

PREPARATION AND EVALUATION OF ANTI BACTERIAL AND ANTISEPTIC POLYHERBAL SOAP

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ABSTRACT: Herbal soap is a natural alternative to conventional soap that is often made using botanical herbs and plant-based ingredients. The rising popularity of herbal soap can be attributed to its skinfriendly and environmentally conscious characteristics. The natural components found in herbal soap possess antibacterial, antifungal, and anti-inflammatory properties, which make them effective in addressing various skin conditions like acne, eczema, and psoriasis.. The formulation and assessment of poly herbal soap using cold process techniques is the primary goal of the current study. Formulated and assessed on the basis of coconut oil and sodium hydroxide were *Acalypha indica*, *Tridax procumbens*, red sandal powder. Various assessment techniques have been used, including skin irritancy testing, total fatty matter, moisture content, foaming index, foam retention time, percentage of free alkali and pH. In terms of eliminating microorganisms from the skin, the soap also demonstrated good cleansing effectiveness. And *T. procumbens* is commonly known as Coat Button or Kansari (hindi) or Ghamara (in local language) and belongs to family Asteraceae. It shows a number of pharmacological activities like, wound healing, antiinflammatory, hepato protective and immunomodulatory, which have been screened scientifically. This is an attempt to compile and review them in order to highlight its medicinal importance.

Keywords: *M. arundinacea* (MEMA), Antidiarrheal.

INTRODUCTION

The term “Herbal Cosmetics” refers to products that have been made with one or more herbal substances that are employed solely to deliver specified cosmetic benefits after a base of other legal cosmetic ingredients. A drug or medications are contained in the herbal soap formulation. Antibacterial and antifungal medications are primarily created from plant materials including leaves, branches, roots, and fruits, and they're used to heal wounds, fend against illness, and enhance general health. This product is available in a range of dosage forms, like ointment, lotions and creams as well as gels, solvent extracts, and ointments, and has antibacterial qualities that are applied topically. Various skin conditions have been treated

using the qualities of various creams and soaps. Fungi, *staphylococcus aureus*, and *streptococcus* species are the main causes of skin infections. In traditional medicine, juice and extract from plant leaves are administered topically as antibacterial and anti-inflammatory medicines to treat skin conditions such eczemas, ringworm, and itch. Soaps are one of the latest cosmetics for protecting and enhancing skin vibrancy. As a result, the Ayurvedic herbs listed under varnya are chosen for formulation. Galen, a physician, is credited with bringing up the idea of using soap for bathing and body preservation for the first time. However, the skin is commonly irritated and dried out by modern chemical soaps

Herbal soap is a type of soap made using natural ingredients derived from various herbs and plants. Herbs such as lavender, mint, rosemary, and chamomile are commonly used in making herbal soap. These herbs are rich in essential oils, vitamins, and minerals that have various therapeutic benefits for the skin. Herbal soap is known for its soothing, rejuvenating, and healing properties, making a popular choice for people with sensitive or dry skin. Currently, a significant number of cosmetic products are adulterated, and numerous other beauty preparations available in the market are of inferior quality, posing potential risks of side effects such as skin rashes, allergic reactions, and even the development of skin diseases. Herbal soaps basically consist of plant parts such as seeds, rhizomes, and roots. It has antibacterial, antiaging, antioxidant, and antiseptic effects. Herbal soap contains none of the synthetic dyes, flavors, fluorides, or other additives typically found in commercial soap. The majority of individuals lack awareness regarding the extended ramifications of using commercial soaps. Herbal soap do not contain the artificial colours, flavours, fluorides etc., when compared to the content of commercial soap. Herbs are the natural products mostly found in the treatment of almost all diseases and skin problems owing to their high medicinal value, cost effective ness, availability and compatibility Herbal soap preparation is a medicine or drug. it contain antimicrobial or anti oxidation property, agent Which are mainly use of part of plant such as like leave, stem, roots and fruits to treatment for a skin disease or to achieve to good health.

MATERIALS AND METHODS

1.Collection of Plant material

Fresh leaves of *acalypha indica* and *Tridax procumbens* are collected from local areas. Red sandal wood is procured from authenticated herbal suppliers. Plants are washed, shade, dried and coarsely powdered. The coarse powder was subjected to extraction with solvents of ethanol or distilled water by maceration process and extract was concentrated extract using evaporation.

2.Preparation of plant material

Once collected, the entire plant was subjected to a thorough cleaning process to remove any contaminants or debris. After cleaning the plant material was air dried in shade to finely prevent degradation of sensitive phytochemical. once

completely dry, the plant was ground into the coarse powder using a mortar pestle or mechanical grinder.

3.Extraction process

The coarse powder of *acalypha indica*, *tridax procumbens* and red sandal wood was subjected to series of solvent extractions to isolate its bioactive compound. The extraction was performed using solvents such as ethanol distilled water, to assess the efficacy of each in extracting valuable compounds. Solvent selection: Each solvent was selected based on its polarity, with polarity solvents like ethanol and methanol expected to extract polar compounds. Extraction procedure: The powdered material was soaked in solvent for (specific time, e.g., 72 hours in a closed container. The mixture was then filtered using filter paper to separate the liquid extract from the solid residue.

4.Determination of percentage yield

Percentage Yield (%) = $(\text{Actual Yield} \div \text{Theoretical Yield}) \times 100$

- Actual yield = Weight of dried extract
 - theoretical yield = Weight of raw material
- Record yield for each plant extract separately.

Helps in standardization of formulation.

5.Preliminary phytochemical screening

The extracts obtained were then subjected to qualitative analysis to determine the presence of phytochemicals such as alkaloids, flavonoids, tannins, and essential oils.

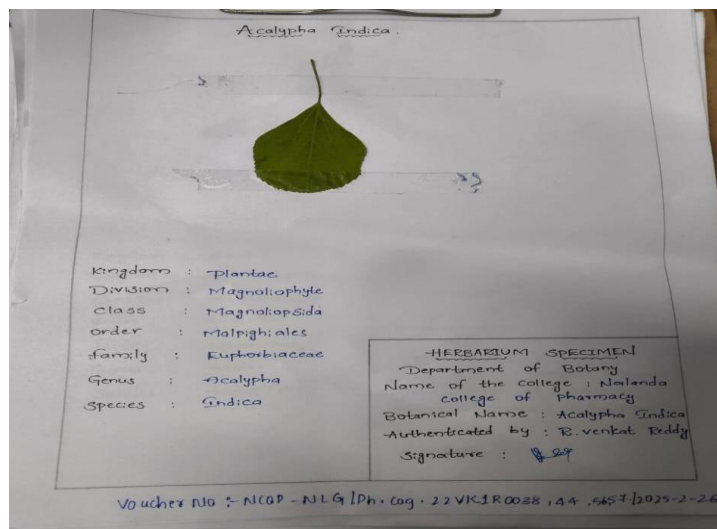
6.Safety and ethical considerations

All methods used in this research adhered to safety guidelines and ethical considerations regarding the collection and use of plant materials.

AUTHENTICATION OF ACALYPHA INDICA

Acalypha indica leaves are used in herbal soap according to literature review. Leaves of *Acalypha indica* were collected from Nalanda College of Pharmacy, Cherlapally, Nalgonda District in the month of March 2026. The plant was identified as *Acalypha indica* and authenticated by Mr. R.

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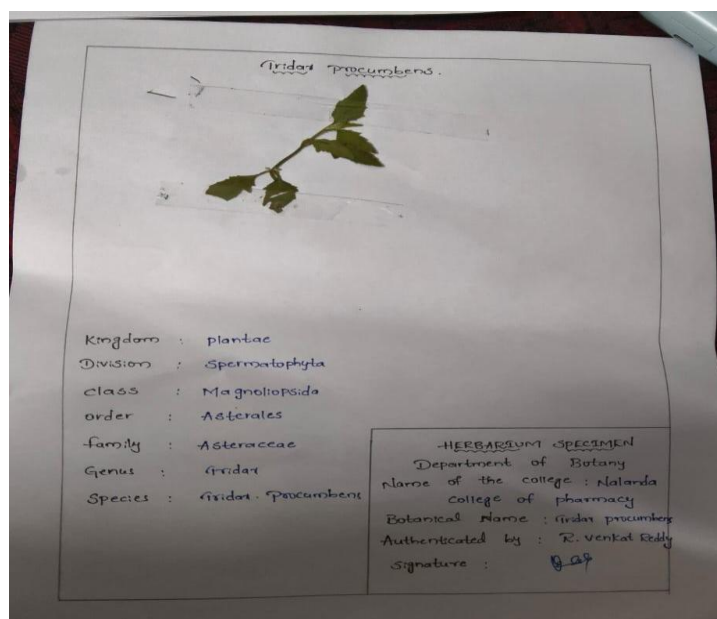


After authentication, the specimen was prepared and submitted in the Department of Pharmacognosy under the name of *Acalypha indica*, Family: Euphorbiaceae.

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AUTHENTICATION OF TRIDAX PROCUMBENS

Tridax Procumbens leaves are used in herbal soap according to literature review. Leaves of *Tridax Procumbens* were collected from Nalanda College of Pharmacy, Cherlapally, Nalgonda District in the month of March 2026. The plant was identified as *Acalypha indica* and authenticated by Mr. R. Venkat Reddy, M.Sc, M.Phil (Chemistry) (Ph.D), B.Ed Department of Pharmaceutical chemistry, Nalanda College of Pharmacy, affiliated to JNTUH University, Nalgonda.



After authentication, the specimen was prepared and submitted in the Department of Pharmacognosy under the name of *Tridax Procumbens*, Family: Asteraceae.

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PROCEDURE

Extraction of Herbal Materials

Wash and shade-dry the leaves of *Acalypha indica* and *Tridax procumbens*. Powder the dried materials separately. Take 5 g of each powder and add 50 mL ethanol or methanol. Keep for 24–48 hours (maceration) with occasional stirring. Filter and evaporate the solvent to obtain concentrated extracts. Store the extracts in airtight containers.



(Fig -4)



(Fig -5)

Preparation of Polyherbal Soap (Melt and Pour Method)

Cut 100 g glycerine soap base into small pieces. Melt the soap base using a water bath at 60–70°C. Add 2 g *Acalypha indica* extract, 2 g *Tridax procumbens* extract, 2 g red sandalwood powder/extract. Add 5 mL glycerine and mix thoroughly. Add a few drops of fragrance if required. Stir continuously to obtain a uniform mixture. Pour into soap moulds. Allow to cool and solidify for 24 hours. Remove from moulds and store in a dry place.



(Fig -6)



(Fig -7)



(Fig-8)

FORMULATION TABLE

S.NO	Ingredients	Quantity	Role
1	Soap Base	100g	Base
2	Acalypha Indica Powder	2-3g	Antimicrobial
3	Tridax Procumbens Powder	2-3g	Wound healing
4	Red Sandal Powder	1-2g	Color+ Soothing
5	Coconut Oil	5 ml	Moisturizer
6	Rose Water/ distilled water	Q S	Binding
7	Essential Oil	2-3 drops	Fragrance

EVALUATION PARAMETERS

1. Physical evaluation

Organoleptic characters like shape , odour , colour , appearance was determined .

2. pH Determination

1gm of the soap was dissolved in 10ml of distilled water and the pH was determined using a digital pH

3. Foam Height

Dissolve 1 g soap in 50 mL water. Shake vigorously for 1 minute. After that, pour it into a 100 ml measuring cylinder and add water until the volume reached 50 ml. After 25 strokes ,the aqueous volume was measured up to 50 ml, and the foam height was measured above the aqueous volume . Measure foam height immediately.

4. Foam Retention

A 100 ml graduated measuring cylinder was filled with 25 ml of the 1% soap solution. Top of the measuring cylinder was closed with our palm and shaken for 4 minutes, the volume of foam was measured at one minute intervals .

5 . Skin irritation test

Soap was applied over the skin for 10 minutes and the reaction was observed

6. Moisture Content

About 5 g of the soap was taken in a petri dish and dried in a hot air oven at 105°C for 2 hours. Then it was heated, cooled

and weighed. The difference in weight indicates moisture content. Water content = $m/M \times 100$ m = loss in mass of the material after drying M = mass of sample taken.

7. Free Alkali Content

About 5 grams of soap and 50 ml of neutralized alcohol were taken in a conical flask. It was boiled in a water bath for 30 minutes by reflux method. It was allowed to cool at room temperature and 1 ml of phenolphthalein solution was added. It was then titrated with 0.1N HCl.

8 .Antibacterial Activity (Agar Well Diffusion method)

Prepare nutrient agar plates. Inoculate with bacteria such as Staphylococcus aureus, Escherichia coli .Make wells in the agar.Add soap solution into wells. Incubate at 37°C for 24 hours.

Measure the zone of inhibition (mm).

9.Stability studies

Prepare poly herbal soap samples and record initial values (color, odor , pH, foam, weight). Store samples at 25°C, 40°C/75% RH, and 4°C.Evaluate at 0, 2, and 4 weeks. Check parameters: appearance, pH, foam, hardness, and weight. Compare with initial values to determine stability and shelf life.

RESULTS & DISCUSSION

The formulated poly herbal soap containing Acalypha indica, Tridax procumbens, and Pterocarpus santalinus was evaluated for various physicochemical and biological parameters to determine its quality, safety, and effectiveness.

S.NO	PARAMETERS	RESULTS
1.	Colour	Brown
2.	Odour	Pungent
3.	Appearance	Smooth , solid
4.	pH	7-8

5.	Foam height	2.5 cm
6.	Foam retention	2cm
7.	Moisture content	5.3 %
8.	Total Fatty Matter(TFM)	71%
9.	Free alkali	0.2%
10.	Stability test	Melts at 45°C
11.	Irritation test	Nil
12.	Anti-microbial activity	18mm zone

The organoleptic properties such as colour, odour, and appearance were found to be acceptable. The brownish-green colour is due to the presence of herbal extracts, while the pleasant odour indicates suitability for cosmetic use. The pH of the soap (7–8) was within the acceptable range for skin application, suggesting that the formulation is mild and unlikely to cause irritation.

Maintaining a near-neutral pH is important to preserve the natural skin barrier.

The foam height (2.5 cm) and foam retention (~5 minutes) indicated good foaming ability and stability. Although herbal soaps generally produce less foam compared to synthetic soaps, the obtained results confirm satisfactory cleansing action.

The moisture content (5.3%) was within acceptable limits, which ensures good shelf life and prevents microbial growth. Excess moisture can lead to softness and reduced stability, but the obtained value indicates a stable formulation.

The free alkali content (0.28%) was within permissible limits (<0.3%), showing that the soap is non-irritant and safe for regular use. Excess alkali can cause skin dryness and irritation, which was not observed here.

The antimicrobial activity (~18 mm zone of inhibition) demonstrates that the herbal ingredients possess effective antibacterial properties. This can be attributed to the phytoconstituents like flavonoids, tannins, and phenolic compounds present in the selected plants.

The skin irritation test showed no redness or irritation, confirming that the formulation is safe and suitable for topical application.

DISCUSSION

The formulated poly herbal soap is a combination of natural ingredients including *Acalypha indica*, *Tridax procumbens*, and *Pterocarpus santalinus*, which are well known for their medicinal and cosmetic benefits. The use of these herbs in soap formulation is based on their traditional applications in skin care and their scientifically proven pharmacological activities.

Polyherbal formulations are based on the principle of synergism, where multiple plant constituents work together to enhance therapeutic effectiveness. In this formulation, *Acalypha indica* contributes antimicrobial and antifungal activity, making it useful in preventing skin infections. *Tridax procumbens* is known for its wound healing, antiinflammatory, and antibacterial properties, which help in soothing the skin and promoting tissue repair. Red sandalwood provides cooling, anti-inflammatory, and antioxidant effects, improving skin tone and reducing irritation. The combination of these three herbs makes the soap not only a cleansing agent but also a therapeutic skincare product. Unlike synthetic soaps that may contain harsh chemicals, the poly herbal soap is expected to be milder, safer, and eco-friendly, reducing the risk of side effects such as dryness, irritation, and allergic reactions. From a formulation perspective, the preparation involves the saponification process, where fats or oils react with alkali to form soap. The incorporation of herbal extracts into the soap base must be done carefully to preserve the active constituents. Excessive heating during preparation can degrade phytochemicals such as flavonoids and tannins, thereby reducing efficacy. Hence, controlled temperature conditions are essential.

The evaluation results indicate that the formulated soap possesses acceptable physicochemical properties, including suitable pH, good foaming ability, adequate moisture content, and appropriate Total Fatty Matter (TFM). These parameters confirm that the soap has good cleansing efficiency, stability, and shelf life. In addition to basic properties, the formulation also showed significant antimicrobial activity, which enhances its value as a medicated or functional soap. This makes it particularly useful for individuals with minor skin infections, acne, or sensitive skin conditions. Another important aspect is the cosmetic acceptability of the product. The natural colour, pleasant herbal fragrance, and smooth texture contribute to user satisfaction. Although herbal soaps may produce less foam compared to synthetic soaps, they compensate with skin friendly and therapeutic benefits. The use of plant-based ingredients supports sustainability and biodegradability, making the product environmentally friendly. This aligns with the growing demand for natural and herbal cosmetic products in the market.

CONCLUSION

The present study successfully focused on the formulation and evaluation of a poly herbal soap using *Acalypha indica*, *Tridax procumbens*, and *Pterocarpus santalinus*. The selection of these herbs was based on their well-known antimicrobial, anti-inflammatory, and skin-protective properties. The prepared formulation was evaluated using various physicochemical parameters such as pH, foam height, foam retention, moisture content, Total Fatty Matter (TFM), free alkali content, and stability. The results obtained were found to be within acceptable limits, indicating that the soap possesses good quality, stability, and suitability for skin application.

The formulation exhibited satisfactory foaming ability and cleansing action, along with appropriate moisture content and TFM value, which contribute to effective skin conditioning. The low free alkali content confirmed that the soap is non-irritant and safe for regular use. Furthermore, the antimicrobial activity demonstrated by the formulation highlights its potential in preventing minor skin infections and maintaining skin hygiene.

The absence of skin irritation during testing confirms that the formulation is dermatologically safe. In addition, the use of natural herbal ingredients enhances the eco-friendly and biodegradable nature of the product, making it a safer alternative to synthetic soaps.

Overall, the study concludes that the formulated poly herbal soap is effective, safe, stable, and suitable for daily use, with added therapeutic benefits due to the synergistic action of the selected herbal ingredients. Hence, it can be considered a promising natural formulation for skincare applications.

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