

Botanical Study and Antimicrobial Activity of *Heliotropium indicum* Linn

Phyo Phyo Win
Phyophyowin688@gmail.com

Ohn Mar Than

Khin Cho

Abstract

Study of a medicinal plant Heliotropium indicum L. (Sin-nha-maung-gyi) belong to the family Boraginaceae which were collected from Tha-Kay-Ta Township, Yangon Region. In this research morphological characters and antimicrobial activity were detect. 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; flowers are pale purple; stamens epipetalous; ovary bicarpellary. In antimicrobial activity, the different solvents extracts of the whole plants and isolated compounds were tested by using agar-well diffusion method. The solvents extracts were tested against six pathogenic microorganisms. According to the result, pet-ether extract, chloroform extract and ethyl acetate extract show antimicrobial activities on all tested organisms.

Keywords- *Heliotropium indicum L., botanical study, antimicrobial activity, pathogenic microorganism, crude extract*

1. Introduction

Myanmar is rich in varieties of medicinal plants. Myanmar have inherited their own traditional medicine practiced it for over millennium of history. In Myanmar, most people have been living in rural areas and which have used traditional medicines for health are needs for the past decades. At the present, the government of Myanmar, they have assumed a vital for the developing of traditional medicine system and urged to enhance the quality and to promote the system development of traditional medicine.

Heliotropium indicum L. commonly known as Sin-nha-maung-gyi in Myanmar belongs to the family of Boraginaceae. This family contain 100 genera and 2,000 species [7]. The juice of the fresh herbs of *H. indicum* L. can be used as external application in snake bite and scorpion sting. Diuretic properties are also assigned to the plant [6]. *H. indicum* L. was bitter and astringent and many medicinal uses have been recorded for the plant, but none of them appears to be of importance.

It is used for local application for ulcers, sores, wounds, gum boils, skin infections. Seeds are masticated and swallowed as stomachic. The stems and leaves contain tannin and probably also an alkaloidal principle. The wild plant of *Heliotropium indicum* L. was belong to the family Boraginaceae, under the order Tubiflorae [8]. This genus was known to certain 150 species in the tropical and temperate zone of both the hemisphere [4].

In Myanmar, *Heliotropium indicum* L. was known as “Sin-hna-maung-gyi” [5]. This plants grown wild throughout in Myanmar. It possesses many medicinal properties.

The taste of the plant is bitter, astringent, heating, cures all intractable fevers. Diuretic properties are also assigned to the plant. It is used as local application for ulcers, sores, wounds, gum boils, skin infections, stings of insects and rheumatism [7].

In Philippines, decoction of the dried roots taken internally is considered an excellent emmenagogue. The sap of the leaves, mixed with salt, is said to be useful for cleaning the vision. The plant is said to be also used for ear and skin diseases. In Maxico, decoction of the roots or any part of the plant is good for coughs and asthma [6].

In this research, the morphology of vegetative and reproductive parts of fresh specimens and antimicrobial activity of *Heliotropium indicum* L. were described.

2. Materials and Methods

2.1. Botanical Study

The specimens of *Heliotropium indicum* L. was collected from Tha-Kay-Ta Township, Yangon Region in Myanmar. They were collected during the flowering and fruiting period. The specimens were identified by using literature such as [1][4][6].

2.2. Antimicrobial activity of crude extracts from *H. indicum* L.

The collected specimens were washed with water and dried at room temperature for two weeks. After completely dried, the specimens were pulverized by grinding machine to get powder and then stored in air tight containers for antimicrobial activity tests.

The plant powders were extracted by using chloroform, ethanol, ethyl acetate, petroleum ether and water. These extracts were tested on different types of bacteria and one fungal species. *Bacillus pumalis*, *Bacillus subtilis*, *Escherichia coli*, *Pseudomonas aureginosa*, *Staphylococcus aureus* and *Candida albicans* by using agar-well diffusion method. The test was detected at the Development Center for Pharmaceutical Technology (D.C.P.T).

3.Results

3.1. Morphological characters of *Heliotropium indicum* L.

Annual herbs, about 2 ft high. Stems herbaceous, cylindrical, stout, pubescent, the branch ascending, hirsute. Leaves alternate, simple, lamina obovate, 2.5 - 11.0 cm x 1.0 - 7.0 cm the tips acuminate, the margin undulate, the base cordate, both surfaces pubescent, petioles 1.0 - 6.0 cm x 0.2 - 0.3 cm pubescent, long and decurrent from the leaf base to the middle of its length with winged, exstipulate. Inflorescence terminal and axillary, scorpioid cymes, the tips prominently coiled, 2.0 - 18.0 cm long, pubescent. Flowers ebracteate, ebracteolate: pale purple, sessile about 0.5cm long and 0.1 cm wide, complete, bisexual, actinomorphic, 5-merous, hypogynous. Calyx synsepalous, five lobed, unequal, lanceolate and linear, 0.2 cm long 0.1 cm wide, persistent. Corolla synpetalous, infundibuliform, five lobed, imbricate, 0.1 long and 0.5 wide, corolla tube 0.4 cm long and 0.1 wide, deciduous. Stamens 5, epipetalous, the filament very short, alternate with the corolla lobe, inserted, introrse, dorsifixed, longitudinal dehiscence. Ovary superior, syncarpous, bicarpellary, 2-loculed but becoming 4-loculed at maturity due to false septum, one ovule in each locule, axile placentation, the style terminal and distinct. The stigma capitate with a disc. The fruit 4-dry nutlets and deeply 2-lobed glabrous. The seeds small, ovoid and smooth, endosperm abundant. The results were as shown in Figures [1-14].



Figure1. Habit



Figure 2. Leaves



Figure 3. Various sizes of leaves



Figure 4. Inflorescence



Figure 5. Various sizes of inflorescence



Figure 6. Flowers

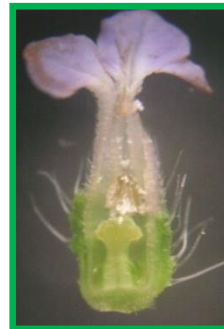


Figure 7. L.S of flower



Figure 8. Calyx

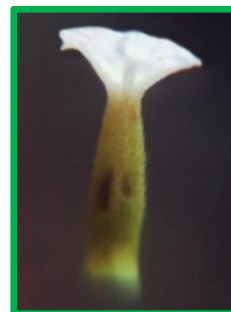


Figure 9. Corolla



Figure10. Stamen

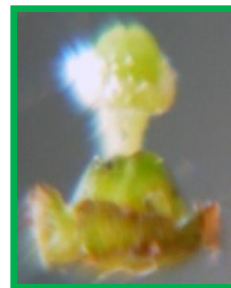


Figure 11. Pistil

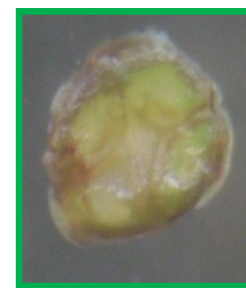


Figure 12. T.S of ovary

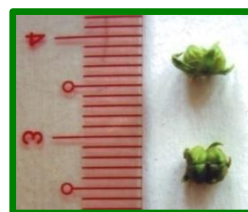


Figure 13. Fruits

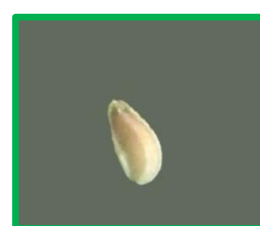


Figure 14. Seed

3.2. Antimicrobial activity of crude extracts of *H. indicum* L.

In the experiment, the powdered drug of the whole plant from *H. indicum* L. were extracted with petroleum ether, chloroform, ethyl acetate, ethanol and water. The crude extracts were tested against six pathogenic microorganisms (*Bacillus pumalis*, *B. subtilis*, *Escherichia coli*, *Pseudomonas aureginosa*, *Staphylococcus aureus* and *Candida albicans*) by using agar-well diffusion method. According to the experiments, petroleum ether and watery extracts did not showed the antimicrobial activities. The inhibition zones that appeared were shown in Table 1 and Figures (15-20).

Table1. Antimicrobial activity of *H. indicum* L.

Organisms	Solvents				
	1	2	3	4	5
<i>Bacillus pumalis</i>	-	13 mm	12 mm	15 mm	-
<i>Pseudomonas aureginosa</i>	-	13 mm	12 mm	14 mm	-
<i>Escherichia coli</i>	-	13 mm	12 mm	14 mm	-
<i>Bacillus subtilis</i>	-	14 mm	12 mm	14 mm	-
<i>Staphylococcus aureus</i>	-	13 mm	-	13 mm	-
<i>Candida albicans</i>	-	13 mm	13 mm	14 mm	-

Agar-well – 10 mm

- 1 =Petroleum ether
- 2 =Ethanol
- 3 =Chloroform
- 4. Ethyl acetate
- 5. H₂O



Figure 15. *Bacillus pumalis*

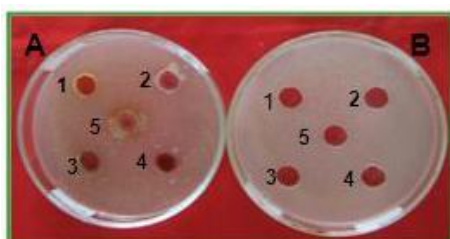


Figure 16. *Pseudomonas aureginosa*

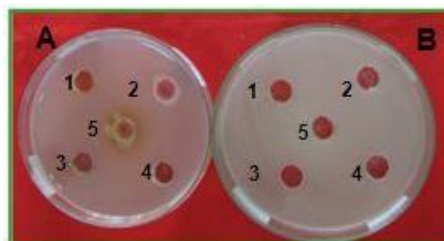


Figure 17. *Escherichia coli*

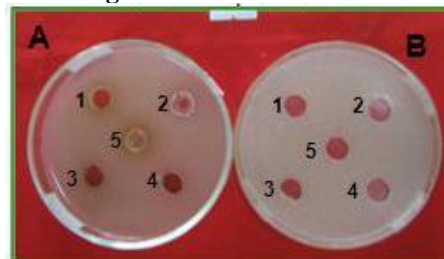


Figure 18. *Bacillus subtilis*

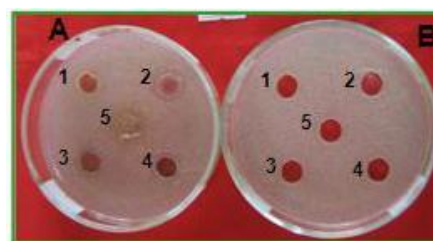


Figure 19. *Staphylococcus aureus*

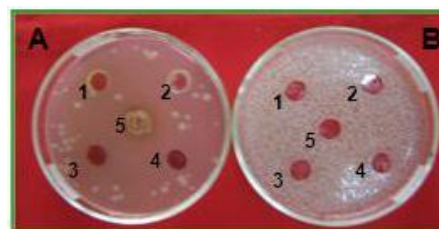


Figure 20. *Candida albicans*

- 1 =Petroleum ether
- 2 =Ethanol
- 3 =Chloroform
- 4. Ethyl acetate
- 5. H₂O
- A = Sample
- B= Control

4. Discussion

In this research, the morphological characters of *Heliotropium indicum* L. have been undertaken.

As a result, the plants are annual herbs, stems herbaceous and ascending branches with spreading hairs. These characters are in agreement with [2] [4].

Leaves are simple, alternate, exstipulate, petiolate, lamina obovate with both surfaces pubescent. This characters are agreement with [4] [6].

Inflorescences terminal and axillary, scorpioid cymes, the tips prominently coiled. Flowers are bisexual, actinomorphic, ebracteate, sessile and pale purple. Calyx synsepalous, unequal, persistent and corolla synpetalous, infundibuliform with five lobed. These characters are stated by [3] [4] [6].

Stamens 5, epipetalous, filaments very short, alternate with corolla lobe, basifixed which characters are agreement with described by [1] [6].

Ovary syncarpous, 2-loculed but becoming 4-lobed at maturity due to false septum, the style terminal and distinct.

The stigma capitate with a disc. The fruit 4-dry nutlets and deeply 2-lobed glabrous. The seeds small, ovoid and smooth. These characters are agreement with stated by [1] [7]. In the antimicrobial activity of *H. indicum* L. were extracted with petroleum ether, chloroform, ethyl acetate, ethanol and water and tested on six microorganisms such as *Bacillus pumalis*, *B. subtilis*, *Escherichia coli*, *Pseudomonas aureginosa*, *Staphylococcus aureus* and *Candida albicans*. According to this experiment, ethyl acetate, chloroform and ethanolic extracts showed inhibition against on six pathogenic microorganisms, the result indicated that *H. indicum* L. can be used as remedy for urinary infection, rheumatism, sores wounds and ulcers. These characters are agreement with [7].

5. Conclusion

This paper focus on botanical study as morphological and histological characters and antimicrobial activity of *Heliotropium indicum* L. In botanical study, identification of the plant is basic important factor in record species. According to the identification, the name of selected plant is *Heliotropium indicum* L. belongs to the family Boraginaceae. It is commonly known as Sin-nha-maung-gyi in Myanmar. In antimicrobial activity, the different solvents extracts of *H. indicum* L. inhibited six pathogenic microorganism. Therefore, *Heliotropium indicum* L. can be used for the preparation of effective antimicrobial sources. So, other bioactive compounds should be isolated from the various plant parts of *Heliotropium indicum* L.

Acknowledgement

We would like to express my gratitude to Dr. Aye Aye Tun, Rector, Dr. Yin Yin Than, Pro-rector, Bago University their kind permission to carry out this research work.

We are also thankful to Dr. San Wai Aung, Professor and Head, and Dr. Tin Moe Aye, Professor, Department of Botany, Bago University, for their invaluable advices and encouragement. We are also thankful to Daw Cherry Aung (D.C.P.T) for her helps of antimicrobial activity tests of this research.

References

- [1] Backer, C.A., 1963. *Flora of Java*. Vol.I N.V.P. Noordhoff Groninger. The Netherland.
- [2] Chopra, R.N. 1982. *Chopra's Indigenous Drugs of India*. U.N. Academic publishers Calcutta. New Delhi.
- [3] Dassanayake, M.D. and F.R. Foshberg, 1991. *A Revised Handbook of the Flora of Ceylon*. Vol. III.
- [4] Hooker, J.D. 1885. *The flora of British India*. Vol. VI. L. Reeve and Company Ltd., London.
- [5] Hundley, H.G. and Chit Ko Ko, 1987. *List of trees, shrubs, herbs and principal climbers etc.* Government printing press, Yangon.
- [6] Kartikar and Basu, 1975. *Indian Medicinal Plants*. Vol. 1-1, 2nd ed., 49, Leader Road; Allahabad, India.
- [7] Lawrence, G.H.M. 1969. *Taxonomy of vascular plants*. 10th ed., The Macmillan Company, New York. [8] *Wealth of India*, 1948. A dictionary of India Raw Materials and Industrial Products. Vol. V. Publications and Information Directorate, CSIR, New Delhi.