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PHARMACOGNOSTICAL AND PHYTOCHEMICAL INVESTIGATIONS OF ROOT OF *HELIOTROPIUM INDICUM* LINN.

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ABSTRACT

The root of *Heliotropium indicum* is reported to have good medicinal values in traditional system of medicines. Commonly called as Indian Turnsole, is a herb with slightly woody at base. It is distributed in the tropical and temperate regions of the world and found throughout India. The present study deals with phytochemical investigations of *Heliotropium indicum* root including determination of loss on drying (3.8%), Ash values {total ash (6.3%), acid insoluble ash (3.5%), water soluble ash (3.2%), sulphated ash (6%)} and extractive values {water soluble extractive (21%), alcohol soluble extractive (2%), benzene soluble extractive (1.5%), Petroleum Ether soluble Extractive (2.1%)}. The preliminary phytochemical screening of powdered drug was also carried out. The qualitative chemical examinations revealed the presence of various phytoconstituents like alkaloids, carbohydrates, phytosterols, tannins and saponin in the root extracts through the chromatographic separation technique i.e. TLC. These observations therefore support the use of *Heliotropium indicum* in herbal cure remedies. Alkaloids which are one of the largest groups of phytochemicals in plants have amazing effects on humans and this has led to the development of powerful pain killer medications. Saponin was found to be present in *Heliotropium indicum* extracts and has supported the usefulness of this plant in managing inflammation.

INTRODUCTION: Man's existence on the earth has been made possible only because of the vital role played by the plant kingdom in sustaining his life. The pharmaceutical industry has reported to have synthesized over three million new synthetic chemicals in search for new drugs. The lead that directs this synthetic effort frequently comes from a natural product, and drugs derived from natural products still form a surprisingly large proportion of medicines in current use¹.

Heliotropium indicum (Boraginaceae) - commonly called as Indian Turnsole, is a herb with slightly woody

at base. It is distributed in the tropical and temperate regions of the world and found throughout India². The whole plant is claimed to possess medicinal properties. In ayurveda the juice of leaves applied on boils, pimples, ulcers, sores and wounds to cure. In Belize, the plant is used for diarrhea, malaise or vomiting in infants³. The leaves are used for the treatment of ophthalmic disorders, erysipelas, pharyngodynia, and anti-inflammatory, anti-tumor. The roots are used as astringent, expectorant and febrifuge. The extract of leaves was proved to be active against Schwart's leukemia, wound healing and anti-inflammatory activities.⁴

The root portion of this plant was much more used in traditional as well as in modern era. It was showed the presence of phenyl propanoids, phenolic acids, coumarins, flavonoids, sterols and pentacyclitriterpenoids.

MATERIAL AND METHODS: About 150 gm of dry root powder of *Heliotropium indicum* were extracted with methanol by continuous hot percolation using soxhlet apparatus. The extraction was continued for 72 hrs. The methanol extract was filtered and concentrated to a dry mass by using vaccum distillation. A radish brown residue was obtained⁵.

Physical evaluation: Physical constants of crude drugs like loss on drying, total ash, acid insoluble ash, water soluble ash, alcohol soluble extractive and water soluble extractive values were determined by using official methods.⁶

Preliminary Phytochemical Investigation: The extracts obtained during the extraction process were subjected to preliminary phytochemical screening to determine the presence of various phytoconstituents like

alkaloids, carbohydrates and glycosides, phytosterols, fixed oils and fats, saponins, phenolic compounds, triterpenes, flavonoids, proteins and amino acids, gums and mucilage, tannins and volatile oils by using reported methods^{7,8}.

Thin Layer Chromatography: It is based on adsorption and partition chromatography. It is an important analytical tool for qualitative and quantitative analysis of a number of natural products. The adsorbent such as silica gel G is coated to a thickness of 0.3 mm on a clear TLC plates. The plates are activated at 105°C for 30 minutes and used. The selection of mobile phase depends upon type of constituents to be analyzed. After the development of chromatogram, the resolved spots are revealed by spraying with suitable detecting agent. The information provided by a finished chromatogram includes the 'migrating behavior' of the separated substances. It is determined as R_f values.

$$R_f = \frac{\text{Distance travelled by solute}}{\text{Distance travelled by solvent}}$$

Physical Evaluation Parameters: (Table 1)

TABLE 1: PHYSICAL EVALUATION PARAMETERS

PARAMETER								
Loss on Drying	Extractive Value				Ash Values			
	Water Soluble Extractive	Alcohol Soluble Extractive	Benzene Soluble Extractive	Petroleum Ether soluble Extractive	Total Ash	Acid Insoluble Ash	Water Soluble Ash	Sulphated Ash
3.8%	21%	2%	1.5%	2.1%	6.3%	3.5%	3.2%	6%

Present= (+), Absent= (-)

Phytochemical Investigation: Chemical Tests (Table 2)

TABLE 2: CHEMICAL TESTS FOR ALKALOIDS, SAPONINS, TANNINS

Solvents	Test								
	Alkaloids				Saponins		Tannins		
	Mayer's Reagent	Dragendroff's Reagent	Hager's Reagent	Wagner's Reagent	Foam test	Haemolysis	Ferric Chloride	Gelatin	Lead acetate
Chloroform	+	+	+	+	-	-	-	-	-
Methanol	+	+	+	+	+	+	+	+	+

Chromatographic Separation: Thin Layer Chromatography {Table 3 (a), (b)}

TABLE 3(A): THIN LAYER CHROMATOGRAPHY

Solvent System	Methanol water	Chloroform-Methanol-Water	Benzene-ethylacetate	Benzene-ethylacetate	Butanol-pyridine-Water	Butanol-acetic acid-Water	Butanol-acetic acid-Water
Ratio	50:50	65:35:10	80:20	95:5	60:40:30	40:10:10	40:10:50
Spots	Tailing	Tailing	Tailing	4	6	5	6
Resolution	Tailing	Tailing	Tailing	Poor separation	Poor separation	Poor separation	Good separation

Adsorbent-activated silica gel G, Detecting reagent-50% sulphuric acid

TABLE 3(B): Rf VALUES FOR BUTANOL-ACETIC ACID-WATER WITH RATIO 40:10:50 HAVING 6 SPOTS

Spot	1	2	3	4	5	6
Rf	0.15	0.35	0.57	0.70	0.73	0.89

RESULTS AND DISCUSSION: Phytochemical screening;

- Investigations on the phytochemical screening of *Heliotropium indicum* roots extracts revealed the presence of saponins, steroids, tannins, carbohydrates, alkaloids and flavonoids through the chromatographic separation technique i.e. TLC.
- These compounds are known to be biologically active and therefore aid the antimicrobial activities of *Heliotropium indicum*. These secondary metabolites exert antimicrobial activity through different mechanisms.
- Tannins have been found to form irreversible complexes with proline rich protein resulting in the inhibition of cell protein synthesis.
- Tannins are known to react with proteins to provide the typical tanning effect which is important for the treatment of inflamed or ulcerated tissues.
- Herbs that have tannins as their main components are astringent in nature and are

used for treating intestinal disorders such as diarrhea and dysentery.

CONCLUSION: These observations therefore support the use of *Heliotropium indicum* in herbal cure remedies. Alkaloids which are one of the largest groups of phytochemicals in plants have amazing effects on humans and this has led to the development of powerful pain killer medications revealed the inhibitory effect of saponins on inflamed cells. Saponin was found to be present in *Heliotropium indicum* extracts and has supported the usefulness of this plant in managing inflammation.

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