

Preliminary Phytochemical Study on Three Species of Medicinal and Poisonous Plants in Traditional Medicine

Ni Win Moht Moht
dr.niwinmohtmoht@19gmail.com

Saw Ohnmar Win
sawohnmar98@gmail.com

Su Su Latt
sslatt1997@gmail.com

Abstract

The present study has been undertaken on three medicinal and poisonous plants used to cure various diseases in traditional medicine. *Catharanthus roseus* (L.) G. Don., *Nerium oleander* L. and *Thevetia peruviana* (Peris.) Merr. were selected by literature survey. Medicinal data information was collected from personal interview with traditional practitioners. The selected species was classified and identified. The morphological characters, Myanmar name, English name of these plants have been studied and presented with their necessary colour photographs. The toxic part and toxic substances present in these plants were described according to literature. The plant parts used as traditional medicine for various diseases were tested on the presence or absence of alkaloids, flavonoids, cyanogenic glycosides, saponins, glycosides, tannins and reducing sugars. All studied compounds were present in *Catharanthus roseus*, *Nerium oleander* and *Thevetia peruviana*. Except, reducing sugar was absent in *Thevetia peruviana*.

1. Introduction

People use plants for food, shelter, beauty, stimulants, religious, agriculture tools and various transports vehicles. Moreover, the uses of plants involve in our daily life as medicine. But some plants are poisonous. These plants contain substances that capable of varying degree of discomfort and adverse physical and chemical effects on even death to humans and animals when they are eaten or contacted. Although, the poisonous plants can be used as medicine, at low does their toxic constituents are often beneficial.

Medicinal plants are a very good source of active ingredients of herbal medicine and provide a safer and effective way to treat diseases. The plants may be considered not only for the chemical compounds such as carbohydrates, proteins and lipids that are utilized as food by man but also glycosides, alkaloids, tannins etc., that exert a physiological effect are usually secondary metabolites derived as a result of plant metabolism. So, the plant material may be subjected to preliminary phytochemical screening for the detection of various plant constituents

The present research deals with the study on some medicinal and poisonous plants grown in Monywa University Campus. The natural vegetation found in the studied area is mixing of tree, shrubs, herbs, climber and twiners. Among them, three medicinal and poisonous plants had been selected and studied. These plants are

Catharanthus roseus, *Nerium oleander* and *Thevetia peruviana* that belong to family Apocynaceae.

Catharanthus roseus is a perennial small herb that consist of vinca alkaloid which are sometimes used to prepare medicines for people suffering from diabetes and high blood pressure. It is regarded as a toxic plant depending on the level of exposure and ingestion. These are equally toxic to human, cats, dogs and horses. *Nerium oleander* is a perennial large evergreen shrub that contains toxic in all its parts. It is most commonly known as nerium or oleander. Oleander is one of the most poisonous commonly grown garden plants. Fresh juice of leaves is dropped into the eyes for ophthalmia. Decoction of leaves is applied externally to reduce swellings. Leaf juice is given very small dose in snakebite [11]. *Thevetia peruviana* (yellow oleander) is a perennial evergreen shrub or small tree and closely related to N. Oleander, is mainly known for its cardiac glycosides. African child died 6 hours after eating a kernel. This plant is medicinally used for dropsy, malaria, parasite, rheumatism, snakebite, sore, swelling, toothache, ulcer and wound [9].

The medicinal value of the drug plant is due to the presence of chemical substances. Recently, a rich source of promising chemical compounds from medicinal plants, are important for health care of many people. Moreover, the plants from which wonderful chemical compounds can be extracted are able to cure several diseases and are very much popular in medicinal world.

There are hundreds of plants used all over the world, which are used in herbal medicines as treatments for many diseases. These plant extracts contain chemical compound that produce a definite pharmacological action on the human body.

There is worldwide interest concerning the traditional medicinal plants leading to find the new drugs because today's well established drugs were developed to analyze the plants already obtained information from the traditional medicine.

In the present research, the scientific name, Myanmar name, English name, morphological characters, traditional uses, toxic parts, toxin and phytochemical constituents of (3) selected species are studied and presented.

The objectives of this study are to study and record some medicinal and poisonous plants in studied area, to confirm the validity of selected plants by morphological characters and to investigate the groups of chemical compounds which contain in these plants. The aim of this study is to remind people when taking toxic substances containing medicinal plants as medicine.

2. Materials and Methods

Three medicinal and poisonous plants were used in traditional medicine growing as wild or cultivated in Monywa University Campus were collected from July to August in 2019. Medicinal data information were surveyed from literatures and also collected through personal interviews with traditional practitioners by using structured interviews method. In this study, plastic bags, paper press for plant collection and dissecting lens were used for plant identification and then generic names and species names were identified by using description of [5]. Myanmar names of these plant species were described by [8] and [13]. The studied species were recorded by color photographs while flowering.

The leaves of studied plants were cleaned thoroughly. Then, they were cut into small pieces and were dried in shady place to get dried products for preliminary phytochemical tests.

2.1. Phytochemical Tests

The plant parts were extracted with 1% diluted hydrochloric acid (HCl), 95% ethanol (EtOH) and distilled water (H₂O) and then tested for the presence or absence of alkaloids, flavonoids, cyanogenic glycoside, saponins, glycosides, tannins and reducing sugars by Harbones method [7].

3. Results

3.1. *Catharanthus roseus* (L.) G. Don. Gen. Hist. 4: 95. 1837.

Myanmar name : Thinbaw manyo pan
English name : Periwinkle
Flowering and fruiting period : Throughout the year

Morphological characters

Perennial erect herbs or subshrubs with watery juice. the stems and branches terete, reddish-brown, glabrous. Leaves simple, opposite and decussate, stipulate, petiolate, the blades obovate-oblong, cuneate at the base, entire along the margin, acuminate or obtuse at the apex, glabrous and glossy on both surfaces. Inflorescences axillary or terminal cyme. Flowers pinkish-purple or white, ebracteates, ebracteolate, subsessile, bisexual, actinomorphic, hypogynous, pentamerous, showy and scented. Calyx 5-lobed, apposepalous, the tube short, the lobes lanceolate, persistent. Corolla 5-lobed, synpetalous, salverform, the tube tubular, the lobes rounded. Stamens 5, free, inserted, attached to corolla tube, in the inflated portion near the mouth, the filament very short, the anthers ditheous, basifixed, longitudinally dehiscence. Bicarpellary, unilocular, many ovules in each locule on the axile placentae, the style filiform, the stigma club-shaped. Fruits follicular in pairs linear, divergent.

Traditional uses : The leaves and stems are boiled with pure water to become 1/3 of the volume. This decoction can be drunk to decrease high sugar level in blood. So, it can be used to treat diabetes. It is also applied for hypertension and skin diseases. The decoction of five parts of plant mixed with sugar can be drunk in the treatment of thalasemia. (U Myint Aung, Daw Cho Cho San and Daw Kyi Kyi Khaing)

Toxic part : aerial parts

Toxin : vinca alkaloids (vincristine, vinblastine, vindesine and vinorelbine)

3.2. *Nerium oleander* L., Sp.Pl.1:209.1753

Myanmar name : Nwe tha gee
English name : Indian Oleander,
Sweet Scented Oleander
Flowering and fruiting period : Throughout the year

Morphological characters

Perennial large evergreen shrubs with milky latex present, the stem and branches terete, puberulous. Leaves simple, whorled with three leaves, exstipulate, shortly petiole, the blade linear-lanceolate, attenuate at the base, entire along the margin, acute at the apex, coriaceous, glabrous and glossy on both surfaces. Inflorescence terminal dichasial cymes, many-flowered, the peduncle triangular, glabrous. Flower pink, bracteate, bracteolate, pedicellate, bisexual, actinomorphic, hypogynous, pentamerous, fragrance. Calyx 5-lobed, synsepalous, the tube very short, the lobes lanceolate, green, pubescent. Corolla 5-lobed, synpetalous, the tube cylindrical, the lobes obliquely obovate. Stamens 5, epipetalous, inserted, the filament very short, the anthers sagittate, ditheous, basifixed, longitudinally dehiscence. Bicarpellary, unilocular, many ovules in each locule on the axile placentae, the style filiform, the stigma 2-lobed, subglobose. Fruit follicles with many seeds

Traditional uses: The decoction of leaves rubbed to relief swelling. The powdered leaves with oil was rubbed on herpes and scabies The pounded roots mixed with washed rice water can be drunk in snake bite (normal person should not be drunk because it will cause poisonous). (Daw Kyi Kyi Khaing, U Myint Aung)

Toxic part : entire plant, especially the seed

Toxin : cardiac glycosides

3.3. *Thevetia peruviana* (Peris.) Merr., Philipp. J. Sci. 9:130.1914

Myanmar name : Set hna ya thi
English name : Yellow oleander
Flowering and fruiting period : Through the year

4. Discussion and Conclusion

4.1. Medicinal Uses

According to Myanmar traditional practitioners, the leaves and stems of *Catharanthus roseus* can be used to treat diabetes, hypertension and skin diseases. The decoction of five parts of plant mixed with sugar can be drunk in the treatment of thalassemia. [14] and [3] reported that the Periwinkle leaves used as remedy for diabetes which agree with [16] and this research. The decoction of all parts of the periwinkle plant is used to treat for diabetes [15]. The roots of the white variety used for diabetes [19]. The whole plant are used for malaria, diarrhoea, diabetes, cancer, skin disease, diuretic, dyspepsia, dysentery, toothache, purgative, vermifuge and vomitive [16].

According to Myanmar traditional practitioners, the leaves and roots of *Nerium oleander* applied as lotion to relief swelling, herpes and scabies. The roots of this plant can be used for snake bite. [6] reported that the leaves of *Nerium oleander* are an important medicinal plant in India folk medicine. The leaves of *N.oleander* are used to treat various kinds of diseases. The important phamacological activities are antibacterial, antioxidant, anthelmintic, antipyretic, anticancer, immunopotential and anti-HIV activity. [6] mentioned that the pharmacological activities of *N. oleander* are anti-inflammatory which are in agreement with [2]. [2] described that *N. oleander* is known to contain active cardiac glycoside is used in the treatment of cardiac asthma. It may have positive effects in breast cancer. It is also used as diuretic, anti- parasitic. The leaves of *N. oleander* can be used for anticancer and it agrees with [6].

According to Myanmar traditional practitioners, the leaves of *Thevetia peruviana* are used as remedy for arthritis and dermatitis. Powdered roots were rubbed with oil for ringworm. [12] reported that the flowers, leaves, seed and root of *Thevetia peruviana* are used as medicine. This plant can be used for the treatment of various disorders in human being such as diabetes, liver toxicity, fungal infection, microbial infection, inflammation, pyrexia and to relieve pain which are not in agreement with the description of [17]. [17] also reported that the bark of *Thevetia peruviana* is widely used as antipyretic. Further reports suggest its use emetics, diuretics tonics and antitumor.

4.2. Chemical Constituents

The leaves of *Catharanthus roseus* showed the presence of all studied compounds in this research . This plant produces numerous indole alkaloids which have important therapeutic activities [4]. It is a rich source of alkaloids which are distributed in all parts of the plant [1].

The leaves of *Nerium oleander* showed the presence of all studied compounds in this research. [2] stated that the leaves of *N. oleander* contain alkaloids, glycosides, saponins and tannins and it agree with this study.

Negative results were obtained for compounds, flavonoids [2] which are not agree with this study. According to [6], the plant species also produce secondary metabolites such as alkaloids and flavonoids which have pharmacological application and it agree with this research.

The leaves of *Thevetia peruviana* showed the presence of alkaloids, flavonoids, cyanogenic glycoside, saponins, glycosides, and tannins in this research and the absence of reducing sugars. [17] reported that the plant *Thevetia peruviana* were found alkaloids, flavonoids, cyanogenic glycoside, saponins, glycosides and tannins and it agree with this research.

The information obtained from preliminary photochemical screening will be useful in finding out the genuity of the drug. Alkaloids are one of the largest groups of phytochemicals that have led to the invention or powerful pain killer medication. Flavonoids and tannin are the group of phenolic compounds that act as primary antioxidants and possess antimicrobial, anti-inflammatory, antiallergic, anticancer, antineoplastic activity and for treatment of intestinal disorders. Saponins which act as bioactive antibacterial agents in plants are also used to treat hypercholesterolemia, hyperglycemia and obesity [10].

According to literature, Toxic substances containing these medicinal and poisonous plants are revealed in table 4.

Table 4. Toxic substances containing studied medicinal and poisonous plants by previous author

No	Scientific Name	Toxic parts	References	
			Toxic substances	Author
1	<i>Catharant hus roseus</i>	aerial part	Four types of alkaloids vincristine, vinblastine, vindesine and vinorelbine.	de Padua <i>et al.</i> 1999
2	<i>Nerium oleander</i>	roots , barks, seeds	Oleandrin, glycosides Neriodorein,kara bin, neriodorin	Fuller and Clinrock 1968 Kapoor 2001
3	<i>Thevetia peruviana</i>	Leave, roots flowers	Cardiac glycisides	Fuller and Clinrock 1968) Valkenburg 2002

Many people use traditional plant remedies for the management of various diseases. Toxic substances containing these medicinal and poisonous plants can be used as medicine; at low does their toxic constituents are often beneficial.

The present research may be provided information from medicinal properties of studied plants for pharmaceutical industry.

This research paper will give some information of medicinal value, toxic parts and toxic substances of studied plants for other researchers.

The present research can provide some valuable information of medicinal and poisonous plants used to treat for various diseases in traditional medicine

Further studies are needed to isolate the active chemical constituents as well as detailed pharmacological activity will be carried out by proper scientific way. Moreover, an acute toxicity test by mice or rabbit is needed in order to assure its safety.

Acknowledgement

I would like to thank Rector Dr Zaw Win and Pro-Rector Dr Thazin, Sagaing University for their permission to do this research. I am deeply grateful to Dr May Kyawt Khaing, Professor and Head and Dr Khin Pale, Professor, Department of Botany, Sagaing University for their active encouragement and providing necessary suggestions. I would like to acknowledge Dr Swe Swe, Professor and Head and Dr Theingi Htay, Professor, Department of Botany, Monywa University for their providing advice and necessary research facilities in the field of study.

References

- [1].Aslam, J., Pharmacie Globale International Journal of Comprehensive Pharmacy, 2010
- [2] Bhuvaneshwari, L., E.Arthy, C. Anitha, K. Dhanabalan and M. Meena, Phytochemical analysis & Antibacterial activity of *Nerium oleander*, 2007
- [3].Chiej, R., The Macdonald encyclopedia of Medicinal Plants, Macdonald and Co. Ltd, London, 1988
- [4] Chung, M., A New chemical Constituent from the Hairy Root Cultures of *Catharanthus roseus*. Department of Applied life Science, Konkuk University, Korea, 2006
- [5] Dassanayake, M. D., A Revised Handbook to the Flora of Ceylon, University of Peradeniya, Department of Agriculture, Peradeniga, Sri Lanka, 1987
- [6].Faroqui, S. and T. Tyagi , *Nerium oleander*: IT'S APPLICATION IN BASIC AND APPLIED SCIENCE : A REVIEW, Department of Zoology , Ranchi University, Ranchi-834002Jharkhand India, 2018
- [7].Harbone, J. B., Phytochemical method, 2nd edition, Published in the U.S.A by Champman and Hall, London, New York, 1984
- [8].Hundley, J. H. and Chit Ko Ko , Lists of trees, shrubs, herbs and principle climbers of Burma. Supt. Govt. Printing and Study of Burma, 1961
- [9] James, A.D., Handbook of Medicinal Herbs, CRC Press LLC, United States of America, 2002
- [10].Kochuthressia, K. P and M.O. Jaseentha , Phytochemical Investigation of Active Compounds in *Morinda citrifolia* Leaves, 2015
- [11] Kapoor, L. D., Hand book of Ayurvedic Medicinal Plant, CRC Press, Boca Roton London New York Washington, D.C, 2001
- [12] Kishan, S., A.K.Kumar, M.Vimlesh, U.S.Mubeen amd S,Alok, A Review on THEVETIA PERUVIANA, Institute of pharmaceutical Research GLA University , Mathura-281403 (U.P) India, 2012
- [13] Kress, J., W. Robert Deilpps, A Ellen Earr and Yin Yin Kyi, A Checklist of the Trees, Shrubs, Herbs and Climber of Myanmar. Department of Systematic Biology, Botany, National Museum of Natural History, Washington D. C., USA, 2003
- [14]..Mya Bwin and Sein Gwan, Burmese Indigenous Medicinal Plans, Plants With Reputed Hypoglycemic Action, Burma Medical Research Institute, 5, Zafar Shah Road, Rangoon, 1967
- [15] Myint Myint Swe, Daw, U, Myint, Daw Thet Naing Htwe and Daw Nu Nu Yee, The study and Evaluation on some medicinal plants in Mandalay Division. Department of Botany, University of Distance Education Mandalay, 2005
- [16] Padua de, L.S., N. Bungyapraphatsara and R.H.M.J. Lemmens, Plant Resources of South-East Asia No. 12. and Poisonous Plants 1, PROSEA Bogor, Indonesia, 1999
- [17] Ranman,M, , R.Mahmood, H.Rahman and M. Hairs, Systematic screening for phytochemicals of various solvent extracts of THEVETIA PERUVIANA SCHUM LEAVES AND FRUIT RIND, Department of Biotechnology and Bioinformatics, Kuvempu University, Inanasahyadri, Shankarghatta 577481, Shimoga Dist, 2014
- [18].Valkenburg, J.L.C.H. and N. Bunyapraphatsara , Plant Resources of South-East Asia. No. 12. Medicinal and Poisonous Plants 2, PROSEA Bogor, Indonesia, 2002
- [19] Wiart, C., Medicinal Plants of South East Asia. Printed in Malaysia ,2000