IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Preparation And Evaluation Of Ointment Containing Heliotropium Indicum Extract

Nuthakki. Surya [1], P. Madhu Latha [2], K. Sesha Sita Godha Mohana [3], O. Anusha [4], U. Phani Kumar Sai[5]

1st author final year student of B.pharmacy in Bapatla college of pharmacy,Bapatla

2nd author assistant professor department of Biotechnology in Bapatla college of pharmacy Bapatla

3rd author final year student of B.pharmacy in Bapatla college of pharmacy Bapatla

4th author final year student of B.pharmacy in Bapatla college of pharmacy Bapatla

5th author final year student of B.pharmacy in Bapatla college of pharmacy Bapatla

Bapatla College of Pharmacy, Bapatla-522101, Andhra Pradesh, India

Abstract

The present work explores the potential of *Heliotropium indicum* leaves as a natural ingredient for formulating a topical ointment. The plant is widely recognized in traditional medicine for its soothing and skin-protective properties. To harness these benefits, the leaves were subjected to ethanolic extraction, and the resulting extract was incorporated into a semi-solid ointment base using the fusion method. The extract was first screened for major phytochemical groups, revealing the presence of bioactive constituents such as flavonoids, phenolics, tannins, alkaloids, and saponins, all of which are associated with skin repair and antioxidant functions. The prepared ointment was then examined through simple pharmaceutical evaluation tests that focused on its physical features and user-friendly characteristics. These assessments helped confirm that the incorporation of the plant extract produced a stable and uniform formulation with suitable texture and spreadability. This study highlights the feasibility of developing an herbal ointment from *H. indicum* using basic extraction and formulation techniques. By demonstrating good physical properties and identifying key phytochemicals in the extract, the work supports the continued investigation of this plant as a candidate for herbal skincare and wound-care applications.

Key words: *Heliotropium indicum*; herbal ointment; ethanolic extract; topical formulation; phytochemical screening; wound healing; anti-inflammatory activity; antioxidant activity; alkaloids; flavonoids; phenolic compounds; tannins; saponins; glycosides; fusion method; ointment base; semi-solid dosage form; spreadability; extrudability; pH evaluation; pharmaceutical characterization; medicinal plants; ethnopharmacology; Boraginaceae; natural wound remedy; herbal therapeutics; traditional medicine;

maceration extraction; paraffin base; lanolin; stearic acid; skin protection; phytopharmacology; botanical drug development.

Introduction

Heliotropium species, especially *Heliotropium indicum*, have long been used in traditional medicine for treating wounds, skin infections, and inflammation. The leaves contain a variety of natural compounds such as flavonoids, phenolics, and antioxidants that help reduce swelling, fight microbes, and support the natural healing process of the skin. Because of these properties, many recent studies have explored using *Heliotropium* leaf extract in modern topical formulations, including ointments, gels, and creams. Preparing an ointment from *Heliotropium* leaves generally begins with extracting the active components from dried or fresh leaves using water or alcohol-based solvents. These solvents are commonly used in research because they effectively pull out the plant's wound-healing chemicals. The concentrated extract is then mixed into a soft ointment base such as white soft paraffin, emulsifying ointment or other semi-solid bases to create a smooth, uniform herbal formulation suitable for application on the skin. Ointments are particularly useful for herbal wound treatments because they keep the affected area moist, protect it from contamination, and allow the plant extract to remain in contact with the skin for longer periods. After preparation, ointment is usually tested for qualities such as appearance, pH, spreadability, consistency, and microbial safety. Researchers also evaluate its wound-healing ability using standard in vivo models to measure how well it promotes tissue repair. One important safety consideration is the presence of pyrrolizidine alkaloids in *Heliotropium* leaves, which may be harmful if absorbed in significant amounts. Because of this, modern studies recommend checking the extract for these compounds and ensuring that their levels remain within safe limits, especially when developing products intended for human use. Overall, ointments made from *Heliotropium* leaf extract offer a promising natural approach to wound management. Their traditional background, combined with growing scientific evidence, supports their potential as gentle yet effective topical healing agents.The plant description is given below....

Heliotropium indicum

Basic Botanical Description

H. indicum belongs to the family Boraginaceae. It is an annual, erect, hairy (pubescent) herb, typically growing between about 15 to 50 cm tall. The leaves are ovate to oblong-ovate, sometimes broadly ovate, with a hairy surface. The plant bears small tubular flowers, often white or pale-violet/pale-lilac, arranged in coiled or curved inflorescences (scorpioid spikes) — a characteristic of many Boraginaceae. The fruit consists of small nutlets (pyrenes), typical of the genus. H. indicum commonly grows in waste places, fallow land, along water edges, paddy fields in short: disturbed or semi-natural habitats across its distribution range.

Phytochemistry of the plant

According to a comprehensive review of literature:

- H. indicum contains a wide variety of chemical constituents. Among them are pyrrolizidine alkaloids (PAs) — e.g., indicine, heliotrine, echinitine, lasiocarpine, acetyl-indicine, indicine N-oxide and others.
- It also contains triterpenes (e.g. β-amyrin, lupeol), sterols (e.g., β-sitosterol, campesterol, stigmasterol), amines (e.g. putrescine, spermidine), volatile oils (such as phytol, linalool derivatives) and other minor constituents

- ❑ Some studies also report presence of antioxidant molecules — the plant extracts show free-radical scavenging activity in vitro assays.

Ethnomedicinal & Traditional Uses

The plant has a long history of use in folk and traditional medicine in many regions.

Reported traditional uses include:

- Treatment of skin disorders: wounds, ulcers, boils, sores, insects, or animal bites. Leaf juice or leaf-paste applied externally.
- Used As an anti-inflammatory, antiseptic and febrifuge remedy.
- Other internal uses in some systems: stomach ailments, some febrile conditions, though such use is more controversial due to safety concerns.

Pharmacological / Biological Activities (Laboratory / Preclinical Evidence)

Scientific studies support several biological activities of H. indicum extracts (in vitro or in animal models). Some major findings:

Wound-healing: In a rat model using excision and incision wounds, topical application of H. indicum ethanolic extract resulted in faster wound closure and increased tensile strength — better than some comparative plants in that study.

Antioxidant activity: Extracts (ethanol or aqueous) show free-radical scavenging (e.g. DPPH assay) and hydroxyl-radical scavenging activity.

Anti-inflammatory and cytotoxic (anticancer potential): Extracts demonstrated anti-inflammatory effects in cell studies and cytotoxic activity against certain human cancer cell lines (e.g. lung cancer lines), suggesting potential anticancer properties

Other reported effects: According to some reviews, H. indicum extracts have been associated (in various in vitro / in vivo investigations) with antimicrobial, antitumor, antituberculosis, ant plasmodial, antiallergic, antinociceptive, diuretic, and even antidiabetic activities.

Phytochemical screening

Phytochemical screening is a preliminary analytical process used to detect the naturally occurring chemical compounds (phytochemicals) present in a plant extract. These compounds are responsible for many of the plant's therapeutic effects, such as antioxidant, anti-inflammatory, antimicrobial, and wound-healing activities. Screening helps researchers understand the medicinal potential of a plant and provides scientific support for its traditional uses.

Figure 1: Extract used for phytochemical screening

The following are different tests that performed in phytochemical screening

- **Test for Alkaloids**

Three milliliters of each plant extract were combined with 1 mL of 1% aqueous hydrochloric acid. This mixture was heated for 20 minutes, allowed to cool, and then filtered. One milliliter of the filtrate was treated with two drops of Wagner's reagent. The formation of a cream or brown precipitate confirmed the presence of alkaloids.

- **Test for Saponins**

Saponins were identified based on their ability to produce stable foam. The plant extract was shaken vigorously with water in a test tube. If froth formed and remained even after warming, this was taken as a sign of saponins. Their known ability to hemolyze red blood cells further supports their presence.

- **Test for Anthraquinones**

About 0.2 g of the extract was mixed with 5 mL of concentrated benzene and shaken. The mixture was filtered, and 5 mL of 10% ammonia solution was added to the filtrate. A pink, red, or violet coloration in the ammoniacal layer indicated the presence of anthraquinones.

- **Test for Cardiac Glycosides**

One milliliter of the ethanol extract was mixed with 2 mL of chloroform and shaken gently. After the layers settled, concentrated sulfuric acid was added carefully. A reddish-brown coloration at the interface between the two layers indicated the presence of the aglycone portion of cardiac glycosides.

- **Test for Carbohydrates**
  - **Molisch's Test**

A small amount of the extract was mixed with a few drops of Molisch's reagent. Concentrated sulfuric acid was then carefully added down the side of the test tube to form a separate layer. The appearance of a **purple or reddish-violet ring** at the interface confirmed the presence of carbohydrates.

- **Benedict's Test**

The extract was mixed with Benedict's reagent and heated in a water bath. A **brick-red, yellow, or green precipitate** indicated the presence of reducing sugars.

➢ **Test for Proteins**

- **Biuret Test**

Two milliliters of the extract were treated with a few drops of 10% sodium hydroxide, followed by a drop of 1% copper sulfate solution. The development of a **violet or purple coloration** indicated the presence of proteins

➢ **Test for Flavonoids**

Alkaline Reagent Test

Two milliliters of the extract were treated with a few drops of 10% sodium hydroxide solution. The formation of a **yellow coloration** that became colorless upon addition of dilute acid indicated the presence of flavonoids.

➢ **Test for Tannins**

About 0.2 g of the plant extract was mixed with 5 mL of distilled water and then filtered. A few drops of 0.1% ferric chloride solution were added to the clear filtrate. The appearance of a blue-black or greenish precipitate indicated the presence of tannins.

➢ **Test for Phenols**

Ferric Chloride Test

A small amount of extract was mixed with 3–4 drops of 5% ferric chloride solution. The appearance of a **blue, green, or dark coloration** indicated the presence of phenolic compounds.

Materials and methods for ointment preparation and evaluation

I. Collection of plant

The whole Heliotropium indicum plant was collected from the areas surrounding the author's home in the rural region of Amruthaluru, Tenali city, Andhra Pradesh, India. After collection, the plant sample was taken to the Department of Botany, Arts and Science College, Bapatla, where it was properly identified and preserved for further study. The freshly collected plant material was gently washed with distilled water to remove any dust or debris. It was then shade-dried at room temperature (around 25 °C) to protect its phytochemicals from degradation. Once fully dried, the material was powdered using a mixer grinder and stored at room temperature in a clean container until it was used for the extraction process.

Preparation of extract

1. Approximately weighed 25g of leaf powdered material and was subjected to three days using 250ml of 70% ethanol. The resulting extract was then further filtered using Whatman No. 1 paper. Re-

maceration is performed by Adding fresh 100 mL solvent to the residue, shake for 24 hours, filter again.

2. Combine both filtrates for higher yield. And evaporated on a hot plate at 45^{o}c, yielding the crude ethanol extract.

Figure 2: Maceration by 70% ethanol

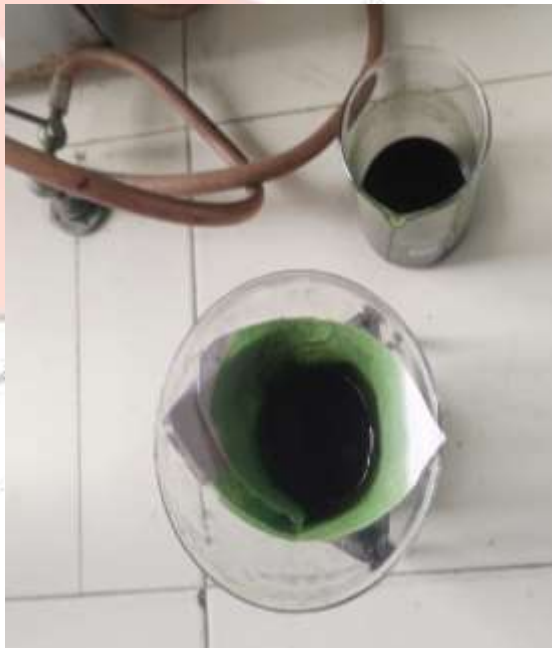

Figure 3: Filtration of macerated solution

Figure 4: Macerated powder

Figure 5: preparation for evaporating solvent by pouring extract into evaporating dish

Figure 6: Evaporation of solvent by using hot plate

Ointment preparation

I. Materials

White soft paraffin, Liquid paraffin, Wool fat (Lanolin), Ceto stearyl alcohol, Stearic acid, Purified water, Preservative (optional), herbal extract.

II. Method of preparation (fusion method)

Ointment preparation involves two main steps...

Step 1: preparation of ointment base

Step 2: Incorporation of herbal extract into ointment base

After the extract incorporation into ointment base, the base is cooled at room temperature slowly and continuous stirring is required to form a Homogenous mixture of ointment

1. Preparation of Ointment Base

A clean, dry beaker was taken, and the required quantities of white soft paraffin, liquid paraffin, wool fat, Ceto stearyl alcohol, and stearic acid were added.
The beaker was placed on a water bath and gently heated until all ingredients melted completely to form a clear and uniform liquid base.

2. Incorporation of Herbal Extract into the Base

The prepared Heliotropium indicum extract was warmed slightly.
The semi-cooled ointment base (approximately 40–45°C) was then taken, and the warm extract was slowly incorporated into it with continuous stirring.
Mixing continued until a smooth, homogeneous ointment was obtained.

III. Evaluation of ointment prepared

1. Physical Appearance

After preparing the ointment, take a small amount on a spatula and visually check it under good light. And observed whether it looks smooth, even, and free from lumps or separation.

2. Color and Odor

The container was Opened and checked the color by looking at it directly. Bring it close to your nose and gently smell to confirm if the odor is normal and unchanged.

3. Spreadability Test

A small amount of ointment was Placed between two glass slides and pressed the top slide lightly and move it to see how easily the ointment spreads

4. Consistency (Texture) Test

A small portion was taken between two fingers and gently rubbed. To Feel whether it is smooth and uniform without gritty particles.

5. pH Test

A small amount of ointment was Dispersed in distilled water. Stir well and to check the pH using a pH meter or pH strip.

6. Washability Test

A small amount of ointment was Applied on the back of your hand. Wash it under running water to see how easily it comes off.

7. Extrudability Test

The ointment was filled in a collapsible tube then Pressed the tube gently and observe how smoothly the ointment comes out.

Table1: Phytochemical screening of H.indicum extract

Phytochemical Test	**Test Procedure**	**Positive Result / Observation**
Alkaloids (Wagner's Test)	3 mL extract + 1 mL 1% HCl → heat 20 min → cool → filter → 1 mL filtrate + 2 drops Wagner's reagent	Cream or brown precipitate
Saponins (Foam Test)	Shake extract vigorously with water → warm gently	Stable froth/foam that persists after warming
Anthraquinones (Bontrager's Test)	0.2 g extract + 5 mL benzene → shake → filter → add 5 mL 10% ammonia to filtrate	Pink, red, or violet coloration in ammoniacal layer
Cardiac Glycosides (Keller–Killiani Test)	1 mL ethanol extract + 2 mL chloroform → let layers separate → add conc. H_2SO_4 carefully	Reddish-brown coloration at the interface
Carbohydrates (Molisch's Test)	Extract + few drops Molisch's reagent → add conc. H_2SO_4 down tube side	Purple or reddish-violet ring at interface
Reducing Sugars (Benedict's Test)	Mix extract with Benedict's reagent → heat in water bath	Brick-red, yellow, or green precipitate
Proteins (Biuret Test)	2 mL extract + few drops 10% NaOH → add 1% $CuSO_4$ dropwise	Violet or purple coloration
Flavonoids (Alkaline Reagent Test)	2 mL extract + few drops 10% NaOH → add dilute acid	Yellow color that becomes colorless on acidification
Tannins (Ferric Chloride Test)	0.2 g extract + 5 mL water → filter → add few drops 0.1% $FeCl_3$	Blue-black or greenish precipitate
Phenols (Ferric Chloride Test)	Extract + 3–4 drops 5% $FeCl_3$	Blue, green, or dark coloration

Table 2: Composition of ointment

Ingredient	**Quantity (for 20 g)**	**Purpose**
Heliotropium indicum leaf extract	2 g	Active herbal ingredient
White soft paraffin	10 g	Main base providing smooth texture
Liquid paraffin	4 g	Softens the base; improves spreadability
Ceto stearyl alcohol	2 g	Thickener; gives ointment body
Stearic acid	1 g	Helps stabilize and harden the ointment

Wool fat (Lanolin)	1 g	Helps the skin absorb the ointment

Table 3: General Evaluation Parameters

Parameter	**Observation**	**Interpretation**
Appearance	Smooth, brownish green	Indicates good incorporation of extract
Consistency	Soft, uniform	Suitable for topical application
Spreadability	Good	Ensures easy application on skin
pH	Skin-compatible	Safe for use without irritation
Washability	Easily washable	Convenient for routine use
Extrudability	Good	Comes out easily from collapsible tube

Conclusion: The present study successfully formulated an herbal ointment using the ethanolic leaf extract of *Heliotropium indicum* and evaluated its basic physical and functional characteristics. The plant material was authentically identified, extracted using 70% ethanol, and incorporated into a standard ointment base using the fusion method. The prepared formulation showed desirable pharmaceutical properties, including smooth appearance, uniform texture, acceptable pH, good spreadability, easy washability, and satisfactory extrudability. Phytochemical screening of the extract confirmed the presence of key bioactive compounds such as flavonoids, phenolics, tannins, alkaloids, saponins, and glycosides, which are widely associated with wound-healing, antioxidant, and anti-inflammatory activities. Based on these findings, the ointment formulated with *H. indicum* extract demonstrates promising potential as a natural topical preparation for supporting skin protection and wound management. Although the evaluation conducted in this study focused primarily on physical and preliminary characteristics, the results indicate that the extract was successfully incorporated into a stable and homogeneous formulation suitable for topical use. Further studies such as antimicrobial testing, in vivo wound-healing models, stability studies, and safety assessments are recommended to establish the therapeutic effectiveness and safety profile of this herbal ointment. With additional research, *Heliotropium indicum*–based topical formulations may serve as affordable and effective alternatives to conventional wound-care products.

References

1.Dash GK, Murthy PN. Studies on Wound Healing Activity of Heliotropium indicum Linn. Leaves on Rats. ISRN Pharmacol. 2011;2011:847980. doi: 10.5402/2011/847980. Epub 2011 Apr 12. PMID: 22084720; PMCID: PMC3198611.

2.Ruchi.S.Shivhare, Development of Wound Healing Ointment Formulation containing Active Extracts of Tridax Procumbens, Calendula Officinalis, Murraya Koenigii, and Aloe Barbadensis, International Journal of Pharmaceutical and Phytopharmacological Research (eIJPPR) | December 2019|Volume 9| Issue 6| Page 99-104

3. Yassine KA, Houari H, Mokhtar B, Karim A, Hadjer S, Imane B. A topical ointment formulation containing leaves' powder of *Lawsonia inermis* accelerate excision wound healing in Wistar rats. Vet World. 2020 Jul;13(7):1280-1287. doi: 10.14202/vetworld.2020.1280-1287. Epub 2020 Jul 7. PMID: 32848301; PMCID: PMC7429373.

4. Marwa A.A. Fayed,Heliotropium; a genus rich in pyrrolizidine alkaloids: A systematic review following its phytochemistry and pharmacology,Phytomedicine Plus,Volume 1, Issue 2,2021,100036,ISSN 2667-0313, https://doi.org/10.1016/j.phyplu.2021.100036.

5.Gujarat Forestry Research Foundation,Gandhinagar, Gujarat, INDIA,**Principal Investigator :** Dr. Maulik Gadani,**Data Compiler :** Dr. Goral Jani, https://www.efloraofgandhinagar.in/herb/heliotropium-indicum

6. Refered from wikipedia,https://en.wikipedia.org/wiki/Heliotropium_indicum

7.State medicinal board kerala, http://smpbkerala.in/herbal-data/heliotropium-indicum.asp

8. Sarkar C, Mondal M, Khanom B, Hossain MM, Hossain MS, Sureda A, Islam MT, Martorell M, Kumar M, Sharifi-Rad J, Al-Harrasi A, Al-Rawahi A. *Heliotropium indicum* L.: From Farm to a Source of Bioactive Compounds with Therapeutic Activity. Evid Based Complement Alternat Med. 2021 Jun 1;2021:9965481. doi: 10.1155/2021/9965481. PMID: 34158818; PMCID: PMC8187075.

9. In vitro studies on phytochemical analysis and antioxidant activity of Heliotropium indicum linn. (2021). *International Journal of Research in Pharmacology & Pharmacotherapeutics*, *5*(2), 108-114. https://doi.org/10.61096/ijrpp.v5.iss2.2016.108-114

10. A. Krishnaveni et al / Int. J. of Pharmacy and Analytical Research. 13(4) 2024 [592-604], Pharmacognostical, preliminary phytochemical probe and phenetics of Heliotropium indicum Linn leaves https://doi.org/10.61096/ijpar.v13.iss4.2024.592-604

11. Rupam Mandal (2022). Heliotropium indicum L: An Ethnomedicinally Important plant of India. © International Academic Publishing House (IAPH), B. Sarkar (eds.), The Basic Handbook of Indian Ethnobotany and Traditional Medicine,Vol. 1, pp. 36-45. https://doi.org/10.52756/bhietm.2022.e01.003

12. Reddy JS, Rao PR, Reddy MS. Wound healing effects of Heliotropium indicum, Plumbago zeylanicum and Acalypha indica in rats. J Ethnopharmacol. 2002 Feb;79(2):249-51. doi: 10.1016/s0378-8741(01)00388-9. PMID: 11801388.
13. Chunthorng-Orn J, Dechayont B, Phuaklee P, Prajuabjinda O, Juckmeta T, Itharat A. Cytotoxic, Anti-inflammatory and Antioxidant Activities of Heliotropium indicum Extracts. J Med Assoc Thai. 2016 Jul;99 Suppl 4:S102-9. PMID: 29919994.
14.Pharmaceutics basic principles and formulations by k.d.tripathi,published by pharma med press,2017
15.A textbook of pharmaceutivcs by Dr,Narrapusetty naidu,published by SIA publishers,2017
16.Dispensing pharmacy by R.M.Mehtha published by Mk.jain for vallabh prakshan,2012
17. Evaluation of Wound Healing A ctivity of Heliotropium indicum L. leaves BY S GAYATHRI, Thesis Submitted to the Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore - 641 043 In Partial Fulfillment of the Requirements for the Degree of Master of Science in Zoology April 2019.
18. Miss.VidyaShankarChougule, formulation and evaluation of topical herbal ointment from tridax procumbens l.and azadiractha indica leaves extract for wound healing activity. Journal of Emerging Technologies and Innovative Research.