths. Compounds of the digested products represent major and prominent substance markers of both extracts and new substance markers were also appeared. Phytochemical constituents were also analyzed. Formation of same substance markers in enzyme digested products relative to ethanol or aqueous extract was 100% (n=6/6; n=11/11). Formation of different substance markers in enzyme digested products relative to ethanol of aqueous extract was 66.67 and 36.36% (n=4/6; n=4/11). These simulated digested materials may represent the bioavailable products which can give pharmacological actions in human biological system. The bioavailable products of the particular plant resulting from this digestion tool can be used as more sensible new testable product of *in vitro* efficacy determination. It is concluded that this technique could serve as a test of bioavailability of traditional medicine which have undergone *in vitro* digestion: Beyond extraction technique.

124. Direct relaxant effect of some plant extracts on isolated tissue models. Aye Than; Win Myint; Tin Myint; Mu Mu Sein Myint; Win Myint; Mya Bwin. *Myanmar Health Sci Res J.* 1995; 7(1): p18-25.

The effects of two different extracts of three medicinal plants namely *Piper betle* L. (Kun), *Coleus aromaticus* Benth. (Ziyar-ywet-htu) and *Ageratum conyzoides* L. (Khway-thay-pan) leaves on the smooth muscles of guinea pig and rat were tested *in vitro* using isolated segments of trachea, intestine and uterus. The extracts inhibited the contractions of guinea pig tracheal muscle induced by carbachol and histamine stimulation. The alcoholic extracts also inhibited the spontaneous movement of guinea pig ileum induced by histamine stimulation. Furthermore, the alcoholic extracts inhibited the contractions of rat uterus induced by 5-HT stimulation. These data suggest that the alcoholic extracts have antihistaminic and anti 5-hydroxytryptamine effects and the active principle may probably resides in the saponin glycoside component.

125. The diuretic effect of *Alysicarpus vaginalis* (D.C) (Than-ma-naing-kyauk-ma-naing) on albino rats. K Khine Thu. Thesis, MMedSc (Pharmacology), Yangon: University of Medicine (1); 2007.

The diuretic effect of *Alysicarpus vaginalis* (D.C) (watery and 50% ethanolic extract) was studied in laboratory animals; albino rats of Wistar strain. The dried powder of whole plants of *Alysicarpus vaginalis* (D.C) was extracted with water and 50% ethanol. The phytochemical analysis of watery and 50% ethanolic extract was done and results showed that both extract contained glycosides, flavonoids, steroid, polyphenol, tanninoids, saponin and reducing sugar. Acute toxicity study of both watery and ethanolic extract was done by using albino mice. Neither watery nor ethanolic extracts showed lethality up to 16g/kg body weight. The diuretic effect of watery and ethanolic extract was studied on albino rats of same sex weighing from 160-260gm. They were then put into metabolic cages after giving watery and ethanolic extract orally and urine was collected for 5 hours. Diuretic effect of both watery and ethanolic extract was carried out by using six dosage levels i.e.12, 9, 6, 3, 1.5 and 0.75g/kg body weight. Significant diuretic effect was found in both watery and ethanolic extract of *Alysicarpus vaginalis* (D.C). The diuretic effect was found to have dose dependant effects for both watery and ethanolic extract. The diuretic response was started from the dose of 1.5g/kg body weight of both extract and up to 9g/kg for watery extract and up to 12g/kg for ethanolic extract. But the diuretic response produced by watery extract was greater than ethanolic extract for same dosage level. The change in PH of the urine of the tested animals was found to be more alkaline with increasing the dose of both extract. Urinary electrolytes content such as Na^+ and K^+ in the urine of tested animals were determined by using digital flame analyzer. The results showed significant loss of Na^+ and K^+ in the urine. The possible side effects of *Alysicarpus vaginalis* (D.C) on albino rats was studied by giving watery extract 9g/kg body weight for one month period. There was no change in internal organs of rats after histopathogical examination. In conclusion, a definite diuretic effect was seen with both watery and ethanolic extract of *Alysicarpus vaginalis* (D.C) and it was also associated with saliuresis effect. The watery extract produced more powerful diuretic response than ethanolic extract of the plant. The watery extract of *Alysicarpus vaginalis* (D.C) showed no demonstrable toxicity in both live animal and histology after autopsy.

126. The diuretic effect of *Centella asiatica* Linn. on healthy volunteers. May Aye Than; Ohnmar Kyaw; Win Win Maw; Khine Khine Lwin; Zin Lu Aye. *Myanmar Health Res Congr*, 2008: p16.

The aim of this is to determine the diuretic potential of *Centella asiatica* (မြင်းခွာ) on healthy volunteers. The whole plants were purchased from market and were extracted in Pharmacology Research Division. This extract was physicochemically and phytochemically standardized by using standard quality control method. The renal status was specifically determined. Nine out of 18 healthy volunteers were put under the controlled setting of over night fasting. Fluid intake was restricted up to 250ml and only a standardized meal was allowed immediately preceding the drugs administration. The urine output within 4hours was collected as for the control readings. On the next day the subjects were again put under these conditions and text extract (5g) was given orally. Urine out put was collected for 4hr. After one-week rest the same procedure was repeated with standrd furosemide 40mg orally. Urine volumes were measured and urinary electrolytes (sodium and potassium) were determined by using digital flame analyzer. The mean urine output of control, test and standard group showed 194.89±20.19ml, 353.75±60.53ml and 808.33±98.59ml within 4hr, respectively. The test group showed significant increase in mean urine volume ($p<0.05$) at 2hr, 3hr and 4hr and standard group showed significant increase in mean urine volume ($p<0.0005$) throughout the study. Urinary sodium excretion of *Centalla asiatica* and furosemide showed significant increase ($p<0.001$) and ($p<0.005$) compared to control. Urinary potassium excretion of *Centella asiatica* did not showed significant increase but the urinary potassium excretion of furosemides showed significant increase ($p<0.01$) when compared with that of control. The untoward side effects were also monitored. Clinically evident acute side effects were not detected in the test group.

127. The diuretic effect of *Hydrocotyle umbellata* Linn. on rat model. May Aye Than; Than Than Lwin; Mu Mu Sein Myint; Mar Mar Myint; San San Myint; Aung Aung Maw; Nu Nu Win; Ei Ei Soe. *Myanmar Health Sci Res J*. 2011 April; 23(1): p57-62.

The aim of this study was to evaluate the diuretic activity of *Hydrocotyle umbellata* Linn. The plants were collected from Yangon area and were extracted in Pharmacology Research Division. The cross-over study design was used to test diuretic efficacy. Six albino rats with body weight (200-260gm) were used in this study. Firstly, the rats were given 0.9% NaCl (normal saline) 5ml/100gm body weight and served as control group. Then, urine output was collected at hr, 2hr, 3hr, 4hr and 5hr, respectively. The same procedures were conducted on the same six rats with watery extract 1.5gm/kg, 3gm/kg and 6gm/kg body weight and standard furosemide 40mg/kg body weight after one week rest. Urine volume was measured and urinary electrolytes (sodium and potassium) were determined by using digital flame analyzer. The watery extract 3gm/kg and 6gm/kg body weight treated groups showed significant increase in mean urine volume ($p<0.05$) at 2hr, 3hr and 4hr. Standard furosemide 40mg/kg body weight given group showed significant increase in mean urine volume ($p<0.05$) at 3hr, 4hr and 5hr. Significant urinary sodium and potassium excretion was found with watery extract of *Hydrocotyle umbellata* Linn. at 1.5gm/kg, 1gm/kg and 6gm/kg body weight dose and standard furosemide treated group ($p<0.0005$ to $p<0.05$) when compared with that of control. It is concluded that watery extract of *Hydrocotyle umbellata* Linn. has diuretic activity.

128. The diuretic effect of *Phyllanthus niruri* Linn. (Taung-zebyu*)* on albino rats. Moe Moe Thinn. Thesis, MMedSc (Pharmacology), University of Medicine (2); 2005.

The diuretic effect of *Phyllanthus niruri* L. (aqueous extract) was studied in laboratory animals; albino rats of Wistar strain. The dried powder of whole plant of *Phyllanthus niruri* L. was extracted with water to obtain aqueous extract. The diuretic effect of the extract was studied on albino rats of same sex weighing from 200-260gm. They were put into metabolic cages and urine was collected for 5hours. Diuretic effect of aqueous extract was carried out by using three dose level i.e. 4.5, 3, 1.5g/kg body weight orally. Significant diuretic effect was found with aqueous extract of *Phyllanthus niruri* L. It was found that the diuretic effect of aqueous extract started to appear with the dose of 1.5g/kg. And the diuretic effect had dose-response relationship. Urinary electrolyte content such as $Na^+$and k^+ are determined by digital flame analyzer FGA 350-L (Gallenkamp, England, 1987). The result showed significant Na^+ and k^+ loss in urine. Acute toxicity study of the extract was performed by using albino mice. The results indicated that there was no lethality up to 5g/kg body weight with aqueous extract. General pharmacological screening test of aqueous extract of *Phyllanthus niruri* L. had shown no abnormal changes. Phytochemical analysis showed that both aqueous extract and dried powder of *Phyllanthus niruri* L. have flavonoids, alkaloids, steroids, tanninoids, amino acid and polyphenol. Dried powder of *Phyllanthus niruri* L. contains reducing sugar and carbohydrates. Quantitative determination of mineral contents in whole plant of *Phyllanthus niruri* L. showed that it has $Na^+$and K^+.

129. Dose finding study of hypoglycemic potential of MAT/MP014 (ပဲနံသာစေ့) on maturity onset diabetes. Clinical Research Unit (Traditional Medicine). *Annual Report 2006*. Yangon: DMR (LM). p30.

Preliminary dose finding study of MAT/MP014 (ပဲနံသာစေ့) was done on 3 maturity onset diabetes patients. The patients were tested for oral glucose tolerance test for base line examination. Three days after withdrawal of all antidiabetic drugs. After that MAT/MP 014 (ပဲနံသာစေ့) seed 2g, orally per day for 2 days was given and fasted at 2nd night. On next day, after fasting blood sample was collected, the 3rd dose was given and oral glucose tolerance test was done. Then 3 days washout the same procedure was repeated with 3g/kg and 5g/kg. The untoward side effects were also monitored. A patient tolerated the drugs well and except for mild gastrointestinal upset, no serious side effects had been reported.

130. A double blind control study on anti-inflammatory and antiplague activity of Ponna-yeik (*Ixora coccinea* Linn.) leaves exteact using as mouthwashes as chronic gingivitis patients. May Aye Than; Moe Wint Oo; Tin Tun Hla; Mar Mar Nyein; Aye Than; Thein Tut; Tin Nu Swe; Mya Thet Lwin. *Myanmar Health Res Congr*, 2003; p37.

Ponna-yeik (*Ixora coccinea* Linn.) is locally claimed to be useful in treatment of toothache and oral diseases as a mouthwashes in Myanmar. In Myanmar, 80% of school children had gingivitis and 18% of them had periodontal destruction. Bacterial plague in oral cavity is regarded as the primary local etiological factor in inflammatory disease. Preventing and controlling of periodontal disease would prevent the microbial colonization of plague on the teeth and gingival. There are varieties of antiseptic mouthwashes in modern dental practice, but chlorhexidine gluconate is the most effective antiplague mouthwashes, which is not cheap and not

easily available. This study aimed to evaluate the efficacy of Ponna-yeik mouthwashes, which was easily available at low cost, was conducted at the Insitute of Dental Medicine, Yangon. The study was a double blind controlled, study design and chlorhexidine gluconate using as a positive standard drug. Twenty patients with typical chronic gingivitis were participated in this study and randomly divided into two groups, 10 patients for 0.2% watery extract of Ponna-yeik mouthwashes and 10 patients for 0.2% chlorhexidine mouthwashes for two times a day for 4 weeks. The plague score, bleeding on probing supra-gingival plague formation, staining effect and severity of gingivitis has been examined prior to the clinical trial, during the study for weekly up to 4 weeks and after trial. Both chlorhexidine and Ponna-yeik mouthwashes showed significant effective in plague score, bleeding on probing and severity of gingivitis (p0.05 to 0.0005) when compared to before treatment.Staining effects were observed in patients using chlorhexidine but not in patients using Ponna-yeik mouthwashes. There was no significant difference between two groups on all score except staining score. It was concluded that Ponna-yeik mouthwashes revealed anti-inflammation and anti-plague activity without staining.

131. The effect of a medicinal plant *Euphorbia hypericifolia* L. (Kywe-kyaung-min-sae**)** on entric infections and hypoglycemic activity of a medicinal plant *Trigonella foenum-graecum***.** L. (Pe-nantha-sae)**.** San San Aye. Thesis, PhD (Botany), University of Yangon; 2004.

Two medical plants *Euphorbia hypericifolia* L. and *Trigonella foenum-graecum* L. reputed to possess the curative power in enteric infections and antidiabetic activites were selected, tested and evaluated for their activities by *in vivo* and *in vitro* techniques. The plant extracts were prepared using different concentrations of ethanol, aqueous solution and ethyl acetate in various rations. Kywe-kyaung-hmin-sae was extracted with 50% ethanol, 95% ethanol, ethyl acetate and aqueous solution and the extracts were used to screen enteric infections, testing of antiamoebic effect and antibacterial activity *in vitro*. Pa-natha seeds were extracted by 95% ethanol and aqueous solution*. In vivo* screening was done for inhibitory effect of the pe-natha seeds extracts on adrenaline induced hyperglycaemia in animal models. These two plants extracts were found to be potent. The morphology and anatomy of these plants were investigated so as to ascertain their correct identification. In addition, quercetin was identified and isolated from *Euphorbia hypericifolia* L. and so was sesquiterpene from *Trigonella foenum-graecum* L. The isolated compounds were identified by thin layer chromatographic method, UV and FTIR spectroscopic techniques.

132. Effect of *Aegle marmelos* Linn. (Okshit) on isolated smooth muscle preparation. Ye Lin Kyaw. Thesis, MMedSc (Pharmacology), Yangon: Defense Services Medical Academy; 2009.

The purpose of the present study was to evaluate scientifically smooth muscle relaxant effect of *Aegle marmelos* Linn. (Okshit) by using isolated smooth muscle preparations. In this study, ethanolic and aqueous extraction of Okshit dried leaves, acute toxicity and pharmacological screening tests, phytochemical analysis of both ethanolic and aqueous extracts of Okshit and experiments for smooth muscle were carried out. The dried powder of Okshit leaves was extracted with ethanol and water. Both extracts were used for this study. In acute toxicity study in mice, it was observed that both extracts of Okshit were not toxic up to the maximal feasible dose of (16g/kg) body weight. General pharmacology screening test of both extracts of Okshit had shown no abnormal changes. In isolated guinea-pig tracheal chain, both extracts produced direct relaxation of tracheal smooth muscles and also antagonized the

contraction caused by either histamine or acetylcholine. In isolated rabbit jejunum, both extracts caused relaxation of intestinal smooth muscles and had dose-dependent antagonism with histamine or acetylcholine. Their relaxation effects on intestinal smooth muscle could not be blocked by either tolazoline or propranolol. In isolated rabbit heart, both extracts caused cardiac depression i.e. decrease in rate and force of contraction, and coronary flow reduction was seen. In isolated rabbit aortic strip, both extracts did not show any contractile effect and they did not relax the contraction caused by adrenaline. In isolated rat uterus, ethanolic extract showed no relaxation effect on normal rat uterus preparation but had antagonism against contraction caused by acetylcholine and oxytoxin. Aqueous extract produced contraction response on normal uterus preparation. The findings suggested that both extracts have smooth muscle relaxant effects. Their actions were not effected via adrenergic pathway. It may be an antagonist of histamine or an anticholinergic activity, but it is more likely to be due to its direct action on tissues.

133. Effect of *Avocado* on plasma lipid levels in young Myanmar adult males. Ohnmar. Thesis, MMedSc (Pharmacology), Yangon: Defense Services Medical Academy; 2003.

A total of 24 apparently healthy young male Myanmar adults were selected as subjects. They were randomly divided into two groups. For the two groups the changes in serum lipid profile after consumption of 100g avocado with salt and 100g avocado with sugar per day for 6 weeks period was studied. Serum total cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C) weeks free fatty acid (FFA) were determined at base line, after 3 weeks and 6 weeks consumption of avocado with salt and avocado with sugar respectively. The serum total cholesterol and triglyeride levels were decreased significantly with $p<0.001$ and the serum LDL-C level was also decreased significantly with $p<0.05$ after 6 weeks consumption of both types of avocado preparations. A significant change was not seen in other serum lipids (FFA and HDL-C). The consumption of avocado with salt and avocado with sugar has similar beneficial effect on serum lipid levels. Moreover, a significant positive correlation between the decreased mean serum total cholesterol and LDL-C level was noted before and after consumption of both types of avocado preparations.

134. Effect of *Azadirachta indica* Neem seed kernel extracts on *Anopheles dirus* mosquitoes. Htay Aung; Khin Khin Cho; Than Myat Htay; Sein Min; Win Myint; Aye Than. *Myanmar Health Sci Res J*. 1998 Aug; 10(2): p78-82.

Neem oil (seed kernel extract) produced a strong repellent action on *An. dirus* mosquitoes (the major vector of malaria) in Myanmar even at concentrations as low as 0.5 and 1.0%. At a concentration of 2% no anopheles biting and the protection provided was 100% during 10-12 hrs periods. The larvicidal effects of neem oil on *An. dirus* (larvae) were determined by using 3rd instar and above. The LC_{90} and LC_{50} were found to be one percent and 0.45-0.5% respectively, the residual effect of neem oil under laboratory condition with 2 and 4% persisted ca 72±5 hrs. Moreover, under laboratory condition with 2 and 4%, the ovicidal effect was found to be 100% control.

135. Effect of berberine on intestinal toxic secretory response in rats due to enterotoxigenic *Escherichia coli* heat stable (ST) and heat labile (LT) toxin. Nwe Nwe Wai. Thesis, MSc (Zoology), University of Rangoon; 1986.

The effect of berberine (an alkaloid preparation from *Berberis aristata*) on the intestinal fluid secretory response to heat-stable (ST) toxin of enterotoxigenic *Escherichia coli* in suckling (2-4 days old) wistar rats was studied. A standard preparation of ST toxin produced a positive fluid secretory response in suckling wistar rats up to 1/8 dilution. When berberine (0.1mg/rat) and 1/8 dilution of ST toxin were injected together or administered orally together, a significant reduction in fluid secretory response was observed. Neither pretreatment with berberine (0.1mg/rat) orally before ST was injected intragastrictly, nor intragastric administration of berberine (0.1mg/rat) after ST was administered orally, reduced the fluid secretory response due to heat-stable (ST) toxin of *Escherichia coli*.

136. Effect of *Desmodium triquetrum* extract on some pathogenic bacteria. Hkun Saw Lwin; Tu, Margaret. *Union Burma J Life Sci,* 1968; 1: p66-70.

An aqueous extract of *Desmodium triquetrum* was tested against *Salmomella typhi*. *S. paratyphi* A. S. *Shigella boydii*, *S. flexperl*, *S. shigae*, *Vibrio* Eltor, *V. cholerae* (Inaba serotype). *V. cholerae* (Ogawa serotype) and *Escherichia coli* by the serial dilution tube technique. The extract was found to have bactericidal action on the ten tested. The range of Minimum Inhibitory Concentration (MIC) values also determined compared with values for streptomycin, chloramphenicol and tetracycline. Large scale growing of *D. triquetrum* is suggested to facilitate analysis and identification of the anti-bacterial principle.

137. Effect of dried Chinese quince fruits (*Cydonia cathayensis*) on serum total cholesterol and HDL cholesterol levels in rats fed a high cholesterol diet. Theingi Thwin; Thet Thet Mar; Hnin Lwin Tun; Khin Than Yee; Mie Mie Nwe; Lwin Zar Maw; Tin Ko Ko Oo; Aye Myint Oo. *Myanmar Health Res Congr*, 2006: p60-61.

The effect of administering dried Chinese quince fruits on high-cholesterol-fed rats was studied for a period of 90 days. A total of twenty male Wistar rat with 150-200gm body weight were included in the study. Thoroughly dried Chinese quince fruits were ordered from Lashio (Northern Shan State) and made into a fine powder. All rats were supplemented with a high cholesterol diet which was enriched with coconut oil (25% by weight) and egg yolk (66.6% by weight) to an ordinary feed up to the end of the study. Dried Chinese quince fruit powder was put into water in a ratio of 1:100 (w/v) and boiled for 10 hours to make a watery extract. One ml of watery extract (144mg dried Chinese quince/kg body weight) and an equal volume of distilled water were administered orally by intragastric intubation daily for ninety days to the test and control group (10 in each), respectively. Serum total cholesterol and HDL cholesterol levels were measured on Day 0, Day 30, Day 60, and Day 90. There was a significant decrease ($p=0.02$) in the mean level of total cholesterol on Day 90 in serum of the test group (169.5±41.06mg/dl *vs*. 255.7±76.12mg/dl). When serum total cholesterol levels were compared between the test and control group on Day 30 (180.7±31.23mg/dl *vs.* 218.3±72.93mg/dl) and Day 60 (167.75±19.76mg/dl *vs*. 246.5±83.05mg/dl), they were not statistically significant ($p>0.05$). Serum HDL cholesterol levels of test and control groups were not significantly different during the study ($p>0.05$).

138. Effect of dried quince fruits (*Cydonia cathayensis*) supplementation on plasma lipid profile and peroxidation in hypercholesterolemic subjects. Theingi Thwin; Thet Thet Mar; Hnin Lwin Tun; Lwin Zar Maw; Tin Ko Ko Oo; Aye Myint Oo. *Myanmar Health Res Congr*, 2007: p40-41.

The effect of dried quince fruit (*Cydonia cathayensis*) supplementation on plasma lipid profile and peroxidation was investigated for a period of ninety days in 12 hypercholesterolemic subjects (≥200mg% plasma total cholesterol levels). Throughly dried quince fruits were made into a fine powder and formed 250mg tablets. They were supplemented daily with one gram (4 tablets) of dried quince tablets. Another age, sex-matched twelve hypercholesterolemic subjects were also administered daily (after dinner) with ten milligrams of Simvastatin USP. Plasma lipid (total cholesterol, HDL cholesterol, triglycerides and LDL cholesterol) and malondialdehyde (MDA, as an indicator of lipid peroxidation) levels were measured on Day 0, Day 45 and Day 90 of the intervention in both groups. The significant decreases in plasma total cholesterol levels (13.2% and 16.5%), and in plasma LDL-cholesterol (28.9% and 34.4%) on Day 45 and Day 90 were found in the dried quince supplemented group, respectively. Plasma MDA levels were significantly decreased by 45% on Day 90 of the intervention in quince group. In comparison with the Simvastatin group, the mean plasma total cholesterol levels of the quince group were significantly higher than those of Simvastatin group on Day 45 and Day 90 (186.78±6.26mg% *vs.*158.7±14.47mg% and 179.73±18.11mg% *vs.*132.9±21.0mg %), respectively. Plasma MDA levels were not statistically different between two groups on Day 45 and Day 90 ($p>0.05$). Plasma total cholesterol lowering effect of dried quince fruit supplementation was not as much as that of Simvastatin administration.

139. Effect of *Eclipta alba* on acute alcoholic liver disease. Win Maung Maung. Thesis, MSc (Zoology), University of Rangoon; 1982.

The acute carbon tetrachloride induced liver damage was shown to be protected by *Eclipta alba*, an indigenous medicinal herb found in Burma. This study was therefore undertaken to assess the efficacy of *E. alba* on the acute alcohol related liver disease in experimental animals, with a view to providing a more rational basis for treating acute alcohol related liver disease in the human subjects, with such an indigenous medicinal herb. The parameters used for the assesment were (1) histology, (2) behavioural changes, (3) body weight changes, (4) mortality rate and (5) biochemical changes. Using rats as experimental animals reliable models of acute alcohol related liver disease was produced initially. After establishment of the model four experimental groups of rats were used in the present study. The test group of animals received daily oral intubation of 50% ethyl alcohol for 45 days: the protected group received *E. alba* prior to the administration of 50% ethyl alcohol. One control group received daily oral intubation of *E. alba* only for 45 days, while another control group consists of normal rats exposed to ether anesthesia for a few minutes only. All the rats were sacrificed at the end of the experimental period which lasted for 45 days. The efficacy of *E. alba* was assessed using the above mentioned parameters. The results of the study showed the following. (1) Liver sections showed reduction of the fatty changes in 80% of the experimental rats protected with *E. alba*. (2) Body weight gained and improvement in the behavioural changes were also seen in the protected group. Mortality rate between the two groups did not significant. (4) Serum aspartate aminotransferase (AST) and alanine aminotransferase (ALT) in both the groups showed no significant difference. (5) The elevated levels of serum alkaline phosphatase (ALP) in the *E. alba* treated groups (protected group and control group)

may probably be due to the summation effects of *E. alba* and alcohol or maybe due to the action of *E.alba* on the excretory functions of the liver. It is concluded that *E. alba* has a protective effect on the fatty change of the liver produced by alcohol.

140. Effect of *Eclipta alba* on carbon tetrachloride hepatotoxicity. Nyunt Nyunt. Thesis, MSc. (Zoology), Rangoon Arts & Science Universit; 1976.

The protective effect of *Eclipta alba* on carbon tetrachloride induced acute liver damage was studied by using 63 female guniea pigs as experimental animals. Pretreatment of the animals with *Eclipta alba* gave significant protection from the hepatotoxic action of CCL_4. This was evidenced by studying the mortality rate, SGPT, serum alkaline phosphatase and urinary amino acid levels in the *Eclipta alba* protected and unprotected groups of animals. The mortality rate and the enzyme levels were significantly lower in the *Eclipta alba* protected group and the results were even better than the protection afforded by $ZnSO_4$ which is a well known liver protective agent. The protective effect was also seen histologically, where centrilobular necrosis, hydropic degeneration and fatty change of the hepatic parenchymal cells were markedly reduced in animals receiving *Eclipta alba* treatment before CCL_4 intoxication. Study of urinary amino acids revealed that *Eclipta alba* reduced the excretion of glycine which is excreted in large amounts in CCL_4 intoxicated animals.

141. Effect of indigenous antipyretic agent Halleidda-sonna on oxidative metabolism. Tin Myint; Aung Naing; Tha, Saw Johnson. *Res Pap Reading Session, Med Sci Div*, 1985-86: p6.

Sixteen healthy volunteers were administered six gram daily dose of commonly used Burmese indigenous antipyretics Halleidda Sonna for 2 weeks. Antipyrine was selected for a locus for oxidative metabolism as it reflects the functional activity of cytochrome p-450 dependent mixed-function oxidase systems. It was found that the shortening of mean plasma half-life was as much as 27±77%. All subjects showed a decline in plasma half-life. There was little or no effect on apparent volume of distribution, but the mean metabolic clearance rate increased by 30±1%. Post-trial control data which were taken after one week indicated that the stimulation still persisted for at least one week. Thus, especially to the people with habit of taking this indigenous drug together with modern therapeutic agents, there will be considerably less durable or insufficient therapeutic effect of the latter.

142. Effect of indigenous plant *Derris elliptica* Benth. on *Culex quinquefasciatus* and *Aedes aegypti* mosquito vectors under laboratory conditions. Sein Min; Pe Than Htun; Aye Mi Mi Htwe; Sein Thaung; Yan Naung Maung Maung; Khin Myo Aye; Moe Thuzar Min. *Myanmar Health Res Congr,* 2009: p70-71.

Laboratory studies were carried out to determine the efficacy of ethanolic crude extracts and dry powder of *Derris elliptica* Benth. roots for the control of *Culex quinquefasciatus* (vector of lymphatic filariasis) and *Aedes aegypti* (vector of dengue haemorrhagic fever) larvae. The tests were conducted using various breeding water samples comprising concrete drain water, septic tank water, earthen drain water and tap water as appropriate for *Culex quinquefasciatus* and *Aedes aegypti* laboratory reared fourth instars larvae. The most effective control was achieved in tap water followed by earthen drain water, septic tank water and concrete drain water respectively. Result revealed that high larvicidal effect was evident with LC_{10} values ranging from 0.32 to 1.1ppm and LC_{90} values ranging from 1.26 to 4.6ppm for *Culex quinquefasciatus* mosquitoes. At the same time LC_{50} values ranging from 2.6 to

2.7ppm and LC_{90} values ranging from 8.1 to 9.2ppm were achieved for *Aedes aegypti* mosquitoes. *Culex quinquefasciatus* mosquitoes were more susceptible to both formulations of *Derris elliptica* Benth. roots than *Aedes aegypti* mosquitoes. The extract formulations were more effective than powder formulation for both species of mosquitoes. Regarding the residual effects in concrete drain water, LC_{90} concentration of 3.2ppm and 4.2ppm of extracts and powder, respectively, were effective up to 6 days and more than 50% mortality were recorded. These values were comparable to that of determethrin, indicating that crude extracts and dry powder were as effective as the synthetic insecticide in killing mosquito's larvae.

143. Effect of leaf of *Annona squamosa* Linn. (Awza) on alloxan-induced diabetic mice. Htin Linn Naing Soe. Thesis, MMedSc (Pharmacology), Yangon: Defense Services Medical Academy; 2011.

Annona squamosa Linn. commonly known as custard apple, is one of Indian medicinal plants, and also used as traditional medicinal in Myanmar. The aim of the present study was to investigate the antihyperglycemic effect of squeous extracts of *Annona squamosa* Linn. leaf (Awza) in alloxan induced diabetic mice. Diabetic was induced in overnight fasted albino mice by intraperitoneal (IP) administration of alloxan. The dose of alloxan (150mg/kg body weight) was administered. On day seven, the animal was fasted for 18hr and blood glucose level were determined by glucometer. There was a rise in blood glucose level significantly, an average of 310.33=36.19mg/dL on days 7 after alloxan injection. In observation of blood glucose lowering effect of aqueous extract of leaf of *Annona squamosa* Linn. (Awza), 1g/kg dose significantly lower blood glucose 7.75% in 1hr, 15.11% in 2hr, 31.39% in 3hr, 43.14% in 4 hr, 2g/kg dose significantly lower blood glucose 9.10% in 1hr, 27.49% in 2hr, 51.15% in 3hr, 69.66% in 4hr and 3g/kg dose significantly lower blood glucose 8.56% in 1hr, 26.71% in 2hr, 34.96% in 3hr, 45.79% in 4hr. ED_{50} was found to be 2.6g/kg (1.2879 g/kg-5.2486 g/kg). ED_{16} was 0.65g/kg and ED_{84} was 4.85g/kg. Acute toxicity study was carried out according to OECD guideline (2001) and no mice was died up to 5g/kg dose of aqueous extract of leaves of *Annona squamosa* Linn. Histological studies of the pancreatic islets showed necrotic beta cells with pyknotic nucleic with a homogenous cytoplasm, and alpha cells were unaffected in alloxan induced diabetic mice. Phytochemical analysis of *Annona squamosa* Linn. showed the presence of alkaloids, flavonoids, tannins, glycosides, polyphenol, saponins, amino acids, carbohydrate, reducing sugar, steroids and terpenes. There was absence of toxic cyanogenic glycoside. It was concluded that the present study clearly showed that aqueous extract of leaves of *Annona squamosa* Linn. has significantly antihyperglycemic activity and may be used safely in traditional medicine as antihyperglycemic.

144. Effect of Lingzhi on aphrodisiac of laboratory rat. Laboratory Animal Service Division, *Annual Report 2000*. Yangon: DMR (LM): p100.

The present study was carried out on laboratory animals to find out effect of Lingzhi on aphrodisiac. Twelve pairs (for test I) and five pairs (for test II) of OFA strain rats about 4 months old (approximately 200g body weight) were used to study the effect on aphrodisiac. Self-controlled clinical study design was used for study of the effect on aphrodisiac. The dose of Lingzhi used was 3g/50gkg body weight/day for test I and 3g/kg body weight/day for test II for 14 consecutive days. The effect on aphrodisiac was assessed by observing the frequency of genital probing, frequency of attempts for mating and frequency of actual mounting before and after giving the dose Ligzhi. No significancant difference wad found in the frequency of genital probing (16 *vs* 14 times, $p>0.1$), frequency of attempts for mating (7 *vs* 4 times, $p>0.1$) before and after

giving the dose Lingzhi in test I. There was also no significant difference in the frequency of genital probing (7 *vs* 5 times, p>0.5), frequency of attempts for mating (9 *vs* 2 times, p>0.1) and frequency of actual mounting (1 *vs* 0 time, p>0.1) before and after giving the dose Lingzhi in test II.

145. Effect of Lingzhi on reproductive performance of laboratory mice (ICR strain). Laboratory Animal Service Division, *Annual Report 2000*. Yangon: DMR (LM): p99.

Forty males and forty of ICT strain mice, 23-25g in body weight were divided into test group and control randomly. They were maintained at a dean conventional room with room temperature of 22-24˚C, 8 hour a day fluorescent lighting. Food and water were provided ad libitum. 0.5ml of fluid containing 3g/50kg body weight/day dosage of Linghi was given to each mouse of test group and the same amount of water was given to each mouse of the control group until the end of the study. The permanent mating type with the mating ratio of 1:1 was used and the reproductive performance was observed up to 2nd litter. Mean and standard deviation of each parameter was calculated by standard statistical methods. Statistical difference analysis was made by one way ANOVA statistics. The control group had higher fertility indices (95% for 1st and 75% for 2nd litter) than test group (65% in both 1st and 2nd litter). There were no significant in numbers of litter size (7.52 ± 2.85 *vs* 7.92 ± 2.25 in 1st litter and 8.73 ± 2.78 *vs* 8.85 ±1.99 in 2nd litter), mean birth weight (1.64 ± 0.25g *vs* 1.43 ± 0.34g in 1st litter and 1.64 ± 0.16g *vs* 1.57 ± 0.20g in 2nd litter), mean weaning weight (8.83 ± 2.83g *vs* 8.10 ± 2.61g in 1st litter and 8.08 ± 1.71g *vs* 7.67 ± 1.82g in 2nd litter) and preweaning mortality rate (11.20% *vs* 13.70% in 1st litter and 11.70% *vs* 13% in 2nd litter). According to the result, it was found that Lingzhi has no effect on reproductive performance of laboratory mice (ICR strain).

146. The effect of *Millingtonia hortensis* root bark on alcohol in toxication. Mya Tu, M; Chit Maung; Sein Gwan. *1st Burma Res Congr,* 1965: p5.

Millingtonia hortensis roots (ဇကရာဓိမြစ်) has a reputation amongst the Burmese an "anti-alcohol" agent. In order to test the above claim, the effect of a watery paste of *Millingtonia hortensis* root bark after a test dose of alcohol was determined. The objective tests used were: - (a)Blood alcohol levels, (b)The finger-finger co-ordination test, (c)The spokes test, (d) The standing steadiness test. The subjective test used was that of self-estimation. The results of the tests so far conducted are inconclusive; therefore no definite conclusion can as can yet be drawn regarding the effect of *Millingtonia hortensis* on alcohol metabolism.

147. Effect of Myanmar traditional medicine paste (အထူးလိမ်းဆေး) in treatment of osteoarthritis knee in female patients. Khin Win Sein. Thesis, DrMedSc (Rehabilitation Medicine), Yangon: Institute of Medicine (1), 2007.

Osteoarthritis is an important cause of disability in our society, affecting millions and resulting in loss of time at work and activity limitations. New pharmacologic therapies for this disease are available among which the use of Myanmar traditional medicine is becoming popular because of the commonly used analgesics are having side effect in long term use. The present study therefore aims to determine the effectiveness of Myanmar Traditional Medicine paste (အထူးလိမ်းဆေး) being used in Yangon Traditional Medicine Hospital in treatment of osteoarthritis knee in female patients. This study was carried out with the objectives of to determine the phytochemical characteristics of its different extracts in Myanmar Traditional

Medicine paste (အထူးလိမ်းဆေး). An experimental study was conducted as a preliminary study to explore the anti-inflammatory effects of Myanmar Traditional Medicine powder (အထူးလိမ်းဆေး). Based on the findings of preliminary data, a clinical study was done to comparing the effectiveness on relief of pain, determining the improvement of range of movement and improvement of knee functional capacity and quality of life in following two treatment regimes, Myanmar Traditional Medicine paste (အထူးလိမ်းဆေး) versus Wax bath Physiotherapy in 100 female osteoarthritis knee joint. A preliminary animal study using Myanmar Traditional Medicine (MTM) (အထူးလိမ်းဆေး), Sweet flag (လင်းနေမြစ်) and Cinnamon (ကရဝေးရွက်) was carried out in 42 albino rats for their anti-inflammatory effects. Inflammation of right hind paws were induced by injection of carrageenin. The volume changes due to inflammation were measured by plethysmometer. There were eight rats in each group except MTM group which consisted of 10 rats. There was significant inhibition of paw oedema due to Aspirin, MTM, Cinnamon and Sweet flag in 1, 2, 3 and 4 hours. The degree of inhibition was Aspirin maximum with MTM, followed by Cinnamon and Sweet flag. In a clinical study, a total of (100) female patients aged 45-75 years with current BMI of not more than 39, who attended the physical Medicine and Rehabilitation Department, No (2) Military Hospital with the complaint of knee pain was studied Half of them (50 patients) were allocated to Group A and treated with Myanmar Traditional Medicine (အထူးလိမ်းဆေး) paste application with knee exercise for 3 times a week for 4 weeks duration. The rest (50 patients) were recruited for Group B and treated with application of Wax bath physiotherapy (WBP) combined with knee exercise 5 times a weeks for 4 weeks. The arthritic functional status and quality of life status was assessed before and during treatment at each follow up at 1^{st} , 2^{nd} , 3^{rd} , 4^{th} , 6^{th} , 8^{th} and 12^{th} weeks. Myanmar Traditional Medicine paste (အထူးလိမ်းဆေး) has been found to be effective, safe and an economical alternative medical treatment for cases of Osteoarthritis knee who have side effects due to NSAIDs or who are not responding well to other kind of treatment. The age groups in both treatment groups were comparable with both groups having a maximum of 45-50 year group respectively. In this study, the education status of both treatment groups were comparable, mostly being middle school group, and patients were mainly housewives in both groups. There was no significant difference between the two groups. The body mass index of both treatment groups was comparable in both groups. All the patients (100%) were over-weight (i.e BMI 25-29.9) and some of then were obese (i.e BMI more than 30). In this study, the patients from both groups had bilateral knee joint involvement in more than 50%. There was no significant difference between the two groups regarding the nature of pain. All patients, 50 in each group, completed the treatment duration of 12 weeks. There was no drop-out in both groups. Clinical outcomes or the effects of the MTM and WBP were measured by VAS score for pain, F & S score for joint stiffness, degree of flexion and extension for the range of movement and manual muscle testing (MMT) for muscle power. Comparison of the baseline of both groups showed significant improvement more remarkable in first four weeks. There were no significant difference in all the measurement between two groups. Both right and left knee receiving treatment showed similar improvement, with both MTM and WBP. The joints were also assessed by alternative method of measurement (i.e WOMAC score.) By this measurement as well, there was significant improvement in both groups in terms of pain, stiffness and dysfunction scores after 4 weeks and 12 weeks treatment. Regarding side effects, there was no allergic reactions

nor hypersensitivity. However, erythematous skin reaction was noted probably due to irritation. The skin changes were found to be less severe with subsequent treatment. There were no drop-out due to this skin irritation. According to results of this study, Myanmar Traditional Medicine knee paste (အထူးလိမ်းဆေး), is an effective alternative to Western medicine such as aspirin which can have harmful side-effects in some patients. It is easy to administer and can effectively reduce pain and inflammation in osteoarthritis knee, providing relief and enabling the sufferer to continue with daily activities of life.

148. Effect of pomegranate juice supplementation on serum total cholesterol level of hypercholesterolemic rats. Theingi Thwin; Thet Thet Mar; Hnin Lwin Tun; Khin Than Yee; Lwin Zar Maw; Tin Ko Ko Oo; Aye Myint Oo; Khin Myat Tun. *Myanmar Health Sci Res J.* 2005; 17(3); p142-148.

To investigate the effect of pomegranate (*Punica granatum*) juice on serum total cholesterol level in an animal model, an experimental study was carried out in twenty wistar strain rats (150-200gm body weight, 10 males and 10 females). To induce hypercholesterolemia, all rats were supplemented with a high cholesterol diet which was enriched with coconut oil (25% by weight), cholesterol (1% by weight) and sugar (16% by weight) to the ordinary feed, for thirty days. After dietary inducement, 10 of 20 hypercholesterolemic rats whose serum total cholesterol levels increased by 75% and above 75% than their basal levels were administered orally, an alcohol extract of pomegranate seeds (0.056gm) and 3ml of fresh pomegranate juice daily for 90 days. Another ten hypercholesterolemic rats (control group) were administered orally, 3ml distilled water daily for 90 days. Serum total cholesterol levels were measured on Day 30, Day 60 and Day 90 of pomegranate juice and distilled water supplementation. Serum total cholesterol levels of the test group were lower than those of the control group on Day 30 (91.44±22.9mg/dl *vs.* 109.4±27.19mg/dl), and on Day 60 (82.6±17.3mg/dl *vs.* 89.7±13.96mg/dl) of supplementation, although they were not statistically significant ($p<0.05$ for both). On Day 90 of supplementation, serum total cholesterol level of test group was significantly lower than that of control group (74.4±10.11mg/dl *vs.* 86.8±10.52mg/dl), ($p=0.043$). Therefore, a 90 day supplementation of pomegranate juice reduces serum total cholesterol level in diet-induced hypercholesterolemic rats.

149. Effect of *Quisqualis indica* (Da-we-hmaing) on some bacteria. Mar Mar Nyein; Min Zaw. *Rep Burma Med Res Counc*, 1972; p18.

The *in vitro* action of a 50% water 50% alcoholic extract of *Quisqualis indica,* leaf and flower were tested on *Escherichia coli, Klebsiella pneumoniae, Proteus vulgaris, P. mirabilis, Salmonella paratyphi, S. typhi, Shigella boydii, S. dysenteriae, S. flexneri, S. schemitzi, Staphyphylococcus aureus* and *Vibrio cholerae* Eltor. Aqueous solutions of extract of 10 to 1000mcg/ml were tested using (1) Agar disc diffusion technique Fairbrother & Sherris, 1959) for screening and (2) the serial tube dilution technique to determine if this was bacteriostatic or bactericidal. Ampicillin was used as a control. The extract of flower was found to have a bactericidal activity on the 12 bacteria tested. The Minimum inhibitory concentration was found to be approximately 500mcg/ml in the tested bacteria. The extract of leaf also showed an antibacterial activity on the tested bacteria except on *S. typhi*.

150. Effect of raw garlic (*Allium sativum*) supplementation on serum lipid profile in hypercholesterolemic subjects. Moe Thida Kyaw. Thesis, MMedSc. (Biochemistry), Yangon: University of Medicine (2); 2006.

Effect of raw garlic (*Allium sativum*) supplementation on serum lipid profile was investigated in 25 volunteers with high serum cholesterol level. The fasting serum lipid levels of subjects were determined at basal, after 2 weeks of diet control alone, 4 weeks and 8 weeks after diet control plus 10g/day raw garlic supplementation and after 2 weeks wash-out period. The serum lipids determined in the present study were total cholesterol (TC), triglycerides (TG), high density lipoprotein cholesterol (HDL-C) and low density lipoprotein cholesterol (LDL-C). The decrease in serum total cholesterol, triglyceride and LDL-C levels and the increase in HDL-C were observed at 2 weeks after diet control and 4 weeks after garlic supplementation but were not statistically significant. The decrease for total cholesterol (7.7%) and LDL-C (11.7%) were statistically significant ($p<0.05$) at the end of 8^{th} week after garlic supplementation. Also the increase in HDL-C (15.1%) and decrease in LDL-C (11%) were seen after 2 weeks wash-out period which were significant ($p<0.05$). However, there was not significant increase in total cholesterol, triglyceride and LDL-C at 2 weeks wash-out period which do not reach the basal levels.

151. The effect of some medicinal plants on uterine smooth muscle. Aye Than; Win Myint; Mu Mu Sein Myint; Tin Myint; Mya Bwin. *Myanmar Health Sci Res J.* 1995; 7(2): p70-74.

Some selected plants reputed for use in menstrual disorders were scientifically investigated for their efficacy. Plant aqueous extracts were preliminarily screened for the efficacy on rat's uterine smooth muscle. The effects of aqueous extracts of *Eclipta alba* (L.) Hassk. (Kyeik-hman), *Amaranthus spinosus* Linn. (Hinnu-nwe-subauk) and *Averrhoa carambola* Linn. (Zaung-yah) were tested *in vitro* using isolated rat's uterus smooth muscle. Kyeik-hman, Hinnu-nwe-subauk and Zaung-yah whole plant aqueous extracts significantly induced contraction on the uterine smooth muscle.

152. Effect of spirulina on body weight, blood glucose and cholesterol level in rats. Win Win Khine. Thesis, MSc (Zoology), University of Yangon; 1999.

Twenty five male wister rats of 45 days old were randomly allotted into five groups of 5 each for 8 weeks experiment. Five rats which were given spirulina at a dose of 0.092mg per body weight followed by laboratory chow was taken as Group A. Rats given only, this amount of laboratory chow without spirulina were taken as Group B. Group C and Group D consisted of rats which were one half and one third dose of spirulina followed by free DMR laboratory chow to study the dose effect of spirulina. Remaining five rats which were fed with free DMR diet were taken as control. Body weight, food intake, blood cholesterol and blood glucose level of each and every rat was recorded at fourth weeks and eighth weeks. At the end of the experiment when spirulina was given to growing rats, although there was weight gain the body weight of spirulina treated rats (273.6 ± 17.5gm) was significantly lower $p<0.05$ than that of ad.libitum animals (297.6 ± 7.17gm). There was no significant difference of body weight between spirulina treated animals and diet restricted ones (257.2 ± 20.9gm). By studying the food intake it showed that the higher the spirulina in the diet, the lesser the food intake which results in lower weight gain. Therefore it can be concluded that the bulking action of spirulina in the stomach hindered the food intake and decreased the weight gain of rats. This pattern was also noted in blood glucose level of rats where the spirulina treated rats (103.6 ± 6.4mg%) was

significantly lower ($p<0.001$) when compared to ad libitum animals (128.4±5.79mg%). The lower the spirulina in diet made the rat to take more food intake resulting in higher blood glucose level. There was also no significant difference of blood glucose level between diet restricted animals (93±3.16mg%) and spirulina treated ones (103.6±6.4mg%). Therefore the same action of spirulina might play an important role in controlling blood glucose level of rats. At the end of the experiment it was noted that the ad.libitum rats had the highest cholesterol level (51.42± 3.59mg%) when compared to that of spirulina given rats (36.63±8.3mg%). The significant difference ($p<0.05$) was noted in spirulina treated rats when their onset of cholesterol level (51.52± 12.79mg%) was compared to their results at the end of the experiment (36.63±8.3mg%). Where else no significant change was detected in diet restricted ones. Therefore it can be regarded that the spirulina itself had some cholesterol lowering effect which was not depended on bulking action.

153. Effect of tamarind (*Tamarindus indica* Linn.) seed extract on Russell's viper (*Daboia russelii siamensis*) venom. Zaw Lynn; Myo Win; Khin Maung Maung; Theingi Myint. *Myanmar Health Res Congr*, 2008: p24.

Snake bite has been regarded as an important health problem in Myanmar since early 1960's. In the recent years, there has been growing interest in alternative therapies and therapeutic use of natural products, especially those derive from plants. In Myanmar and Indian traditional medicine, various plants have used as a remedy for treating snake bite. The present study was carried out to evaluate the effects of alcoholic extract of (*Tamarindus indica* Linn.) tamarind seed on some biologic properties of Russell's Viper Venom (RVV). Phospholipase A_2 (PL $A_{2)}$ enzyme, coagulase enzyme and Caseinolytic enzyme activities of Russell's Viper Venom (RVV) were reduced when mixed and incubated with the extract. When the RVV and the different amount of extracts were preincubated and injected intramuscularly into mice, all of them survived, although all mice of control group died. On the other hand, when the extract and RVV were injected separatrely into mice, all of them died. If the extract was injected near the site were Russell's viper venom was injected, all the mice survived for more than 24hours and prolong the survival time but they all died in 96 hours. In conclusion, according to the results, the extract reduces some biologic properties of Russell's viper venom when mixed before injection.

154. Effect of *Zizyphus jujuba* kernel on aphrodisiac and stress adaptation. Ye Tint Lwin; May Aye Than; Ni Thet Oo; Mu Mu Sein Myint; Sein Win; Moe Moe Aye; Mu Mu Win; Aye Win Oo. *Myanmar Health Res Congr*, 1999: p71.

Zizyphus jujuba kernel (Zee sei asan in Myanmar name) is used as tonic for heart and brain and also for aphrodisiac in our country as well as in India. It is also useful for general debility. The present study was carried out on laboratory animals to find out its effect on aphrodisiac and stress adaptation. Nine pairs of OFA strain rats about 4 months old (approximately 200g body weight) were used to study the effect on aphrodisiac and 5 males of wistar strain were tested for stress adaptation. Self-controlled clinical study design was used for study of the effect on aphrodisiac and crossover study design was used for study of stress adaptogenic activity. The dose of *Zizyphus jujuba* kernel used was 50 times the dose of human on kilograms body weight. Water or 1 acasia was used as placebo. The effect on aphrodisiac was assessed by observing the frequency of attempts to mate before and after giving the dose *Zizyphus jujuba* kernel. It was found to be no significant difference in the

frequency of attempts to mate before (32±18 times) and after (27±21 times) giving the dose of *Zizyphus jujuba* kernel.

155. Effects of *Artemisia annua* plant and extracts on mosquitoes. Htay Aung; Than Myat Htay; Than Than Swe; Sein Min; Sein Thaung; Aye Than; Aye Aye Thein; Mu Mu Sein Myint. *Myanmar Health Res Congr*, 2000: p39.

Artemisia annua plant extract produced a promising repellent action on *A.aegypti* mosquitoes (the major vector of DHF in Myanmar) even at concentrations as low as 5.0 and 7.5%. At a concentration of 100% no mosquitoes biting and the protection provided was 100%. The larvicidal effect of *Artemisia annua* on *A. aegypti* (larvae) was determined by using 3rd instars and above. The LC_{50} and LC_{90} were found to be 0.45 and 0.75% respectively. The residual effect of *Artemisia annua* under laboratory condition with 1 and 2% persisted more than 30 days. Also, under laboratory condition with Artemisia 1.0% concentration the ovicidal effect was found to be 100% control. However, field study at Pyin-oo-lwin showed growing Artemisia plant in the garden or around the house alone could not keep away from mosquito bites.

156. The efficacy of *Artemisia annua* crude extracts on *Anopheles dirus* in the laboratory and whole plants on other mosquitoes in the field. Sein Min; Than Myat Htay; Than Than Swe; Tun Lin, W; Sein Thaung; Pe Than Htun; Win Win Maw; Sein Hla Bo. *Myanmar Health Sci Res J.* 2005; 17(1): p15-21.

Evaluation of the efficacy of an aromatic plant *Artemisia annua* against *Anopheles dirus* mosquito (a major vector of forest malaria in Myanmar) was conducted in the laboratory and in the field situation. Repellent effect on adult mosquito was observed at the concentration as low as 0.5% Artemisia extracts solution. At the concentration of 6.0%, the repellent was marrkedly increased and protection provided was found to be 94.74% during an exposure period of six hours (r=0.95, df=6, p=0.001). The larvicidal effect on 3rd and 4th instar larvae of *An. dirus* showed that the LC_{50} and LC_{90} were 0.04% and 0.14% respectively based on the dose effect probit analysis (X^2= 3.05, df = 3, $p<0.05$).The residual effect persisted for at least 6 days at 0.25% and 0.50% concentrations. Regarding the ovicidal effect, a series of concentrations starting from 0.025% were tested and at 0.40% concentrations, the relative reduction in egg hatching rate was 93.85% compared to that of control (r=0.92, df=4, p=0.026). However, protection from mosquito bites was not observed when *Artemisia annua* plants were placed around baits under field situation (X^2=1.69, df=2, $p>0.05$).The prospects for the use of indigenous plants and its extracts for personal propective measures in prevention and control of vector born diseases are also discussed.

157. Establishment and use of *Plasmodium berghei*-mouse model in Burma for the screening of drugs for antimalarial activity. Tin Tin Aye. Thesis, MSc. (Zoology), University of Rangoon; 1983.

Plasmodium berghei infection produces a self resolving benign type of infection in albino rats. The level of parasitaemia was significantly increased in female rats than the male and also in the younger age group than the older one. The relationship of the infective inocula and the prepatent period was found to be linear with an approximate slope of r=0.9. However, *P. berghei* produced non-resolving fatal infections in mice regardless of the strains. The average mortality rate was significantly increased in DDY mice and nude mice. The antimalarial effect was not elucidated with the extracts of Pan-daw-na, Taw-daw-na, Thu-young-kha, Khant-tauk-myint and Let-htoke-gyi. Phenylbutazone, Gentamycin, Streptomycin and Metronidazole showed some

antimalarial activity, but with very high ED_{90}. Clindamycin was proved to be an effective antimalarial with an ED_{50} (2.2mg/kg/day). Kanamycin, Ampicillin, Isoniazid, Griseofulvin, Diethylcarbamazine and Furazolidone did not produce any antimalarial effect.

158. The establishment of *in vitro* screening model for antimalarials using rabbit serum and *Plasmodium falciparum.* Mi Mi Sein. Thesis, MSc (Zoology), University of Rangoon; 1987.

A rabbit *in vitro* model system is tested to determine the activity of antimalarial drugs against *P. falciparum* infection. Serum samples obtained from rabbits at various time intervals after administration of drugs were incubated with parasites collected from patients. Antimalarial activity was detected in sera obtained from rabbits treated with amodiaquine, chloroquine, quinine and pyrimethamine. The rabbit *in vitro* system using quinine or chloroquine treated rabbit serum showed the definite relationship with the sensitivity pattern of *in vitro* testing using precharged plates with known amount of antimalarials and human serum. The model was also found to be useful for the screening of the extracts of *Artemisia annua*. The rabbit *in vitro* system showed the similar results with that of *P. berghei* mouse system when petroleum ether and di-ethyl ether extracts of the plants with antimalarial activity were used. The results indicated that this model may be a useful system for further screening of drugs against falciparum malaria, particularly compounds which need to be metabolised *in vitro.*

159. Evaluation of antibacterial activity and characterization of phytoconstituents of selected Myanmar medicinal plants. Nwe Yee Win. Thesis, PhD (Engineering Chemistry), Yangon Technology University; 2001.

A research has been carried out on *Allium sativum* Linn. (Garlic) which is commonly cultivated in the Union of Myanmar. Studies on the morphology of the vegetative and reproductive parts and the anatomy of the leaf blade, leaf sheath, bulb and roots have been made. Comparative physico-chemical and phyto-chemical studies on garlic collected from three different localities namely, Taunggyi, Mogoke and Monywa Townships were conducted. The main constituent of garlic, allicin, from the bulb was extracted and identified by the thin layer chromatographic and spectroscopic determinations.

160. Evaluation of antidiarrhoeal activities of some isolated bioactive organic compounds present in *Melastoma malabathricum* Linn. (Say-obok) leaf and *Mangifera indica* Linn. (Tha-yet) seed kernel. Ohnmar Ko.Thesis, PhD (Chemistry), University of Yangon; 2007.

In the present work, two medicinal plants: *Melastoma malabathricum* Linn. (Say-obok) leaf (SOL) and *Mangifera indica* Linn. (Tha-yet) seed kernel (TYSK) were chosen for isolation of phytoconstituents and bioactivity studies. By silica gel column chromatographic separation, 0.01% of ursolic acid (m.pt=280~283˚C) was isolated from EtOAc fraction of defatted SOL 95% EtOH extract where 0.001% of 1,7-dihydroxy-6-(3-hydroxy butanoyl) -3-methoxy-9H-xanthen-9-one m.pt=168~172˚C), 0.09% of ethyl gallate (m.pt=158~161˚C) and 0.07% of gallic acid (m.pt=240~243˚C) were isolated from that of TYSK. The identities of all isolated compounds were made by modern spectroscopic techniques (UV, FT-IR and ^{1}H NMR). In acute toxicity test, aqueous and ethanol extracts from SOL as well as TYSK aqueous extract were found to be free from acute toxic or harmful effect at maximum permissible dose of 16g/kg bw. However, TYSK ethanol extract has mild toxic effect and the medium lethal dose

(LD_{50}) was 3.4g/kg BW and confidence limit of LD_{50} was between 2.15-5.37g/kg BW. Anti-bacterial activity screening of PE, EtOAc, EtOH and H_2O extracts from both plants samples against 13 species of pathogenic microorganisms was carried out by employing agar disc diffusion method. All of the extracts from TYSK were generally found to exhibit higher anti-bacterial activity (inhibition zone diameters ranged between 10-30mm) against all test microorganisms than that of SOL. Therefore TYSK may be more effective than SOL for the treatment of the infections caused by the test microorganisms, such as *E. coli* ETEC, *E. coli* O126H12, *and E.coli* ATCC 25922, *E. coli* VTEC, *Salmonella kefeld, Salmonella chloreaegaia*, *Salmonella paratyphi*, *Vibro fluvialis, Vibro cholerae, Bacillus subtilis, Proteus valgaris, Shigella sonnei* and *S. oureus* species. *In vivo* anti-diarrhoeal effects of SOL and TYSK aqueous extracts (6g/kg BW doses) and ethyl gallate (30mg/kg BW dose) were studied on castor oil-induced diarrhoeal mice model. The investigation was conducted by castor oil-induced diarrhoeal test, castor oil-induced entropooling test and castor oil-induced small intestinal transit test. From these results, it can be inferred that aqueous extracts from both plant samples and ethyl gallate had frequencies of diarrhoeal reducing effect, anti-secretary effect and anti-motility effect. *In vitro* anti-diarrhoeal effects of SOL and TYSK aqueous extracts (0.8, 1.2 and 1.6mg/ml BC doses) and ethyl gallate (0.02, 0.03 and 0.04mg/ml BC doses) were also investigated by studying the smooth muscle relaxation effect on isolated rabbit intestine. From this experiment, it was observed that both aqueous extracts and ethyl gallate had direct relaxation effect on smooth muscle. The relaxation effects were increased with increasing the concentrations of all samples tested. It was also observed that both aqueous extracts and ethyl gallate showed marked decrease in magnitude and frequency of ileal contraction and decrease in intestinal movement. According to the *in vivo* and *in vitro* anti-diarrhoeal index, SOL aqueous extract (6g/kg BW dose) ($ADI_{in\ vivo}$ 84.86% and $ADI_{in\ vitro}$ 72.03%) showed more potent in anti-diarrhoeal activity than TYSK aqueous extract (6g/kg BW dose) ($ADI_{in\ vivo}$ 66.6% and $ADI_{in\ vitro}$ 71.51%). And ethyl gallate (30mg/ml BW dose) showed 81.99% of $ADI_{in\ vivo}$ and 66.76% of $ADI_{in\ vitro}$. The action of SOL and TYSK aqueous extracts and ethyl gallate on isolated rabbit intestinal smooth muscle contraction induced by Ach, carbachol, histamine and propranolol were also studied. It indicated that both extracts and ethyl gallate have anti-muscarinic activity as atropine and tolazoline and they also have anti-histamine activity very similar to that of chlorpheniramine.

161. Evaluation of antidiarrhoeal activity of seed kernel of *Mangifera indica* Linn. (Mango). May Aye Than; Mu Mu Sein Myint; Ohnmar Ko; Myint Myint Khine; San San Myint; Nu Nu Win; Mar Mar Nyein. *Myanmar Health Res Congr*, 2007: p24-25.

In order to combat the problems of diarrhoea globally, World Health Organization has given a special emphasis on the use of traditional medicines in management of diarrhoea. It thus becomes important to evaluate commonly available natural drugs as alternative to currently used anti-diarrhoeal drugs. The aim is to evaluate *in vivo* and *in vitro* antidiarrhoeal activity of reputed Mango seed kernel. *In vivo* the anti-diarrhoeal activity of aqueous extracts were carried out using castor oil-induced diarrhoea model in mice with the standard loperamide. Like loperamide, a single oral dose of its extract produced significant reduction in fecal out put and onset of diarrhoea ($p<0.005$-0.001) compared with that of control. This study was also conducted on castor oil-induced gastrointestinal motility (intestinal-transit) after

charcoal meal, intestinal fluid accumulation, and the effect of smooth muscle on isolated rabbit intestine for its mechanism of action.

162. Evaluation of antidiarrhoeal activity of *Swertia angustifolia* Ham. on mice. May Aye Than; Mu Mu Sein Myint; Myint Myint Khine; Phyu Phyu Win; San San Myint; Nu Nu Win; Ohnmar Tun, Naw. *Myanmar Health Sci Res J*. 2011 August; 23(2): p108-115.

In order to combat the problems of diarrhoea globally, the World Health Organization encouraged studies for the treatment of diarrhoea diseases with herbs. It thus becomes important to evaluate commonly available nature drugs as alternative to currently used antidiarrhoeal drugs. The study was carried out to evaluated acute toxicity, phytochemical, and antidiarrhoeal activity of *Swertia angustifolia*. Acute toxicity study showed that there was no toxic effect even with maximum permissible dose of 24g/kg. No toxic compound and metal like cyanogenic glycoside and arsenic were detected. *In vivo* antidiarrhoeal activities of aqueous extracts (3, 6, 12g/kg single oral doses) were carried out using castor oil-induced diarrhoeal model in mice with standard loperamide. Like loperamide, all doses of extract produced significant reduction in fecal output and prolongation in onset of diarrhoea ($p<0.05$-0.0005) compared with that of control. To understand the mechanism of action, it is also evaluated castor oil-induced gastrointestinal motility (intestinal-transit) and intestinal fluid accumulation. The extract and loperamide also significantly reduced the castor oil-induced gastrointestinal motility and intestinal fluid accumulation (anti-secretory effect) ($p<0.05$-0.0005). The *in vivo* antidiarrhoeal index of extract and loperamide were 60.2% and 97.4%, respectively. Antibacterial activity screening of aqueous extracts against 9 types of pathogenic microorganisms was carried out by employing agar disc diffusion method. It inhibited the growth of enterotoxigenic *Escherichia coli* (ETEC), *Salmaonella typhi* and *Salmonella paratyphi*. These results indicated their potential usefulness in infected diarrhoea with these three organisms. In conclusion, aqueous extract of *Swertia angustifolia* revealed the antidiarrhoeal effect and potential utility in both infected and non-infected diarrhoea states.

163. Evaluation of antidiarrhoeal effect of fruit of *Phyllanthus emblica* Linn. (Zee-byu) in mice. Zaw Myo Tint; May Aye Than; Mu Mu Sein Myint; Khin Tar Yar Myint; Win Win Maw; Myint Myint Khine; San San Myint; Aung Aung Maw. *Myanmar Health Res Congr,* 2011. p10-11.

The aim of this study was to evaluate phytochemicals, acute toxicity and antidiaharrhoeal activity of 70% ethanolic extract of fruit of *Phyllanthus emblica* Linn. Phytochemicals test showed present of alkaloid, glycoside, reducing sugar, steroid/terpenes, flavonoid, polyphenol and tannin. Cyanogenic glycoside was absent. Acute toxicity test showed that the median lethal dose (LD_{50}) was (11.04-14.61) g/kg body weigh per orally in mice. *In-vitro* antidiarrhoeal activity was evaluated by (1) castor oil-induced diarrhoea test (onset of defecation and number of stools passed), (2) castor oil-induced enteropooling test (weight/volume of accumulated fluid) and (3) castor oil-induced small intestinal transit (passage of charcoal meal). The control group received oral 10ml/kg of normal saline. The standard group received oral 6ml/kg loperamide. Three test groups received oral 1.5g/kg, 3g/kg and 6g/kg of 70% ethanolic extract of fruit of *Phyllanthus emblica* respectively. The number of stools were significantly reduced in all test groups (<0.05-0.0005) and loperamide group ($p<0.0005$) as compared with control group. Onset of defection was significantly increased in loperamide group ($p<0.0005$) but not in all test groups. The volume and weight of accumulated small intestinal contents were significantly decreased in

loperamide group ($p<0.0005$), extract 3g/kg group ($p<0.05$) and extract 6g/kg group ($p<0.00005$). The percent inhibition of intestinal transit was significantly increased standard group ($p<0.01$) and extract 6g/kg group ($p<0.05$). The antidiarrhoeal indexes of loperamide and extract were 173.49%, 66.09%, 72.37% and 77.38% respectively. In conclusion, 70% ethanolic extract of fruit of *Phyllanthus emblica* Linn. showed significant antidiarrhoeal activity on castor oil-induced diarrhoea in mice model.

164. Evaluation of bioactive organic compounds and antioxidant activity *in vivo* and *in vitro* methods of *Vitis vinifera* Linn. (Grape) (Sa-byit) and *Punica granatum* Linn. (Pomegranate) (Tha-lae) seeds. Kyi Nwe Aye. Thesis, PhD (Chemistry), University of Yangon, 2008.

Many edible fruits have powerful natural antioxidant compounds. Among them, grape seeds and pomegranate seeds have been reported to provide superior antioxidant activity than vitamin C and vitamin E. The aim of this research was to evaluate the antioxidant activity from the seeds of locally cultivated *Vitis vinifera* Linn. (Grape) (Sa-byit) and *Punica granatum* Linn. (Pomegranate) fruits in *in vivo* as well as *in vitro* methods, and to isolate some natural antioxidants compounds from these two samples. In the present work, on silica gel column chromatographic separation a triterpenoid compound: ursolic acid (A, 0.042%, m.pt = 285-287˚C), a phenolic compound catechin: (B, 0.05%, m.pt = 174-176˚C) and another one phenolic compound: epicatechin (C, 0.06%, m.pt = 232-235˚C) were isolated from defatted 95% EtOH extract of Grape seeds. In addition, from the defatted EtOAc crude extract of Pomegranate seed, gallic acid (D, 0.07%, m.pt = 234-236˚C), a tannin, was isolated. All of these isolated compounds were characterized and classified by their physical and chemical properties and structurally identified by UV-visible, FT-IR, ^{1}H NMR and ^{13}C NMR spectroscopic methods. *In vivo* antioxidant activity of 95% EtOH and aqueous extracts from grape seed was studied by using CCl_4-induced rat model. The antioxidant activity was determined by the effect on serum Malondialdehyde (MDA), biomarker for lipid peroxidation product levels, in rats. The serum MDA levels were measured spectroscopically by thiobarbituric acid reactive species (TBARS) assay method. After 7-days treatment of GS EtOH, GS aqueous, PS aqueous and PS EtOH extracts in 400mg/kg bodyweight doses were found to reduce 56.44%, 46.08%, 38.86% and 37.69% of serum MDA respectively. Since, the higher the reduction percent of MDA level, the more significant to inhibit the lipidperoxidation due to free radicals, GS EtOH extract was the most effective than the others in antioxidant power and followed by GS aqueous extracts, PS aqueous extract and then by PS EtOH extract. On the other hand, after 7-days treatment of four isolated compounds (4mg/kg b.wt/day dose) in CCl_4- induced rats, catechin (45.30% reduction), epicatechin (43.69% reduction) and gallic acid (40.33% reduction), showed lowering the MDA levels compared with same dose treated of commercial standard antioxidant vitamin E (38.92% reduction), and vitamin C (34.28% reduction). But ursolic acid (27.51% reduction) has less reduced the MDA level than vitamin C and vitamin E. These results were indicative that phenolic compounds of catechin, epicatechin and gallic acid showed good antioxidant power and riterpenoid ursolic acid has low antioxidant property than standard antioxidant vitamin E and vitamin C. Study on *in vitro* antioxidant activity test, ethanol and aqueous extracts both sample seeds and four isolated compounds (ursolic acid, catechin, epicatechin and gallic acid) were used by DPPH assay and compared with commercial antioxidant vitamin C. IC_{50} values of Grape seed 95% EtOH extracts (IC_{50} = 0.82µg/mL) was found to be the highest activity followed by Grape seed aqueous extracts (IC_{50} =

0.90µg/mL), Pomegranate seed aqueous extracts (IC_{50}=0.94µg/mL) and Pomegranate seed 95% EtOH extracts of (IC_{50} = 0.98µg/mL) respectively. And both seed extracts showed higher radical scavenging activity than reference standard vitamin C (IC_{50} = 1.85µg/mL). The radical scavenging power of isolated compounds were observed to be in the order of catechin (IC_{50} = 0.84µg/mL> epicatechin (IC_{50} = 0.87µg/mL) > gallic acid (IC_{50} = 0.97µg/mL) > ursolic acids (IC_{50} = 1.89µg/mL). Consequently, it can be inferred that catechin, epicatechin and gallic acid are very powerful antioxidants and they are more effective than vitamin C, and ursolic acid has lower anti-oxidant effect than vitamin C. According to this acute toxicity test, there is no acute toxic effects occurred in Grape seeds as well as Pomegranate seeds at maximum permissible dose of 16g/kg b.w. Thus, it may be inferred that both edible fruit seeds could be used safely. It was investigated that, Grape and Pomegranate seeds extract showed higher potency activity than isolated compounds in antioxidant activity, because it may be due to the most active compounds that are concentrated in crude extracts. Both Grape and Pomegranate seed extracts showed comparable antioxidant power in *in vivo* and *in vitro* methods. It is evident that, Grape and Pomegranate seeds extracts contain high level of antiradical phytochemical constituents and they could used as the free radical scavengers to prevent the oxidative damage of diseases. From the present result obtained, chief sources of two locally cultivated Grape and Pomegranate seeds could be safely used as anti-oxidative agents for the treatment of diseases caused by free radicals.

165. Evaluation of the effect of some indigenous plants on bacterial activities. Mi Mi Htwe. Thesis, MSc (Zoology), University of Yangon; 1998.

The study period of this work lasted from 18-9-96 to 8-8-97. Twelve indigenous plant extracts were tested on 5 strains of *Escherichia coli*, three strains of Shigellae, and one strain each of *Klebsiella aeruginosa*, *Plesiomonas shigelloides*, *Proteus morganii, Pseudomonas pyocyanes, Salmonella typhi, Staphylococcus aureus* and *Vibrio cholerae* for *in vitro* study. Of the 12 indigenous plant extracts tested, *Ageratum conyzoides* (Hkwathaipan) was active on four species of tested bacteria; *Coleus aromaticus* (Ziyaywetthu) on six bacteria species; *Cuminum cyminum* (Ziyasai) on two bacteria species; *Embilica officinalis* (Zibyuthee) on 11 bacteria species; *Foeniculum vulgare* (Samonsaba) on 1 bacteria specie; *Nyctanthes arbortristis* (Seikphaluywet) on six bacteria species; *Piper betle* (Kunywet) on 14 bacteria species; *Piper nigrum* (Ngayokkaungsai) on five bacteria species; *Terminalia chebula* (Pangathee) on 11 bacteria species; *Vinca rosea* (Thinbawmahnyoywet) on 5 bacteria species. The test was observed by using agar disc diffusion technique. *Staphylococcus aureus* strain was artifically infected on open wounds in experimental rats and topical application of plant extracts in paraffin was applied for in *Nyctanthes arbor-tristis* accelerated the rate of wound healing without formation of pus. Suggestions for future work are outlined.

166. An experimental evaluation of anti-asthmatic potential of some plant extracts. Aye Than; Win Myint; Tin Myint; Mu Mu Sein Myint; Win Myint; Mya Bwin. *Myanmar Health Res Congr*, 1993; p76.

The purpose of the investigation is to study the anti-asthmatic effect of some traditional medicinal plant extracts which are claimed for their therapeutic values in the treatment of asthma in Myanmar. The efficacy and mechanism of action of five reputed bronchodilating traditional medicinal plant extracts were studied on the *in vitro* guinea-pig tracheal chain model. Three medicinal plant extracts, namely *Piper betle* L. (Kun-ywet), *Coleus aromaticus* Benth. (Ziya-ywet-htu) and *Ageratum conyzoided* Linn. (Khway-thay-pan) were found to produce a significant relaxation (p0.025). Since this study indicated that the relaxant action found was neither mediated through antihistaminic effect nor anti 5 hydroxytrytamine effects, it may probably act through direct relaxant action on the tracheal smooth muscle.

167. Experimental evaluation of biological and anti-mycobacterial activities of medicinal plants. Khin Chit; Win Myint; Ti Ti; Kyi Thein; Win Win Maw; Mar Mar Myint; Kyaw Myint; Aye Aye Thein; Aye Than; Myo Khin. *Myanmar Health Res Congr*, 1995: p35.

Medicinal plant such as *Acorus calamus* L. (Lin-ne), *Alpinia galanga* Wall. (Ba-de-gaw), *Desmodium triquetrum* DC. (Lauk-thay), and *Vitis discolour* Dalz. (Da-bin-daing-mya-nan) were scientifically investigated for their biological and anti-mycobacterial activities. Biological activity regarding the inhibition of cyclic AMP was assessed by an established method based on the nucler-based analytical technique. Anti-mycobacterial activity of plant extracts were evaluated by *in vitro* screening. Results were then compared with those of isoniazid and rifampicin. Chemical screening of the active plant extracts was also conducted by standard procedures described for the detection of organic constituents. Some of the plant extracts were found to have antimycobacterial activity even on strains resistant to isoniazid and rifampicin. This was important preliminary information for the use of natural products in the treatment of tuberculosis.

168. Experimental screening for anti-peptic ulcer activity of some Myanmar traditional medicine formulations. Aye Than; Tin Myint; Mu Mu Sein Myint; Mya Bwin. *Myanmar Health Sci Res J.* 1995; 7(2): p80-85.

Four Myanmar traditional medicine formulations (TMFs), namely TMF-02, TMF-03A, TMF-03B and TMF-08, locally claimed to be useful in treating dyspepsia, were screened for anti-peptic ulcer activity employing two experimental *in vivo* test models in rats. Only TMF-02, TMF-03B and TMF-08 markedly reduced ulcer severity to the ulcer indices of 17.4, 15.6 and 14.5 respectively. These effects were comparable to cimetidine (13.8), while that of the negative control was 35. Measuring gastric juice acidity in rats employing pyloric ligation confirmed that these 3 drugs did reduce gastric acidity, particularly diminishing the free acid 1/3 and shifting gastric pH from 6 to 7.

169. Handbook of botanical and physico-chemical characterization of Myanmar traditional medicine formulation. Pharmacology Research Division. Yangon: DMR; 1989.

Botanical characterization and physico-chemical standardization of the 39 traditional medicine formulations (covering all plant ingredients investigated) are presented in this book. Provided were descriptions and data on each formulation regarding diagnostic microscopic particles of each plant ingredient of the formulations and physico-chemical data; such as organoleptic characters, thin layer chromatography (TLC) and ultraviolet and visible spectrum (UV & VLS).

170. Hepatoprotective effect of *Emblica officinalis* Gaertn. (Zibyu-thee) on carbon tetrachloride induced hepatotoxicity in albino rats. Myint Myint Than. Thesis, MMedSc (Pharmacology), Yangon: University of Medicine (1); 2011.

The main aim of this research work is to evaluate scientifically on the hepatoprotective activity of *Emblica officinalis* Gaertn. (Zibyu-thee). The dried pulp of fruits of *Emblica officinalis* Gaertn. (Zibyu-thee) was extracted with 80% ethanol and the yield was 20%. It was found in acute toxicity study that ethanolic extract of *Emblica officinalis* Gaertn. (Zibyu-thee) was not toxic up to 6g/kg body weight in mice and 100% lethality was 16g/kg. The LD_{50} of ethanolic extract of *Emblica officinalis* Gaertn. was 12.7g/kg and its 95% confidence limit was (11.04-14.61g/kg). Phytochemical analysis of *Emblica officinalis* Gaertn. (Zibyu-thee) showed the presence of alkaloid, flavonoid, glycoside, cyanogenic glycoside, steroid, tannin, polyphenol, reducing sugar and saponin. The hepatoprotective effect of extract was studied on thirty albino rats of both sexes weighing 180 to 200g. CCl_4 was used as hepatotoxic agent. The test agent was given by oral route. For the hepatoprotective effect, rats were grouped into five, Group I served as negative control, Group II served as positive control and Group III, IV, V served as tested groups. The rats were fasted for 12hours. Tested groups received ethanolic extract of *Emblica officinalis* Gaertn. 1.25g/kg, 2.5g/kg and 5g/kg daily up to 7^{th} day. All groups received water 10ml/kg daily up to 7^{th} day. On the 8^{th} day, Group II, III, IV and V received single dose of CCl_4 1ml/kg per orally. After that, they were observed for 24hours. After 24 hours of CCl_4 administration, i.e., on 9^{th} day, the animals were counted in order to calculate the percent mortality and the remaining lived animals were sacrificed. The blood samples were collected by cardiac puncture. The serum was sent for biochemical examinations, i.e. ALT and AST. The liver tissues were sent for histological examinations to look for degeneration and necrosis. CCl_4 induced hepatotoxic effect significantly in degeneration ($P<0.01$), in necrosis ($P<0.0005$). CCl_4 only treated group also showed significant increased in liver enzymes, ALT ($P<0.00$) and AST ($P<0.00$). All doses of the ethanolic extract of *Emblica officinalis* Gaertn. showed significant hepatoprotective effect in necrosis ($P = 0.02$, $P = 0.003$, $P = 0.01$) but gave no significant hepatoprotective effect in degeneration ($P = 0.73$, $P = 0.48$, $P = 0.73$). The ED_{50} of extract was 2.7g/kg and its 95% confidence limit was (0.63-4.59g/kg). ALT level which reflects significant liver injury was decreased by all doses of extract whereas liver injury nonspecific AST level was not. Thus, it was concluded that ethanolic extract of *Emblica officinalis* Gaertn. (Zibyu-thee) had some hepatoprotective effect on CCl_4-induced hepatotoxicity in albino rat model but not free of toxic effect.

171. The hepatoprotective effect of *Pterocarpus marsupium* Roxb. (Padauk) on experimental animals. Myo Kyaw Swar. Thesis, MMedSc (Pharmacology), Yangon: Defense Services Medical Academy, 2011.

The purpose of present study was to evaluate scientifically on the hepatoprotective effect of stem bark of *Pterocarpus marsupium* Roxb. (Padauk) by using carbon tetrachloride-induced hepatotoxicity in albino rat model. In this study, aqueous extraction, pharmacological screening test, phytochemical analysis, physico-chemical analysis, acute toxicity and hepatoprotective effect of aqueous extract of stem bark of *Pterocarpus marsupium* Roxb. were carried out. The phytochemical analysis of the dried stem bark of *Pterocarpus marsupium* Roxb. showed the presence of glycoside, reducing sugar, carbohydrate, steroid/terpenes, flavonoid, polyphenol, saponin, and tannin. Physico-chemical analysis of stem bark of *Pterocarpus marsupium* Roxb. showed swelling index (0.7cm), foaming index (<100) and moisture content (11.8%). Extract values were watery extract (7.63%), ethanolic extract (2.87%), chloroform extract (0.56%) and pet-ether extract (0.1%). Acute toxicity study was done in 40 albino mice. The result indicated that there was no lethality of the mice even with maximum permissible dose at the dose of 16g/kg. Therefore, the medium lethal dose LD_{50} was supposed to be more than 16g/kg. General pharmacological screening of stem bark of *Pterocarpus marsupium* Roxb. in albino rats showed no abnormally changes. The hepatoprotective effect of aqueous extract of stem bark of *Pterocarpus marsupium* Roxb. was investigated on carbon tetrachloride-induced hepatotoxicity in albino rats. In this study, control parallel experimental study design was performed Pharmacology Research Division, Department of Medical Research (Lower Myanmar). The ameliorating effect of *Pterocarpus marsupium* Roxb. was evaluated by liver function tests and histological changes. Tested rats were grouped into five. Group I was negative control group (distilled water only), group II was positive control group (CCl_4 only) and group III, IV and V were extract treated group (different doses of extracts 1.5, 3 and 6g/kg followed by CCl_4). In this study, there were significant decrease in liver enzyme ALT changes in group III, IV and V. But there were significant decrease of liver enzyme AST in 6g/kg extract treated groups when comparing with carbon tetrachloride treated group. There were no significant changes in histopathological findings except in degenerative changes. There was also no lethality in all extract treated groups, but one rat died in CCl_4 only treated group. In conclusion, the aqueous extract of stem bark of *Pterocarpus marsupium* Roxb. had some degree of hepatoprotective effects and practically non toxic in rodents.

172. Hepatoprotective effect of *Spilanthes acmella* Murr. (Yellow-bizat) on carbontetrachloride-induced hepatotoxicity in albino rats. Naing Thar Myint. Thesis, MMedSc (Pharmacology), Yangon: Defence services Medical Academy; 2010.

The purpose of present study was to evaluate scientifically on the hepatoprotective activity of *Spilanthes acmella* Murr. (Yellow-bizat) by using CCl_4 -induced hepatotoxicity in albino rat model. In this study, aqueous extraction, acute toxicity, pharmacological screening test, phytochemical constituent's analysis, physicochemical analysis and hepatoprotective effect of aqueous extract of whole plant of Yellow-bizat were carried out. The hepatoprotective activity of aqueous extract of whole plant of Yellow-bizat was done on twenty five CCl_4 induced hepatotoxicity in albino rats. In this study, control parallel experimental study design was done in Pharmacology Research Division, Department of Medical Research (Lower Myanmar). The aqueous extraction of whole plant of Yellow-bizat was done.

In acute toxicity study, it was observed that aqueous extract of whole plant of Yellow Bizat was not toxic up to the maximal feasible dose (16g/kg) body weight in mice. Therefore, the medium lethal dose (LD_{50}) was supposed to be more than (16g/kg). General pharmacological screening test of aqueous extract of whole plant of Yellow-Bizat had shown no abnormal changes. Phytochemical analysis of whole plant of Yellow-Bizat showed the presence of alkaloid, flavonoid, glycoside, steroid, tannin, and polyphenol, carbohydrate, reducing sugar, saponin and amino acid. But cyanogenic glycoside is absent. Physico-chemical analysis of whole plant of Yellow-Bizat showed Swelling Index (1.5 cm), Foaming Index (<100), Total Ash (13.3%), Water Soluble Ash (6%), Acid Insoluble Ash (5.3%), Moisture content (19.4%), ethanolic extract (7.2%) and watery extract (16%). The aqueous extract of whole plant of Yellow-Bizat (1.5g/kg + CCl_4 treated group) showed no significant hepatoprotective effect in degenerative changes ($p<0.05$). In necrotic changes ($p<0.0005$) and in fibrotic changes ($p<0.0005$) were observed. The aqueous extract of whole plant of Yellow-Bizat (3g/kg + CCl_4 treated group) showed significant increase hepatotoxic effect in degenerative changes ($p<0.05$). In necrotic changes, p-value is not significant i.e. reduction in hepatotoxicity. But in fibrotic changes, p-value is significant ($p<0.05$). The aqueous extract of whole plant of Yellow-bizat (6g/kg + CCl_4 treated group) showed significant increase hepatotoxic effect in degenerative changes ($p<0.01$). Both in necrotic and fibrotic changes, p-values are significant ($p<0.0005$) and ($p<0.05$) respectively. CCl_4 only treated group showed significantly increased hepatotoxic effect in degeneration ($p<0.01$), in necrosis ($p<0.0005$) and in fibrosis ($p<0.0005$) when compared with control (untreated group). The comparative effects of CCl_4 only treated group with three different doses of extract plus CCl_4 treated group showed no significant different in histology. But, in necrotic changes, extract 3g/kg + CCl_4 treated group showed significant reduction in CCl_4 -induced hepatotoxicity ($p<0.05$) when compared with that of CCl_4 only treated group whereas in fibrotic changes, extract 6g/kg + CCl_4 treated group showed significant reduction in CCl_4-induced hepatotoxicity ($p<0.05$) when compared with that of CCl_4 only treated group. The comparison between histology of liver of control group and extract plus CCl_4 group showed different liver histology. Thus, it was concluded that aqueous extract of whole plant of Yellow-bizat had no significant hepatoprotective effect on CCl_4 -induced hepatotoxicity in albino rat model.

173. The hepatoprotective effect of *Vitex trifolia* Linn. (Kyaung-pan) on experimental animals. Kyi Phyoe Latt. Thesis, MMedSc (Pharmacology), Yangon: Defense Services Medical Academy; 2011.

Vitex trifolia Linn. belonging to the family of Verbenaceae is commonly known as Kyaung-pan in Myanmar. Aqueous extract of leaves of *Vitex trifolia* Linn. was investigated for hepatoprotective activity against acetaminophen-induced hepatotoxicity in albino rats models. In this study, aqueous extraction, acute toxicity, phytochemical constituents' analysis, physicochemical analysis and hepatoprotective effect of aqueous extract of leaves of *Vitex trifolia* Linn. were carried out. The hepatotoxic effect in animal model was induced by acetaminophen in dose of 1g/kg body weight. Parameters of alanine aminotransferase (ALT), aspartate aminotransferase (AST) and histopathological changes of hepatocytes, degeneration, necrosis and fibrosis were determined to access the hepatoprotective activity. In control group, distilled water taken group, mean ALT and AST were 60.6±14.15IU/L and 93.68±35.77IU/L respectively. In group which received acetaminophen only, mean ALT and AST were 138.65±74.8 IU/L and 181.17±80.82 IU/L respectively.

Those values for acetaminophen with extract (1.5g/kg, 3g/kg and 6g/kg) received groups were 81.53±23.46IU/L and 137.41±76.23IU/L; 83.03±17.85IU/L and 123.25±74.43 IU/L; 72.4±24.4 IU/L and 83.2±25.16IU/L respectively. Mean ALT and AST values were significantly increased in group received with acetaminophen and distilled water when compared with distilled water only received group (p value <0.05). The mean ALT and AST values of extract received groups were not significantly different with distilled water only received group (p value >0.05). When comparing with acetaminophen only received group and different doses of extracts plus acetaminophen received groups, there were no statistically significant difference (p value >0.05). In histopathological changes, distilled water only received group showed normal liver architecture. Less degenerative, necrotic and fibrotic changes were seen in extracts plus acetaminophen received groups when comparing with acetaminophen only received group. In acute toxicity study, there was 80% lethality with 16g/kg of aqueous extract of leaves of *Vitex trifolia* Linn. The LD_{50} value is 20g and 95% confidence limit was 15.75 - 25.4g/kg. The phytochemical analysis of the dried leaves of *Vitex trifolia* Linn.showed the presence of alkaloid, amino acid, glycoside, reducing sugar, carbohydrate, steroid/ terpenes, flavonoid, polyphenol, saponin, and tannin. Physico-chemical analysis of leaves of *Vitex trifolia* Linn. showed swelling index (0.6cm), foaming index (<100), total ash (12.7%), water soluble ash (5.6%), acid soluble ash (1.5%) and moisture content (12%). Extract values were watery extract (15.5%), ethanolic extract (4.4%), chloroform extract (6.5%) and pet-ether extract (3.4%). The present study suggests that aqueous extracts of leaves of *Vitex trifolia* Linn. may have some extent of hepatoprotective effect on acetaminophen-induced hepatotoxicity.

174. High-throughput screening of herbal plants against *Mycobacterium tuberculosis* using microplate alamar blue assay in Myanmar. Nwe Nwe Yee. Thesis, PhD (Pharmacology), University of Medicine (2), 2007.

Drug resistance in tuberculosis is a global health emergency. Emergence of multi drug resistant strains of *Mycobacterium tuberculosis (*MDR-TB) and extensively drug-resistant (XDR-TB), call for more discovery research for new anti-TB drugs. "Pharmaceuticals from plants" is an import historical fact which exits a great potential for new and alternative antimycobacterial drug development for Myanmar with her rich plants. Sixty two extracts from eighteen Myanmar medicinal plants were tested for their *in-vitro* activity against *Mycobacterium tuberculosis* (TS) NC 13144 standard strains by applying, Microplate-based Alamar Blue Assay (MABA). In this assay, the anti-tuberculosis activity was detected by using the Alamar blue dye to the broth cultures with drugs in 96-well microplates. MABA was simple, sensitive, inexpensive and appropriate technology. It had high-throughput format to perform a large scale screening and determination of Minimum Inhibitory Concentration (MICs) and the results were available within 8 days as compared to conventional culture-based method which took 28 to 42 days Minimum Inhibitory Concentrations (MICs) of six plant extracts (95% ethanol) were as follows; (1) Su-poke-gyi, *Acacia pennata* Willd., MIC 25µg/ml; (2) Mayo-gyi, *Calotropis gigantea* Willd., MIC 25µg/ml; (3) Nga-phone-hsay, *Aristolachia tagala* Cham., MIC 50µg/ml; (4) Pa-yan-na-wa, *Boerhaavia diffusa* Linn., MIC 50µg/ml; (5) Kywe-kaung-hhmin-hsay, *Euphorbia hypericifolia* Linn., MIC 50µg/ml; and (6) Sin-ngo-myet, *Chloris barbata* (L) Sw. MIC 50µg/ml. The six anti-TB active plant extracts were characterized by Thin Layer Chromatography (TLC) and Ultra-Violet (UV) profile. The medicinal plants tested in this study were not mentioned yet as anti-mycobacterium tuberculosis activity neither in Myanmar nor in

other countries. Hence, the findings in this study were the first report exhibiting antimycobacterial activity. This report also highlighted the first introduction of MABA to Myanmar as a sharing of this advantageous technique. It could also be further extended to determine the anti-tuberculous drug susceptibility and resistance of clinical mycobacterium isolates.

175. Hypoglycemic activity and phytochemical characterization of Lingzhi. Pharmacology Research Division. *Annual Report 2000.* Yangon: DMR (LM): p76.

Scientific evaluation of hypoglycemic activity was tested on adrenaline induced hyperglycemic rabbits model. Adrenaline 0.2mg/kg body weight was injected subcutaneously and blood glucose levels were determined using glucometer at 0hr, 1hr, 2hr, 3hr and 4hr after administration of adrenaline. After one week, Lingzhi 3g/kg body weight was administered with distilled water and the blood glucose level were again determined at 0hr, 1hr, 2hr, 3hr and 4hr after administration of Lingzhi. The results showed that blood glucose levels of adrenaline induced hyperglycemic rabbits were 350.3 ± 38.4mg % at 2hr, 312.1 ± 13.1mg % at 3hr and 237.1 ± 2.69mg% at 4hr. In contrast, the blood glucose levels of the test group were 219.3 ± 46.1mg% at 2hr, 179.9 ± 35.1mg % at 3hr and 133.6 ± 21.9mg% at 4hr respectively. The study indicated that the Lingzhi powder significantly lowered the blood glucose level at 2hr ($p< 0.005$), 3hr ($p< 0.005$), and 4hr ($p<0.01$). Phytochemical analysis showed that Lingzhi contained alkaloids, flavonoids, tannis and phytosterols.

176. Hypoglycemic activity and related chemical constituents of *Premna integrifolia* Linn. (Taung-tan-gyi). Khin Tar Yar Myint; Thaw Zin; May Aye Than; Myint Myint Khine; Win Myint; Mu Mu Sein Myint; Mya Aye; Thandar Myint. *Myanmar Health Res Congr,* 2009: p18.

The aim of this study is to evaluate the hypoglycemic activity of *Premna integrifolia* Linn. (Taung-tan-gyi) and to identify the chemical constituent(s) of active extracts. Using standard glibenclamide (4mg/kg) as a positive control, 70% EtOH extracts tested for hypoglycemic activity on adrenaline-induced rat model. Blood glucose levels of rats at various time intervals were measured by glucometer. All extracts showed blood glucose lowering effect, with leave extracts possessing hypoglycemic activity at 1hr ($p<0.05$) while stem bark and root extract at 2hr ($p<0.005$) and 3hr ($p<0.05$) respectively. These extracts show no lethal effect when tested for acute toxicity (LD_{50}) with the maximum dose of 20g/kg. The most active stem bark extracts was further fractionated to chloroform-soluble and insoluble portions, and hypoglycemic activity tested. Chloroform-insoluble fraction showed significant hypoglycemic activity at the dose of 2gm/kg (that is less than crude 70% EtOH extracts) ($p<0.05$) at 2hr and 4gm/kg (that is same dose of crude 70% EtOH extracts) ($p<0.05$) at 1hr, 2hr and 3hr. Column chromatographic separation of this active extracts (chloroform-insoluble fraction of 70% EtOH extracts of stem bark) yielded and led to the isolation of a pure compound. The compound was chemically identified to be aphelandrine ($C_{28}H_{36}N_4O_4$) by means of UV, FT-IR, ^{13}C NMR, ^{1}H NMR, HMQC, HMBC, COSY and mass spectroscopy.

177. Hypoglycemic activity of *Acacia catechu* Willd. (Sha) on albino rats. Phone Myint Ko. Thesis, MMedSc (Pharmacology), Yangon: Defense Services Medical Academy; 2009.

The present study was planned to observe the hypoglycemic activity of the ethanolic extract of the bark of *Acacia catechu* Willd. (Sha) by using adrenaline-induced hyperglycemic albino rat model. In this study, ethanolic extraction, acute toxicity test general pharmacological screening tests, test of hypoglycemic activity and phytochemical analysis of the bark of *Acacia catechu* were carried out. The dried powder of the bark of *Acacia catechu* was extracted with 90% alcohol to get ethanolic extract. In acute toxicity study, albino mice were used to determine the degree of toxicity to the administration of ethanolic extract but no toxic signs were observed at the maximal feasible dose of 16g/kg body weight. General pharmacological screening tests of ethanolic extract of the back of *Acacia catechu* had been done using albino mice but there was no abnormality regarding central and autonomic nervous system. Adrenaline-induced hyperglycemic albino rats were used to determine the hypoglycemic activity. The results after giving the ethanolic extract of the bark of *Acacia catechu* in the dose of 1.5g/kg, 3g/kg and 6g/kg showed significant hypoglycemic effect ($p<0.005$) at 1hour and ($p<0.0005$) at 2hour, 3hour and 4hour when compared to the control groups taking distilled water. The results also showed that the hypoglycemic activity of ethanolic extract of the bark of is in dose-dependent relationship and similar to that of standard drug, glibenclamide (4mg/kg). Phytochemical analysis of ethanolic extract of the bark of revealed the presence of alkaloids, flavonoids, tannin, α-amino acids, glycosides, saponins, resin, phenolic compounds and carbohydrate. According to these results, it is concluded that ethanolic extract of the bark of *Acacia catechu* possess the significant hypoglycemic activity on adrenaline-induced hyperglycemic rat model.

178. The hypoglycemic activity of *Murraya koenigii* Spreng. (Pyin-daw-thein) on albino rats. Thant Zin Win. Thesis, MMedSc (Pharmacology), Yangon: Defense Services Medical Academy; 2008.

The purpose of present study was to evaluate scientifically the hypoglycemic activity of *Murraya koenigii* Spreng. (Pyin-daw-thein) by using adrenaline-induced hyperglycemic albino rat model. In this study, aqueous extraction, acute toxicity, pharmacological screening test, phytochemical constituents and hypoglycemic effect of aqueous extract of Pyin-daw-thein were carried out. Six adrenaline-induced hyperglycemic albino rats were used to study the hypoglycemic activity. In this study, crossover study was done. The dried powder of leaves of Pyin-daw-thein was extracted with water used to prepare aqueous extract. In acute toxicity study in mice, it was observed that aqueous extract of Pyin-daw-thein was not toxic up to the maximal feasible dose of (16g/kg) body weight. General pharmacology screening test of aqueous extract of Pyin-daw-thein had shown no abnormal changes. Phytochemical analysis of leaves of Pyin-daw-thein showed that they have alkaloid, triterpene, tannin, resin, glycoside, polyphenol, carbohydrate, amino acids and reducing sugar. In observation of aqueous extract of Pyin-daw-thein at the three different doses, aqueous extract 2g/kg and 4g/kg showed significant hypoglycemic effect at 2hr ($p<0.01$), 3hr ($p<0.005$) and 4hr ($p<0.005$) whereas 6g/kg showed significant hypoglycemic effect at 1hr ($p<0.05$), 2hr ($p<0.005$), 3hr ($p<0.005$) and 4hr ($p<0.005$) after oral administration when compared with that of control group. The comparison between hypoglycemic effects of aqueous extract of Pyin-daw-thein and standard drug, glibenclamide (4mg/kg), showed that they have similar hypoglycemic effect. These

findings suggested that aqueous extract of Pyin-daw-thein possessed significant hypoglycemic effect in adrenaline-induced hyperglycemic albino rat model.

179. The hypoglycemic activity of *Syzygium cumini* (L.) Skeels. (Tha-bye). Zaw Hlaing Oo. Thesis, MMedSc (Pharmacology), Yangon: Defence Services Medical Academy; 2008.

The purpose of present study was to evaluate the hypoglycemic activity of *Syzygium cumini* (L.) Skeels. (Thabye) by using adrenaline-induced hyperglycemic albino rat model. In this study, aqueous extraction, acute toxicity, pharmacological screening test, phytochemical constituents and hypoglycemic effect of aqueous extract of Tha-bye were carried out. Eight adrenaline-induced hyperglycemic albino rats were used to study the hypoglycemic activity. In this study, crossover study was done. The dried powder of bark of Tha-bye was used to prepare aqueous extract. In acute toxicity study in mice, it was observed that aqueous extract of Tha-bye was not toxic up to the maximal feasible dose of (16g/kg) body weight. General pharmacology screening test of aqueous extract of Tha-bye had shown no abnormal changes. Phytochemical analysis of bark of Tha-bye showed the presence of alkaloid, flavonoid, tannin, glycoside, polyphenol, steroid, saponin, amino acid, carbohydrate and reducing sugar. In observation of aqueous extract of Tha-bye at the three different doses, aqueous extract 2g/kg showed significant hypoglycemic effect at 1hr ($p<0.05$), 2hr ($p<0.005$), 3hr ($p<0.05$) and 4hr ($p<0.01$) and 4g/kg showed significant hypoglycemic effect at 2hr ($p<0.001$), 3hr ($p<0.001$) and 4hr ($p<0.001$) whereas 6g/kg showed significant hypoglycemic effect at 2hr ($p<0.005$), 3hr ($P<0.005$) and 4hr ($P<0.05$) after oral administration when compared with that of control group. The comparison between hypoglycemic effects of aqueous extract of Tha-bye and standard drug, glibenclamide (4mg/kg), showed that they have similar hypoglycemic effect. These findings suggested that aqueous extract of Tha-bye possessed significant hypoglycemic effect in adrenaline-induced hyperglycemic albino rat model.

180. The hypoglycemic activity of *Zingiber officinale* Roscoe. (Gin) on albino rats. Soe Moe Aung. Thesis, MMedSc (Pharmacology), Yangon: Defence Services Medical Academy; 2009.

The purpose of present study was to evaluate scientifically the hypoglycemic activity of *Zingiber officinale* Roscoe. (Gin) by using adrenaline-induced hyperglycemic albino rat model. In this study, aqueous extraction, ethanolic extraction, acute toxicity, pharmacological screening test, analysis of phytochemical constituents and hypoglycemic effect of aqueous and ethanolic extract of Gin were carried out. Six adrenaline-induced hyperglycemic albino rats were used to study the hypoglycemic activity. In this study, crossover study was done. In acute toxicity study in mice, it was observed that aqueous extract of ginger was not toxic up to the maximal feasible dose of (16g/kg) body weight. But ethanolic extract showed lethal effect and its LD_{50} is 26g/kg. General pharmacology screening test of aqueous and ethanolic extract of ginger showed no abnormal changes. Phytochemical analysis of ginger showed that they have alkaloid, triterpene, tannin, resin, glycoside, polyphenol, carbohydrate, amino acids and reducing sugar. In observation, though aqueous extract of ginger showed no significant hypoglycaemic effect, ethanolic extract showed significant hypoglycaemic effect at the dose of 3g/kg at 1hr ($p<0.05$), 3hr ($p<0.05$), 4hr ($p<0.05$), 6g/kg at 1hr ($p<0.05$), 2hr ($p<0.05$), 3hr ($p<0.05$) and 4hr ($p=0.005$), 9g/kg at 1hr ($p<0.01$), 2hr ($p<0.005$), 3hr ($p<0.01$), 4hr ($p<0.05$) after oral administration when compared with that of control group. The comparison between hypoglycemic effects of ethanolic extract of ginger and standard drug, glibenclamide

(4mg/kg), showed that they have similar hypoglycemic effect. These findings suggested that ethanolic extract of rhizome of ginger possessed significant hypoglycemic effect in adrenaline-induced hyperglycemic albino rat model.

181. Hypoglycemic effect of *Azadirachta indica* A.Juss (Tama) leaves on rabbit model. Khine Khine Lwin; Sandar Aung; Mu Mu Sein Myint; Aye Than; May Aye Than; Khin Tar Yar Myint; Win Win Maw; Myint Myint Khine; San San Myint. *Myanmar Health Res Congr*, 2006: p22.

This study was carried out to determine the phytochemical constituents, acute toxicity and hypoglycaemic effect of dried leaves of *Azadirachta indica* A.Juss (Neem). Seven adrenaline-induced hyperglycaemic rabbits were used to study the hypoglycaemic effect. Cross over study design was used in hypoglycaemic study. In this study, phytochemical studies of crude powder and 70% ethanolic extract of dried leaves of *Azadirachto indica* A.Juss showed that both contained alkaloid, steroid, flaonoid, saponin, amino acid, resin, tannin, phenol and glycoside. In acute toxicity study in mice, it was observed that crude powder of this plant, was not toxic up to the maximal feasible dose of (4g/kg) body weight. But, 70% ethanolic extract of this plant possessed mild acute toxic effect and median lethal dose (LD_{50}) of this plant extract was determined to be (8g/kg) and its confidence limit was (5.16g/kg-12.4g/kg). It was observed that 70% ethanolic extract of extract of *Azadirachta indica* A. Juss at the dose level of (1g/kg) had significant hypoglycaemic effect at 3hr ($p<0.05$) and at 4hr ($p<0.01$) after oral administration of the extract when compared with that of the control group. In the comparison between hypoglycaemic effects of 70% ethanolic extract of dried leaces of *Azadirachta indica* A.Juss (1g/kg) and standard drug glibenclamide (4mg/kg), it was found that hypoglycaemic effects of both were the same. Therefore, 70% ethanolic extract of dried leaves of *Azadirachta indica* A.Juss. possessed significant hypoglycaemic effect in adrenaline-induced hyperglycaemic rabbit model.

182. The hypoglycemic effect of *Coccinia indica* Wight & Arn. (Ivy gourd) (Kin-pon-thee) on albino rats. Myo Thanda Htut. Thesis, MMedSc (Pharmacology), Yangon: University of Medicine (2); 2007.

The purpose of the present study is to evaluate scientifically the hypoglycemic effect of fruits of *Coccinia india* (ivy gourd) (Kin-pon-thee) by using adrenaline induced hyperglycemic rat model. The fruits were prepared to get fresh juice and watery extract, respectively. Fresh juice up to maximum feasible dose of 40ml/kg did not show any hypoglycemic activity. However, watery extract of 2g/kg showed hypoglycemic activity significantly at 2hour ($p<0.05$) and 3hour ($p<0.005$). In comparison between hypoglycemic effects of watery extract of fruits of *Coccinia indica* (2g/kg) and standard drug glibenclamide (4mg/kg) (negative control). It was found that both showed hypoglycemic activities but percent inhibition of glibenclamide was superior to watery extract. Pectin was isolated from fruits of *Coccinia indica* in this study. Pectin of different doses (1g/kg, 2g/kg, and 3g/kg) were tested on adrenaline induced hyperglycemic rats and compared with standard drug glibenclamide (4mg/kg) (negative control). Pectin of different doses showed dose-dependent hypoglycemic activity. Highest efficacies were seen at 1 hour with low dose pectins i.e 1g/kg and 2g/kg in this study. But, the effect of pectin declined with time. However, with the highest dose pectin i.e. 3g/kg, the activity started at 1 hour and increased with time but after 3hour the effect slightly declined. Although glibenclamide had late onset of action than pectin at 1hour, the efficacy was superior to pectin in later hours. Acute toxicity studies of the fresh juice and watery extract were performed by using the albino mice. The results indicated that there was no

lethality up to maximum feasible dose of 40ml/kg in fresh juice and 4g/kg in watery extract. In general pharmacological screening test of both fresh juice and watery extract of fruits of *Coccinia indica*, no abnormal changes regarding ANS and CNS were observed. The phytochemical analysis of fresh juice of fruits of *Coccinia indica* had shown to have alkaloid, saponins, tanninoids, resin, and glycosides, reducing sugar, phenols, carbohydrates and triterpene. The phytochemical analysis of watery extract of fruit of *Coccinia indica* also showed the present of alkaloid, tanninoids, and resin, glycosides, reducing sugar, phenols, carbohydrate and triterpene. The only difference was presence of saponins in the fresh juice.

183. Hypoglycemic effect of *Curcuma comosa* Roxb. (Nanwin-ga) rhizomes on rabbits model. Khine Khine Lwin; Mu Mu Sein Myint; May Aye Than; Khin Tar Yar Myint; Win Win Maw; San San Myint; Myint Myint Khine; Nu Nu Win; Hla Phyo Lin. *Myanmar Health Sci Res J.* 2008; 20(2): p107-113.

This study was carried out of determine the phytochemical constituents, acute toxicity and hypoglycemic effect of crude power and 80% ethanolic extract of dried rhizomes of *Curcuma comosa* Roxb. (Nanwin-ga). Adrenaline- induced hypoglycemic rabbits were used to study the hypoglycemic effect. Oral route of administration was used in this study. The hypoglycemical studies of the crude powder and 80% ethanolic extract of this plant showed that both contained alkaloids, flavonoids, glycosides, steroids, saponins, tannins and amino acid. In acute toxicity study in mice, it was observed that the crude powder of the rhizomes was not toxic up to the maximal feasible dose of 5g/kg. But, 80% ethanolic extract of the dried rhizomes showed mild acute toxic effect and median lethal dose (LD_{50}) was determined to be 5.2g/kg and its confident limit was 4g/kg-6.76g/kg.The results showed that the 80% ethanolic extract of the rhizomes at the dose level of 1.5g/kg had significant hypoglycemic effect at 2hr, 3hr and 4hr ($p<0.01$-$p<0.05$) after oral administration when compared with those of the controls. But, the crude powder of the rhizomes at the dose level of 3g/kg showed no significant hypoglycemic effect. It was observed that the hypoglycemic effect of 80% ethanolic extract was inferior to that of the standard drug glibenclamide. Therefore, it can be concluded that the 80% ethanolic extrace of the dried rhizomes of *Curcuma comosa* Roxb. (Nanwin-ga) possessed significant hypoglycemic effect on adrenaline-induced hypoglycemic rabbit's model and the effect was inferior to that of glibenclamide.

184. Hypoglycemic effect of ethanolic extract of *Andrographis paniculata* Nees. on rabbit model. Pharmacology Research Division. *Annual Report 2007*. Yangon: DMR (LM): p99.

The aim of this study is to determine phytochemical constituents, acute toxicity and the hypoglycaemic effect of *Andrographis paniculata* Nees. (ဆေးခါးကြီး၊ ငရုတ်ခါး) Ethanolic extract was extracted from the air-dried *Andrographis paniculata* Nees. leaves. Qualitative tests of the chemical constituents present in the ethanolic extract were conducted. Saponin, tannin, amino acid, carbohydrate, reducing sugar, glycosides, alkaloid and steroid were present in the ethanolic extract. Acute toxicity study of ethanolic extract of dried leaves was evaluated in mice. The ethanolic extract was not toxic up to the maximum feasible dose level of 24g/kg body weight. Therefore the median lethal dose (LD_{50}) was observed to be more than 24g/kg. The hypoglycaemic effect of ethanolic extract (3g/kg body weight) was carried out on adrenaline-induced hyperglycemic rabbit's model. The mean blood glucose levels of the control group were 258.67 ± 22.45mg% at 1hr, 328.33 ± 16.82mg% at 2hr, 331.33 ± 4 1.41mg% at 3hr and 282.33 ± 47.3 at 4 hr after adrenaline administration whereas

the mean blood glucose levels of the test group were 193.2 ± 27.29mg% at 1hr, 240.4 ± 46.07mg% at 2hr, 181.4± 37.31mg% at 3hr and 118 ± 21.74 at 4hr after adrenaline administration. It was found that the ethanolic extract (3g/kg body weight doses) showed significant lowering the blood glucose levels at 3hr and 4 hr respectively ($p< 0.01$). The mean blood glucose levels of the control group were 259.83 ± 27.04mg% at 1 hr, 345. 5 ± 31.44mg% at 2hr, 354 ± 27.52mg% at 3hr and 307 ± 33.1at 4hr after adrenaline administration whereas the mean blood glucose levels of the glibenclamide group were 192.67 ± 23.49mg% at 1hr, 270.83 ± 33.19mg% at 2hr, 263.33 ± 41.59mg% at 3hr and 234.5 ± 41.5 at 4hr after adrenaline administration respectively. It was found that glibenclamide significantly lowered the blood glucose levels at 2hr, 3hr and 4hr ($p<0.05$ to $p<0.005$) respectively. Comparison between ethanolic extract and glibenclamide were not significantly different.

185. The hypoglycemic effect of *Ficus bengel* Linn. (Pyi-nyaung) on albino rats. Shwe Lynn Aung. Thesis, MMedSc (Pharmacology), Yangon: Defense Services Medical Academy; 2009.

The purpose of present study was to evaluate scientifically the hypoglycemic activity of *Ficus benghalensis* Linn. (Pyi-nyaung) by using adrenaline-induced hyperglycemic albino rat model. In this study, extraction, acute toxicity, pharmacological screening test, phytochemical constituent's analysis and hypoglycemic effect of ethanolic extract of bark of Pyi-nyaung were carried out. The hypoglycemic activity of ethanolic extract of bark of Pyi-nyaung was done on six adrenaline-induced hyperglycemic albino rats in this study, design was done. The ethanolic extraction of bark of Pyi-nyaung was done. In acute toxicity study, it was observed that ethanolic extract of bark of Pyi-nyaung was not toxic up to the maximal feasible dose of (8g/kg) body weight in mice. Therefore, the medium lethal dose (LD_{50}) was supposed to be more than (8g/kg). General pharmacology screening test of ethanolic extract of bark of Pyi-nyaung had shown no abnormal changes. Phytochemical analysis of bark of Pyi-nyaung showed the presence of alkaloid, triterpene, tannin, resin, glycoside, polyphenol, carbohydrate, amino acids and reducing sugar. The ethanolic extract of bark of Pyi-nyaung (1.5g/kg) showed significant hypoglycemic effect at 2hr ($p<0.05$),the extract (3g/kg) showed significant hypoglycemic effect at 1hr ($p<0.005$), 2hr ($p<0.01$), 3hr ($p<0.05$) and 4hr ($p<0.05$) whereas 6g/kg showed significant hypoglycemic effect at 1hr ($p<0.05$), 2hr ($p<0.005$), 3hr ($p<0.0005$) and 4hr ($p<0.05$) after oral administration when compared with that of control group. The comparison between hypoglycemic effects of ethanolic extract of bark of Pyi-nyaung and standard drug, glibenclamide (4mg/kg), showed that they have similar hypoglycemic effect. Thus, it was concluded that ethanolic extract of bark of Pyi-nyaung possessed significant hypoglycemic effect in adrenaline-induced hyperglycemic albino rat model.

186. Hypoglycemic effect of *Hydrocotyle umbellata* on adrenaline-induced hyperglycemic rat model. May Aye Than; Mu Mu Sein Myint; Win Win Maw; Myint Myint Khine; Aung Aung Maw; Nu Nu Win; Ei Ei Soe; Thaw Zin. *Myanmar Health Res Congr*, 2009: p19.

Hydrocotyle umbellata (တိုင်ဝမ်မြင်းခွာ) had been introduced in Myanmar a few years ago. There has been no scientific information about the hypoglycemic activity of *H. umbellata*. Therefore, the aim of this study was to evaluate acute toxicity, phytochemical constituents and hypoglycemic activity of whole plant of *H. umbellata*. Flavonoid, glycoside, polyphennol, steroid/trepene, carbohydrate, reducing sugar and saponin were detected in crude powder. Elemental analysis on dried powder using energy dispersive X-ray fluorescent (EDXRF) spectrometer showed the presence of calcium, potassium, chlorine, iron, strontium, zinc, manganese, bromine and copper. The median lethal dose (LD_{50}) of aqueous extract was more than 16g/kg body weight per orally in mice. The crossover experimental study design was done on the adrenaline-induced hyperglycemic rat model. Hypoglycemic effect of aqueous extracts of *H. umbellata* 1.5, 3, 6g/kg and standard drug, glibenclamide 4mg/kg were also determined. The aqueous extract produced significant reduction ($p<0.05$) of blood glucose at 3hour at a dose of 1.5g/kg and also significant hypoglycemic effect ($p<0.05$-$p<0.005$) was seen throughout the 4hour period with glibenclamide, aqueous extracts at 3g/kg and at 6g/kg. A significant dose dependent effect was observed. It was found that glibenclamide did not significantly differ from 6g/kg of aqueous extract in percentage inhibition. It was concluded that *H. umbellata* had significant hypoglycemic effect. Hypoglycemic effects of *H. umbellata* had not yet been reported in literature before this study. Therefore this finding is the first report of the hypoglycemic activity providing a potential resource for the develolpment of new phytomedicine for diabetes.

187. Hypoglycemic effect of locally grown saffron *Carthamus tinctorius* L. (ဆူးပန်း) on rabbit model. Pharmacology Research Division, *Annual Report 2005.* Yangon*:* DMR (LM): p84.

The aim of this study is to determine phytochemical constituents, acute toxicity and the hypoglycaemic effect of locally grown saffron *Carthamus tinctorius* L. (ဆူးပန်း) Aqueous extract was extracted from the air-dried locally grown saffron. Qualitative tests of the chemical constituents present in the aqueous extract were conducted. Flavonoids, terpene, glycosides, alkaloid, protein and steroid were present in the aqueous extract. Acute toxicity study of aqueous extract of dried whole plant were evaluated in mice. The aqueous extract was not toxic up to the maximum feasible dose level of 8g/kg body weight. Therefore the median lethal dose (LD_{50}) was observed to be more than 8g/kg. The hypoglycaemic effect of aqueous extract (3g/kg body weight) was carried out on adrenaline-induced diabetic rabbits. The mean blood glucose levels of the control group were 278.7 ± 14.2mg% at 1hr, 351.7 ± 21.7mg% at 2hr, 377 ± 16.1mg% at 3hr and 304.5 ± 37.7 at 4 hr after whereas the mean blood glucose levels of the test group were 230.8 ± 28.9mg% at 1hr, 297.8 ± 29mg% at 2hr, 329.5 ± 17.3mg% at 3hr and 292.0 ± 29.9 at 4hr after adrenaline administration. It was found that aqueous extract (3g/kg body weight) which is 120 times human doses showed significant lowering the blood glucose levels at 1hr and 3hr respectively ($p< 0.05$).

188. Hypoglycaemic effect of medicinal plant (MP/CR) rhizomes on rabbit model. Khine Khine Lwin; Mu Mu Sein Myint; May Aye Than; Khin Tar Yar Myint; Win Win Maw; San San Myint; Myint Myint Khine; Nu Nu Win; Hla Phyo Lin. *Myanmar Health Res Congr*, 2007: p23-24.

This study was carried out to determine the phytochemical constitients, acute toxicity and hypoglycaemic effect of crude powder and 80% ethanolic extract of dried rhizomes of the medicinal plant MP/CR. Acute toxicity study was carried out in mice. Six adrenaline-induced hyperglycaemic rabbits were used to study the hypoglycaemic effect. Oral route of administration was use in this study. To compare the hypoglycaemic effects of this plant wiht that of the standard drug, hypoglycaemic effect of glibenclamide (4mg/kg) was also investigated. The phytochemical studies of the crude powder and 80% ethanolic exteact of this plant showed that both contained alkaloid, flavonoid, glycoside, steroid, saponin, tanin and amino acid. In acute toxicity atudy in mice, it was observed that the crude powder of rhizomes of this plant was not toxic up to the maximal feasible dose of (5g/kg). But, 80% ethanolic extract of the dried rhizomes of this plant showed mild acute toxic effect and median lethal dose (LD_{50}) of this plant extract was determined to be (5.2g/kg) and its confident limit was (4g/kg-6.76 g/kg). The results showed that the 80% ethanolic extract of the rhizomes of this plant at the dose level of (1.5g/kg) had significant hypoglycaemic effect at 2hr, 3hr and 4hr ($p<0.01$-$P<0.05$) after oral administration of the extract when compared with those of the controls. But, the crude powder of the rhizomes of this plant at the dose level of (3g/kg) showed no significant hypoglycaemic effect. It was observed that the hypoglycaemic effect of 80% ethanolic extract of this plant was inferior to that of the standard drug, glibenclamide. Therefore, it can be concluded that the 80% ethanolic extract of the dried rhizomes of MP/CR possessed significant hypoglycaemic effect on adrenaline-induced hyperglycaemic rabbit's model and the effect was inferior to that of glibenclamide.

189. Hypoglycaemic effect of *Orthosiphon aristatus* (Bl.) (See-cho-pin) on health volunteers. Khin Chit; Khin Ye Myint; Myo Win; Aye Than; Myint Lwin. *Myanmar Health Res Congr*, 1998: p52.

A clinical trial to determine the hypoglycemic potential of popular Myanmar medicinal plant *Orthosiphon aristatus* Bl. (See-cho-pin) was carried out on 13 healthy adult volunteers. A significant blood sugar lowering effect was observed 1hr after administration of 175ml of plant decoction extracted from 25g leaves on glucose-loaded (75g glucose) model when compared to glucose loaded control group. The difference in blood sugar level between normal OGTT and See-cho-pin treated subjects was 22% after 1hr, 15mg% at 2hr after administration of plant decoction clinically evident acute side effects were not detected. There was no effect on liver function tests, kidney function tests blood urea and electrolyte, serum creatinine and serum cholesterol level.

190. Hypoglycemic effect of *Orthosiphon aristatus* (Bl.) (See-cho-pin) on Type II Diabetes Mellitus patients (NIDDM*).* Khin Chit; Khin Ye Myint; Aye Than; Mu Mu Sein Myint; Myint Lwin. *Myanmar Health Res Congr,* 1998: p54.

A clinical trial to determine the hypoglycemic effect of *Orthosiphon aristatus* (BI.) (See-cho-pin) was carried out on 20 Type II diabetes mellitus patients (30-70 years). Patients were divided into two groups. First group of 10 patients received 75g of glucose together with 175ml plant decoction at the same time (group A). A second group of 10 patients, 175ml of plant decoction was given first; 75g glucose load was given 2hrs later (group B). The effect of 500mg of glucophage together with 75g glucose was also determined on the same group of patients for positive control. OGTT of the same patients were taken as negative control. Significant blood sugar lowering effects were observed in both group A and group B 3 hours after administration of plant decoction. There was statistical significant reduction of blood sugar level in both group A and group B patients when compared to the control group ($p<0.05$). There was more reduction of blood sugar level in both receiving See-cho-pin (group A and group B) when compared to patients receiving glucophage 500mg. But the difference was not statistically significant. There was no side effect clinically. It was also observed that it had no effect on EGG; liver function test; kidney function test (blood urea and electrolyte; serum cretatinine) and serum cholesterol level.

191. Hypoglycemic effect of *Orthosiphone aristatus* (Bl.) (See-cho-pin) plain tea on non-insulin dependent diabetes mellitus patients. Khin Chit; Ohnmar May Tin Hlaing; Phyu Phyu Aung; Tin Tin Aung; Win Win Myint; Khine Khine Lwin; Aye Than; Phyu Phyu Win; San San Win. *Myanmar Health Res Congr,* 2001: p31.

A clinical trial to determine the hypoglycemic effect of *Orthosiphon aristatus* (Bl.) (See-cho-pin, Thagyar magike) dried leaf plain tea was carried out on (17) type 2 diabetes mellitus patients (35-65) years of age). All patients stopped all anti-diabetic drugs 72 hours prior to the study. Individual diet instruction as prescribed by dietitian of Nutrition Research Division was distributed to each patient. The oral glucose tolerance test (OGTT) was carried out for each patient prior to See-cho-pin study. After the control study, the patient was given 8gm of dried leaf in 250ml boiled water for 30mins, 3 times per day for 28 days. The effect of gliclazide 80mg for a period of 28 days was also studied on the positive control group of six patients. There was a statistically significant reduction of blood sugar level in patients receiving See-cho-pin plain tea ($p<0.002$) when compared to the control study. A significant blood sugar lowering effect was also observed in patients receiving gliclazide ($p<0.002$). There was no significant difference in the blood sugar lowering effect among the group receiving gliclazide and the group receiving See-cho-pin plain tea after a complete wash out period. No significant side effect of See-cho-pin plain tea was observed clinically during the study.

192. Hypoglycemic effect of "Paya-say", prepared from traditional method, on rabbit model. Pharmacology Research Division. *Annual Report 2005*, Yangon: DMR (LM). p87.

The aim of this study is to determine acute toxicity and the hypoglycaemic effect of "Paya-say", prepared from traditional method. Acute toxicity study of "Paya-say", was evaluated in mice. The "Paya-say", was not toxic up to the maximum feasible dose level of 53ml/kg body weight. Therefore the median lethal dose (LD_{50}) was observed to be more than 53ml/kg. The hypoglycaemic effect of "Paya-say", (15ml/kg body weight) which is 7.5 times human doses was carried out on adrenaline-

induced diabetic rabbits. The mean blood glucose levels of the control group were 289±10.5mg% at 1hr, 357.8±15.1mg% at 2hr, 363.7 ±14mg% at 3hr and 308.8±33.2 at 4hr after whereas the mean blood glucose levels of the test group were 266.5±2.7mg% at 1hr, 326.8±52.2 mg% at 2hr, 282.5±39.9 mg% at 3hr and 242.2±40.3 at 4hr after adrenaline administration. It was found that "Paya-say", 15ml/kg body weight showed not significantly lowered the blood glucose levels at 1hr, 2hr, 3hr and 4hr respectively.

193. Hypoglycemic effect of *Punica granatum* Linn. fruit on adrenaline induced hyperglycemic rabbits model. May Aye Than; Mu Mu Sein Myint; Aye Than; Khin Tar Yar Myint; San San Myint; Mya Thet Lwin; Nu Nu Win. *Myanmar Health Res Congr*, 2006: p59.

The purpose of this study is to determine phytochemical constituents, acute toxicity and hypoglycemic effect of (သလဲသီး) *Punica granatum* Linn. fruit juice without seed and seeds were conducted. Flavonoids, terpene, reducing sugar, tannins, glycosides, saponin, amino-acid and vitamin C were present in the fresh and concentrated juice. Flavonoids, glycosides, tannins and amino-acid were present in seeds. Acute toxicity study of the fresh juice with seeds, concentrated juice without seeds and 70% ethanol extract of seeds were evaluated in mice. The fresh juices with seeds was not toxic up to 66.6ml/kg and both the concentrated fruit juice without seed and 70% ethanol extract were not toxic up to the maximum feasible dose of 6g/kg body weight. Evaluation of hypoglycemic effect of the fresh juices with seeds (40ml), the concentrated juice without seeds (6g/kg), 70% ethanol extract (3g/kg) and glibenclamide 4mg/kg body weight were carried out on adrenaline-induced hyperglycemic rabbits model. It was found that 70% ethanol extract of seeds and glibenclamide 4mg/kg showed significant lowered the blood glucose levels at 2hr and 3hr ($p<0.05$) and at 1, 2, 3, 4hr ($p<0.05$-0.005) respectively. The percent inhihition of blood glucose levels of ethanol extract and glibenclamide were 38.5, 41.8% at 2, 3hr and 36.8, 32.6, 32.6, 28.6% at 1, 2, 3, 4hr respectively.

194. Hypoglycemic effect of *Scoparia dulcis* Linn. (Sweet broom weed) on adrenalin induced hyperglycemic rabbit model. Yin Tway Si. Thesis, PhD (Zoology), University of Yangon, 2007.

Using adrenaline-induced diabetic rabbits, both aqueous and ethanolic extracts of the whole plant of *Scoparia dulcis* Linn. commonly known as Sweet broom weed as well as Dan-ta-thukha in Myanmar (Family-Scrophulariaceae) possesses a hypoglycemic property. Aqueous and ethanolic extracts were prepared from air-dried crude powder of *S. dulcis*. Dried crude powder sample and aqueous extract contained glycosides, steroids, polyphenol, tannin, carbohydrates and reducing sugar whereas glycosides, steroids, polyphenol and tannin were present in ethanolic extract. Elemental analysis on dried powder sample using Energy dispersive X-ray fluorescent spectrometer (EDXRF) techniques showed the presence of potassium (K), calcium (Ca), manganese (Mn), copper (Cu), iron (Fe), sulfur (S), zinc (Zn), rubidium (Rb) and strontium (Sr). The median lethal dose (LD_{50}) of aqueous extract of *S.dulcis* was more than 18g/kg body weight and while in the ethanolic extract it was 12.9g/kg body weight. Hypoglycemic effect of both extracts of *S. dulcis* and standard drug, glibenclamide was also conducted and found to have significant ($p<0.05$) hypoglycemic effects of the aqueous and ethanolic extracts of *S. dulcis*. The results were compiled and discussed. Suggestions for future work were outlined.

195. Hypoglycemic effects of selected Myanmar medicinal plants. Mar Lar Than. Thesis, PhD (Engineering Chemistry), Yangon Technological University; 2001.

Extracts of the following Myanmar medicinal plants were tested for their hypoglycemic effects on glucose-loaded and diabetic rabbit models. (i) *Aegle marmelos* Corr. (Rutaceae) (ii) *Andrographis paniculatus* Nees. (Acanthaceae) (iii) *Cassia glauca* Lam. (Caesalpiniaceae) (iv) *Morinda angustifolia* Linn. (Rubiaceae) (v). *Orthosiphon aristatus* Bl. (labiatae) (vi). *Vitex glabrata* R.Br. (Verbenaceae) Dried leaves of these plants except *Morinda angustifolia* were extracted with water and dried leaves of *Orthosiphon aristatus* were also extracted with petroleum ether and ethanol. Fresh leaves juices of *Cassia glauca* and *Aegle marmelos* and fresh fruit juice of *Morinda angustifolia* were also investigated. The watery extract and ethanolic extract of *Orthosiphon aristatus* had hypoglycemic effects in adrenaline-induced hyperglycemic rabbit's model. The ethanolic extract had more hypoglycemic effect than watery extract of *Orthosiphon aristatus*. Extracts of other selected plants produced no hypoglycaemic effects on the glucose loaded hyperglycaemia rabbit model. Characterization of components from *Orthosiphon aristatus* by conventional methods (Thin Layer Chromatography and Column Chromatography) together with UV and IR indicated that the possible constituents may possibly be classed as flavonoids; such as sinesetin and scutellarein tetramethyether. Probable, structural features of the compounds are being speculated on the light of the present data.

196. Hypoglycemic potential of *Momordica charantia* Linn. on maturity onset diabetes mellitus patients. Thaung Hla; Mya Mya Win; Than Than Htay; Yu Yu Lwin; Ye Thwe; Maung Maung Wint. *Myanmar Health Res Congr,* 1996: p63.

A clinical trial to determine the hypoglycemic potential of locally grown *Momordica charantia* Linn. Fruit powder was carried out on 26 non-insulin dependent diabetes mellitus patients for a period of 28 days during which their diet, exercise, smoking and all medications except anti-hypertensives were restricted. It was found that the fruit powder had highly significant effect on the glucose tolerance patterns in 92.3% of patients. Clinically evident side effects were not detected and it had no effect on liver function test, blood urea and cholesterol levels.

197. Hypolipidiemic effect of locally grown saffron *Carthamus tinctorius* L. (ဆူးပန်း) on triton induced hyperlipidiemic rat model. Pharmacology Research Division. *Annual Report 2005*. Yangon: DMR (LM), p85.

The reputed hypolipidiemic effect of locally grown saffron *Carthamus tinctorius* L. (ဆူးပန်း) was carried out on triton induced hyperlipidiemic rat model. The 80% ethanolic extract of saffron leaves and stem (2g/Kg) and Standard drug lovastatin (500mg/Kg) intraperitoneally. The mean blood total cholesterol levels of the control group were 43.1±2.4mg% whereas the mean blood total cholesterol levels of the triton treated group were 97.5±8.1mg%. The triton treated rat were significantly higher total cholesterol ($p<0.0005$) than the control. The mean blood total cholesterol levels of the saffron leaves and stem treated group were82.7±8.1mg% and 86.8±6.4mg%. The mean blood total cholesterol levels of the lovastatin treated group were 66.6±5.3mg%. Both saffron leaves and stem treated rat showed not significant lowering the total cholesterol but the standard lovastatin treated rat showed significant lowering the total cholesterol ($p<0.05$).

198. Hypolipidiemic effect of (သလဲသီး) seed on triton induced hyperlipidiemic rat model. Pharmacology Research Division. *Annual Report 2005*. Yangon: DMR(LM), p85

The reputed hypolipidiemic effect of locally grown (သလဲသီး) seed was carried out on triton induced hyperlipidiemic rat model. The 70% ethanolic extract of (သလဲသီး) seed (2g/Kg) and Standard drug Lovastatin (500mg/Kg) intraperitoneally. The mean blood total cholesterol levels of the control group were 43.1± 2.4 mg% whereas the mean blood total cholesterol levels of the triton treated group were 97.5 ± 8.1mg%. The triton treated rat were significantly higher total cholesterol ($p<0.0005$) than the control. The mean blood total cholesterol levels of the test group were 77.9 ± 7.4 mg% whereas the mean blood total cholesterol levels of the lovastatin treated group were 97.5±8.1mg%. The 70% ethanolic extract of (သလဲသီး) seed treated rat showed not significant lowering the total cholesterol but the standard lovastatin treated rat showed significant lowering the total cholesterol($p<0.05$).

199. Hypotensive mechanism of the *Plantago major* Linn. extract PM-9. Aye Than; Tha, Saw Johnson. *Res Paper Reading Session, Med Sci Div*, 1982: p20.

The various extracts of ***P. major*** had been screened for their hypotensive activity. Many fractions such as PM-1, PM-4, PM-5, PM-7 and PM-9 showed varying degrees of hypotensive activity. The PM-9 did not have any effect on the heart either on the in situ preparation or on the isolated one. There was no detection of any evidence of the hypotensive action of the PM-9, either acting directly at the smooth-muscle, or at the adrenergic neurone, or at the sympathetic ganglion. The PM-9 causing hypotension by acting centrally is further confirmed, using a cross-circulation experiment on dog.

200. Hypotensive property of *Plantago major* Linn. Khin Kyi Kyi; Mya Bwin; Sein Gwan; Chit Maung; Aye Than; Mya Tu, M; Tha, Saw Johnson. *Union Burma J Life Sci.* 1971; 4: p167-171.

Fifty percent water-alcohol soluble extract of *Plantago major* Linn. from Rangoon, Kalaw and Taunggyi was tested for hypotensive action on anaesthetized normotensive dogs. Early trials with the water-alcohol soluble extract in a dose of 125mg/kg given intravenously were found to produce a fall in arterial blood pressure of 20-40mmHg. Further fractionation of the extract was carried out and screened for hypotensive activity. The fraction designated F-7 produced a fall in the arterial blood pressure which was sustained up to 1 hour.

201. Identification and anatomical characterisation of Yardan-zeet. Mya Bwin; Marlar Lwin. *Myanmar Health Sci Res J*. 1994; 6(3): p98-104.

An indigenous medicinal plant growing in Myeik, Tanintharyi Division whose bitter fruit commonly known as Yardan-zeet is very similar to the vernacular name of the Chinese drug "Yardan-zeet" the ripe bitter fruit of *Brucea javanica* (L.) Merr. Due to the similarity in the common names, the specific name of Yardan-zeet plant obtained from Myeik was identified taxonomically. Yardan-zeet fruit available in Yangon market as antidysenteric drug was also identified by comparing the macroscopic features and microscopic characters with that of the identified Yardan-zeet from Myeik. Yardan-zeet plant growing in Myeik was identified as *Brucea avanica* (L.) Merr. belonging to the family Simaroubaceae. The macroscopic features and microscopic characters of Myeik and market Yardan-zeet fruits were identical. The findings from this study reveals that Yardan-zeet fruits are of the same species as the Chinese drug "Yadanzi" the bitter fruit of *Brucea javanica* (L.) Merr.

202. Identification of cultivated chounggyah plant and comparative pharmacognostic studies with market sample. Mya Bwin; Win Myint; San San Nwe. *Myanmar Health Sci Res J*. 1994 April; 6(1): p31-37.

Chounggyah plant cultivated in the herbal garden of Traditional Medicine Hospital, Mandalay was identified to be *Vernonia elaeagnifolia* DC. Comparative pharmacognostical, physicochemical and phytochemical studies revealed that cultivated and market Chounggyah are not identical.

203. Identification of omega-3 fatty acid and evaluation of antioxidant activity on seed of *Perilla frutescens* (L.) Britt. Kyipyar Soe. Thesis, MPharm, Yangon: Uuniversity of Pharmacy; 2011.

Perilla frutescens (L.) Britt. (Shan-hnan, သျှမ်းနှမ်း) belonging to the family Lamiaceae has been used in Myanmar traditional medicinal as a remedy for common cold, expectorant and domestically in cooking. The primary aim of this study was to identify alpha linolenic acid (omega-3 fatty acid) in Perilla seed oil and the secondary aim was to evaluate the antioxidant activity of Perilla seed. Botanical identification of *Perilla frutescens* (L.) Britt. (Shan-hnan) was done morphologically and verified microscopically. Perilla seed oils yields were studied by driect pressing method, extracted with petroleum ether by refluxing method and Soxhlet extraction method, and were found that the yield percents were 29-44%, 26-35% and 36-45% respectively. The physicochemical properties such as moisture content, total ash, extractable matter, swelling index and foaming index of the seeds and acid value, iodine value, saponification value , weight per milliliter, viscosity, optical rotation and refractive index of the seed oil was also determined according to WHO quality control methods for medicinal plant materials and British Pharmacopoeia methods. The fatty acid of Perilla seed oil was identified as fatty acid methyl esters (FAME) by GC-MS analysis. Each sharp peak with the relevant molecular weight was identified as 9, 12, 15-Octadecatrienoic acid methyl ester (omega-3 or δ-linolenic acid methyl ester), 9, 12-Octadecatrienoic acid methyl ester (omega-6 or linolenic acid methyl ester), 9 Octadecatrienoic acid methyl ester (omega-9 or linolenic acid methyl ester) respectively. Among these fatty acids, the propotion of of δ- linolenic acid known as omega-3 fatty acids was found to be greatest (81%). In acute toxicity study, there was no lethal effect of DDY strain of albino mice up to 2ml/30gm body weight of Perilla seed oil. The antioxidant activity was also determined by free radical scavenging activity DPPH assay method. The extract showed the free radical scavenging activity and IC_{50} values were 8.9862µg/ml for Perilla seed extract and 0.2614µg/ml for standard ascorbic acid.

204. *In-vitro* and *in-vivo* antimicrobial activity of essential oil and thymol obtained from *Carum copticum* Benth and Hook. fruit (စမုန်ဖြူ). Khine Zar Pwint; Myo Myint; Win Win Maw; May Aye Than; Nwe Ni Thin. *Myanmar Health Res Congr*, 2010: p18.

The aim of study is to determine the *in-vitro* and *in-vivo* antimicrobial activity of essential oils and isolated thymol from *Carum copticum* and to evaluate the acute toxicity of isolated thymol. The essential oils of air-dried fruit samples were obtained by hydrodistillation method. Thymol was isolated by fractional distillation method and was identified by thin layer chromatography and FTIR spectrophotometer compared with standard thymol. Antimicrobial activity of essential oils and isolated thymol were tested on *Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa* and *Candida albicans* by agar disc diffusion method and compared with

standard thymol and control antibiotics such as ciprofloxacin, econazole. It was observed that essential oil, standard and isolated thymol was effective against *S. aureus*, *E. coli*, and *Candida albicans*, except *Pseudomonas aeruginosa*. Minimum Inhibitory Concentration (MIC) of isolated thymol was 100µg/ml for *S. aureus, E. coli.* and 50µg/ml for *Candida albicans* by agar plate dilution method and compared with MIC of standard thymol. It showed that MIC of isolated thymol was coincided with MIC of standard thymol. *In-vivo* study, open wounds were induced by *Staphylococcus aureus* strain in albino rats and treated with essential oil, isolated thymol, and standard thymol. It showed that complete wound healing rate of essential oil was 6^{th} day; isolated and standard thymol was 5^{th} day. The LD_{50} of isolated thymol was 1.6g/kg body weight per orally in mice. In conclusion, essential oil and isolated thymol from *Carum copticum* Benth & Hook. represented an inexpensive source of natural antimicrobial agents.

205. *In-vitro* antibacteria activity of extracts and active compound from stem bark of *Mangifera indica* L. (Mango). Saw Thi Dar; Hla Myint, Saw; Wah Wah Aung; Mi Mi Htwe; Khin Lay. *Myanmar Health Res Congr,* p9-10.

Mangifera indica L., commonly known mango plants, is an important nutritional source in the world. The bark has been traditionally used in Myanmar for the treatment of various ailments. In the present study, the extracts of mango cultivar Sein-ta-lone stem barks were screened for phytochemical constituents and antimicrobial activity. From this, polyphenolic compounds, flavonoids, tannins, saponins and glycosides were observed in the bark. The barks defatted with petroleum ether were extracted successively with acetone and 70% ethanol repeatedly to obtain mangifera compound. The mangifera was crystallized out as yellow crystals and 1.85% was obtained from (70%) ethanol extract. The purity of compound was confirmed by Thin Layer Chromatography (TLC), chemical tests, melting point and Ultra-violet (UV) and Fourier-transform Infra-red (FT-IR) spectroscopic method. *In-vitro* antibacterical activities of extracts and isolated mangifera were investigated on some pathogenic bacteria strains; *Bacillus cereus, Staphylococcus aureus, Salmonella typhi, Shigella bodyii, Shigella flexneri, Shigella dysentriae, Escherichia coli, Klebsiella aerogenes* and *Vibrio cholera* by agar disc diffusion methods. Promising antibacterial activity was observed only on *S. aureus*. The minimum Inhibitory Concertration (MIC) of 70% ethonolic and acetone extract, ≥1.25mg/ml and ≥10mg/ml, respectively, was determined by broth micro-dilution method; and antibacterial activity and MIC (20mg/ml) of isolated compound was determined by agar plate dilution method. *S. aureus* causes skin, respiratory and nosocomial infections and its resistance to many antibiotics is a major problem. The present study highlighted some medical values from mango stem barks and isolated mangiferin compound.

206. *In-vitro* antibacterial activity of some indigenous plants and effect on *in vivo Staphylococcal* induced wounds. Mi Mi Htwe; Mar Mar Nyein; Khin Chit; Mu Mu Sein Myint; Aye Than. *Myanmar Health Sci Res J.* 2001; 13 (1-3): p32-37.

For *in vitro* study, 12 indigenous plant extracts were tested on 5 strains of *Escherichia coli* (EPEC, ETEC, VTEC, EAEC and ATCC), 3 strains of Shigellae (*Shigella boydii, Shigella dysenteriae, Shigella sonnei*); one strain each of *Klebsiella aeruginosa*, *Plesiomonas shigelloides, Proteus morganii, Pseudomonas pyocyanea, Salmonella typhi, Staphylococcus aureus, and Vibrio cholerae*. The antibacterial activity of plants on tested bacterial species were *Ageratum conyzoides*: Hkwathaipan (4 species); *Coleus aromaticus*: Ziyaywethtu (5 species); *Cuminum cyminum*: Ziyasai

(2 species); *Emblica officinalis* syn. *Phyllanthus emblica*: Zibyuthee (11 species); *Foeniculum vulgare*: Samonsaba (1 specie); *Nyctanthes arbortristis*: Seikphaluywet (6 species); *Piper betle*: Kunywet (13 species); *Piper nigrum*: Ngayokkaungsai (5 species); *Terminalia chebula*: (11 species); and *Vinea rosea*: Thinbawmahnyoywet (6 species) respectively were demonstrated by using agar disc diffusion technique. For *in vivo* study, *Staphylococcus aureus* strain was induced as open wounds in experimental rats and topical application of plant extracts in paraffin was introduced. It was noted that the plant *Piper betle* (Kun) and *Nyctanthes arbor-tristis* (Seikphalu) accelerated the rate of wound healing and tensile strength without formation of pus and induration when compared with the controls.

207. *In-vitro* antibacterial of some medicinal plants on bacteria causing diarrhoea and dysentery. Mi Mi Htwe; Khin Nwe Oo; Win Maw Tun; Wah Wah Aung; Mya Mya Aye; May Aye Than. *Myanmar Health Res Cong,* 2009: p75.

Diarrhoea and dysentery still play an important role as major morbidity and mortality in many countries. In Myanmar diarrhoea and dysentery stood as the fourth priority disease in the National Health Plan (2006-2011). The emergence of antibiotic resistance bacteria accounts for a significant challenge in the treatment of these infections. As there are numerous medicinal plants which are reputed to be effective against many diseases, the present study was carried out to detect antibacterial activity of some reputed medicinal plants on bacteria causing diarrhoea and dysentery. The different extracts of 16 medicinal plants were tested for *in vitro* antibacterial activity by using agar disc diffusion technique at the Bacteriology Research Division, Department of Medical Research (Lower Myanmar) during 2007 and 2008. The minimum inhibitory concentrations of the extracts with the most significant activity were evaluated by plate dilution method. The bacterial strains tested were *Escherichia coli* ATCC, *Escherichia coli* O157, *Vibrio cholerae* O1, *Vibrio cholerae* O139, *Shigella dysenteriae*, *Shigella dysenteriae, Shigella flexneri, Shigella boydii* and *Salmonella* typhi. The plants that had antibacterial activity on bacterial causing diarrhoea and dysentery were found to be *Garcinia morella* Desr. (Pan-nyo-gyi), *Hibiscus rosa-sinensis* Linn. (Kaung-yan), *Quisqualis indica* Linn. (Dawei-hmaing), *Cardiospermum helicacabum* Linn., (Kala-myet-si), *Allium tuberosum* Roxb. (Gyu-myit), *Gastrochilus pandurata* (Seik-phoo), *Asparagus acerosus* Roxb. (Shin-ma-tet), *Cinnamomum tamala* (Thit-kyabo), *Dracaena terminalis* (Zawgyi-taung-mway), *Triumfetta annua* Linn. (Kat-si-ne) and *Oroxylum indicum* (Kyaung-sha). The research findings provide necessary data for further *in vivo* animal studies and clinical trails on effectiveness of these medicinal plants.

208. *In-virto* antimicrobial activity of Danta-thu-kha (*Scoparia dulcis* Linn.) on some control strains of microorganisms. Nwe Nwe Soe. Thesis, MMedSc (Pharmacology), Yangon: University of Medicine (2); 2009.

The purpose of the present study is to evaluate scientifically the *in vitro* antimicrobial activity of whole plant and leaves of Danta-thu-kha (*Scoparia dulcis* Linn.). Screening of antimicrobial activity of crude extracts of Danta-thu-kha (*Scoparia dulcis* Linn.) were done on eleven strains of organisms (*Candida albicans*, *Escherichia coli* (O157), *Escherichia coli* (ACTT), *Samonella typhi*, *Samonella enteritis*, *Shigella dysentriae*, *Shigella flexneri*, *Shigella boydii*, *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Bacillus cereus*). The crude extracts have been extracted from Danta-thu-kha (*Scoparia dulcis* Linn.) with polar and non polar solvents such as 95% ethanol, 95% methanol and water. The antimicrobial activities of crude extracts of Danta-thu-kha (*Scoparia dulcis* Linn.) were determined by agar disc diffusion method. The minimum inhibitory concentration of active extracts on

Staphylococcus aureus and *Bacillus cereus* were also determined by tube dilution method. It was observed that the crude extracts were effective only on *Staphylococcus aureus* and *Bacillus cereus* but no activity on other organisms. The ethanolic extract (whole plant) gave the zone of inhibition 10mm on *Bacillus cereus* and the zone of inhibition 16mm on *Staphylococcus aureus*. The aqueous extract (whole plant) gave zone of inhibition 11mm and the aqueous extract (leves) gave zone of inhibition 10mm only on *Staphylococcus aureus*. The Minium Inhibitory Concentration (MIC) of the ethanolic extract (whole plant) was 2.5mg/ml; the queous extract (whole plant) was 10mg/ml ethanolic extract (leaves) was 5mg/ml, aqueous extract (leaves) was more than 10mg/ml, on *Staphylococcus aureus*. The Minimum Inhibitory Concentration (MIC) of both the ethanolic and aqueous extract were more than 10mg/ml on *Bacillus cereus*. From these findings, it was concluded that the crude extracts of whole plant of Danta-thu-kha (*Scoparia dulcis* Linn.) may have useful antimicrobial activity in infection caused by *Staphylococcus aureus* and *Bacillus cereus*.

209. *In-vitro* antimicrobial activity of *Lawsonia alba*. Mar Mar Nyein; Myint Oo; Sein Gwan; Chit Maung. *Burma Res Congr,* 1973: p97.

Lawsonia alba (Dan-gyi), a plant chiefly grown in Burma, was reputed to have antidysenteric effect. The crude extract of *L.alba* was tested upon two strains of *Entamoeba histolytica* and some bacteria. Two strains of *E. histolytica* of human origin were cultured in biphasia media (Dobell & Laidlaw, 1926; Rao, 1951) and tested against water soluble powdery extract of *L. alba*. The growth pattern of *E. histolytica* was determined at intervals of 12 and 24 hours respectively after exposure to the drug and indubation at 37°C. The Minimum Amoebicidal Concentration (MAC) of the extract of *L. alba* was found to be 100 milligrams per milliliter. An aqueous extract of *L. alba* was tested against 12 species of bacteria by (1) Agar Disc Diffusion Technique (Bauer, Kirby, Sherris and Turck, 1996) and (2) Serial Dilution Tubes Technique to determine bacteriostatic or bactericidal. Ampicillin and tetracycline were used as controls. The range of Minimum Inhibitory Concentration of the extract was also determined. The extract was found to have a bactericidal action on some tested bacteria.

210. *In-vitro* antimicrobial activity of *Quisqualis indica* Linn. (Dawei-hmaing*)* on bacterial causing gastrointestinal infections. Zarni Myint. Thesis, MPharm, Yangon: University of Pharmacy; 2008.

Myanmar medicinal plant; *Quisqualis indica* Linn. (Dawei-hmaing) used for the treatment of dysentery and diarrhea, was screened for antibacterial activity by agar disc diffusion technique. Polar and non polar solvents employed for the extraction of leaves of *Quisqualis indica* Linn. (Dawei-hmaing) these different crude extracts were determined for the antibacterial activity against 8 pathogenic bacteria causing common gastrointestinal infections. The main microorganisms tested are *Escherichia coli* ATYCC, *Escherichia coli* 0157, *Salmonella typhi*, *Shigella boydii, Shigella dydenteriae, Shigellas flexneri, Vibrio cholerae, cholerae* O1 and O139. Petroleum ether, ethyl acetate, 95% ethanolic, 70% edthanolic and watery extracts were used to test antibacterial activity. Norfloxacin, tetracycline and gentamicin were used as control antibiotics among five types of extracts of *Quisqualis indica* Linn. (Dawei-hmaing), ethyl acetate extract (flavonoid extract) showed zone of inhibition on all test bacteria. All types of extracts of *Quisqualis indica* Linn. (Dawei-hmaing) had antibacterial activity when on *Vibrio cholerae* O1. It was found that flavonoid extract of *Quisqualis indica* Linn. (Dawei-hmaing) possessed significant antibacterial activity

on test bacteria probably because of rich flavonoid fractions. This flavonoid may be quercetin and it was identified by thin layer chromatography with authentic quercetin using pet ether, ethyl (1:1) .The minimum inhibitory concentration (MIC) of the extracts with the significant activity was evaluated by agar disc diffusion technique. The lowest MIC of plant extracts with different solvents was 1.25mg/ml and the highest MIC was 10mg/ml. Acute toxicity of watery and ethanolic extracts of *Quisqualis indica* Linn. (Dawei-hmaing) was done by the method of Litchfield and Wilcoxon (1949) using mice. The results indicated that there was no lethality up to 20g/kg body weight with watery extract and 16g/kg body weight with 95% ethanolic extract.

211. The *in-vitro* antimicrobial activity of some indigenous plant extracts. Khin Min Min Phyo. Thesis, MSc. (Botany), University of Yangon; 1998.

The dry fruits, leaves and barks of *Emblica officinalis* Gaertn. (Zibyu), the dry leaves of *Eupatorium odoratum* Linn. (Bizat) and the dry flowers of *Syzygium aromaticum* L. (Lay-hnyin) were extracted with ethanol, fifty percent ethanol and water. The antimicrobial activity on the growth of different pathogenic bacteria were tested by treating with various soluble extracts. Agar disc diffusion technique with surface swab plately method was used in 18 different types of bacterial isolates. The bacterial species included five strains of *Escherichia coli*, four species of *Shigella*, three strains of *Vibrio cholerae* and one strain each of *Klebsiella, Plesiomonas, Pseudomonas, Proteus, Salmonella* and *Staphylococcus*. Most of them were from clinical infection specimens. The three tested extracts of *Emblica officinalis* fruits were active on four types of bacteria (28.57%); three strains (18.75%) and seven strains (38.89%) out of 14, 16 and 18 types of bacteria tested respectively. Similarly, the three extracts of bark revealed to be active on one strain each (6.67%) and two strains (13.33%) out of 15 strains tested.

212. *In-vitro* antioxidant activity of fresh leaves and dried leaves of *Gynura procumbens* (Lour.) Merr. (ပျားမြီးရွက်). Wai Mi Aung. Thesis, MPharm, Yangon: University of Pharmacy, 2010.

Gynura procumbens (Lour.) Merr. (ပျားမြီးရွက်) belonging to the family Asteraceae can be occurred widely as ornamental and cultivated medicinal plant and prefers up to 2800m altitude such as Ka-chin, Chin and Shan States in Myanmar. Habit, morphological and histological characters of this plant were presented in this study for the plant authenticity purpose. Phytochemical and physicochemical characters were also studied by using reference analytical methods and were documented in Myanmar Herbal Pharmacopoeia Monograph presented in this research. In recent years, the public prefers to take natural antioxidant sources from edible materials such as fruits, spices, herbs, and vegetables. Petroleum ether, chloroform and methanol extracts of fresh and dried leaves of *Gynura procumbens* (Lour.) Merr. were prepared by maceration method B.P. These extracts were determined for antioxidant activity by using 1, 1-dipheny 1-2picryl-hydrazy (DPPH) assay and total phenolic content. The 50% inhibitory concentrations for free radical (IC_{50}) values of fresh leaves were 0.66mg/ml, 0.55mg/ml , 0.08mg/ml and that of dried leaves were 0.15mg/ml, 0.14mg/ml, 0.00008mg/ml for petroleum ether, chloroform and methanol extract respectively. It was found that methanol extracts of fresh dried leaves had higher free radical scavenging activity than others. The total phenolic contents of the extracts of fresh leaves were 10.07, 11.16 and 20.08mg GA/g material and that of dried leaves were 17.19, 18.12 and 24.05mg GA/g material in petroleum ether, chloroform and

methanol extracts, respectively. The results showed that DPPH radical scavenging activity increased as total phenolic content increased. In acute toxicity study, it was no lethal effect on Dutch Denken Yoken strain of albino mice was found up to 36ml/kg of fresh juice and 5000mg/kg of dried leaves.

213. *In-vitro* antiviral effect of Kin-bon (*Cephalandra indica*) and propolis (bee product) on herpes simplex virus (type 1 and 2). Angelina, Naw; Soe Thein; Win Myint; Phyu Phyu Win; Win Kyi. *Myanmar Health Res Congr,* 1995: p34.

Myanmar traditional plant "Kin-bon" and bee product "Propolis" were investigated for *in-vitro* antiviral activity against HSV1 and 2 using cell culture method. Vero cell line (African green monkey kidney) was used for the test. Identification of HSV1 and 2, propagation of virus, determination of the TCID50 of the virus, finding the lowest concentration of the inhibitory effect of Acyclovir for drug control, and antiviral activity tests were carried out according to standard procedures. Each test sample was mixed with 100 TCD50 of HSV1 and 2 in equal volumes respectively and introduced into the cell suspension in a 24 well culture plate. As for controls, diluent was used in place of virus. The test plates were kept at 37˚C in a CO_2 incubator and observed daily microscopically. The results were taken on day 5 to 7 as cytopathic effect (CPE) appeared show absence of i*n-vitro* antiviral effect of both Kin-bon and Propolis on herpes simplex virus type 1 and 2.

214. *In-vitro* assessment of some reputed medicinal plants against hepatitis B virus. Myo Khin; Ni Ni Than; San Yu Maw; San San Oo; Nu Nu Lwin; Win Win Mar; Khin May Oo. Myanmar Health *Res Congr,* 2009: p65-66.

An *in-vitro* study to identify herbal products with potentials use for treatment of hepatitis B infention was undertaken. The ethanolic extracts (1mg/ml to 8mg/ml) of *Eclipta alba* (Kyeik-hman) leaves, *Butea monosperma* (Pauk-pwint) flowers, and *Cassia fistula* (Ngu) bark were tested for the presence of anti-hepatitis B surface antigen like activity. Different concertrations of the extracts were mixed with serum samples obtained from high titre hepatitis B virus surface antigen (HBsAg) carriers and incubated at 37°C for 24hours. The incubated samples were screened for HBsAg titres using the enzyme linked immunosorbent assay. Lamivudine was used as a standard drug and lamivudine 5mg/ml showed HBsAg titre reduction to 1/128 (4 times). Ethanolic extracts of *Eclipta alba*, *Butea monosperma*, *Cassia fistula* exhibited 1/32 (16 times), 1/64 (8 times), 1/128 times (4 times) HBsAg titre reductions in test sera samples. Compounds isolated from the plants were further tested. Three pure compounds; butein, monospermonside, and isobutrin were isolated from *Butea monosperma*, and among them isobutrin showed 1/8 (64 times) reduction of HBsAg titre in test serum. Catechin isolated from *Cassia fistula* also demonstrated 1/16 (32 times) reduction of HBsAg titre in test sera samples. Thus isobutrin and catechin could be identified as active compounds with potential use in the management of hepatitis B infection. Although some clinical data exists on the use of catechin in management of hepatitis B infection, data on the use of *Cassia fistula* is limited and needs to be explored.

215. *In-vitro* assessment of the anti-hepatitis B viral activity of selected Myanmar medicinal plants and identification of active principle from bioassay guided fractions. San Yu Maw. Thesis, PhD (Chemistry), University of Yangon; 2005.

In vitro anti-hepatitis B (anti-HBV) activity of selected Myanmar traditional medicine plants, namely, *Clerodendrum neriifolium* Wall. (Fam. Verbenaceae) (Pyae-sone), leaves, *Cassia fistula* Linn. (Fam. Leguminosae) (Ngu), bark, and *Swertia chirata* Buch Ham. (Fam. Gentianaceae) (Pan-kha), aerial parts, have been investigated by using ELISA (enzyme link immunosorbent assay) test kits. Two different concentrations (4mg cm^{-3} and 6mg cm^{-3} in PBS buffer) of each ethanolic crude extracts (50% and 95% ethanolic extract) were prepared for these plant samples. All ethanolic extracts of "Ngu" bark (HBsAg titre 1/128) and "Pan-kha" (HBsAg titre 1/512) showed significant anti-hepatitis B virus surface antigen (HBsAg) like activity. Extraction, isolation, solvent partition, successive column chromato-graphic separation on silica gel and crystallization provided β-sitosterol (I) (0.02% yield, m.p.138˚C) from petroleum ether extract, and methyl cinnamate (II) (0.013% yield, m.p.172˚C) from ethylacetate extract of "Pyae-sone". Catechin (III) (cyanidan-3-ol) (0.0213% yield, m.p.172-174˚C) has been isolated from the ethanolic extract of "Ngu" bark after column chromatographic separation on silica gel followed by sephadex LH-20 and crystallization. Decussatin (IV) (1-hydroxy-3,7,8-trimethoxy xanthone) 0.033%yield,m.p.151˚C), isobellidifolin (V) (1,3,8-trihtdroxy-5-methoxy xanthone) (0.167% yield, m.p 264-266˚C), acacetin-6-C-glucoside (VI) (4′-methoxy-5, 7-dihydroxy flavone 6-C glucoside) (0.05% yield, m.p198-200˚C) have been isolated from ethanolic extract of "Pan-kha". It is the first report for the presence of VI in "Pan-kha" plant. All isolated constitutents were identified by melting point determination and spectroscopic measurements. All of them except I were screened for the presence of anti-HBsAg like activity using ELISA kit. Catechin (III) showed the most potent anti-HBsAg like activity among these isolated compounds and especially for HBsAg titre 1/16. Present investigation revealed that either crude plants or ethanolic extracts of "Ngu" bark and "Pan-kha" could be used in the treatment of HBV infection as claimed by Myanmar traditional medicinal practitioners. Indeed, ethanolic crude extract of "Ngu" bark may be more effective than "Pan-kha". The anti-HBsAg like activity of III of "Ngu" bark is higher than that of ethanolic crude extract. Thus, III may be responsible for the plant to exhibit anti-HBV activity and may be of therapeutic value in treating viral hepatitis B infection. The activity of IV, V and VI of Pan-kha were lower than of ethanolic crude extract showing the therapeutic superiority of crude ethanolic extract over single isolated constituents.

216. *In-vitro* effects of some indigenous plant extracts against *Entamoeba histolytica*. Myint Oo; Tu, Margaret; Sein Gwan. *Burma Res Congr*, 1972: p117.

Strains of *Entamoeba histolytica* of human origin were cultured in biphasic media (Dobell & Laidlaw's, 1926; Rao, 1961) and tested against water-soluble powder extracts of indigenous plants. Emetine dihydrochloride, metronidazole and diodo-hydroxy-quinoline were used as control drugs. The growth pattern of *E. histolytica* was determined at intervals of 12 and 24 hours respectively after exposure to the drug and incubation of 37˚C. Berberine chloride, the crude extracts of *Brucea sumatrana* and *Coptis teeta*, and the total alkaloids of *Holarrhana antidysenterica* was amoebicidal at concentration of 20, 20, 125 and 250 micrograms per milliliter respectively.

217. *In-vitro* parasite clearance of herbal antimalarial traditional medicine compound for uncomplicated falciparum malaria. Tin Tin Htay. Thesis, MMedSc (Microbiology), Yangon: University of Medicine (1); 2007.

The emergence and spread of multi-drug resistant *Plasmodium falciparum* worsen the global malaria situation. Artemisinin-based combination therapy is recommended to treat malaria. One of the herbal antimalarial traditional medicine compounds which contains the extracts of *Dichroa febrifuga*, *Coptis teeta* and Qinghao leaf extract. These three plants are cheaply available in Myanmar. Three hundred and fify-three clinically suspected malaria patients attending the outpatient clinics of Vector Borne Disease Control Centre, Gyogone, Insein were tested during the studied period of one year. Among those patients, 31 isolates met the selection criteria for *in vitro* drug sensitivity testing. Out of 31 isolates tested, 20 isolates were successfully grown in *in vitro* test culture for the traditional medicine compound and 22 isolates were successfully grown for those of chloroquine and mefloquine. The mean initial parasitaemia levels were 33,829 parasites/ cu.mm for the traditional medicine compound and 33,333.8 parasites/ cu.mm for chloroquine and mefloquine. The traditional medicine compound showed 89.59% schizont inhibition at a concentration of 1000 nmol/1, 2558 nmol/1 and 7886 nmol/1 respectively with mean MIC value of 1550 nmol/1.These parasite inhibition datas indicated that the traditional medicine compound has definite *in vitro* antimalarial activity against *Plasmodium falciparum*. Its potency was found to be less than chloroquine and mefloquine. But the efficacy of traditional medicine compound may be as good as or even better than the two other drugs tested in parallel because of its nature of three herbal drugs combination.

218. *In-vitro* screening of antithelminthic effect of some indigenous plant extracts on *Ascaris suum*. Thawka Kyin; Tu, Margaret. *Rep Burma Med Res Counc*, 1972: p45.

The *in vitro* activity of the extracts of *Butea frondosa* (Pauk) and *Quisqualis indica* (Da-we-hmaing) on *Ascaris suum* according to the method of Goodwin (1958) was investigated. L-tetramisole, Oil of Chenopodium and Piperazine hexadrate served as control drugs. The water soluble extracts of *Butea frondosa* seeds have a paralyzing effect on *Ascaris suum in vitro* at a concentration of 4mg/ml within 1.9 hours. The alcoholic extract of *Quisqualis indica* produced decreased activity at a concentration of 4mg/ml within 5 hours.

219. *In-vitro* sensitivity of *Azadirachta indica* extracts on *Mycobacterium tuberculosis*. Ti Ti; Lwin Ko; Khin Chit; Win Myint; Than Swe; Aung Naing; Hla Naing; Sein Kyi. *Myanmar Health Res Congr,* 1995: p39.

Different parts and various extracts of *Azadirachta indica* were tested against *Mycobacterium tuberculosis*, *in-vitro*. Among watery, ethanol and petroleum ether extracts of leaf bark, stem and seed of *Azadirachta indica*-watery extracts showed least anti *Mycobacterium tuberculosis*, where as ethanol and petroleum ether extracts of bark, stem and seed have some inhibition action on *Tubercle bacilli*. Seed extracts showed good inhibition action. Detail study of seed extracts showed that ethanol extracts have been action with minium inhibitory concentration of 10µg/ml. Further biology and animal toxicity studies need to be extended.

220. *In-vitro* testing of various indeginous plant extracts on human pathogenic bacteria. Mar Mar Nyein; Chit Maung; Mya Bwin; Tha, Saw Johnson. *Myanmar Health Sci Res J.* 1991 August; 3(2): p89-99.

Differentt parts and different extracts of twenty-six plants were tested against fourteen pathogenic bacteria for general screening. Out of these, thirteen plants showed an inhibitory activity against at least one test-bacterium, though there was a variation regarding the size of zones of inhibition. The thirteen plants showing zones of inhibition were *Artemisia vulgaris, Brucea sumatrana, Coptis teeta,* Yin-bya (unindentified yet), *Euphorbia hirta, Hiptage madablota, Lawsonia alba, Myristica fragrans, Pithecellobium dulce, Pterocarpus santalinus, Quisqualis indica, Stephenia hernandifolia, Symplocos santalinus,* and *Symplocos paniculata*. The antimicrobial spectrum and bacteriostatic or bactericidal effect of the plants were also determined.

221. *In vivo* anti-diarrheal activity of Seik-phoo (*Boesenbergia pandurata*, (Roxb.) Schltr.) in mice. Aye Myint Sein; Thaw Zin; Khin Chit; Mu Mu Sein Myint; Hla Myint, Saw; Moe Moe Aye; Yu Yu Nwe. *Myanmar Health Res Congr,* 2008: p24-25.

Acute diarrhea is commonly encountered in developing countries, where traditional herbal remedies are often sought for symptomatic relief. Thus, identifying and evaluation reputed plants used for diarrhea, in terms of efficacy and safety becomes a necessity. With the object to determine the antidiarrheal efficacy of Seik-phoo (*Boesenbergia pandurata* (Roxb.) Schltr), a plant reputed of having antidiarrheal property, studies on experimentally-induced diarrhea mouse model and antibacterial activity on common diarrhea-causing organisms was carried out. The watery extracts, in serial dilutions of 3,6 and 12g/kg of Seik-phoo, were administered to 3 groups of mice induced by castor oil to produce experimental diaatthea and the efficacy compard with a nagetive control receiving normal saline and a positive control receiving standard antidiarrheal drug, loparamide. Antidiarrheal activity was assessed by 1) effect on castor oil-induced diarrhea (number/type of stools passed), 2) effect on castor oil induced enteropooling (weight/volume of fluid accumulation), and 3) effect on castor oil induced small intestinal transit (passage of charcoal meal). Seik-phoo was found to possessed marked anti-diarrheal effect comparable to loparpmide, as seen by a significant delay in onset on diarrhea in first hour and a market reduction in the number of diarrhea stools (12.5±1.4 to 5.8±0.7 times in 4hours; $p<0.02$). There was also marked reduction in both intestinal fluid accumulation (43.6%, $p<0.05$), and intestinal transit (63.3%; $p<0.001$). In addition, ethyl acetate, petroleum ether and ethanolic extracts showed marked antimicrobial activity against *E.coli* species, *Salmonella typhi, Shigella dysenteriae, Staphlococcus aureus,* and Vibrio species, indicating its potential usefulness in infective diarrhea where non-specific antidiarrheal agents are contraindicated. The present study signified the antidiarrheal effect of the extracts and their potential usefulness in a wide range of diarrheal states, whether due to disorders of transit (e.g functional diarrhea, radiation diarrhea) of due to abnormal secretory mechanisms like in cholera or *E.coli* enterotoxin induced diarrhea.

222. *In-vivo* study of the prophylactic value of some plants against experimentally-induced infection of closed and open wounds. Mar Mar Nyein; Aye Than. *Myanmar Health Sci Res J*. 2001; 13(1-3): p26-31.

Coptis teeta, (Khan-tauk), *Lawsonia alba* (Dan-gyi), *Quisqualis indica* (Dawei-hmaing), and *Stephania hernandifolia* (Taung-kya-kyet-thway) were tested for *in vivo* closed wound infected with *Staphylococcus aureus* Viable bacterial count, tensile strength and tissue collagen content were measured and compared with three control groups, one with parrafin alone treatment, another with sterile gauze alone and with classical drug tetracycline ointment. The most promising results were observed with extracts of *C. teeta* and *S. hernandifolia* than the remaing two plants. As for open wounds, linear open wounds infected with *S. aureus* in albino rats treated with Kaemferia spp. (bulb powder, benzene extract, and 50% alcoholic extract) and kanamycin, distilled water, sulphanilamide, talcum powder and no treatment were used as controls. Out of various treatments, the Kaempferia spp. powder in paraffin gave the most promising results.

223. Influence of cultural characteristics on the utilization of traditional medicine and its impact upon health care in Myanmar. Thaw Zin; Sein Win; Khin Chit; Tin Mg Lay; Kyi Kyi; Kyi May Htwe; Moe Moe Aye; Mya Mya Moe. *Myanmar Health Res Congr,* 2006: p24-25.

Traditional Medicine is the sum total of the knowledge, skill and prectices based experiences indigenous to different cultures. According to a world-wide review by the WHO, 2001, the most commonly reported reason for using traditional medicine is that it is more affordable, more closely corresponds to the patient's culture and ideology, and less paternalistic than modern medicine. Two dimensions are concerned with the culture impact on health: emphasis on negative vs positive behavior patterns, and emphasis on internal vs external causal factors. This gives rise to four cultural models: the cultural deficit model, the cultural conflict model, the mainstream conformity model, and the cultural distrust model. In order to understand the influence of cultural characteristics on the utilization of traditional Medicine and its impact upon health care in Myanmar, the present study was carried ouyt on 2 different areas in Myanmar: the Yangon Division and the Southern Shan State. The aim was to study the socio-demographic characteristics and the influence of culture and beliefs on the pattern of decision-making and health care utilization. A Community-based, cross-sectional descriptive, qualitative research involving use of pre-set questionnaires for socio-demographic inputs, and standardized, semi-structured interviews for KAP, cultural beliefs, pattern of health care utilization and satisfaction on the health care received, was carried out. The study indicated that allopathic health services are many times more available and also more utilized by the community irrespective of its location. One of the main drawbacks of TM is the slow effect, but inaccessible distance and the availability of practitioner and drugs also play a major role in influencing utilization. The disease morbidity was relatively low in rural area of the Southern Shan State (probably due to healthy environment and less stressful working conditions) and majority of the population that suffered from minor ailments seemed to be successfully taken care of, with available health care facilities, whether it may be allopathic or traditional. Although the differences in cultural characteristics was not apparent to have an extreme impact upon healthcare utilization in the Yangon Division, it became more apparent within the diverse ethnic groups in the Southern Shan State, where diverse ethnic minorities have their own different charactieristics,

beliefs and healing practices unique to their culture. The likelihood of conflicts with culture and current healing practices is discussed.

224. Investigation of acute toxicity, anti inflammatory activity& some chemical constituents of Kanzaw [*Madhuca lobbii* (C.B.Clark) H.J.Lam.] seed oil. Than Than Htay. Thesis, PhD (Chemistry), University of Yangon; 2006.

Kanzaw seed oil from Tanintharyi Division of Myanmar has been popularly used as a folk medicine for the treatment of inflammation, rheumatism, tumor and different type of cancers. Kanzaw or Ye-meze plant was identified as *Madhuca lobbii* (C.B.Clarke) H.J Lam. by the botanists at the Department of Botany, University of Yangon. The reported distribution of this plant species was not found in any other parts of the world. Two seeds oil samples extracted by means of Traditional method and solvent (pet-ether, 60-80ºC) extraction method were used for chemical and pharmacological investigation and yields of oils based on the dried kernals were found to be 39% and 48% respectively. In the present work, the acute toxicity effect of Kanzaw oil obtained from traditional method was assessed on mice and it showed no toxic symptoms and mortality in mice up to an oral maximal permissible dose (60g/kg) of Kanzaw oil. Anti-inflammatory activity of Kanzaw oil was evaluated on carrageenin-induced paw edema in rats and it was found that the reduction of paw edema with an oral dose (45g/kg) of Kanzaw oil was comparable to that of standard drug aspirin (300mg/kg). Physico-chemical characteristics of oil (PE extract) such as colour, specific gravcity, refractive index, boiling point, cloud point, free fatty acid, iodine value, unsaponifiable matter, moisture plus volatile matter content and ash content were determined according to the reported methods of analysis. Qualitative analysis of elementts in two oil samples were carried out by EDXRF method and it indicated the presence of Fe, Cu, Zn, Cr, Ni and Se. In addition, cobalt (Co) was found to be present in the oilof PE extract, The elemental compositions of Kanzaw oil (PE extract) determined by direct solvent AAs method were observed to be Fe(3.88ppm), Cu(0.70ppm), Zn(0.30ppm), Cr(0.08ppm), Ni(0.49ppm) and Se(0.14ppm). The fatty acids composition measured by GLC technique gave lauric acid (0.46%), palmitic acid (21.25%), stearic acid (11.57%), oleic acid (60.43%), and linoleic acid (6.29%). One triterpenoid, lupeol (0.06%) and one sterol, campesterol (0.05%) were isolated from unsaponifiable fraction of seed oil by using chromatography on silica gel column with PE: EtOAc (19:1) solvent system. The isolated compounds were identified by colour tests on TLC chromatograms, melting points and spectoscopic methods such as UV, FT-IR, ^{1}H NMR, ^{13}CNMR and EI-MS. The observation of these two compounds (Lupeol and Campesterol) in the seed oil of Kanzaw [*Madhuca lobbii* (C.B.Clarke) H.J. Lam] is the first in Myanmar.

225. An investigation of *Ananas sativa* for its anthelmintic actions. Yee Mon Myint. Thesis, MSc (Zoology), Rangoon Arts and Science University; 1981.

The anthelmintic potential of the pineapple *A. sativa* (Nanat-thee) for its clinical application was investigated. Appropriate *in vitro* screening method and *in vivo* test models were developed. The *in vitro* model employed the standard Tyrode solution with the pH of 7±0.2, similar to that of jejunum and ileum where the parasites most commonly reside, being 28.6% and 67.4% respectively. The *in vitro* model also employed a shorter duration of incubation period of two days with daily renewal of the bathing solution which is suitable for the screening of such indigenous herbal agents. A concentration of 40 to 80mg/ml pineapple significantly killed the test worm during the experimental period of two days. Comparison potency-wise showed 80mg/ml of the pineapple juice was equivalent to 4 mM of piperazine in its

anthelmintic activity. As a prerequisite test for its clinical application and *in vivo* model using pigs had been done and found satisfactory. The anthelmintic action of fresh pineapple consumed was due to its bromelain content. The mechanism of action of bromelain is due to its proteolytic digestion of the worm's cuticle. Crude bromelain could be extracted from local pineapple fruit as much as 0.29gm per 100gm of fruit. At its edible form and amount, the pineapple possesses sufficient anthelmintic activity even though it was partially destroyed on its passage to the stomach. The required anthelmintic effect was suggestive to be achieved by consuming a quarter to the whole fruit of medium size depending on the age of the subjects.

226. Investigation of anthelmintic and bioactivities and some organic constituents of *Balanites aegyptiaca* Linn. Delile. (Thit-pa-lway) bark and *Benincasa cerifera* Savi. (Kyauk-phayon) seed. Thida Tun. Thesis, PhD (Chemistry), University of Yangon; 2008.

In the present work, *Bakabutes aegyptiace* Linn. Delile. (Thit-pa-lway) bark (TPLB) and *Benincasa cerifera* Savi. (Kyauk-phayon) seed (KPYS) were chosen for isolation of phytoconstituents and bioactivity studies. By silica gel column chromatographic separation, 0.007% of palmitic acid (m.pt=61~63˚C), 0.008% of bergapten (m.pt=178~182˚C) and 0.001% of β-sitosterol (m.pt=132~142˚C) were isolated from pet-ether extract of TPLB and from ethyl acetate extract, 0.006% of diosgenin (m.pt=203~205˚C) was isolated. Whereas, 0.02% of arachidic acid (m.pt=73~75˚C) was isolated from ethyl acetate extract of KPYS. The idenitities of all isolated compounds were made by joint application of modern spectroscopic techniques (UV, FT-IR, ^{1}H NMR and ^{13}CNMR and their physico-chemical properties. Acute toxicity test revealed no harmful effect can mice for both aqueous and EtOH extracts from KPYS 24g/kg BW dose. However, TPLB extracts were observed to be toxic. LD_{50} of TPLB aqueous extract was 11.5g/kg BW and its confidence limit was between 9.2g/kg~14.38g/kg BW. LD_{50} of TPLB EtOH extract was 13g/kg BW and its confidence limit was 11.3g/kg~14.22g/kg BW. Antimicrobial activity of some crude extracts such as pet-ether, ethanol, ethyl acetate and aqueous extracts was investigated against 5 bacterial strains of microorganisms such as *Staphylococcus aureus, Pseudomonous aeruginosa, Bacillus pumalis, Candida albican* and *Escherichia coli* by agar well diffusion method, Pet-ether extract of TPLB showed antimicrobial activity against all strains with inhibition diameter of 12-15mm. Ethanol and ethyl acetate extract of TPLB, respectively, exhibited inhibition zones diameters in the ranges of 14~20 above mm against four microorganisms, except *E. coli.* However, aqueous extract of TPLB exhibited inhibition zone diameters in the ranges 20mm~above against only *E. coli*. But all extracts of KPYS did not show antimicrobial activity against all microorganisms tested. The minimum inhibitory concentration (MIC) value of two isolated compounds bergapten and diosgenin against 8 microorganisms such as *Proteus morganella*, *Staphylococous aureus* ws, *Escherichia coli* ATCC 25922, *Salmonella cholerae-suis, Shigella dystentriae* (ID), *Vibrio cholerae, Staphylcoccus aureus* and *Bacillus sublilis* were also determined by employing microplate dilution method. The MIC of bergapten against *S. cholerae-suis* and *S. dysenteriae* (ID) were found to be 12.5μg/ml and 25μg/ml, respectively. The MIC of bergapten against remaining 6 bacterial strains of microorganism were observed to be >25μg/ml. For diosgenin, the MIC values against P. *morganella* and *V. cholerate* (O1 DMR ID 93) were found to be 25μg/ml, and >25μg/ml against the other 6 microorganisms. Furthermore, antioxidant properties of watery and 95% EtOH extracts of TPLB and KPYS as well as two isolated

compounds (B, bergapten) and (D, diosgenin) were also investigated by determination of oxidative inhibitory concentration (IC_{50}) with DPPH assay. As the lower the (IC_{50}) values, the higher the antioxidant activities, TPLB ethanol extract (IC_{50}=0.547μg/ml) has the highest antioxidant activity followed by TPLB watery extract (IC_{50}=1.067μg/ml) and KPYS watery extract (IC_{50}=1.111μg/ml). Both TPLB and KPYS extracts were also found to be more effective than standard BHT C and diosgenin (IC_{50}=1.209μg/ml) in antioxidant activity. The anthelmintic activity of watery and 95% EtOH extracts from TPLB and KPYS, and two isolated compounds β-sitosterol and diosgenin was also studied by using mice model infected with *Hymenolepis nana* at various time intervals, i.e., day 0, day 3, day 5, day 7, day 10 and day 14 before and after orally administration of different doses of samples and standard drug albendazole. The percent reductions of egg count at post-treatment day 14 for TPLB watery and EtOH extracts with the doses of 3,6 and 9g/kg bw were respectively found to be 65.16%, 77.94%, 89.95% and 54.06%, 68.72%, 75%. Whereas KPYS watery and EtOH extracts showed the percent reduction of egg count at post treatment day 14 to be 53.41%, 67.27%, 73.33% and 43.09%,52.03%,57.05% with the same doses of 3,6 and 9g/kg bw, respectively. It was found that as the doses of samples were increased, the percent reduction of egg count was increase, and the TYLB watery extract has the highest anthelmintic activity and the KPYS EtOH extract has the lowest potency. The investigation of anthelmintic activity of two isolated compounds β-sitosterol and diosgenin was also carried out. β-sitosterol and diosgenin could reduce 88.53% and 94.53% of egg count after 14 day post-treatment with the dosage of each 2mg/kg bw. Therefore, it could be inferred that β-sitosterol and diosgenin have anthelmintic potency and diosgenin possessed slightly better activity. Therefore, it can be inferred that TPLB and KPYS may be useful in the medicinal formulation for the treatment of anthelminitic activity and the diseases related to the microorganism tested. Furthermore, the bark of TPL and the seed of KPY may be used as antioxidant agents.

227. Investigation of antibacterial activity of three traditional medicine formulations. Mar Mar Nyein; Chit Maung; Mya Bwin. *Myanmar Health Sci Res J.* 1996; 8(1): p20-24.

Three traditional medicine formulations which are widely used by local people were investigated for antibacterial activity using 14 species of bacteria. The bacteria include one specie each of *Escherichia coli*, *Klebsiella pneumoniae*, *Streptococcus pyogenes* and *Vibrio cholerae*; two species each of *Proteus, Salmonella* and *Staphylococcus* and 4 species of *Shigellae*. The formulations were Ah-bein-nyin, Heleikda-sonna and Nandwin-nganzay which contain herbs and chemicals and have been used as antipyretic or in the treatment of urinary disorders, gastrointestinal disorders and cardiovascular disorders. Fifty percent alcoholic extract of these drugs were found to possess some antibacterial activity on certain bacteria. Moreover, extracts from 7 plants namely, *Saxifraga ligulata* (Wall) (Nat-hsay-gamone), *Capparis sepiaria* (Sugaut-net), *Holoptelea integrifolia* (Pyauk-seik), *Zizyphus oenoplia* (Baung-bet), *Hygrophila spinosa* (Su-padaung), *Mitragyna parviflora* (Htain-they) and unidentified sp. (Thetyin-kadoe) were also tested on the above bacteria. It was observed that *Saxifraga ligulata*, *Capparis sepiaria* and *Zizyphus oenoplia* showed antibacterial activity on some bacteria.

228. Investigation of antimicrobial activities of some organic constituents from *Cyperus scariasus* R.Br. (Nwa-mye-yin) and *Barleria prionitis* Linn. (Leik-su-shwe). Khin Sunn Yu. Thesis, PhD (Chemistry). University of Yangon; 2007.

The aim of this study is to screen *in vitro* and *in vivo* antimicrobial activity and some bioactive phytoconstituents from activity guided plant extracts of *Cyperus scariosus* R.Br*, Barleria prionitis* L.*, Barleria cristata* L. and *Barleria dichotoma* Roxb. These have been studied on preliminarily *in vitro* screening of antibacterial activity by agar disc diffusion method. The extracts of *B. cristata* L. and *B. dichotoma* Roxb. did not show antibacterial activity. Therefore, among four plants tested, the two antibacterial activities guided plants *C. scariosus* R.Br., and *B. prionitis* L.were chosen for the isolation of some bioactive constituents and for revealing scientific proof on antidiarrheal and antimicrobial activities by *in vitro* and *in vivo* experimental models. *In vitro* screening of antibacterial activity by agar well diffusion method, all of the extracts of *C. scariosus* R.Br. showed antibacterial activity on six strains of microorganisms (inhibition zone diameter, 12-20mm). Moreover, all crude extracts of *B. prionitis* L. except PE extract showed an inhibition zone of 12-20 mm) against the tested organisms. According to these results, the EtOAc extracts of *C. scariosus* R.Br. and *B. prionitis* L. Exhibited the most significant antibacterial activity when compred with activities of extracts of both plants. *In vitro* screening of antifungal activity, PE and MeHO extracts of *C. scariosus* R.Br. exhibited antifungal activity (zone of inhibition–14mm) against *Candida albicans* and *Aspergillus niger*. All crude extracts such as PE, MeOH and H_2o extracts of *B. prionitis* L. showed antifungal activity against *Aspergillus niger* (zone of inhibition ranging from 15-20mm) whereas only MeOH extract displayed antifungal activity against *Candida albicans* (zone of inhibition is 16mm). *In vivo* investigation of antidiarrheal activity of aqueous extracts of *C. scariosus* R.Br. and *B. prionitis* L. were carried out using castor oil-induced diarrhea model in mice. According to the experimental results, it can be observed that *C. scariosus* R.Br. have more potent antidiarrrheal activity which is similar to that of the standard drug, loperamide, (57.2; $p<0.05$) than those of *B. prionitis* L. (31.61%) at the dose of 12g/kg boby weight. *In vivo* screening of wound healing activity of 70% EtOH and aqueous extracts of both plants were also tested on *Staphylococcus aureus* infected wound of albino rats. The results showed that the 70% EtOH extracts of both plants have a higher potency in complete healing effect together with reducing inflammation at the dose of 20mg after 3 to 4 days than of aqueous extracts of both plants after 4 to 5 days. Activity guided extracts of both plants were separated by column chromatographic method. The isolated compounds were identified by UV-vis, FT-IR, ^{1}H NMR, ^{13}C NMR, 2D NMR, ^{1}H-^{1}H COSY and EI-MS spectroscopy. Column chromatographic separation of activity guided EtOAC extract of *B. prionitis* L. Provided compounds KSY-1 (0.0012%), KSY-2 (0.008%) and KSY-3 (0.005%) and KSY-4 (0.007%). The isolated compounds KSY-1, 2 and 3 may be identified as the same skeleton of fatty acid ester. Compound KYS-5 (a mixture of 3:1 composition ratio of (a) β-sitostenone and (b) stigmastenone) (0.0037%), KSY-6 (β-sitosterol, 0.015%) was isolated from PE extract of *C. scariosus* R.Br. And also, KSY-7 (β-sitosterol acetate) was obtained from semisynthetic of KSY-6. The finding of KSY-5, a mixture of β-sitostenone and stigmastenone from *C. scarsiosus* R.Br. plant was also assumed as the first report since no report has been found in the previous literature regarding in *C. scariosus* R.Br. plant. In addition, activity guided EtOAc extract of *C. scariosus* R.Br. gave compounds KSY-8 (an aurone, 0.0015%), KSY-9 (an aurone, 0.0025%) and KSY-10 (4-methoxy aureusidin, 0.0065%). The quantitative and qualitative analysis of vitamins content (Ascorbic acid and Thiamine)

were also carried out by A.O.A.C method and UV-vis spectroscopic method and the qualities of the vitamins were compared with those of the standard vitamins. The MIC values of isolated compounds from *B. prionitis* L. were (KSY 1; 1.25µg/mL; KSY 2:1.25-µg/mL; ≥2.5µg/mL; KSY 3:0.3µg/mL≥2.5µg/mL) against *Proteus motganii*, *Bacillus subtilis*, 2 species of Salmoella, 3 species of *Escherichia coli*, 2 species of *Staphlococcus aureus* and *Vibrio cholerae*. Moreover, the MIC values of active EtOAc extract and isolated compounds from *C. scariosus* R.Br. were determined on eight common pathogens causing dearrhea such as 2 species of *Escheichia coli*, 3 species of Shigella, a species of *Vibrio cholerae* and *Salmonella typhi*. The MIC value of EtOAc extract was (5µg/mL), KSY-5 was (>1.25µg/mL); KSY-6 was (>2.5µg/mL); KSY-7 was (>1.25µg/mL); and KSY-8 was (2.5µg/mL).

229. Investigation of antimicrobial, antidiarrhoeal & antioxidant activities of Sabalin (*Cymbopogon flexsuosus*) Stapf. Hla Thidar Aung. Thesis, PhD (Chemistry), University of Yangon; 2008.

Lemongrass or *Cymbopogan flexuosus*. Stapf., as it is known botanically, originated in Southern India and Srilanka. This versatile herb will grow in almost any tropical or subtropical climate as long as it gets adequate water and nutrition. In this research, the antimicrobial, antidiarrhoeal and antioxidant activities were investigated. According to the phytochemical investigation, chemical constituent's flavonoids, alkaloids, phenolic compound, tannins, carbohydrate, glycoside, steroids and reducing sugar) were found in the leaves of Sabalin. From EDXRF spectrum, K, Cl, Fe, Rb, Mn and Br were found in the leaves of Sabalin. The essential oil was extracted from leaves of Sabalin and yield % was 0.26%. Then the citral was isolated from essential oil (70% yields) by using column chromatographic technique using silica gel G. The purified citral was well characterized using boiling point, TLC, FT-IR, and GC-MS techniques. Two isomers, *cis* citral a and *trans* citral b of retention times 7.14 and 7.38min, were detected in the gas chromatogram. Then extractions with water and EtOH were carried out on leaves of Sabalin. The β-sitosterol (0.035%) was isolated from EtOH extract by using column chromatographic technique with silica gel G. The β-sitosterol was characterized by TLC, FT-IR and NMR techniques. The antibacterial and antifungal activities and MIC of citral, essential oil two crude extracts and β-sitosterol were investigated using *Proteus morgani*, *Bacillus subtilis*, 2 species of *Salmonella,* 3 species of *E. coli*, 2 species of *Staphylococcus aureus*, *Vibrio cholerae* and C*andida albican* According to the inhibition zone diameters, *Vibro cholerae* and C*andida albican.* According to the inhibition zone diameters, the order of antibacterial and antifungal activities were citral > lemongrass oil > EtOH extract > water extract. The acute toxicity test and antidiarrhoeal activities, the water and EtOH extracts were studied by using albino mice model (ddy strain). Comparative study was done using antidiarrhoeal medicine, dicotil (loperamide). *In vitro* examination of acute toxicity results on mice model were exhibited that this plant was free from acute toxicity effect at maximum permissible dose 12g/kg body weight and therefore medium lethal dose (LD_{50}) of 70% EtOH and H_2O extracts was more than 12g/kg body weight. By utilizing the screening of free radical scavenging activity (DPPH) assay on two crude extracts of aerial parts of Sabalin, by using Butylated Hydroxy Toluene (BHT) as a standard, the inhibition % (IC_{50}) was found 1.17, 1.26 and 1.98 respectively, for BHT, H_2O and EtOH extracts.

230. Investigation of bioactive phytoconstituents and the biological activities of some Myanmar traditional medicinal plants. Ni Ni Than. Thesis, PhD (Chemistry), University of Yangon, 2005.

The purpose of this research work is to study bioactive phytoconstituents and their biological activities from four medicinal plants which are currently used in TMH for the treatment of hepatitis and liver disorder. These are the whole plants of *Phyllanthus niruri (*Taung-zee-phyu), the whole plants of *Elephantopus scaber* (Taw-mon-lar or Sin-chay) leaves of *Eclipta alba* (Kyeik-hman) and flowers of *Butea monosperma* (Pauk-pwint). Fifteen compounds were isolated and identified from the whole plants of *Phyllanthus niruri*. Among these one was **a new** flavone sulfonic acid named **niruri flavone (8)** together with hypophyllanthin (**1**). isoquercetin (**2**). gallic acid (**3**) brevifolin carboxylic acid (**4**). methyl brevifolin carboxylate (**5**), corilagin (**6**) and isocorilagin (**7**), quercetin-3-0-β-D-glucopyranosyl (1→4)- α-rhamnopyranoside (**9**), 6,10,14-trimethyl-2-pentadecanone (**10**). methyl hexadecanoate (**11**), ethyl hexadecanoate (**12**). methyl octadecanoate (**13**). ethyl (E)-9-octadecenoate (**14**). ethyl octadecanoate (**15**). Ten compounds were isolated and identified from the whole plants of *Elephantopus scaber*. Among these **two new sesquiterpene** lactones named **17, 19-dihydrodeoxyelephantopin** (**18**). **iso-17, 19-dihydrodeoxyelephantopin** (**19**). together with the known compounds deoxyelephantopin (**17**). lupeol (**19**). stigmasterol (**20**). stigmasterol glucoside (**21**). ethyl hexadecanote (**22**).9.12- ethyl octadecadienoate (**23**). ethyl Z-9-octadecanoate (**24**) and ethyl octadecanoate (**25**) were identified by modern spectroscopic methods. Seventeen compounds were isolated and identified from the flowers of *Butea monosperma*. from which medicarpin-3-O-glucoside (**29**) was isolated for the first time. The other compounds were butein (**26**). butin (**27**), monospermoside (butein-3-β-D-glucoside) (**28**). β-sitosterol glucoside (**30**), sulphurein (**31**). isomonospenlloside (butin-3-glucoside) (**32**), isocoreopsin-(Butin- 7-glucoside) (**33**), butrin (**34**). isobutrin (**35**). ergost-5-en-3β-ol (**36**), stigmasterol (**37**). β-sitosterol (**38**). 6.10, 14-trimethyl-2-pentadecanone (**39**), methyl hexadecanoate (**40**). methyl octadecanoate (**41**). heptacosane (**42**). Eleven pure compounds were isolated from the leaves of *Eclipta alba*. Namely stigmasterol (**43**), wedelolactone (**44**), stigmasterol glucoside (**45**), Eclalbasaponin II (**46**). eclalbasaponin I (**47**), apigenin (**48**) luteolin (**49**), apigenin- 7-0-sulphate (**50**). luteolin- 7-0-sulphate (**51**). luteolin- 7-0-glucoside (**52**) and indole-3-carboxylic acid (**53**). Out of the flavonoid sulphates, apigenin-7-0-sulphate. luteolin- 7-0-sulphate and indole-3-carboxylic acid were isolated for the first time from the leaves of *E. alba*. In the biological activities, primary) screening was carried out for the antitumour activity of 21 compounds (compound **1-9** from *P. niruri*. compound **16-21** from *E. scaber*. compound **26, 34** and **35** from *B. monosperma* and compound **44, 47** and **51** from *E. alba*) using six cell lines with two different concentrations. Four compounds from *E. scaber* (deoxyelephantopin (**17**), 17.19-dihydrodeoxyelephantopin (**18**) iso-17.19-dihydrodeoxyelephantopin (19), lupeol (**16**). one compound from *B. monosperma* (butein. **26**). one compound from *E. alba* (wedelolactone. **44**) which showed activity in the primary screening were further screened by 36 cell lines using five different concentrations. The **new** substances (from *E. scaber*) I 7.19-dihydrodeoxyelephantopin (**18**) and iso-17. 19-dihydrodeoxyelephantopin (**19**) exhibited a mean IC_{70} value of 4.0μg/ml and 4.3μg/ml respectively, compared to a mean IC_{70} value of 1.1μg/ml for **17**. All three compounds were active against the melanoma derived cell line MEXF 394 NL. The compound **17** effected pronounced activity in the mammary cancer cell line MAXF401 NL. **18** was highly effective in the renal cancer cell line RXF 944L and **19** showed marked activity to the large cell

line lung cancer LXFL-526L. Compound **16** showed activity against central nerve system cells CNXFSF 268. Compound **26** (from *B. monosperma*) exhibited activity against the gastric cancer cell line GXF 251L. and 44 showed activity against the ovarian cancer cell line OVXFI619L. Four major compounds isolated from *E. scaber* exhibited pronounced antitumour activity and due to their selectivity should be used for the treatment of melanoma mammary renal and lung cancers. From these tests, as we are getting not only the cellular toxicity but also the selectivity, results will allow us to evaluate the potential medical value of the metabolites. Antiviral activity of four plant extracts and the pure compounds wedelolactone (**44**) (isolated from *E. alba*). and butrin (**34**) (isolated from *B. monosperma*) was tested by using human lung endothelial cell line A-549. *E. scaber* EtOH extract showed antiviral activity at a diluation of 1:300. Wedelolactone (**44**) showed cytotoxic activity at a concentration of 100µg/ml. The antioxident activity of fourteen pure compounds namely isoquercetin (**2**), gallic acid (**3**), brevifolin carboxylic acid (**4**), methyl brevifolin carboxylate (**5**), niruri flavone (**8**) and quercetin-3-0-β-D-glucopyranosyl-(1→4)-α- rhamnopyranoside (**9**) from *P.niruri*. butein (**26**), butin (**27**). monospermoside (butein-3-β-D-glucoside. **28**), sulphurein (**31**). isomonospermoside (butin-3-glucoside, **32**), butrin (**34**). isobutrin (**35**). from *B.monosparma* and wedelolactone (**44**) from *E. alba* were tested by using improved an ABTS cation radical reduction assay. All the compounds were capable of reducing approximately half of the cation radical at only 10µM. The new compound niruri flavone (**8**) reduced ABTS cation radical at 20µM and the highly active compound gallic acid (**3**) showed reduction at 2µM. Since a radical scavenger turns into a free radical itself after interaction with a radical and since a reducing agent may autooxidize it is important to test for potential prooxidant activity *in vivo*. For this purpose bioluminescent dinoflagellate *Lingulodinium polyedrum* was monitored as an indicator of oxidative stress. All the fourteen compounds which showed efficient scavenging capacity (2-20µM) with ABTS cation radical were tested using concentrations of 10 and 100µM. Gallic acid (**3**), niruriflavone (**8**), quercetin-3-0-β-D-glucopyranosyl (1→4)-α- rhamnopyranoside (**9**), butin (**27**) and wedelolactone (**44**) proved to be prooxidant in the assay. Gallic acid (**3**), which showed high scavenging capacity (at 2µM) proved to be highly toxic. This showed that gallic acid (**3**) can scavenge free radicals fonl1ing prooxidant intenl1ediates. Isoquercetin (**2**), brevifolin carboxylic acid (**4**), methyl brevifolin carboxylate (**5**), and isomonospermoside (butin-3-g1ucoside) (**32**). Which scavenged free radicals without forming prooxidant intenl1ediates were further tested for protection of *Lingulodinium polyedrum* against. Toxicity by the prooxidant paraquat. In this experiment. isomonospenl1oside (butin-3-g1ucoside. **32**) showed no sign of toxicity after microscopic inspection of the *L. polyedrum* cells. Although it did not restore the full height of the glow peak maximum. It has been show'n that this test on a cellular level provides much more information than simple chemical tests. In the anti-HBsAg like activity. EtOH extracts of *P. niruri*. *E. alba*. *B. monosperma* exhibited 1/16 (32 times), 1/32 (16 times). 1/64 (8 times) test serum titre reduction, respectively. *E. scaber* EtOH extracts showed no significant activity of the three pure compounds butein (**26**), monospermoside (butein-3-β-D-glucoside. **28**), isobutrin (**35**) isolated from *B. monosperma*. The compounds monospermoside (butein-3-β-D-glucoside. **28**), and isobutrin (butein-3.4-β-D-diglucoside. **35**) showed pronounced activity by 1/8 (64 times) test serum titre reduction at a concentration of 4 mg/ml.

231. Investigation of biological activity and of some organic chemical constituents from the seeds of *Zanthoxylum alatum* Roxb. (Mak-kat) and the roots of *Atalantia monophylla* DC. (Taw-shauk). Lay Sandar. Thesis, PhD (Chemistry), University of Yangon; 2007.

In the present work, two selected Myanmar medicinal plants, namely *Zanthoxylum alatum* Roxb. (Mak-kat) seeds and *Atalantia monophylla* DC. (Taw-shauk) roots were chosen for investigation of some chemical constituents and biological activity. Mar-kat used for treatment of fever, diarrhea, dyspepsia and rheumatism. Taw-shauk is especially used for chronic rheumatism and paralysis. Antibacterial screening by agar well diffusion method against *Bacillus subtillis, Staphylococcus aureus, Pseudomonas aeruginosa, Bacillus pumalis, Candida albicans* and Mycobacterium species of different extracts of Mak-kat seeds and Taw-shauk roots indicated that polar extracts are good candidates for active compounds, especially ethyl acetate extract. Xanthoxylin (L-1) was isolated as major constituent from active ethyl acetate extract of *Z alatum* Roxb. seeds. Marmesin (L-2) (0.005%) and demethylsuberosin (L-3) (0.004%) were also isolated from active ethyl acetate extract of *Atalantia monophylla* DC. roots by silica gel column chromatographic separation. The isolated compounds were characterized and identified by chemical methods, modern spectroscopic methods and reference to biosynthesis pathways. Furthermore, two derivatives from xanthoxylin, namely methyl xanthoxylin (L.4) (58.33%) and 2'–hydroxy-4', 6'-dimethoxy chalcone (L-5) (67%) were semi-synthesized. They were characterized by chemical and spectroscopic methods. Minimum Inhibitory Concentration (MIC) value showed that isolated compounds L-1 (62.5µg/ml) and L-2 (31.25µg/ml) were active on 2 species of *Escherichia coli*, 3 species of *Staphylococcus aureus, Bacillus pumalis, Proteus morganii* and *Salmonella typhi.* Then, the determination of the nutritional values, physicochemical characterization, qualitative elemental analysis and rapid screening of antioxidant by Dot-Blot and DPPH staining method of both plants were carried out. Finally, the antidiarrheal activity of the aqueous extract of *Zanthoxylum alatum* Roxb. seeds was investigated by experimental test models using castor oil induced diarrhea, castor oil induced intestinal fluid accumulation and castor oil induced intestinal propulsion methods on albini mice. There were significant reduction in faecal outputs and frequency of droppings when the plant extracts of 3.6 and 12g/kg doses were administered orally compared with castor oil treated mice, with the (3g/kg) dose showing the highest significant inhibition activity (76.13%, $p<0.00001$) against castor oil induced diarrhea similar to standard antidiarrheal agent dicotil (79.09%, $p<0.00001$). In addition, the aqueous extract (3g/kg dose) was found to possess significant antidiarrheal activity, with experimental *in vivo* antidiarrheal index of 71.4%.

232. Investigation of chemical constituents and bioactivities of some organic compounds from rhizomes of *Boesenbergia pandurata* (Roxb.) Schltr. (Seik-phoo) (Red and Yellow varieties). Aye Myint Sein. Thesis, PhD (Chemistry), University of Yangon, 2008.

Besenbergia pandurata (Roxb) (Seik-phoo) red and yellow rhizomes were chosen for the investigation of chemical analysis and biological action. Rhizomes and roots of this plants are used in cases of stomachic, cough, confinement, diarrhea, also for rheumatism and muscular pains and as tonic and skin liniment in traditional medicine. The present work deals with the isolation of 7 compounds from Seik-phoo (yellow) rhizome, MIC values of antibacterial activities of pure 3 compounds, acute toxicity, anti diarrhoea activities and antioxidant activities. By silica gel column chromatographic separation technique, seven compounds namely, pinostrobin (A-1, 2%, m.p 100ºC), panduratin A (A-2, 0.015%, m.p 157ºC), pinocembrin (A-3, 1.01%, m.p 2000ºC), 2', 6' dihydroxy-4'- methoxy chalcone (A-4, 0.002%, m.p 164ºC), cardamonin (A-5, 0.025%, m.p 200ºC)), alpinetin (A-6, 0.03%, m.p 220ºC) and helichrysetin (A- 7, 0.002%, m.p 200ºC) were isolated from (yellow) rhizome of Seik-phoo plant. The minimum inhibitory concentration (MIC) of compounds A-I and A-3 were determined by using micro plate dilution method: *Proteus morganii, Salmonella typhi*, *E. coli* 0128K67, *Staphylococcus aureus*, *E coli* ATCC 25922, *Bacillus subtilis*, *Staphylococcus aureus* L-43, *E. coli* EHEC. The compound A-I was active against *E. coli* and *Staphylococcus aureus* (15.63µg/l). The compound A-3 was active against *Salmonella typhi*, *E. coli* 0128:K67, *Staphylococcus aureus, E. coli* ATCC 25922, *Bacillus subtilis*, *E. coli* EHEC (4.7µg/ml) and against other two screening bacteria with MIC value of (9.4µg/ml). The MIC value of isolated compound A-3 was active against *Vibrio cholerae* O139 (2.5µg/ml). *In vivo* screening of antimicrobial activity by agar disc diffusion method, all of the extracts such as PE, EtOH, EtOAc of *B. pandurata* (yellow rhizome) were active against on 9 strains of microorganism (inhibition zone diameter 14-23 mm) and these extracts of red rhizome were active against on 4 strains of main organism (inhibition zone diameter 14-16mm). Therefore, Seik-phoo (yellow rhizome) may possess higher antimicrobial potency than that of red rhizome. The acute toxicity of 70% EtOH and aqueous extracts was examined on albino mice by Litchfied and Wilcoxon method. It was observed that both extracts were free from acute toxic or harmful effects in the concentration range from 3g/kg to the maximal permissible dose 12g/kg. Antidiarrhea activity of aqueous extract of Seik-phoo (yellow) rhizome was carried out using castor oil induced anti diarrhea model in mice. The response parameters assessed includes antidiarrhea, anti secretory and intestinal transit activaties. A significant reduction of fecal output and the frequency of droppings in the first hour of administration (53.3%, $p<0.05$) were seen with extracts of Seik-phoo (12 g/kg), which was similar with that seen with loperamide. In antioxidant activity, EtOH and EtOAc extracts of both plants, isolated compounds from Seik phoo (yellow) were measured for the antioxidant activity by DPPH staining method. EtOH and EtOAc extracts of both plants showed potent activity upto the dry matter 50µg. A-2, A-3, A-5 and A-7 showed activity at the dry matter amount 50µg. Compound A-1 and A-6 showed no activity. Thus, the rhizomes of Seik-phoo (red and yellow) plant may be used as antimicrobial, antidiarrheal and antioxidant agents in traditional medicine formulations.

233. Investigation of chemical constituents and mosquito repellency of *Melaleuca leucadendron* Linn. (Ka-lan) leaves. Aye Aye Naing. Thesis, PhD (Chemistry), University of Yangon; 2009.

Mosquito repellent actiyity of two crude extracts (PE and EtOH), essential oil and isolated compound from *Melaleuca leucadendron* Linn. (Ka-lan) in Myanmar, cajeput in English)leaves were investigated.The repellent activity was tested on human volunteers by mean of arm in cage studies againts *A. aegypti* mosquitoes.The decreasing order of % protection from mosquito bites after 3 hours topical application of 5% solution (w/v)of indibidual sanples were: DEET (synthetic repellent), 96.55%; Ka-lan oil, 65.63%; pet-ether extract, 50.14% ethanol extract, 48.37%; **KL-2**, 38.39; **KL-1**,35.12; and **KL-3**, 19.00. The most potent Ka-lan essential oil consists of eucalyptol; α-terpineol; eugenol; β-caryophyllene; cyclohexane methanol, 4-ethyl-a,a-4-trimethyl-3-(1-methylethenyl)-,[1r-(la,3-a,4-b)]-; cis- α–eudesmol; β-eudesmol; naphthylene-1, 2, 4a, 5, 8, 8a-hexahydro-4, 7-dimethyl-1-(1-methyl)-(la,4ab,8a-a-a)-(±)-; benzene,1-(1,1-dimethy ethyl) -4-methoxy-; and phenol,4-(1,1-dimethylethyl)-2-methyl-; according to GC-MS analysis. Ka-lan essential oil did not cause dermal irritation when applied to human skin. No adverse effects on human volunteers were observed 2 months after application. According to spectroscopic analyses, **KL-1** (sesquiterpene, MW 236, 0.15% yield,m.p 88°C), **KL-2** (6,7-oxytaraxastenone,0.03% yield,m.p.263°C)and **KL-3** (β-sitosterol, 0.009% yield,m.p. 135°C) were identified. No lethality in mice was observed when fed with 95% ethanol extract of Ka-lan leaves up to 9g/kg body weight dose.

234. Investigation of mosquito repellent activities of some compounds in *Cymbopogon winterianus* Jowitts. (Zabalin-hmwe) and *Artemisia vulgaris* Linn. (Mel-di-dote). Ei Ei Soe. Thesis, PhD (Chemistry), University of Yangon; 2006.

To find an alternative compound that is safer to use and equally or more effective than synthetic repellent such as DEET (diethyl-*meta*-toluamide) was the main aim of this work. Two plants, *Cymbopogon winterianus* Jowitts. (Fam. Gramineae, Zabalin-hmwe in Myanmar) and *Artemisia vulgaris* Linn. (Fam. Asteracerce, Mel-di-dote in Myanmar), were selected for investigation of mosquito repellent activity. In a laboratory study, citronella oil extracted from *C. winterianus*, and petroleum ether extract and 95% ethanol extract of *A. vulgaris* were tested for repellent activity against *Aedes aegypti* on human volunteers by means of arm-in cage studies. The result revealed that topical application of 25% (w/v) citronella oil in acetone-water provided at least 1½ h of complete protection. In addition, 100%, 25% 10%, 5% and 2% (w/v) citronella oil after 6h single application reduced the biting rate by 90.37, 85.24, 40.43, 37.8 and 20.16%, respectively. For *A. vulgaris,* no complete protection was observed in 5% (w/v) concentration of both petroleum ether and ethnolic plant extract. However, single application after 6h reduced the biting rate by 38.96 and 39.77%, respectively. 5% DEET (w/v) (synthetic repellent as a positive control provided 1½h of complete protection and reduced the biting rate by 85.06% after 6h exposure time. Activity guided fractionation leads to isolation of isopulegol (**I**), α-citronellol (**II**) and α-eudesmol (**III**) (1.33% yield, m.p 133˚C) from citronella oil, arglabin (**IV**) (0.25% yield, m.p 100˚C), arborescin (**V**) (0.09% yield, m.p 147˚C) and 8-hydroxy arborescin (**VI**) (0.22% yield, m.p 171˚C from *A. vulgaris.* All isolated compounds were identified by spectroscopic measurements. Advanced NMR techniques such as DEPT, H-H and C-H COSY were applied to elucidate the molecular structure of **IV**, **V** and **VI**. Percent protection of 5% concentration (w/v) of individual compounds after 6h single application were: **III**, 75.93%; **IV**, 86.24%; **V**,

84.97% and **VI**, 74.59%. All isolated compounds showed better repellent activity than their mother extracts. Arglabin (**IV**) was examined to be the best mosquito repellent compound among the isolated compounds.Because of its high yield, it can be considered as an alternative in mosquito repellent formulation. All the plant extracts and isolated compounds did not cause dermal irritation when applied to human skin. No adverse effects on human volunteers were observed 2 month after application. Mosquito-borne diseases prevalent in Myanmar such as malaria and dengue haemorrhagic fever (DHF) could be reduced by the topical application of the citronella oil or *A. vulgaris* extract during the peak biting periods of the vector.

235. Investigation of organic constitutents and bioactivity of the leaves of *Vitex trifolia* Linn**.** (Kyaung-pan-lay) and *Moringa oleifera* Lam. (Dant-da-lun). Khin Soe Win. Thesis, PhD (Chemistry), University of Yangon; 2006.

In the present work, investigation of some phyto organic constituents and some biological activities such as antimicrobial and antimalarial activities were carried out on the leaves of two selected medicinal plants: *Vitex trifolia* Linn. (Kyaung-pan-lay) and *Moringa oleifera* Lamk. (Dant-da-lun). These plants are traditionally used as remedy for the treatment of sinusitis and malaria. By silica gel column chromatographic separation technique, vitexilactone (A, 0.0302%, 148-149˚C), unidentified diterpenoid compound (B, 0.088%, 214-215˚C), *p*-hydroxy benzoic acid (C, 0.002%, 212-213˚C) and unidentified diterpenoiid (D, 0.026%, 170-172˚C) were isolated from EtOAC extract whereas a mixture of fatty acid esters (E, 0.5%, ethyl-9-oxo nonanoate, ethyl hexadecanoate, ethyl (E)-9-octa-decenoate and ethyl eicosanoate) was obtained from PE extract of *Vitex trifolia* Linn. leaves. In addition, ursolic acid (F, 0.001%, 283-284˚C) was separated from MeOH extract *Moringa oleifera* Lamk. leaves by column chromatography whereas separation of pet-ether extract provided n-hexadecanoic acid (G, 0.05%, 62-63˚C) and a mixture of fatty acid esters (H, 0.02%). The identifies of all of the isolated compounds were determined by measurement of their melting points, some physico-chemical properties and also by modern spectroscopic techniques. For screening of antimicrobial activities, the crude extracts such as PE, EtOAc, MeOH, 70% EtOH were prepared by successive Soxhlet extraction method. All of these extracts were tested on 6 strains of pathogenic microorganisms such as *Staphylococcus aureus*, *Pseudomonas aeruginosa, Bacillus subtilis, Bacillus pumalis, Candida albican* and *Mycobacterium tuberculosis* by agar plate diffusion method. It was found that except EtOAc extract, all extracts of *Moringa oleifera* Lamk leaves exhibited the inhibition zones in the range of 12-19mm against all microorganisms tested. All extracts of *Vitex trofolia* Linn were found to be inactive against *B. pumalis* and 70% ethanol extract of this plant showed the inhibition zones of 12-13mm against 3 species such as *S. aureus, C. albican* and *M.tuberculosis* whereas MeOH extract exhibited the inhibited zones only in the range of 12-13mm against 4 species namely *S. aureus, P. aeruginosa, C. albican* and *M. tuberculosis*. This observation indicated that *Moringa oleifera* Lamk. leaves may generally possess higher antimicrobial potency than *Vitex trifolia* Linn. leaves. The Minimum Inhibitory Concentration (MIC) values of active EtOAc extract of *Vitex trifolia* Linn. and PE extract of *Moringa oleifera* Lamk. were determined by plate dilution method, testing on *S. aureus* and *P. aeruginosa*. The corresponding lowest MIC values of EtOAc extract and PE extract were respectively found to be similar (0.0625mgcm^{-3}) against *P. aeruginosa*. However, the highest MIC values of EtOAc extract and PE extract were observed as 0.5mgcm^{-3} and 0.125mgcm^{-3} respectively when tested with *S.aureus.* PE extract of *M. oleifera* Lamk. may be

therefore most effective for the treatment of diseases caused by *P. aeruginosa*. *In vivo* screening of antimalarial activity of *Vitex trifolia* Linn. by suppressive and therapeutic tests against asexual blood stages of *Plasmadium berghei* mouse model. 70% EtOH extract was found to possess antimalarial activity in suppressive test (29.66%). Therefore, it may be useful as a remedy for the trearment of malaria caused by *P. berghei.* The antimicrobial activity of isolated compounds such as vitexilactone, *p*-hydroxy benzoic acid, a mixture of fatty acid ethyl esters (E) and n-hexadecanoic acid were also determined by agar plate diffusion method against *S. aureus, P. aeruginosa, B. subtilis, B. pumalis, C. albican* and *M. tuberculosis.* Among them, vitexilactone and *p*-hydroxy benzoic acid and mixture of fatty acid esters (E) were found to exhibit the antimicrobial activity effectively against the *S. aureus, P. aeruginosa*, and *M. tuberculosis.* Although PE extract of *Moringa oleifera* Lamk. indicated antimicrobial activity on all test microorganisms, n-hexadecanoic acid isolated from this extract was active only against *S. aureus*, *B. pumalis,* and *M. tuberculosis.* No effect was found on *B. subtilis, B. pumalis,* and *C. albican* by all test compounds. All isolated compounds have shown effective antimicrobial activity against *P. aeruginosa.* Therefore, from these observations it can be inferred that vitexilactone and *p*-hydroxy benzoic acid, oil mixture (E) and n-hexadecanoic acid can be used in the treatment of diseases namely; sinusitis, skin infections, respiratory tract infections, urinary tract infections, external ear infections, septicemia, tuberculosis and leprosy etc.

236. Investigation of phytoconstituents of *Oldenlandia corymbosa* L. and its pharmacological activity. Htay Htay Lwin. Thesis, PhD (Chemistry), University of Yangon; 2008.

The plant *Oldenlandia corymbosa* L. locally known as Su-la-na-pha, belonging to the family Rubiaceae. It is naturally grown plant and collected from Yangon. The morphological and microscopical characters of the leaves, stems and roots were also studied. Verification of the plant was done according to the literature. In morphological study, the plant is annual herb; the stem is ascending or spreading, simple or much branched. Microscopical characters of leaves, stems and roots were also undertaken and examination of powdered drug were carried out for standardization of drugs. In microscopical study, the epidermal cell of lower and upper surface of lamina were wavy and covered with striated cuticle. Paracytic stomata were present only in lower surface. Calcium oxalate crystals formed as bundles of raphide present in spongy layers of leaves, cortex layers of leaves, cortex layers of stems and peridem layer of roots. In transverse section of stem and root, the vascular bundles are collateral type. The collected plants were dried, powdered and stored in airtight bottle for further use. The preliminary phytochemical examination was carried out to examine the chemical constituents. This examination showed the presence of alkaloids, glycosides, amino acid, phenolic compounds, reducing sugar, saponins, steroid, tannins and terpenoids. Physicochemical characterization such as moisture content, total ash, acid insoluble ash, water soluble ash, polar to non-polar soluble matter content were carried out to determine the soluble matter content. In this examination, the plant was found to be more soluble in polar solvent. The elements of this plant were analyzed by using Energy Dispersive X ray Florescences (EDXRF) and Atomic Absorption Spectrophotometer (AAS). In elemental analysis by EDXRF, K, Ca, S and P were found as principle elements and Fe, Zn, Mn, Sr and Rb were found as trace ones. Isolation of chemical constituents of the plant extract was carried out by silica gel column chromatography and selective solvent solubility method.

Yield percentage of three isolated compounds (oleanolic acid, β-sitosterol and asperuloside) were (0.36%), (0.02%) and (0.07%) respectively. Isolated compounds were identified by TLC, melting point, UV and FTIR technique. Various solvent extracts of plant and isolated compounds (oleanolic acid and asperuloside) were tested against different microorganisms for their antimicrobial activity by using agar well diffusion method. It was found that isolated compounds showed more significant antimicrobial activity than different solvent extract. The acute toxicity test was carried out with 70% ethanolic extract of Su–la–na-pha by using albino mice. It was observed that the 70% ethanolic extract was free from acute toxicity or harmful effect during observation period of 2 weeks even with maximum permissible dose of 16g/kg. Using albino rats at 6g/kg dose tested diuretic activity of 70% ethanolic extract of *O. corymbosa* L. The results showed that the 70% ethanolic extract of *O. corymbosa* L. significant for diuretic activity.

237. Investigation of some bioactive and bioactive constituents of *Achyranthes aspera* Linn. (Kyet-mauk-sue-pyan) (White variety) and *Alternanthera sessilis* (Linn.) R.Br. (Pazun-sar). Shwe Sin Oo. Thesis, PhD (Chemistry), University of Yangon; 2008

The present research deals with the investigation of some bioactive constituents from the roots of *Achyranthes aspera* Linn. (Kyet-mauk-sue-pyan) (white variety) and the whole plants of *Alternanthera sessilis* (Linn.) R.Br. (Pazun-sar) and screening of some biological activites of both plant extracts. *In vitro* screening of antibacterial activity by agar disc diffusion method, EtOAc extract of the roots of *Achyranthes aspera* Linn. showed antibacterial activity against *Shigella dysenteriae, Proteus vulgaris, Escherihia coli* VTEC, *Klebsiella pneumonia, Bacillyus subtilis, and Vibrio cholerae* (Inaba) (inhibition zone Diameter, 12-20mm). Aqueous extract of the roots of *Achyranthes aspera* Linn. also showed antibacterial activity against *Staphylococcus epidermidis* and *Staphylococcus aureus* (inhibition zone diameter, 12-14mm). PE and 70% EtOH extracts of the roots of *Achyranthes aspera* Linn. and all crude extracts of *Alternanthera sessilis* (Linn.) R.Br. have no antibacterial activity. The acute toxicity study on aqueous and 70% ethanolic extracts of *Achyranthes aspera* Linn. on albino mice was done by the method of Litchfield and Wilcoxon, 1949. Ethanolic extract of *Achyranthes aspera* Linn. was free from acute toxicity effect at maximum permissible dose 12g/kg body weight while LD_{50} of aqueous extract was found to be 16.8g/kg body weight. *In vivo* investigation of diuretic activity of aqueous and 70% ethanolic extract of two selected plants was systematically studied on albino rats. *Achyranthes aspera* Linn. exhibited significant diuretic activity after administering aqueous extract (1g/kg body weight) and ethanolic extract (4g/kg body weight). *Alternanthera sessilis* (Linn.) R.Br. showed significant diuretic activity after administering aqueous and ethanolic (each 4g/kg body weight). The maximum effects of aqueous and ethanolic extract of both plants were observed at 2hr of the experiment ($p<0.05$). The isolated compound E (vitexin rhamnoside) also exhibited significant diuretic activity at the dose of 100mg/kg body weight and the maximum effect was observed at 2hr and 3hr of the study ($p< 0.05$). In semi-quantitative DPPH staining, methanolic extract of two selected plants and three isolates; compound A, D and E had the radical scavenging activity at the dry amount (400µg). Among all the test samples, the isolated compound E (vitexin rhamnoside) showed the highest radical scavenging activity at the dry amount (100µg-400µg). Three phytoconstituents; A (terpeniod) (0.006%), B (ecdysterone) (0.0027 %) and C (flavonoid) (0.0018%) were isolated from the roots of *Achyranthes aspera* Linn. and

two phenolic compounds; D (apigenin glycoside) (0.0032%) and E (vitexin rhamnoside) (0.025) were isolated from the whole plants of *Alternanthera sessilis* (Linn.) R.Br. by using column chromatography method. Minium inhibitory concentration (MIC) of isolated compounds (A, B, C, D and E) was determined on focusing main diarrheal causing microorganisms such *Escherichia coli* ATCC strain, *Escherichia coli* O157 *Shigella dysenteriae, Shigella boydii, Salmonella typhi, Vibrio cholearae* O1 and *Vibrio cholera* O139 by agar disc diffusion method. It was found that MIC values of all isolated compounds were greater than 3µg/ml.

238. Investigation on some chemical constituents and biological activities of *Kaempferia parviflora* Wall. (Na-nwin-net) rhizome. Khin Sanda Myint. Thesis, PhD (Chemistry), University of Yangon; 2011.

Seven flavones (A, B, C, D, E, F and G) from the ethanolic extracts of *K. parviflora* Wall. rhizome were isolated. Isolation was furnished by silica gel column chromatographic separation of ethanol extract followed by repeated crystallization. On the basis of spectroscopic measurements, compound A (3,7-dimethoxy-5-hydroxy flavone) (0.034% yield, m.pt. 148-149ºC), compound B (3,7,4'- trimethoxy-5-hydroxy flavone) (0.015% yield, m.pt.144-146ºC), compound C (3,5,7,4' tetramethoxy flavone) (0.090% yield, m.pt. 163-165ºC), compound D (3,5,7,3',4'-pentamethoxy flavone) (0.092% yield, m.pt. 151-152ºC), compound E (5,7,4'-trimethoxy flavone) (0.221% yield, 156-158ºC) compound F (7, 4'-dimethoxy-5-hydroxy flavone) (0.019% yield, m.pt. 146-148ºC), and compound G (5,7-dimethoxy flavone) (0.016% yield, m.pt. 150-15 ºC) were identified. The relaxation effect on smooth muscle of isolated rat ileum induced contraction by carbachol (20µg/ml bc) was investigated *in vitro* by using different concentration of ethanol extract and some isolated compounds of *K. parviflora* Wall. rhizome. The ethanol extract and isolated compounds (B, D and E) were able to relax rat ileum muscle in dose dependent manner and 50% effective dose (IC_{50}) was calculated by linear regression method. For ethanol extract, exposure of (0.3, 0.6, 0.9, 1.2 and 1.5mg/ml bc) was able to reduce the mean height of contraction to (1.2±0.5), (0.7±0.12), 0.41±0.06), (0.1±0.09) and 0.00 cm resceptively and the percent inhibition of height of contraction were (29.98%), (58.77%), (73.35%), (92.98%) and (100%) resceptively. IC_{50} was derived to be 0.48mg/ml bc. Similarly, compound B at (0.03, 0.06, 0.09)mg/ml bc significantly reduced the height of contraction to 0.95± 0.065 cm (24.52 % reduction), 0.45± 0.15cm (67.12% reduction) and 0.00cm (100 % reduction). IC50 of compound B was 0.044mg/ml bc. In addition, compound D could reduce the height of contraction to 1.05± 0.20cm (32.19% reduction) in 0.01 mg/ml bc; 0.525±0.13 cm (65.78 % reduction) in 0.02mg/ml bc and 0.00cm (100% reduction) in 0.03 mg/ml bc IC_{50} of compound D was found to be 0.0139mg/ml bc. Similarly, anti-spasmodic effect of compound E was found to be reduced the height of contraction to 1.05±0.09cm (23.66% reduction), 0.625± 0.11 cm (54.85% reduction), 0.05± 0.05 cm (95.45% reduction), and 0.00cm (100% reduction) at 0.03.0.06, 0.09 and 0.12) mg/ml bc. (IC_{50}) was calculated as 0.048mg/ml bc. Based on the (IC_{50}) values, anti-spasmodic effect of compound D was higher than those of B, E and ethanol extract. In these experiments, ethanol extract at (1.5mg/ml bc), compound B at (0.09mg/ml bc), compound D at (0.03mg/ml bc) and compound E at (0.09mg/ml bc) could completely blocked the contraction induced by carbachol (20µg/ml bc) as similar to standard drug (atropine) at (0.72µg/ml bc) level. Antioxidant activities of ethanol extract and compound B were also investigated by using DPPH radical scavenging assay. Free radical scavenging efficacy of ethanol extract

(IC_{50}=16.06µg/ml) was better than compound B (IC_{50}=19.26µg/ml). Both test samples showed lower activity than standard ascorbic acid (IC_{50}=2.08µg/ml) in radical scavenging activity.

239. Investigations on some Burmese indigenous plants against ascariasis. Thawka-kyin. Thesis, MSc (Zoology), Rangoon Arts and Science University; 1976.

Eleven indigenous plants were screened for *in vitro* anthelminthic activity against *Ascaris suum*, namely *Albizia lebbeck* (Ah-nyar-kok-ko), *Butea frondosa* (Pauk), *Carica papaya* (Thin-baw), *Desmodium triquetrum* (Lauk-thay-ywet), Yin-pya (May-myo), *Euphorbia hirta* (Kywe-kyaung-hminsa), *Hiptage medablota*, *Lantana aculeata* (Sein-na-ban), *Lawsonia alba* (Dan), *Prunus persica* (Met-mon) and *Quisqualis indica* (Dawe-hmaing). Plant extracts were screened generally by a modification of the method of Sen and Hawking (1960). Specific testing was done by the method of Goodwin (1958). By Sen and Hawking's (1960) method, a dose level of 8 mg/ml of extracts of *B. frondosa* (seed), *D. febrifuga* (bark), *E. hirta* (entire plant), *H. metablota* (flower), *P. persica* (leaf) and *Q. indica* (leaf and flower) produced muscular paralysis of the worm within 18 hr. The three most promising plants, *Q. indica, D. febrifuga, P. persica* and a mixture of *C. papaya* seed and honey were further tested by Goodwin's (1958) method. The extracts, again at a dose level of 8 mg/ml, produced muscular paralysis of the worms within 24 hr. The *C. papaya* seed and honey mixture produced paralysis after 5 hr. The results were compared with those produced by the classical anthelminthic drugs laevo-tetramisole (Ketrax), piperazine hexahydrate and oil of chenopodium. From the above four promising plants, the *Q. indica* leaf extract and *C. papaya* seed mixture were selected for testing their anthelminthic activity *in vivo*. The subjects were preliminary screened by routine examination of a stool specimen, including an egg-count in positive cases. Children in the 1 to 12 yr age group with 800 eggs/50mg stool were selected for clinical trial, comparing their potency with that of two classical anthelminthic agents namely laev-tetramisole (Ketrax, Imperial Chemical Industries Limited, England) and piperazine adipate. Control groups were administered the vehicle honey as a placebo, and a saline purgative. Using the reduction of egg-count as a criterion, both the *C. papaya* seed/honey mixture and the *Q. indica* leaf extract were only half as potent approximately as laevo-tetramisole and piperazine adipate. No untoward side effects were noted in any patient severe enough to warrant withdrawal of either test agent.

240. Isolation and bioactivities of some organic compounds in the stem bark of *Sanmarae samanea* (Jaeq) Merr. (Thinbaw-kokko) *and Albizia labbeck* (L) Benth. (Anya-kokko)**.** Khaing Khaing Shwe. Thesis, PhD (Chemistry), University of Yangon; 2009.

In the present research work, two selected medicinal plants namely, *Sanmarae samanea* (Jaeq) Merr. (Thinbaw-kokko) and *Albizia labbeck* (L) Benth. (Anya-kokko) were chosen for investigation of some chemical constituents and biological activities. By using silica gel column chromatographic method, compound A (Lupeol) (2.6%, 40mg), Compound B (Pithecolobine), (0.046%, 7 mg) and Compound C (Montanicglyceride), (0.042%, 6.3mg) were isolated from the bioactive ethanol extract of the stem barks of Thinbaw-kokko and compound D (Lupeol) (1.15%, 17.3 mg) and compound E (unidentified), (2%, 30 mg) were obtained from the bioactive ethanol extract of the stem barks of Anya-kokko. All isolated compounds were structurally identified by physicochemical determinations and modem spectroscopic techniques such as UV-vis, FT-IR, 1D and 2D NMR and EI-MS and comparing with the published data. In the study on qualitative chemical

evaluation of bioactive ethanol extracts of both plants, it was found that condensed tannins (catechin/epi catechin and proanthocyanidin) and saponins and a few alkaloids are present in the stem bark of both plants. Biological activities such as anti-microbial activity, anti pyretic activity, anti-oxidant activity, acute toxicity test and pesticidal activity were carried out. Antimicrobial screening of various plant extracts of both plants was done by agar well diffusion method against six strains; *Bacillus subtilis, Staphylococcus aureus, Pseudomonas aeruginosa, Bacillus pumalis, Candida albicans, Escherichia coil* species. It was found that EtOAc, PE and EtOH extracts of *Albizia lebbeck* (L.) Benth. (Anya-kokko) showed antimicrobial activity against all six strains (zone of inhibition ranged from (14-20mm). Although EtOAc and EtOH extracts of *Samanea saman* (Jaeq.) Merr. (Thinbaw-kokko) showed antimicrobial activity against all strains (zone of inhibition ranged from 12-14mm), PE and watery extracts did not show antimicrobial activity. In the investigation of antimicrobial activity of isolated compounds A, B and C it can be seen that all of these compounds inhibited the all six strains microorganisms with the inhibibition zone diameters ranging between (11-15 mm). The most susceptible to those isolated compounds was *Escherichia coli* (~ 15 mm). In the study of acute toxicity test of extracts of two selected plants, the medium lethal dose LD_{50}) of EtOH of extract of Thinbaw-kokko and Anya-kokko were found to be 2.9 (1.73-4.87) and 5.6 (3.89-8.06)g/kg, b.w respectively. Aqueous extract of Thinbaw-kokko bark has been found to be free from toxic effect at the 6g/kg low dose and that from Anya-kokko has been found to be free from toxic effect at 8g/kg low dose. Antipyretic activity studied in rat models revealed that water and ethanol extract of Thinbaw-kokko (6g and 0.5g/kg) and Anya-kokko stem bark (6g and 1g/kg) body weight in dose respectively showed moderate reduction in yeast-induced pyrexia rat which was comparable to that of standard antipyretic drug paracetamol. According to the results of the antipyretic activity on albino rat, Anya-kokko aqueous extract is the most effective in antipyretic activity among the crude extracts of both plants. Similarly compound A (Lupeol) (60mg/kg) b.w dose showed moderate reduction induced pyrexia rat. Antioxidant activity of both plants were conducted by using DPPH assay method. The lowest IC_{50} value (highest antioxidant activity) was found for EtOH extract of Anya-kokko IC_{50} = (0.79µg/ml). In Thinbaw-kokko ethanol extract was found to have the lowest IC_{50} value (1.21µg/ml). Finally, screening of *in vivo* pesticidal activity of 95% EtOH extracts of both plants on *S. litura* (Armyworm) on castor leaf were carried out of by Randomited Complete Block Design. In this study, 95% EtOH extract of Anya-kokko exhibited more potent pestcidal activity than Thinbaw-kokko. Therefore, from the result of observation, it can be inferred that 95% EtOH extracts from barks of both plants may be used as biopesticides. From the overall assessment of the present investigation, it may be inferred that ethanolic extracts of stem bark of both plants can be used in the formulation of medicines to combat diseases caused by the microorganisms tested. From the antipyretic activity study, aqueous and EtOH extracts of the stem bark of both plant may be used in the formulation of antipyretic medicine for mankind. The 95% ethanolic extracts of both plants may be used as biopesticides.

241. Isolation and identification of some bioactive phytochemical constituents present in leaf & bark of *Cinnamomum cassia* Blume. (Thit-kyabo). Aye Thanda. Thesis, PhD Chemistry), University of Yangon; 2008.

In the present work, leaf and bark of the medicinal plants: *Cinnamomum cassia* Blume. (Thit-kyabo) were chosen for isolation of phytoconstituents and bioactivity studies. On silica gel column chromatographic separation, 0.025% of palmitic acid (m.pt=63~64ºC) and 0.009% of β-sitosterol (m.pt=139~140ºC) were isolated from PE extract of TKBL. Moreover 0.005% of stearic acid (m.pt=69-70ºC) and 0.004% of β-sitosterol (m.pt =139~140ºC) were isolated from PE extract of TKBB and0.001% utsolic acid (m.pt=280~28ºC) from EtOAc extract of TKBL. The identities of all isolated compounds were made by modern spectroscopic techniques (FT–IR, 1^3CNMR). In acute toxicity tests, aqueous and ethanol extracts from TKBL as well as TKBB aqueous extracts were found to be free from acute toxic effect up to the dose of 16g/kg BW. However, TKBB ethanol extract has mild toxic effect and the medium lethal dose (LD_{50}) was 11g/kg BW and confidence limit of LD_{50} was between 8.59-14.08g/kg BW. Antimicrobial activity screening of PE, EtOAc, EtOH and H_2O extracts from both plants samples against 10 species of microorganisms was carried out by employing agar disc and agar diffusion method. Only H_2O extract of TKBL was found to exhibit against 5 species of pathogenic microorganisms such as *E. coli* ATCC*, S. typhi, S. krefel, S. choleraesuis, P. valgaric* (inhibition zone diameter 14~20mm). But only EtOAc extract of TKBB was found to exhibit against *E.coli* O157 (14mm). In turns, all extract of TKBL and TKBB were found to exhibit inhibition zone diameters ranged between 15~20 mm against the other microorganisms. *In vivo* anti-diarrhoeal effects of TKBL watery extract, TKBB watery extract and β-sitosterol were studied on castor oil-induced diarrhoeal mice model. The investigation was conducted by castor oil-induced diarrhoeal test, castor oil-induced enterpooling test and castor oil-induced intestinal transit test. From these results, aqueous extracts from both plant samples and β-sitosterol were found to possess the diarrhoeal reducing effect, anti-secreting effect and anti-motility effect. According to the *in vivo* anti-diarrhoeal index, the antidiarrhoeal potency was found to be in the order of TKBB aqueous extract ($ADI_{in\ vivo}$ 71.76%, 3g/kg bw dose) > TKBL aqueous extract ($ADI_{in\ vivo}$ 73.24%, 6g/kg bw).Therefore aqueous extract of TKBB was found to have higher potency in anti-diarrhoeal anti-diarrhoeal activity than that of TKBL. Moreover β-sitosterol was β-sitosterol ($ADI_{in\ vivo}$ 70.05 %, 30mg/kg bw dose) was found to exhibit lesser anti-diarrhoeal effect than standard drug dicotil ($ADI_{in\ vivo}$ 78.47%, 6mg/kg bw dose) on castor oil-induced mice. Furthermore, antioxidant properties of watery and 95% EtOH extract from TKBL and TKBB as well as the isolated β-sitosterol were also investigated by determination of 50% oxidative inhibitory concentration (IC_{50}) with DPPH assay. As the lower the IC_{50} values, the higher the antioxidant activity, the antioxidant potential of β-sitosterol (IC_{50} =1.60µgml^{-1}) was found to be lower than the extract. Among the extract, TKBB 95% EtOH extract (IC_{50} = 0.66µgml^{-1}) was found to be the most effective antioxidant, followed by TKBL 95% EtOH extract (IC_{50} =0.72µgml^{-1}), TKBB watery extract (IC_{50} =0.94µgml^{-1}). All of the extract were also found to be better than standard BHT (IC_{50} =1.18µgml^{-1}) in free radical scavenging activity. Since no acute toxic effect occurred in aqueous and ethanolic extracts of TKBL and TKBB of TKB plant species may be used safely as antimicrobial, antioxidant and anti-diarrhoeal agents in the formulation of traditional medicines.

242. Isolation and identification of some bioactive principles from *Picrorhiza kurroa* Royle ex Benth. (Saung-may-kha) and *Sauropus albicans* Blume. (Kyet-tha-hin) used in the treatment of hepatitis B irus infection. Win Win Mar. Thesis, PhD (Chemistry), University of Yangon; 2005.

In vitro anti-hepatitis B virus (anti-HBV) activity of *Picrorhiza kurroa* Royle ex Benth. (Family Scrophulariaceae) (Saung-may-kha in Myanmar), roots and *Sauropus albicans* Blume (Fam-Euphobiaceae) (Kyet-tha-hin in Myanmar) leaves, have been evaluate by ELISA (Enzyme Link Immunosorbent Assay) test kits. Two different concentrations (4mg cm^{-3} and 6mg cm^{-3} in PBS buffer) of each ethanolic crude extracts (50% and 95% ethanolic extract) were prepared for both plant samples. Ethanolic extracts of *P. kurroa* showed a significant anti-hepatitis B virus surface antigen (HBsAG) like activity. The activity was dose independent and more pronounced in serum positive for HBsAg titr 1/128. Thus, the ethanolic extract of Saung-may kha roots may be used in treatment of Hepatitsm B virus infection. Isolation, solvent partition, successively column chromatographic separation on silica gel followd by sephadex LH-20 and crystallization provided hexacosanyl caffeate (I) (0.018% yield, mp 114-116ºC), cucurbitacin (II) (0.015% yield, mp 251-256˚C), cantleyoside (III)) 0.17% yield) (potent anti-HBV compound), 2-hydroxy stearic acid (IV) (0.08% yield, mp 140-144ºC), β-sitosterol (V) (0.06% mp 140-144ºC) from *P. kurroa.* (I) and (II) from defatted ethyl acetate extract; (III) from active 10 % ethanol-ethyl acetate extract; and (IV) and (V) from petroleum ether have been isolated. Similarly, β-sitosterol (V) (0.01%) and an unidentified sterol (VI) (0.01% yield, mp 102ºC) have been isolated from petroleum ether of *Sauropus albicans*. Isolated compounds were identified and characterized by melting point determination and UV, FT-IR, H and C-NMR, H-HCOSY and MS spectroscopic measurements. Cantleyoside (III) showed the most potent anti- HBsAG like activity among these isolated compounds. It was the first report for the presence of hexacosanyl caffeate (1) and cantleyoside (III) in *P. kurroa* plant. It may be inferred that cantleyoside (III) which was isolated from Saung-may-kha roots may be used in treatment of Hepatitis B virus infection owing to its most potent anti-HBsAG like activity. In other words, it is envisaged that the present work has paved a promising route to develop a new anti-HBV drug based on Saung-may-kha roots.

243. Isolation and identification of some chemical constituents and immunoenhancing activity of wild glowing *Ganoderma lucidum* (Ling-gzhi) of Myanmar. Ommar Win Naing. Thesis, PhD (Chemistry), Univeristy of Yangon; 2006.

In vitro anti-hepatitis B viral (anti-HBV) activity test using ELISA (Enzyme Link Immuno-Sorbent Assay) test kits revealed no significant anti-HBsAG like activity was present in *Ganoderma lucidum* (Leyss ex Fr.) karts (Lingzhi) in 6mg/ml dose. However, (EtOH-H_2O) extract of *G. lucidum* was able to enhance the production antibody against hepatitis B virus surface antigen (anti HBs) in serum of mice. Three different does (755mg/kg, 1067mg/kg and 1689mg/kg) of crude extract were tested and the antibody titers were found to be 1590IU/mL, 9739IU/mL and 7620IU/mL, respectively. The antibody titre of control group was 513IU/mL. The dosing level 1067 mg/kg provided the best antibody response. Though *G. lucidum* did not show anti-hepatitis B viral activity, it was able to enhance the antibody production in mice induced by hepatitis B surface antigen. However, the immune enhancing activity of *G. lucidum* was highly dependent on the dosing level-lower dose was not able to significantly enhance the antibody; on the other hand, much higher dose may cause inhibitory responses. Extraction, successive column chromo graphic separation and

crystallization provided ergosterol palmitate (I) (0.027% yield, m.p. 108˚C), ergosta-7, 22- diene-3-one (II) (0.004 % yield, m.p. 180-182˚C), ergo sterol (III) (0.09 % yield, m.p. 164˚C and ergo sterol peroxide (IV) (0.004 yield, m.p. 179-180˚C) from pet ether extractof *G. lucidum.* In addition, gonoderic acid E (V) isolated constituents were identified by melting point and spectroscopic data while comparing with the reported data in literature.

244. Isolation and identification of some chemical constituents and study of termiticidal activity of *Derris elliptica* Benth. (Hone in Myanmar) roots. Aye Mi Mi Htwe. Thesis, PhD (Chemistry), University of Yangon; 2008.

The aim of the present work is to evaluate the termiticidal activity of *Derris elliptica* Benth. (Hone) roots and to screen the most potent termiticidal constituents that are safer to use and equally or more effective than synthetic insecticides. Five compounds were isolated from the root of *Derris elliptica* Benth (Hone) and spectroscopically identified. They are lupeol (1) (0.004% yield, mp. 215˚C), β-sitosterol (2) (0.012% yield mp 135˚C), warangalone (3) (0.003% yield, mp 168˚C), 3'-hydroxy warangalone (4) (0.29% yield, mp 148˚C) and pomeferin (5) (0.31% yield, mp 186˚C). Termiticidal activity test via force feeding method revealed that LC_{50} of petroleum ether and ethanol extracts, and compound 4 and 5, respectively, were 0.07, 0.78, 0.18 and 0.09%. LC_{90}, respectively, were 0.30, 7.17, 0.60 and 0.75%. Test results revealed that petroleum ether extract was the most active termiticide. Abamectin (Demon), a synthetic insecticide, was used as a standard reference which showed control showing LC_{50} of 0.00038% and LC_{9o} of 0.0011%. All tested samples of *Derris elliptica* showed mild activity when compared to synthetic insecticide. However, it is hoped that natural insecticides are safer and ecofriendly compared to synthetic insecticides. Acute toxicity test of ethanol extract in mice provided (LD_{50}) to be 4.0g/kg (confidence limits). It is assumed to be moderately toxic according to the toxicity categorization.

245. Isolation and identification of some organic compounds and investigation of anti-hyperglycemic and anti-oxidant activity of *Abarema bigemina* L.Kosterm. (Da-nyin) leaf. Khin Ma Gyi. Thesis, PhD (Chemistry), University of Yangon; 2009.

In the present work, investigation of some chemical constituents and some biological activities such as, antibacterial, antihyperglycaemic, antioxidant activities and acute toxicity has carried out on the leaf of *Abarema bigemina* L.Kosterm. (Da-nyin). In this research, by preliminary phytochemical tests, steroids, terpenoids, flavonoids, glycosides, phenolic compounds, carbohydrate, saponins, tannins, alkaloids and α-amino acids were observed to be present and starch is absent in selected plant sample. The determination of some standardization parameters of herbal drugs such as mineral contents, some vitamins, nutritional values and physicochemical characterization were done on Da-nyin leaf. By the result obtained from the determination of some nutritional value, Da-nyin leaf was found to contain 0.8% of fat, 2.27% of protein, 4.26% of ash, 11.46% of moisture, 36.93% of carbohydrate and 44.27% of fibre. The determination of qualitative elemental analysis of Da-nyin leaf by ED-XRF suggested that Ca and K (relative% content 46.4% and 34.6%) as macronutrients elements: Fe, Mn, Cu and Zn (8.4%, 6.5%, 2.2%, and 1.9%) as essential trace elements were present in leaf of Da-nyin. By column chromatographic separation technique, n- hexadecanoic acid (compound KMG-1, 0.0094%, 63-64˚C), Chondrillasterol (compound KMG-2, 0.0038%, 168-169˚C) and Epigallocatechin 3-gallate (compound KMG-3, 0.0073%, 218-221˚C) were isolated

from EtOAc extract of *Abarema bigeminal* L.Kosterm. (Da-nyin) leaf. The three isolated compounds were characterized by L.Kosterm. (Da-nyin) leaf. The three isolated compounds were characterized by measurement structure were elucidated by modern spectroscopic techniques. *In vitro*, antibacterial activities of crude extract such as PE, EtOAc, 70% EtOH and H_2O extract were tested on 28 strains of pathogenic microorganisms such as six species of *Escherichia coli*, four species of *Vibrio cholerae* and *Salmonella,* 8 species of *Shigella*, 2 species of *Klebsiclla*, each 1 species of *Proteus morgani, Pseudomonas aeruginosa, Bacillus subtilis* and *Staphylococcus aureus* by agar disc diffusion method. It was found that EtOH extract of *Abarema bigeminal* L.Kosterm. leaf has (15~19mm) medium inhibition on against *Escherichia coli* ATCC, *Salmonella dereby, S. krefeld, Shigella sonnei* (76) and high inhibition on against *Shigella dysentriae* and *Shigella sonnei* (59) (20mm~above). EtOAc extract of *Abarema bigemina* L. Kostern. (Da-nyin) leaf showed more potent antibacterial activity than other extract. The hypoglycaemic activity of 70% EtOH extract (3g/kg) was comparable to that of the standard drug glibenclamide (4mg/kg) on adrenaline induced hyperglycaemic rats. The Blood sugar lowering activity of 70% ethanolic extracts of Da-nyin leaf (*Abarema bigeminal* L.Kosterm. (Da-nyin) was studied on adrenaline-induced hyperglycaemic rats' model. The 70% ethanolic extracts of Da-nyin leaf (3g/kg) was observed to significantly reduce blood glucose level at 1hr ($p<0.05$) and 2hr ($p<0.05$) after administration of drugs. Antioxidant activity of ethanolic extract from Da-nyin leaf was determined by DPPH assay. IC_{50} value of 70% EtOH extract (Da-nyin leaf) was 1.85µg/ml. It was found to be higher than IC_{50} value of standard ascorbic acid (0.123µg/ml). Thus, the radical scavenging power of plant extract was observed that 70% EtOH extract had lower anti-oxidative effect than ascorbic acid. Acute toxicity test of 70% EtOH extract was carried out on albino mice at maximum permissible dose of 6g/kg body weight dose level showing not toxic effect by Litchfield and Wilcoxon method. In brief, based on above scientific findings, 70% EtOH extract of Da-nyin leaf may be safely used in the formulation of oral medicine for the treatment of diabetes mellitus and medicines for diseases contracted by the tested microorganisms.

246. Isolation and structural elucidation of active principle from *Curcuma longa* Linn. (Na-nwin) and its antioxidant activity. May Aye Than; Mi Mi Aye; Than Soe; Win Win Maw; Maung Maung Htay. *Myanmar Health Res Congr*, 2007: p54-55.

Antioxidant reduced the harmful effects of oxidative stress and risk of cardiovascular cancer and aged relative neuronal degenerative diseases, and anti-aging. Thus, the aim of this study is to evaluate the antioxidant active principle isolated from *Curcuma longa* Linn. rhizome. The different extracts and isolated compounds were determined their antioxidant activity by the inhibition of linoleic acid oxidation using thiocyanote method, in comparison with the synthetic antioxidant butylated hydroxyanisole (BHA). The chloroform, ethanol, petroleum ether extract, and BHA were significant retarded the oxidation of linoleic acid when compared with that of control ($p<0.01$– $p<0.0005$). The % inhibition of oxidation activity of the chloroform, ethanol, petroleum ether extract and BHA were 81.78%, 46.87%, 65.97% and 85.34% respectively. Curcumin (6.0%), demethoxycurcumin (0.033%) and bisdemethoxycurcumin (0.026%) from chloroform extract were isolated by column chromatography technique. The isolated compounds were identified by melting point, thin layer chromatographic, Ultraviolet spectroscopic, Fourier transform infrared spectroscopic. Mass spectroscopic and ^1H Nuclear Magnetic Resonance Spectroscopic methods. The isolated compounds, and BHA were significant reduced

the oxidation of linoleic acid when compared with that of control ($p<0.0005$). Percent inhibition of oxidation activity of curcumin, demethoxycurcumin and bisdemethoxycurcumin were 88.27%, 80.25% and 76.23% respectively. Thus, it was concluded that curcumin, demethoxycurcumin and bisdemethoxycurcumin were antioxidant active principle and curcumin was the most potent natural antioxidant.

247. Isolation and structural identification of some hypoglycaemic active compound from selected part of *Premna integrifolia* Linn. (Verbenaceae) (Taung-tan-gyi). Khin Tar Yar Myint. Thesis, PhD (Chemistry), University of Yangon; 2010.

This thesis describes the evaluation of the quality control parameters, safety and hypoglycemic activity of various part (leaves, stem barks, roots) of *Premna integrifolia* Linn. (Taung-tan-gyi) and the isolation and identification of phytoconstituent(s) from activity guided plant extracts. The 70% EtOH extracts of various parts (leaves, stem barks, roots) of *Premna integrifolia* Linn. (Taung-tan-gyi) showed no lethal effect when tested for acute toxicity (LD_{50}) with the maximum doses of 20g/kg. Using standard glibenclamide (4mg/kg) as positive control, 70% EtOH extracts of various parts (leaves, stem bark and roots) 4g/kg were tested for hypoglycemic activiy on adrenaline-induced rat model. Blood glucose levels of rats at various time intervals were measured by glucometer. All extract showed blood glucose lowering effect. The percent inhibition of hypoglycaemic effect of leaves extracts at 1hr was 38% ($p<0.05$) while that of stem barks at 2hr and 3hr were 32% ($p<0.005$) and 31% ($p<0.05$) respectively. The percent inhibition of hypoglycaemic effect of root extracts at 2hr and 3hr were 27% ($p<0.05$) and 38% ($p<0.005$) respectively. The active stem bark extracts was further successively fractionated into pet-ether fraction (Fraction 1), chloroform-soluble fraction (Fraction 2) and chloroform-insoluble fraction (Fraction 3). Chloroform-soluble fraction and chloroform-insoluble fraction were tested hypoglycemic activity on adrenaline induced rat model. Chloroform-soluble fraction showed no significant hypoglycemic activity. Chloroform-insoluble fraction showed significant hypoglycaemic effect at the dose of 2g/kg (that is less than crude 70% EtOH extracts) ($p<0.05$) (10.2%) at 2hr and 4g/kg (that is same dose of crude 70% EtOH extracts) ($p<0.05$) (10.2%) at 1hr, ($p<0.005$) (14.3%) at 2hr and ($p<0.05$) (25.8%) at 3hr. Column chromatographic separation of 70% EtOH extracts of stem barks of *Premna integrifolia* Linn. (Taung-tan-gyi) led to the isolation of three pure compounds, namely: cylicodiscic acid ($C_{30}H_{48}O_4$) (0.007%)**,** scopoletin ($C_{10}H_8O_4$) (0.01%) and aphelandrine ($C_{28}H_{36}N_4O_4$) (0.005 %). These compounds were chemically identified by UV, FT- IR, ^{13}C NMR, ^{1}H NMR, HMQC, HMBC, COSY and EI-mass spectroscopy. Chloroform-soluble fraction (Fraction 2) and chloroform-insoluble fraction (Fraction 3) were characterized by TLC screening using isolated compound as markers, color tested, UV-Vis and FT- IR spectrometry. Compound I (cylicodiscic acid) and compound II (scopoletin) were indicated in hypoglycaemic inactive chloroform-soluble fraction and compound III (aphelandrine) was indicated in hypoglycaemic activity guided chloroform-insoluble fraction on TLC plate. From overall assessment of the present invetigation, it may be deduced that aphelandrine and other flavonoids in chloroform insoluble active fraction may contribute to the hypoglycaemic activity of *Premma integrifolia* Linn. and this active fraction can be used in traditional medicine formulation for the treatment of diabetic.

248. The isolation and structure elucidation of new pyranoflavanone compounds from medicinal plants *Derris reticulata*. May Aye Than; Prawat, Hunsa; Ruchirawat, Somsak; Paing Soe. *Myanmar Health Res Congr,* 2001: p47.

The medicinal plants *Derris recticulata* Benth. (Leguminosae) locally known as Cha-aim-thai, which is used for the relief of thirst and expectorant. One of the recent study reported that the dichloromethane extract from the stem of *Derris recticulata* inhibited the P-338 cell line at 0.4-0.5μg/ml and were inactive against the KB cell line. For this reason *Derris recticulata* was selected for isolation and investigation of cytotoxic phytoconstituents. Two new pyranoflavanone were isolated and purificated from the dichloromethane extract by using column chromatography (CC), preparative thin layer chromatography (PTLC), and vacuum liquid chromatography (VLC) and high performance liquid chromatography (HPLC) techniques. The structure were elucidated by using spectroscopic methods such as Ultra violet spectroscopic, Fourier transform infrared spectroscopic, Mass spectroscopic, ^{1}H Nuclear Magnetic Resonance (NMR) and ^{13}C Nuclear Magnetic Resourance (NMR). the structure were established as 1'''-hydroxy-2''', 3'''-epoxylupinifolin and 2''', 3''' dihydroxylupinifolin.

249. Isolation, characterization & identification of some bioactive constituents & investigation of cholesterol lowering activity of *Euphorbia hirta* Linn. (Kywe-kyaung-hmin) and *Oldenlandia corymbosa* Linn. (Sular-na-pha)**.** Thandar Aung. Thesis, PhD (Chemistry), University of Yangon; 2006.

In the present work, two medicinal plants: *Euphorbli hirta* Linn. Euphorbiaceae (Kywe-kyaung-hmin) and *Oldenlandia corymboss* Linn. Rubiaceae (Su-lar-na-phar) (SNP) were chosen for isolation of phytoconstituents and bioactivity studies. By silica gel column chromatographic separation, 0.006% of D-friedoolean -14-en-3-one (m.p 234-236ºC) and0.011 % of β-sitosterol (m.p 138-140ºC) were isolated from pet-roscopic techniques ether extract of KKH. Whereas, from ethyl acetate extract, 0.021% of gallic acid (m.p 253-255ºC) was isolated. In addition, 0.003% of stigmasterol (m.p 169-170ºC) as a new finding compound and 0.004% of ursolic acid (m.p 285-287ºC) were respectively, isolated from pet-ether and ethyl acetate extract of SNP. The identities of all isolated compounds were made by joint application of modern spectroscopic techniques (UV, FTIR, ^{1}H NMR, ^{13}CNMR, EI-MS and GC-MS). Antimicrobial activity of pet-ether, ethyl acetate, 95% ethanol and water extracts successively extracted from both plants and two isolated compound: β-sitosterol and stigmasterol was investigated against 6 species of microorganisms such as *Bacillus subtilis, Staphylococcus aureus, Pseudomonas aeruginosa, Bacillus pumalis, Candida albican* and *Mycobacterium* species by employing agar well diffusion method. Ethyl acetate extract, 95% ethanol extract and water extract of SNP, respectively, exhibited inhibition zone diameters in the ranges of 12~15, 18~24 and 17~34mm against all microorganisms, whereas, that of KKH showed, respectively, the inhibition zones in the ranges of 15~19, 20~25 and 19~23 mm against five microorganisms except *Pseudomonas aeruginosa*. Hypocholesterolemic activity was also studied on the plant extract as well as isolated compounds, determined by *Zlatkis et al*. method *in vivo* rabbit model. After one week duration administrated with 200mg/kg body weight/day doses, watery extract of both plants were observed to significant decrease the serum total cholesterol (TC) levels of the rabbits to 76.30% and 69.80%, however, 95% ethanol extract could lower that only to 83.16% and 93.79% respectively. The bad cholesterols: the serum triglyceride (TG), serum very low density lipoprotein (VLDC) and serum low density lipoprotein (LDL) level were

reduced to 85.71%, 90% and 68.28% by KKH water extract, and that to 83.33%, 83.33% and 78.06% by KKH ethanol extract respectively. Whereas, SNP could raise the good cholesterol: serum high density lipoprotein (HDL) levels to 133.33% and 119.05%, whereas ethanol extract of both plants increased that to 110.34% and 113.64% respectively. β-sitosterol, gallic acid, stigmasterol and ursolic acid were found to lower TC level to 48.45%, 88.83%, 90.31%and 86.26% respectively, after one week treatment with 0.1mg/kg body weight /day dose. Furthermore, β-sitosterol, stigmasterol, gallic acid and ursolic acid could decrease the TG levels to 70.05%, 88.89%, 85.94%, VLDL levels to 77.78%, 93.33%, 85.71% and 85.71% and LDL levels to 39.26%, 87.43%, 84.62% and 81.18%, respectively. At the same time, HDL levels increased respectively, to 105.88%, 111.11%, 110.34% and 114.29% after one week treatment with these compounds. Therefore, it can be inferred that since no toxic effect occurred in mice model, both plants may be used as cholesterol lowering agents in medicinal formulations for the treatment of hypertension, cardiovascular and heart diseases, and also as the remedy for the treatment of diseases related to the microorganisms tested.

250. Isolation, identification and bioactivities of some organic constituents in *Dendrobium nobile* Lindl. (Daung-myi-thit-kwa) and *Dendrobium parishii* Rchb.F. (Kha-yang-yaung-lwin-pyin) stems**.** Aye Aye Cho. Thesis, PhD (Chemistry), University of Yangon; 2008.

The present work is the investigation of some phytoconstituents and the pharmacological effects of the stems of *Dendrobium nobile* Lindl. (Daung-myi-thit-kwa) and *Dendrobium parishii* Rchb.f (Kha-yaung-yaung-lwin-pyin). The Dendrobium species are used as traditional medicine especially for the treatment of analgesis and fever in Shan State, Myanmar. From the total alkaloids extract of *D. nobile*, dendrobine and three other alkaloids were isolated by column chromatography. Dendrobine, compound **B** (0.2058%) was definitely identified by UV, FT-IR, ^{1}H NMR, ^{13}CNMR, 2D NMR and melting point determination. Among the other alkaloids, compound **A** (0.0249%) was deduced as 2-hydroxydendrobine by UV, FT-IR and TLC. The compound **C** (0.0479%) was also deduced as 6-hydroxydendrobine by UV, FT-IR, ^{1}H NMR TLC. From methanol extract of *D. parishii*, oleic acid and two other compounds were isolated by column chromatography and PTLC. Oleic acid, compound E (0.0063 %) was identified by UV, FT-IR, and ^{1}H NMR. Among the remaining two compounds, compound F (0.0074%) was deduced as bibenzyl derivative by UV, FT-IR, and TLC and literature data. The compound G (0.1703%) was known as an alkaloid by colour reaction tests by TLC and paper chromatography. The acute toxicity of 70% EtOH and aqueous extract from *D.nobile* and *D. parishii* were tested with albino mice. Both extracts of *D.nobile* were free from acute toxic or harmful effect for mice with the maximal permissible dose of 10g/kg. The aqueous extract and 70% EtOH extract of *D. parishii* were free from acute toxic effect with the maximal permissible dose of 10g/kg and 8g/kg respectively. Methanol extract and total alkaloid extract of stems of two selected plants were examined their antimicrobial activity on eight bacteria species (*Escherichia coli, Klebsiella pneumoneae, Proteus vulgaris, Pseudomonas aeruginosa, Salmonella paratyphi, Shigella dysentery* (Type1)*, Staphylococcus aureus* and *Streptococcus pyogenes).* Plant extracts of *D.nobile* were not active against almost all eight strains. Total alkaloid extract (CH_2Cl_2) containing primary, secondary and tertiary alkaloids from *D.parishii* showed antimicrobial activity against seven strains except *Streptococcus pyogenes* with inhibition zone diameter

10-16mm). Methanol extracts, total alkaloids extract of both plants and isolated compound **B** (dendrobine) were investigated for the antioxidant activity by Dot-Blot and DPPH staining method. Total alkaloid extracts containing primary, secondary and tertiary alkaloids from both plants showed antioxidant activity up to dry matter amount 200µg (conc:1mg/ml). Compound **B** (dendrobine) showed antioxidant activity up to dry matter amount 200µg (conc: 1mg/ml.) The 70% EtOH extracts of *D.nobile* showed analgesic activity ($p<0.05$) and isolated compound B (dendrobine) showed analgesic activity ($p<0.005$) relatively compared with standard morphine. Thus, total alkaloids extracts of stems of both plants can be used as antioxidants and 70% ethanolic extracts of stems of both plants and isolated compound **B** (dendrobine) can be used as an analgesic agent.

251. Laboratory studies on larvicidal, ovicidal and oviposition repellent action of *Nicotiana tobacum* on *Aedes aegypti* Linnaeus 1762. Moe Moe Aung. Thesis, MSc (Zoology), Rangoon Arts and Science University; 1985.

To avoid the recurring and increasing expenditure of purchasing insecticides and also to overcome the problem of development of resistance to insecticides, there is a need to develop compounds of vegetative origin which will be cheap, locally available, and effective as larvicides. Locally grown tobacco leaves (*Nicotiana tabacum*) were bought from whole sale dealer and the stock solution was prepared from it. Using laboratory strain of *Aedes aegypti*, larvicidal tests were carried out according to WHO larvicide testing methods. The results showed that the tobacco extracts has a LC_{100} at 2800ppm. Ovicidal action of the tobacco extract was tested by placing *Aedes aegypti* egg strips in varying concentrations of the extract. Complete ovicidal action was observed at 3200ppm. Gravid females were placed in standard cages with beaker containing tobacco extract (3200ppm and 4000ppm) alternating with beaker containing distilled water to test the oviposition repellent action. No oviposition repellent action was noted. Rearing methods to obtain standard *Aedes aegypti* larvae were also described.

252. Lipid lowering effect of *Trigonella foenum Graecum* L. (Pe-natha) (Fenugreek) in hypercholesterolemic patients from North Okkalapa General Hospital. Ei Ei Khin. Thesis, MMedSc (Pharmacology), Yangon: University of Medicine (2); 2011

This is hospital-based quasi experimental study, consisting of outpatients attending medical OPD of NOGH. Lipid lowering activity of Pe-natha seeds was determined on fasting lipid profile of 19 hypercholesterolemic subjects who met the selected criteria. Serum total cholesterol (TC) levels was determined by Zlatkis, Zak and Boyle (1953), serum low density lipoprotein cholesterol (LDL-C) level by Friedewald-Levy (1972), serum triglyceride (TG) level by GPO-PAP method and serum high density lipoprotein cholesterol (HDL-C) level by Lopes-Virella, Stione, Ellis and Colwell (1977) respectively. The serum lipid levels were determined before and after 4 weeks period of Pe-natha seeds therapy. Serum TC (249.66±27.38mg/dL) was decreased to (193.90±29.62mg/dL) and it was statistically significant ($P<0.000$). Serum TG (173.64 ± 52.92 mg/dL) decreased to (141.04 ± 22.32 mg/dL) and it was also significant ($P< 0.05$). Serum HDL cholesterol (50.74 ± 9.31 mg/dL) was not significantly changed. Serum LDL cholesterol (160.56 ± 27.60mg/dL) decreased to (115.90 ± 31.68mg/dL) and the decrease was also statistically significant ($P<0.000$). Regarding the percent changes of the mean serum lipid profile, there were 22.33% reduction in serum TC level, 18.77% reduction in serum TG level and 27.81% reduction in serum LDL-C level. But there was no significant change in serum HDL-C level. There were no statistically significant changes in the mean fasting blood sugar

and waist circumference ($p>0.05$) but mean body weight was significantly reduced ($p<0.05$) after 4 weeks of Pe-natha seeds therapy. The findings of the present study confirm the benefit of Pe-natha seed in prevention and treatment of artherosclerosis due to its lipid lowering effect on serum TC, serum TG and serum LDL-C.

253. Lycopodium technique: quantitative determination of plant ingredients in Myanmar Traditional Medicine Formulation-02. Saw Han; Mya Bwin. *Int J Pharmacog*. 1994; 32(3): 256-261.

This report describes the quantitative determination of four plant ingredients contained in Myanmar traditional medicine formulation-02 (TMF-02) by use of microscopic examination.

254. Morphological and histological characters of *Morinda citrifolia* L. fruits (Noni) and its hypoglycemic activity. Thida Myint. Thesis, PhD (Botany), University of Yangon; 2006.

Leaves and fruit of *Morinda citrifolia* L. have been use as a medicine for many years in Myanmar. Still, this herb is used as a folk medicine popularly in various ailments (hypertensive diabetes, arthritis and cancer). Due to its varius interesting uses in different ailments, plants were collected from different locations, where fruits were from Yangon University campus, Htaukkyant and Dagon Townships for identificarion and phytochemical studies. Morphological and anatomical studies of leaves and fruits of the plant were carried out as according to the method of Khin Sein (1985) and Le Le win (1989) respectively. In chemical studies, phytochemical screening of leaves and fruits has been investigated and the moderate amount of alkaloid, saponin and higher amount of steroids were observed in leaves. The ripe fruits were cleaned, sliced and allowed to dry at 105˚C for further extraction. Phytochemical screening of leaves and fruit revealed that the fruit higher concentration of carbohydrates, saponin, tannin, quinona and alkaloids. The moderate amount of alkaloid, spaonin and higher amount of steroid was also observed from fruit and leaves. Physicochemical analysis of the powdered fruit were determined and found to be more soluble in distilted water and ethanol. Dried powdered fruit sample were extracted with ethanol and concentrated. The obtained crude extracts were with hexane and the resultant aqueous layer was again partitioned with ethyl acteated. After removal of ethye acetate solvent, the obtained crude extract was separated by Preparative Thin Layer Chromatography (PTLC) using dichloromethane: ethyl acetate 9:1 and compound I and II were discovered and was found out to be coumarin and asperulin respectively. In vivo screening was done for inhibiting effect of *Morinda citirifolia* L. fruits extract, on adrenaline induced hyperglycemia in animal mode, by utilizing 6g/kg body weight of the ethanolic extract. Glibenclamide 4mg/kg was used as a control drug. From this research, it was demonstrated that the ethanolic extract of *Morinda citirifolia* L. had transient reduced in blood glucose level by using adrenalin induced hyperglycemia in rabbit model. Moreover, acute toxicity of the extract was not detacted in all the three groups (1.5g/kg, 3g/kg and 6g/kg) of mice colonies.

255. Morphology and pharmacognosy of *Eupatorium horsfieldii* Miq. San San Win. Thesis, MSc (Botany), University of Yangon; 1994.

In this study, morphological and histological characters as well as pharmacognostical aspects of *Eupatorium horsfieldii* Miq. (Pannyo) was conducted. The preliminary phytochemical investigations carried out on various soluble extract reveal the presence of amino acid, glycoside, reducing sugar, sterol, triterpene, saponin and phenolic. The presence of essential oil was also detected and was found to be 0.89. (v/w) that is the volume of essential oil in milliliter produced from hundred gram of dried powder of leaves Quantitative microscopic analysis of Pannyo ingredient present in the Myanmar Traditional Medicine Formulation (TMF-44) was conducted with a view to authenticate and quantitate the proportion of Pannyo ingredient which was estimated as 47.78±3.72 and found to be relevant to that of the percentage as specified in Table 1. Revive and bring it into line with Western Medicine.

256. Myanmar coconut water as a food-based oral rehydration fluid. Aung Khin. Thesis, MMedSc (Physiology), Yangon: Institute of Medicine (2); 1992.

Coconut water has been claimed to be a useful alternative oral rehydration fluid. Altogether 324 coconuts from the two varieties commonly found in Yangon were divided into 4 stages and analysed for physical and chemical characterization. The sterility of the coconut water before and after exposure to the environment was also studied. The objective was to find out whether the Myanmar coconut water is suitable for oral rehydration, and if so, which stage or stages would be optimal for that purpose. Control studies were also done on oral rehydration solution (ORS) prepared from WHO/UNICEF packets. Although there are some differences in the physical characteristics and chemical composition between the coconut waters of the tall and golden varieties, the general composition between the coconut waters of the tall and golden varieties, the general of the coconut water decreased with maturity (e.g. from 504.5-277.8ml) while the pH increased (e.g. from 4.8-6.1). The osmolality (283.0 to 308.2mOsm/Kg) of coconut water was nearer to that of human plasma compared with that of WHO-ORS (318.2mOsm/1). Both the sodium and potassium contents increased with maturity of the nut. When compared with that of WHO/ORS, the sodium content was low (9.0-46.0 *vs* 88.9mmol/1) while potassium content was high (9.4 to 92.6 *vs* 19.8mmol/1). The glucose content of stage 1 coconut water (97.3mmol/1) was not very far from that of WHO-ORS (105.2mmol/1) but declined in the later stages (19.9mmol/1 in stage 4). Coconut water of both varieties at all stages also contained protein and aminoacids, fat, sucrose, fructose and minerals-calcium, magnesium, iron, copper and zinc Coconut water in its natural paclage is sterile and after exposure to the environment, remains uncontaminated with faecal colifroms as long as 24 hours (stages 1 and 2) while prepared WHO/ORS became contaminated at the 6^{th} hour. Despite the apparently low sodium and high potassium content, it is concluded that Myanmar coconut water (particularly the immature stages of both varieties) may be regarded an optimal food- based oral rehydration fluid. The reasons for this conclusion were discussed.

257. Myanmar experience in integrating traditional medicine into modern medicine. Thaw Zin. Paper presented at the *Forth International Traditional/Complementary Conference and Exhibition* (INTRACOM 2002*)*, Kuala Lumpur, Malaysia, p14-16, 2002 Oct.

Myanmar people had a long cultural background of using traditional remedies, which are still practiced and relied upon about 80% of the rural population. In this paper, authors present some account of Myanmar system of Traditional medicine and Myanmar efforts to functionally integrate two systems of medicine in some areas. Integration of Traditional medicine into modern medicine in the fields of health care system, laboratory research, clinical research, clinical practive, medical education and pharmaceutical production are described. Some constraints faced in practice in integration of two systems are also presented. Myanmar, moving towards the development of integrated medicine is such that it is comprehensive and considering the two systems of medicine as complementary to each other rather than more alternative, thus offering the best possible care and benefit for the patients.

258. Myanmar traditional medicine formulary. Pharmacology Research Division. Yangon: DMR; 1989.

The formaulary was produced encompassing 48 traditional drugs as described in the Ministry of Health publication "Formulations Used by the Traditional Medicine Department", October 1982. The formulary describes the composition of the formulations, expressing the individual ingredients in terms of precise weights and measures, their dosages, their uses, the physico-chemical and botanical characteristics of the formulations, their methodologies of analysis, and a summary of their pharmacological and toxicological effects.

259. The nature of the chemical constituents of *Apium graveolens*. Sein Gwan; Khin Saw Oo; Than Yee; Han Min. *Proc Burma Med Res Soc*, 1958-59; 1: p19-20.

Apium graveolens Linn. (Family Umbelliferae), the equivalent Burmese name being "Tayok-nan-nan", has been extensively utilized among the local people as a remedy against hypertension. The watery extract of the whole plant mixed with sugar or honey is used. In addition to the above use, the plant is also used as a tonic, a carminative and a diuretic.

260. Nephroprotective effect of *Camellia sinesis* Linn. (Green tea) in albino mice. Myo Thu Zar. Thesis, MMedSc (Pharmacology), Yangon: University of Medicine (1); 2011.

The leave of *Camellia sinesis* Linn. (Green tea) is being used for many years in Myanmar as food and drink. The present study was done to evaluate the nephroprotective activity of watery extract of leaves of *Camellia sinesis* Linn. (Green tea) on cisplatin induced nephrotoxicity in albino mice. The leave of *Camellia sinesis* Linn. (Green tea) was extracted with water. Watery extraction method was used because it is like tea brew consumed by many people. The total yield produced with watery extract was 9.2%. The ED_{50} value of watery extract of *Camellia sinesis* Linn. (Green tea) for nephroprotective activity on mice was 3.8gm/kg and its 95% confidence limit was 0.15gm/kg to 8.4gm/kg. The nephroprotective effect of extract was studied on albino mice of both sexes weighing 180 to 200gm. Cisplatin was used as nephrotoxic agent. The test agents were given by oral route. To study the protective effect, mice were fasted 48 hours in metabolic cages. Mice were grouped into six. Group I served as negative control group, which received only water. Group III, IV and Group V served as extract treated group, which were received three different

doses of extract; 1g/kg, 2g/kg and 3g/kg body weight for 2 days. Starting from 3rd day until 6th day, Group III, IV and V groups were given 5mg/kg body weight of cisplatin everyday intraperitoneally after 1hour of giving the extracts. Group II served as positive control group, which received only 5mg/kg cisplatin intraperitoneally daily from 3rd day to 6th day. On 7th day all of the mice were sacrificed with chloroform. The blood samples collected by mean of cardiac puncture were used to determine urea and creatinine. Mice kidneys were made into tissues slides for histological examination at four sites of renal tissues, i.e, glomerulus, tubules, endothelium and vascular tissues. The level of serum urea mean ± SD for those of cisplatin alone treated group was 84.86 ± 14.67mg/dl that for drinking water group was showed 33.43 ± 5.28mg/dl and aqueous extract 1, 2 and 3g/kg pretreated groups were 52.86 ± 20.23 ($P<0.01$*) , 36.36 ± 5.53 ($P<0.001$*) and 53.86 ± 20.06 ($P<0.05$*) respectively. Serum creatinine level of mean ± SD for those of cisplatin alone treated group was 0.98 ± 0.44 mg/dl, and that for drinking water group showed 0.38 ± 0.11 and aqueous extract 1, 2 and 3 g/kg pretreated groups were 0.40 ± 0.06 ($P<0.01$*), 0.48 ± 0.17 ($P< 0 .05$*), 0.48 ± 0.13($P<0.05$*) respectively. Mean histological scoring was significantly reduced in Group V, i.e, 3g/kg of green tea extract pretreated group. This reduced scoring showed nephroprotective effect and significant ($p <0.01$) at 3 sites of renal tissues, i.e, glomerulus, tubules and vascular changes except endothelium because endothelial injury caused by cisplatin is not remarkable from the beginning. Acute toxicity of watery extract was done by using albino mice. It was observed that the extract was toxic because all of 10 mice died within 24hour at 20mg/kg dose and median lethal dose (LD_{50}) was 11.1gm/kg with its 95% confidence limit was 9.32gm/kg to 13.2g/kg. The phytochemical analysis was done with dried powder of leaves of *Camellia sinesis* Linn. Myanmar green tea powder contained flavonoid and polyphenol which is claimed to be the substances that can give nephroprotective effect. In conclusion, this study proved scientifically that watery extract of *Camellia sinesis* Linn. (Myanmar Green tea) had nephroprotective effect on cisplatin induced nephrotoxicity in mice.

261. Non-specific antidiarrhoeal activity of rhizome of *Acorus calamus* Linn. (Lin-ne) on experimental animals. Tin Htay Naing. Thesis, MMedSc (Pharmacology), Yangon: University of Medicine (2); 2009.

The purpose of the present study is to evaluate scientifically the anti-diarrhoeal effects of rhizome of *Acorus calamus* Linn. (Lin-ne) by using castor oil-induced diarrhea on albino mice *in vivo* and isolated rabbit intestine *in vitro*. The dried powdered of rhizome of Lin-ne was extracted with both water and 95% ethanol to obtain aqueous and ethanolic extract respectively. Phytochemical analysis of ethanolic, aqueous extract and dried rhizome powder of Lin-ne showed that they have alkaloids, steroids, tannin, glycoside, saponin, carbohydrate and triterpene. Acute toxicity study of ethanolic and aqueous extract of Lin-ne was performed by using the albino mice. Acute toxicity study of aqueous extract showed no lethality even with the maximum permissible dose of the extract 16g/kg. Acute toxicity study of ethanolic extract showed the lethal effect and the lethal dose (LD_{50}) was 6g/kg and its 95% confidence limits were 3.45-10.5g/kg. General screening of pharmacological actions of the extract, no abnormality was detected except slight sedation effect. *In vivo* study, there was dose-dependent reduction in castor oil-induced diarrhea in all doses (i.e. ethanolic extract 125mg/kg, 250mg/kg, 500mg/kg and aqueous extract 3g/kg, 6g/kg, 8g/kg) at 4 hour after castor oil administration. The results of the present study showed that both extracts of Lin-ne produed significant reduction in fecal weight and

volume of intestinal contents and percent intestinal transit produced by castor oil. Both extracts of Lin-ne cause relaxation of intestinal smooth muscle by as yet unknown mechanisms. The median effective dose (ED_{50}) of ethanolic extract of Lin-ne was 260mg/kg and its confidence limit was 153-442mg/kg. The median effective dose (ED_{50}) of aqueous extract was 4g/kg and its confidence limit was 2.35-5.8g/kg.

262. Paper chromatographic analysis of free amino acids in etiolated seedlings of *Cicer aritenum* and *Vigna catjang* Walp. Khin Swe Win; Myint Myint Gyi; Yi Yi Win (2); Khin Than Swe; Than Aung, Maung; Thant Zin, Maung; Khin Latt, Maung; Thet Htun, Maung; Mya Mya Thein; Thein Aung. *Burma Res Congr*, 1971: p142.

Seedling of *Vigna catjang* Walp. and *Cicer arietenum* were grown in the dark and the free amino acids analyzed every alternate day. Analysis was qualitative only and the amino acids separated by two dimensional paper chromatography. In addition to the essential amino acids, eight unknowns were also noted.

263. A pharmacognostic on *Crinum asiaticum* Linn. A Mo Htet. Thesis, MSc (Botany), University of Yangon; 1999.

Pharmacognostical studies on *Crinum asiaticum* Linn. (Ko-yan-gyi) of the family Amaryllidaceae has been undertaken. The morphological and taxonomical studies on both vegetative and reproductive parts have also been carried out. Physico-chemical standardizations of leaf and bulb powders were conducted by the standard analytical procedures described in Physico-chemical Standards of Unani Formulations (1987, India) and Myanmar Traditional Medicine Formulary (1989, DMR). All the results are recorded in this thesis. The genus Crinum is reported to contain an alkaloidal compound, lycorine, as one of the major constituent. For this reason, extraction and isolation of lycorine has been attempted from bulb of *Crinum asiaticum* Linn. and identification of the isolated crystal was achieved by melting-point determination, thin layer chromatography and ultra-violet spectral data analysis in comparison with the reported data for lycorinem.

264. Pharmacognostic studies and isolation of L-Dopa from *Mucuna pruriens* DC. and *Mucuna utilis* Wall. Saw Han. Thesis, MSc (Botany), Rangoon Arts & Sciences University; 1978.

Taxonomic and Pharmacognostic studies of *Mucuna pruriens* DC. and *Mucuna utilis* Wall. were conducted. Isolation of L-Dopa from the seeds of both the species were carried out by two methods. (i) 50% ethanolic solution containing 0.5% ascorbic acid and (II) 1.0% acetic acid solution. The percentage yield by method (I) was found to be 1.8gm% for *Mucuna pruriens* DC. and 1.21gm% for *Mucuna utilis* Wall. : by method (II) the yields were 2.0gm% and 1.5gm% respectively. The L-Dopa from *Mucuna utilis* Wall. contained 0.15gm tyrosine. The isolated substance was identified as L-Dopa by specific colour reaction, paper chromatography, thin-layer chromatography, melting point, UV absorption spectrum and specific rotation. An attempt was made to extract L-Dopa was not obtained. Investigation of serotonin (5-hydroxytryptamine) in fruit trichomes was also attempted but no serotonin was detected. A 20% sodium chloride extractable protein in *Mucuna pruriens* DC. and *Mucuna utilis* Wall. were found to be 12.8gm% and 12.6gm% respectively by gravimetric method. The colorimetric analysis by Biuret method showed 10gm% for the former and 9.8 gm% for the latter species.

265. Pharmacognostic studies of *Urginea indica* Kunth. Thidar Swe. Thesis, MSc (Botany), University of Rangoon; 1983.

In this study Taw-kyet-thun, which is commonly known as Indian Squill was studied taxonomically and identified as *Urginea indica* Kunth. Histological characters and pharmacognostic aspects of the plant were investigated. Preliminary phytochemical pharmacognostic aspects of the plant were investigated. Preliminary phytochemical possess effective anthelmintic activity. The test revealed the presence of flavonoid and steroidal glycoside. Flavonoid detection was conducted on methanolic concentrate, eluted from 50. Alcoholic extract of air-dried bulb powder; using paper chromatography with BuAW (4:1:5) as solvent system at 30˚C. One flavonoid spot of R_f value 0.531±0.047 was obtained by specific colour reaction and two sugars were also detected. The R_f values corresponded to authentic fructose and galactose and this was confirmed by osazone test. Such a flavonoid compound could not be identified due to lack of reference compound. The presence of steroidal substance was also detected in ethyl acetate-soluble substance obtained from methanolic concentrate which was eluted from 50. Alcoholic extract of air-dried powder using liebermann-Buchard colour reaction. The presence of β-sitosterol was confirmed by T.L.C. and specific colour reaction. There were four unknown spots which could not be identified. The presence of a scillaren-like substance was detected by specific colour reaction test but the amount was too small for further characterization.

266. Pharmacognostic studies on *Nasturtium officinale* R.Br. (ဧရုမုန်ညင်း) Family: Brassicaceae. Kay Zin Kyaw. Thesis, MPharm, Yangon: University of Pharmacy; 2009.

A variety of mustard (Mon-hnyin) belonging to the family Brassicaceae, has been commonly appreciated as salad and vegetables since many years ago. Nowadays those species are preferably accepted as medicinal and health-foods claiming for various bioactivities. In Myanmar, a mustard species namely Ye- mon-hnyin (ဧရုမုန်ညင်း), which is abundantly available in Shan State is becoming popular and vastly used by people. This local plant, Ye-mon-hnyin which is one of the mustard species was botanically identified and confirmed to be *Nasturtium officinale* R.Br. Its habit, morphological and histological characters were systematically documented in this thesis for the plant authenticity purpose. Physicochemical and phytochemical studies were also conducted by using reference analytical procedures chromatographic and spectroscopic methods. All of physicochemical data determined in this work were documented in Myanmar Herbal Pharmacopoeia Monograph presented in this research. A major compound present in the locally grown *Nasturtium officinale* R.Br. was extracted and isolated. It was identified to be gluconasturtiin according to the UV and NMR spectral data analysis. For the purpose of safe and effective uses of *Nasturtium officinale* R.Br. laxative activity and acute toxicity were studied on experimental mice. Expressed juice from fresh specimen and aqueous, ethanol (50%) and ethanol (95%) extracts from dried powder were tested with the various dose of 3, 6 and 12g/kg for toxicity and 3 and 6g/kg for laxative activity respectively. Laxative activity was evaluated by measurement of frequency and weight of stool after oral administration of test extracts. At the dose of 6g/kg, aqueous extract showed statistically significant activity at 0.5hr, 1hr and 2hr, and ethanol (50%) extract showed at 1hr and 5hr by means of Mann-Whitney non-parametric test. Fresh juice showed no fatal effect of all mice with the tested doses. No toxic effect was found with the dose of 3 and 6g/kg of all tested extracts. One, two and ten mice were found

to be lethal with aqueous, ethanol (50%) and ethanol (95%) extracts respectively, only with the highest dose (12g/kg) was tested. LD_{50} value of ethanol (95%) extract was calculated to be 9.4 (7.2-12.2)g/kg according to Litchfield and Wilcoxon method. It can be concluded that this plant possesses laxative activity and practically non-toxic on mice.

267. Pharmacognostic study of *Enhydra fluctuans* Lour. San San Moe. Thesis, PhD (Botany), University of Yangon; 2009.

Enhydra flucturans Lour. is one of the flowering plants belongs to the family Asteraceae. It is a marsh herb as aquatic plants. They are mostly wild species and it is known as "Kana-hpaw" in Myanmar. In Myanmar, it is often planted for the edible stems, leaves and also some medicinal values although they are not cultivated plant species. This plant was collected from Hlaing Township, Yangon Division. The morphological and taxonomical aspects of this plant have been studied and identified in the Department of Botany, University of Yangon. The microscopical characters of the whole plant and examination of powdered drugs were carried out for a perfect standardization of drugs. In microscopical study, the cells of lower and upper lamina are irregular, wavy anticlinal walls and abundant anomocytic stomata types of lower surface than upper one were found. In tranverse section of lamina, collateral type vascular bundle and finely oil dotted glands in mesophyll tissues were observed distinctly. In the surface view of stem, multicellular uniseriate trichomespresented and chloroplasts with anomocytic type of stomata were found. The collected plants were dried, powdered and stored in an air tight bottle for phytochemical and physicochemical observations. The preliminary phytochemical examination was carried out to examine the chemical constituents. This examination indicated that the presence of saponins, carbohydrate, tannin, glycoside, alkaloid, terpenoid, flavonoid, starch and phenolic compound. In physicochemical observation, the results indicated that dry powders of the whole plant were most soluble in water and moderately soluble in other solvents. The elemental analysis (EDXRF) of the whole plant was indicated the presence of Chlorine (Cl), Potassium (K), Calcium (Ca), and Iron (Fe). Isolation of chemical constituents of the plant extract was carried out by silica gel column chromatography method. Yield percentages of three isolated compounds were (0.12%), (0.2%) and (0.027%) respectively. Isolated compounds were identified by TLC, melting point, Ultraviolet (UV), and Fourier Transform Infrared Spectrometer (FTIR) techniques. In microbial test, the results showed that effective activities on the microbes were found in extracts of acetone, methanol and ethanol. Various solvent extracts of plant and isolated compounds (diterpene, lupeol, and stigmasterol) were tested against different microorganism for their antimicrobial activity by using agar well diffusion method. The isolated compounds were active against on *Bacillus pumalis, Candida albican, Staphylococcus aureus, Pseudomonas aerugonisa* and *Eschrichia coli.* The acute toxicity test of aqueous extract of *Enhydra flucturans* Lour.was tested on albino mice. These extracts did not show any toxic effect at the maximum permission doses of 12g/kg body weight. Aqueous extract of the plant *Enhydra flucturans* Lour.also showed laxative activity on albino mice with 8g/kg body weight. Therefore, this study was revealed a significant laxative effect on albino mice.

268. Pharmacognostic study of *Payena paralleloneura* Kurz. (ကန်းဇော်). Moe Moe Lwin. Thesis, PhD (Botany), University of Yangon; 2006.

There is a well known tree (Kan-zaw) near Southern Myanmar, the seeds of which are medicinal and is used by local people. The oil is the main components present in the seeds of this plant and it is used as a major remedy in traditional medicine for the treatment of breast and ovarian cancer, anti-peptic ulcer, paralysis, bronchitis, rash, chest pain, injury, sores and various other ailments. Although the oil is popularly used by local people and has commercial value, the identification of this plant has not been undertaken previously. The seeds were collected from Mann Thin Mountain, Myay Yoe Village, Yebyu Township and Nyin Maw Village Launglone Township of Tanintharyi Division. According to the characters present in the vegetative and reproductive parts of the plants, it has been identified as *Payena paralleloneura* Kurz. (Kan-zaw) belonging to the family Sapotaceae. This research covered the morphological and microscopical characters of the leaves, fruits and these were investigated so as to ascertain their correct identification. Preliminary phytochemical tests have been carried out by using the leaves, stem, bark and seeds. Physicochemical properties of the seeds were examined; petroleum ether (60-80˚C) extract of seed oil were also investigated for the saponification and iodine value and estimation of free fatty acids. Column chromatographic separation of active petroleum ether (60-80˚C) extract on gel yielding compound A, while 95% ethanol extract of the seeds on silica gel yielded two compounds. Isolated compound A was identified by UV, FT-IR and GC-MS spectroscopic methods and compounds B and C were identified by UV and FT-IR. Compound A (5-Undecene, 3-methyl-, (E)-) with a moleculer formula of C_{12} H_{24}, 0.5%) having the following structure; compound B and compound C have been assigned to the major component which have been isolated from the seeds and the activity of this compound was rechecked by employing agar-well diffusion method and it was found compound A showed more responsible for that significant antimicrobial activity than other compound B and C. Isolated fixed oil content of Kan-zaw seeds found to be 11.25% (v/w). The results of fixed oil was analyzed by GC-MS method. All together, 24 peaks were detected by the gas chromatographic profile of Kan-zaw oil. Of them, 9 constituents were identified by GC-MS spectrophotometer. In addition elemental analysis of the plant parts were conducted by using energy dispersive X-ray flurescence (EDXRF) spectrometry. Moreover these samples were also determined by atomic absorption spectrophotometry (AAS). In addition, extracts from the leaves, stem, bark and seeds were obtained by using solvent chloroform, acetone, 95% ethanol and petroleum ether (60-80˚C) and they have been tested for their antimicrobial activity by using agar-well diffusion method against six different types of microbes. The results obtained were compared with the activity of the commercial oil sample. Ethanol extracts of whole powder seed were found to possess more effective antimicrobial potency than chloroform, acetone and petroleum ether (60-80˚C). Kan-zaw oil produced commercially showed less antimicrobial activity than the studied samples. Acute toxicity tests on animal models has been conducted on aqueous extract of Kan-zaw seeds and commercial Kan- zaw oil and compared with Yangon peanut oil as a control. In this study, the former were tested for its anti-peptic ulcer activity in rats. The effect of aqueous extracts of the seeds and oil (5g/kg and 10ml/kg) per orally were studied on gastric secretion and gastric ulcers on aspirin induced (Buspro 600mg/kg) gastric mucosal injury in rats. The reduction in the ulcer index in both the models along with the increase in volume and total acidity, and neutralize the pH of gastric fluid in rats proved the anti-peptic

ulcer activity of aqueous extracts and Kan-zaw oil. Thus, if can be concluded that the Kan-zaw seeds and oil possess definite anti- peptic ulcer activity.

269. A pharmacognostic study on *Allium sativum* Linn. Moe Moe San, Nant.Thesis**,** MSc (Botany), University of Yangon; 1999.

A research has been carried out on *Allium sativum* Linn. (Garlic) which is commonly cultivated in the Union of Myanmar. Studies on the morphology of the vegetative and reproductive parts and the anatomy of the leaf blade, leaf sheath, bulb and roots have been made. Comparative physico-chemical and phyto-chemical studies on garlic collected from three different localities namely, Taunggyi, Mogoke and Monywa Townships were conducted. The main constituent of garlic, allicin, from the bulb was extracted and identified by the thin layer chromatographic and spectroscopic determinations.

270. A pharmacognostic study on *Artabotrys burmanicus* A.DC. Yin Yin Waing. Thesis, MSc (Botany), University of Yangon; 1999.

Artabotrys burmanicus A.DC. belonging to the family Annonaceae is an indigenous medicinal plant widely distributed throughout Myanmar. This plant is locally known as Ta-daing-hmwe and also as Nga-bye-shin. It is claimed to be useful for fever and emmenageogue. In this study, morphological, anatomical and phyto-chemical investigation was carried out. The presence of Artabotrine (alkaloid) was detected from the barks and roots by means of chromatographic studies.

271. Pharmacognostic study on *Atalantia monophylla* (Taw-shauk) and antispasmodic activities of its roots. Khin Mar Naing. Thesis, PhD (Botany), University of Yangon; 2007.

Atalantia monophylla Correa. (Taw-shauk), belonging to the family Rutaceae was selected as the plant materials because this plant is used as lubricant in Myanmar traditional medicince. Morphological characters of both vegetative and reproductive parts were investigated to ascertain their correct identification. They are large aromatic shrubs, sharp spines at the nodes. Most of the Rutaceae families are wing petiole but this plant is not wing petiole, the tip emarginate and gland dotted. Microscopical characters of leaves and roots were studied for their diagnostic characters which can be used in standardization of drugs. Stomata are present on the lower surface of the lamina, anisocytic type. Transverse section of lamina contain secretory cavity with yellowish brown oil. Transverse section of young root and mature root has starch grain present. The preliminary phytochemical examination showed the presence of reducing sugars, alkaloid, flavonoids, steroids/terpenoids, saponin, carbohydrate, glycosides, tannins, phenolic compounds and amino acids in the leaves, stems and roots. Extractive value of leaves and roots are found to be more soluble than that of the stem in ethanol. The principal element in leaf, stem and root as calcium (Ca), potassium (K) and iron (Fe) were detected by EDXRF and AAS analysis. The root powder of Taw-shauk was extracted with 95% ethanol. Total alkaloids (0.48% yield) have been carried out by using Stas-Otto method. The acridone alkaloids compounds: atalaphyllidine (A), N-methylatalaphylline (B) and N-methylbicycloatalaphylline (C) were isolated by PTLC and identified by thin layer chromatography, melting point, Ultraviolet and infrared spectroscopic methods. The yield of the isolated alkaloids compounds were 0.008% (A), 0.005% (B) and 0.007% (C) respectively. The leaf, stem and root extracts were prepared by various solvents of ethanol, chloroform, pet-ether (60-80ºC) and acetone. These extracts and total alkaloid from the roots were tested with different type of microorganisms by using

agar well diffusion method. Acetone, ethanol and chloroform are found to be effective antimicrobial activity against all microbes tested than pet-ether (60-80˚C). Total alkaloid showed the best antimicrobial activity against *S. aureus* and *C. albican*. Acute toxicity tests on animal model had been conducted with aqueous and 50% ethanolic extracts of Taw-shauk root. It was observed that both extracts were free from acute toxic or harmful effects even with maximal permissible dose of 12g/kg. The LD_{50} (median lethal dose) of both extracts was more than 12g/kg body weight. The antispasmodic activity of 95% ethanolic extract of *Atalantia monophylla* Correa. root was investigated on acetylcholine induced contraction of isolated rat intestine. The 95% ethanolic extracts (6mg) of Taw-shauk roots sample could completely block the contraction cause by Ach (0.1mg) transiently, when the action of Ach (0.1mg) was completely blocked by atropine (5mg). These results suggest the use of *Atalantia monophylla* Correa. root as antispasmodic agent in traditional medicine.

272. A Pharmacognostic study on *Cassia tora* Linn**.** Khine Kyi Oo. Thesis, MSc (Botany), University of Yangon; 1998.

A pharmacognostical study of *Cassia tora* Linn. (Dan-gywe) which grows wild throughout the Union of Myanmar has been undertaken. A detailed study on the morphology and the anatomy of the leaflets, rachis, fruits and seeds have been made. Physico-chemical standardization of seed and leaf powder were conducted by standard analytical procedures described in physico-chemical standards of Unani-Formulations (1987, India) and Myanmar traditional medicinal formuration (1989, DMR). The major constituents of emodin from seeds and flavonol glucoside from leaves have been detected by thin layer chromatography and spectroscopy techniques.

273. Pharmacognostic study on *Evolvulus alsinoides* Linn. Khin Win Yi. Thesis, MSc (Botany), Rangoon Arts & Science University; 1979.

In this study the morphological and histological characters and pharmacognostic aspects of *Evolvulus alsinoides* Linn., were investigated. Isolation of alkaloids from entire dried plant was carried out by two methods of extraction. Method I is a cold process using petroleum ether and 95% ethanol. This method yields 0.011gm% of total alkaloid in the first batch and 0.004gm% in the second batch extraction. Method II is the lime process producing 0.129-0.134gm% of total alkaloid. There were altogether three spots of alkaloidal substances detected by paper chromatography developed in butanol : acetic acid : water (15:1:4) in which the uppermost spot fairly agrees with the R_f value of evolvine alkaloid reported in the literature; the other two spots could not be identified, due to lack of reference materials. A search for betaine in the alkaloidal extract was also conducted; but no betaine was detected. β-sitosterol was detected from petroleum ether extract and confirmed by TLC and specific colour reaction.

274. Pharmacognostic study on *Hedychium coronarium* Koenig. (Ngwe-pan) and its bioactivity. Khin Cho Cho Oo. Thesis, PhD (Botany), University of Yangon; 2007.

Five species of Hedychium (Zingiberaceae) were collected. *Hedychium elatum* R.Br, *Hedychium coccineum* Buch. and *Hedychium flavescene* Roscoe. were found (wild) around Anisakhan roadside and near Dat-taw-gyeik fall, Pyin Oo Lwin Township (Myanmar Division). *Hedychium coronarium* Koenig. and *H. flavum* Roxb. (cultivated) were collected from South Okkalapa Township (Yangon Division). Morphology of the five species of Hedychium was comparatively investigated *Hedychium coccineum* Buch. has narrowly lanceolate leaves with fertile stamen twice as long as the labellum and orange flowers. *H. flavescens* has yellow fertile stamen slightly exceeding the

orbicular labellum. *Hedychium coronarium* has white fertile stamen which is shorter than the orbicular labellum while that of *H. flavum* is yellow and exceeding the obovate labellum and *Hedychium elatum* is dark pink and exceeding the obovate labellum. Microscopical characters of rhizomes and roots were carried out so as to ascertain their true identification. Irregularly distributed closed collateral vascular bundles, numerous starch grains and oleoresin are found in rhizomes and roots. Phytochemical and physicochemical investigation of the five species of Hedychium were compared. Starch is especially abundant in *H. flavescens* and *Hedychium elatum*; glycoside is abundant in *Hedychium elatum* and a lot of ά-amino acid is shown in *Hedychium coccineum.* The powdered sample of *Hedychium coccineum* was mostly soluble in water and the powdered sample of *Hedychium coccineum* was mostly soluble in ethanol. Elemental analysis of plant. *Hedychium coronarium* was determined by energy dispersive X-ray Fluoresence (EDXRF) spectrometry. Elemental analysis by using EDXRF showed that potassium (K) is found as principal element. Column chromatographic separation of bioactive compound from 50% ethanol extract on silica gel yielded diterpene compound A and sterol compound B. Isolated diterpene compound A and sterol compound B were identified by UV, FT-IR. The isolated diterpene compound A may be hedychenone and the isolated sterol compound B might be stigmasterol. The antimicrobial activity of various extracts [methanol, 50% ethanol, pet-ether (60-80°C), watery] of dried rhizome of *Hedychium coronarium* Koenig. Hydychenone compound and Stigmasterol compound were also tested to find out its medicinal values. Methanolic extracts was found to be the best in antimicrobial activity against *Pseudomonas aeruginosa.* So, the results of the experimental provided much useful information in the development of traditional medicine from natural products. The acute toxicity of aqueous extracts and 50% ethanol extract *Hedychium coronarium* Koenig. dried rhizome were tested on albino mice. Aqueous extract was free acute toxicity or harmful effect up to 10g/kg dose. The rhizome of *Hedychium coronarium* Koenig. had found application in folk medicine for treatment of various ailments. The present study confirms the antipyretic action of the aqueous extracts and 50% ethanol extract of this plant against fever experimentally induced by giving yeast to which was comparable to that of a standard paracetamol. The 50% ethanol extract of *Hedychium coronarium* Koenig. is more effective than aqueous extracts of *Hedychium coronarium* Koenig. This study indicates that both extracts of *Hedychium coronarium* Koenig. can be used as an effective agent against fever.

275. A pharmacognostic study on *Morinda tinctoria* Roxb. Blute Tser, Naw. Thesis, MSc (Botany), University of Yangon; 1999.

Morinda tinctoria Roxb. belonging to the family Rubiaceae is an indigenous medicinal plant widely distributed in lower Myanmar, especially in Ayawady Division. This plant locally known as Nibase or Taw-ye-yo is being clained to be useful as expectorant and emmenagogue is traditional medicine. In this study, morphological, anantomical and phytochemical investigations were conducted. The presence of morindin was detected from the roots by thin-layer chromatography.

276. Pharmacognostical and pharmacological study on Taw-kyet-thun reputed for anthelminthic action. Aye Than; Thidar Swe; Chit Maung; Mya Bwin. *Myanmar Health Sci Res J.* 1991; 3(3): p124-128.

Taw-kyet-thun, an indigenious Myanmar medicine plant whose bulb is being claimed by the country-folks to be effective in purging intestinal roundworms, was identified to be *Urginea indica* Kunth. Phytochemically, it consists of steroidal and flavonoid glycosides. On the *in vitro* test model of *Ascaris suum* the 50% alcoholic bulb extract indicated its anthelminthic efficacy by significantly immobilizing the parasite within 4-6 hours, with respect to both the frequency and the magnitude of motility of the worm; however, an initial stimulatory action on the parasite was observed, a situation which is undesirable. Acute toxicity of the bulb extract tested on mice showed the LD_{50} to be 52 (41-66) mg/kg when administered intraperitoneally, and 680 (555-833) mg/kg, orally.

277. Pharmacognostical identification of an indigenous medical herbal plant Pan-oo to be *Kaempferia* species. Mya Bwin; Saw Han. *Burma Res Congr,* 1985-86: p6.

Rhizomes of Pan-Oo, used as an ingredient in some Burmese indigenous drugs, was pharmacognostically investigated. The detail anatomy on the basis of microscopical characteristics indicated its similarity to another Burmese indigenous herbal-drug ingredient "Seik-Phoo" a species already identified as *Kaempferia pandurata*. Only the microchemical and fluorescence test could have been able to differentiate between the two species. Therefor pharmacognostical standardization techniques could detect any adulteration of one for the other ingredient between these two ingredients.

278. Pharmacognostical identification of market Pwaygaing leaf. Mya Bwin; Saw Han; Swe Swe Thaung. *Myanmar Health Sci Res J*. 1992 December; 4(3): p176-180.

Pwaygaing leaflets sold in the market for its medicine value as purgative and laxative drug and also as one of the ingredients in many of the traditional medicine formulations (TMFs) was pharmacognostically identified to be *Cassia angustifiolia* Vahl.

279. Pharmacognostical studies of *Abroma augusta* Linn.F. Win Win Aung. Thesis, MSc (Botany), University of Yangon; 1995.

Abroma augusta Linn.f belonging to the family Sterculiaceae is an indigenous medicinal plant widely distributed throughout Myanmar. This plant locally known as Mwe-ma-naing-pin or Naga-thay-pin or Ga-loun-ja-za is being claimed to be useful as a detoxicant in the traditional medicine. In this study, morphological, anatomical, phytochemical investigation and characterization was conducted. The presence of β-sitosterol and 12 amino acids was detected from the chromatographic studies.

280. Pharmacognostical studies of Kyet-thahin. Tin Tin Kyu. Thesis, MSc (Botany), University of Yangon; 1991.

In this study, taxonomical and histological characters as well as pharmacognostical aspect of *Sauropus albicans* Blume. (Kyet-thahin) was conducted. The preliminary phytochemical investigations carried out on alcoholic extract reveal the presence of flavonoid and alkaloid. Two flavonol aglycones, namely quercetin and kaemferol were isolated and identified by means of thin layer chromatography and UV absorption spectra. Although qualitative investigation indicated the presence of alkaloid, no alkaloidal substance could be detected by thin layer chromatographic studies.

281. Pharmacognostical studies of *Nerium indicum* Mill. Tin Sein Mar. Thesis, MSc (Botany), University of Yangon; 1998.

The present study was conducted on the pharmacognostical investigations of *Nerium indicum* Mill. (Nwe-tha-gee). A detailed characterization of the morphology, taxonomy and anatomy of the plant were done and recorded. Physico-chemical characterizations of the dried leaf powder was performed with those test parameters such as solubilities in various solvents, ash values, essential oil content, mineral content and fluorescence characteristics of natural and chemically treated samples. Phytochemical study have achieved on the isolation and identification of cyanindrin from flowers and, rutin and oleandrin from leaves. Solvent extraction, chromatographic techniques and spectroscopic methods were utilized for chemical analysis.

282. Pharmacognostical studies of *Strychnos nux-blanda* A.W.Hill**.** Khin Thida. Thesis, MSc (Botany), University of Yangon; 1998.

A pharmacognostical study of *Strychnos nux-blanda* A.W.Hill which grows wild throughout the Union of Myanmar has been undertaken. A detialed study on the morphology and the anatomy of medicinally important organs such as the leaves, petioles and seeds have been made. Chemical studies include extraction and isolation of the major alkaloids such as strychnine; brucine and steroid (β-sistosterol) form the seeds by solvent extraction and thin layer chromatography techniques. Chemical analysis has also been carried out on the barks, leaves and seeds.

283. Pharmacognostical studies on *Alysicarpus vaginalis* DC. Mya Sanda, Sao. Thesis, MSc (Botany), Rangoon Arts & Sciences University; 1979.

Taxonomical, histological and chemical studies were conducted on *Alysicarpus vaginalis* DC. The present study revealed that *Alysicarpus vaginalis* DC. contains at least two types of flavonoid glycosides in the alcoholic extract. Two methods were employed for the extraction of plant constituents, using the organic solvent extraction method and lead complex method. Two isolates were identified, one a flavonoid glucoside and the other a flavonoid fructoside by R_f values, specific colour reactions and osazone derivatives of free sugars. However, the aglycones could not be identified due to lack of reference compounds. The presence of β-sitosterol was also confirmed.

284. Pharmacognostical studies on *Cephalandra indica*, Naud in Arn. Khin Khin San. Thesis, MSc (Botany), University of Rangoon; 1984.

Botanical and chemical studies were conducted on *Cephalandra indica*, Naud. The botanical portion includes morphological and anatomical investigations to help in the identification of the plant; phytochemical studies were performed by the application of Thin Layer Chromatography. An alkaloidal extract of the leaves of *C. indica*. indicated the presence of not less than four alkaloids with R_f. 0.68, 0.57, 0.50 and 0.29 respectively. The roots of the plant materiel indicated the presence of two alkaloids with R_f. 0.94 and 0.03 respectively. The identification of the alkaloids present in the leaves could not be determined due to lack of reference material. A steroidal extract of the leaves of the plant materiel has shown the presence of not less than six steroids with R_f. 0.84, 0.71, 0.60, 0.52, 0.34 and 0.24 respectively. The results show the presence of three major and three minor steroids. Of the six steroids, the second steroid had an R_f. 0.71 similar to that of stigmasterol and was therefore tentatively identified as stigmasterol by thin layer chromatography and infra-red spectroscopy,

although a derivative could not be prepared. Thus thin layer chromatography of the lipid fraction suggest the presence of stigmasterol in addition to other steroids.

285. Pharmacognostical studies on *Dicentra scandens* Walp. Wai Myint Aung. Thesis, MSc (Botany), University of Rangoon; 1984.

In this study, Thu-yaung-khar was studied taxonomically and identified as *Dicentra scandens* Walp. Histological characters and pharmacognostical aspects of the plant were investigated. Preliminary phytochemical investigation conducted on various soluble extracts of airdried underground tuberous root powder revealed the presence of alkaloids. The presence of two steroidal substances Beta-sitosterol and stigma sterol were detected in the hexane-soluble concentrate using Liebermann-Buchard colour reaction. These two phytosterols cannot be distinguished by their R_f values. Three alkaloidal substances designated as "X", "Y" and "Z" were isolated by two methods of extraction. Method "I" is a cold process using 95% alcohol, producing a total yield of 2g of white amorphous crystalline powder "X". Two types of alkaloids "Y" and "Z" were obtained by Method "II", using methanol by soxhlet extraction. "Z" is the white shining monoclinic prismatic crystalline alkaloid giving a yield of 1g and the other "Y" is a faint creamy yellow crystalline powder giving a yield of 2g.

286. Pharmacognosy of *Euphorbia geniculata* Ortega. Tin Tin Nu Yi. Thesis, MSc. (Botany), Rangoon Arts & Sciences University; 1974.

In this study of *Euphorbia geniculata* definitive morphological and histological characters were surveyed. Microchemical, qualitative and quantitative chemical tests were used to determine the plant constituents. Steroids, sterol esters and waxes were extracted and identified. The flavonoid glycoside, quercetrin and its aglycone quercetin was extracted, isolated, and identified by chemical reactions, paper chromatography, melting point determination, ultraviolet and infrared spectrometry. Putative candidate's possesing the purgative action were investigated biochemically. The purgation effect of *E. geniculata* in man, mice and rats was also studied. Boiled leaves produced purgative action in human subjects whereas green leaves, and various extracts did not show any significant purgative effect.

287. Pharmacognosy of plant ingredients of Myanmar traditional medicine formulations. Pharmacology Research Division. Yangon: DMR; 1989.

Botanical characterization is essential features of traditional drug standardization being mostly of plant origin. An important component of such strategy is the pharmacognostical study of individual plant ingredients. The crude drugs used in the preparation are judged only by physical appearance, smell and personal experience. There is no assurance of the authernticity or quality control of the plant ingredients by scientific judgement. Thus, there is a great need to authenticate and to have reference standards of the plant ingredients before the preparation of a traditional medicine formulation. The method for authentication and standardization is lacking in the field of traditional medicine. Pharmacognostic studies were conducted on 134 plant ingredients of the 39 traditional medicine formulations. Five pharmacognostical tests carried out for each plant were;-macroscopic features; microscopic (powder) studies; quantitative microscopic estimations; fluorescence analysis and chemical treatment (colour reactions) of powder. Illustrated microscopic particles in line drawings are also presented. Grouping arrangement in this book was made in the following sequence: whole plant, aerial parts, flower, stamen, fruit, seed, leaves, stem, bark, wood, rhizome, bulb, gall and algae.

288. Pharmacognosy of *Plantago major* Linn. Mya Sein, Ma. Thesis, MSc (Botany), Rangoon Arts & Sciences University; 1975.

In this study taxonomical, morphological and histological characters of *Plantago major* were conducted. Micro-chemical investigations of leaves stems and roots of 1 month-, 2 month-, 3 month-, 6 month- and 1 year- old plants were made concurrently with general qualitative tests of dried powdered leaves. Extracts of dried leaves were analysed. Total water-soluble pectin content with respect to the age of the plant was studied. Increase in pectin content was found in April and May irrespective of the age of the plant. Pectin from four batches of leaves taken from three different localilties and extracted from the ninth step of hydrolysis (designated PM-9) show that the content is highest from Rangoon grown plants. Effect of pooled PM-9 on bolld pressure of dog was determined and it was observed that the blood pressure fell immediately.

289. Pharmacological and chemical studies on *Orthosiphon aristatus* (Bl.) Miq. Aye Than; Win Myint; Tin Myint; Mu Mu Sein Myint; Than Than Htay; Khin May Ni. *Myanmar Health Sci Res J.* 2002; 14 (1-3): p1-6.

The plant *Orthosiphon aristatus* (Bl.) [See-cho-pin or Tha-gyar-ma-gike in Myanmar name] scientifically evaluated for its traditionally reputed activity of hypoglycemic property. When aqueous extract of the leaf was tested on rabbit model, blood sugar lowering effect was observed on both adrenaline-induced and glucose-loaded models. Reduction in blood glucose concentration was significant and was maximum at 1hr and 2hr. Acute toxicity test and physico-chemical studies of the leaf extracts of the plant were also conducted. The acute toxicity studies carried out on mice has not revealed an adverse or side effects of this extract at the dosages tested. Detailed results on the evaluated hypoglycemic activity, acute toxicity study and physico-chemical tests were discussed and reported.

290. Pharmacological and toxicological evaluation of Myanmar traditional medicine formulations. Pharmacology Research Division. Yangon: DMR; 1989.

The reslts of screening of a total of 34 traditional medicine formulations for selective pharmacological actions, such for anti-asthmatic, anti-diarrhoea, analgesic, antipyretic, anti-inflammatory and diuretic activities are described. All the 34 formulations (which are in the form of powder) were tested for acute toxicity (LD_{50}). For subacute or chronic toxicity, however, only two drug formulations were selected, on the basis of their ingredients, some of which (e.g., arsenic) are known to lead to chronic toxicity. Clinical evaluation was undertaken on two therapeutic actions, i.e., diuretic and antipyretic activities. Five drug formulations were tested clinically for each of these activities. Full detalis of the 34 formulations tested including the ingredients, (plant, animal, mineral/salt), their common name/scientific name, Myanmar name, amount per 100g of mixture, main therapeutic indication/uses and manner of administration, dose (human and animal); methods and results of toxicological and pharmacological (i.e., animal studies as well as clinical trials) are described. As regards the scientific evaluation of the efficacy of the traditional medicine formulations, the pharmacological tests have indicated a number of promising formulations. These will need to be followed up vigorously and more extensive clinical trials undertaken before definitive conclusions can be drawn and more widespread use of the formulations promoted.

291. Pharmacological evaluation of some traditional medicine formulations and medicinal plants on *in vitro* and *in vivo* experimental animals. Aye Than. Thesis, PhD. (Zoology), University of Yangon; 2004.

The pharmacological evaluation of some Traditional Medicine Formulations (TMFs) and selected medicinal plants in seven experimental areas namely bronchodilating activity, antheminthic efficacy, activity on uterus, anti-diarrhoeal activity, hypoglycaemic efficacy, anti peptic-ulcer effects and anti-inflammatory actions were experimented on using animal models system during 1997 to 2004. Three formulations out of seven reputed TMFs were found to produce significant bronchodilating effect with relaxation of tracheal muscle as much as 127±12% and 110±18%. The effect of two different extracts of three medicinal plants namely *Piper betle* L. (Kun), *Coleus aromaticus* (Ziyar-ywet-htu) and *Ageratum conyzoides* L. (Khway-thay-pan) leaf extracts also significantly inhibited the contraction of tracheal muscle induced by carbachol and histamine in rabbit and guinea pigs models. Out of 33 plant extracts, 22 plant extracts were found to have anthelminthic activity. Among the active plants tested, 40-80mg/ml of *Ananas sativa* L. (Nanat-thee) juice was found to be most effective. In the *in vivo* test model using pigs when 10g of fruit was consumed, it was recorded that *Ascaris suum* was passed out with the feaces within 6 hours. The aqueous extracts of *Eclipta alba* (L.) Hassk. (Kyeik-hman), *Amaranthus spinosus* Linn. (Hinnu-nwe-subauk) and *Averrhoea carambola* Linn. (Zaung-yah) significantly induced contraction of the uterine smooth muscle. Two TMFs (TMF-16 & TMF-35b) out of five TMFs tested were found to possess significant anti-diarrhoeal activity, with experimental antidiarrhoeal indices of 77% and 82%, respectively. Regarding the hypoglycemic activity tested, only the water soluble extract of TMF-32 inhibited the hyperglycaemic blood glucose level on adrenaline-induces diabetic rabbits ($P<0.05$). The plant *Orthosiphon aristatus* Bl. (See-cho-pin or Tha-gyar-ma-gike in Myanmar name) significantly reduced in blood glucose concentration with the maximum rate between 1 to 2 hours. Fresh fruit juice (10ml/kg) approximately equivalent to 400mg/kg of the substance significantly inhibited the hyperglycemic blood glucose levels on the rabbit models at two hours. In screening the anti-peptic ulcer activity of the TMFs, only three (TMF-02, TMF-03B and TMF-08) markedly reduced ulcer severity with the ulcer indices of 17.4, 15.6 and 14.5, respectively, whereas those of the cimetidine showd 13.8 and of the negative control 35. These drugs also reduced gastric acidity diminishing the free acid amount to one-third. In addition, *Plantago major* Linn. (Akyaw-baung-ta-htaung) aqueous extract of air dried leaves had a singnificant anti-ulcerogenic activity against aspirin-induced ulceration on *in vivo* rat model ($p<0.005$). The ulcer severity and ulcer index of the test reduced to 59% when compared with the control group. Aqueous extracts of *Nyctanthes arbortristis* Linn. (Seik-balu), *Curcuma longa* Linn. (Nanwin) and *P. major* Linn. showed a significant antiinflammatory activity ($p<0.005$) at a dose of 3g/kg in rats tested *in vivo*. The data obtained are compared and discussed, suggestions for future work are outlined.

292. Pharmacological study on *Orthosiphon aristatus* (B1.) See-cho-pin. Khin Chit; Aye Than; Khin Ye Myint; San San Win; Aye Aye Thein; Mu Mu Sein Myint. *Myanmar Health Res Congr,* 2000: p45.

The plant *Orthosiphon aristatus* (Bl.) (See-cho-pin) or Tha-gyah-ma-gike in Myanmar name was scientifically evaluated for its traditionally reputed activity of hypoglycemic property. First botanical identification of this plant and physico-chemical studies were conducted. When aqueous extract of the leaf was tested on rabbit model, blood sugar lowering effect was observed on both adrenaline-induced and glucose loaded models. Acute toxicity test on mice and sub-acute toxicity study on rats were also conducted. No toxicity was observed. Thereafter, a clinical trial to determine the hypoglycemic potential of this plant was carried out on 13 healthy adult volunteers. A significant blood sugar lowering effect was observed 1hr after administration of 175ml of plant decoction (25g leaves) on glucose loaded model. Then, a clinical trial was carried out on type 2 diabetes mellitus patients (30-70yrs). Significant blood sugar lowering effect was observed in all patients 3hrs after administration of plant decoction. There was no side effect clinically. Then, preliminary study of long-term clinical trial was carried on 5 NIDDM patients. These patients were administered in plain tea form in 3 divided doses (25g/day) for 1 month. It was observed that blood glucose levels during oral glucose tolerance test (OGTT) before drug administration and after drug administration were different. Blood glucose levels were lowered significantly ($p<0.025$) at 1hr and ($p<0.05$) at 2 hrs, respectively, after 1 month administration of the plant in plain tea form.

293. Physico-chemical analysis of home-based fluids. Win Myint; Hla Pe; Po Aung, Saw; Win Kyi; Khin Aye Than; Mya Bwin. *Med Res Congr,* 1992: p30-31.

Rehydration measure should be instituted as early as possible when life threatening dehydration state due to diarrhea or severe fever is suspected or detected. Home-based fluids are usuaslly given under such circumstances and thus chemical compositions of syrups (n=9), soft drinks (n=5), fresh fruit juices (n=4) and plant decoctions (n=7) were analysed by using published methods and atomic absorption spectrophotometer. High concentrations of total sugars (8.67 to 34.87g%) and free reducing sugars, mainly as glucose and fructose (1.97 to 21.49g%) were detected in syrups and soft drinks. Potassium was found to be rich in plant decoctions (34.08 to 273.10mg%) and sodium in soups (140.0 to 475.0mg%). Soft drinks were found to be acidic (pH=2.76 to 3.63) whereas soups and plant decoctions had pH values (5.29 to 8.91). Colours used in syrups and soft drinks were found to be permitted dyes. According to this study, it can be suggested that jaggery-salt solution or plant decoction laced with jaggery/sugar/starch with common salt could well be used as an alternative for ORS where it cannot be easily available.

294. Physicochemical, enzymic and antioxidant properties of selected honey samples from different localities in Myanmar. Hla Hla Than. Thesis, PhD (Chemistry), University of Yangon; 2009.

The honey samples from different localities were collected. They are Zee honey (H_P) from Patheingyi Township in Mandalay Division, Pann-hnan honey (H_K) from Kalaw Township in Southern Shan State and Pe-sin-ngon honey (H_C) from Chaung Oo Township in Sagaing Division. Microscopic examination of pollen in honey samples and related flowers were carried out for identification. The physical and chemical properties of local honey samples were determined by recommended methods of International Honey Commission (IHC). The honey samples Zee honey (H_P), Pann-hnan honey (H_K) and Pesin-ngon honey (H_C) have: refractive index, 1.486,

1.486 and 1.472; viscosity, 2625, 2575 and 575 centipoise (cP) at room temperature; and specific gravity, 1.4054, 1.4121 and 1.3511, respectively. The honey samples H_P (Zee honey), H_K (Pann-Hnan honey) and H_C (Pe-sin-ngon honey) have: pH 5.8, 5.4 and 2.9; free acidity, 12, 19 and 56 meq/kg; water content, 23.64, 25.30 and 28.70%; water insoluble matter content, 0.3945, 0.4700 and 0.4140%; total solid content, 49.773, 46.159 and 54.560%; ash content, 0.274, 0.109 and 0.147%; nitrogen content, 0.0368, 0.0272 and 0.0320%; protein content, 0.23, 0.17 and 0.20%; and hydroxyl-methylfurfural (HMF) content, 6.512, 4.042 and 13.174 mg/kg, respectively. The Pe-sin-ngon honey (Pyar-lay) obtained from Chaung Oo Township, Sagaing Division showed the lowest pH value, the highest free acidity and water content values. Total reducing sugars of honey samples H_P, H_K and H_C from different localities were found to be 93.75, 79.79 and 99.01% and non-reducing sugar obtained by acid hydrolysis was found to be 3.22, 2.54 and 3.58%. The Pe-sin-ngon honey (Pyar-lay) showed highest values of total reducing sugars and apparent sucrose. According to discriminant function, Pann-hann honey was classified as honeydew and the other samples Zee honey and Pe-sin-ngon honey were classified as floral honey. Quantative determinations were carried out using atomic absorption spectroscopy. Totally 12 elements (Ca, Cd, Cr, Cu, Fe, K, Mg, Mn, Na, P, Pd and Zn) were found in all honey samples. Diastase enzyme is responsible for converting starch to dextrins and sugars and is introduced into honey by the bees. Its main point of interest is as an indicator of heating. Diastase activity of the H_P, H_K and H_C honey samples were determined to be 4.48, 5.45 and 5.66 DN, respectively. The literature value for diastase activity is not less than 4 DN units. Invertase activity of the honey samples were determined using Glucose-oxidase enzyme reagent method. The invertase activities of the H_P, H_K and H_C were found to be 2.640, 2.955 and 2.185μmole$min^{-1}ml^{-1}$, respectively. Antimicrobial activities of honey samples were studied using *Bacillus subtilis, Staphylococcus aureus, Pseudomonas aerugenosa, Bacillus pumalis, Candida albican* and *E. coli*. Among the three honey samples, H_C (Pe-sin-ngon honey) sample showed the highest antimicrobial activity than that of H_K (Pann-hnan honey) sample, whereas H_P (Zee honey) showed no antimicrobial activity. The antioxidant activities of three honey samples were determined by using DPPH assay method. It was found that H_P, Zee honey (IC_{50}=0.1021mg/ml) exhibited the higher activity than that of H_K, Pann-hnan honey (IC_{50}=0.8578mg/ml) and H_C, Pe-sin-ngon honey (IC_{50}=0.8513mg/ml), respectively. In the assay test, ascorbic acid (IC_{50}=0.1362μg/ml) was employed as a standard. It may be inferred that the H_P (Zee honey) showed the highest antioxidant activity and H_K (Pann–hnan honey) indicated the lowest antioxidant activity. In this research, vitamin B6 content of the H_P, H_K and H_C honey samples were found to be 0.0009mg, 0.0007mg and 0.0004mg/00g, respectively. Vitamin C contents were 0.15mg, 0.13mg and 0.08mg/100g, for H_P (Zee honey), H_K (Pann-hnan honey) and H_C (Pe-sin-ngon honey) samples, respectively. Vitamin B2 was present in all honey samples.

295. Phytochemical, adulterations, heavy metals and acute toxicity studies of some Myanmar traditional medicines from private sectors. Mu Mu Sein Myint; May Aye Than; Khin Tar Yar Myint; Mar Mar Myint; Moe Moe Aye; Phyu Phyu Win; Thazin Myint; Myint Thuzar Thant. *Myanmar Health Res Congr,* 2003: p64.

Myanmar people use to take traditional medicine formulations of health foods to cure or to relieve from a wide range of diseases and disorders such as fever, ache and pain, indigestion, asthma, diabetes, malaria, hypertension, diarrhoea and dysentery. There is, however, a great need to explore whether they have any toxic effects and whether they contain adulterations, heavy metals and cyanogenic compounds respectively. In this study, a total of twenty samples of Myanmar traditional medicine formulations from private sectors were coded and screened for phytochemical constituents, heavy metals, adulterations and acute toxicity. Out of these formulations (I) formulation showed acute toxicity, (2) formulation contained adulterations. No formulations contained heavy metals. The results were compiled and analysed.

296. Phytochemical analysis and acute toxicity testing of quinine sulphate from Myanmar Cinchona bark. May Aye Than; Aye Than; Mu Mu Sein Myint; Kyi Kyi Myint; Thazin Myint; Moe Moe Aye. *Myanmar Health Res Congr,* 2002: p59.

Malaria is the top priority health problem and one of the major diseases in Myanmar. Two varieties of cinchona trees (Indian and UNICEF strains) are being grown locally around Thandaungyi area, Kayin State. Myanmar Pharmaceutical Factory has successfully produced extraction of quinine sulphate from the bark of cinchona tree. To be able to use it safely and effectively for the treatment of malaria, the local quinine sulphate product needs to be confirmed by phytochemical analysis and acute toxicity test. That was conducted as a controlled parallel, experimental study on mice model comparing with quinine sulphate from Indonesia, Holland and Germany. The same median lethal doses (0.72g/kg body weight) were found in all different types of quinine sulphates powder. The LD_{50} of quinine sulphate powder from Myanmar Pharmaceutical Factory (QS-MPF) was 520mg (lower limit 419.4-upper limits 644.8mg/kg) in mice. Basic identification and impurity testing of all different types of quinine sulphates powder were tested. Same solubility of all different types of quinine sulphates was also evident. Characterization by ultra-violet spectrophotometer and infrared spectrophotometer revealed the same spectrum with no major impurity peak. It was concluded that Myanmar quinine sulphate (QS-MPF) was not different from other types of quinine sulphate in terms of toxicological and phytochemical characters.

297. Phytochemical analysis of commonly known Banda trees (*Terminalia catappa* Linn.) grown in Yangon Division. Mie Mie Nwe; Zaw Myint; Theingi Thwin; Thet Thet Mar; Aye Myint Oo; Lwin Zar Maw; Tin Ko Ko Oo; May Thu Kyaw; Yee Yee Sein. *Myanmar Health Sci Res J*. 2010 December; 22(3): p137-140.

The aim of the study is to identify and differentiate between two varieties of trees which are commonly known as Banda trees grown in Yangon Division. The morphological, phytochemical, and elemental studies of leaves, fruits and barks were done. Two different varities of tree: *Terminalia catappa* Linn. variety 1 catappa and *Terminalia catappa* Linn. variety 2 pubescens, are almost similar in general appearance. The leaves are obovate to oblong, round or tapering at base and have yellowish spot-like glands on the lamina and base of midrib in variety 1 and red glands in variety 2. The mesocarp (flashy part) of fruits are either pink or yellow in colour, pink are bitter and yellow are sweet. Both kinds of kernel contain catappa oil (25-40%). Barks are smooth or nearly rough, the bark of variety 1 provides more oil.

The phytochemical tests have shown the presence of alkaloid, flavonoid, glycoside, tannin, phenolic compounds, carbohydrate, saponin, reducing sugar and absence of cyanogenic glycoside. But the content of flavonoid was higher in variety 2. In the elemental analysis, potassium, calcium and silicon were found in leaves, fruits and barks; iron, calcium and iodine were found in oil. Due to the different phytochemical and elemental contants of these two varieties of *Terminalia catappa* Linn. they may have different activities and these activities may be useful in the preparation of traditional medicine.

298. Phytochemical analysis of Myanmar Green tea: implications to antioxidant properties and health benefits. Khin Tar Yar Myint; Thaw Zin; Khin Chit; Win Win Maw; Thandar Myint; Khin Myat Tun. *Myanmar Health Res Congr,* 2006: p24.

Many people around the world drink Green-tea for its reputed health benefits, which are believed to be attributed to the presence of polyphenols. Polyphenols contained in tea are classified as catechins, which are chemicals with potent antioxidant properties and thus, act as scavengers of free radicals. This antioxidant property of Green-tea is dependent on the gentle steaming method which prevents oxidation and thus preserving the polyphenols in its original form. The fermentation and oxidation process used for other kinds of tea destroys the polyphenols with loss of health benefits. The objective of the study is to conduct the phytochemical analysis of Myanmar Green-tea so as to evaluate the contents which can contribute to its health benefits and further compare it with plain tea, which was also extensively consumed by the Myanmar people. Myanmar Green-tea (Nara organic Green tea, Kachin special group) and Plain tea (Htoo super plain tea), commercially available in the market, were subjected to qualitative and quantitative analysis of its constituents including alkaloids such as caffeine, total phenols, catechin containing polyphenols, and tannins. The results showed that Myanmar Green-tea has a higher percentage of polyphenols than plain tea, thus supporting the preservation of anti-oxidant properties and its health benefits. Persence of alkaloids including caffeine and related compounds is responsible for the stimulant effect of both Plain tea and Green-tea. Presence of tannins indicated the yellowish color and the refreshing aroma which is unique to the pleasing effect valued by many people. The study supported the importance of the processing methods in making tea if the beneficial effects are to be preserved.

299. Phytochemical and toxicological activity on tubers of *Gloriosa superba* L**.** Sabai. Thesis, PhD (Botany), University of Yangon; 2006.

Gloriosa superba L. widely found in Zalum, Laymyethna, Bago and Yangon were collected identified and classified. The microscopical characters of the leaves, stems and tubers were also studied. The collected tubers were dried, powdered and stored in air tight bottles for further use. The preliminary phytochemical tests and determination of extractive values were determinated by using the powdered tubers. The physico-chemical characterization and elemental analysis (EDXRF) were tested from the poedered sample. The presence of alkaloids and tannins were mostly dominant in the phytochemical investigation of the powdered tubers. So colchicines, gloriosine and tannins were extracted and isolated by selective solubility method. The isolated compounds were identified by column and thin layer chromatography using benzene, ethyl acetate methanol (2:2:1v/v). The isolated compounds were characterized by UV, FTIR spectroscopic techniques and melting point. The plant extract was prepared from powdered tubers by using polar and non polar solvents. These crude extracts were investigated for antibacterial activity *in vitro* by using

plate agar well diffusion method and was found to possess antibacterial activities against *Staphylococcus aureus, Pseudomonas aeruginosa, Candida albicans, Mycobacterium species, Bacillus subtilis* and *Bacillus pumalis.* Toxicological investigation of the aqueous extract was performed by using animal model (Pharmacology Research Division, Department of Medical Research). The medium lethal dose (LD_{50}) of aqueous extract of powdered tubers was about 1.3 (0.261-6.641)g/kg.

300. The phytochemical constituents and the antioxidant effects of different extracts of *Thea sinensis* Linn. (Tea) leaves. May Aye Than; Mi Mi Aye; Than Soe; Win Win Maw; Maung Maung Htay. *Myanmar Health Sci Res J.* 2009 December; 21(1): p12-16.

Antioxidants may play a major role in the prevention of diseases, including cardiovascular and cerebrovascular diseases, some forms of cancer and effective to be long life and anti-aging. Thus, the aim of this study was to evaluate phytochemical constituents and the antioxidant activity of different extracts of *Thea sinensis* Linn. (လက်ဖက်) leaves. It was found that leaves of *Thea sinensis* Linn. contained alkaloids, α-amino acids, basic compounds, flavonoids, phenolic compounds, reducing sugars, saponins, steroids and terpenoids. The chloroform, ethanol, petroleum ether extracts of tea leaves were tested for their antioxidant activity by using thiocyanate method (the inhibition of linoeic acid autoxidation to detect lipid oxidation) in comparison with the synthetic antioxidant butylated hydroxy anisole (BHA). The chloroform, ethanol, petroleum ether extracts and BHA significantly lowered the autoxidation of linoeic acid when compared with that of control ($p<0.01$ - $p<0.0005$). The % inhibition of antioxidation activity of the chloroform, ethanol, petroleum ether extracts and BHA were 75.97%, 87.06% 59.10% and 85.34%, respectively, after 14th day incubation.

301. Phytochemical constituents of *Beta vulgaris* Linn. (Beetroot) and its antioxidant activity. May Aye Than; Khin Tar Yar Myint; Mu Mu Sein Myint; Win Win Maw; Ohnmar Kyaw; Mar Mar Myint; San San Myint. *Myanmar Health Res Congr,* 2009: p67-68.

The aim of this study was to evaluate the phytochemical constituents, acute toxicity, metal content and antioxidant activity of beetroot which is recently introduced in Myanmar as there is no scientific information available. It contained alkaloids, flavonoids, and phenolic compounds, glycosides, reducing sugars, carbohydrates, steroid/terpenoids, amino acids in the root and flavonoids, phenolic compounds, glycosides, reducing sugar, carbohydrate, steroid/terpenoids and amino acids in leaves. Betacyanin and betaxanthins were isolated as major compounds from fresh juice of beetroot by Harborne methods. Acute toxicity of fresh juice of beetroot was done on mice. The median lethal dose was higher than 50ml/kg body weight per orally. Heavy metal contents were determined by energy dispersive X-ray fluorescent spectrometer. Beetroot contained potassium (K) 62.8%, and calcium (Ca) 20.3% as major elements and chlorine, sulphur, iron, rubidium, manganese, strontium, zine and copper as trace elements. Antioxidant activity of beetroot was studied using DPPH free radical scavenging activity by spectrophotometer. The antioxidant activity of fresh juice and standard ascorbic acid was tested. The percentage inhibition of free radical formation of ascorbic acid at 0.625, 1.25, 2.5, 5, & 10µg/ml were 69.2%, 83.2%, 94.6%, 98.9% and 99.5% and fresh juice at 66, 123, 198, 264 & 33µg/ml were 66%, 71.2%, 78.5%, 85.3%, and 93.2%, respectively. The IC_{50} of ascorbic acid and fresh juice were 0.0139µg/ml and 48.06µg/ml, respectively. Thus it was concluded

that beetroot had antioxidant activity. These findings provide necessary health benefit data of beetroot.

302. Phytochemical investigation of *Abrus precatorius* L. and hypoglycemic activity of its leaves. Thet Su Hlaing. Thesis, PhD (Botany), University of Yangon; 2009.

Abrus precatorius L. is the medicinal plant which belongs to be the Fabaceae family. It is known as "Ywe-lay" or "Zin-ywe" in Myanmar. This plant was collected from Monywa Township in Sagaing Division. Morphological and histological characters were investigated so as to ascertain their correct identification. The dried powder has been examined and presented its diagnostic characters as a standard for medicinal purposes. In morphological study, the plant was perennial twiner with slender flexible and tough branches, stem scarcely woody and seed is bright scarlet with a black spot at the hilum. In histological study, styloid (rod shap) crystals were present in the upper surface and anomocytic stomata were present in the lower surface of the lamina. The trichomes were unicellular with warty wall and pointed tip. The lower epidermis of the lamina had papillose. The cortical region of the young stem consisted of angular collenchymatous cells toward the outside and chlorenchymatous cells toward the inside. Pith region of the mature stem was characterized by pitted lignified parenchymatous cells. Phelloderm of the root was composed of parenchymatous cells and groups of sclereids. The vascular bundle was collateral type and endarch. In the surface view of fruit, anomocytic stoma, unicellular and glandular trichomes were present. In transverse section, the epicarp and endocarp were composed of tightly packed sclereids. The vascular bundles were occurred within the mesocarp. The seed coat was composed of five tissue layers. The cotyledon consisted of the epidermis and the spongy parenchymatous cells with aleurone grains. The powdered leaves and the whole plant were tested for the phytochemical constituents and physicochemical properties. Alkaloid, carbohydrate, glycoside, phenolic compound, saponin, flavonoid, terpenoid, steroid, starch, tannin, reducing sugar and ά-amino acid were present but cyanogenic glycoside was absent in both samples. According to physicochemical examination, the leaves and the whole plant were the most soluble in methanol, ethanol and water. The presence of elements such as K, Ca, P and S in the leaves and K, Ca, and Fe in the whole plant were analysed by using Energy Dispersive X-ray Fluorescence (EDXRF) spectrophotometer. The four phytoconstituents A (0.06%), B (0.08), C (0.04%) and D (0.03%) were isolated from methanolic extract of the whole plant by using column chromatographic method. The isolated compounds were identified by modern spectroscopic techniques such as UV, FTIR spectroscopy, Thin Chromatography and melting point. According to the chemical tests and spectroscopic data, the four isolated compounds were supposed to be methyl abrusgenate, terpenoid, abruslactone A and precatorine. In antimicrobial activity, the various solvent extracts of leaves and the isolated compounds of the whole plant were tested by using agar well diffusion method. The ethanolic extract especially more sensitive against *Bacillus pumalis, Pseudomonas aeruginosa* and *Staphylococcus aureus*. The chlorofome exract showed the highest activity on all six micro-organism. The four isolated compounds exhibited against on *Escherichia coli.* Analysis on nutritional values was conducted on the leaves of *Abrus precatorius* L.. The result revealed that protein, fat, vitamin B1, vitamin C and carbohydrate were present in leaves. The acute toxicity of aqueous eatract and 70% ethanolic extract from the leaves of *Abrus precatorius* L. was tested on mice. It was observed that the both extracts were free from harmful effect during observation period of two weeks with maximum permissible dose of 12g/kg. In this research, hypoglycaemic activity

of aqueous and 70% ethanolic extracts of *Abrus precatorius* L. leaves were studied on adrenaline induced hyperglycaemic rats. The leaves produced significant reduction in the blood glucose concentration when compared with that of control group.

303. Phytochemical investigation of *Achyranthes aspera* Linn. and its hypoglycemic activity. Sandar. Thesis, PhD (Botany), University of Yangon; 2009.

Achyranthes aspera L. (Kyet-mauk-sue-pyan) belongs to family Amaranthaceae which was collected from Kamayut Township, Yangon Division from November to March (2006) during the flowering periods. The plants are identified with the help of available literature for morphological characters by using the vegetative and reproductive parts. In morphological study, the plant is annual herb, leaves opposite and decussate, flowers, ferile stamens and staminodes (sterile) alternate with each other. The histological characters of whole plant were studied. The cells of upper and lower surfaces of lamina were wavy and anisocytic type of stomata was present on both surfaces. Calcium oxalate crystals were present in mesophyll tissues of lamina and parenchymatous cells of midrib, petiole and stem. Collenchymatous cells were present in transverse section of midrib, petiole and stem. In transverse section of stem, collenchymatous cells beneath the ridges and collenchymatous cells beneath the furrows. Two medullary bundles are fused in the lower internodes but free in the upper internodes and opposite to each other in the pith region. Alteranation layers of vascular bundles were present in transverse section of root. The qualitative analysis examnation was showed the presence of alkaloids, ά-amino acids, carbohydrates, flavonoids, glycosides, phenolic compounds, reducing sugar, saponins, starch, steroids, terpenoids and tannins. In physicochemical properties, the powdered samples were more soluble in polar solvents. The elemental analysis of the whole plant powder was examined by using EDXRF technique. From this result, potassium (K), calcium (Ca), phosphorous (P), sulphur (S), iron (Fe) were found to be principal elements and manganese (Mn), rubidium (Rb), strontium (St), zinc (Zn) and copper (Cu) are found as trace elements. The nutrient content of this plant were also studies. It revealed that the presence of carbohydrates, fats, fibres, proteins, vitamin B1 and vitamin C. Isolation of the chemical constituents of the plant extract was carried out by using column chromatography. The three isolated compound were indentified by TLC, melting point, ultraviolet (UV) and Fourier Transform Infrared Spectroscopy (FTIR). Yield percentage of these compounds were (0.03%), (0.02%) and (0.05%) respectively. According to spectroscopic data three isolated compound were assumed ecdysterone, terpenoid and aurone. In antimicrobial test, various solvent extracts and isolated compounds were tested on six pathogenic microorganisms. It was found that all are well potent except that in petroleum ether and aqueous extracts of this plant. Acetone extract showed more active against on *Bacillus pumalis.* The isolated compounds A, B and C showed the highest activity on *Bacillus pumalis*. The acute toxity of 70% ethanolic and aqueous extracts of *Achyranthes aspera* L. was evaluated on albino mice. It was observed that 70% extract did not show any toxic effect at the maximum permissible dose of 12g/kg. Aqueous extract only at the maximum dose of 4g/kg, there was no lethality. The hypoglycaemic activity of 70% ethanolic and aqueous extracts was also studies on adrenaline-induced hyperglycaemic rat's model. These effects were also compared with control and standard drug glibenclamide. The effect of aqueous extract was faster than 70% ethanolic extract. The percentage inhibition of blood glucose levels of aqueous extract and glibenclamide were not significantly different. It was observed that aqueous extract of *Achyranthes aspera* L. showed hypoglycaemic activity.

304. Phytochemical investigation of *Alternanthera sessilis* (L.) R.Br. and its hypoglycemic and antibacterial activities. Thu Zar Tin. Thesis, PhD (Botany), University of Yangon; 2007.

Study of a medicinal plant *Alternanthera sessilis* (L.) R.Br. (Pazunsa) was collected from Thingangyun and South Okkalapa Township and identified according to the literature by using the morphological characters of the plant. The collected plants were dried, powdered and stored in air tight bottles for further investigation. In morphological study, *Alternanthera sessilis* (L.) R.Br. is perennial herb and the stem is herbaceous, cylindrical and solid. In microscopical study, the cells of the upper and lower surfaces of the lamina are slightly wavy and diacytic stomata are present on both surfaces. In transverse section of the stem, the vascular bundles are oval shaped, 2 large bundles are on the opposite side, the other between them are small, collateral type. Calcium oxalate crystals are present in the leaves, stem and roots. The preliminary phytochemical test was carried out to detect chemical constituents. The presence of terpenoid and steroid were found in the phytochemical examination. In physicochemical characterization, polar solvents are more soluble. The elements of *Alternanthera sessilis* (L.) R.Br. were analyzed by using Energy Dispersive X-ray Fluorescence (EDXRF), potassium was major constituent. The isolated compounds stigmasterol and β-sitosterol were identified by Thin Layer Chromatography using benzene: ethyl acetate (15:1) and isolated lupeol using hexane: isopropyl alcohol (16:1). The yield of compound β-sitosterol and were 0.10, 0.03 and 0.3% respectively. *Alternanthera sessilis* (L.) R.Br. were extracted with petroleum ether, chloroform, ethyl acetate, ethanol and methanol. These extracts were used to screen for antibacterial activities *in vitro* with six test organism. Only the ethyl acetate extract showed antibacterial activity. The acute toxicity testing was made by method of Litchfield & Wilcoxon in mice. It was observed that mice were found to be alive and healthy during the observation period of 14 days even with maximum permissible dose level of 18g/kg per orally. *In vivo* screening was done for inhibitory effect of aqueous extract of *Alternanthera sessilis* (L.) R.Br. on adrenaline induced hyperglycaemic rabbits model. The results showed that significant hypoglycaemic effects have been observed when tested on rabbits model.

305. Phytochemical investigation of *Aristolochia roxburghiana* Klotzch. and pharmacological activity of its rhizome. Sanda Myint. Thesis, PhD (Botany), University of Yangon; 2009.

A medicinal plant *Aristolochia roxburghiana* Klotzsch. was known as "Eik-tharamuli " in Myanmar which belongs to the family Aristolochiaceae. These plants were collected from Thardukan (Hlawga), Shwe Pyi Thar Township, Yangon Division. The collected plants were studied, classified and identified by the literature references to confirm its identity. In morphological study, the plants were woody climbers and shrubs. The leaves were simple and alternate. The leaves base was cordately with a deep, narrow sinus and the twining petioles were present. The inflorescences were axillary raceme. The flowers were purplish brown, base globose, tube shortly funnel-shaped with mouth obique trumpet- shaped gradually passing into the short oblong obtuse glabrous purple brownish lip. The ovaries were hexacarpellary and axile placentation.The fruits were capsule, globose pyriform. Seeds were numerous seeds. In microscopical study, the leaves were dorsiventral type and anomocytic type of stomata. The papillose of leaves were confined in lower surface and more rarely occur on both sides. The siliciferous cells embedded the palisade mesophyll. Trichomes were present on lower surfaces. The multicellular

uniseriate and a hooked terminal cell with a silicified tip of trichome were present on lower surface. Calcium oxalate crystals were present in the midrib, petiole and rhizome. In addition, the dried powdered of the leaves and rhizome was also investigated for their standardization use in medicine. The microscopical studies were examined with the microscope by literature of (Wallis, 1967 and Trease and Evans, 1978). Phytochemical investigation revealed that the twelve tests constituents were present except cyanogenic glycoside was absent. According to the physicochemical examination, the samples were more soluble in water, moderately soluble in ethanol and methanol. Phytochemical and physicochemical investigation by the methods of British Pharmacopeia, 1968. In elemental analysis of leaves and rhizome of *Aristolochia roxburghiana* Klotzsch. by using the Energy Dispersive X-Ray Fluorescence (EDXRF). It was found that Calcium (Ca), Potassium (K), Sulfur (S) and Iron (Fe) were found as principal elements and Chlorine (Cl) was moderately presented in leaves only. Ethanol was used as a solvent for extraction. This extraction was based onto the method of Coutte *et al;* (1959). Isolated compounds were identified by thin layer chromatography, melting point, UV and FTIR spectroscopic method. Aristolochic acid A (melting point 278-282ºC, R_f = 0.8, 0.05 % yield), berberine (melting point 142-144ºC, R_f = 0.75, 0.04 % yield) and aristolochic acid D (melting point 266-269ºC, R_f 0.3, 0.01 % yield) were isolated from 95% ethanolic extract by selective solvent solubility method. Antimicrobial activities with six micro-organisms were also tested by using pet-ether (60ºC-80ºC), chloroform, water,ethanol, methanol, ethyl acetate extract and acetone extracts . In this experiments, ethyl acetate of leaves and rhizome showed strongly. The rhizomes extracts showed more activity than the leaves extracts of *Aristolochia roxburghiana* Klotzsch. Isolated total acid, chloramphenicol and tetracycline were tested against six microorganisms for their antimicrobial activites by using agar well diffusion method according to Cruickshank, (1975). The acute toxicity test was carried out with aqueous extract and 70% ethanolic extracts of rhizome on albino mice. They were observes that these extracts did not show any visible symptoms of toxicity even with the maximum permissible dose of 7g/kg. The lethal activity and the calculation of LD_{50} of the ethanolic and aqueous extracts were done according to the method of Litchfield and Wilcoxon (1949). Antidiarrhoeal activity of 70% ethanolic extract of *Aristolochia roxburghiana* Klotzsch. were studied on castor oil induced albino mice by the method of (Robert *et al.,* 1976, Zaval *et al.,* 1988 and Mujunder *et al.,* 1988).The siginificant antidiarrhoeal effect was found at 3g/kg dose . Thus these results showed that *Aristolochia roxburghiana* Klotzsch. should be used in the treatment of antidiarrhoeal activity. So, which was beneficial to human health.

306. Phytochemical investigation of *Benincasa hispida* (Thunb.) Cogn. and antipyretic activity of its seeds. Shwe Shwe Hla. Thesis, PhD (Botany), University of Yangon; 2011.

A medicinal plant *Benincasa hispida* (Thunb.) Cogn. is commonly known as Kyankpayon belongs to the family Cucurbitacae has been collected from Hinthada Township. The collected plants were studied and identified with the help of literature using morphological characters. It is a medical herb, with simple, palmate leaves having 5 lobes, the lamina reniform in shape. The tendrils were lateral and 2-fid. The flowers were monoecious and solitary pentamerous. The ovary inferior, tricarpellary with 3- flexous stigmas. The fruit is pepo, large, oblong and fleshy. The present work deals with the histological characters of the leaves, petioles, fruits and seeds of the species *Benincasa hispida* (Thunb.) Cogn. The leaves and petioles showed the

particular characters of having bicollateral bundle, the hispid trichomes and presence of both normal and abnormal stomata. The fruits having massive mesocarp which was heterogeneous in structure with thick-walled sclerehymatous layer in the outer part of pericarp (fruit wall) and the seed coat (or) testa having sclerenchymatous layer as inner seed coat cells were the principal structure features. Qualitative analysis were concerned with the determination of presence or absence of phytochemical in the pulp and seeds of *Benincasa hispida* (Thunb.) Cogn. in qualitative value. The investigation of these tests confirmed with the presence of alkaloids, glycosides, amino acids, tannin are present in both pulp and seeds. Seeds contain only flavonoid and pulp contain saponin glycosides. Cyanogenic glycosides was absent in both parts. The physicochemical characterization of the dried fruits pulp and seeds were carried out. In solubility test, fruits pulp was more soluble in water than the seeds but less soluble in petroleum ether than the seeds. According to the Elemental Analysis by EDXRF methods, 10 elements were found in fruits pulp in which potassium and cacium were more abundant than the other elements. Whereas, 5 elements were found in seeds in which potassium elements were more abundant than the others. In the present work, the active compound I (Mannitol) was isolated by selective solubility method from ethanolic extract and identified by authentic mannitol in R_f value, TLC, melting point and infrared spectrum. Compound II (β-sitosterol) and compound III (oleic acid) from petroleum ether seeds extract which were partitioned with chloroform. Chloroform soluble β-sitosterol was isolated by PTLC method which also agreed with authentic β-sitosterol in R_f value, TLC, UV, melting point and infrared spectrum. Chloroform in soluble fraction which ethanol and chloroform giving yellow oil. It was confirmed by authentic oleic acid in TLC, R_f value, boiling point and infrared spectrum. The antimicrobial activities of crude extracts were carried out by using various solvents such as petroleum ether, chloroform, acetone, ethyl acetate, ethanol and distilled water. Among the six different extracts, the ethanolic extract of fruits showed high antimicrobial activities on *Bacillus pumalis, Bacillus subtilis, Candida albicans, Escherichia coli, Pseudomonas aeruginosa, Staphyococcus aureus.* Petroleum ether extract had no activity on all test organisms. In acute toxicity test, no lethality and toxic effect of the mice were observed up to 14 days, even with the maximal permissible dose of 9g/kg of ethanolic extracts. Therefore, it can be observed that these extracts were free from acute toxic or harmful effect for the mice. Therefore, the LD_{50} of *Benincasa hispida* (Thunb.) Cogn. dried seeds powder in mice was supposed to be more than 9g/kg body weight. The 70% ethanolic extract of *Benincasa hispida* (Thunb.) Cogn. produced significant ($p< 0.05$) antipyretic effect in dose of 3g/kg. The appreciable antipyretic effect noticed at 50mg/kg was slightly comparable to standard drug paracetamol. Therefore, the results showed that the 70% ethanolic extract of *Benincasa hispida* (Thunb.) Cogn. possesses significant antipyretic activity.

307. Phytochemical investigation of *Camellia sinensis* L. (Let-phet) and its antioxidant activity. Moet Moet Khine. Thesis, PhD (Botany), University of Yangon; 2007.

Camellia sinensis Linn. belongs to the family Theaceae was collected from Thandaung-gyi Township, Kayin State during their flowering and fruiting period from October to December, 2004-2005. Morphology and microscopical characters of *Camellia sinensis* Linn. were investigated so as to ascertain their correct identification by using liberature in Botany Department of Dagon University. Evergreen trees or shrubs, usually growing to a height about 609.60cm but under cultivation it is usually pruned down to a height about 30.48-183.88cm. Inflorescences axillary, clusters 2-4 flowered, white and fragrant, fruits loculicidal capsule, 1-3 lobed and seed 1-3. Stomata are present on the lower surface of laminum and are anomocytic type. Tanniniferous cells with yellowith brown content scattered throughout the lamina, various sizes of astrosclereids and calcium rosettes are abundant in the leaves and fruits. The plant materials were dried at room temperature for 7 days and then crushed and powdered by using grinding mill and stored in air-tight bottle for further use. Plant materials were preliminary studied for photochemical and physicochemical tests. Tannin and alkaloid were present dominantly, and more soluble in polar solvents. Elemental analysis of the leaves were conducted by using energy dispersive X-ray fluorescence (EDXRF) spectrometry and atomic absorption spectrophotometry (AAS). Potassium and calcium were major constituent and lead, Arsenic and Cadium were present but their contents were lower than the toxic level. Fixed oil (0.05%) was isolated from pet-ether extract and physical properties such as saponification, iodine and acid values were also investigated. Saponification value was 190.5%, iodine value was 90 and acid value was 3.1. Isolated copaene alcohol compound A (0.008%) from fixed oil was identified by TLC, UV, FTIR and GC-MS spectroscopic method. Alkaloid compound B (0.7%) was extracted from water extract by soxhlet extraction method and was identified as caffeine by caffeine by melting point TLC, UV, and FTIR spectroscopic method. Tannin compound C (0.14%) was consequently isolated from the chloroform insoluble portion and identified as catchin by melting point, TLC, UV, and FTIR spectroscopic method. In addition, the plant extracts were prepared by various solvents such as methanol, ethanol, pet-ether and ethyl acetate. These extracts were tested with six types of microorganisms by using agar-well diffusion method *in vitro*. Methanol, ethanol, and ethyl acetate extracts showed good antimicrobial activity. Furthermore, the acute toxicity studies of caffeine was perform by using albino mice and harmful effect was observed up to 0.4g/kg dose. The medium lethal doses (LD_{50}) of caffeine from the powdered leaves was about 400 (210-750) mg/kg. *In vitro* antioxidant activity of caffeine compound (0.1g/kg dose) from *Camellia sinensis* Linn. was studied in albino rats. Caffeine treated rats showed significant reduction in Malondialdehyde levels than carbon tetrachloride treated hepatotoxic rats. Thus it can be conducted that caffeine had an antioxidant activity.

308. Phytochemical investigation of *Canna indica* L. and its antimicrobial and diuretic activity of rhizomes. Khin Thu Zar. Thesis, PhD (Botany), University of Yangon; 2007.

The plant *Canna indica* Linn. locally known as (Budatharana), belonging to the family Cannaceae, which is growing wild in Yangon vicinity were collected, identification and classified. The morphology and taxonomy of this plant have been studied by using the standard methods used in Botany Department of Yangon University. To study the microscopical characters the free-hand sections of fresh plant materials as well as the dried powdered drugs were prepared. In anatomical study, the cells of epidermal of the laminae are straight. Stomata present and tetracytic type. Stellate or armed aerenchymatous cells are present in the petiole. In transverse section of the rhizome, the vascular bundles are scattered, collateral and closed. Calciumoxalate crystals are abundant in the rhizome. Using grinding mill the rhizome also is thoroughly powdered and phytochemical and physicochemical tests were conducted. In this research work, the concentration of elements was analyzed by using Energy Dispersive X-ray Fluoresence spectrometer techniques (EDXRF) and atomic absorption spectrometer analytical techniques (AAS). The presence of glycosides and flavonoids were mostly common in the phytochemical investigation of the powdered rhizomes. So, cyaniding, kaempferol and quercetin were extrated and isolated by selective solubility method. The isolated compounds were identified by thin layer chromatography, melting points, Ultra Violet (UV) and Infra-red spectroscopic methods (FTIR). The yield of cyaniding, kaempferol and quercetin compounds was 0.64, 0.15, 0.32% respectively. The plant extract was prepared from powdered rhizomes by using polar and non-polar solvents. These crude extracts and isolated compound cyaniding were investigated for *in vitro* antimicrobial activity by using agar well diffusion method and found to be potent. In addition, the acute toxicity studies of the crude extracts (aqueous and ethanolic) were performed by using albino mice. It was observed that, mice were found to be alive and healthy during the observation period of 1 day even with the maximum permissible dose of extract (24g/kg). There was neither acute toxic effect nor lethality. Moreover, the diuretic effect of *Canna indica* Linn. (aqueous and ethanolic)were studied in laboratory animals; albino rats of Wistar strain. Significant diuretic was found with both aqueous and ethanolic of *Canna indica* Linn. at 6g/kg dose. The ethanolic extract exhibits more effective diuretic activity than aqueous extract. Urinary electrolyte content such as $Na^+$and K^+ are determined by digital flame analyzer FGA-350 L (Gallenkamp). The results showed the significance of Na^+ and K^+ loss in urine.

309. Phytochemical investigation of *Cassia glauca* Lam. and its hypoglycaemic activity. Ni Ni Aye, Thesis, PhD, University of Yangon, 2011.

Cassia glauca Lam. was the medicinal plant which belongs to the family Caesalpiniaceae. It was known as "Pyi-pan-nyo" or "Pyi-pan-shwe" in Myanmar. This plant was collected from the vicinity of Yangon Technological University, Yangon Division. The plants were identified with the help of available literature for morphological characters by using the vegetative and reproductive parts. In the morphological study, the plant was small trees. The leaves were simple, alternate, unipinnately compound, flowers were bright yellow. Fruits were oblongoid pods with 20-25 seeded. In the histological study, the cell walls of the upper surface were wavier than the lower surface and paracytic stomata were present on both surfaces of the lamina. Collenchymatous cells were present in transverse sections of midrib, petiole, rachis and stem. In petiole and rachae, the vascular tissue composed of large

peripheral vascular bundle and small wing bundles. The cortical region of young stem consisted of angular collenchymatous cells and numerous starch grains. Phelloderm of the root was composed of parenchymatous cells and groups of sclerieds. The transverse section of pericarp composed of thick-walled epicarp, thin-walled parachymatous mesocarp and highly sclerified endocarp. The epidermal layer of the seed frequently develops very thick-walled and filled with colouring matter. In addition, diagnostic characters of dried powders of the leaves and barks were also investigated for their standardization in medicine. The powdered leaves and barks were tested for the phytochemical constituents and physicochemical properties. Glycoside, alkaloid, carbohydrate, saponin, phenolic compound, flavonoid, terpenoid, steroid, starch, tannin, reducing sugar and α- amino acid was present but cyanogenic glycoside were absent in both samples. According to the physicochemical examination, the leaves and barks were the most soluble in ethanol and methanol, moderately soluble in water. In elemental analysis, leaves and barks were examined by using EDXRF technique. From this result, Possium (K) and Calcium (Ca) were found to be principal elements and Strontium (St) was found as trace element. The nutrient content of this sample were also studied. It revealed that the presence of carbohydrate, fats, fibers and proteins. The six phytoconstituents A (0.08 %), B(0.04 %), D(0.06%), E(0.04%), F(0.06%) were isolated from methanolic extract of barks by using column chromatographic method. The isolated compounds were identified by TLC, melting point, UV and FTIR spectroscopy. According to the chemical tests and spectroscopic data, the six isolated compounds were assumed to be β-sitosterol, flavonone, anthraquinone, flavonol, β-amyrin and tannin. In anitimicrobial test, various solvent extracts and isolated compounds were tested on six pathogenic microorganisms. In this experiment, acetone extract of leaves and barks showed the highest activity on all six microorganisms. The six isolated compounds exhibited against on *Escherichia coli*. The acute toxicity test was observed that the 70% ethanolic and aqueous extract showed lethality effect. At the minimum dose of both extracts were 2g/kg body weight, there was no lethality. The hypoglycaemic activity of 70% ethanolic and aqueous extracts were also studied on adrenaline- induced hyperglycaemic rats model. These effects were also compared with control and standard drug, glibenclamide. The effect of aqueous extract was more effective than 70%ethanolic extract. It was observed that aqueous extract of barks of *Cassia glauca* Lam. showed hypoglycaemic activity. There was no scientific information about *Cassia glauca* Lam.with hypoglycaemic activity and antimicrobial activity in Myanmar. Therefore, this present experiment was to study antimicrobial activity, toxicity test and hypoglycaemic activity of *Cassia glauca* Lam. growing in Myanmar.

310. Phytochemical investigation of *Cnestis palala* (Lour.) Merr. and antidiarrhoeal activity of its roots. San Mar Lar, Mi. Thesis, PhD (Botany), University of Yangon; 2011.

The medicinal plant *Cnestic palala* (Lour.) Merr. belonging to the family Connaraceae has been undertaken in the present study. This plant has not been studied by previous workers therefore specimens were collected from Myeik Township, Tanninthary Region, in Southern Myanmar. The collected plants were studied, classified and identified with the help of literatures for morphorlogical characters. In morphorlogical study, the plant was a shrub which later became a liana; the leaves were unipinnately compound, exstipulate; inforescences axillary, fascicled raceme or cauliflorous; flowers small and fragrant follicle, 1-3 per flower; seeds with aril. In histological study, the epidermal cells and the cortex of the midrib have secretary

cavities which produce mucilage. Stomata were paracytic type and confined only to the lower surface of the leaflets. Epidermal papillae were distinctly present only on the lower surface of lamina. The simple and glandular trichomes were abundantly located on the lamina, midrib and petiole. Solitary prismatic crystals had been observed in cortical cells especially around the bundle sheath. In addition, microscopical characters of dried powdered roots were also examined for their standardization use in medicine. Preliminary phytochemical investigation of the leaves and roots from *Cnestis palala* (Lour.) Merr. were determined for the presence or absence of chemical constituents. Glycoside, terpenoid, reducing sugar, saponin, phenolic compound, α-amino acid, carbohydrade, tannin, flavonoid and coumarin were present but alkaloids were found to be absent in both plant parts, In addition, fats, fibers, proteins and carbohydrates were observed as nutritional content. According to the physicochemical examination, the sample was more soluble in water and moderately soluble in pet-ether. The elemental analysis of the leaves and roots of this plant were examined by Energy Dispersive X-ray Fluorescence (EDXRF) Spectrometry. From the analysis Calcium (Ca), Potassium (K) and Sulphur (S) were found as principal elements in both plant parts. However, Chlorine (Cl) and Zinc (Zn) were absent in roots. Manganese (Mn), Iron (Fe) and Rubidium (Rb) were moderately present. Calcium (Ca) was found to be a major element in both plant parts. Column chromagraphic separation of EtOAc extract of roots of isolated compounds were identified by TLC, UV and FTIR spectroscopic methods which were compound A (R_f 0.75, 0.029g, 0.007% yield), Compound B (R_f 0.52, 0.035g, 0.008% yield) and Compound C (R_f 0.74, 0.021g, 0.005% yield) that may be compound A, phenolic group (coumarin type); B, fatty acid ester group and C, flavonoid group respectively. Antimicrobial activities with six different microorganisms were also tested by using pet-ether (60-80˚C), choloform, water, ethanol, methanol, ethyl acetate and acetone extracts. It was revealed that among these extracts, chloroform ($CHCl_3$), ethyl acetate (EtOAc) and ethanol (EtOH) extracts exhibited antimicrobial properties against all tested organisms. Chloroform ($CHCl_3$) extract showed the most significant activity, while pet-ether (PE) and watery extracts did not show any activity. In addition, the determination of antimicrobial activities of the isolated compounds from this plant by agar well diffusion method revealed that compound A showed antimicrobial activities against all six tested microorganisms, however, compounds B and C were non effective on *Bacillus subtilis*, Compound A showed the best activity against *Pseudomonas aeruginosa* and *Bacillus pumalis*. The acute toxicity test of the aqueous extract and 70% ethanolic extract of roots showed no toxicity on albino mice, even with the maximum permissible dose of 16g/kg body weight. Andiarrhoeal activity of the extract of roots was evaluated by castor oil induced diarrhoeal test, intestinal transit test and enteropooling test on albino mice. The significant antidiarrhoeal effect was found at 6g/kg dose. Therefore, these results showed that the 70% ethanolic extract of *Cnestic palala* (Lour.) Merr. possesses significant antidiarrhoeal activity.

311. Phytochemical investigation of *Gynandropsis gynandra* (L.) Merr. and pharmacological activities of its roots. Myint Myint San. Thesis, PhD (Botany), University of Yangon; 2009.

A medicinal plant *Gynandropsis gynandra* (L.) Merr. (Hingala) belongs to the family Capparaceae which has collected from Thaketa Township in Yangon Division and the period of June to October, 2006. The collected plants were classified and identified with the help of literatures from morphological characters. In morphological study, the plant is herbaceous, annual and cylindrical stem with puberulunt and branches.The filament of white flowers were adnate below to the slender gynophore to androgynophore. In the microscopial characters, the anomocytic type of stomata and glandular hairs of the leaves were present on both surfaces. The mesophylls were made up of only one palisade and spongy cells. In surface view of midrib, the epidermal cells were rectangular in shape with multicellular head and biseriate stalk glandular hairs and stomata. In transverse section of midrib, the papillose were present only the lower epidermal cells. The vascular bundles were 6-9 in number of cresent-shaped and collateral type. In surface view of petiole, stomata, glandular and covering trichomes were present. In transverse section of petiole, semicircular in outline with canaliculated on the upper side and 7-9 vascular bundles were separated. In transverse section of stems, the patches of sclerenchymatous pericycles were distinct. In transverse section of young root, the cortex was made up of parenchymaatous cells and vascular bundles were tetrarch. In addition, microscopial characters of dried powdered of the whole plant were also investigated for their standardization used in medicine. Preliminary phytochemical examination of leaves and roots from *G. gyandra* (L.) Merr. determined the presence or absence of chemical constituents. This examination showed that alkaloid, glycoside, reducing sugar, saponin, steroid, phenolic compound, α-amino acid, carbohydrate, tannin, flavonoid were present. Moreover, protein, fibre, fat, vitamin B1, Vitamin C and carbohydrate were observed as nutrients content. According to physicochemical examination, the samples were more soluble in water. In elemental analysis of leaves and roots of *G. gyandra* (L.) Merr. were examined by using the Energy Dispersive X-Ray Fluorescence (EDXRF). From the analysis, Calcium (Ca), Phosphorus (P), Potassium (K), Sulphur (S) and Chlorine (Cl) were found as principle element and Iron (Fe), Zinc (Zn), Strontium (Sr) and Rubidium (Rb) were found as trace elements in leaves. From this analysis Potassium (K), Calcium (Ca), Sulphur(S) and Chlorine (Cl) were found as principle elements and Iron (Fe), Zinc (Zn), Strontium (Sr) and Rubidium (Rb) were found as trace elements in roots. The isolated compounds such as trimyristin and β-sitosterol were isolated from leaves. The glucosinolate, myristic acid and β-sitosterol were also isolated from roots of *Gynandropsis gynandra* (L.) Merr. The isolated compounds were identified by thin layer chromatography, melting point, UV and FTIR spectroscopic methods. *In vitro* screening of antimicrobial activity, the leaves and roots extracts were prepared by various solvent such as chloroform, pet-ether, methanol, acetone, ethyl acetate, ethanol and water. The crude extracts were tested on six pathogenic microorganisms by using agar-well diffusion methods. In the result, ethyl acetate extract of leaves and roots showed the highest activity against on *Bacillus pumalis, Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus* and *Candida albicans*. Pet-ether exract of leaves, acetone extract of leaves and roots were shown to be non effective antimicrobial activity on six microorganisms. Moreover, the isolated compounds such as trimyristin, β-sitosterol, glucosinolate, myristic acid and β-sitosterol from this plant were tested on six pathogenic microorganisms by using agar-well diffusion methods. In this result,

all the compounds were shown to be effective antimicrobial activity against on six microorganisms. The acute toxicity tests were carried out with aqueous extract and 70% ethanolic extract of roots on albino mice. They were observed that both extracts free from acute toxicity or harmful effect during observation period of two weeks maximum permissible dose of 16g/kg. The antipyretic activity of aqueous and 70% ethanolic extracts of roots from G*. gynandra* (L.) Merr. were tested on yeast induced fever in albino rats. The significant antipyretic effect was found at 3g/kg dose. The results showed that the 70% ethanolic extract of *G. gynandra* (L.) Merr. possesses significant antipyretic activity.

312. Phytochemical investigation of *Heliotropium indicum* L. and its hypoglycaemic activity. Phyo Phyo Win, Thesis, PhD (Botany), University of Yangon; 2011.

Study of a medicinal plant *Heliotropium indicum* L. (Sin-nha-maung-gyi) belong to the family Boraginaceae which were collected from Thakayta Township, Yangon Division and prepared herbarium sheet. After collection the specimens were identified by using vegetative and reproductive parts according to the literatures. In morphological study, the plants are annual herbs, stem herbaceous, cylindrical; leaves simple, alternate, exstipulate, and both surfaces pubescent; inflorescence terminal and axillary, heliocoidal spike, the tips prominently coiled; flowers are pale purple; stamens epipetalous; overy bicarpellary, becoming 4-loculed at maturity due to false septum. Histological characters of whole plant were studied. The cells of upper surfaces and lower surfaces of lamina are wavy. Anomocytic stomata and unicellular trichomes with warty wall, pointed tips and basal swollen with cystoliths are present on both surfaces. Epidermal cells of midrib, petiole and stem are made up of parenchymatous cells. These cells are rectangular or polygonal in shape. Collenchymatous cells are present in transverse section of midribs, petioles and stems, vascular bundles are collateral, closed types and ring shape in midribs and stems. In petioles, vascular bundles are crescent-shaped and collateral type. In transverse section of root, secondary phloem consists of phloem cells and medullary ray's cells and secondary xylem consisting large abundant vessel and medullary rays. The preliminary phytochemical tests were carried out to the chemical constituents of the plant. Alkaloids, reducing sugar, glycosides, saponin, carbohydrates, tannins, starch, phenolic compounds, ά-amino acids, steroids and terpenoids were present but flavonoids and cyanogenic were absent in *Heliotropium indicum* L. Three organic compounds were isolates from the petroleum-ether extract of *H. indicum* L. by using chromatographic method. Three isolated compounds were identified by using TLC, R_f values, melting point, UV and FT-IR spectroscopic methods. According to spectroscopic data, the three isolated compounds may be assumed as fulvoplumierin, steroid and stigmasterol. The elemental analysis of *H. indicum* L. was determined by using energy dispersives. X-ray flurescence (EDXRF) spectrometry. According to the EDXRF data, potassium (K), chlorine (Cl) and calcium (Ca) are observed principle elements. Nutrition values of *H. indicum* L. were also investigated. In antimicrobial activity, the different solvents extracts of the wholes plants and isolated compounds were tested by using agar-well diffusion method. The solvents extracts were tested against six pathogenic microorganisms. Among solvents extracts, petroleum-ether and watery extracts did not show the antimicrobial activity. According to this experiment, three isolated compounds were not showed against on *Eschrichia coli.* In this research, acute toxicity test on animal models have been conducted by using aqueous and 70% ethanolic extracts of *H.indicum* L. investigation was carried out on the medium lethal dose (LD_{50}) of the drug in albino mice. It was observed that both

extracts were free from harmful effect during observation period of two weeks with permissible dose of 2000mg/kg. The hypoglycaemic activity of aqueous and 70% ethanolic extract of *H. indicum* L. were tested on adrenaline induced hypoglycaemic rats. It was found that 70% ethanolic extract showed more effects than the aqueous extract in response to dose dependent manner.

313. Phytochemical investigation of *Jatropa gossypifolia* L. (Kyetsu-kanakho) and its uterine relaxant activity. Khin Thandar Win. Thesis, PhD (Botany), University of Yangon; 2007.

Jatropa gossypifolia L. is one of the flowering plants belonging to the family Euphorbiaceae. It is known as (Kyetsu-kanakho) in Myanmar, it grows wild in dry zone of Myanmar. This plant was collected from Salingyi Township in Sagaing Division. The morphology and taxonomy of this plant have been studied and identified by using available literatures from Botany Department of Yangon University. The microscopical characters of the leaves, stems and roots were investigated so as to ascertain their identification. Calcium oxalate crystals were abundantly found in the plant. The collected samples were washed and then dried in room temperature for thirteen days until constant weight was obtained. After drying completely, the samples were ground to get powder and stored in air-tight containers for microscopical, chemical and pharmacological studies. The powdered leaves, stems and roots were tested for the phytochemical constituents and physicochemical properties. Cyanogenic glycosides were show in stems. Flavonoids were not shown in roots. The plant extracts were prepared from the powdered leaves, stems and roots by using polar and non-polar solvents. The presence of (Ca, K, Fe and Mn) elements in roots were observed by using Energy Dispersive X-Ray Fluoresecence (EDXRF) spectrometer and Atomic Absorption Spectrophotometry (AAS). The preliminary phytochemical tests showed thar the roots of (Kyetsu-kanakho) (Cotton leaves, Bellyache bush) plant contained terpenoids and phenolic conpounds. Jatrophone (melting point 153˚C, R_f=0.35, 0.001% yield) was isolated from ethnol extract. Two lihgnans arylnaphthalene (melting point 184˚C, R_f =0.52, 0.001% yield) and gadain (melting point 145˚C, R_f=0.64, 0.001% yield) were isolated from petroleum-ether extract by column chromatographic method. Jatrophone (terpernoids), arylnaphthalene and gadain lignans (phenolic compounds) were isolated from the roots. The isolated compounds were identified by melting point, thin layer chromatograpy and spectroscopic methods such as UV and FTIR. Then extracts obtained by using ethanol, acetone, petroleum-ether (60-80˚C), chloroform extracts and Jatrophone compound were tested on six microorganisms by using agar-well diffusion method. It was found that roots extract was more effective than the extracts of leaves and stems. The acute toxicity of the aqueous, 95% and 50% ethanol extracts of Kyetsu-kanako root was evaluated on mice. Aqueous 95% and 50% ethanolic extracts did not show any toxic effect even with maximum permissable dose of 24g/kg of aqueous extract and 12g/kg of ethanolic extracts at the dosages tested. Ethanol extracts (0.3mg/ml, 0.5mg/ml, 0.8mg/m1, 1.0mg/ml and 1.2mg/ml) were tested *in vitro* on the isolated rat uterus model. It was found that the, extract produced relaxation activity on oxytocin induced contraction in the isolated rat uterus. So also the highest dose (1.2mg/ml) bath concentration was observed to inhibit the contraction produced by oxytocin (0.002IU/ml) bath concentration.

314. Phytochemical investigation of *Leucas cephalotes* Spreng. and its antipyretic activity. Moe Zin Zin Thet. Thesis, PhD (Botany), University of Yangon; 2009.

Leucas cephalotes Spreng. is a herb of the family Labiatae (Lamiaceae) which grows wild on the near foot hills and railway tracks, especially of Mawlamyine, Mon State. The plant is a crude drug which is known as Pongu-hteik-peik and has been used for snake bite, jaundice, fever and scabies. This plant popularly used for snake bite in Myanmar. It is an indigenous Indian plant sacred to Hindus, where is used in folk medicine. Investigation of morphological and histological characters have been carried out for identification and its use as standard drug: Qualitative and quantitative analysis of relative abundance elements and mineral elements, nutritional values, extraction and isolation of active constituent compounds. The biological properties of this plant, preliminary pharmacological and clinical studies with *Leucas cephalotes* Spreng. show that its crude extracts and isolation of active compounds possesses antimicrobial activity, acute toxicity for safety and antipyretic activity. In this research a detailed study of the morphological and histological characters of *Leucas cephalotes* Spreng. collected from Uzina pagoda and Taung-yoe-tan roads in Mawlamyine. This plant is a stout, annual herb, inflorescence verticillate, leaves opposite and decussate, simple. Flowers bilabiate, bisexual and zygomorphic with upper and lower lips, gynobasic style and disc present. In histological characters, stomata and trichomes occur on both surfaces. Basal midribs are two to three separate vascular bundles; small vascular bundle is present in petiolar wing. Stem quadrangular with well-defined group of collenchyma in the four angles. Some cells replaced by pericycle fibers at maturity. Calcium oxalate crystals in the form of (small needle) occur in parenchyma cells of all aerial plant parts as well as in the root. The preliminary phytochemical examination showed the presence of alkaloids, α-amino acid, carbohydrate, starch, reducing sugar, glycoside, tannin, saponin, phenolic compound, steroid, terpene, flavonoid and cyanogenic glycoside was not detected. In physicochemical properties, moisture content, total ash, acid insoluble as well as water insoluble ash, polar and non polar soluble matter were found in leaves and whole plant to determine the extract was more soluble using ethyl acetate than other solvents. Mineral elements Ca, K, P, Cl, Fe, S, Ti, Zn, Cu and Zr were common in *Leucas cephalotes* Spreng. Analyzed by using (EDXRF) spectrometer to find the concentration of principle and trace elements. This plant showed relative abundance of mineral elements. For detail mineral elements, Cu, K, Ca, and Fe have been carried out using Atomic absorption spectrophotometer (AAS). In the present work, the active organic compounds were isolated from the whole plant of *Leucas cephalotes* Spreng. with ethyl acetate solvent by applying silica gel column chromatography with gradient elution of petroleum ether: ethyl acetate solvent system, compound I was, white, solid R_f=0.46, mpt=216°C, 0.002%, compound II found colourless needle, R_f=0.52, mpt=139°C, 0.03%, compound III is pale yellow needle, R_f=0.44, mpt=252°C, 0.06%, compound IV was yellow needle, R_f =0.87, mpt=346°C, 0.003%. Compound I may be diterpene, compound II as β-sitosterol, compound III and compound IV may be flavone characterized by comparing the physical properties as mpt, R_f solubility, chemical reagents as 10% $FeCl_3$, 10% H_2SO_4 reagent test. Characterization of compound I was confirmed as lupeol, compound II as β-sitosterol by comparing with an authentic sample. Compound I and II were inactive to UV, FT-IR spectral data of compound I and II were identical with those of lupeol and β-sitosterol. Among them, compound III (luteolin 7-O-glucoside) has been identified by physical data as well as complete spectroscopic data analysis that is including ^{1}H NMR, ^{13}CNMR, ESI-MS to elucidate its structure. Whereas the other three have been characterized by its physical data and

UV, FT-IR spectroscopic analysis only. The examination of nutritional values of the whole plant showed carbohydrate was the highest. Evaluating data were obtained from research to determine the amount of carbohydrate, fat, fibres, proteins and vitamins. Many carbohydrates and fats processing involved for energy production. Protein in take in excess of that required to build muscle. There are six main classes of nutrients that the body needs: carbohydrate, proteins, fat, vitamins, minerals and water. It is important to consume these six nutrients on a daily basis to build and maintain healthy bodily function. In antimicrobial activity, the leaves and whole plant crude extracts and isolated compounds (sitosterol and flavonoid) were tested by agar-well diffusion method with six microorganisms. The ethyl acetate crude extract leaves and the whole plant showed the highest activity except against *E.coli*. The isolated compounds such as β-sitosterol and luteolin 7-O-glucoside also indicated antimicrobial activity. The present study of acute toxicity examination, the aqueous and 50% ethanolic extracts of whole plants were administered on albino mice; the maximum permissible dose was 12kg/kg. Both extracts were found to be free acute toxic effect. So, this plant may be used safely. The aqueous and 50% ethanolic extracts of Pingu-hteik-peik have the significant antipyretic effect when tested on yield induced pyrexia in albino rats. The 50% ethanolic extract of the whole plant was more effective than aqueous extract of wholeplant.

315. Phytochemical investigation of *Mangifera indica* L.Cv. Parr-ni-thayet. Ni Lar Khin. Thesis, PhD (Pharmacognosy). University of Yangon, 2011.

The morphology and histology of *Mangifera indica* L.Cv (Parr-ni-thayet) have been studied and identified by using available literatures. This plant is large tree and spreading panicel with distinct reddish colour. Yellowish colour in staminate and reddish in pistillate flower with 5-lobed disc. Stamens one fertile and four reduced to staminode. Drupe pyriform with a pink blush on the cheek. Histological studies of leaves, stem, bark and root were investigated. The epidermal cells of upper and lower surface were more or less silicified cell and anomocytic stomata type. Petioles are diverse sorts of complex architecture. Separate collateral bundle are consistently with the resin canals in the phloem, It was one of the most important features of the genus were present in continuousing elongated tannins sac and sclereids are abundant in mature stem. The preliminary phytochemical examination of the powdered leaves and bark of *Mangifera indica* L.Cv. (Parrni-thayet) were conducted alkaloids, amino acids, carbohydrate, starch, reducing sugar, glycoside, tannin, saponin, phenolic compound steroid, terpenoid and flavonoid were present. Cyanogenic glycoside was not found. In physicochemical properties, moisture content, total ash, acid insoluble as well as water insoluble ash, polar and nonpolar soluble percentage were tested in powdered leaves and bark. Mineral elements Si, Ca, K, Fe, Mn, Zn, Cu and Al were common in leaves and bark powder of *Mangifera indica* L.cv (Parrni-thayet) and analyzed by using EDXRF spectrometer to find out the concentration of principle and trace elements. The total ash sample was used for toxic elemental analysis by using Atomic Absorption Spectrometer analytical technique (AAS) University of Research Centre (URC). Confirmation test of terpene and steroid in powdered leaves and bark were carried out and averaage percent of crude yield of steroid were determined. Extraction and isolation of active constituents from the leaves and bark of *Mangifera indica* L.Cv. (Parrni thayet) had been carried out by selected chemical method with selected solvents. The purification of isolated compound I, II, III, IV, V, and VI were subsequently identified and characterized by melting points, crystals shapes, thin layer chromatography behaviour, ultra-violet spectrum and FT-IR spectrum data. Isolated

active compounds (Polyphenol, Triterpere and Sterols) were characterized by comparing the physical properties using the variable chemical reagents. Among them, compound V and VI may be mangiferin and mangiferincin a and b. Some isolated compound was confirmed by comparing with their standard samples. Isolated compound V (mangiferin) was identified by detection with successive reagent (phenolic and flavone test) (Kokate, 1993). The decolorization in phenolic compound and flavone, xanthone assumed as mangiferin. Phenolic and polyphenolic compound constitute the main class of natural antioxidant present in plants, food and beverages. Bioassay test was carried out determined the effect of antimicrobial and antioxidant activity of isolated compound V (mangiferin). The susceptibility of the microorganisms on the basis of zone of growth in inhibition varied. Antimicrobial activity of major isolated compound (mangiferin) were assayed indicate the presence of more sognificantly effective than mangiferincin a and b (DCPT). Investigation of antioxidant on mangiferin was prepared and evaluated the free radical scavenging activity by using 1, 1-Diphenyl-2-Picryl hydraxyl (DPPH) asssay at Department of Medical Research. Major compound mangiferin possess the effective antioxidant activity.

316. Phytochemical investigation of *Melastoma malabathricum* L**.** and antipyretic activity of its leaves. Aye Aye Thaw. Thesis, PhD (Botany), University of Yangon; 2009.

Melastoma malabathricum L. (Melastomataceae) is one of the medicinal plants reputed for its medicinal value and used by local people. It is wild plant found growing in open land and waste places. It can also be seen near water stream. Both morphological and histological characters of *M. malabathricum* L. were studied to get correct identification. Powder of leaves, stems and roots were also examined which can be used to ascertain their identification and standardization for traditional medicine. In morphological study, the plants were evergreen shrubs, up to 3m tall; leaves simple, opposite and decussate, palmately 5-nerved; flowers showy pentamerous; Inflorescences corymbose cymes; Fruits were fleshy capsules and opening irregularly transversely at maturity. In histological study, the lower surface of the lamina were wavy, anomocyticrpe type of stomata were abundant in lower surface only. Druses were abundant at the base of the trichome. In transverse section of the lamina, the hypodermal layer was present below the epidermis. Scale-like multicellular shaggy hairs were occurred interface view of midrib and petiole. In transverse section of petiole, midrib and stem, intraxylary phloem was observed. Starch grains were abundantly found in midrib and petiole. Cortical and internal phloem was also found in transverse section of petioles and stems. In transverse section of old stem, sclereids and druses were prominently found in phelloderm layer. Transverse section of root, calcium oxalate (druses) were observed in phelloderm layer. Phytochemical screening, alkaloids were absent among the twelve tested constituents. Physicochemical properties showed that the powdered leaves were more soluble in polar solvents. Elemental analysis of the leaves of *M malabathricum* L. were conducted by using with Energy Dispersive X-Ray Fluorescence (E DXRF) technique. In addition, toxic elements such as As, Cu, Pb and CD were analyzed by Atomic Absorption Spectrophotometer (AAS) whether it possess toxic elements or not. Nutritional values of the leaves of the specimens were also studied because it is used for tonic and vegetables. The four organic compounds were isolated from the methanolic extracts of the specimens by applying column chromatography method. These isolated compounds A (0.04%), B (0.06%) and C (0.02%) and D (0.03%) were identified and characterized by using TLC behaviour, shape of crystals, melting point,

UV and FTIR spectroscopic techniques. Based on the chemical test and spectroscopic data, isolated compounds A, B, C and D were may be assigned as β-sitosterol (steroid), ursolic acid, lupeol and α-amyrin (triterpenoid). The antimicrobial screening of the leaves and the whole plant extract by different solvents were tested against six pathogenic microorganisms using agar-well diffusion method. The methanolic extract from the leaves showed the highest activity especially more sensitive against *Escherichia coli*. In the case of the whole plant, all of the extracts (except aqueous) exhibited antimicrobial activity on all tested microbes, however; pet-ether (60°C-80°C) extract showed Bacillus subtilis only. Acute toxicity test of both aqueous and 70% ethanolic extracts from the whole plant of *M malabathricum* L. pointed out no lethality and any toxic symptoms up to the maximum given dose of 16g/kg body weight of the extracts. In antipyretic activity, both 70% ethanol and aqueous extracts of *M malabathricum* L. were evaluated in three doses, 1.5g/kg, 3g/kg and 6g/kg orally. In this experiment, 70% ethanol and aqueous extracts showed significant reduction of fever on Wister albino rats. But aqueous extract did not act in dose dependent manner.

317. Phytochemical investigation of *Nerium odorum* Soland. (Nwe-thar-gi). Sandar Wynn. Thesis, MSc (Botany), University of Yangon, 1998.

Phytochemical investigation was conducted on leaves and flowers of *Nerium odorum*. Cyanidin and quercetin from flowers were analysed by paper chromatographic and spectroscopic methods after acid hydrolysis. Flavonoids in leaves, mainly rutin, was extracted and the latter was isolated by paper chromatographic method and identified by chromatographic, chemical degradative and various spectroscopic methods. The yield percent of the chemical constituents in Nwe-thar-gi plant were cyaniding (1%) and quercetin 0.14% in flowers, rutin 0.33%, quercetin 0.1% in leaves.

318. Phytochemical investigation of *Polygonum tomentosum* Willd. and its antioxidant activity. Khin Nyo. Thesis, PhD (Botany), University of Yangon; 2011.

Polygonum tomentosum Willd. is the medicinal plant belongs to the family Polygonaceae. This plant is locally known as Wet-kyein or Kywe-hna-khaung. It was widely distributed and usually grown wild in marshy places, along roadsides and on banks of river and lakes of Myanmar, which was collected from Maubin Township, Ayeyarwady Division. The flowering and fruiting period is from September to January. The morphological and histological characters of the plant have been studied and identified by using available literature. In morphological study, the plant is annual or perennial herbs stem cylindrical, fine reticulate roots with tumid nodes and hollow. Leaves alternate and simple, superficial mucilage glands present on young leaves, ochreate stipule present. Flowers are small, white in colour and fruit shining black. Seeds are globose. The histological characters of whole plant were studied, the cell walls of upper and lower surfaces of lamina are slightly wavy, and anomocytic stomata are present. The trichomes present are simple, tapering towards the ends with pointed tips and have a multicellular base sunken in the epidermis. Calcium oxalate crystals were present in mesophyll tissue of lamina, parenchymatous cells of midrib, petiole. Vascular bundles are collateral and close type form continuous ring, around the parenchymatous pith however in the petiole the vascular bundles are concentric. In root, the epiblema cells are rectangular and compactly arranged. Xylem cells arranged in radial rows, the cells wall lignified. The medullary ray lies between the xylem in transverse section. The preliminary phytochemical tests of the powdered sample of the whole plant were carried out. In this study, the main constituents

observed were saponins, carbohydrates, phenolic compounds, tannins, reducing sugar, terpenoids and steroids and alkaloids. In physicochemical properties, the powdered sample was found to be most soluble in polar solvent. In chemical studies, active principles were isolated from powdered sample of *Polygonum tomentosum* Willd. by solvent extraction and column chromatography method. The three isolated compounds were identified by thin layer chromatography (TLC), Ultraviolet (UV) and Fourier Transform Infrared (FTIR) Spectrophotometer method. According to the chemical test and spectroscopic data, three isolated compounds were assumed lupeol, stigmasterol and β-sitosterol. The elemental analysis of powdered sample was determined by using EDXRF technique. Among them, potassium was found to be highest percentage. Nutritional values were conducted from the powdered sample of *Polygonum tomentosum* Willd. In antimicrobial activity, the various solvent extracts from the powdered sample of the whole plant were tested on six pathogenic microorganisms by using agar-well diffusion method. The acetone extract showed more active against on *Staphylococcus aureus* and *Bacillus pumalis*. The isolated compound B (stigmasterol) showed the inhibition against on *Bacillus subtilis* and *Staphylococcus aureus.* The acute toxicity of 70% ethanolic extract and aqueous extract of *Polygonum tomentosum* Willd. was evaluated on albino mice. It was observed that both extracts were free from acute toxic or harmful effects during observation period of 2-weeks even with maximum permissible dose of (5000mg/kg). The antioxidant activity of ethanolic extract from powdered sample was also investigated by using DPPH staining method and UV spectrophoptometer method. The result indicated that ethanolic extract from the whole plant of *Polygonum tomentosum* Willd. had the radical scavenging (antioxidant) activity.

319. Phytochemical investigation on four selected legume cultivars and the extraction of lecithin from *Glycine Max* (Linn.) Merr. and *Arachis hypogaea* Linn. and their bioactivity. Thandar Oo. Thesis, PhD (Botany), University of Yangon; 2007.

The fourteen legume cultivars such as *Glycine max* (L.) Merr. (Soybean), *Arachis hypogaea* L. (Peanut), *Cicer arietinum* L. var. *karbuli, Cicer arietinum* L.var *dessi* (Chickpeas), *Cajanus cajan* (L.) Mill. var *flavus*, *Cajanus cajan* (L.) Mill. var *bicolor* (Pigeon peas), *Phaseolus lunatus* L. cultivar Pe-htaw-bat, *Phaseolus lunatus* L. cultivar Pe-ni-bya (Butter beans), *Phaseolus radiatus* L. (Green gram), *Phaseolus mungo* L. (Black gram), *Vigna unguiculata* (L.) Walp. subsp. *Unguiculata , Vigna unguiculata* (L.) Walp. subsp. *Cylindrical* (Cowpeas*), Dolichos lablab* L. (Lablab bean) and *Pisum sativum* L. (Sweet pea) were widely cultivated in six townships of Hinthada District such as Hinthada, Zalun, Ingapu, Laymyethna, Myanaung and Kyangin Townships. The plants were collected, classified and identified. Their utilization was noted from the available literature and their uses were also obtained from the people living in this district. Most of them were cultivated for consumption for their medicinal purpose. Among them, the exported four legume cultivars namely *Glycine max* (L.) Merr. (Soybean), *Arachis hypogaea* L. (Peanut), *Cicer arietinum* L. var. *karbuli* (Chick pea) and *Phaseolus lunatus* L. cultivar Pe-ni-bya (Butter bean) were selected and studied. The macroscopical characters of matured ripe seeds of the above mentioned four selected legume cultivars were examined in details in order to ascertain their identification. For chemical studies, the preliminary phytochemical investigation, physicochemical characterization and elemental analysis of four selected legume cultivars were performed from the powdered sample of the seeds. In addition, the phosphotide lecithin from *Glycine max* (L.) Merr. and *Arachis hypogaea* L. were extracted from the powdered seeds. Lecithin was isolated by preparative thin-

layer chromatography method. Then, the isolated lecithin was identified and characterized by thin layer chromatography, UV and FTIR spectroscopic techniques. In the pharmacology studies, the seeds of 4 selected legume cultivars were extracted using 95% ethanol and petroleum-ether (60ºC-80ºC). Their extractions were tested for antimicrobial activities *in vitro* with six test organisms. Among the four selected ones, the ethanolic extracts of only *Glycine max* (L.) Merr. and *Arachis hypogaea* L. showed definite results. According to the survey of literature, the cyanogenic glycosides were found in the seeds of *Phaseolus lunatus* L. var. I (Butter bean). The acute toxicity test of *Phaseolus lunatus* L. cultivar Pe-ni-bya has not been studied yet in Myanmar. So, the purpose of this research is to investigate the acute toxicity of ethanolic extracts of butter bean seeds included in albino mice. Besides this, experiments on the growth rate of animal model by dosing the aqueous suspension of *Cicer arietinum* L. var. *karbuli* (Chickpea) was also undertaken. This research reveals that the extraction has potentiality. The growth rate of animal model namely weight, height, and width had increased owing to the high protein content of chickpea. Hence, this scientific research has helped in revealing the effectiveness and usefulness of leguminous seeds not only for consumption but also for pharmaceutical uses.

320. Phytochemical investigations of five selected species of Zingiber and pharmacognostic studies on *Zingiber cassumunar* Roxb. Ni Ni Htun. Thesis**,** PhD (Botany), University of Yangon; 2007.

The five species of Zingiber were collected from Pyin Oo Lwin and surrounding areas of Yangon during the flowering period (July to November, 2004-2006). According to the morphological characters present in the vegetative and reproductive parts of the plants, these plants have been identified by using available literature. Among them *Zingiber cassumunar* Roxb. (Meik-tha-lin) is found to be the important aromatic medicinal herb in South East Asia including Myanmar. So, an attempt was made to investigate its medicinal properties in the present research. The microscopical characters of root, rhizome and dried rhizome powder were examined to ascertain its identification. Starch and oleoresin were abundantly found and closed collateral type vascular bundle scattered in T.S of rhizome. The dried rhizome powder of 5 species was tested to determine the phytochemical characters and physicochemical properties. Terpene, resin and starch were present dominantly and more soluble in water and chloroform. Elemental analysis of rhizome was conducted by using energy dispersive X-ray fluorescence (EDXRF) spectrometer. Potassium was found to be dominant. Then the active essential oils present in rhizome were extracted by water distillation method. The yield % of essential oil was 1.5% v/w. The odour, taste and yield of essential oil were studied as preliminary examination. Physical measurements such as specific gravity, optical rotation and refractive index were conducted for identification and assessment of purity. Then the camphene, camphor and terpineol compounds were isolated from essential oils by column chromatographic method and identified by thin layer chromatography, melting point, boiling point, UV and IR spectroscopic methods. The different solvent extracts of rhizome, essential oil and isolated compounds were tested against different microorganisms for their antimicrobial activity by using agar well diffusion method. It was found that the essential oil and isolated compounds showed more significant antimicrobial activity than different solvent extracts. Acute toxicity test of aqueous extract of rhizome of *Zingiber cassumunar* Roxb. on mice was done. The median lethal dose (LD_{50}) of aqueous extract of rhizome of *Zingiber cassumunar* Roxb. was found to be 16g/kg (between the upper limit 21.6g/kg and lower limit 11.85g/kg). The smooth muscle relaxant activity of

Zingiber cassumunar Roxb. was tested on the isolated rat uterus. It was found that the aqueous extract of rhizome of *Zingiber cassumunar* Roxb.caused relaxation on the oxytocin-inducion in dose dependent manner with ED_{50} of 1.643.

321. Phytochemical investigations on 4 selected species of Musaceae and pharmacognostic studies on *Musa paradisiaca* L. Sandar Cho. Thesis, PhD (Botany), University of Yangon, 2007.

In the present investigation of *Musa paradisiaca* L., (Nanthabu-hnget-pyaw), *Musa sapientum* L.var. *arakanensis* Ripl. (Yakhine-hnget-pyaw), were collected from Twante area during the month of July to November in 2004. Species of *Ensete galaucum* Roxb., (Shwe-kyin-hnget-pyaw), *Musella lasiocarpa* Franch., (Kyar-hnget-pyaw) were collected from Pyin Oo Lwin Area during the flowering time from January to July in 2004. The morphology and taxonomy of the vegetative and reproductive parts of four species of Musaceae have been studied, identified and also compared, by using available literature from Botany Department of Yangon University. The microscopical character of the leaves of *Musa paradisiaca* L. and the powdered drug were investigated so as to as certain their identification. The collected plant samples were washed and dried at room temperature for about one week and then crushed and powdered by using grinding mill and stored in air tight bottle for future use. The powdered leaf sample of the four species of Musaceae was tested for its phytochemical and physico-chemical properties. It was found that tannin, steroid and resin were present dominantly and it was more soluble in ethanol. In addition, when elemental analysis of the plant of *Musa paradisiaca* L. leaves were conducted by using energy disperse X-ray flucorescence (EDXRF) spectrometry, potassium and calcium were found as major constituents. In addition, the extraction and isolation of compounds A (β-sitosterol), B (stigmasterol) and C (9, 19 tetracycline triterpene) from leaf powder were performed by using column chromatography method. And compound D (gallic acid) is also isolated by application of chemical process. Identification of the compounds was achieved by TLC, melting point, UV and infrared spectra. The yield of isolated compound A, B, C and D from powdered leaves were 0.026%, 0.024%, 0.057% and 0.0246% respectively. Antimicrobial activity of the two extracts such as chloroform and 50% ethanol extract; 50% ethanol extract from leaves showed effective antibacterial activities on all tested microorganism except *Bacillus pumalis* and four isolated compounds, namely β-sitosterol, stigmasterol, 9-19 tetracyclic triterpene and gallic acid were investigated against six different microorganism by employing agar well diffusion method. The isolated compound of gallic acid from *Musa paradisiaca* L., leaf exhibited more significant antimicrobial activity than that of other isolated compound of β-sitosterol, stigmasterol and 9-19 tetracycline triterpene. The acute toxicity studies on both aqueous and 50% ethanolic extract of *Musa paradisiaca* L. leaves were tested and calculated to be between 10.5 (7.789-14.154)g/kg for aqueous extract and 10.9 (8.014-14.824) g/kg for 50% ethanolic extract. The contractile spasmogenic effect of both aqueous and 50% ethanol extract of *Musa paradisisca* L. leaf were tested on isolated guinea pig ileum preparation. The observed effects of both extracts were similar to that of acetylcholine-like activity.

322. Phytochemical screening and evaluation of *in vitro* antimicrobial activity of *Cassia fistula* Linn. (Ngu-shwe-war) leaves extract. Myo Thurein, Sai. Thesis, MPharm, Yangon: University of Pharmacy; 2011.

Cassia fistula Linn. belongs to the family Caesalpiniaceae which contains about 600 genera and 12,000 species. The plants belonging to this family are widely distributed throughout the tropical countries. This plant is well known in Myanmar as Ngu Shwe War. It is recognized because of its beautiful flowers, laxative activity and cures certain skin infections such as ringworm. In the present study, the vegetative and floral parts of *Cassia fistula* Linn. were collected from the campus of University of Pharmacy. The plant parts were pressed for Herbarium sheet and air dried and powdered for further use. The plant parts were investigated for botanical identification, morphological description and histological examinations. Qualitative analysis or phytochemical screening and quantitative analysis of the leaves of *Cassia fistula* Linn. were carried out according to international standard procedures. The dried leaves sample was extracted with sodium bicarbonate, concentrated hydrochloric acid to obtain free anthraquinones. The isolation and purification of crude extracts was done by using column chromatography. From the column chromatography, the active compound was isolated. The purity and identification of isolated compound was performed by Thin Layer Chromatography (TLC), Ultraviolet (UV) spectroscopy and Fourier Transform Infrared Spectrophotometer (FTIR). The antimirobial activity of different rude extracts was tested for skin pathogens suh as *Staphylocous aureus, Pseudomonas aeruginosa, Escherihia coli* and *Candida albians.* The antimirobial activity the crude extracts was examined by using agar disc diffusion method and was evaluated by measuring the diameter of inhibiting zones. Ciprofloxain and econazole were used as standard antibiotis. Among the crude extracts, aqueous leaves extract showed largest zone size of 25mm against *Staphylocous aureus.* Minimum Inhibitory Conentration (MIC) of active rude extracts was also determined by agar disc diffusion method. MIC of aqueous leaves extract was also carried out by broth dilution method. In the present study, two types of aute toxicity test were performed for *Cassia fistula* Linn. leaves extracts. The crude aqueous extract was utilized because of having largest inhibition zone among the extracts. Aute toxicity study was performed in albino mice by the method of Litchfield and Wilcoxon (1947). The results showed that three was no lethality up to maximum permissible dose of 16g/kg. Acute toxicity study was also done with the brine shrimp (*Artemia salina*). The brine shrimp toxicity test was a simple and rapid test for plant produts (Sam., 1993) The analysis revealed that the LD_{50} for the aqueous extract was 3600μg/ml (3.6mg/ml) which indiates that the extract has wide margin of safety. Then, ointment for the skin infection aused by *Staphylocous aureus* was formulated using aqueous extract and hard paraffin oinment B.P. as a base. Then for the effect of wound healing effect was seen within seven days. Finally, it was onluded that *Cassia fistula* Linn. leaves could be manufactured locally.

323. Phytochemical study of *Allium cepa* L. and hypoglycemic activity of its bulb. Khin Aye Aye San. Thesis, PhD (Botany), University of Yangon; 2009.

Allium cepa L. locally known as Kyethun-ni were collected from Bago Division. According to the morphological characters present in the vegetative and reproductive parts of the plants, it has been identified by using available literature. *Allium cepa* L. belongs to the family Liliaceae, which was widely cultivated in Myanmar. The microscopical characters of fresh leaves, leaf-sheath, bulbs, roots and dried powder of bulbs were examined to ascertain its identification. The bulbs of this plant were tested to determine the preliminary phytochemical and physicochemical properties. Tannin, cyanogenic glycoside was found to be absent and alkaloids, glycosides, flavonoids, phenolic compounds, reducing sugar, carbohydrate, saponins, and steroids were present. The powdered were more soluble in ethanol. Elemental analysis of bulb was conducted by using Energy Dispersive X-ray Fluorescense EDXRF spectrometry. Calcium and potassium were found as principal but iron was found as trace element. Moisture, protein, fat, ash, fibre, carbohydrate, calcium, phosphorus, iron, vitamin C and vitamin B_1 were also investigated and found to be the constituents of the bulbs. So, diosgenin, quercetin and cyanidin were extracted and isolated by selective solubility method. The isolated compounds were identified by thin layer chromatography, melting points, Ultra Violet (UV) and Infra-red spectrophotometer (FTIR). The antimicrobial activity of 70% ethanolic and aqueous extracts and the isolated compounds were tested effective activity on different microorganism by agar-well diffusion method. So, the results provided much useful information for the development of the traditional medicine from natural products. The acute toxicity of 70% ethanolic and aqueous extracts of bulbs of *Allium cepa* L. were tested on albino mice. The median lethal dose LD_{50} was supposed to be more than 24gm/kg body weight, which was a maximum permissible dose. The hypoglycaemic activity of 70% ethanolic and aqueous extracts of bulbs was also studied on adrenaline induced hyperglycaemic rabbits model. These effects were also compared with standard drug glibenclamide. After oral administration of 70% ethanolic and aqueous extracts of 3g/kg body weight, a significant lowered of blood glucose level at 4hr and 2hr, 3hr were respectively, when compared with that of a control group. The percentage inhibition of blood glucose level of 70% ethanolic extract and standard drug glibenclamide were not significantly different. It was found that 70% ethanolic extract of bulbs of *Allium cepa* L. showed hypoglycaemic activity.

324. Phytochemical study of barks and leaves from *Mimusops elengi* L. and its antipyretic activity. Sandar Sann. Thesis, PhD (Botany), University of Yangon; 2009.

A medicinal plant *Mimusops elengi* L. was collected from Insein and Mingaladon Townships in Yangon Division. It is known as Kha-yay or Thit-cho-cha-yar. The collected plants were studied, classified and identified by the literature references to confirm its identity. In morphological study, the leaves were simple, alternate and coriaceous, pedicel was tomentose. Calyx, corolla and stamens were in two series. Ovary was superior with axile placentation. In microscopical study, laticiferous sacs were abundant in the mesophyll cells, rarely in the midrib and the petiole. The anomocytic type of stomata was abundant only in the lower surface of lamina. Two armed or T-shaped trichomes were present on surface of the petiole. Prismatic and tetragonal calcium oxalate crystals were present in leaves. The oil cells, calcium oxalate crystals and stone cells were present in transverse section of bark. In ad'dition, the dried powder of leaves and bark from *Mimusops elengi* L. were also studied. Phytochemical investigation revealed that cyanogenic glycoside was absent.

According to the physicochemical examination, the samples were more soluble in aqueous, ethanol and methanol. In elemental analysis of leaves and bark of *Mimusops elengi* L. by using the Energy Dispersive X-Ray Fluorescence (EDXRF), it was found that Calcium (Ca), Potassium (K), Iron (Fe) were showed as principal elements and Manganese (Mn) was moderately present, only in bark. Betulinic acid (melting point 315-317°C, R_f = 0.85, 0.5% yield) and lupeol (melting point 211-213°C, R_f 0.66, 0.02% yield) were isolated from petroleum-ether extract of bark by selective solvent solubility method. β-sitosterol (melting point 136 -138°C, R_f 0.75, 0.01% yield) was isolated from petroleum-ether extract of leaves with the same method. Isolated compounds were identified by thin layer chromatography, melting point, UV and FTIR spectroscopic method. In the result of antimicrobial tests, methanol extract of bark showed the highest activity especially more sensitive against *Pseudomonas aeruginosa*, *Bacillus pumalis* and *Candida albicans*. Acetone extract of leaves showed the highest activity especially more sensitive against *Pseudomonas aeruginosa* and *Candida albicans*. Similarly, isolated compounds (betulinic acid, lupeol and β - sitoserol) were tested against different microorganisms for their antimicrobial activity by using agar well diffusion method. It was found that betulinic acid was active against *Bacillus subtilis, Staphylococcus aureus* and *Escherichia coli*. Lupeol was active against all tested microorganisms. β-sitoserol was active against *Staphylococcus aureus* and *Pseudomonas aeruginosa*. The acute toxicity test was carried out with aqueous extract and 70% ethanolic extract of bark on albino mice. They were observed that the two extracts did not show any visible symptoms of toxicity even with the maximum permissible dose of 10g/kg. Antipyretic activity of aqueous extract and 70% ethanolic extract of if *Mimusops elengi* L. were tested on yeast induced pyrexia in albino rats. The significant antipyretic effect was found at 3g/kg dose.

325. Phytochemical study of leaves from *Acanthus ilicifolius* L. and its antipyretic activity. Yin Yin Khaing. Thesis, PhD (Botany), University of Yangon; 2009.

There is a well-known plant (Ye-khayar) in village and the leaves of which are medicinally used by local people. The leaves are used as a major remedy in traditional medicine for the treatment of fever, arrow poison, oedema, arthritis and various ailments. Mostly the decoction of leaves was used as an oral medicine. The plant *Acanthus ilicifolius* L. belongs to the family Acanthaceae are widely distributed throughout the mangroves forests. Very few phytochemical investigations on this plant were informed. So, this phytochemical investigation was conducted to find out some compounds from this plant. The morphology and histological studies of the roots, stems, leaves, fruits, seeds and these were investigated so as to ascertain their correct identification. This plant was a short bushy shrub, leaf with sharp spinous teeth on the margin and midrib.The cells of upper lamina were polygonal and lower epidermises were wavy and diacytic stomata were present in only lower surface. Vascular bundles were collateral type and accessory bundles were present in midrib and petiole. In transeverse section of roots and stems, arenchymatous cells well develop and crystals occur in the cavity. The preliminary phytochemical tests and physicochemical properties were also performed from the powdered leaves. The presence of phenolic compounds, steroid and terpene were mostly found in the phytochemical examination. The elemental analysis was conducted by using the Energy Dispersive X-rays Fluorescence (EDXRF) spectrometry. Methanolic extracts of leaves was separated by column chromatography method. The organic compounds separated were found to be stigmasterol (0.02%), terpenoid compound (0.04%) and

phenolic carboxylic acid (0.03%). Antimicrobial activity of crude extracts and isolated compounds were performed by using agar well diffusion method. The acetone crude extract was found to be significant against *Candida albicans*. The antioxidant activity was screened by the semi quantitative Dot-Blot method, spectrophotometer method and DPPH staining. 12.5µg was found to be more significantly effective than other concentration. Further more, the extracts from the leaves of this plant was not found to be significant compared with ascorbic acid. The acute toxicity test was carried out with the aqueous and 70% ethanolic extracts of Ye-khayar leaves by using albino mice. It was observed that both extracts were free from harmful effect during observation period of 2 weeks with maximum permissible dose of 24g/kg. The study of bioactivity, the aqueous and 70% ethanolic extracts of leaves were tested for antipyretic activity on albino rats. This study indicates that both extracts can be used as an effective agent against fever which was comparable to that of a standard paracetamol.

326. Phytochemical study of leaves from *Cleodendrum inerme* Gaertn. and etc antipyretic activity. San San Maw. Thesis, PhD (Botany), University of Yangon; 2009.

Cleodendrum inerme Gaertn. (Pinle-kyauk-pan), is an evergreen shrub, belongs to the family Verbenaceae which grows only in marshy places, especially along tidal creeks. It was collected from Ka-mar-aung creek in Dalla Township and identified by the available literatures. In morphological characters, the plants are aromatic and perennial shrubs, the stems are profusely branched. The microscopial characters of the leaves and roots were investigated for their identification and standardization of drugs. Unicellular and multicellular head of glandular trichomes and anomocytic stomata were present. The powdered leaves were tested by the determination of phytochemical and physicochemical properties. In phytochemical investigation, glycoside, phenolic compound, terpenoid, steroid and tannin were present. According to the physicochemical results, the leaves were found more soluble in polar solvent. The elements in powdered leaves were observed by using Energy Dispersive X-ray fluorescence (EDXRF) Spectrometer and Atomic Absorption Spectrophotometer (AAS). The isolated compounds apigenin, scutellarein and β-sitisterol were identified by melting point, thin layer chromatography and spectroscopic methods of UV and FTIR. The antimicrobial activity of isolated compounds apigenin and scutellarein and extracts of petroleum ether, chloroform, ethyl acetate, ethanol, methanol and water were investigated against six microorganisms by employing agar well diffusion method. In this result, ethyl acetate extract was more significant and isolated compound apigenin and scutellarein exhibited against six microorganisms especially most effective activity on *Staphylococcus aureus*. 70% ethanolic extract of leaves was tested with albino mice for acute toxicity. The mice were no lethality and healthy during the observation period of two weeks with maximum dose of 16g/kg body weight. Accordingly, the antipyretic activity of 70% ehtanolic extract from the leaves of *C.inerme* Gaertn. was investigated, yeast induced pyrexia in albino rats. The leaves possess a significant antipyretic effect have been observed.

327. Phytochemical study of *Morus alba* L. (Posa) and its hypoglycemic activity on animal models. May Oo Khine. Thesis, PhD (Botany), University of Yangon; 2008.

Morus alba L. belong to the family Moraceae. It is known as Posa in Myanmar and its widely cultivated for their leaves used in sericulture. The specimens of this plant were collected from Pyin-Oo-Lwin Township in Mandalay Division. The morphological characters of the vegetative and reproductive parts of the plant had been identified in the department of Botany, University of Yangon. In morphological study, *Morus alba* L.was a cultivated, medium sized tree with leaves variable in size and shape; ovate or irregularly lobed. Flowers were monoecious and unisexual. The microscopical characters of leaves and powdered leaves were investigated. Stomata present were more abundant on lower surface. They were anomocytic type. Unicellular and glandular trichomes were present on both surfaces. In transverse section of lamina, the upper epidermal cells were bulliform or motor-shaped, in which cystoliths of calcium carbonate crystals were present. The collected samples were washed and dried in room temperature. Then, they were crushed to get powdered and stored in an an air tight container for microscopial, chemical and pharmacological studies. Preliminary phytochemical and physicochemical properties of the leaves were analysed. The alkaloid was riched in leaves but saponins, terpenoids and cyanogenic glycosides were absent. When elemental analysis was carried out by using Energy Dispersive X-ray fluorescence (EDXRF) Spectrometer and Atomic Absorption Spectrophotometer (AAS), calcium was found to be dominant in leaves. Firstly, leaves were defatted with petroleum ether by using Soxhlet extraction method and meal cake was analysed for the presence of amino acids composition. Crude amino acids mixture was obtained by acid hydrolysis of meal cake. Amino acids present in the hydrolysate of leaves were detected by one dimensional paper and thin layer chromatography comparing with 12 standard amino acids and the standard amino acid mixture. According to the result, 9 amino acids such as lysine, aspartic acid, serine, glycine, glutamic acid, threonine, alanine, methionine and leucine were present. Antimicrobial activity of the 70% ethanolic and aqueous extracts of leaves were tested against thirty microorganisms by using paper disc diffusion method and was found the aqueous extract was more effective than ethanolic extract. The aqueous extract showed activity against *Escherichia coli* EHEC, *E. coli* EPEC, *Staphylococcus aureus* L43, *Staphylococcus aureus* ws, *Shigella aureus* cosmoe, *S. aureus* LLC, *S. aureus* us, *Bacillus subtilis* A, B.subtilis *B, Samonella typhi* and *Shigella flexneri*. The acute toxicity of the 70% ethanolic and aqueous extracts of *Morus alba* L. leaves were evaluated by using albino mice. The extracts were found to be toxic at 24g/kg body weight on albino mice. The median lethal dose LD_{50} of both 70% ethanolic and aqueous extract of leaves were also studied on adrenaline-induced hyperglycemic rabbits model. These effects were also compared with standard drug, glibenclamide. After oral administration of ethanolic extract (3g/kg) body weight, a significant inhibition of blood glucose level at 1hr, 2hr and 3 hr were observed when compared with that of that of a control group. After administration of aqueous extract (3g/kg) body weight, it caused a significant inhibition of blood glucose level at 1hr, 2hr, 3hr and 4hr which were almost the same with that of glibenclamide administration. The percentage inhibition of blood glucose level of ethanolic extract was shown to be significantly increased only at 2hr after administration of drugs when compared with that of glibenclamide. Aqueous extract could significantly reduced glucose level when compared with that of ethanolic extract.

328. Phytochemical study on *Carissa carandas* L. and its anthelmintic activity. Aye Aye Naing. Thesis, PhD (Botany), University of Yangon; 2009.

The plant *Carissa carandas* L. locally known as "Khan-pin", belongs to the family Apocynaceae are generally used as ornamental in Myanmar and its attractive by its fruits. Very few phytochemical investigations on this plant were informed. So, this phytochemical investigation was conducted to discover some new compounds from this plant. It was collected from Taungoo Township, Bago Division. The morphological and histological characters of this plant have been studied and identified by using available literatures from Botany Department of Yangon University. The plant is perennial small tree, latex present. Axillary spines present were stout sharp. Leaves are simple and coriaceous. Flowers are pale pink colour. Fruits colours are white in young stage, red in mature and purplish-black when ripe. The distinct histological characters of roots were xylem exarch and polyarch in primary root, oil cells and starch grains were present in phelloderm of secondary root. The cells of upper and lower surfaces of lamina were wavy and anomocytic types of stomata were present on the lower surface. Calcium oxalate crystals were present in mesophyll tissues of lamina and parenchymatous cells of midrib and petiole. Vascular bundles were bicollateral type in midrib and petiole. Angular collenchyma and parenchymatous cells were present in mesocap of the fruits. The testa of seeds was composed of brachy sclereids and tegmen was parenchymatous cells. Oil globules and tannin were present in the seeds. The qualitative analyses showed the presence of alkaloids, carbohydrates, flavonoid, glycoside, phenolic compound, saponin, starch, terpenoid, steroid, reducing sugar and tannins. The powdered roots were more soluble in polar solvents. The presence of elements in roots was observed by using Energy Dispersive X-ray Fluorescence (EDXRF) spectrophotometer. The quantitative analysis was carried out by column chromatography method. Isolated compounds A, B, C and D were found to be present 0.1%, 0.06%, 0.06%, 0.04% and 0.6, 0.4, 0.6 and 0.5 of R_f values respectively. Nutritioinal analyses of the powdered root was conducted and found that carbohydrate, protein, vitamin B1, vitamin C, fat and fibre were present. Various solvent extracts and compounds A and B were tested against six microorganisms for their antimicrobial activity by using agar well diffusion method. It was found that acetone, methanol and ethanol extracts were more effective than compounds A and B. But the isolated compounds were effective than petroleum-ether, chloroform, ethyl acetate and water extracts. The acute toxicity of aqueous extract and 70% ethanolic extract from roots of *Carissa carandas* L. was evaluated on albino mice. It was observed that aqueous and ethanolic were free from acute toxicity or harmful effect during observation period of 14-days even with maximum permissible dose of 24g/kg. In anthelmintic activity, aqueous extracts was found to be more effective than ethanolic extracts. Antioxidant activity of ethanolic extract from roots was also investigated by using Dot-blot and DPPH staining method and spectrophotometry method. In the former method, ethanolic extract showed the antioxidant activity up to dry matter amount 25µg (Conc.0.125mg/ml). But the latter showed that the ethanolic extract from the roots of this plant was found to be significant as the ascorbic acid.

329. Phytochemical study on *Eleusine indica* (L.) Gaertn**.** and its antipyretic activity. Khin Ohnmar Saw. Thesis, PhD (Botany), University of Yangon; 2008.

Eleusine indica (L.) Gaertn. locally known as Sin-ngo-myet were collected from North Dagon Myothit Township, Yangon Division and the whole plant was studied in this research. According to the morphological characters present in the vegetative and reproductive parts of the plants, it has been identified by using available literature. *Eleusine indica* (L.) Gaertn. belongs to the family Poaceae , which naturally grown in fields and open grounds and found abundantly during the rainy season.The microscopical characters of fresh leaves, culms, roots and the dried powder of the whole plant were examined to ascertain its identification.The epidermal cells are arranged in parallel row. The bulliform or motor cells and two types of vascular bundles are observed in tranverse section of lamina. The vascular bundles are scattered, except in the center of the culm in tranverse section. The whole plant powder of this plant was tested to determine the preliminary phytochemical and physicochemical properties. Tanins and cyanogenic glycosides were found to be absent and carbohydrate, starch, α-amino acids, phenolic compounds, flavonoids, tannins, saponins, steroids, alkaloids, glycosides and reducing sugar were present. The powder was more soluble in water and least in petroleum ether. Elemental analysis of whole plant was conducted by using energy dispersive X-ray fluorescence EDXRF spectrometry. Phosphorus, potassium, calcium and iron are found as principal elements. Moisture, protein, fat, ash, fiber, carbohydrate, calcium, phosphorus, iron, vitamin C and vitamin B1 were also investigated and found to be the constituents of the whole plant. The chemical compounds were extracted and isolated by selected chemical method and identification of each of them were achieved by TLC, UV, FT-IR and by finding melting points. Accordingly, two compounds were detected, one was assumed to be vitex and the other saponarin. The antimicrobial activity of different solvent extracts of the whole plant and the isolated compounds were tested against different microorganism by agar-well diffusion method. The acetone extract was found to show the best activity and none in aqueous extract on all tested microorganisms. Compound A (vitexin) showed the activity on all tested microorganisms but compound B (saponarin) did not show any activity against *Staphylococcus aureus*. So, the results provided much useful information for the development of the traditional medicine from natural products. The acute toxicity of 70% ethanolic extract of whole plant of *Eleusine indica* (L.) Gaertn. were tested on mice. The median lethal dose LD_{50} was supposed to be more than 16g/kg body weight which is a maximum permissible dose. This plant has found to be applied in folk medicine for the treatment of various ailments. The 70% ethanolic extract of this plant was tested for antipyretic activity on yeast induced pyrexia in albino rats. The antipyretic activity of 70% ethanolic extract was compared with standard drug paracetamol. It was found that the extract reduced fever more than paracetamol.

330. Phytochemical study on the Myanmar Momordica species, the isolation of hypoglycemic Charantin and their antibacterial activities. Sanda Hlaing. Thesis, PhD (Botany), University of Yangon; 2006.

A phytochemical study had been undertaken out on the four speices and a variety of the genus Momordica of the family *Cucurbitaceae,* out of which some pharmacological study was made on *Momordica charantia* L. In Myanmar, they commonly grow wild or are cultivated.The diagnostic characters of *Momordica charantia* L., *Momordica charantia* variety*, Momordica cochinchinensis* Spreng., *Momordica dioica* Roxb. and *Momordica subangulata* Blume. have been described and compared for the identification of this species. The microscopical characters of the leaves and fruits of *Momordica charantia* L. and the powder drugs have been supplemented for identification. The phytochemical tests for all the plants have been made. The species *Momordica charantia* L. was selected for the isolation for the active compounds glycoside charantin, an alkaloid momordicine and a steroidal diosgenin. The isolated compounds were characterized by thin layer chromatography, melting point, UV and IR spectroscopic methods. In the pharmacological study the effect of antidiabetes was tested with ethanolic extract and fresh juice of leaves of *Momordica charantia* L. The antibacterial activities were undertaken by testing with various crude extracts of the leaves and fruits of *Momordica chrantia* L. The species *Momordica cochinchinensis* Spreng., *Momordica subangulata* Blume. were also tested for antibacterial activity .

331. Phytochemistry of the root of Thu-yaung *Talinum cuneifolium.* Kyaw Min; Chit Maung; Sein Gwan. *Rep Burma Med Res Counc*, 1972: p51.

Thu-young root (identification as *Talinum cuneifolium*) was collected from the Southern Shan State. The local people believe that it possesses adaptogenic properties like *Panax ginseng*. The two roots are similar in physical structure. The chemical investigation was carried out and the separated products identified qualitatively. The petroleum ether extract contains triglycerides, hydrocarbon waxes and a trace of sterol or triterpene. Alcohol soluble portion contains an acid insoluble in water and which is found to be either a steroid or triterpene in nature, potassium nitrate, reducing sugars and a coloured mother liquor which gives a positive glycoside test. In the water soluble portion, the following compounds were detected: starch, pectins, reducing sugars, phenolic compounds and glycoside. Metallic ions and salts are also present namely, potassium nitrate, trace of iron, and calcium. No sulphate and choloride ions are present.

332. Pilot study of hypoglycemic potential of Bay-dar-pwint (*Eichhornia crassipes* Solms.) on healthy person. Myat Myat Ohn Khin, Thaung Hla, Thidar Swe, Than Tun, Myint Myint Than, Kyaw Myint Tun. *Myanmar Health Res Congr,* 1998: p87.

The plant *Eichhornia crassipes* Solms. (water hyacinth) known as Bay-dar in Myanmar belong to the family of Pontederiaceae was scientifically evaluated for its traditionally reputed activity of hypoglycemic property. The acute toxicity of Bay-dar-pwint extract was done and it was found that LD_{50} of this herb is more than 3.8g of the extract kg body weight in albino mice. (collaboration with DMR). Base on the above mention scientific knowledge in this study, a pilot scale clinical trial was done on its hypoglycemic and side-effects in healthy human volunteers. Decoction of 45g of Bay-dar flower (i.e., 50ml) was tested on healthy human volunteers, blood sugar lowering effect was observed. Also found that no side-effects of physiological action on human body.

333. Plant diversity in Mae-san-mhe Hill and pharmacognostic study on *Tephrosia purpurea* (L.) Pers. for it antioxidant activity. Khin Thinn Kyi. Thesis, PhD (Botany), University of Yangon, 2007.

Tephrosia purpurea (L) Pers. (Mae-yaing) is widely grown in hilly regions of Monywa Township in Sagaing Division including Mae-san-mhe hill. A vegetation survey was made on Mae-san-mhe hill in the letpadaung area from June 2004 to December 2005, related to the Myanmar Ivanhoe Copper Company Limited (MICCL) project. Five stations were established at different altitudes to study distribution of plants. The area of each station was 256 square meters.The species found in each station were recorded, counted and species area curve of cumulative number of species per block had been surveyed during wet and dry season by the method of Horn (1993). The total number of plants species found in this research is 28-families. 45-generas and 50-species. Only those plants which were characteristic to the central dry zone were photographed and described. These plants are used by the local people for medicinal pruposed. Among them, *Tephrosia purpurea* (L.) Pers. was used as traditional medicine for the treatment of liver, asthma and tuberculosis. So these plants were collected, classified and verified for its identifying (Nair, 1962; Backer, 1963; Hooker, 1897; kirtikar and Basu, 1933). In Myanmar, the same vernacular name Mae-yaing is given to two different species, namely *Indigofera tinctoria* L. and *Tephrosia purpurea* (L) Pers. Belonging to the same family Fabaceae (figure 5,6). The leafkets of the *Indigofera tinctoria* L. is 9-13, green but drying a grayish black, oblong or oblasnceolate, flowers numerous, in nearly sessile lax spicate reacemes, pinka, pod cylindric, straight or slightly curved, seeds 8-12 in each pod. The leaflets of the *Tephrosia purpurea* (L) Pers. Is 5-25 green but brown when drying oblanceolate, inflorescence racemose, flowers violet to purple, fruit flattened, linear, slightly curved, seeds 5-7 in each legume. In surface view of leafblade, stomata are present on both surfaces. They are anisocytic type. Trichomes are numerous on both surfaces and more abundant in the lower epidermis. In surface view of midrib, stomata are absent. In transverse section of midrib and petiolule, the vascular bundle is cresent shape in outline and close collateral type. The distinct macrosclereids are present as a layer in the epicarp of fruit wall and in the testa of seed-coat but the arrangements are different. In the former they are elongated transversely whereas in the latter they are elongated radially with a layer of shorter sclereids. The preliminary phytochemical tests were determined by using the powderd leaves. The physicochemical characterization and the elemental analysis (EDXRF) were conducted from the powdered sample. The presence of steroids and flavonoids were observed in the phytochemical investigation of the powdered leaves. As such β-sitosterol and rutin were isolated rom the leaves of *Tephrosia purpurea* (L.) Pers. By using column chromatography. And then rutin compound was hydrolysed by refluxing with IN sulphuric acid and to form quercetin compound. These isolated compounds were identified by TLC and spectroscopic analysis. In addition *Tephrosia purpurea* (L) Pers. Leaves were extracted with n-hexane, chloroform, petroleum ether, benzene, acetone, methanol, ethyl acetate and ethanol. Their extractives were used to screen for antimicrobial activities *in vitro* with six test organisms and was found to posses antimicrobial activities against *Bacillus subtilis, Staphylococcus aureus, pseudomonas aeruginosa*, *Bacillus pumalis, Candida albicans* and *Mycobacterium spp.* Finally, in this research *Tephrosia purpurea* (L.) Pers. was studied for free radical scavenging activity (antioxidant activity) by 1,1-diphenyl -2 picrylhydrazyl (DPPH) assay according to the method of Tsuchiya (1985) Tomoko Yamaguchi (1998). Three extracts (ethanol, aqueous, ethyl acetate) were prepared and

the antioxidant activity was evaluated. According to DPPH assay, the aqueous extract possess the most effective antioxidant activity (% inhibition=76.804).

334. Plants possessing antibacterial activity. Mar Mar Nyein; New Yee Win; Win Myint; Aye Aye Thein; Mi Mi Htwe; Win Win Maw; Aye Than. *Myanmar Health Sci Res J*. 1999; 11(1-3): p26-32.

Forty one plants were tested for antibacterial activity by using 18 species of bacteria and found to be active on some bacteria by 28 plants. The tested bacteria include: five species of *Escherichia coli*; four species of shigella*;* three species of vibrios; and one each of *Klebsiella aerogenes, Plesiomonas shigelloides, Proteus morganii, Pseudomonas pyocyanea, Salmonella typhi* and *Staphylococcus aureus*. Plants having antibacterial activity include *Ageratum conyzoides* (Hkwe-thai-pan), *Azadirachta indica* (Tamar); *Cassia fistula* (Ngu); *Coleus aromaticus* (Ziyarywethtu); *Cuminum cyminum* (Ziyarzai); *Cyperus scariosus* (Nwamyetyin); *Embelia robusta* (Eikmwethee); *Embilica officinalis* (Zibyu); *Eugenia caryophyllata* (Layhnin); *Eugenia jambolana* (Thabye); *Eupatorium odoratum* (Bizat); *Euphorbia milli* (Shahzaungtinga-neah); *Euphorbia splendens* (Shahzaungtinga-neah-ni and wah); *Garcinia mangostana* (Min-good); *Giradimia zeylonica* (Petya); *Leucaena glauca* (Bawsakaine); *Neptunia oleracea* (Yehtikayone); *Nerium oleander* (Nwethagi); *Nyctanthes arbortristis* (Seikphalu); *Phyllanthus urinaria* (Taungzibyu); *Pinus kesiya* (Htinyu); *Piper betle* (Kun); *Piper nigrum* (Ngayokekaung); *Plumeria rubra* (Tayokesaka-ni); *Rhoeo discolor* (Mikwingamone); *Terminalia chebula* (Panga); and *Vinca rosea* (Thinbawmanyo).

335. *Polypetabus flora* of Tharrawaddy town and its vicinity. Win Thida. Thesis, MSc (Botany), University of Yangon; 1989.

The present work is on the *Polypetalous angiosperm* flora of Tharrawaddy town and its vicinity, in Pegu Division. The area covered includes the local Peoples' Councils area of Zaypaing, Quetthit, Alepaing, Kyaung-su, Kayin-su, Yewai and Ywagyigon. Intensive collection of the specimens was undertaken over a three -year period from 1985 to 1988 at fortnightly intervals. Approximately 120 species of polypetalous flowers belonging to 86 genera distributed among 28 families have been collected. They consist of the wild angiosperms. The families Malvaceae, Euphorbiaceae, Mimosaceae, Caesalpiniaceae and Papilionaceae, are seen to be the most abundant. Highly valuable timber plants such as, *Hopea odorata*, *Shorea siamensis, Swietenia macrophylla, Pterocarpus macrocarpus* were also collected. The medicinally important plants found in this area are *Ricinus communis*, Jatropha sp., *Croton oblongifolius*, *Acalypha indica, Cassia alata, Leucaena glauca, Alysicarpus vaginalis, Callistemon lanceolatus, Melaleuca leucadendra*. The economically important species are fibreyielding plants such as *Hibiscus tiliaceus, Gossypium barbadense, Salmalia malabarica* and tannin-yielding plants like *Acacia catechu* and *Lawsonia inermis* which are used to stain finger nails, teeth and beard. Out of the species collected from this area, it was found that about 84 have already been reported in floras previously compiled by other students in the Botany Department, University of Rangoon. About 36 species that were not reported in those floras are treated in detail. To support the descriptions, line drawings of the habit, longitudinal sections of the flowers, fruits and seeds were included and described in detail. The families have been classified according to Rendle's systems. Keys to the genera and species of the families with two or more species have been included. A location map of the area covered in included.

336. Potential use of Kyethingha-thee (*Momordica charantia* L. fruit) in the treatment of maturity onset diabetes mellitus. May Aye Than; Ye Thwe; Thaw Zin; Mu Mu Sein Myint; Hla Pe; Aung Naing; Maung Maung Wint. *Myanmar Health Sci Res J.* 1996; 8(3): p148-154.

The hypoglycemic efficacy of Kyethingha-thee dired powder capsule was conducted on five uncomplicated type II non insulin dependent diabetes mellitus patients, who were admitted to the No. 2 Military Hospital, Yangon. Preliminary study revealed that it has hypoglycaemic effect with minimum effective dose of 3 grams for each patient and the time of maximum effect was 4 to 6 hours respectively. Kyethingha-thee was found to be 79.94% as effective as tolbutamide and 154.53% as effective as TMF-32. So far no adverse side effects were observed in any of these patients.

337. The Potential usefulness of *Plantago major* Linn. in management of peptic ulcer. Thein Saw; Myo Khin; Win Myint; Than Than Swe; Aye Than; Kyaw Soe. *Myanmar Health Res Congr,* 1999: p96.

Peptic ulcer is a common condition in clinical practice. Modern management of peptic ulcer includes eradication of the associated *Helicobacter pylori* infection with the use of expensive drugs such as colloidal bismuth citrate and a combination of antibiotics. Regimens such as proton-pump inhibitors and newer antibiotics such as clarithromycin are also used but unfortunately these medicines are also expensive and may not be affordable for a developing country like Myanmar. *Plantago major* Linn, (Ahkyaw-baung-tahtaung) is a readily avaiable and affordable plant compound with reputed healing activities and with documented anti-ulcerogenic properties. Thus, a treatment regimen containing *P. major* in combination with standard antibiotics was tested in five patients with proven peptic ulcer disease. Pepto-major solution containing (900) mg of *P. major* extract was given (3) times a day for 28 days. In the initial (7) days, they also received Amoxicillin (1000mg) twice a day and Tinidazole (500mg) twice a day. Histological examination of the gastric biopsies for gastritis severity and biopsy urease testing and 14C breath test for the presence of *H. pylori* infection were carried out initialiy and at the end of the treatment. Eradication of *H. pylori* with improvements in clinical and histology findings was seen in three patients. *P. major* is a potential candidate to be used as a medication in the management of peptic ulcer disease in Myanmar.

338. Pre-clinical sub acute toxicity testing of antihyperglycemic medicinal plants (MAT/MP014). Pharmacology Research Division. *Annual Report 2007*, Yangon: DMR (LM): p99.

The study was carried out to fulfill the pre-clinical study on diabetic patients, preliminary experiment on acute toxicity and sub acute toxicity of traditional antihyperglycemic medicinal plants (ဝဲနို့သာဇေ့) was mandatary. The samples collected were air dried and grinded into powder. Acute toxicity was done in mice. The median lethal dose was higher than 16g/kg body weight. Two doses levels of medicinal plants (MAT/MP 014) were administered orally to (2) groups of rats for (14) weeks and one group served as control group in subacute toxicity test. At the end of (14) weeks, all the rats were sacrifed and blood samples were collected for haematological and biochemical studies. In control groups showed Hb% 13.3±0.6%, WBC count 6000±0.78/Cu mm, AST 54.11±5.71mmol/L, ALT 83.67±11.37mmol/L and blood urea 53±1.79mmol/L and test group (low dose) showed Hb% 15±0.5%, WBC count 5640.±134.3/Cu mm, AST 49±23.63mmol/L, ALT 98.13±27.85mmol/L and blood urea 29.25±1.96mmol/L and Hb% 14.7±1%, WBC count 7666.7±193.7/Cu mm,

AST65.17±16.41mmol/L, ALT 130.5±34.97mmol/L and blood urea 46±2.5mmol/L respectively. Haematological parameters and biochemical data were not siginificant difference from control group. The internal organs were excised and weighed. Gross examination and histological studies were carried out on internal organs. No significant changes were observed in grossly. Histopathological results of tested groups showed not significant difference from control group. In conclusion there was no acute and subacute toxicity in mice and rats.

339. Pre-clinical sub acute toxicity testing of antihyperglycemic medicinal plants (MAT/MP009). Pharmacology Research Division. *Annual Report 2009*. Yangon: DMR (LM). p107.

The study was carried out to fulfill the pre-clinical study on diabetic patients. Preliminary experiment on acute toxicity and sub-acute toxicity of traditional antihyperglycemic medicinal plants (ပန်းခါး) was mandatory. The samples collected from Ka-yhar State were air dried and ground into powder. Acute toxicity was done in mice. The median lethal dose was higher than 6g/kg body weight. In sub-acute toxicity test, total of 30 albino rats were used. They were divided into 3 groups. Two dose levels (1.5g/kg and 3g/kg) of medicinal plant (MAT/MP009) were administered orally to (2) groups of rats and one group served as control group was administered distilled water for 3 months. The rats were observed for behaviour and toxic signs daily for 3 months. At the end of 3 months, all the rats were sacrificed humanly and blood samples were collected for haematological and biochemical studies and sent to Experimental Medicine Research Division for liver function tests and blood urea and Blood Research Division for complete picture, platelet count. In this study, gross examinations of the internal organs were found to be normal. The internal organs were sent to Pathology Research Division for histological studies. The histological and biochemical, heamatological parameters of the control group and two test groups are not significantly different. Therefore, it was concluded that there was no sub-acute toxicity on rat model.

340. Pre-clinical sub-acute toxicity testing of antihypertensive medicinal plant (Shan-myinkhwa) (ရှမ်းမြင်းခွါ). Pharmacology Research Division. *Annual Report 2008*. Yangon: DMR (LM), p35-36.

The study was carried out to fulfill the pre-clinical study on hypertensive patients. Preliminary experiment on acute toxicity and sub-acute toxicity of traditional antihypertensive medicinal plants was mandatory. The samples collected from Shan State were air dried and ground into powder. Acute toxicity was done in mice. The median lethal dose was higher than 6g/kg body weight. In sub-acute toxicity test, total of 30 albino rats were used. They were divided into 3 groups. Two dose levels (1.5g/kg and 3g/kg) of medicinal plant (MAT/MP 004) were administered orally to (2) groups of rats and one group served as control group was administered distilled water for 3 months. The rats were observed for behaviour and toxic signs daily for 3 months. At the end of 3 months, all the rats were sacrificed humanly and blood samples were collected for haematological and biochemical studies and sent to Experimental Medicine Research Division for liver function tests and blood urea and Blood Research Division for complete picture, platelet count. In this study, gross examinations of the internal organs were found to be normal. The internal organs were sent to Pathology Research Division for histological studies. The histological and biochemical, heamatological paremeters of the control group and two test groups

are not significantly different. Therefore it was concluded that there was no sub-acute toxicity on rat model.

341. Preliminary dose finding study of *Swietenia macrophylla* seed (မဟော်ဂနီစေ့) and (MAT/MP014) seed for hypoglycemic effect on maturity onset diabetes. Clinical Research Unit (Traditional Medicine). *Annual Report 2003.* Yangon: DMR (LM). p22.

Preliminary dose finding study of *Swietenia macrophylla* seed was done on seven maturity onset diabetic patients. The patients were tested for oral glucose tolerance test for base line examination 3 days after withdrawal of all antidiabetic drugs. After that the *Swietenia macrophylla* seed 0.5g, orally per day for 2 days was given and fasted at 2nd night. On next day, after fasting blood sample was collected, the 3rd dose was given and oral glucose tolerance test was done. After 2 days washout period one group was given 1g/day dose and the second group was administered with 1.5g/day after which crossover study was done. OGTT showed singnificant inhibition at 0hr, 3hr and 4hr ($p<0.05$) after administration of glucose to the test groups where 1g/ day. It was also showed siginificant inhibition at 0hr,1hr, 2hr, 3hr and 4hr ($p<0.05$-$p<0.01$) after 1.5g/day of test drugs were administered. The untoward side effects were also monitored. It was observed that dyspepsia, anorexia, nausea and vomiting were due to its bitterness at high doses and the compliance of the test seed was not good because of its side effects and 2 patients tested with high doses, were dropped out from the study. The compliance at lowest dose was good but which was not effective significantly. Therefore, because of its side effect the study was stopped and another test on MAT/MP014 seed was tested clinically instead of continued testing for *Swietenia macrophylla* seed.

342. Preliminary screening of medicinal plants for biological activity based on inhibition of cAMP phosphodiesterase. Kyi Thein; Win Myint; Mar Mar Myint; Po Aung, Saw; Myo Khin; Aye Than; Mya Bwin. *Med Res Congr,* 1992: p54-55.

Hot aqueous extracts of medicinal plants were tested for their inhibitory effect on phosphodiesterase to detect biologically active compounds present there in using nuclear-based techniques. Out of 34 plants, 6 plants; *Coptis teeta* Wall. (Khan-tauk), *Glycyrrhiza glabra* Linn. (Nwe-cho), *Millingtonia hortensis* Linn. (Aye-ka-rit), *Alstonia scholaris* R.Br. (Taung-ma-yo), *Quisqualis indica* Linn. (Htar-we-hmaing) and *Cleistocalyx operculatus* Roxb. Merr & Perry. (Tha-pyai-chin-gyuk) were found to be biologically active with reproducible inhibition (30). The aqueous extracts were partitioned with chloroform and the chloroform solubles and insolubles were tested. The former showed higher activity principles are more soluble in organic solvents. Responsible inhibitor in *Coptis teeta* Wall. was found to be berberine which is one of the well known pharmacologically active substances. Our findings support that the biological activity (inhibitory effect on the camp) correlates with the pharmacological activity.

343. Preliminary screening of the reputed hypotensive property of the indigenous plant *Plantogo major*. Khin Kyi Kyi; Mya Bwin; Sein Gwan; Chit Maung; Aye Than; Mya Tu, M; Tha, Saw Johnson. *Burma Res Congr*, 1970: p42.

Crude extracts of the indigenous plant, *Plantago major*, from Rangoon, Kalaw and Taunggyi were tested for hypotensive action anaesthetized normotensive dogs. Early trials with the crude watery extract in a dose of 125mg/kg given intravenously were found to produce sustained fall in blood pressure of 20-40mmHg. Fractionation of the crude extract was carried out and similar screening of the various fractions was done.

344. Preliminary study on blood sugar lowering effect of *Eichhornia crassipes* Solms. flower (Beda-pwint) in rabbit models. Myat Myat Ohn Khin; Thidar Swe; Aye Than; Mu Mu Sein Myint; Tin Myint. *43rd Myanmar Med Conf*, 1997: p38.

The plant *Eichhornia crassipes* Solms. Flowers (water hyacinth) known as Beda in Myanmar was scientifically evaluated for its traditionally reputed activity of hypoglycaemic property. When aqueous extract of the flower (48g/Kg) was tested on rabbit models, no blood sugar lowering effect was observed on both of adrenaline-induced and glucose-loaded model. But the flower decoction (20ml/Kg) was tested rabbit model, blood sugar lowering effect was observed on glucose-loaded model. Acute toxicity test and qualitative chemical studies were also conducted on the aqueous extract of the flower. Detailed results on the evaluated pharmacological activity, acute toxicity study and qualitative chemical tests were discussed and reported.

345. Preliminary study on hypoglycemic activity of C*uminum cyminum* Linn. (Ziya). Mu Mu Sein Myint; Aye Than; Aung Aung Maw; May Aye Than; Khin Tar Yar Myint; Win Win Maw; Myint Myint Khine; San San Myint; Thandar Than. *Myanmar Health Res Congr,* 2005: p54.

This study is to determine the phytochemical constituents, acute toxicity and the hypoglycemic effect of aqueous extract of dried seeds of *Cuminum cyminun* Linn. (Ziya). Qualitative identification tests of the chemical constituents present in the crude powder and aqueous extract were conducted. Acute toxicity study of the aqueous extract of dried seeds was evaluated and was observed that it was not toxic up to 6g/kg body weight. Evaluation of hypoglycemic effect of aqueous extract was carried out on adrenaline-induced diabetic rabbits. It was found that the aqueous extract of 3gm/kg body wt of dried seeds significantly lowered the blood glucose levels at 1hr ($p<0.01$), at 2hr ($p<0.05$), and at 4hr ($p<0.05$), respectively.

346. Preliminary study on hypoglycemic effect of *Phyllanthus niruri* Linn. (Taung-ze-phyu) on rabbit model. Mu Mu Sein Myint; May Aye Than; Khine Khine Lwin; Aye Than; Khin Tar Yar Myint; Mar Mar Myint; Phyu phyu Win; Hla Phyo Lin; Khin May Nyo. *Myanmar Health Sci Res J*. 2009; 21(1): p17-21.

The aim of this study is to determine phytochemical constituents, acute toxicity and hypoglycemic effect of aqueous and 95% ethanol extract of whole plant of *Phyllanthus niruri* Linn. (Taung-ze-phyu). Phytochemical results showed that crude powder, aqueous extract and 95% ethanol extract contained alkaloids, flavonoids, tannins, saponins, steroids, amino acids and polyphenols. Acute toxicity study of crude powder, aqueous extract and 95% ethanol extracts were evaluated in mice. Both crude powder and 95% ethanol extracts showed no evidence of toxicity up to the maximum feasible dose level of 3gm/kg body weight. In contrast, the maximum feasible dose level of aqueous extract was 6g/kg body weight. Therefore, the median lethal dose (LD_{50}) of crude powder and 95% ethanol extract was observed to be more than 3g/kg body weight. The median lethal dose (LD_{50}) of aqueous extract was observed to be more than 6g/kg body weight. Evaluation of hypoglycemic effect of 95% ethanol extracts (1.5gm/kg body weight) and aqueous extract (3gm/kg body weight) was carried out on adrenaline-induced diabetic rabbits. It was found that 95% ethanol extracts significantly lowered the body glucose levels at 2hr ($p<0.05$). Aqueous extract also lowered the body glucose levels at 1hr, 2hr,3hr and 4hr ($P<0.005$~$P<0.05$) respectively when compared with those of the control. Hypoglycemic effect of standard drug glibenclamide (4gm/kg body weight) was also studied to compare with that of the plant extracts. Between the two extracts, the

effects of aqueous extract (3gm/kg body weight) when compared with that of glibenclamide was not significantly different.

347. Preliminary study on the efficacy of Myanmar traditional medicine in the treatment of multi-drug resistant/chronic TB cases at Aung San TB Hospital, Yangon. Than Lwin; Khin Chit; Ti Ti; Thaw Zin; Phyu Phyu Win; Mar Mar Myint; Tin Nu Swe; Paing Soe. *Myanmar Health Res Congr*, 2002; p3.

The outbreak of MDR-TB in 1991 had alarmed the global population, as it is well known that there is little chance of survival in tuberculosis without proper treatment. Treatment with second-line anti-TB drugs in MDR-TB is empirical and impractical because, not only are they inferior to the first-line drugs, they are more toxic and are also extremely expensive, making compliance and prolong treatment questionable. Reports of in vitro efficacy of Myanmar traditional medicine against *Mycobacterium tuberculosis*, especially multi-drug resistant strains, has sparked new hopes for MDR-TB since they are less expensive and readily available locally. During the phase I clinical trial, 5 promising Myanmar traditional medicine were given, exclusively of other anti-TB drugs, in culture-proven MDR-TB patients who cannot afford the second line or newer anti-TB agents. Results were not optimistic since 2 of the patients expired within 5 months, one showed no improvement, and gradual deterioration in chest X-ray. Therefore, during phase II trial on 8 MDR-TB cases, these 5 Myanmar traditional medicines, in their maximum tolerable dose, were added to the second line drugs/new drugs (Kanamycin, clofazamine and either thiacetazone or quinolones both). All patients showed significant improvement between 3 months to one year of treatment. Six showed radiological improvement and sputum conversion to negativity (one showed negative AFB culture), and one patient revealed reduced bacillary load on direct smear examination with chest X-ray improvement. The last patient revealed fall and rise phenomenon in bacillary load on direct smear examination. It was concluded that Myanmar traditional medicine, although not yet comparable alternatives to the first-line anti-TB drugs (HRZES), can of great value as adjunct therapy to newer anti-TB drugs in MDR-TB cases. They may even find place as alternative to extremely expensive drugs like macrolides and beta-lactam antibiotics. However, more studies with longer period of therapy and follow up observation for relapses is mandatory before its place in MDR-TB can be fully documented.

348. Purgative effect of *Euphorbia geniculata* Ortega. leaves. Tha, Saw Johnson; Aye Than; Kyaw Min. *Burma Res Congr*, 1979: p13.

Fresh leaves of *E. geniculata* administered orally to mice could significantly increase ($p<0.05$) gastro-intestinal propulsion rate to 36.8±3.5 per 10 min. On human subjects the fresh leaves showed no purgative action unless heat-treated by boiling otherwise. It caused purgation in 1-2 hours, with maximum effect within 3-6 hours and no effect after 12 hours following the injection. The active principle was found to be acetone-soluble and non-pectate bound. Preparations of various tincture forms to withstand storage were tested and it was observed that there was no marked difference in potency between that from the fresh leaves and that from the partially dried leaves. Administered together with meal it was found to be significantly more effective ($p<0.005$) than that of the prior-to-meal administration, the results being 2.4±0.5 and 1.1±0.3 frequencies/man/hr respectively.

349. Purgative effect of Pway-mezali (*Cassia alata* Linn.) leaves on healthy subjects. May Aye Than; Mu Mu Sein Myint; Aye Than; Myint Thuzar Thant; Thandar Myint; Tin Nu Swe. *Myanmar Health Sci Res J*. 2002; 14(1-3): p17-21.

Majority of Myanmar national people lived in rural areas and have been using traditional medicinal plants for hundred of years. Many people have used some medicinal plants, which claimed to have purgative activity, as crude drugs or as traditional medicine formulations. With the aim to evaluate the therapeutic purgative efficacy of *Cassia alata* Linn. (Mezali-gyi or Pway-mezali), on healthy subjects was conducted at Clinical Research Unit (Traditional Medicine) Department of Medical Research, Lower Myanmar. The study was a controlled, complete cross-over single dose design using magnesium sulphate and phenolphthalein as positive standard. Ten clinically healthy volunteers were participated in this study. Pway-mezali fresh leaves 4g which was just heated for few seconds for softening, magnesium sulphate 1 teaspoonful, and phenolphthalein 0.8g and placebo 2g were administered weekly. Pway-mezali, magnesium sulphate and phenolpthalein showed significant ($p<0.00005$) purgative efficacy on frequency and volume when compared to placebo. Pway-mezali fresh leaves showed no significant different efficacy on frequency, volume and onset when compared to phenolphthalein. It was also found that the onset time of action of Pway-mezali and phenolpthalein is prolonging than magnesium sulphate due to the different mechanism of action. No side effects were observed in any of these subjects. It was concluded that Pway-mezali leaves showed purgative activity.

350. Quantitative determination of Senna ingredient from Traditional Medicine Formulations TMF-09, TMF-10 and TMF-12. Mya Bwin; Saw Han; Swe Swe Thaung. *Myanmar Health Sci Res J*. 1992; 4(3): p138-143.

Quantitative determination of a major plant ingredient Senna contained in Myanmar Medicine Formulation (TMFs) - namely TMF-09, TMF-10 and TMF-12 were estimated by following schedule XIII and XIV of Wallis (1953). Quantitative microscopic work conducted at the Pharmacognosy Laboratory of the Pharmacology Research Division, could quantify the proportion of Senna ingredient, from the above three TMFs.

351. Role of Say-tha-gya plant, *Stevia rebaudiana* cultivated in Shan State, Myanmar: Either as dietary sugar substitute or hypoglycemic agent for diabetics. Nwe Nwe Yee; Group from Central Committee for Drug Abuse Control; Htun Naing Oo; Mu Mu Sein Myint; Moh Moh Htet Kyaw; Khin Tar Yar Myint; Yin Yin Aye; Zaw Naing Win. *Myanmar Health Res Congr,* 2005: p58-59.

A composite plant *Stevia rebaudiana* (Bertono) Bertoni, Say-tha-gya (Sweet herb) has been cultivated in Shan State, Myanmar as "Stevia-Poppy Substitution Project" since September, 2002. That plant is 200-300 times sweeter than ordinary sugar. It is used as a sweetener in food and drink in some areas. There is controversy on its beneficial effect on glucose tolerance. This research was also done to exclude the effect of biodiversity. Aqueous extract of that plant clutivated in Myanmar, 3g/kg was tested on normal and adrenalin induced hyperglycemic rabbits for its effect on blood glucose levels. Acute toxicity test was performed on mice at different doses: 1g/kg, 2g/kg, 3g/kg and 4g/kg. After oral administration, blood glucose levels did not rise in normal rabbits after 1, 2, 3, 4 and 24hr ($p<0.05$). There was no acute toxic effect up to the 4g/kg does. Chemical constituents were analyzed qualitatively and thin layer chromatogram and ultraviolet spectrum of the extract were taken. Although, Stevia plant has the potential role for dietary sugar substitute in diabetics, it cannot be used

as a hypoglycemic agent at this dose. Cultivation of this plant may highly benefit our nation as a natural source of non-sugar sweetener.

352. The role of traditional medicine in the treatment of multidrug-resistant pulmonary tuberculosis, Myanmar. Paing Soe; Than Lwin; Khin Chit; Thaw Zin; Ti Ti. *WHO Southeast Asia Reg, Reg Health Forum*. 2006; 10(2): p1-10.

Extracts of reputed medicinal plants used in Myanmar for treatment of suppurative lung disease were screened for *in vitro* activity on *Mycobacterium tuberculosis* (H37 RV strain). Plants showing satisfactory efficacy were further subjected to phyto-chemical characterization and acute and sub-acute toxicity testing before having approval from the National Ethical Committee, Department of Medical Research (Lower Myanmar). Five out of 11 medicinal plant extracts, coded as PTBOO2, PTBOO3, PTBOO5, PTBOO7 and PTBOO9, were found to possess significant *in vitro* anti-mycobacterial activity. Chemical screening did not indicate any presence of toxic organic constituents. Acute and sub-acute toxicity tests in mice and rats showed no significant abnormalities in biochemical, haematological and histopathological changes in both the control and the test groups. With due consideration to medical ethics in human trials, the above-mentioned five promising plant extracts were allowed for clinical trials, on selected culture-proven multidrug-resistant tuberculosis (MDR-TB) patients from the Aung San Tuberculosis Hospital who had not shown satisfactory response to the routinely-administered second-line anti-TB drugs up to a minimum of two years. Also, for ethical reasons, the plant extracts were only allowed to be given in addition to the second-line anti-TB drugs already being administered (kanamycin, thiacetazone or quinolones), to which the patients had shown no response. A dose-finding study was conducted, starting from the minimal dose used by traditional practitioners, and slowly increasing it to its maximum tolerable level. All plant extracts were found to be well tolerated and all patients showed significant improvement after three to 12 months of treatment. This study indicated that the reputed indigenous medicinal plants of Myanmar can become potentially valuable anti-TB drugs in the future.

353. Safety and *in vivo* antiamoebic efficacy of *Euphobia hirta* Linn. (Kywe-kyaung-min-say) on *Caecal amoebiasis* in mice. Nu Nu Aung. Thesis, PhD (Zoology), University of Yangon; 2010.

Amoebiasis is an invasive disease of the caecum and large intestine, and affects mainly the low socio-economic groups living under crowded, poor hygienic conditions. Because of low cost, safety and easy availability, herbal remedies, like Kywe-kyaung-min-say (*Euphobia harta* Linn.), are popularly used for amoebic dysentery among these people. Thus, it is of interest to scientifically evaluate its safety by acute toxicity testing (LD_{50}) and antiamoebic acivity against *Caecal amoebiasis* in mice. The study tested the effect of crude 50% ethanolic extract of *Euphobia hirta* on the *Caecum amoebiasis* induced in mice by *E. histolytica* (HM1: MISS) strain. *E. histolytica* trophozoites ($2x10^5$) were administered orally and infection comfirmed on the fourth day through detection of trophozoites in mice stools. The ethanolic extract, in serial dilutions of 3, 6 and 9g/kg of *Euphobia hirta*, were administered daily for 3 consecutive days, to 3 groups of mice infected with *E. histolytica*. On the fourth day, the mice were sacrificed and the reduction in caecal wall ulceration was compared with a negative control group of non-infected mice and a positive control group of infected mice receiveing metronidazole (78mg/day). Marked antiamoebic activity of *Euphobia hirta* was seen as reduction of ceacal wall ulceration in mice treated by the extract and metronidazole when compared to the control animals. The 50% ethanolic

extract, at doses of 9g/kg, affect cure in 40% of the mice treated, as compared to 80% with metronidazole. The remaining 2 doses of 3 and 6g/kg extract still showed 20-25% effectiveness in treated mice. Since acute toxicity study (LD_{50}) did not indicate significant toxicity, the study signified the potential usefulness of (Kywe-kyaung-min-say) (*Euphobia hirta* Linn.) in caecal amoebiasis.

354. Screening, isolation and charaterization of natural antioxidants from Myanmar medicinal plants: *Thea sinensis* Linn. (Tea) and *Curcuma longa* Linn. (Nanwin). Mie Mie Aye. Thesis, PhD (Chemistry), University of Yangon; 2005.

In the present work, leaves of *Thea sinensis* Linn. (Tea) which is widely consumed in Myanmar as a drink "Green tea" and rhizomes of *Curcuma longa* Linn. (Nanwin) which is used both as a colouring material and as a condiment in Myanmar traditional cooking have been selected and screened for antioxidative activity. The antioxidative activities of the extracts of the two plants were studied by a model system of linoleic acid (Thiocyanate method) in comparison with the synthetic antioxidant butylated hydroxyl anisole (BHA). The antioxidative activity of the chloroform extract (% Inh=75.970) of *T. sinensis* was slightly less than synthetic antioxidant BHA (% Inh=85.340) by the thiocyanate method after 14^{th} day incubation while the antioxidative activity of its ethanol extract (% Inh =87.055) was higher than that of the synthetic antioxidant BHA. Caffeine (3.9%) from chloroform extract, and catechin (0.0438%) and epicatechin (0.075%) from ethanol extract were isolated by column chromatography on silica gel. Similarly, the chloroform extract (% Inh=81.779) of *C. longa* showed as nearly effective an antioxidative activity BHA by the thiocyanate method. Chromatographic separation of chloroform extract yielded three curcuminoids, namely curcumin (6%), demethoxycurcumin (0.033%) and bisdemethoxycurcumin (0.026%). The isolated compounds were identified by melting point, optical rotation, TLC, V, TIR, R, NMR with DEPT and mass spectrometric methods. Among these isolated compounds, catechin (% Inh =89.404) from *T. sinensis* and curcumin (% Inh =88.266) from C. *longa* showed more antioxidative activities than the synthetic antioxidant BHA by the thiocyanate method. Thus, from the observation, it is found out that, "catechin" have strong potential to be used as "natural anti-aging substances" for men, and in food industry, they may be employed as "natural antioxidant additives" in place of "synthetic antioxidant additives"

355. Screening of diuretic activity of medicinal plant extracts on *in vivo* animal model. Mu Mu Sein Myint; Aye Than; Aye Aye Thein; Win Win Maw; Kyi Kyi Myint; San San Myint. *Myanmar Health Res Congr,* 2000: p44.

Eight Myanmar medicinal plants which are reputed for use in the treatment of urinary ailments and which had never been tested before were selected. The aqueous and 50% alcohol extracts of *Plantago major* Linn.; *Hydrocotyle asiatica* Linn.; *Orthosiphon aristatus* Bl. *Zingiber officinale* Roscoe., *Allium cepa* Linn., *Allium sativum* Linn., *Acorus calamus* Linn. and 95% alcohol extracts of *Hibiscus sabdariffa* Linn. were studied. Out of eight plants tested five plants were found to have diuretic activity in albino rats. Aqueous extracts of *P. major* (1g/kg), *H. asiatica* (1g/kg) 50% alcohol extract of *O. aristatus* (1g/kg), *Z. officinale* (1g/kg), 95% alcohol extract of *H. sabdariffa* (1g/kg) and the standard drug hydrochlorothiazide (25mg/kg) significantly increased the urinary excretion when compared with that of the control group (p0.05 to p0.005). Among these extracts, 95% alcohol extract of *H. sabdariffa* was determined to have most effective diuretic activity. It also increased the excretion of sodium and potassium in the urine. 50% alcohol extract of *O. aristatus* (1g/kg) also showed potent diuretic activity but with less potassium loss than *H. sabdariffa*. Three plants

(*H. asiatica, P. major* and *Z. officinale*) had mild diuretic activities, but the remaining 3 plants (*A. cepa, A. sativum* and *A. calamus*) had no significant diuretic activities.

356. Screening of five Myanmar medicinal plants for hypoglycemic activity on rabbit model. May Aye Than; Mu Mu Sein Myint; Aye Than; Mar Lar Than; Kyi Kyi Myint; San San Myint; Thazin Myint; Win Win Maw; Wai Lwin Oo. *Myanmar Health Res Congr,* 2001: p29.

The aim of this study was to reveal scientific proof on hypoglycemic properties of reputed Myanmar medicinal plants, usually claimed to be effective for diabetes mellitus in Myanmar traditional medicine system. A complete cross-over experimental study of hypoglycemic activity was tested on glucose-loaded hyperglycemic rabbit model. The aqueous extract of dried leaves of *Aegle marmelos* Corr. (Oat-shit-ywet), *Andrographis paniculata* Nees. (Say-khar-gyi or Nga-yoke-khar), *Cassia glauca* Lam. (Pyi-pan-nyo), *Vitex glabrata* R.Br. (Htauk-sha or Kyet-le-zan) and *Trigonella foenum-graecum* Linn. (Pe-natha-seet) powder 3gm/kg body weight in glucose water were administered, 1 week after studying of glucose loaded hyperglycemic control curve. The blood glucose levels were determined at 0, 2, 3, 4 hours after administration of extracts and powder of plants. Among the plants tested, only Pe-natha-seet was observed that the blood glucose level of glucose loaded control group were 238.7±2.3mg. At 2hr, 149.7±6.7mg. 3hr whereas the blood glucose levels of the test group were 136.0±3.7mg. At 2hr, 118.5±11.6mg. At 3hr, respectively. It was found that the Pe-natha-seet powder only significantly lowered the blood glucose levels at 2hr ($p < 0.005$) and 3hr ($p < 0.025$).

357. Screening of Myanmar medicinal plants for antimalarial activity. Ye Htut; Kyin Hla Aye; San San Htwe; Myint Lwin; Myint Oo; Win Myint; Tin Ko Ko Oo; Khin Myo Aye; Ni Ni. *Myanmar Health Res Congr*, 2000: p43.

Many medicinal plants are well known for the prevention and treatment of malaria. With the aim of exhibiting scientific proof for their antimalaria activity, some medicinal plants namely *Artemisia annua* (Daw-na-shwe-war), *Coptis teeta* (Khan-tauk-myit), *Brucea javanica* (Ya-dan-se), *Swertia chirata* Buch-Ham, (Say-khar-gyi), *Aristolochia bracteata* (Nga-phone-say) and *Andrographis paniculata* (Nga-yoke-khar) were screened using both *in vitro* drug testing and *in vivo* experimental mouse model systems. Among the medicinal plants tested, only petroleum ether extract of *Artemisia annua* (Daw-na-shwe-war) showed therapeutic effect on malaria in both systems. The importance of requirements for screening system as well as the nature of traditional medicines tested were discussed.

358. Screening of natural larvicides from *Spilanthes acmella* L. (Pe'-laynyin) and *Melia azedarach* L. (Pan-tamar). Khin Su Latt. Thesis, PhD (Chemistry), University of Yangon; 2009.

Two plant materials, aerial part of *Spilanthes acmella* L. (Pè-laynyin) and bark of *Melia azedarach* L. (Pan-tamar) were selected for the screening of mosquito larvicidal activity against third and fourth instar larvae *(Aedes aegypti* mosquito*)*. Petroleum ether extract from aerial part of Pè-laynyin and EtOH extract from Pan-tamar bark showed potent larvicidal activities (LC_{50}=0.0065%, LC_{90}=0.0146% and LC_{50}=1.008%, LC_{90}=3.693%, respectively). Activity guided fractionation lead to isolate β-sitosterol (**I**) (0.18% yield m.pt. 141°C), *N*-isobuty 1-2,6,8-decatrienamide (**II**) (0.01% yield, *m.pt*. 81°C) and 5-hydroxy dihydroedesmol (**III**) (0.02% yield, m.pt. 133°C) from petroleum ether extract of aerial part of Pè-laynyin, and β-sitosterol- β-D-glucoside (**IV**)(0.01% yield, m.pt. 264-268 °C) from ethyl acetate soluble portion of ethanol extract

of Pan-tamar bark. Although compound **I** does not possess larvicidal activity, compounds **Il** and **III** have significant larvicidal effect (LC_{50}=0.0017% and LC_{90}=0.0035%, LC_{50}=0.0017% and LC_{90}=0.0072%, respectively). Their activities are better than those of their mother crude extracts. However, the larvicidal activities of these compounds were much lower than that of synthetic larvicide (Abate). Compounds **II** and **III** could be considered as natural larvicidal agent and used as alternatives for conventional chemical control that is environmentally safe and biodegradable. In addition, PE extract from aerial part of Pè-laynyin and EtOAc extract from bark of Pan-tamar could also be used as natural larvicidal agents. Ethanolic extract of *Spilanthes acmella* in mice had no sign of toxicity at 10g/kg dose and can be safely used as larvicide that has no harmful effect to mammalian. The maximum giving dose for ethanolic extract of *Melia azedarach* in mice was 8 g/kg within survival period for 7 days to be looked forward. At a dose of 10g/kg, one out of three mice was found to be dead and therefore, care must be taken if bark of *Melia azedarach* is used as larvicide. PE extract from aerial part of *S. acmella* showed no lethality on fishes *Clarias batrachus* (Nga-khu) at 0.025% concentration level. PE extract at this concentration was seemed to be no harmful effect to aquatic vertebrates and can safely be used as natural larvicide in fresh water.

359. Screening of six Myanmar medicinal plants for hypoglycemic activity on rabbit model. May Aye Than; Mu Mu Sein Myint; Aye Than; Mar Lar Than; Kyi Kyi Myint; San San Myint; Thazin Myint. *Myanmar Health Res Congr*, 2002: p35-36.

Diabetes mellitus is one of the six major priority diseases in Myanmar. Myanmar has a rich tradition in the use of medicinal plants for the treatment of diabetes mellitus. The aim of this study was to reveal scientific proof on hypoglycemic properties of reputed Myanmar medicinal plants, usually claimed to be effective for diabetes mellitus in Myanmar traditional medicine system. Thus, the complete cross-over experimental study of hypoglycemic activity was tested on glucose-loaded hyperglycemic rabbit model. The fresh leaf juice of *Aegle marmelos* Corr. (Oat-shit-ywet), *Cassia glauca* Lam. (Pyi-pan-nyo), *Anacardium occidentale* L. (Thi-ho-thayet), fruit juice of *Morinda angustifolia* Linn. (Ye-yo), whole plant juice of Shan-myin-khwar and Hmyit-kha 10ml/kg with 3gm/kg body weight in glucose water were administered, one week after studying of glucose loaded hyperglycemic control curve. The blood glucose levels were determined at 0, 2, 3, 4 hours after administration of fresh juice of plants. Among the plants tested, Shan-myin-khwar was observed that the blood glucose level of glucose loaded control group were 396±2.4mg% at 2hr, 141.3±8.6mg% at 3hrs whereas the blood glucose levels of the test group were 121±17.1mg% at 2hr and 83.2±7mg% at 3hrs, respectively. Thi-ho-thayet was observed that the blood glucose level of glucose loaded control group were 244±23.1mg% at 2hr, 173.3±19.2mg% at 3hrs and 144.5±19.6 at 4hrs whereas the blood glucose levels of the test group were 168.5±29.3mg% at 2hr, 123±6.2mg% at 3hrs, and 90.5±13 at 4hrs, respectively. It was found that the fresh juice of Shan-myin-khwar significantly lowered the blood glucose levels at 2hr ($p<0.01$), 3hr ($p<0.001$) and Thi-ho-thayet at 2hr ($p<0.01$), 3hrs ($p<0.05$) and 4hrs at ($p<0.05$), respectively.

360. Screening of six Myanmar medicinal plants for hypotensive activity on anaesthetized normotensive dogs. May Aye Than; Aye Than; Mu Mu Sein Myint; Kyi Kyi Myint; Thazin Myint. *Myanmar Health Res Congr,* 2002; p52-53.

Hypertension is one of the six major priority diseases in Myanmar and one of the leading causes of death. Myanmar has a rich in variety of medicinal plants and people use various herbal medicines tremendously for using hypertension. But, so far, there has not been full and systematic exploitation of these natural resources with regard to hypotensive effect. So it is rational to screen of these extract preliminary on laboratory test models. The experimental design using anaesthetized normotensive dogs. After intravenous administration of the aqueous extract of Shan-myin-khwar whole plants, Hmyit-khar, Na-nwin-khar rhizome (*Curcuma comosa* Roxb.), Ye-yo-thee (*Morinda angustifolia*), Ponna-yeik leaves (*Ixora coccinea* Linn.) and Thagyar-ma-gike leaves (*Othosiphon aristatus* Bl.), the blood pressure lowering levels were determined by kymograph. Among the plants tested, the aqueous extract of Na-nwin-khar, Ye-yo-thee and Thagyar-ma-gike produced transient fall of mean systolic blood pressure about (31.4%-39.9%), (14.6%-30.2%), (17.1%-35%) and mean diastolic pressure (33.9%-43.2%), (13.9%-29.8%), (18.5%-37.7%) respectively, for 2-10mins in all dose levels and then returned to baseline level. The aqueous extract of Shan-myin-khwar produced fall of mean systolic blood pressure (15.2%-31.2%) and mean diastolic pressure (16.5%-33.9 %) for 15-30 mins at all dose levels and then returned to baseline level. The aqueous extract of Hmyint-khar and Ponna-yeik reduced the mean systolic blood pressure about (19.4%-51.8%), (27.2%-67.2%) and mean diastolic pressure (22.4%-55.5%), (31%-72.8%) respectively, at all dose levels without returning to baseline after 45 mins. It was found that the aqueous extracts of Hmyit-khar and Ponna-yeik, Shan-myin-khwar reveal hypotensive activity for 30-40mins after drug administration whereas Na-nwin-khar, Ye-yo-thee and Thagyar-ma-gike had mild transient hypotensive activity for 2-10mins only.

361. Screening of some anti-bacterial indigenous plant extracts. Mar Mar Nyein; Tu, Margaret. *Rep Burma Med Res Counc,* 1972; p18.

An aqueous extract of *Brucea sumatrana* (Ya-tan-sai), *Butea frondosa* (Pauk), *Coptis teeta* (Khan-tauk), *Ixora coccinea* (Pon-na-yeik) and *Peperomia pellucida* (Tein-ta-la) were tested against *Escherichia coli, Klebsiella pneumoniae, Proteus mirabilis, P. vulgaris, Salmonella paratyphi, S. typhi, Shigella boydii, S. flexneri, S. schmitzi, Staphylococcus aureus* and *Vibrio cholerae* Eltor. Agar disc diffusion technique (Fairbrother & Sherris, 1959) was used. Zone of inhibition of more than 2mm from the edge of the disc, were recorded 'sensitive'. An extract of *Brucea sumatrana* had an antibacterial activity on *P. vulgaris* and *Shigella boydii.* An extract of *Butea frondosa* had no antibacterial activity on the 12 tested organisms. *Proteus mirabilis* and *S. paratyphi* were sensitive to an extract of *Ixora coccinea*. An extract of *Peperomia pellucida* showed an antibacterial activity on *S. paratyphi.* An extract of *Coptis teeta* showed an antibacterial activity on *S. paratyphi, Shigella boydii, S. aureus* and *Vibrio cholerae* Eltor.

362. Screening of some indigenous plants for anthelminthic action against *Ascaris suum*. Mya Bwin, Aye Than; Saw Han; Tin Myint. *Burma Res Congr,* 1985, p13.

Thirty three indigenous plants, traditionally claimed to be useful for purging human intestinal round worms and yet not been scientifically tested, were evaluated experimentally for their anthelminthic actions on an *in vitro* test *Ascaris suum*. Plant extracts were screened generally by a modification of the method of Sen and Hawkins (1960), and specific testing was done by the method of Goodwin (1958) as modified by Thawka-Kyin (1976). On the basis of producing muscle paralysis of the worm within predetermined experimental periods, twenty two of the plants tested were found to possess a moderate degree of anthelminthic activity and three of the plants, were highly potent ; the latters were *Urginea indica*, *Ananas sativa* and Hydnum sp.

363. Screening of some medicinal plants reputed for anthelminthic activity on *in vitro* test models. Aye Than; Mya Bwin; Saw Han; Tin Myint; Marlar Lwin; Po Aung, Saw. *Myanmar Health Sci Res J*. 1993; 5(2): 79-84.

Thirty three medicinal plants, traditionally claimed to be useful for purging human intestinal roundworms were evaluated experimentally for their anthelminthic action against *Ascaris suum in vitro*. On the basis of producing muscle paralysis of the worm within predetermined experimental periods, seventeen of the plants tested were found to possess anthelminthic activity. *Urginea indica* and *Ananas sativa* were most effective and a fungus, *Hydnum repanda* also showed good activity.

364. Screening of two indigenous medicinal plants for snake venom neutralization. Chit Maung; Aung Tun. *Rep Burma Med Res Counc.* 1972: p51.

Two indigenous medicinal plants, ဂမုန်းတိမ်ပြာ and ဝိန်းရိုင်း both of which have not yet been botanically identified were screened for their viper venom neutralization activity. The method has already been described in the 1969 Annual report. Water-saline soluble extracts of both the plants showed no inhibitory activity on snake venom toxicity.

365. Screening of the anti-peptic ulcer activity of some Myanmar traditional drugs experimentally. Aye Than; Tin Myint; Mu Mu Sein Myint; Mya Bwin; Tha, Saw Johnson. *Med Res Congr*, 1990: p11.

Five Myanmar Traditional Medicine Formulations (TMFs) namely TMF-02, TMF-03A, TMF-03B, TMF-05 and TMF-08, traditionally claimed for treating dyspepsia, were screened for anti-peptic ulcer activity by employing two experimental *in vivo* anti-ulcer test models on rats. Both negative control (no drug) and positive control (cimetidine) were included. Only TMF-02, TMF-03B and TMB-08 markedly reduced ulcer severity to the ulcer indices of 17.4, 15.6 and 14.5 respectively. The effects were comparable to cimetidine-being 13.8, whilst that of the negative control was 35. A further test model of gastric juice acidity in rats, employing pyloric ligation method, confirmed these three drugs reduced gastric acidity, particularly in diminishing the free acid amount to one-third and concomitantly attaining the pH of the gastric content to the value of 6-7. The promising antacid action of the three formulations were discussed.

366. Standardization, pharmacological and toxicological evaluation of traditional drugs and herbal medicine: Project findings and recommendations. Pharmacology Research Division. Yangon: Dept Med Res; 1989.

The book includes five specimen texts. It describes the ingredients of each formulation with the retrospective weights, along with taste, dosage and indications. The ingredients of traditional drugs are mainly medicinal plants, while a few are materials of animal origin, mineral/inorganic salts or organic substances. The findings and recommendation consists of outputs, objectives achieved and conclusions. The five specimen texts were mentioned and Annexes.

367. Structural and anti-hepatitis B viral activity study of some organic compounds present in the leaves of *Urena lobata* Linn. (Kat-si-ne) and *Bryophyllum pinnatim* Kurz. (Ywet-kya-pin-bauk). Malar Khaing. Thesis, PhD (Chemistry), University of Yangon; 2008.

In vitro anti-hepatitis B virus (anti-HBV) activity of *Urena lobata* Linn. (Kat-si-ne) leaves and *Bryophyllum pinnatim* Kurz. (Ywet-kya-pin-bauk) leaves were investigated by using ELISA (Enzyme Link Immuno-Sorbent Assay) test kits. Two different concentrations (4mg cm^{-3} and 6mg cm^{-3} in PBS buffer) of ethnolic crude extracts each (ethnol and ethnol water extracts) were prepared for these plant samples. Ethnolic crude extract of *Bryophyllum pinnatim* Kurz. (Ywet-kya-pin-bauk) leaves (effective at HBsAG titre 1/32) and *Urena lobata* Linn. (Kat-si-ne) leaves (effective at HBsAG titre 1/1024) possess anti-HBsAg like activity. By percolation and silica gel column chromatographic separation methods, tiliroside, (3-O-β-D (6"-O-coumaryl) – glycopyranoside) (I) (0.004% yield, m.p.220-222˚C) and (I – [3-methoxy-4-((1Z, 3E) – 2, 5, 6 - trihydroxy hepta-1, 3-dienyl) –phenyl] ethanone) (II) (0.026% yield, m.p. 252-254˚C) were isolated from ethanolic extract of "Kat-si-ne" leaves. Similarly, β-sitosterol β-glucoside (III) (0.007% yield, m.p. 235-237˚C) was isolated from petroleum ether extract and flavonoid (IV) (0.003% yield, m.p. 210˚C) and flavonoid (V) (0.005% yield, m.p. 263-265˚C) from ethyl acetate extract of "Ywet-kya-pin-bauk" leaves were isolated, respectively. The isolated compounds were identified and the structure elucidated by the joint application of UV, FT-IR, ^{1}H NMR, ^{13}C NMR and ESI-MS spectroscopic techniques. The isolated compounds I and II possess a weak anti –HbsAg like activity (negative at HBsAg titre 1/2048). Compound III also exhibited a weak anti-HBsAg like activity (at HBsAg titre 1/2048), and compound V indicated a mild anti-HBsAg like activity (HBsAg titre 1/512). Anti-HBsAg like activities of all isolated compounds was found to be lower than their respective crude extract. The present investigation revealed that either crude plants or ethanolic extracts of Kat-si-ne and Ywet-kya-pin-bauk leaves could be used in the treatment of HBV infection as claimed by Myanmar traditional medicinal practitioners. However, the ethanolic extracts of Ywet-kya-pin-bauk leaves were more effective than those of Kat-si-ne leaves extracts.

368. Structural elucidation of potent anti-bacterial constituents from *Oroxylum indicum* L.Vent. (Kyaung-sha) bark used in the treatment of diarrhoea. Htoon Lwin Htoon. Thesis, PhD (Chemistry), University of Yangon; 2010.

Bark of *Oroxylum indicum* L.Vent. (Kyaung-sha) traditionally used in the treatment of diarrhoea was chosen for investigation of chemical constituents and bioactivity. By silica gel column chromatographic separation, five compounds namely, oxoylin-A (A) (0.026% yield, m.p. 282-230ºC); chrysin (B) (0.049% yield, m.p. 282-284ºC); baicalein (C), (0.073% yield, m.p. 212-214ºC) and scutellarein (E) (0.017% yield, m.p.>300ºC) were isolated from EtOAc soluble fraction of petroleum

ether extract of defatted bark. In vitro antibacterial activity tests using agar disc diffusion method and agar well diffusion method revealed that ethanol and ethyl acetate extracts have moderate antibacterial activity against all tested organisms (*Staphylococcus aureus, Bacillus cereus, Escherichia coli* (ATCC), *Salmonella typhi, Shigella flexneri* and *Vibrio cholarae* O139, *Bacillus subtilis, Escherichia coli* (ETEC), *Shigella sonnei* and *Samonella krefeld*) while petroleum ether and aqueous extracts did not show any antibacterial activity. *In vitro* screening of antifungal activity using agar well diffusion method revealed all extracts (pet-ether, ethanol, methanol and ethyl acetate extracts) except aqueous extract were able to inhibit the growth of *Candida albican*. The minimum inhibitory concentration (MIC) of compound D was determined by using microplate dilution method against the strains; *Staphylococcus aureus,* and *Bacillus cereus, Escherichia coli* (ATCC), *Salmonella typhi, Shigella flexneri* and *Vibrio cholarae* O139. The most potent activity was found against *S. aureus* with MIC value (0.625mg/ml). Investigation of acute toxicity in mice revealed that 70% ethanolic extract was found to be free from harmful effect at maximum permissible dose of 16g/kg bw and the medium lethal dose (LD_{50}) would be greater than 16g/kg bw. *In vitro* anti-diarrhoeal effects of 70% ethanolic extract (at dose of 1.5, 3.0 and 6.0g/kg BW) were studied in castor oil induced diarrhoeal mice model. The investigation was conducted via diarrhoeal test, enteropolling test and gastrointestinal transit test. Results revealed that 6g/kg dose provided significant frequencies of diarrhoeal reducing effect, anti-secretory effect and anti-motility effect. *In vivo* antidiarrhoeal index ($ADI_{in\ vivo}$) at 6g/kg dose was 56.02% for ethanolic extract and 123.9% for standard drug, loperamide (Dicotil). Thus, 70% ethanolic extract of *Oroxylum indicum* L.Vent. bark possessed less potent antidiarrhoeal activity than that of standard drug, loperamide. DPPH staining Dot-blot method was applied for screening antioxidant activity. Both pet-ether and ethyl acetate extracts of *O. indicum* bark showed antioxidant activity down to 50µg of dry matter. However, ethyl acetate extract more rapidly discharged the purple background when compared to that of pet-ether extract showing much higher anti-oxidant potency. ED-XRF analysis revealed the presence of Ca, K, Cl, Fe, Cu, Sr and Zn in the bark. Thus, the bark of *Oroxylum indicum* L.Vent. (Kyaung-sha) is hoped to be useful as antimicrobial and antidiarrhoeal and in treating degenerative disease.

369. Structure study of some organic compounds in *Bombax malabaricum* DC. (Let-pan) (Flowers) and *Glinus oppositifolius* L.A.DC. (Ganga-lar) and their anti-Hepatitis B virus activity. Myat Theingi. Thesis, PhD (Chemistry), University of Yangon; 2008.

In vitro anti-hepatitis B virus surface antigen like activity of *Bombax malabarium* DC. (Family: Ambacaece) (Let-pan in Myanmar) flowers and *Glinus oppositifolius* L.A.DC. (Family: Molluginaceae) (Gangalar in Myanmar) have been investigated by using ELISA (Enzyme Link Immuno-Sorbent Assay) test kits. (4 and 6mg/cm^3) concentration of ethanol or ethanol-water crude extract of both samples were prepared by dissolving in PBs buffer. All ethanolic crude extracts showed anti-HBsAG like activity. The order of potencies of *B. malabaricum* > ethanol extract of *B. malabaricum* > ethanol extract or ethanol-water extract of *G. oppositifolius*. Isolation, solvent partition, successively column chromatographic separation on silica gel followed by sephadex LH-20 and crystallization provided β-sitosterol (I) (0.006% yield, m.p. 137-142˚C), β-sitosterol β-glucoside (II) (0.005% yield, m.p. 264-268˚C) and triterpene trigluciside (III) (0.004 % yield, m.p. 200-208˚C) from active ethanol extract of *B. malabaricum*. Triterpene digluciside (IV) (0.005% yield, m.p. 280-

283˚C) was similarly isolated from active ethanol extract of *G. oppositifolius*. All isolated compounds were identified and characterized by melting point determination and UV, FI-IR, ^{1}H-NMR, ^{13}C-NMR and MS spectroscopic measurements. Anti-HBsAG like activities of all isolated compounds was lower than their respective crude extract. Ethanol extracts of both *B. malabaricum* (Let-pan) flowers and *G. oppositifolius* (Gangalar) hoped to be successfully applied in the treatment of hepatitis B viral infection.

370. Studies on bioactivity and chemical investigation of Myanmar Traditional Medicine Formulation (TMF-06) and medicinal plants used for the treatment of dysentery and diarrhoea. San San Aye. Thesis, PhD (Chemistry), University of Yangon; 2002.

Traditional Medicine Formulation-06 (TMF-06) which is used for the treatment of dysentery and diarrhoea in Myanmar was selected and screened for antibacterial activity by using agar disc diffusion technique. Polar and non-polar extracts of TMF-06 as well as its two constituent plants were tested on 33 species of standard and hospital bacterial strains and the Minimum Inhibitory Concentration (MIC) of the active extracts was also determined. Rhizomes of *Curcuma longa* Linn. one of the two constituent plants of TMF-06, was fractionated by column and thin layer chromatographic methods. Chromatographic separation of active ethyl acetate extracts yielded three curcuminoids, namely curcumin (5.9%), desmethoxycurcumin (0.018%) and bisdesmethoxycurcumin (0.0136%). *Nigella sativa* Linn. seeds, the other plant constituent, were also steam distilled and the essential oil obtained was fractionated by column chromatography to give thymoquinone (0.01%). Kaempferol (0.12%), quercetin (0.001%), a beter-diketone (0.002%) and an ester (0.02%) were also isolated by column chromatography from the 70% EtOH polar extract of the *Nigella sativa* seeds after defatting and acid hydrolysis. The isolated compounds were identified by UV, FT-IR, H ^{1}NMR, C^{13} NMR and mass spectroscopic methods. Isolated curcumin, thymoquinone, kaempferol, quercetin and the beter-diketone were found to show bactericidal activity.

371. Studies on the *in vitro* antibacterial activity of some indigenous plant extracts. Thandar Oo. Thesis, MSc (Botany), University of Yangon; 1998.

The dry plant of *Phyllanthus niruri* L. (Taung-zipyu), the dry seeds of *Piper nigrum* L. (Nga-yok-kaung) and the fruits, bark and leaves of *Terminalia chebula* Retz. (Panga) were extracted with ethanol, 50% ethanol and water. These plant extracts were tested for antibacterial activity on 18 bacterial organisms. Agar disc diffusion test by surface-swab method as described by Bauer et al. (1966) was used for screening. The tested samples were extracted with ethanol, 50% ethanol and water. The test organisms include five species of Shigella, three species of Vibrio and one species of each of Klebsiella, Plesiomonas, Proteus, Pseudomonas, Salmonella and Staphylococcus. It was investigated that the plant of *Phyllanthus niruri* with ethanolic, 50% ethanolic and watery extracts were active on one strain of Sr. No. 2; two strains of Sr. No.11, 15 and three strains of Sr. No.11.15 and 16. The percentage activity of the three extracts and the number of bacteria tested were 7.14%, 12, 5%, 16.6% and 14, 16 and 18 respectively. It was found that the watery extract of *Phyllantus niruri* possessed the highest antibacterial activity. The three different extracts of *Piper nigrum* seed had no activity on the tested bacteria. The ethanolic, 50% ethanolic and watery extract of *Terminalia chebula* fruit was active on three strains (23.07%) out of 13 strains; five strains (27.77%) out of 18 strains ; nine strains (56.25%) out of 16 strains respectively. The extracts of bark were active on two

strains (13.33%) out of 15 strains; two strains (13.33%) out of 15 strains and six strains (40%) out of 15 strains respectively. The extracts of leaves were active on 11 strains (73.33%) out of 15 strains; three strains (20%) out of 15 strains and ten strains (66.6%) out of 15 strains respectively.

372. Studies on the morphology and anatomy of *Lawsonia inermis* Linn. (Dan-gyi) and extraction of bioactive compounds from it. Khin San Nu. Thesis, PhD (Botany), University of Yangon; 2005.

The species of *Lawsonia inermis* Linn. in Myanmar as Dan-bin is used in Myanmar for its medicinal properties and grown as an ornamental as well. This research deals with the study on the morphological characters of the plant and anatomical characteristies of the leaf, the stem, the barks and the root. The species being medically important for its possession of anthraquinone compounds; chemical extractions are carried out for naphthoquinone (Lawsone) tannin as gallic acid and xathone. Crude extraction is made using water, 50% ethanol, 95% ethanol, and chloroform and petroleum ether to study the pharmacological activity. The extracts were tested against 13 pathogenic bacteria, comprising 2 strains of Proteus, 2 strains of Staphylococcus, 4 strains of Shigella, 1 strain each of *Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Salmonella typhi* and *Vibrio cholera* Eltor. The effectiveness of the extracts was shown on eleven species of bacteria and test on *Entamoeba histolytica*, a pathogenic organism for the treatment of diarrhea and dysentery showed positive results.

373. Study of disease morbidity and drug dispensing patterns on patients utilizing traditional medical care at the Traditional Medicine Centers in Yangon and Mandalay. Thaw Zin; Thaung Hla; Nwe Nwe Win; Win Kyi; Kyin Thein; Aye Lwin; Soe Moe; Mya Bwin; Aung Naing; Thein Hlaing; Hla Pe. *Med Res Congr*, 1991; p28-29.

With the purpose of narrowing the gap in health service coverage between urban and areas, the National Health Plan in Myanmar envisaged the development and involvement of traditional medicine in the support of the primary health care. For the delivery of the traditional medical care to effectively support the National Health Plan, the first step is the development of a list of essential drugs which will offer the widest possible coverage of the prevalent morbidity effecting the population. This study was conducted with the aim to identify the prevalent morbidity pattern encountered in traditional medical care and the drugs most needed to treat which ailment, to study the drug dispensing patterns and to find out the rationale behind such prescribing, and finally, to develop a common treatment schedule for the diseases identified above so as to get as overview of the cost of the traditional medical care. The records and charts of all patients who attended the traditional medicine hospital and dispensaries in Yangon and Mandalay during the specified months, namely January, April and July, 1991 as well as the total amount of drugs used for various illnesses for one year (1stSeptember, 1990 to 31stAugust, 1991) were studied. The amount of drug used in the record was compared with the total amount of drugs that would be needed according to the common treatment schedule which was developed through interview and discussion of 19 well-experienced traditional medicine physicians. The association between seasonal variation and disease morbidity, and subsequent drug dispensing pattern, as well as the cost and rationale behind drug use was discussed.

374. A study of hypoglycemic effects of the extracts of *Caesalpinia cristata* L. (Gray Nicker & Bean.) in rabbit models. Phone Myint Aung. Thesis, PhD (Zoology), University of Yangon; 2006.

Diabetes mellitus is one of the dreadful diseases threatening the health of people in Myanmar. Many synthetic medicines are used in curing the diabetes. However, most of them are paired with side effects. So that synthetic medicines are substituted by traditional medicine with the least side effect. The seed shell of *Caesalpinia cristata* L. (Ka-lein), one of the herbal medicines already used traditionally in Myanmar, has not been systematically and scientifically studied on its hypoglycaemic effect. This study was conducted to determine the phytochemical constituents and median lethal dose LD_{50} of the extracts of *C. cristata* seed shell and to search the hypoglycaemic activity of aqueous and ethanolic extracts systematically and scientifically. Aqueous and ethanolic extracts were extracted from the air dried seed shell powder of *C. cristata*. Alkaloids, glycosides, flavonoids, terpenoids, tannins, resins and polyphenol were present in crude powder and the extracts of *C. cristata* whereas steroids and saponins were absent. When the acute toxicity test was conducted, it was found that the median lethal dose (LD_{50}) of *C. cristata* was more than 8g/kg body weight. So it was observed that it was not toxic at 8g/kg. Statistical analysis (Student's't' test) was applied in comparing the hypoglycaemic effects of aqueous extract and ethanolic extract of *C. cristata* seed shell (test group) with control group. Comparison of hypoglycaemic effects of the extracts of *C. cristata* and that of standard drug, glibenclamide was also made. It was observed that aqueous extract of the seed shell produced a significant inhibition of blood glucose level at 2hours ($p<0.05$) and 3hours ($p<0.05$). The ethanolic extract of it also produced a significant inhibition of blood glucose level at 1hour ($p<0.01$). Here the maximum hypoglycaemic activity was observed at 1hour ($p<0.01$). Both extracts of *C. cristata* seed shell showed significant hypoglycaemic effects. The results were compiled and discussed. Suggestions for future work were outlined.

375. The study of hypotensive and hypoglycemic effect of medicinal plant MAT/MP 004. May Aye Than; Aye Than; Mu Mu Sein Myint; Kyi Kyi Myint; San San Myint; Tin Nu Swe. *Myanmar Health Res Congr*, 2003: p62.

Diabetes mellitus and hypertension are the two of the six major priority diseases in Myanmar and it now stands prioritized health problem and leading cause of death. MAT/MP004 from the north-east areas of Shan State of Myanmar was introduced as medicinal herb for longevity of elderly for few years. But so far, there has not been full and systematic exploitation of these natural resources with regard to hypotensive and hypoglycemic effect. So it is rational to screen the herb extracts on laboratory test models. Thus, the experimental design using anaesthetized normotensive dogs for hypotensive activity was tested on glucose loaded hypoglycemic rabbit model. Different intravenous administration of aqueous extract of MAT/MP004 10ml/kg produced fall in blood pressure in anaesthetized dogs. High and medium dose levels of the extracts produced significantly fall of mean systolic blood pressure ($p<0.05$) and mean diastolic pressure ($p<0.05$) which again returned to baseline level. In hypoglycemic study, 3gm/kg body weight glucose dissolved in distilled water was administered, and blood glucose levels were determined at 0hr, 1hr,2hr, 3hr and 4hr, After one week, fruits juice of MAT/MP004 10ml/kg and glucose 3g/kg body weight was administered and the blood glucose loaded control group were 392±2.4mg% at 2hr. 141.3±8.6mg% at 3hr whereas the blood glucose levels of the test group were 121±17.1mg% at 2hr and 83.2±7mg% at 3hr, respectively. It was found that the fresh

juice of MAT/MP004 significantly lowered the blood glucose levels at 2hr ($p<0.01$), and at 3hr ($p<0.001$). It was concluded that MAT/MP004 revealed hypotensive activity as well as hypoglycemic activity and it was the first findings reported.

376. The study of hypotensive effect of medicinal plant MAT/MP008. May Aye Than; Sandar Moe; Aye Than; Yee Yee Tin; Maung Maung Htay; Hla Myint, Saw; Hnin Pwint Aung; Moe Thida. *Myanmar Health Res Congr,* 2003; p51.

Hypertension is one of the most common risk factors for cardiovascular morbidity and mortality. The higher the arterial blood pressure, will be the greater the risk of stroke, congestive cardiac failure and ischaemic heart disease. Hypertension is one of the six major priority diseases in Myanmar and it now stands prioritized health problem and leading cause of death. *Gisekia pharnaceoides* Linn. a plant widely distributed in Myanmar, was reputed to have hypotensive action traditionally. But there was no scientific information about *Gisekia pharnaceoides* having hypotensive activity in local and internationally. The aim of this study was to reveal scientific proof on hypotensive properties of reputed plants, usually claimed to be effective for hypertension. The effects of the aqueous and the 70% ethanolic extracts taken from whole plant of *Gisekia pharmaceoides* have been studied on the blood pressure of anaesthetized normotensive dogs. The blood pressure was recorded by a mercury monometer connected to the kymograph. Intravenous injection of the extracts in the doses of 10, 20 and 40mg/kg body weight lowered the blood pressure significantly ($p<0.05$-0.005). The average percent fall of mean arterial blood pressure with 10mg/kg, 20mg/kg and 40mg/kg of the aqueous extract were 17.5%, 28.7% and 26.2% respectively, whereas the average percent fall of mean arterial pressure with 10mg/kg, 20mg/kg and 40mg/kg of 70% ethanolic extract were 18.6%, 22.9% and 27.3% respectively. It was concluded that *Gisekia pharmaceoides* revealed hypotensive activity. This finding is the first report on hypotensive activity of *Gisekia pharnaceoides* Linn.

377. Study of inhibitory effects of some traditional medicine formulations on adrenaline-induced hyperglycaemia in animal models. Aye Than; Tin Myint; Mu Mu Sein Myint; Win Myint; Mya Bwin. *Myanmar Health Sci Res J.* 1993 April; 5(1): p25-30.

Traditional Medicine Formulations TMF-27, TMF-28 and TMF-32 have been used traditionally to treat diabetes in Myanmar. Blood glucose levels of adrenaline-induced diabetic rabbits were determined after oral administration of maximum dose of the Traditional Medicine Formulations TMF-27 TMF-28 and TMF-32 and their watery extracts respectively. From the data obtained, it was concluded that the oral administration of 1.6g/kg TMFs did not produce inhibition of hyperglycaemic effect in rabbits. Only the water soluble extract of TMF-32 inhibited the hyperglycaemic blood glucose level on adrenaline-induced diabetic rabbits ($p<0.05$) and rats ($p<0.05$).

378. Study of knowledge, perception and practice of patients utilizing traditional medical care at the traditional medical centres in Yangon and Mandalay. Thaw Zin; Thaung Hla; Nwe Nwe Win; Win Kyi; Kyin Thein; Aye Lwin; Soe Moe; Mya Bwin; Aung Naing; Thein Hlaing; Hla Pe. *Med Res Congr,* 1991: p28.

With recognition of traditional medicine as a great potential in contribution to primary health care, the National Health Plan in Myanmar is at present, engaged in developing the most appropriate method for inclusion of traditional medicine in the health care strategies for the attainment, by the people of Myanmar, the goal known as "Health for all by the year 2000". For the traditional medicine system to contribute

usefully to primary health care, factors such as sociocultural background, strength of traditional belief, economic considerations distance to be covered in attaining health care, knowledge and compliance in taking traditional remedies, etc., has to be taken in to account if realistic health plan and related training programmes are to be developed. Thus, the study was conducted on 922 patients attending the traditional medicine health centres in Yangon and Mandalay and their socio-cultural background, strength of the traditional medicine was studied so as to identify the target beneficiaries and to develop methods by which traditional health care can be delivered effectively to the population for which it is intended. The acceptable role of traditional medicine in primary health care was discussed.

379. The study of phytochemical constituents and hypoglycemic effect of medicinal plant MAT/MP009. May Aye Than; Mu Mu Sein Myint; Aye Than; Khin Tar Yar Myint; Kyi Kyi Myint; San San Myint; Mya Thet Lwin. *Myanmar Health Res Congr*, 2003; p52.

Diabetes mellitus is one of the six major priority diseases in Myanmar. Myanmar has a rich tradition in the use of medicinal plants for the treatment of diabetes mellitus. *Swertia angustifolia* from the border of Kayin and Kayah States of Myanmar was introduced as antidiabetic in Myanmar traditional system for few years, but there was no scientific information about *Swertia angustifolia* having hypoglycemic activity in Myanmar. The aim of this study was to reveal scientific proof on hypoglycemic properties of reputed plants and its constituents, usually claimed to be effective for diabetes. Thus, the complete crossover experimental study design was tested on adrenaline induced hyperglycemic rabbit model. Adrenaline 0.2mg/kg body weight was injected subcutaneously and blood glucose levels were determined at 0hr, 1hr, 2hr, 3hr and 4hr after administration of adrenaline. After one week, aqueous extracts of *Swertia angustifolia* 3g/kg body weight was administered with 1% methyl cellulose and the blood glucose level were again determined after adrenaline injection. The result showed that blood glucose levels of adrenaline induced hyperglycemic rabbits were 197.8±17.1mg% at 1hr, 478.3±40.4mg% at 2hr, 271.2±35.2mg% at 3hr and 253.5±47.2mg% at 4hr. In contrast, the blood glucose levels of the test group were 148.7±10.1 at 1hr, 120.2±20.8mg% at 2hr, 92.7±7.3mg% at 3hr and 97.8±5.5mg% at 4hr, respectively. The study showed that the aqueous extracts of *Swertia angustifolia* significantly lowered the blood glucose levels at 1hr ($p<0.05$); 2hr ($p<0.005$); 3hr ($p<0.001$) and 4hr ($p<0.05$). Flavonoid, steroid, saponin, polyphenol, glycoside, protein and carbohydrate were detected. It was concluded that *Swertia angustifolia* revealed hypotensive activity and reported as first finding.

380. The study of phytoconstituents and hypoglycemic activity of two medicinal plants of (*Coccinia indica* Wight & Arn**.** and *Cassia fistula* L.) on rabbits model. Cherry. Thesis, PhD (Zoology), University of Mandalay; 2007.

Diabetes is a condition in the body where the pancreas does not produce enough insulin to process glucose or the insulin receptor are not working properly. In this study,the hypoglycemic activity of some medicinal plant *Coccinia indica* (*C. indica*) *and Cassia fistula (C. fistula*) were tested on adrenaline induced hyperglycemic rabbit model and were compared with standard drug Glibenclamide. Acute toxicity study of 3g/kg of aqueous and ethanolic extracts of *C. indica* (Kin-bon) and *C. fistula* (Ngu) on albino mice did not cause any death within 24 hours and for two weeks. Phytochemical contituents detected in crude powder, aqueous and 70% ethanolic extract of *C. indica* and *C. fistula* were found alkaloid, steroid, amino acid, phenolic protein to be the same *C. fistula* bark contains flavonoids, glycosides, saponins and

tannins but do not contain in *C. indica* leaves. This study will try to determine the effectiveness of medicinal plants, which lowering blood glucose levels on hyperglycemic rabbits. The aqueous extract and 70% ethanolic extract of dried leaves of *C. indica* and bark of *C. fistula* 3g/kg body weight were administered, one week after studying of base line adrenaline induced hyperglycemic control curve. The blood glucose levels were determined at 0hr primarily and at 1hr, 2hr, 3hr, and 4hrs after administration of adrenaline. The aqueous extract of *C. indica* at the dose level of 3g/kg showed significant hypoglycemic effect at 1hr and 2hr ($p<0.005$). Whereas rabbits treated with 3g/kg of 70% thanolic extract of *C. indica* administration showed blood glucose levels, significantly lowered at 1hr, 2hr, 3hr and 4hr ($p<0.0005$, $p<0.005$, $p<005$ and $p<0.05$) after administration of adrenaline injection, respectively. The treated aqueous extract of *C. fistula* caused significant reduced of the blood glucose level when comparison was made between the test and control group at 2hr ($p<0.05$) and at 4hr ($p<0.005$). Whereas 70% ethanolic extract showed a decreasing blood glucose level throughout the 4hr period time ($p<0.05$, $p<0.05$, $p<0.05$, $p<0.005$). Glibenclamide caused a significantly lowering to the blood glucose level at 2hr ($p<0.05$) to 4hr ($p<0.05$). *C. indica* lowered the blood glucose level similarly to *C. fistula*. *C. indica* and *C. fistula* had the same ability to lower glucose level as Glibenclamide.

381. The study of phytoconstituents and hypolipidemic effect of *Phyllanthus emblica* (Zebyu) & *Leucaena glauca* Benth***.*** ***(***Bawzagaing***)*** on hyperlipidemic rat models. Cho Cho Win.Thesis, PhD (Zoology), University of Yangon, 2005.

Two medicinal plants *Phyllanthus emblica* L. (Euphobiaceae) and *Leucaena glauca* Benth. (Mimosaceae) reputed to possess the lowering effects in hyperlipidemia were selected, tested and evaluated for their antihyperlipidemic effect on Triton induced hyperlipidemic albino rats. The plants were extracted using different concentration of ethanolic and aqueous solution. These extracts were used to test antihyperlipidemic effect and acute toxicity *in vivo*. The median lethal dose of both plants more than 3g/kg body weight (i.e.maximum permissible dose) in mice. Phytoconstituents of the two plants extracts showed that aqueous extract of *Phyllanthus emblica* (*P. embilica*) contains flavonoids, glycosides, saponins, polyphenols, tannins and 96% ethanolic extract contains alkaloids, steroids, saponins, amino acids, polyphenols, tannins and proteins. Aqueous extract of *Leucaena glauca (L. glauca)*. contains alkaloids, saponins, amino acids, polyphenols, proteins, tannin and 70% ethanolic extract contains alkaloids, steroids, saponins, resins, amino acids, polyphenols, tannins and proteins. The hyperlipidemic action was induced by Triton WR-1339 (400mg/kg) injection to albino rats subcutaneously and the test drugs were given 1g/kg body weight intraperitoneally. After 18hrs injection of Triton, the rats were anaesthetized and blood was taken from cardiac puncture for lipid profile. Ultra-Violet Spectrophotometer was used to determine the rat's serum lipid levels. Significant antihyperlipidemic effect was found with both aqueous and ethanolic extracts of *P. emblica*. With the aqueous extract of *L. glauca*, significant antihyperlipidemic effect was not found at the dose level of 1g/kg body weight although, significant antihyperlipidemic effect was found with ethanolic extract. Antihyperlipidemic effects of both aqueous and 96% ethanolic extracts of *P. emblica*. (1g/kg) and 70% ethanolic extract of *L. glauca* (1g/kg) have no significant difference from standard reference drug lovastatin (500mg/kg). However, antihyperlipidemic effect of aqueous extract of *L. glauca* was inferior to that of standard reference drug lovastatin (500mg/kg).

382. Study of the antihyperglycemic effect of the leaves of *Moringa oleifera* Lam. Family Moringaceae on albino rats. Ei Mon Hla. Thesis, MPharm, Yangon: University of Pharmacy; 2009.

Moringa oleifera Lam. (ဒနှံ့ဒလွန်) Family; Moringaceae grows wild or is extensively cultivated as a vegetable throughout Myanmar. It is also used as medicinal plant. Various parts of the plant such as leaves, roots, seeds, barks, flowers and immature pods are being employed for antitumor, antipyretic, antiepileptic, anti-inflammatory, antiulcer, antispasmodic, diuretic, antihypertensive, antioxidant, antidiabetic, hepato-protective, cholesterol lowering, antibacterial and antifungal activities in the indigenous system of medicine. The purpose of the present study is to evaluate the antihyperglycemic effect of the leaves of *Moringa oleifera* Lam. (ဒနှံ့ဒလွန်) on adrenaline induced hyperglycemic rat model and to identify the organic flavonoid compound, quercetin by using Thin Layer Chromatography, Ultraviolet Spectroscopy and Fourier Transform Infrared Spectroscopy. For evaluation of antihyperglycemic effect, the doses of crude aqueous extract (1.5g/kg, 3g/kg, 6g/kg) and the doses of crude 95% ethanolic extract (1.5g/kg, 3g/kg, 6g/kg) were administered by oral route on adrenaline induced hyperglycemic rat model. Aqueous extracts (1.5g/kg, 3g/kg, 6g/kg) showed significantly antihyperglycemic effect at 2hr ($p<0.05$), 3hr ($p<0.05$), and 4hr ($p<0.05$), respectively. Ninety-five percent ethanolic extract (1.5g/kg) showed antihyperglycemic effect significantly at 4hr ($p<0.05$) only. Ninety-five percent ethanolic extract (3g/kg and 6g/kg) showed significantly antihyperglycemic effect at 2hr ($p<0.05$), 3hr ($p<0.05$) and 4hr ($p<0.005$) respectively. Comparison of antihyperglycemic effects between different doses of extracts and glibenclamide showed that both extracts and glibenclamide have antihyperglycemic activities but percent inhibition of glibenclamide was superior to crude extracts. The antihyperglycemic effect of crude extracts had late onset and short duration of action than glibenclamide. The acute toxicity study of aqueous extract and 95% ethanolic extract were performed by using albino mice. The result indicated that there was no lethality up to maximum permissible dose of 12g/kg in both extracts. Phytochemical and physicochemical analyses were also conducted by using reference analytical procedures for quality control of leaves materials of *Moringa oleifera* Lam. (ဒနှံ့ဒလွန်). Flavonoid compound, quercetin which is known to have antihyperglycemic activity was qualitatively isolated by using Preparative Thin Layer Chromatography from acid hydrolysed extract of the leaves of *Moringa oleifera* Lam. (ဒနှံ့ဒလွန်). The isolated compound was identified by Thin Layer Chromatography, Ultraviolet Spectroscopy and Fourier Transform Infrared Spectroscopy. It can be concluded that the leaves of *Moringa oleifera* Lam. (ဒနှံ့ဒလွန်) contain quercetin which is known to have antihyperglycemic activity; the aqueous and 95% ethanolic extracts have no acute toxic effect on mice and have significant antihyperglycemic effect on adrenaline induced hyperglycemic rats.

383. A study of the anti-inflammatory effect of *Zingiber officinale* Roscoe. (Gyin-sein) on albino rats. Khine Khine Lwin. Thesis, MMedSc (Pharmacology), Mandalay: Institute of Medicine; 2000.

These investigations were performed to find out whether the extracts of *Zingiber officinale* Roscoe. (Ginger) possess anti-inflammatory activity or not. The dried rhizomes powder of *Zingiber officinale* Roscoe. was extracted with both water and 50% ethyl alcohol to obtain aqueous extract and 50% ethanolic extract respectively. In order to study the anti-inflammatory action of both aqueous and ethanolic extract of *Zingiber officinale* Roscoe., the experiments were carried out on albino rats of same sex and same strain i.e Wistar strains. Plethysmographic apparatus was used to measure the volume changes of the rat's paws oedema. Inflammation was induced by subplantar injection of 0.1ml of 1% carrageenan (in 0.9% normal saline) in right hind paws of the albino rats. Anti-inflammatory action of both extracts was investigated by using three doses levels i.e-3g/kg, 1.5g/kg, 0.75g/kg body weight, orally. Significant anti-inflammatory action was found with both aqueous and ethanolic extract of Ginger. It was found that the anti-inflammatory action of ethanolic-extract started to appear with the dose of 0.75g/kg and the anti-inflammatory action had dose-response relationship in nature. With aqueous extract, the anti-inflammatory action began with the dose of 1.5gm/kg and the action had dose-response relationship in nature. The results also indicated that the anti-inflammatory action of ethanolic extract of *Zingiber officinale* Roscoe. was found to be superior to that of aqueous extract. However, anti-inflammtory actions of both aqueous and 50% ethanolic extracts of Ginger (3g/kg) were inferior to that of standard reference drug acetylsalicylic acid (i.e Aspirin 3000mg/kg). Acute toxicity studies of the extracts were performed by using the albino mice. The results indicate that there was no lethality up to 3g/kg body weight with both aqueous and 50% ethanolic extract. General pharmacological screening test of both aqueous and ethanolic extracts of Ginger on albino rats has shown no abnormal changes. The phytochemistry of the extracts showed that the aqueous extract contained saponins, alkaloids, tanninoids, flavonoids, steroids and the 50% ethanolic extract contained saponins, alkaloids, resin, tanninoids, flavonoids and steroids. It was observed that anti-inflammatory action of both extracts of *Zingiber officinale* Roscoe. can be due to one or more compounds obtained in those extracts (i.e-saponin, alkaloid, resin, tannin, steroids and flavonoid). It was found that anti-inflammatory action of 50% ethanolic extract of Ginger 3g/kg was (0.49-0.66) times that of aspirin and aqueous extract 3g/kg was (0.52-0.55) times that of aspirin. Therefore, it can be concluded that both extracts of *Zingiber officinale* Roscoe. may probably make use in joint pain and inflammation.

384. Study of the antimycobacterial activity of biologically active medicinal plant: *Desmodium triquetrum* DC. (Lauk-they). Khin Chit. Thesis, MMedSc (Pharmacology), Yangon: Institute of Medicine (1); 1996.

Tuberculosis is one of the most common infectious diseases all over the world. It is a major cause of death in young adults following Human-immunodeficiency virus epidemic and emergence of multi-drug resistant strains of mycobacteria. Hence, there is a clear need to develop new and effective drugs for management and control of tuberculosis. In the present study, reputed medicinal plants such as *Azadirachta indica* A.Juss. (Tama), *Acorus calamus* L. (Lin-ne), *Alpinia galanga* Wall. (Ba-de-gaw-gyi), *Desmodium triquetrum* DC. (Lauk-they) were investigated for their biological and anti-mycobacterial activities. Plant extracts which were to be tested for biological and

anti-mycobacterial activity were prepared by solvent extraction. Common solvents such as petroleum ether, chloroform, ethanol and water were used. Soxhlet assembly for extraction and rotatory evaporator were used to get solvent-free plant extracts. Biological activity was determined by the inhibition of cyclic AMP metabolism as assessed by nuclear-based analytical technique. This assay was developed through a modification of isotope dilution principle. Among the biologically active plant extracts screened as mentioned above, alcoholic extract of Lauk-they had the highest biological activity and it was evaluated for anti-mycobacterial activity by using *in vitro* method. Effects of various concentrations of alcoholic extract of Lauk-they on different isolates of Mycobacterium tuberculosis were tested *in vitro*, both qualitatively and quantitatively. These effects were compared with those of minimal inhibitory concentrations of isoniazid and rifampicin. Lauk-they was found to have anti-mycobacterial activity at 72mg/ml concentration even on strains resistant to isoniazid and rifampicin. Phytochemical analysis of Lauk-they alcoholic extract showed that it contained alkaloids, flavonoids, triterpene steroids and tannins. No acute toxicity was found in this study and median lethal dose of Lauk-they was assumed to be above 1g/kg concentration.

385. Study of the effecf of Da-nyin-thee (*Pithecellobium lobatum* Benth.) on sulphadimidine pharmacokinetics of the Burmese. Chit Maung; Tha, Saw Johnson. *Res Paper Reading Session, Med Sci Div*, 1985-86: p6.

The effect of Da-nyin-thee (seed of *P. lobatum* Benth.) after ingestion 70-75gm a day for seven consecutive days, on sulphadimidine pharmacokinetics was studied on 12 healthy adult Burmese, of both sexes, whose acetylator phenotypes being predetermined. The parent and its metabolite N_4-acetylsulphadimidine elimination half-lives, deduced from their time profiles of plasma and urine, were monitored spectrophotometrically. The seeds under investigation revealed no significant effect on any of the pharmacokinetic criteria, regarding hepatic acetylation or renal excretion in either of the phenotypes.

386. A study of the hypotensive effect of leaves of *Moringa oleiferlam* (Danthalun). Kyaw, Maung. Thesis, MMedSc (Pharmacology), Yangon: Institute of Medicine (1), 1993.

The extraction of green mature leaves of *Moringa olifera* Lam. was done by solid-liquid extraction method using water as a solvent. In order to study the hypotensive action of the aqueous extract of *Moringa olifera* Lam., the experiments were carried out on normotensive anaesthetized dogs of either sex. The blood pressure recording method used throughout the present work was kymographic method. The hypotensive activity of *Moringa olifera* Lam. was found to be dose-related. The extract had also effect on isolated heart, isolated intestinal smooth muscle, isolated aortic strip, vascular smooth muscle of rabbit ear and bilateral carotid occlusion reflex. Tranquilizing effects were also found to be present. Diuretic and ganglion blooking actions were not seen with the extract. It was found that the acute toxicity of the extract was very low. Phytochemical analysis showed presence of flavonoids, glycosides, amino acids, tanninoids and phenolic compounds as organic constituents, and iron, sodium, potassium, magnesium and sopper as inorganic constituents. The results were discussed with regards to possible mechanism of action of *Moringa olifera* Lam.

387. Study of the protective effect of Bizat (*Eupatorium odoratum* Linn.) on carbon tetrachloride-induced liver toxicity in albino rats. May Aye Than; Mu Mu Sein Myint; Ohnmar Kyaw; Moh Moh Htun; Khin Taryar Myint; Phyu Phyu Win; San San Myint; Nu Nu Win; Thandar Myint. *Myanmar Health Res Congr,* 2008: p55.

Bizat (wild) is the most popular medicinal herbs reputed for many ailments such as liver diseases, cancer, wound, abscess and AIDS in Myanmar, but so far there is no scientific information about hepatoprotective effect. Thus, the aim of this study was to extract of Bizat was physicochemically and phytochemically standardized by using the methods for it herbal pharmacopoeia. Glycoside, polyphenol, flavonoid, steroid, terpene carbohydrate, saponin, protein, resin and reducing sugar were present. The media lethal dose (LD_{50}) of aqueous extract was supposed to be more than 16g/kg body weight per-orally in mice. The hepatoprotective activity was done on carbon tetrachloride (CCL_4), induced liver toxicity in albino rats. Study design was control parallel experimental design. The first and second groups were administered distilled water as control. CCL_4 was given orally to second and third group. The aqueous extract 3g/kg/day was given orally to the rats of third group up to 7^{th} day, one hour prior to CCL_4 administration. Twenty four hours after CCL_4 treatment, the animals were counted in order to calculate the percent mortality, the remaining animals were sacrificed. The blood and liver tissue were collected for biochemical and histological assessment of liver damage. The mortality rate with CCL_4 was 16.67% whereas pretreatment with aqueous extract was 50% and no mortality in normal control. Both aqueous extract protected and unprotected (CCL_4 only) groups showed signigicant rise in serum alanine aminotransferase ALT, aspartate aminotransferase (AST) and alkaline phosphatase (ALP) levels ($p<0.01$-$p<0.005$) compared with control. The serum enzyme activities and histological appearance of degeneration, necrosis and fibrosis were no significant difference between aqueous extract protected and unprotected groups. Therefore it was concluded that Bizat leaves had no protection of liver from hepatotoxic effect of CCL_4.

388. Study of the utilization pattern of traditional medicine on the management of malaria. Pharmacology Research Division. *Annual Report 2006*, Yangon: DMR (LM). p74.

This study was undertaken in 5 townships (Bago, Daik-U, Kyauk-ta-ka, Tharyarwaddy, Oke-Po in Bago Division to determine the use of modern drugs and traditional medicine for malaria. Among 2096 household members, 507 (24.2%) reported history of malaria. Modern drug use (93.3%) was higher than traditional medicine (43.8%) and 78.4% of modern drug use was prescribed by health staff. None of the children under 5 used traditional medicine only. Modern drugs use included artesunate/artemether (64.2%), mefloquine (21.9%), quinine (5.8%), chloroquine (3.3%), sulfadoxine–pyrimethamine (3.3%) and antipyretics only (19.3%). One-fifths of artesunate use was self-treatment. Incorrect use of artesunate was 52%. The use of prepackaged modern drugs from local shops was 12.4% and some contained antimalarials. Some traditional medicine packets contained antipyretics like aspirin. Commonest reasons for traditional medicine use were usual practice (60.6%), perceived curability (57.1%) and unavailability of modern medicine (46.5%). Five hundred and seven respondents with history of malaria fever during the last 3 months were face to face interviewed. Qualitative information was collected through informal conversation with shop owners, interviews with traditional healers, persons with history of malaria fever and focus group discussions with community members. Traditional medicine use for malaria fever was 222 (43.8%) and 182 (82%) of them

used it as the first line self-treatment. None of the children under 5 used traditional medicine only for malaria. Traditional drugs use included packets with antipyretics (59%), packets with traditional medicine (22.5%), packets with other contents (8.5%), (*Andrographis paniculata*) (5%) and other traditional herbs (21.6%). The cost of each packet ranges from 10 to 100 kyats. ဆေးခါးကြီး is used by a few respondents only for unavailability, difficult preparation and unpleasant taste. . Licensed traditional healers usually refer malaria patients to the health staff. Health education should include emphasis on avoidance of such medicine packets which are not approved by the Traditional Medicine Department.

389. Study on acute and sub-chronic toxicities of *Pueraria mirifica* Airy Shaw & Suvatab. (ပေါက်ဥ) Family: Fabaceae. Win Ko Ko. Thesis, MPharm, Yangon: Military Institute of Nursing and Paramedical Sciences. 2011.

There are many species of Pueraria. *Pueraria mirifica* Airy Shaw & Suvatab. (ပေါက်ဥ) was naturally grown in Myanmar and it belongs to the family Fabaceae. The use of this plant has been reported as a medicine plant since Poutkam (Bagan) Dynasty. In Myanmar traditional medicine systems, there can be confusing on the names of Pout-oou (ပေါက်ဥ) and Pouk-nwe-oou (ပေါက်နွယ်) because of their similar names. *Pueraria mirifica* Airy Shaw & Suvatab. (ပေါက်ဥ) is used for women's health and beauty purpose and *Butea superb* Roxb. (ပေါက်နွယ်) is useful as an aphrodisiac agent. *Pueraria mirifica* Airy Shaw & Suvatab. (White Kwao Krua) has business potentials for females, *Butea superb* Roxb (Red Kwao Krua) seems to have such commercial promises for males that it has been called the 'herbal Viagra'. In present study, plant samples were collected from Thar Du Kan, Shwe Pyi Thar Township, Yangon Division. Its habits, morphological characters were documented in this thesis for the plant authenticity purpose. Physicochemical and phytochemical studies were also conducted by using appropriate references and methods. For the purpose of safe and effective uses of *P. mirifica* Airy Shaw & Suvatab. Tests for the absence of pesticide residues, heavy metals, aflatoxins were performed. Acute and sub-chronic toxicities were also studied on experimental mice and rats. *P. mirifica* Airy Shaw & Suvatab. Dried rhizome powder was tested with the various doses of 2, 4 and 8g/kg for acute toxicity study. There were on death occurred in acute toxicity. LD_{50} of *P. mirifica* Airy Shaw & Suvatab. Dried rhizome powder was greater than 8g/kg of body weight. In sub-chronic toxicity study, there were no significant differences in the average organ weights of brain, lungs, heart, small intestine, colon, stomach, liver, spleen and kidney of between the rats treated with the dried rhizome powder of *P. mirifica* Airy Shaw & Suvatab. At the doses of 1g/kg and control group. The rest of organs were significant differences ($p<0.05$) in the average organ weights between the rats treated with the dried rhizome of this at the doses of (1g/kg, 2g/kg) and control group. There were no significant differences in haematological parameters between the rats treated with 1g/kg of dried rhizome powdwe of this plant and control group. It was found that significant differences ($p<0.05$) in monocyte and eosinophil between the rats treated with 2g/kg of dried rhizome powder of this plant and control group. It was also noted that the difference was slightly higher than the normal range. There were significant differences ($p<0.05$) in serum aspartate amino transferase, serum alanine amino transferase and blood urea between the rats treated with 1g/kg of dried rhizome powder of this plant and control group and the differences were lower than the normal ranges. But, higher dose 2g/kg of rats total serum bilirubin showed slightly higher than normal range. Histological changes were observed in some internal organs but most are

normal compared with control group. *P. mirifica* Airy Shaw & Suvatab. is relatively safe. However, optimal doses of *P. mirifica* Airy Shaw & Suvatab. Dried rhizome powder should be clinically assessed.

390. A study on anthelimintic properties of *Holarrhena antidysenterica* (Let-htoke-kyi). Khin Linn. Thesis, MMedSc (Pharmacology), Yangon: Institute of Medicine (2), 1990.

Helminthiasis especially ascariasis is common in Myanmar and its impact on health and economic status of the country is considerable. Although a lot of anthelmintics are available, some more addition from the indigenous source is highly desirable. It will be highly more so, if the indigenous drugs are proved to be safe and more effective than the currently used anthelmintics. Let-htoke-kyi (LTK) (*Holarrhena antidysenterica*) indigenous in upper Myanmar is studied for its activity against nematodes using *Ascaris suum* as the test model. Extract of Let-htoke-kyi was found to contain alkaloids. The anticholinesterase activity of alcoholic extract of Let-htoke-kyi was found to be 802u/gm. Let-htoke-kyi also has anthelmintic activity. The attempt to elucidate its mechanism of action on the ascaris was carried out by camparing with other known anthelmintic drugs such as piperazine, pyrantel and levamisole. The acute toxicity was studied by the method of Litchfield & Wilcoxan (1949) and LD_{50} intraperitoneal route was found to be 0.8mg/gm body weight in mice. The toxicity study using the oral route was limited because the dose used cannot go larger than 15.0mg/gm since the thick suspension cannot be pushed through the gastric tube. At the level of 15.0mg/gm, it did not show any toxic effect.

391. Study on chemical constituents and bioactivity of the tubers of *Asparagus racemosus* Willd. (Shin-ma-tet). Khine Khine Hla. Thesis, PhD (Chemistry), University of Yangon; 2008.

Asparagus racemosus Willd. (Shin-ma-tet) tubers were chosen for the investigation of chemical constituents and biological action. The tubers of this plant have many activies such as diuretic, antidysentery antibacterial, antioxidant and antidiarrheal activities. The tubers of this plant are used in traditional medicine for cough, gastric ulcers, and blood diseases and for general tonic in local regions. It has has not yet been scientifically sutidied of its anti-diarrheal activity in Myanmar. Qualitive elemental analysis was done by EDXRF spectrometer. Some heavy toxic metals such as, As, CDd and Pb were not detected in the sample by EDXRF method. In the examination of nutritional values, carbohydrate was found to be high content in the sample. Before the investigation of anti-diarrhea activity, antimicrobial activity was formally done in order to make sure that the sample may have positive effect on microorganisms, especially diarrhea causing microorganisms. In the screening of antimicrobial activity by agar disc diffusion method, the activity of EtOAc extract is the highest on all the organisms tested. Column chromatographic separation of activity guided EtOAc extract of *Asparagus racemous* Willd. provided compounds, KKH-1(0.03%, 5,7-dihydroxy flavanone), KKH-2 (0.0001%, a flavonoid containing free OH and methoxy group), KKH-3(0.0001%, 2 (2-butenyl) 6-(methoxy) benzoic acid) and KKH-4 (0.0015%, 2,2-dimethoxy, 5-Keto.-3- hexenoic acid), KKH-5 (a flavonoid , 0.0015%) and KKH-6 (a terpenoid , 0.0015%) repectively. Compound, KKH-7 (β-sitosterol, 0.0001%) was isolated from PE extract of the tubers of this plant. Activity guided extract was separated by column chromatographic method. The isolated compound was identified by conventional chemical test and modern spectroscopic method such as UV, FT-IR, ^{1}H NMR and spectroscopy. The minimum inhibitory concentration of isolated compounds KKH-1 and KKH-2, isolated from anti-diarrhea

activity guided EtOAc extract of the tubers of *Asparagus racemosus* Willd. were determined on focusing main diarrhea causing microorganisms such as *Escherichia coil* ATCC, *Escherichia coil* O157, *Shigella dysenteriae, Shigella sonnei, Shigella boyddi, Salmonella typhi, Vibrio cholera* O1 and *Vibrio cholera* O139 by agar disc diffusion method. The MIC values of isolated compounds from the tubers of *Asparagus racemous* Willd. were KKH-1≥1.25µg/ml and KKH-2≥2.5µg/ml, respectively. Acute toxicity test was done before investigating anti-diarrhea activity because the extracts were taken orally for this activity. The acute toxicity effect of 70% ethanol and the aqueous extract of the tubers of *Asparagus racemous* Willd. were assessed on mice of 25-30g body weight. In acute toxicity test, toxic or harmful effect did not occur on both extract. *In vivo* anti-diarrhea effect of the aqueous extract was studied on castor oil-induced diarrhea mice model. The investigation was conducted by castor oil-induced diarrhea test, castor oil-induced enterpooling test and castor oil-induced intestinal transit test. From the results, it can be inferred that the tubers of *Asparagus racemosus* Willd. possessed anti-diarrhea activity which can be used in non-specific diarrhea due to its similar action with that of the standard drug, loperamide.

392. Study on hypoglycemic activity of *Swietenia macrophylla* King. seed kernel in rabbit models. Myat Myat Ohn Khin; Aye Than; Thidar Swe; Mu Mu Sein Myint; Myint Oo; Cho Cho Yee. *Myanmar Health Res Congr,* 2002: p51.

There is a very long history of health care system using herbal medicine in Myanmar. In the past decades, the knowledge of herbal drugs is directly utilized by Myanmar people. *Swietenia macrophylla* King. is one of the famous plants for the effect of hypoglycemic activity. Locally, it is believed that the seed kernel of *Swietenia macrophylla* King. possess hypoglycemic activity. The authors chose the plant seed kernel to investigate whether the seed kernel of the plant possess hypoglycemic activity. OGTT was done. The percentage inhibition of blood glucose levels were 38% in adrenalin-induced method and 25% in the glucose-loaded method respectively. The peak of action was found to be at 1hr in both the methods tested. Blood glucose levels rose again to normal levels by 2hrs and 4hrs respectively. It was observed that the inhibition of hypoglycemia was for a short period. It had transient lowering activity on blood glucose level in two induced diabetic rabbit models. The acute toxicity of the seed kernel paste was also studied. It was observed that the kernel was not toxic at the dose level of 2.4g/kg orally.

393. A study on hypoglycaemic effect of *Tinospora cordifolia,* Miers. Khin Maung Myint. Thesis, MMedSc (Pharmacology), Yangon: Institute of Medicine (1); 1990.

Investigations were carried out to determine whether the extract of *Tinospora cordifolia* possesses oral hypoglycemic activity. The ability of alcoholic extract of *Tinospora cordifolia* to lower the fasting blood glucose level was investigated using albino rats as experimental diabetes models. The results indicate that the extract of *Tinospora cordifolia* capable of significantly lowering the fasting blood glucose level. LD_{50} and ED_{50} were found to be 126.7±2.221mg/100g body weight and 101.5±1.1124mg/10g body weight respectively. Central nervou system depression and cardiomyotoxic effects were observed in acute toxicity study with lethal dosage. No side effects were seen with median effective dose. The site of action was on the beta cells of the pancreas and mechanism of action could be stimulation of endogenous insulin secretion.

394. Study on pattern of traditional health care utilization of the community. Thaw Zin; Nwe Nwe Win; Thein Han Oo; Hlaing Aung; Soe Moe; Soe Soe Yin; Khin Aye Than; Tin Mi Mi Naing; Cho Cho Yee; Aung Naing; Maung Maung Wint. *Med Res Congr,* 1992: p52-53.

Although Myanmar has a well-developed allopathic health care system with highly trained medical professionals, many rural areas still remained underserved by the existing health care facilities and pharmaceuticals are in short supply. With the aim to compare the availability, accessibility care facilities among urban and rural areas, a health systems research was conducted in 5 areas of Taikkyi Township, defined according to the accessibility of different health care facilities. Community based knowledge; attitude and practice study was also conducted on randomly selected 1215 respondents and 20 traditional medicine practitioners so as to identify the factors that influence the pattern of decision-making by patients in choosing different healing practices. Results indicated that despite the extremely low availability and accessibility of traditional medicine health centre and practitioner, majority of the population still prefer and use traditional medicine above others. In addition, local traditional medicine practitioners and herbal remedies were found to play a much more important role than government provided traditional medicine dispensaries and traditional medicine formulations.

395. Study on rejuvenating agents from different plant sources. Thwe Thwe Oo. Thesis, PhD (Botany). University of Yangon; 2006.

The eight medicinal plants namely *Butea spps, Asparagus racemosus* Willd., *Sida carpinifolia* Linn., *Tacca integrifolia* Ker-Gawl., *Tribulus terrestris* Linn., *Trigonella foenum-graecum* Linn., were collected from Yangon and Mandalay Divisions during 2002-2005. The morphology and taxonomy of their vegetative and reproductive parts have been studied and identified by using the standard methods used in Botany Department of Yangon University. These plant materials were washed and dried at room temperature for 3 days and then crushed and powdered by using grinding mill. The dried powders were conducted for phytochemical and physicochemical tests. They were also extracted by using pet-ether (60-80) ºC and 95% ethanol successively. These pet-ether extracts were studied for the presence of total steroids and then the estradiol present in the pet-ether extracts of *Butea frondosa* Roxb., *B. superba* Roxb., *B. parviflora* Roxb., were isolated by column chromatographic methods using alumina as an adsorbent. The remaining 95% ethanolic extracts were further studied for the presence of total alkaloids. The presence of flavonoids in all the plant species were conducted by using the aqueous extracts of the powder. The diosgenin have been extracted from the five species of *Asparagus racemosus* Willd., *Sida carpinifolia* Linn., *Tacca integrifolia* Ker-Gawl., *Tribulus terrestris* Linn., and *Trigonella foenum-graecum* Linn., powders by using n-hexane after acid hydrolysis. The alkaloid trigonelline was also isolated from the powder of *Trigonella foenum-graeum* Linn., by using solvent-solvent extraction method. The isolated compound estradiol, diosgenin and trigonelline were identified by thin layer chromatography, melting point, UV and IR spectroscopic methods. The percentage of estradiol was found to be higher in *B. parvijlora* Roxb. than the other two Butea species in this investigation. The isolated estradiol and diosgenin were tested with animal model to find out the rejuvenating effect of uterus activity. The promising results of hormonal activities and sources of herbal origins were observed.

396. A study on some medicinal plants of Shwebo Township and antimicrobial and antioxidant properties of "Triphala" used in traditional medicine. Thet Thet May. Thesis, PhD (Botany), University of Yangon; 2008.

A study on 54 medicinal plants of Shwebo Township were conducted based on the objective of treating diarrhea and dysentery diseases, with the help of available literatures and information from traditional practitioner. The outstanding characters of 54 species belonging to 45 genera of 30 families and their uses were also described. Among them, three species namely *Phyllanthus emblica* L., *Terminalia bellerica* Roxb. and *Terminalia chebula* Retz. were selected for detailed studies. The combination of these three fruits is known as "Triphala". In Myanmar Triphala is reputed to have curative power for antimicrobial and antioxidant properties. Histological examination was also conducted on these plants. Phytochemical and physicochemical tests have been undertaken on fruits of three species and Triphala. In addition, gallic acid was isolated from Triphala and identified. The isolated compound was identified by thin layer chromatographic method, UV and FT-IR spectroscopic analysis. Elemental analysis on the powdered fruits of these three species was conducted by using Energy Dispersive X-ray Fluorescence (EDXRF) spectrometry. In addition, five different extracts using water, ethyl acetate, ethanol (95%), pet-ether (60ºC-80ºC) and chloform were prepared from fruits of three species and Triphala and their *in vitro* antimicrobial activities was tested with five bacteria *Bacillus subtilis, B. pumilis, Staphylococcus aureus, Pseudomonas aeruginosa, Esherichia coli* and a fungus *Candida albicans.* Acute toxicity test of both aqueous and ethanolic (95%) extracts of Triphala on albino mice have been conducted. The LD_{50} of the aqueous and ethanolic (95%) extracts of Triphala was found to be higher than 14g/kg and 9g/kg body weight of albino mice. Finally, the investigation of radical scavenging activity of both aqueous and ethanolic (95%) extracts from Triphala was performed by using the 1, 1, Diphenyl 1-2 Picryl Hydrazyl (DPPH) assay. The antioxidant activity in ethanolic (95%) extract is higher than that of aqueous extract from Triphala. Their activities were compared against standard ascrobic acid and the antioxidant activity of gallic acid isolated from Triphala. From these results, the antioxidant activity of gallic acid was found to be higher than that of ascorbic acid.

397. Study on the anti-diabetic activity and chemical constituents of *Tinospora cordifolia* Miers. (Sindon-ma-nwe) and *Wedelia calen-dulaceae* Less. (Negya-gale). Mon Mon Thu. Thesis, PhD (Chemistry), University of Yangon; 2003.

Two medicinal plants, namely *Tinospora cordifolia* (Sindon-ma-nwe) and *Wedelia calendulaceae* (Negya-gale), which are used in traditional medicine for the treatment of diabetes, have been selected for chemical and pharmacological investigations. In the pharmacological investigation, aqueous and 70% ethanolic extracts of *W. calendulaceae* were subjected for the first time to *in vivo* antihyperglycemic test with JB strain rabbits model, where they exhibited significant antihyperglycemic activities on the rabbits model. Solvent fractionation of the 70% ethanolic extract of *W. calendulaceae* and chromatography on silica gel column with PE-EtOAc (8:2) solvent system has yielded stigmasterol (0.013%) and with EtOAc-MeOH (95:5) solvent system, three steroidal glycosides (0.1, 0.01 and 0.1 % yield) respectively. Similarly, the 70% ethanolic extract of *T. cordifolia*, after solvent fractionation and by chromatography on silica gel co1umn with EtOAc-MeOH (9:1) solvent system, yielded two diterpene glycosides, namely methyl ester of 12-0-P-D-glucopyranosyl-15-16-epoxy-12-hydroxy-3, 13(16), 14 -clerodatrien -17-6-olid-18-oic acid (0.06%) and borapetoside B (or methyl ester of 6-0-β-D-glucopyranosyl-15-

16-epoxy-2,6- dihydroxy-3,13(16), 14-clerodatrien-17-, 12-olid-18-oic acid) (0.05%) respectively. The isolated compounds were identified and characterized by TLC, UV, FT-IR, ^{1}H NMR, ^{1}H-^{1}H COSY, ESI and EI mass spectroscopic methods. The two diterpene glycosides that have been isolated may be reported as the new finding in *Tinospora cordifolia* (Sindon-ma-nwe).

398. Study on the antihypertensive activity and chemical constituents of *Millingtonia hortensis* Linn.f. (Egayit) & *Gisekia pharnaceoides* Linn. (Gangala). Sanda Moe. Thesis, PhD (Chemistry), University of Yangon; 2003.

Two medicinal plants, namely *M. hortensis* (Egayit) and *G. pharnaceoides* Linn. (Gengala), which are used in traditional medicine for the treatment of hypertension, have been selected for chemical and pharmacological investigations. In the pharmacological investigations, aqueous and 70% ethanolic extracts of *G. pharnaceoides* were subjected for the first time to *in vivo* antihypertensive test with anaesthetized dogs model, where they exhibited significant antihypertensive activities on the anaesthetized dogs. Solvent fractionation of the 70% ethanolic extract of *G. pharnaceoides* and chromatography on silica gel column with EtOAC-CH3COOH-HCOOH-H_2O (100:11:11:26) solvent system has yielded 2 aliphatic nitro compounds (0.2 and 0.27%). Similarly, the 70% ethanolic extract of *M. hortensis* yielded, by chromatography on silica gel column with PE-EtOAc (9:1) solvent system, and sometimes by PTLC on silica gel layer with PE-EtOAc mixture, β-sitosterol-stigmasterol (3:1) (0.162%), acacetin (0.36%) 7-methoxy-4', 6, 8-trihydroxyisofavone (0.08%) and 7'–carboxy-6, 8-dihydroxy -4' –methoxyisoflavone (0.04%). This may be the first time that these flavonoids are reported in *M. hortensis*. The structure of the isolated compounds were elucidated by UV, FT-IR, ^{1}H NMR and mass spectroscopic methods.

399. Study on the effects of *Phyllanthus niuri* L. (Taung-zebyu) on animal models. Khin May Nyo. Thesis, PhD (Zoology), University of Yangon; 2007.

The effect of *Phyllanthus niruri* L. (Taung-zebyu) widely distributed in Myanmar was studied using appropriate animal models during the study period from October 2003 to October 2006. The effect of watery extract of the whole plant on blood glucose level was tested on adrenaline-induced hyperglycaemic rabbit models. Oral administration of aqueous extract significantly reduced the blood glucose levels in the tested models within 1, 2, 3 and 4 hour. Its effect on blood pressure was investigated in normotensive mongrel dogs. The plant extract reduced both systolic and diastolic blood pressure and the hypotensive activity was significant at the dosage levels of mg/kg at 10, 20, 30 and 40. The effect of alcoholic plant extract on urine formation was investigated in rats and was found to exhibit significant diuretic effect at 3, 4 and 5hr. The chemical that could affect the health of man was not recorded in the data obtained from phytochemical analysis. Acute toxicity test carried out in mice also did not show the toxic effect. Suggestions for future work are outlined.

400. A study on the hypotensive action of leaves and root bark of *Millingtonia hortensis* Linn.f. (Aykayit) .Yee Yee Tin. Thesis, MMedSc (Pharmacology), Yangon: Institute of Medicine (2), 1997.

The hypotensive action of aqueous extract of leaves and that of root bark of *Millingtonia hortensis* Linn.f. (Aykayit) was studied in laboratory animals by using *in vivo* and *in vitro* preparations. The hypotensive effect of extracts was studied on adult normal anaesthetized dogs of either sex. The blood pressure of the dog was recorded on smoked drum of Kymograph and measurements were obtained from mercury manometer. Both of the extracts of *Millingtonia hortensis* Linn.f. showed dose independent hypotensive effect up to the dose of 20mg/kg beyond which they lowered blood pressure in dose dependent manner. In intact preparation, i.e. on anaesthetized dog, hypotensive action of the extracts was not blocked by propranolol, atropine and chlopheniramine pretreatment. They did not abolish the noradrenaline induced rise in blood pressure. Both of the extracts suppressed the myocardial contraction in isolated rabbit heart. They also relaxed noradrenaline induced contraction of rabbit aortic strip. Acute toxicity study revealed that both extracts did not cause toxicity in mice. The extracts were also found to have diuretic action with a significant potassium loss in urine. Phytochemical analysis showed that both extracts have glycosides, saponins, tanninoids, carbohydrates and steroids. The extract of leaves also contains alkaloids.

401. Study on the hypouricaemic action of ချဉ်စော်ကားသီး (Chin-saw-kha-thee). Biochemistry Research Division. *Annual report 2000*. Yangon: DMR (LM). p13.

Most of the people living in various parts of Myanmar, especially in Shan State, use *Cydonia cathayensis* Hemsl. ချဉ်စော်ကားသီး a sour fruit, as folklore medicine for relief of joint pain. However, it has never been subjected to scientifically controlled trial in human volunteers. Thus, a randomized two way cross over study was conducted on twenty apparently healthy subjects of both sexes and ages between 25-55 years. Subjects were randomly divided into two groups and allopurinol 100mg three times a day (standard hypouricaemic drug) was administered to the first group for 14 days. It was followed successively by the washout period of 7 days and ချဉ်စော်ကားသီ; (5gm of dried fruits was mixed with 150ml of water, over night and watery mixture (excluding dry fruits) was administered daily for 14 days. For the second group, ချဉ်စော်ကားသီး was administered in the first 14 days and after a washout period of 7 days, it was followed by allopurinol for 14days. Blood samples were collected on Day0, Day14, Day21 and Day 35 to determine the serum uric acid level before and after administration of drugs. Serum uric acid level of first group before and after administration of allopurinol was 4.88±1.25 and 2.96±1.21mg% respectively and for second group it was 4.02±0.38 and 2.73± 0.76mg% respectively. There was a significant difference between the values ($p<0.05$). Serum uric acid level of first group before and after administration of ချဉ်စော်ကားသီး was 4.73±0.98 and 4.69±1.27 and for second group the values were 3.94±0.5 and 4.13±0.82 respectively. There was no significant difference between the two values. Thus it seems that ချဉ်စော်ကားသီး had no hypouricaemic action and the mechanism of action for relief of aches and pains may be due to other actions of ချဉ်စော်ကားသီး.

402. Study on the larvicidal activity and chemical constituents of *Calotropis procera* R.Br (Ma-yo) latex and *Tagetes erecta* Linn. (Htat-taya-pyin-thit) flowers. Htay Htay Khaing. Thesis, PhD (Chemistry), University of Yangon; 2008.

The main aim of this work is to develop environmentally safe, biodegradable, low cost, indigenous methods for vector control, which can be used with minimum care by individual and communicaties in specific situations. Two plant materials, viz., *Calotropis procera* R.BR (Ma-yo) latex and *Tagetes erecta* Linn. (Htat-taya-pyin-thit) flowers, were chosen to study this larvicidal activity. CH_3OH extracts of "Ma-yo" latex and PE extract of "Htat-taya-pyin-thit" flower showed potent larvicidal activity (LC_{50}=0.014% and LC_{90}=0.28%, LC_{50}=0.04% and LC_{90}=0.28%, respectively) against the late third and four instar larvae (*Aedes aegypti* mosquito). Activity guided fraction lead to isolate stigmasterol glucoside (**A**) (0.4920% yield, m.p. 200-204ºC), lupeol (**B**) (0.015% yield, m.p.215ºC) and stigmasterol (**C**) (0.17% yield, m.p. 172ºC) from CH_3OH extracts of "Ma-yo" latex; and 3-keto-23-hydroxy-β-amyrin (**D**) (0.02% yield, m.p.168ºC) and 3-keto-β-amyrin (**E**) (0.016%, m.p. 189ºC from methanol soluble portion of petroleum ether extract of "Htat-taya-pyin-thit" flowers. The isolated compounds were identified and the structures elucidated by joint application of FT-IR, ^{1}H NMR, ^{13}C NMR and EI-MS spectroscopic techniques. Compounds **C** and **D** have significant larvicidal effect (LC_{50}=0.007% and LC_{90}=0.017%, LC_{50}=0.005% and LC_{90}=0.13%, respectively). Their activities are better than those of their mother crude extracts. However, the larvicidal activities of this compound were much lower than that of synthetic larvicide (Deltamethrin). However, **A** and **B** do not possess larvicidal activity. **C** and **D** could be considered as natural larvicidal agent and used as alternatives for conventional control that is environmentally safe and biodegradable. In addition, CH_3OH extracts of "Ma-yo" latex and PE extract of " Htat-taya-pyin-thit" flowers could be also used of natural larvicidal agent. The LD_{50} of ethanolic extract of *C. procera* latex in mice was 5.8g/kg. Therefore, care must be taken when latex of *C. procera* is used as larvicide it may have harmful effect on mammalian. Water extract of *Tagetes errecta* show on lethality of the mice up to 7 days with a maximum giving dose level of 7g/kg indicating it has no harmful effects and hoped to be safety used as larvicide.

403. Study on the organic chemical constituents & antibacterial activity of *Azadirachta indica* A.Juss. (Tama) and *Stephania hernandifolia* (W.) Walp. (Taung-kya). Khin Thandar Shwe. Thesis, PhD (Chemistry), University of Yangon; 2006.

This thesis described about the investigation of phytoconstituents from two selected Myanmar medicinal plants and their pharmacological effects. *Azadirachta indica* A.Juss (Tama) is very famous especially for the treatment of skin diseases. The chemical investigation of *Stephania hernandifolia* (Willd.), Walp (Taung-kya) has limited investigational reports. Acute toxicity on 70% ethanol extracts of *S. hernandifolia* and *A. indica* was done on albino mice.The LD_{50} value of Tama and Taung-kya are 8g/kg and 3.87g/kg respectively. The 70% ethanol effect of Taung-kya exhibited also sedative effect (medium effective dose MED_{50} = 4g/kg) and good relationship between dose and sedative effect. Rotundine isolated from Taung-kya was also determined its analgesic activity *in vivo* compared with that of standard morphine by using tail clip method. Analgesic effect was measured by determining tail-pinch pressure needed to elicit a withdrawal response. As a result, the time onset of pain response of post treatment with rotundine was significant delayed ($p<0.005$) than that of post treatment with placebo. Comparative effect of pain response on pre and post treatment showed significant delayed the onset of pain response ($p<0.005$).

Antibacterial activity of four extracts (PE, CH_2Cl_2, EA, *n*-butanol) of both plants was studied on 8 bacteria strains: *Salmonella derby, Vibrio cholerae, Staphylococcus aureus, Salmonella typhi, Shigella dysenteriae, E. coli, Klebsiella pneumoniae* and *Bacillus subtilis.* All extracts except PE of both plants showed antibacterial activity against seven strains (ID 12-20mm). EA and *n*-butanol extracts of both plants have significant activity against *S. aureus, S. derby* and *B. subtilis*. Chemical investigation of *A. indica* and *S. hernandifolia* have been done by means of solvent extraction and chromatography. Structure elucidation was made by UV, IR, 2D NMR, melting point determination. Two compounds were identified as nimbin (0.012%) and β-sitosterol (0.008%) from the bark of Tama. Two compounds (KTD-003, 004) were isolated from the tuber of Taung-kya. KTD-003 could be confirmed as rotundine (0.018%).

404. Study on the potential use of preparation of *Artemisia annua* plants and its extracts on malaria infections. Nyein Nyein. Thesis, MMedSc (Microbiology), Yangon: Institute of Medicine (1); 1994.

The global problem of multi-drug resistance in falciparum malaria is serious and prompt effective treatment of critically ill patients is mandatory. Nowadays, Qinghaosu, the active antimalarial principle of the Chinese herb Qinghao (*Artemisia annua* L.) is widely accepted to treat drug resistant malaria. Hence, the antimalarial activity of crude plant materials such as leaves, stems, leaves together with stems and the extracts of *A. annua* plants grown in Myanmar were scrutinized in experimental *P. berghei* mouse model as well as in man. 1'107 inoculum size was chosen as the standard inoculum for experimental malaria. Petroleum ether was considered to be the solvent of choice for preparing the extracts. Dried leaves powder of *A. annua* showed maximum effects while testing the plant materials separately. The stems of the plant were found to be devoid of the active compound. On the basis of parallel comparative studies of *A. annua* leaves and stems powder with chloroqunie in *P. falciparum* infections, it has been shown that the mean asexual parasite clearance time by powered *A. annua* is remarkably shorter than that by chloroquine ($p<0.025$). There was no evidence of drug toxicity and side effects observed. However, further research on therapeutic treatment regimen, dosage and drug toxicity should be continued.

405. Study on the screening of some biological activities and isolation of some bioactive compounds from *Cissus quadranglularis* Linn. (Shasaung-let-set) and *Acacia arabica* Wall. (Subyu) bark. Theint Theint Aung. Thesis, PhD (Chemistry), University of Yangon; 2007.

The present research deals with the screening of some biological activities of *Cissus quardrangularis* Linn. (Shazaung-let-set) and *Acacia arabica* Wall. (Subyu) and isolation of some bioactive constituents by activity guided fractionation of plant extracts. In the DPPH staining, methanolic extract of the two medicinal plants and the two isolates, friedelin and catechin had the radical scavenging activity. Among all the test samples, the methanolic extract of *A. arabica* showed the highest radical scavenging activity at 6.25µg dry matter due to the presence of the highest amount of phenolic compounds. The acute toxicity study on aqueous and ethanolic extract of the two selected medicinal plants on albino mice by oral administration indicated that aqueous and ethanolic extracts of *C. quadrangularis* were free from acute toxicity effect at maximum permissible dose (16g/kg) while LD_{50}'s of aqueous and ethanolic extracts *A. arabica* were found to be 4.2g/kg and 8.6g/kg body weight, respectively. Study on the analgesic activity of aqueous and 70% ethanolic extracts of *A. arabica* in albino mice by Haffner's tail clips method showed that both extracts (2g/kg)

significantly ($p < 0.05$) elongated the time onset of pain response and exhibited moderate analgesic activity compared to standard drug morphine. Antimicrobial activity of different crude extracts of two selected plants were tested against six species of bacteria such as, *Bacillus subtilis, Staphylococcus aureus*, *Pseudomonas aeruginosa, Bacillus pumalis, Candida albican*, and *Mycobacterium* species. $CHCl_3$, EtOH and EtOAc extracts of *C. quadrangularis* and *A. arabica* showed antibacterial activity for all six microorganisms whereas PE extract of *A. arabica* showed antibacterial activity against *Staphylococcus aureus*, *Bacillus pumalis* and *Candida albican*. The MIC values of β-sitosterol from *C. quadrangularis* were 3μg/mL against *Proteus morganii*, *Salmonella typhi, Escherichia coli* LT, *Staphylococcus aureus, Escherichia coli* ETEC, *Vibrio cholerae*, *Bacillus subtilis* and > 6μg/mL against *Shigella flexneri*. Ethyl gallate from *A. arabica* inhibited growth at 1μg/mL against *Staphylococcus aureus* while 2μg/mL against other seven test organisms. Therefore ethyl gallate was more active against *Staphylococcus aureus* than against other test organisms. Chromatographic separation of petroleum-ether extract of *C. quadrangularis* yields three phytoconstituents **A (**friedelin) (0.007%), **B** (β-sitosterol) (0.01%), **C** (0.002%). Three phenolic compounds from *A. arabica*, **D** (ethyl gallate) (0.004%) from the bioactive EtOAc extract and **E** (catechin) (0.006%) and **F** (0.007%) from the bioactive EtOH extract were isolated by using column chromatographic technique. The isolated compounds were characterized by modern spectroscopic methods such as UV-vis, FT-IR, NMR spectroscopy and Mass spectroscopy.

406. Study some physicochemical characteristics and acute toxicity on *Jatropha curcas* oil obtained by petroleum ether extraction. Myint Myint Shein. Thesis, MPharm, Yangon: University of Pharmacy, 2007.

This study consists of two parts. Part A was the study of the physico-chemical properties of *Jatropha curcas* (Chan-siyo-kyetsu) oil by using pharmacopoeia analytical text book procedures. The seeds were collected from Katha Township, Kachin State, Shan State and along with the seeds of Htantabin Township and Mingaladon areas, Yangon Division. In this research work, crude *J. curcas* seed oil, degummed *J. curcas* seed oil (expression method), roasted and non-roasted *J. curcas* seed oil (petroleum ether extraction method) were used. Various pharmacopoeia parameters were measured, such as, specific gravity, refractive index, saponification value, iodine value, acid value, Ultraviolet spectrometry and pH values were assessed according to the British Pharmacopoeia (1993). Part B was the study of acute toxicity of *Jatropha curcas* (Chan-siyo-kyetsu) oil, using 170 albino mice (ddy strain). The acute toxicity of crude oil, degummed oil, roasted and non-roasted oil was determined. Ten mice were used as control group and (100%) peanut oil (Shwe brand) used as control test oil. From the results saponification values of *J. curcas* oil were high. Thus, this oil can be used as an emulsifying agent in the preparation of liniments for local application. However, all the extracted *J. curcas* oils have shown acute toxicity effects, when orally administered. Therefore, *J. curcas* (Chan-siyo-kyetsu) oil cannot be used as pharmaceutical intermediate aids in present status finding via oral administration route. However, LD_{50} of degummed oil is not statistically significant and therefore it is of interest as a pharmaceutical intermediate in pharmaceutical field. According to the research findings, degummed *J. curcas* oil can be recommended as an emulsifying agent in pharmaceutical preparation of liniments for skin application.

407. Subacute toxicity study of *Plantago major* Linn. (Ahkyaw-baung-tahtaung). Thaung Hla; Khin Saw Aye; Ne Win; Mu Mu Sein Myint; Moe Moe Aye; Win Myint. *Myanmar Health Res Congr*, 2000: p12-13.

The subacute toxicity of the *Plantago major* Linn. (Ahkyaw-baung-tahtaung) was tested on a group of laboratory rats supplied by Animal Services Research Division, Department of Medical Research (Lower Myanmar). This group comprises 9 male and 9 female rats making a total number of 18. All of them were divided into 3 small groups each belonging equal number of both male and female sex. Two dose levels of watery extract of *Plantago major* Linn. admixed with honey were used. Low dose 0.5ml/100gm body weight (i.e 16.5 times that of the human dose) was administered to group 1. High dose 1ml/100gm body weight (i.e 33 times that of the human dose) was introduced to rat group number 2. The remaining group was served as control and receiving distilled water 1ml/100gm body weight. The test drug was given once daily through the oro-gastric tube up to a total period of 3 months. Test animals were placed in metal cages. Male and female sex of each group was separated in different cages. All the rats were allowed free access to laboratory chow and drinking water. Behaviour, food intake, excreta, body hairs and movement of each individual rat was observed and recorded daily. Body weight also noted once a week. At the end of 3 months, they were sacrificed humanly. Blood was collected by aortic puncture and tested for urea, complete picture and liver function. Internal organs and tissue were examined grossly to explore visible pathological changes. They were then processes for histopathological study. In conclusion, it was found that test drug while administering 3 months daily to rats; provoke no significant change in blood urea, liver function, and complete picture and body tissues.

408. Subacute toxicity study of Yar-dan-tze. Thaung Hla; Mya Mya Win; Aye Than. *Myanmar Health Res Congr*, 2000; p89.

The study was conducted on 24 rats supplied by Animal Services Research Division, Department of Medical Research. It consists of 12 males and 12 females. They were divided into 4 groups, each of which included equal number of both male and female sex. Three dose levels of defatted kernel of Yar-dan-ze were used for testing its subacute toxicity. One dose level was administrated to each test group. The remaining one group was kept as control receiving only vehicle in which the test drug in powder form was suspended. The drug was given once daily for a total of 3 months. At the end of the drug administration period all the rats were sacrificed humanely. Blood was tested for urea, liver function and complete picture. Bone marrow was observed for its haemopoietic activity. Body tissues and internal organs were examined for grossly visible pathological changes. The organs were then prepared for histopathological study. It was found that the drug powder of the defatted kernel produce no significant changes in urea level, liver function, blood and bone marrow picture and body tissues.

409. Symposium on the present status of research on indigenous medicinal plants in Burma - some work done during the Japanese occupation. Sein Gwan. *Proc Burma Med Res Soc*, 1960; 2: p17-18.

Pan-oo. is a tuber. The botanical name of this plant is not yet known. It has two varieties, the smaller and the bigger tubers. It is used in the treatment of ulcers and leprosy. The active principle is thick greenish yellow fragrant oil just like balsam. A 2% solution of this in soft paraffin was applied externally to obstinate ulcers and found to have an extremely good effect. It has a strong antiseptic action. Let-htok-gyi. *Holarrhena antidysterica* Wall. (Apocynaceae). Owing to the scarcity of western imported drugs for the treatment of amoebiasis during the occupation period attention was turned to a locally available source that is the alkaloids from the bark of this tree. An improved method of extraction of alkaloids (1) double iodide of bismuth and total alkaloids for therapcutic use, the former for oral administration and the latter for intramuscular injection. The efficacy of this drug was tested on patients suffering from amoebic dysentery. Generally the patient's condition improved in ten day's time. There were no side effects seen during the course of the treatment Hang-Chick. This is the name of the arrow poison used by the hill tribes of Wa State. Found to contain 5% of alkaloid and the rest 95% is non-alkaloids material soluble in water which has no poisonous effect. The alkaloids so obtained are turned into hydrochloride and the experiment with animals showed that the effect is very similar to South American curare alkaloids.

410. Taxonomical, pharmacognostical and anti-tubercular studies of two species of Vitis. San San Yee. Thesis, MSc (Botany), University of Yangon; 1989.

In this study, two species of Vitis were studied taxonomically and identified as *Vitis repens* W&A. and *Vitis discolor* Dalz. Histological characters and pharmacognostical aspects of the plants were investigated. The pharmacognostical portion includes anatomical studies, preliminary phytochemical studies, fluorescence analysis and microchemical colour reaction tests. Preliminary phytochemical investigations were conducted on various soluble extracts and aqueous extract of air-dried aerial part and underground rhizome powder. Glycoside and flavonoid were detected in 95% ethanolic and aqueous extracts. Anti-tubercular studies were conducted on crude drug powder and aqueous extract of aerial part and underground rhizome of both the species. No anti-tubercular action was detected on *Tuberculli bacilli* with the above drug preparation.

411. Tissue culture and pharmacognostic study of *Stevia rebaudiana* (Bert.) Hemsl. and its hypoglycemic effect on animal model. Kyi Kyi Khaing. Thesis, PhD (Botany), University of Yangon; 2007.

S*tevia rebaudiana* (Bert.) Hemsl. Say-tha-gyar has been selected to evaluate the activities concerning and benefits of people in the rural area and hilly remote regions. The multidisciplinary approach on the usefulness of the plant has been performed to give the way as an opium-substituted plant and also to get regular income so as to upgrade the socio-economic status of native people. In the present work, botanical study included identification based on morphology of vegetative and reproductive parts of the plant. Moreover, tissue culture was studied as the field of plant biotechnology to compare the production and activities of secondary metabolites between the powder of Stevia leaves and callus tissue. Rapid multiplication of callus was achieved by using the Murashige and Skoog (1962) medium containing plant growth regulator and coconut water. In chemical study, preliminary phytochemical properties have been undertaken from leaves and callus tissue of Stevia plant. Results

observed on preliminary phytochemical tests and thin layer chromatography of callus mass and those of leaves were not apparently different. Separation and isolation of some organic constituents by using column chromatography and identification of these compounds was preceded with the help of thin layer chromatography, Ultra-violet Spectroscopy and Fourier Transform Infrared Spectroscopic analyses.The prescence of glycoside group were apparently observed. The concentration of elements was analyzed by using Energy Dispersive X-ray Fluorescence spectrometer tenique (EDXRF). In pharmacological study, acute toxicity tests of both ethanolic extract and aqueous extract of leaves and expressed juice of Stevia callus on albino mice have been conducted. The median lethal dose (LD_{50}) of Stevia was found to be more than 12g/kg body weight of mice. There was no acute toxicity effects and lethality up to the maximum giving dose of 12g/kg of these extracts. In this research, the effect of aqueous extract and ethanolic extract of the leaves on normal rabbits and glucose loaded hyperglycemic rabbits were studied. After oral administration of aqueous extract (3g/kg) blood glucose levels did not rise in normal rabbits after 1,2,3 and 4hrs. After administration of (6g/kg) aqueous extract at blood glucose level was only significantly reduced in blood glucose level loaded hyperglycemic rabbits at 1hr ($p<0.05$) and not significant in blood glucose level at 2,3 and 4hr.

412. Toxicity study, isolation and identification of gelsedine from toxic plant, *Gelsemium elegans* Benth. Khin Tar Yar Myint; Mu Mu Sein Myint; May Aye Than; Win Win Maw; San San Myint; Mar Mar Myint; Aung Aung Maw; Thaw Zin. *Myanmar Health Sci Res J*. 2011 August; 23(2): p84-88.

Since plants contain multiple chemicals and classes that work independently or in concert, understanding plant toxicity is often poor. Additionally, plant themselves are inherently variably and potency and type of toxic depend on the season, geography, local environment, plant part and method of processing. However, in cases of plant poisoning, species and phytochemical characterization for crude recognition of likely toxins in relations to known plant toxics should be attempted. So, the present study investigated the toxicity of *G. elegans* Benth. Followed by isolation and structural identification of toxic alkaloid compound. This plant, indentified as *Gelsemium elegan* Benth. (နာကို/နာငေ့ါ). family of Loganiaceae is a well known toxic indigenous plant of Southeastern Asia, used among hilltribes for committing suicide. Its leaves are morphologically similar to *Dregea volubilis* Benth. (ခွေးတောက်) and was mistaken by people at Mine-khon Village, Kyineton Township who suffered strychnine-like toxic symptoms soon after ingestion. Toxicity studies were concluded using animal model and pure compound isolated by preparative thin layer chromatography (PTLC) was identified by UV, FT-IR, ^{1}H NMR and 13C spectrums. Acute toxicity study of watery extract of leaves and stems of *G. elegans* (400mg/kg and 600mg/kg) and total alkaloid fraction of leaves (100mg/kg) showed lethal effect within 10 minutes, per orally in mice. Isolated pure alkaloids compound from total alkaloids fractions of leaves was identified to be 14-hydroxygelsedine ($C_{19}H_{25}N_2O_4$).

413. Toxicological and histopathological evaluation of *Momordica charantia* Linn. fruit (Kyet-hin-gha-thee) powder in rats. Thaung Hla; Aye Than; Maung Maung Wint. *Myanmar Health Res Congr,* 1997. p96.

Momordica charantia Linn. fruit powder with proven hypoglycemic property was evaluate for its subacute toxicity in rats before the long term administration to human diabetics. A total of 24 rats (12 males and 12 females) were tested. Each sex was divided into 4 groups. Three drug dose levels were administered, the lowest being 6mg/gm body weight and the highest being 48mg/gm body weight (i.e. 800 times that of the human dose). One group in each sex serves as control, having only vehicle in which the drug powder was suspended. The drug was given for a total of 3 months continuously during which the animals were observed daily for visible sign and symptom of toxicity. Body weights were monitored weekly. At the end of three months, all the rats were sacrificed. The blood was tested for liver function, urea and complete picture. Bone marrow was also taken from the femur and its picture was observed. Gross examination and histopathological studies were carried out on internal organs. The biochemical tests data and tissue study results of the drug fed groups were compared with that of the controls. No significant toxicity was provoked by Kyet-hin-gha-thee powder during its 3 months administration to rats.

414. Toxicological evaluation of *Orthosiphon aristatus* (BI.) in mice and rats. Khin Chit; May Aye Than; Ne Win; Moe Moe Aye; Win Win Kyaw; Khin Ye Myint. *Myanmar Health Res Congr,* 2000: p13.

It was reported and confirmed that *Orthosiphon aristatus* (BI.) (See-cho-pin or The-gyah-ma-gike) had hypoglycemic activity. It had been scientifically evaluated for its activity on *in vivo* animal model. Clinical study had also been carried out on normal healthy volunteers and non-insulin dependent diabetes mellitus patients. Acute and subacute studies are essential to study before studying long term trial on diabetic patients. The aqueous extracts prepared from dried leaf of *Orthosiphon aristatus* (B1.) was administered to mice and rats. Following a single dose for three months of daily oral administration, the extracts produced no changes in serum urea, SGOT, SGPT and blood counts. Gross and histopathological investigations showed no abnormalities. These results taken as a whole indicated that the leaves of *O. aristatus* (See-cho-pin) used in Myanmar traditional medicine are not toxic for mice and rats. It was concluded that long trem clinical trial on patients could be carried out as the leaf did not show any toxic effect on acute and sub-acute toxicity tests.

415. Toxicological studies of combination of alcoholic extracts of five Myanmar medicinal plants. Mu Mu Sein Myint; Khin Chit; Aye Than; Ne Win; San Aye; Win Win Kyaw; San Kun; Kyi Kyi Myint; Thazin Myint. *Myanmar Health Res Congr,* 2002. p55.

A prospective combination of 95% alcoholic extracts of five Myanmar medicinal plants which are famous for their anti-mycobacterial activity were carried out for sub-acute toxicity test in rats. A total of 18 rats (9 males and 9 females) were tested. They were divided into 3 groups. Two drug dose levels were administered. A high dose level being a combination of 95% alcoholic extracts of *Desmodium triquetrum* DC. (Lauk-thay) 1.5gm/kg; *Azadirachta indica* A.Juss (Ta-mar) 1.5gm/kg; *Vitis discolor* Dalz. (Dabin-daing-mya-nan) 0.75gm/kg; *Alpinia galanga* Willd. (Badegaw) 0.6gm/kg and *Acorus calamus* Linn. (Lin-ne) 0.2gm/kg, was administered to Group I. The low dose level being a combination of 95% alcoholic extracts of *D. triquetrum* 0.75gm/kg; *A. indica* 0.75gm/kg; *V. discolor* 0.375gm/kg; *A. galanga* 0.3mg/kg and *A. calamus* 0.1gm/kg was administered to Group II. Group III received only distilled

water and served as a control group. Combination of 95% alcoholic extracts of five medicinal plants was given for 3 months. All rats were observed daily for visible sign and symptom of toxicity. Body weights were observed weekly. At the end of three months all the rats were sacrificed. Blood samples were collected for haematological and biochemical studies. The internal organs were excised and weighed. Gross examination and histological studies were carried out on internal organs. It was found that there were no significant biochemical and haematological differences between the control and test groups. In addition, no significant histological lesions were observed.

416. Toxicology and chemical analysis of local synthetic (Kyauk-thway**).** May Aye Than; Than Htut Oo; Mu Mu Sein Myint; Aye Than; San San Myint; Thandar Than; Mar Mar Myint. *Myanmar Health Res Congr*, 2004; p37.

Local synthetic (ကျောက်သွေး) is used for the treatment of anaemia in Myanmar traditional system as blood tonic since years ago, but there was no scientific information about its chemical constituents and toxicity in Myanmar. The aim of this study was to do scientific evaluation on its chemical constituents and LD_{50} for the safety of local synthetic (ကျောက်သွေး)which is easily available in the market. (ကျောက်သွေး) collected from Sandi indigenious shop was identified by using FT-IR (Fourier Transform Infra Red spectrophotometer) and UV spectrophotometer. Ultraviolet and IR spectra of standard ferric ammonium citrate (BDH) and test sample were the same? Toxic elements of arsenic and lead were determined by using UV spectrophotometer and AAS (Atomic absorption spectrophotometer). Iron content was determined by using Redox titration method and zinc, copper, manganese, chromium was determined by using AAS. Arsenic was not detected in both samples. Lead, zinc, copper and chromium contents were 1.54 ppm (0.00015%), 543ppm (0.0543%), 1118ppm (0.118%) and 998 ppm (0.0998%) respectively, in test but not in the standard. Manganese content was 1837.50ppm (0.1838%) in standard and 1467.5ppm (0.1468%) in test. The iron content of sample was 22.39% which was not different from standard sample (21.56). The LD_{50} testing of synthetic (ကျောက်သွေး) was conducted as a controlled parallel, experimental study on mice model. The LD_{50} of synthetic (ကျောက်သွေး) (Sandi) was 3.5g/kg (Lower limit 2.5- upper limits 4.9g/kg) in mice.

417. Treatment outcome of MDR-TB treated with herbal plants in combination with Amoxycillin, Clofazimine, Quinolone and Kanamycin. Paing Soe; Than Lwin; Khin Chit; Thaw Zin; Ti Ti; Kyi May Htwe; Kyi Kyi Myint; Mya Mya Moe; Zar Zar Lwin. *Myanmar Health Res Congr,* 2008: p3.

In the treatment of MDR-TB, not only were the second line drugs extremely expensive, they were less effective and more toxic than the first line drugs and a greater defaulter rate and non-compliances make these regimes impracticable. With the aim to overcome these problems, less expensive available western medicines such as Amoxycillin, Clofazimine. Quinolone and Kanamycin were administered to MDR-TB patients in combination with 5 Myanmar herbal plants extracts. These plants have been proven to be safe by acute and sub-acute toxicity studies and effective by *in vitro* efficacy study against in ***M. tuberculosis***. With due consideration to medical ethics in human trials, these 5 promising plant extracts were allowed for clinical trials on two groups of TB patients. The first group (Group-A) consisted of 30 category II failure patients who had never been treated with second line western anti-TB drugs. The second group (Group-B) consisted of 14 culture proven multi-drug resistant tuberculosis (MDR-TB) patients who showed persistent positive sputum smear for 2 to four years,

inspite of completing full treatment with both first line and second line anti-TB drugs. In both groups, all plant extracts were found to be well tolerated. The findings indicated 83.3% of the patients in Group-A and 50% of the patients in Group-B to obtain cure after 2 years of treatment without subsequent relapse. This indicates the potential of reputed indigenous medical plants of Myanmar to become valuable anti-TB drugs in the future.

418. Use of locally availabel traditional medicine for malaria in Bago Division, Myanmar. Ohnmar; May Aye Than; Wai Wai Myint; Tun Pe; Poe Poe Aung; San Shwe. *Myanmar Health Res Congr,* 2006: p55.

Locally available traditional medicine packets were collected to identify their contents from 21 villages of 5 townships, Bago Division during the household survey. Five hundred and seven respondents with history of malaria fever during the last 3 months were face to face interviewed. Qualitative information was collected through informal conversation with shop owners, interviews with traditional healers, persons with history of malaria fever and focus group discussions with community members. Traditional medicine use for malaria fever was 222 (43.8%) and (82%) of them used it as the first line self-treatment. None of the children under 5 used traditional medicine only for malaria. Traditional drugs use included packets with antipyretics (59%), packets with traditional medicine (22.5%), packets with other contents (8.5%), (*Andrographic paniculata*) (5%) and other traditional herbs (21.6%). The cost of each packet ranges from 10 to 100 kyats. Relatively costly (1200 kyats) traditional medicine like Plasmogyn was not available in this village. Is used by a few respondents only for unavailability, difficult preparation and unpleasant taste. Licensed traditional healers usually refer malaria patients to the health staff. Health education should include emphasis on avoidance of such medicine packets which are not approved by the Traditional Medicine Department. A scrutiny on marketing of ineffective medicine packets is recommended.

419. Use of modern drugs and traditional medicine for malaria in Bago Division, Myanmar. Ohnmar, May Aye Than; Wai Wai Myint; Tun Min; Tin Maung Maung; San Shwe. *Myanmar Health Res Congr,* 2006: p15-16.

A cross-sectional study was undertaken in 21 villages of 5 townships, Bago Division in 2006 to determine the use of modern drugs and traditional medicine for malaria. Overall, 411 households with reported malaria fever within the last 3 months were selected. Qualitative information was obtained through informal conversation and focus group discussions. Locally available traditional medicine packets were collected. Modes of transmission of malaria by key household respondents included infected mosquito bite (79%), use of stream water (75%) and eating banana (47%). Only 9.2% could answer it correctly. Among 2096 household members, 507 (24.2%) reported history of malaria. Modern drug use (93.3%) was higher than traditional medicine (43.8%) and 78.4% of modern drug use was prescribed by health staff. None of the children under 5 used traditional medicine only. Modern drugs use included artesunate/ artemether (64.2%), mefloquine (21.9%), quinine (5.8%), chloroquine (3.3%), sulfadoxine-phrimethamine (3.3%) and antipyretics only (19.3%). One-fifths of artesunate use was self-treatment. Incorrect use of artesunate was 52%. The use of prepackaged modern drugs from local shops was 12.4% and some contained antimalarials. Some traditional medicine packets contained antipyretics like aspirin. Commonest reasons for tradicine use were usual practice (60.6%), perceived curability (57.1%) and unavailability of modern medicine (46.5%). Efforts should be made to improve availability and correct use of antimalarials through health staff and

drug sellers. Avoidance of use of locally available ineffective packets should be highlighted.

420. Utilization of "Paya-say", prepared from traditional method, for the treatment of a variety of ailments in Yangon and Mandalay. Pharmacology Research Division. *Annual Report 2005*, Yangon: DMR (LM). p86.

The usefulness of Paya-say, documented in the relics of Lord Buddha for the prevention and treatment of a variety of ailments, has influenced strong belief and extensive use within some communities in Yangon and Mandalay. Paya-say was prepared from 4 fruits (ဇီးဖြူသီး၊ဖန်ခါးသီး၊ကျစုသီး၊သျှစ်သျှားသီး) which are dried and immersed in cow's urine contained in ceramic jars for 1-3 months. The sediment residues of the fruits were discarded (although some formulated them into tablets), and the filtered urine was taken as single or divided doses of 50-100mL daily, either as health promoter or as a prevention or cure for ailments. A cross-sectional survey on the utilization of Paya-say for various ailments were studied in Yangon and Mandalay, retrospectively, using secondary data from registers, and prospectively, using structured questionnaires and recording of interviews to those who come and collect the urine at the distribution centre (distributed free of charge as donation). The objective is to identify the population utilization Paya-say, their socio-demographic characteristics, knowledge, perception and ailments for which it was used, the reason underlying its use, mode of collection, preparation and dispense outcome and satisfaction of the consumers. In the prospective study, a total of 48 out of 62 subjects who came to collect the urine either for themselves or as behalf of the consumers agreed to participate in answering the structured questionnaires and interview. In the retrospective study, secondary data from register of 1217 patients for the year 2004-5 were recorded into proformas. The overall findings indicated that majority of users were from Mandalay (77.1%), between 26-67 years (mean 45.8 years) with 66.7% having treated with western medicine before. The education status varied widely from illiterate, laborers to skilled professionals including teachers and doctors. Most users have strong belief (72.9%) in its preventing, curing or alleviating of ailments while others used it out of hopelessness of disease, curiosity, no cost and nothing to loose by trying attitudes. Majority (70.8%) claimed to be regular, long-term users, who have noticed no problems or side effects during consumption. Some (10.4%) mentioned about the nauseating smell and unpalatable taste of urine which they soon got use to after some time. However, many patients were non-compliant, taking it as convenient in the form of health promoter for feeling of well-being rather than a medicine needing strict compliance to dose, frequency and duration of use. In spite of these limitations, more than 75% of patients were totally satisfied saying that they experienced some relief of symptoms within a month of taking treatment. Secondary data from registers indicated that the primary area treated were of chronic, disabling diseases such as cerebro-vascular diseases/paresis (23.1%), hypertension and heart diseases (21.1%), diabetes and its complications (14.5%), chronic recurrent arthritis (13.9%), chronic obstructive airway diseases (12.6%), skin disorders and chronic skin ulcers (9.3%), recurrent oedema secondary to liver and kidney diseases (8.7%), chronic indigestion and heart burns (4.1%), menstrual disorders (1.9%) and hopeless cases like cancer, HIV and hepatitis B (10.8%). About 4% did not have any disease or disorder but took treatment either for preventive purposes or as health promoter saying that they feel alert and could work better with regular intake. It was recommended that an in-depth study is needed to assess its true value and utilization as a traditional medicine.

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