



FORMULATION AND EVALUATION OF POLYHERBAL SOAP

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ABSTRACT: This study aimed to formulate and evaluate a polyherbal soap utilizing the synergistic properties of Neem (*Azadirachta indica*), Vallarai (*Centella asiatica*), Triphala (a combination of *Emblica officinalis*, *Terminalia chebula*, and *Terminalia bellerica*), Turmeric (*Curcuma longa*), Honey, Reetha (*Sapindus mukorossi*), Aloe Vera, and Almond Oil (*Prunus dulcis*). These herbal ingredients are renowned for their antibacterial, antifungal, antioxidant, and skin-nourishing properties. The soap formulation was developed through a systematic process of ingredient selection and optimization to ensure compatibility and maximum benefits. Each ingredient was carefully chosen based on its traditional uses and scientific evidence supporting its efficacy in skin care. Neem and Turmeric, with their potent antibacterial and anti-inflammatory properties, were incorporated to combat acne and skin infections. Vallarai, known for its wound-healing properties, was included to promote skin regeneration. Triphala extract acts as a natural cleanser, while Honey provides moisturizing and soothing effects. Reetha serves as a natural foaming agent, ensuring effective cleansing without stripping the skin of its natural oils. Aloe Vera and Almond Oil contribute additional hydration and nourishment, leaving the skin soft and supple. The formulated soap underwent rigorous evaluation for various parameters including pH, moisture content, foamability, and stability. Additionally, microbial analysis was conducted to assess its antimicrobial efficacy. Preliminary results indicate that the polyherbal soap exhibits favourable characteristics, meeting quality standards for commercial production. Overall, this study presents a promising formulation of a polyherbal soap enriched with beneficial botanical extracts. Further research is warranted to explore its therapeutic potential and suitability for various skin types, paving the way for the development of natural and sustainable skincare products.

Keywords: Polyherbal soap, Neem, Vallarai, Turmeric, Triphala, Reetha, Aloe vera, Honey.

INTRODUCTION:

Neem (*Azadirachta indica*)

The demand for natural skincare products has propelled the exploration of botanical extracts in personal care formulations. Among these, neem extract, derived from the *Azadirachta indica* tree, has garnered attention for its diverse therapeutic properties. With a rich history in traditional medicine, neem is renowned for its antibacterial, antifungal, and anti-inflammatory attributes, making it a compelling candidate for herbal soap production. This thesis delves into the integration of neem extract into herbal soap formulations, aiming to explore its efficacy in addressing various skin concerns while adhering to principles of sustainability and natural skincare.



Fig 1: Neem

Scientific classification of *Azadirachta indica*

Kingdom: Plantae

Division: Magnoliophyta

Class: Magnoliopsida

Subclass: Rosidae

Order: Sapindales

Family: Meliaceae

Genus: *Azadirachta*

Species: *Azadirachta indica*

Binomial name: *Azadirachta indica*

Phytochemistry: Neem extract, a cornerstone of herbal soap formulations, boasts a diverse array of phytochemicals that contribute to its therapeutic efficacy. Key compounds include azadirachtin, nimbin, and nimbidin, renowned for their potent antibacterial, antifungal, and anti-inflammatory properties. These bioactive constituents not only combat common skin issues such as acne and eczema but also promote overall skin health by soothing irritation and reducing inflammation. Moreover, neem extract contains antioxidants like quercetin and β -sitosterol, which help protect the skin from oxidative damage and premature aging. Through this intricate blend of phytochemicals, neem extract offers a natural and comprehensive solution for skincare in herbal soap formulations, catering to both cleansing and nurturing skin needs.

Pharmacological activities:

- Antibacterial and antifungal properties cleanse the skin and reduce the risk of infections.
- Anti-inflammatory effects soothe skin irritation and promote a balanced complexion.
- Wound-healing properties aid in the repair of damaged skin tissue.
- Overall, neem extract's pharmacological activities in herbal soap formulations offer cleansing and therapeutic benefits for various skin concerns.

Vallarai (*Centella asiatica*)

Valued for its numerous health benefits, Vallarai (*Centella asiatica*) extract has gained prominence as a key ingredient in herbal soap formulations. Centuries of traditional use and modern scientific research attest to its multifaceted therapeutic properties, making it a compelling addition to skincare products. Renowned for its antioxidant, anti-inflammatory, and wound-healing capabilities, Vallarai extract offers a natural solution for cleansing and nurturing the skin. This introduction sets the stage for exploring the integration of Vallarai extract into herbal soap formulations, aiming to unlock its potential for promoting healthier, radiant skin through the synergistic blend of nature's gifts.



Fig.2. Vallarai Table

Scientific classification of vallarai

Kingdom: Division

Plantae: Magnoliophyta

Class: Magnoliopsida

Subclass: Asteridae

Order: Apiales

Family: Apiaceae

Genus: Centella

Species: Centella asiatica

Binomial name: Centella asiatica

Phytochemistry: Vallarai (*Centella asiatica*) extract, the cornerstone of herbal soap formulations, harbors a rich phytochemical composition contributing to its therapeutic efficacy. Key constituents include triterpenoids such as asiaticoside, madecassoside, and asiatic acid, renowned for their antioxidant and anti-inflammatory properties. These compounds not only scavenge free radicals, protecting the skin from oxidative stress, but also help soothe inflammation and support collagen synthesis, promoting skin rejuvenation. Moreover, Vallarai extract contains flavonoids, amino acids, and vitamins, further enhancing its nutritive value for the skin. Through this intricate blend of phytochemicals, Vallarai extract offers a natural and holistic solution for skincare in herbal soap formulations, catering to cleansing and nurturing skin needs effectively.

Pharmacological activities:

- Potent antioxidant properties neutralize free radicals, protecting against oxidative stress.
- Anti-inflammatory effects soothe skin irritation and promote a balanced complexion.
- Overall, Vallarai (*Centella asiatica*) extract offers both cleansing and therapeutic benefits for skin health in herbal soap formulations.

Triphala

Triphala extract, a blend of three potent medicinal fruits—amla, bibhitaki, and haritaki—stands out as a compelling ingredient in herbal soap formulations. Revered for its extensive use in Ayurvedic practices, Triphala embodies a wealth of therapeutic properties beneficial for skin health. With its antioxidant, anti-inflammatory, and antimicrobial attributes, Triphala extract offers a holistic approach to cleansing and nourishing the skin. This introduction lays the groundwork for exploring the incorporation of Triphala extract into herbal soap formulations, aiming to harness its centuries-old wisdom to promote radiant and rejuvenated skin naturally.



Fig. 3. Triphala Table

Scientific classification of triphala:

Kingdom: Plantae

Division: Magnoliophyta

Class: Magnoliopsida

Subclass: Rosidae

Order: Malpighiales

Family: Phyllanthaceae

Genus: Emblica

Species: *Emblca officinalis*

Binomial name: *Emblca officinalis*

Phytochemistry: Triphala extract, a combination of three powerful fruits—amla (*Emblca officinalis*), bibhitaki (*Terminalia bellirica*), and haritaki (*Terminalia chebula*), boasts a diverse phytochemical composition essential for skincare. Amla, rich in vitamin C and polyphenols, offers potent antioxidant properties, protecting the skin from oxidative damage. Bibhitaki contains tannins and flavonoids, contributing to its astringent and antimicrobial effects, while haritaki's high content of phenolic compounds and terpenoids lends it antioxidant and anti-inflammatory properties. This intricate blend of bioactive compounds in Triphala extract provides a natural and holistic solution for addressing various skin concerns in herbal soap formulations.

Pharmacological activities:

- Antioxidant properties protect the skin from oxidative damage.
- Anti-inflammatory effects soothe skin irritation and redness.
- Antimicrobial activity helps combat acne and other skin infections.
- Astringent properties tighten pores and promote a clearer complexion.
- Supports collagen production, enhancing skin firmness and elasticity.
- Helps regulate sebum production, balancing oily and combination skin.
- Gentle exfoliation removes dead skin cells, revealing smoother skin.
- Overall, Triphala extract offers a comprehensive range of pharmacological activities beneficial for skin health in herbal soap formulations.

Turmeric (*Curcuma longa*)

Turmeric extract, derived from the rhizome of the *Curcuma longa* plant, emerges as a potent ingredient in herbal soap formulations owing to its myriad of health-promoting properties. Esteemed for centuries in traditional medicine, turmeric has garnered attention for its remarkable anti-inflammatory, antioxidant, and antimicrobial characteristics. With its vibrant golden hue and rich cultural significance, turmeric extract offers a natural and holistic approach to skincare, promising to cleanse, nourish, and rejuvenate the skin. This introduction sets the stage for exploring the integration of turmeric extract into herbal soap formulations, aiming to harness its ancient wisdom to promote radiant and revitalized skin naturally.



Fig. 4 turmeric

Scientific classification of turmeric:

Kingdom: Plantae

Division: Magnoliophyta

Class: Liliopsida

Subclass: Liliopsida

Order: Zingiberales

Family: Zingiberaceae

Genus: *Curcuma*

Species: *Curcuma longa*

Binomial name: *Curcuma longa*

Phytochemistry:

Turmeric extract, renowned for its therapeutic efficacy, harbors a complex phytochemical profile that underpins its multifaceted benefits for skincare. Curcumin, the primary bioactive compound in turmeric, possesses potent antioxidant and anti-inflammatory properties, which help protect the skin from oxidative stress and soothe inflammation. Additionally, turmeric contains other important constituents such as turmerones, sesquiterpenes, and flavonoids, which contribute to its antimicrobial, wound-healing, and skin-brightening effects. This rich phytochemistry makes turmeric extract a valuable ingredient in herbal soap formulations, offering a natural and holistic solution for promoting healthier, more radiant skin.

Pharmacological activities:

- Powerful antioxidant properties combat oxidative stress and protect skin cells from damage.
- Anti-inflammatory effects soothe irritation, redness, and inflammation, promoting a calmer complexion.
- Antimicrobial activity helps to inhibit the growth of bacteria and fungi, reducing the risk of acne and other skin infections.
- Wound-healing properties support the repair and regeneration of damaged skin tissue, aiding in the recovery process.
- Skin-brightening effects help to diminish the appearance of dark spots, hyperpigmentation, and uneven skin tone.
- Anti-aging benefits may help to reduce the appearance of fine lines and wrinkles, promoting a more youthful complexion.
- Overall, turmeric extract offers a comprehensive range of pharmacological activities that contribute to healthier, more radiant skin in herbal soap formulations.

Reetha (*Sapindus mukorossi*)

Reetha extract, derived from the fruit of the *Sapindus mukorossi* tree, emerges as a promising ingredient in herbal soap formulations due to its rich history and versatile properties. Revered for centuries in traditional medicine, reetha, also known as soapnut, is renowned for its natural cleansing and conditioning abilities. With its gentle yet effective cleansing action and mild pH balance, reetha extract offers a natural and sustainable alternative for cleansing the skin. This introduction lays the groundwork for exploring the integration of reetha extract into herbal soap formulations, aiming to harness its age-old wisdom to promote clean, nourished, and rejuvenated skin naturally.



Fig. 5. Reetha

Scientific classification of Reetha:

Kingdom: Plantae

Division: Magnoliophyta

Class: Magnoliopsida

Subclass: Rosidae

Order: Sapindales

Family: Sapindaceae

Genus: *Sapindus*

Species: *Sapindus mukorossi*

Binomial name: *Sapindus mukorossi*

Phytochemistry: Reetha extract, derived from the *Sapindus mukorossi* tree, boasts a rich phytochemical composition that contributes to its effectiveness in herbal soap formulations. Its primary active constituents include saponins, particularly saponin glycosides such as sapindosides A and B. These natural surfactants exhibit excellent foaming properties, enabling reetha extract to cleanse the skin gently yet thoroughly. Additionally, reetha extract contains antioxidant compounds such as flavonoids and polyphenols, which help protect the skin from oxidative damage and maintain its youthful appearance. This complex phytochemistry makes reetha extract a valuable ingredient in herbal soap formulations, offering both cleansing and nourishing benefits for healthy and radiant skin.

Pharmacological activities:

- Gentle cleansing action removes dirt, oil, and impurities from the skin without stripping away natural oils.
- Natural foaming properties create a rich lather, facilitating effective cleansing without the need for harsh detergents.
- Mild pH balance helps maintain the skin's natural moisture barrier, preventing dryness and irritation.
- Antioxidant properties protect the skin from environmental stressors and premature aging.
- Anti-inflammatory effects soothe skin irritation and redness, promoting a calmer complexion.
- Antimicrobial activity helps to inhibit the growth of bacteria and fungi, reducing the risk of acne and other skin infections.
- Overall, reetha extract offers a gentle yet effective approach to cleansing and nurturing the skin in herbal soap formulations.

Honey:

Honey extract, revered for its natural healing properties and luxurious texture, emerges as a prized ingredient in herbal soap formulations. Esteemed for centuries in traditional medicine and skincare rituals, honey is renowned for its moisturizing, antibacterial, and antioxidant benefits. With its rich blend of nutrients, enzymes, and amino acids, honey extract offers a nourishing and indulgent experience for the skin. This introduction sets the stage for exploring the integration of honey extract into herbal soap formulations, aiming to harness its age-old wisdom to promote soft, supple, and radiant skin naturally.



Fig.6. Honey

Scientific classification of Honey bee:

Kingdom: Animalia

Phylum: Arthropoda

Class: Insecta

Subclass: Insecta

Order: Hymenoptera

Family: Apidae

Genus: Apis

Species: Apis mellifera

Binomial name: Apis mellifera

Phytochemistry: Honey extract, derived from the nectar of flowers collected by bees, boasts a complex phytochemical profile that contributes to its skincare benefits in herbal soap formulations. Primarily composed of sugars such as glucose and fructose, honey also contains trace amounts of amino acids, vitamins, minerals, and enzymes. Additionally, honey's unique composition includes phenolic compounds, flavonoids, and organic acids, which exhibit antioxidant, antimicrobial, and anti-inflammatory properties. This intricate blend of phytochemicals makes honey extract a valuable

ingredient in herbal soap formulations, offering both moisturizing and protective effects for healthier, more radiant skin.

Pharmacological activities:

- Moisturizing properties help to hydrate and nourish the skin, leaving it feeling soft and supple.
- Antioxidant activity protects the skin from oxidative damage caused by free radicals, reducing the signs of aging.
- Antibacterial properties inhibit the growth of bacteria on the skin, helping to prevent acne and other infections.
- Anti-inflammatory effects soothe irritation and redness, promoting a calm and balanced complexion.
- Wound-healing properties support the repair and regeneration of damaged skin tissue, aiding in the healing process.
- Gentle exfoliation removes dead skin cells, revealing smoother and more radiant skin.
- Overall, honey extract offers a range of pharmacological activities that contribute to healthier, more beautiful skin in herbal soap formulations.

Aloe vera:

Aloe vera extract, renowned for its soothing and moisturizing properties, emerges as a coveted ingredient in herbal soap formulations. Revered for centuries in traditional medicine and skincare practices, aloe vera is celebrated for its ability to hydrate, calm, and rejuvenate the skin. With its rich blend of vitamins, minerals, enzymes, and amino acids, aloe vera extract offers a natural and holistic approach to skincare. This introduction sets the stage for exploring the integration of aloe vera extract into herbal soap formulations, aiming to harness its age-old wisdom to promote healthy, radiant, and refreshed skin naturally.

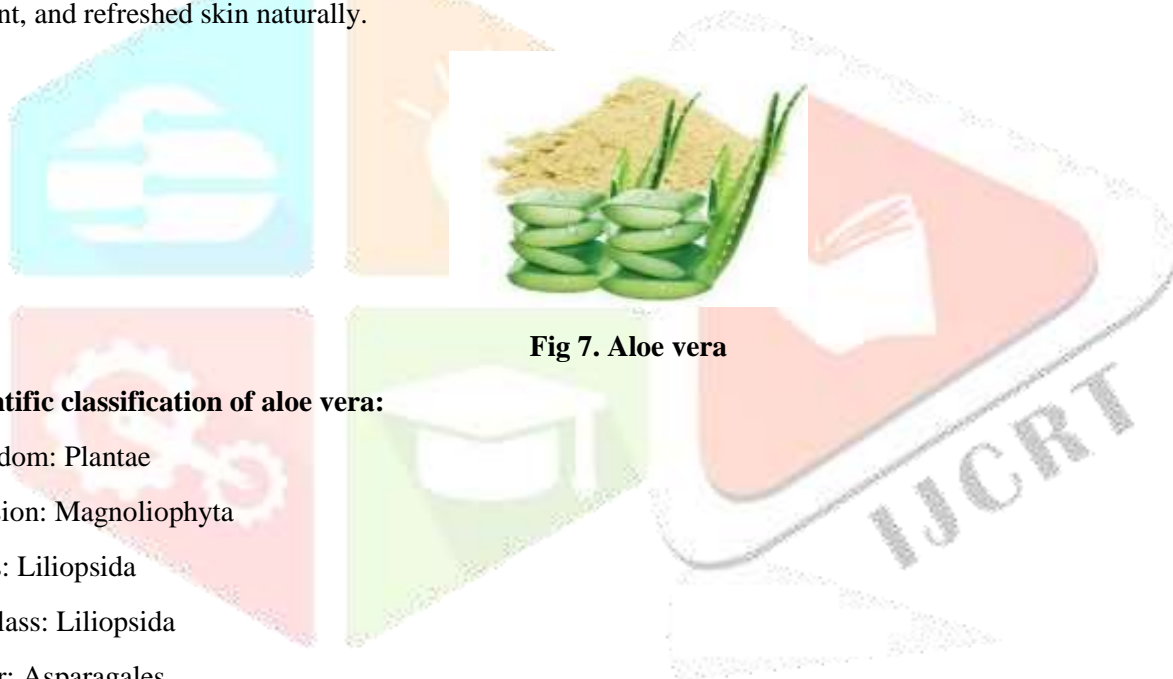


Fig 7. Aloe vera

Scientific classification of aloe vera:

Kingdom: Plantae

Division: Magnoliophyta

Class: Liliopsida

Subclass: Liliopsida

Order: Asparagales

Family: Asphodelaceae

Genus: Aloe

Species: Aloe Vera

Binomial name: Aloe Vera

Phytochemistry: Aloe vera extract, derived from the succulent leaves of the Aloe vera plant, boasts a diverse phytochemical composition that underpins its therapeutic benefits in herbal soap formulations. The gel extracted from the inner leaf contains polysaccharides such as acemannan, which possess moisturizing and soothing properties, aiding in hydration and alleviating skin irritation. Additionally, aloe vera contains a plethora of bioactive compounds including vitamins, minerals, enzymes, and amino acids, which contribute to its antioxidant, anti-inflammatory, and wound-healing effects. This rich phytochemistry makes aloe vera extract a valuable ingredient in herbal soap formulations, offering both nourishing and protective benefits for healthier, more radiant skin.

Pharmacological activities:

- **Antibacterial:** Honey extract possesses antibacterial properties that can help in fighting against various bacteria, thus keeping the skin clean and reducing the risk of infections.
- **Moisturizing:** It has moisturizing properties, which can help in retaining the skin's natural moisture, preventing dryness, and keeping the skin hydrated.
- **Antioxidant:** Honey extract contains antioxidants that can help in neutralizing free radicals, protecting the skin from damage caused by environmental factors such as pollution and UV radiation.
- **Healing:** It has wound healing properties, promoting the healing process of cuts, wounds, and minor skin irritations.
- **Anti-inflammatory:** Honey extract exhibits anti-inflammatory effects, which can help in reducing inflammation, redness, and swelling on the skin.
- **Exfoliating:** It contains enzymes that gently exfoliate the skin, removing dead skin cells and promoting cell turnover, resulting in smoother and brighter skin.
- **Soothing:** Honey extract has soothing properties that can help in calming and soothing irritated or sensitive skin, reducing itching and discomfort.
- **Anti-aging:** It helps in maintaining the skin's elasticity and firmness, thus reducing the appearance of wrinkles and fine lines, and promoting youthful looking skin.

Soap: Soap is a mixture of sodium salts of various naturally occurring fatty acids. If the fatty acid salt has potassium rather than sodium, a softer lather is the result. Soap is produced by saponification or basic hydrolysis reaction of a fat or oil. Most commercial soaps contain chemicals that can be harmful to the skin and using a natural herbal soap can be a good alternative. Herbal soaps are made using natural herbs and ingredients that are healthier and beneficial for the skin and are less likely to cause any damaging effect. Some of the natural soap manufacturers also use aromatherapy and herbal treatments to offer the best skin treatment solution for your skin. Made of rare herbs and 100% natural ingredients, herbal soaps are found to be highly beneficial for the skin. The herbs infused in these soaps have therapeutic and healing characteristics that offer specific benefits to the skin, such as nourishment, strength, healing, and moisturizing. These soaps also contain super fatty oils, Vitamin E, Aloe, and essential oils that are allied to the goodness of skin and overall health. Herbal soaps are also effective in curing different skin complaints. These soaps also contain glycerine, which is generally not used in commercial soaps. Glycerine helps in retaining the moisture in the skin thereby making these soaps for dry skin conditions. Herbal soap preparations are medicines or drugs which contain anti-bacterial & anti-fungal agents which mainly uses parts of plants such as like leaves, stem, roots & fruits for treatment for an injury or disease or to achieve good health. These preparations possess anti-microbial properties and are administered topically and available to apply in various forms like creams, gels, soaps, solvent extracts, or ointments. In the present study, neem, turmeric, triphala, vallarai, honey and aloe vera extracts were used to prepare the anti-bacterial herbal soaps and their physicochemical characteristics were evaluated.

Preparation of soap: Soaps are made through a chemical reaction called saponification. This process involves fats or oils reacting with an alkali, like sodium hydroxide (lye) or potassium hydroxide. Here's a breakdown of soap preparation and the different methods: **The Chemistry (Saponification):** Fats and oils are triglycerides, meaning they have three fatty acids attached to a glycerol molecule. Lye breaks the bonds between the fatty acids and glycerol. The fatty acids then combine with the lye to form soap molecules (sodium or potassium salts of fatty acids) and glycerin as a byproduct. **Soap Making Methods:** There are several methods for making soap, each with its own advantages and level of difficulty.

Here are the most common ones:

1. **Cold Process:** This is the traditional method where fats/oils and lye solution react at room temperature. It offers the most control over customization but requires longer cure time (weeks) and proper handling of lye (can be caustic).
2. **Hot Process:** Similar to cold process but uses heat to accelerate the saponification reaction. This leads to a quicker cure time (days) but requires close monitoring and specific equipment.
3. **Melt and Pour:** This is a beginner-friendly method where pre-made soap base is melted, customized with colorants, fragrances, and additives, and then poured into molds. It requires minimal equipment and cure time is very short. Melt and pour soap is the easiest method of making homemade soap. Because the soap base has already been made and prepared for you, you do not have to worry about working with lye, like you would with cold or hot process soap. Best of all, there are no curing times involved, and the soap is ready to use once it hardens!

4.Rebatch: This method involves shredding or grating commercially available soap and then melting it down with water or other liquids to create a new soap with your own customizations. It's a good way to use up leftover soap scraps and offers some creativity.

5.Liquid Soap: Liquid soaps are typically made with potassium hydroxide, which creates a softer soap that dissolves more easily in water. They can be made from scratch using lye or by diluting pre-made castile soap with water and glycerine.



Fig 8: Herbal Soap

Advantages of soap:

- **Effective Cleaning:** Soap excels at removing dirt, grease, and grime from skin and surfaces.
- **Biodegradable:** Traditional soaps made with natural fats and oils break down easily and don't harm the environment.
- **Gentle on Skin:** Many soaps are formulated to be mild and suitable for most skin types.
- **Cost-effective:** Bar soap, especially, can be a very economical cleaning choice.
- **Wide Variety:** Soaps come in a vast array of styles, scents, and ingredients to suit different needs and preferences.

Disadvantages of soap:

- **Hard Water Performance:** Soap reacts with minerals in hard water, forming a scum that reduces cleaning effectiveness and can leave a residue.
- **Drying Potential:** Some soaps can be stripping of natural oils, leading to dryness on skin or hair.
- **Limited Cleaning Power:** Against certain stains or greasy messes, detergents may perform better.
- **Bulkier Storage:** Bar soap can take up more storage space than liquid alternatives.
- **Detergents:** More effective in hard water and with some stains, but may not be biodegradable.
- **Body Washes:** Liquid soaps formulated for the shower, often with added moisturizers.

Material and method:

Table 1: List of equipment.

Sr. No.	Instrument	Model
1	UV-visible spectrometer	v-530, Jasco
2	Hot air oven	Meta lab scientific industries, Mumbai
3	Auto digital pH meter	LT-11

Materials for decoction:

Chemicals and extract: neem, turmeric, triphala vallarai, honey, aloe vera, almond oil

Collection of powder: Powders and oils were collected from Manakarnika Aushadhalaya.

Extraction by decoction:

- 10 gm of powder of neem, turmeric, triphala, vallarai, honey and aloe vera were accurately measured and placed in 500 ml beaker each.
- To each beaker, 100 ml of distilled water was added along with constant stirring with the help of a stirrer.
- Each beaker is placed in a hot water bath and hot extraction process was carried out.
- The extraction process was carried out for 20-30 min.
- The extractive solutions were kept aside to come to room temperature.
- Extractive solutions were filtered using Whatman filter paper to obtain the extracts of neem, turmeric, triphala, vallarai, honey and aloe vera through the decoction process.
- The extract was then subjected to the process of a rotatory evaporator for a period of 45 minutes to get concentrated extract.
- The concentrated extract was then retrieved and further subjected to phytochemical analysis.

Phytochemical analysis:

- Chemicals and extract: Neem, turmeric, triphala, vallarai, honey and aloe vera extracts All the reagents and chemicals required for phytochemical analysis
- Apparatus: Test tubes Dropper Test tube stand Water bath the extract obtained from the rotatory evaporator was subjected to phytochemical analysis to identify the presence of various phytochemicals in the extract. Phytochemical analysis was majorly carried out for alkaloids, tannin, saponins, flavonoids, proteins, steroids, glycosides and carbohydrates.

UV-visible spectral analysis: UV-visible spectral analysis was performed on v-53, Jasco instrument. The Principle of UV-Visible Spectroscopy is based on the absorption of ultraviolet light or visible light by chemical compounds, which results in the production of distinct spectra. Spectroscopy is based on the interaction between light and matter. When the matter absorbs the light, it undergoes excitation and de-excitation, resulting in the production of a spectrum.

Formulation preparation:

Three different batches of soap each containing varying quantities of extract was prepared.

Table 2: Formula of soap:

Sr. No.	Ingredients	F1	F2	F3	Category
1	Neem extract (ml)	1.75	2.2	2.5	Antibacterial agent
2	Vallarai extract (ml)	1.5	1.3	1.75	Anti-oxidant
3	Triphala extract(ml)	2.25	2.0	2.3	Anti-inflammatory agent
4	Turmeric extract(ml)	0.5	0.5	0.5	Brightening agent
5	Reetha extract (ml)	1.5	2.0	2.75	Cleansing agent
6	Honey extract(ml)	1.3	1.8	1.5	Soothing agent
7	Aloe vera (gm)	1.3	1.1	1.5	Hydrating agent
8	Sodium cocyl isethionate (gm)	5.0	6.0	7	Surfactant
9	Glycerine soap base (gm)	40	40	40	Nourishing agent
10	Almond oil (ml)	1.0	1.0	1.0	Moisturizing agent
11	Lemon Grass Oil	q.s	q.s	q.s	Fragrance

Method of preparation:

1. Cut the soap base and weigh the required quantity Melt the soap base using a water bath, stirring occasionally to ensure even melting Once melted, add the required quantity extracts.
2. Stir well to incorporate.
3. Then take the melted soap off the water bath and add sufficient amount of perfume.
4. Pour the melted soap mixture into moulds carefully.
5. Allow the soap to cool and harden completely.
6. Once cooled and hardened, gently remove the soap from the moulds.
7. Soap is ready to use.

Antimicrobial activity: Neem, turmeric, triphala, vallarai, honey and aloe vera extracts contains several phytochemicals which are useful in treating common ailments. It has antibacterial, antifungal, anti-inflammatory, antiviral, anticancer activity. In order to determine antibacterial activity of extract and each batch of formulation, staphylococcus aureus strain of bacteria was used. Culture media was prepared by accurate weighing nutrient agar powder in distilled water. All glass ware in culture media were sterilized. The culture media was poured on to Petri plate and Bacterial culture was added to it and allowed to solidify. After solidification of media a well of depth 1mm was bored and extract and formulation was placed into it. The plate was then placed into an incubator previously heated 35°C for 24hrs. After 24hr the plates were examined for bacterial growth around the well.

Evaluation parameter: Evaluation of physicochemical parameters of the prepared formulation, various physicochemical parameters which are mentioned below were performed to establish the quality of the prepared formulations.

1.Determination of Organoleptic Characteristics: Clarity and colour was checked by naked eyes against the white background, and the odour was smelled.

2.Shape Determination: The soap which was rectangular in shape, was chosen for the preparation of soap bar.

3.Weight determination: The weight was determined by using a Digital weighing balance.

4.pH TEST: The pH test was performed for all the formulations. Each formulation of soap solution was dissolved in 20ml of distilled water and tested for pH with the help of a digital pH meter.

5.Foam Height: 0.5gm of the sample of soap was taken and dispersed in 25 ml of distilled water. Then, transferred it into 100 ml measuring cylinder; the volume was made up to 50 ml with water. 25 strokes were given and stand till aqueous volume was measured up to 50 ml and measured the foam height, above the aqueous volume.

6.Foam Retention: Take 25 ml of 1% soap solution in a 100 ml measuring cylinder. Cover the measuring cylinder with your hand and shake it vigorously for 10 minutes. Record the volume of foam at 1-minute intervals for a total of 4 minutes.

7.Alcohol insoluble matter: 5gm of soap was taken in a conical flask and added 50ml warm ethanol and shaken vigorously to dissolve the soap. The solution was filtered through a tarred filter paper with 20ml of warm ethanol and dried at 105 °C for 1hr. The weight of the dried paper with residue was taken. Formula: % Alcohol insoluble matter = $\frac{\text{Wt. of residue}}{\text{wt. of sample}} \times 100$

8.Percentage of Free Alkali: - Take 5 grams of the soap sample and dissolve it in 50 ml of alcohol. Boil the mixture for 30 minutes. Titrate the solution with 0.1N HCl (hydrochloric acid) to determine the amount of free alkali present.

9.Moisture Content: - Weigh the soap sample and dry it using a drier at a temperature range of 100 to 115°C. Calculate the moisture content using the formula: -

Percentage Moisture Content = (Initial Weight - Final Weight) X 100

RESULT AND DISCUSSION:**Phytochemical testing:****Table 3: Phytochemical tests**

Sr. No.	Tests	Observation	Result
	NEEM		
1	Test for alkaloid- Dragendorff's Test: 1 ml of extract + 1 ml of Dragendorff's reagent	Orange red ppt observed.	The test was found to be Positive
2	Test for tannins- Ferric chloride Test: 1 ml of extract + a few drops of FeCl ₃	Greenish black colour observed	The test was found to be positive
	VALLARAI		
3	Test for alkaloid- Dragendorff's Test: 1 ml of extract + 1 ml of Dragendorff's reagent	Orange red ppt observed.	The test was found to be positive
4	Test for tannins- Ferric chloride Test: 1 ml of extract + a few drops of FeCl ₃	Greenish black colour observed	The test was found to be Postive
	TRIPHALA		
5	Test for alkaloid- Dragendorff's Test: 1 ml of extract + 1 ml of Dragendorff's reagent	Orange red ppt observed.	The test was found to be positive

	TURMERIC		
6	Test for alkaloid- Dragendorff's Test: 1 ml of extract + 1 ml of Dragendorff's reagent	Orange red ppt observed.	The test was found to be Positive
7	Test for tannins- Lead acetate test: 1 ml of extract + a few drops of lead acetate solution	Blue black ppt is observed	The test was found to be positive
	REETHA		
8	Test for alkaloid- Dragendorff's Test: 1 ml of extract + 1 ml of Dragendorff's reagent	Orange colour ppt is observed.	The test was found to be positive
9	Test for tannins- Lead acetate test: 1 ml of extract + a few drops of lead acetate solution	Black blue colour observed.	The test was found to be Positive
	Honey		
10	Test for reducing sugar: Fehling's solution: A and B + honey extract(heat)	Brick red colour is observed	The test was found to be Positive
	Aloevera		
11	Test for alkaloid- Dragendorff's Test: 1 ml of extract + 1 ml of Dragendorff's reagent	Reddish brown ppt not observed.	The test was found to be positive
12	Test for tannins- Ferric chloride test: 1 ml of extract + a few drops of lead acetate solution	White ppt is observed	The test was found to be positive

UV visible spectroscopy: It is an absorption spectroscopy which uses ultraviolet and visible light. the extract obtained is preliminarily characterised by using UV visible spectroscopy, extract solution is taken in cuvette and scanned in double beam UV visible spectrophotometer from 200 nm to 800 nm wavelength.

Table 4. Absorbance data of Neem extract

Concentration(ug/ml)	Absorption
10	0.1152
20	0.1356
30	0.1527
40	0.1781
50	0.2019

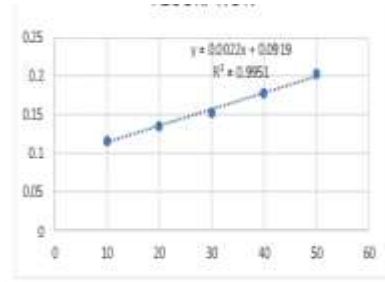


Fig 9. Calibration curve: neem extract

Table 5: Absorbance data of Vallarai extract

Concentration(ug/ml)	Absorption
10	0.1848
20	0.2345
30	0.2719
40	0.2986
50	0.3256

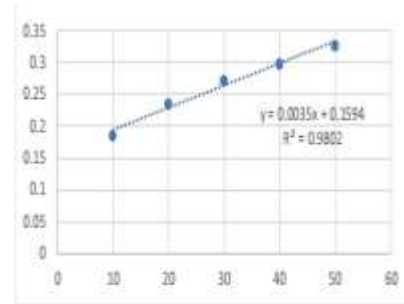


Fig 10. Calibration curve of vallarai extract

Table 6: Absorbance data of Triphala extract

Concentration(ug/ml)	Absorption
10	0.1028
20	0.1465
30	0.1825
40	0.2512
50	0.2654

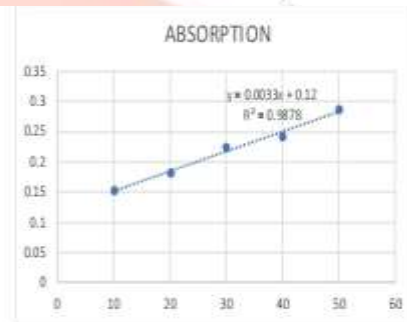


Fig 11. Calibration curve of Triphala extract

Table 7: Absorbance data of TURMERIC extract

Concentration(ug/ml)	Absorption
10	0.1152
20	0.1356
30	0.1527
40	0.1781
50	0.2019

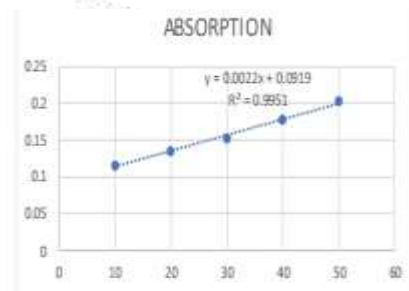


Fig 12. Calibration curve of Turmeric extract

Table 8: Absorbance data of Reetha extract

Concentration(ug/ml)	Absorption
10	0.1532
20	0.1824
30	0.2256
40	0.2432
50	0.2865

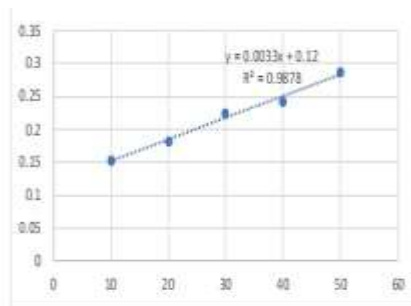


Fig 13. Calibration curve of Reetha extract

Table 9: Absorbance data of Honey extract

Concentration(ug/ml)	Absorption
10	0.1265
20	0.1584
30	0.2234
40	0.2756
50	0.2942

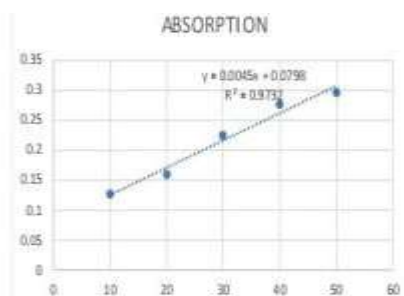


Fig 14. calibration curve of Honey extract

Table 10: Absorbance data of Aloe vera extract

Concentration(ug/ml)	Absorption
10	0.1265
20	0.1584
30	0.2234
40	0.2756
50	0.2942

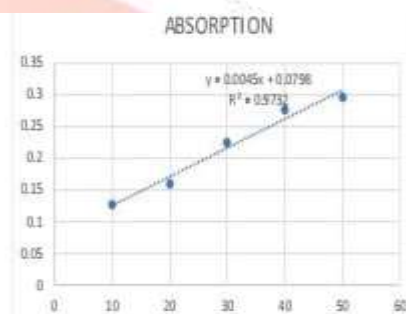


Fig 15 calibration curve of Aloe vera extract

Microbial assay: Concentrations of Neem, Vallarai, Triphala, Reetha, Turmeric, Honey, Aloe vera extract of 30 microgram were prepared and their activity was checked against Staphylococcus aureus. 3 batches of soap with varying quantity of Neem, Vallarai, Triphala, Reetha, Turmeric, Honey, Aloe vera extracts each containing were prepared. Activity of these three batches against staphylococcus aureus was checked and it was observed that maximum zone of inhibition was shown by F3 formulation.



Fig 16: Microbial assay of extract and formulation (24 hrs)

Table 11. Zone of inhibition(mm)

Extracts and Zone of inhibition(mm)

Extracts	Zone of inhibition(mm)
Neem	9.3
Vallarai	8.5
Triphala	8.6
Turmeric	8.9
Reetha	7.9
Honey	7.8
Aloe vera	8.3

Formulation code	Zone of inhibition(mm)
F1	7.9
F2	8.7
F3	9.3

Evaluation parameter:

1.Physical appearance- The colour of prepared soap was brown. The soap was fragrant and appearance was good.

2. Shape determination: The shape of the soap was rectangular.

3.Weight determination: The weight of soap was observed to be 60 gm.

4.pH evaluation: pH of normal skin varies from 4 to 7. pH of formulation was determined using digital pH meter i.e., 7.1 ,7.2, 7.4 for three formulations of soap.

5.Foam height: Foam height of the three formulation of soap was recorded to be 2.5, 2.7, 2.9. **6.Foam retention time:** Around 3 mins of foam retention time was observed. The surfactant used significantly enhanced the foam retention time.

7.Moisture content: The moisture was calculated using the formula. It was observed to be 1.86%, 1.90%, 2.15%.

8.Alcohol insoluble matter: It measures the amount of non-soap ingredients known as builders or fillers such silicate, phosphates or minor constituents and flavouring agents present in the finished product. It was found to be 18%, 17%, 19% for the three formulations of soap.

9.Percentage of free alkali: It measures the amount of free alkali to counter and avert the soap from becoming oily. Excess free alkali causes skin itching. The percentage of free alkali was found to be 0.27%, 0.28%, 0.26%.

Table 12. Evaluation tests:

Sr.no.	Parameters	Formulation F1	Formulation F2	Formulation F3
1.	Colour	Light Brown	Brown	Dark Brown
2.	Odour	Fragrant	Fragrant	Fragrant
3.	Appearance	Good	Good	Attractive
4.	Shape	Rectangular	Rectangular	Rectangular
5.	Weight (gm)	50 gm	50 gm	50 gm
6.	pH	7.1	7.2	7.4
7.	Foam height (cm)	2.5 cm.	2.7 cm.	2.9 cm.
8.	Foam retention time (min)	3 min.	3.3 min.	3.4 min.
9.	Moisture content (%)	1.86%	1.90%	2.15%
10.	Alcohol insoluble matter (%)	18%	17%	19%
11.	Percentage of free alkali (%)	0.27%	0.28%	0.24%

DISCUSSION:

Neem, Vallarai, Triphala, Reetha, Turmeric, Honey, Aloe vera extract showed various phytochemicals present in it which are Tannins, Flavonoids, Carbohydrate., Saponins, glycosides UV was also carried out on extracts and absorbance of extracts were noted. Three batches of soap were prepared with increasing concentration of extract and antimicrobial activity of this extract and soap against staphylococcus aureus bacteria was checked. It was found that as the concentration of extract was increasing, antimicrobial activity was also increasing. Polyherbal soap of Neem, Vallarai, Triphala, Reetha, Turmeric, Honey, Aloe vera extracts were evaluated for various parameters like physical appearance, pH evaluation, moisture content, alcohol insoluble matter, percentage free alkali and irritancy test. The soap was found to be safe for use.

CONCLUSION:

The potential for making soap is demonstrated by the plant components' aqueous extracts. The above studies show that Neem, Vallarai, Triphala, Reetha, Turmeric, Honey, Aloe vera extracts containing soap was formulated and evaluated and it can be used in bacterial infection. Significant activities like moisturizing, nourishing, calming and anti-bacterial were demonstrated by the herbal substances utilized in formulation. The prepared soap demonstrated significant commercial standards, significant antibacterial action, and all other parameters were satisfactory. The results of every test that was run were satisfactory. A safe formulation that offers a possible substitute for other synthetic soaps made with chemicals has been identified.

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