

Phytochemical Analysis of Heliotropium Indicum for its Medicinal Properties

Dr. Preeti Soni, Shri Jitendra Yadav

^{1,2}Government G.N.A PG College, Bhatapara (C.G.), India

Abstract: *Heliotropium Indicum* Linn., commonly known as 'Indian heliotrope' is very common in India with a long history of traditional medicinal uses in many countries in the world. The plant is reported to possess antibacterial, antitumor, uterine stimulant effects, antifertility, wound healing, anti-inflammatory, antinociceptive, and diuretic activities. Several pyrrolizidine alkaloids have been isolated from this species. In the Present Paper we have tried to use the plant extract for the treatment of Swelling in the body Parts. The plant Specimen we have taken for our analysis is used for many ailments, but not for reducing of swelling. The active principle Indicine-N-oxide has reached Phase I clinical trials in advanced cancer patients. But severe toxic side-effects showed that therapy with indicine-N-oxide was not justified. Most of the alkaloids are hepatotoxic, so internal use of *Heliotropium* species is not recommended. Moreover, research are conducting now a days for internal use in various diseases. A comprehensive account of the chemical constituents and the Phytochemical Analysis are presented in this paper, so the potential use of this plant as medicine for reducing swelling in any part of the body can be systematically evaluated.

Keywords: *Heliotropium Indicum* Linn., Pyrrolizidine, alkaloids, Bioactivity, Pharmacognosy

1. Introduction

Heliotropium Indicum, commonly known as Indian Heliotrope, Indian Turnsole, and local language 'Hathsud' because it is a hirsute plant, annual, and a common weed found in waste places and settled areas. The genus *Heliotropium* comprises about 250 species and is distributed in tropical, subtropical, and warm temperate zones of all continents but only a few species have been systematically investigated. The name "*heliotrope*" originates from the old idea that the inflorescence of these plants turned their rows of flowers to the sun. The meaning of 'helios' in Greek is 'sun' and 'tropein' from where the word 'tropium' is derived means 'to turn'. *Heliotropium Indicum* Linn. (Fig. 1) belongs to the family Boraginaceae. A majority of the plants in the family are herbs. Several heliotropes are popular garden plants and some others occur as weeds.

Scientific classification

Kingdom - Plantae
Class - Angiosperms
Order - Boraginales
Family - Boraginaceae (forget me not)
Genus - *Heliotropium*
Species - *Indicum*

2. Material and Methods

Plant material: The aerial part (stem and leaves) of *Heliotropium indicum* (Boraginaceae) was collected in Bhatapara, in November 2016 and authenticated by the Department of Botany, of Govt. GNA PG College, Bhatapara. The voucher specimen was kept in a herbarium.

Method of Extraction:

Plant Material- Fresh Leaves of the selected medicinal herb *Heliotropium indicum* were harvested from the local area of Bhatapara in December 2021. The collected leaves were

thoroughly washed with tap water to avoid specks of dust and other unwanted materials accumulated on the leaves from their natural environment. The dust-free leaves were shaded and dried at room temperature. After 4-5 days for obtaining aqueous extract, the properly dried leaves were then ground into the fine powder by using the grinding machine then the powder material was weighed properly. The fine powder was stored in a clean and tightly closed container for extraction.

Soxhlet method of ethanol extraction—Plant material is crushed, using a pestle and mortar, to provide a greater surface area. The plant material should be sufficient to fill the porous cellulose thimble (an average of 14g of thyme in a 25 x 80mm thimble). The solvent (250 ml of ethanol) is added to a round-bottomed flask attached to a soxhlet extractor and condenser. The crushed material is loaded into the thimble, the side arm is lagged with glass wool. The solvent is heated using the iso-mantle and will begin to evaporate, moving through the condenser, which drips into the reservoir containing the thimble once the level of solvent reaches the siphon it pours back into the flask and the cycle begins again. The process runs up to a total of 16 hours. After finishing the process, the ethanol is evaporated using a rotary evaporator, leaving a small yield of extracted plant material (2-3ml).

Now the extract is analyzed phytochemically for its medicinal properties.

Method of Analysis (Phytochemical Properties)—

- Anti-inflammation activity
- Analgesic activity
- Steroids
- Terpenoids
- Glycosides
- Flavonoids
- Saponins
- Tannins
- Anthraquinones.

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The plant extract ethanoic aqueous solution was assessed for the existence of the phytochemical analysis by the following standard method—

- **Test for Anthraquinone**—The powdered sample and 60ml benzene are taken in a conical flask and soaked for 10min and then filtered, then 10ml of 10% NH₃ Soln. was added to the filtrate and shaken vigorously for 30 sec and (the pink/violet color indicated the presence of anthraquinones in ammonia).
- **Test for Tannins**—10ml of bromine water was added to the 0.5 g aqueous extract. discoloration of Br water shared the presence of tannins.
- **Test for saponin**—5.0ml of distilled water was mixed with aqueous crude plant extract in a test tube and mixed vigorously. The froth was mixed with a few drops of the above oil and mixed vigorously and the foam appearance showed the presence of saponins.
- **Test for Flavonoids-Shinoda Test**—Pieces of mg ribbon and concentrated HCl was mixed with aqueous crude plant sample extract after a few min., a pink color showed the presence of flavonoid.
- **Alkaline Reagent**—2ml of 2.0% NaOH mix. was mixed with aqueous plant crude extract, concentrated yellow color was produced, which becomes colorless when 2 drops of dilute acid are added to the mixture, showing the presence of flavonoids.
- **Test for Glycosides- Libermann's Test**—We added 2.0 ml of acetic acid and 2 ml of chloroform to the extract. The mixture was then cooled and Conc. H₂SO₄ is added. The green color shows the presence of aglucone. Steroidal part of glycosides.
- **Keller Kiliani Test**—A soln. of glacial acetic acid 4.0ml is added with 1 drop of 2.0% FeCl₃ mixture mixed with 10ml of aq. plant extract and 1ml H₂SO₄ extract added, A brown ring formed between the layers which showed the presence of cardiac steroidal glycosides
- **Salkowski's Test**—We added 2ml C. H₂SO₄ to the whole aqueous plant crude extract. A reddish brown color formed which indicated the presence of steroidal aglycone part of the glycoside.
- **Test for Terpenoids**—2.0 ml of chloroform was added with 5 ml extract and evaporated on the water bath and then boiled with 3 ml of C. H₂SO₄. A grey color formed shows the presence of terpenoids.
- **Test for steroids**—2 ml of chloroform and Conc.H₂SO₄ were added with 5 ml extract. In the lower chloroform layer, the red color appeared indicating the presence of steroids.
- **Antioxidant Activity**—DPPH/free radical Scavenging assay 2, 2 - biphenyl, 1- picryl - hydroxyl (DPPH) was used on free radical. 100ml cone of DPPH was used in methanol. Serial distillation was made to check the ICSO. A decrease in absorbance indicated increased radical scavenging activity which was determined by the following formula —

$$\text{Inhibitor \%} = \frac{\text{abs. of control} - \text{total radical activity}}{\text{abs. of control}} \times 100$$

The plant contains the pyrrolizidine alkaloids, indicine, indicine N-oxide, Acetyl-indicine, indicinine, helurine, heliotrone, supinine, supinidine, and lindelo- fidme, safe in small doses, if consumed regularly or in large quantities,

they have been shown to have a cumulative toxic effect upon the liver.

3. Result & Discussion

The Phytochemical study of the Plant material reveals that *Heliotropium indicum* is a potential source of many chemical constituents and can be used for relieving pain and reducing swelling of any body part. Qualitative Phytochemical studies discovered the presence of alkaloids compounds [Appearance of red color]; flavonoids and tannins [The pink color shows the presence of flavonoids and absence of flavonoids [Not observed pink coloration] in all mentioned extracts of the plant. Salkowski's test-[formation of brownish color] showed a positive result for aqueous extract. It showed a negative result in the case of protein, saponin, oil, and steroids. Flavonoid has also been reported to have greater potential benefits to Human Health. The medicinal plants are being used traditionally for the treatment of inflammation, wound healing, carminative and some fungal infection The phytochemical screening of aqueous leaf extract revealed the presence and absence of alkaloids, flavonoids, and tannin compounds. (Tables 1 & 2)

Table 1: Qualitative analysis of phytochemical in the *Heliotropium Indium*

Phytochemical	Test	Inference
Alkaloids	Mayer's test	Present
	Wagner's test	Present
Flavonoids	Sodium hydroxide test	Present
	Shinoda test	Present
	Alkaline reagent test	present
	Ferric chloride test	present
Glycosides	Liebermann's test:	Absent
	Salkowski's test:	Absent
	Keller-kilani test	Absent
	Tannin Ferric chloride test	present
Saponin	Gelatine test	present
	Foam test	Present
Carbohydrates	Oil Stain test	Absent
	Saponifi cation test	Absent
	Molisch's test	Absent
Steroids	Benedict's test	Absent
	Chloroform test	Absent
proteins	Salkowski's test	Absent
	Biuret's test	Absent
	Million's test	Absent
	Ninhydrin test	Absent

Table 2: Organoleptic characterization of *Heliotropium Indium*

S.no	Organoleptic properties	Observation
1	Colour	Green
2	Odour	Non-Aromatic
3	Taste	Tasteless
4	Texture	Slightly rough

4. Conclusion

H. indicum has applications in several traditional systems of medicine including Ayurveda and Siddha. For medicinal uses, *H. indicum* is exclusively collected from the wild. The plants are generally collected when fully grown. The plant

contains a large number of pyrrolizidine alkaloids that proved to be potent liver toxins. The toxicity of this plant has not been well studied. *Heliotropium* alkaloids have been considered as potential agents in chemotherapy and clinical trials have been executed. However, the applications in cancer therapy are limited by the toxic effects, in particular the hepatotoxic effect of the pyrrolizidine alkaloids content. External application to promote wound healing as an anti-infective requires more research. It can be concluded that *Heliotropium indicum* is a potential source of many chemical constituents and can be used for relieving pain and reducing swelling of any body part.

The obtained results from the whole study confirm the validity of the use of the plant *Heliotropium Indicum* as a medicine with antimicrobial properties, and antifungal. After this study, it is assumed that the extract could be used for new formulations and potent to reduce swelling drugs of natural origin.

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