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FORMULATION OF NATURAL CLAY AND CURCUMIN ENRICHED HERBAL SOAP

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ABSTRACT

The present study aimed to formulate and evaluate a natural clay and curcumin-enriched herbal soap using Multani Mitti (Fuller's Earth) and *Curcuma longa* (turmeric). The formulation was developed to provide a natural alternative to conventional soaps by combining the cleansing and oil-absorbing properties of natural clay with the anti-inflammatory, antioxidant, and antimicrobial activities of curcumin. The herbal soap was prepared using the melt-and-pour method and evaluated for its physicochemical properties, including appearance, pH, foamability, foam retention, hardness, and stability. The developed formulation exhibited satisfactory physical characteristics, acceptable pH, good foaming ability, and stability, indicating its suitability for topical use. The incorporation of natural ingredients enhanced the cleansing performance while minimizing the use of synthetic additives. The study suggests that the formulated herbal soap is a safe, effective, and eco-friendly skin cleansing product with potential benefits for maintaining healthy skin. Further clinical studies are recommended to establish its long-term safety and efficacy.

KEYWORDS: Curcumin, Multani Mitti, acne treatment, glycerin soap base.

INTRODUCTION

Plants that possess one or more parts containing substances utilized in the management of diseases are referred to as medicinal plants. Phytopharmaceuticals compounds derived from such plants have garnered considerable attention in contemporary medicine due to their favorable safety profile, wide accessibility, and economical cost. Herbal medicinal preparations may comprise entire plant components or extracts obtained from leaves, roots,

bark, seeds, and flowers. These preparations are administered via oral, inhalational, or topical routes. Medicinal botanicals hold substantial therapeutic significance, as their pharmacological activity is attributed to bioactive phytochemical constituents that elicit specific physiochemical responses within the human body. Key bioactive phytoconstituents include alkaloids, essential oils, flavonoids, tannins, terpenoids, saponins, phenolic compounds, and numerous others. These naturally derived compounds have historically underpinned human civilizations and constitute the foundational basis of numerous contemporary pharmaceutical drug formulations.

HERBAL SOAP

Herbal soap is a plant-based pharmaceutical preparation characterized by its antibacterial, anti-aging, antioxidant, and antiseptic pharmacological properties. It is primarily formulated utilizing phytogenic materials such as seeds, rhizomes, nuts, and pulps, intended for the therapeutic management of dermatological conditions and the promotion of cutaneous health. In contrast to commercially manufactured soaps, herbal soaps are devoid of artificial colorants, synthetic fragrances, fluorides, and other exogenous chemical additives. Botanical ingredients, being naturally derived, are extensively employed in the treatment of a broad spectrum of diseases and dermatological disorders, owing to their superior medicinal efficacy, cost-effectiveness, bioavailability, and dermal compatibility.

Historically, soap manufacturing has been documented as far back as ancient civilizations — archaeological evidence of a soap production facility was excavated from the ruins of Pompeii, and the Greek physician Galen documented the therapeutic application of soap during the second century. Notably, as recently as the previous century, soap products were required to be labelled according to their designated application. During this period, soap usage declined among certain social groups, as conservative Victorian society regarded soap bathing as morally objectionable. In contemporary markets, numerous commercially prominent products marketed under the category of soap do not technically qualify as soap under regulatory definitions. Such products are instead designated as "beauty bars" or "deodorant bars" on their packaging — classifications that identify them as synthetic detergent formulations. These formulations frequently incorporate chemical additives termed "builders," which function to augment surfactant efficiency. Additionally, a substantial proportion of the consumer cost of commercial bath products is allocated toward advertising, packaging, and brand promotion rather than raw ingredient quality. Herbal soaps prepared

under controlled domestic or small-scale conditions present a cost-efficient alternative, offering complete ingredient transparency — a disclosure standard not uniformly mandated for commercially manufactured products.

ADVANTAGES

1. Herbal soaps exhibit a mild dermatological profile and demonstrate a reduced tendency for inducing cutaneous irritation, attributable to their naturally derived ingredient composition.
2. Formulated exclusively with phytogetic constituents, herbal soaps eliminate exposure to harsh synthetic chemicals that may exert harmful effects on both dermal integrity and environmental ecosystems.
3. Many herbal soap formulations incorporate emollient agents such as essential oils and botanical extracts that facilitate trans epidermal moisture retention and skin hydration.
4. Certain phytochemical constituents inherently possess antibacterial activity, rendering herbal soaps efficacious for thorough dermal cleansing and the maintenance of cutaneous microbial balance.
5. The olfactory profile of herbal soaps is naturally derived from plant-based volatile compounds, thereby precluding the incorporation of synthetic perfumes that may precipitate hypersensitivity or allergic reactions.

DISADVANTAGES

1. Given their reliance on natural phytogetic ingredients and the exclusion of synthetic preservative agents, herbal soaps typically exhibit a reduced shelf life and are susceptible to accelerated deterioration when subjected to improper storage conditions.
2. Despite their natural origin, certain botanical constituents may cause allergic or hypersensitivity responses in predisposed individuals. Patients with sensitive skin or documented photo allergies are advised to exercise clinical caution prior to use.
3. Herbal soaps generally demonstrate reduced functional efficacy under hard water conditions due to the formation of insoluble calcium and magnesium salts.
4. In comparison to synthetic surfactant-based detergents, herbal soaps exhibit inferior detergency and cleansing capacity.

PHARMACOLOGICAL PROPERTIES OF HERBAL SOAP

1. Antioxidant Protection — Turmeric (*Curcuma longa*) is enriched with curcuminoids principally curcumin, desmethoxycurcumin, and bisdemethoxycurcumin which are

recognized as potent bioactive antioxidants. In the context of cutaneous application, this antioxidant activity mitigates oxidative stress-induced dermal aging, photo carcinogenesis, and hyperpigmentation, rendering turmeric soap a Phyto medically validated formulation for anti-aging skin care.

2. Antibacterial and Antifungal Activity — Curcumin demonstrates significant broad-spectrum antimicrobial activity against Gram-positive organisms as well as dermatophytic fungi. The mechanism of action involves disruption of microbial cell membrane integrity and inhibition of biofilm formation. These properties render turmeric-based herbal soap effective in reducing acne, suppressing fungal infections, and maintaining dermal microbiome homeostasis.

3. Anti-inflammatory Effects — Curcumin exerts profound anti-inflammatory effects through the inhibition of pro-inflammatory mediators. Upon topical application via herbal soap, these phytoconstituents attenuate cutaneous inflammation associated with eczema, psoriasis, acne vulgaris, and atopic dermatitis.

4. Deep Cleansing and Adsorptive Activity — Multani mitti (Fuller's Earth), a hydrated aluminosilicate clay mineral, possesses an exceptionally high surface area and negative electrostatic charge that enables the adsorption of positively charged impurities, sebum, particulate matter, heavy metal ions, and comedogenic debris from the cutaneous surface and follicular orifices. This mechanism of deep pore cleansing surpasses conventional surfactant-based cleansers, rendering Multani mitti soap particularly efficacious for seborrheic skin types and individuals with hyperactive sebaceous glands.

5. Exfoliative and Keratolytic Properties — The microparticulate texture of Multani mitti provides mild mechanical exfoliation, facilitating the dislodgement of desquamating corneocytes, hyperkeratotic deposits, and follicular keratotic plugs. This exfoliative action improves epidermal cell turnover, refines skin texture, and promotes a more luminous and uniform cutaneous complexion.

6. Antimicrobial and Acne-Preventive Activity — Multani mitti demonstrates antimicrobial activity against acne-associated bacteria including *Cutibacterium acnes*, attributable to its mineral composition and physicochemical surface properties that disrupt microbial adherence to follicular epithelium. By simultaneously removing sebum, the primary nutritive substrate for acneogenic bacteria and reducing the follicular microenvironment favourable to bacterial proliferation, Multani mitti soap represents a mechanistically comprehensive strategy for acne prevention and non-pharmacological management of Acneiform and inflammatory acne vulgaris.

HERBAL DRUG PROFILE

1. Turmeric



Fig no: 7.1 Turmeric.

- Botanical Name: *Curcuma longa* Linn. (Synonym: *Curcuma domestica* Valetton).
- Biological source: It consists of the dried or fresh rhizomes (underground stems) of *Curcuma longa*.
- Common Names: Turmeric, Haldi (Hindi), Indian Saffron.
- Plant Family: Zingiberaceae (Ginger family).
- Active Constituents:
Curcuminoids: Curcumin (Curcumin I)
Demethoxycurcumin (Curcumin II).
Bisdemethoxycurcumin (Curcumin III).
Essential oils: turmerone, atlantone, and zingiberene.

- Morphology

- Leaves: Large, simple, oblong or lanceolate leaves with long petioles (leaf stalks) emerge from the rhizome.
- Rhizomes: Thick, segmented, and brightly orange-yellow interior rhizomes, which are used in traditional medicine.
- Roots: Fleshy roots, sometimes with tubers at the end, are attached to the rhizome.

2. Fuller's Earth:



Fig no:7.2 Fuller's earth.

- Botanical name: Hydrated Aluminum Silicate
- Biological source: It is a natural clay deposit, famously sourced from the region of Multan in Pakistan, and processed for mineral richness, particularly in Rajasthan, India.
- Morphology of multani mitti:
- Appearance: Found as soft, powdery clay, often pale beige to light green or brown in its natural form.
- Texture: Fine, powdery, and soft to the touch.
- Characteristics: It is a non-plastic clay that does not form a cohesive mass easily when wet, making it an excellent absorbent
- Uses-
- Skin care, Acne, Moisturizing
- Oil Control: Absorbs excess sebum, making it ideal for oily skin.
- Acne Treatment: Its anti-inflammatory properties soothe inflammation and help reduce acne and pimples.
- Deep Cleansing: Removes dirt, impurities, and dead skin cells.
- Tan Removal & Brightening: Helps improve skin tone by removing tan and reducing pigmentation.
- Skin Tightening: Improves blood circulation and reduces skin sagging.
- Soothing Sunburns: Acts as a coolant to reduce redness, inflammation.

PREFORMULATION STUDY

Preformulation study of turmeric-

1. Organoleptic characterisation:

Colour: Bright yellow to orange

Odour: Characteristic aromatic smell

Taste: Slightly bitter and pungent

Texture: Fine powder (if dried and powdered)

2. Phytochemical tests:

- a. These tests help identify different classes of chemical constituents present in turmeric extract.
- b. Test for Curcuminoids (Curcumin Test): Take turmeric extract in a test tube. Add a few drops of NaOH solution (alkaline solution). Reddish-brown color appears. On adding dilute acid color turns yellow.
- c. Test for Alkaloids (Dragendorff's Test): Take extract and acidify with dilute HCl. Add Dragendorff's reagent. Orange or reddish-brown precipitate.
- d. Test for Flavonoids (Shinoda Test): Add small piece of magnesium ribbon to extract. Add few drops of concentrated HCl. Pink, red, or orange color develops.
- e. Test for Phenols & Tannins (Ferric Chloride Test): Add few drops of 5% FeCl_3 solution to extract. Blue, green, or black coloration.
- f. Test for Saponins (Foam Test): Shake extract with water vigorously in a test tube. Stable persistent foam (lasting >10 minutes).
- g. Test for Glycosides (Keller–Killiani Test): Add glacial acetic acid containing FeCl_3 . Carefully add concentrated H_2SO_4 along the side of the test tube. Formation of brown ring at the interface.
- h. Test for Carbohydrates (Molisch's Test): Add few drops of Molisch reagent (α -naphthol). Add concentrated H_2SO_4 from the side, violet ring at junction.

Preformulation study of fuller's earth:

1. Organoleptic characterisation:

Colour: Pale brown, yellowish, or light beige, may vary slightly.

Odour: Odourless or very mild earthy smell.

Texture (Touch): Smooth, soft, and fine powder

Feel on Skin: Cool and soothing when applied, absorbs oil effectively, gives tightening effect.

Taste (rarely tested): Generally, not applicable (not meant for oral use)

2. Phytochemical tests:

- a. Test for Silicates: Take small amount of sample. Add dilute HCl and warm gently. Insoluble residue remains.
- b. Test for Aluminium (Al^{3+}): Dissolve sample in dilute HCl, add NaOH solution dropwise. White gelatinous precipitate forms. Precipitate dissolves in excess NaOH.
- c. Test for Magnesium (Mg^{2+}): Add NaOH to extract, white precipitate forms (insoluble in excess)
- d. Test for Calcium (Ca^{2+}): Add ammonium oxalate solution, white precipitate of calcium oxalate
- e. Test for Iron (Fe^{3+}): Add few drops of potassium thiocyanate. Blood-red color appears.
- f. Test for Carbonates: Add dilute HCl to sample. Effervescence (CO_2 gas release).
- g. pH Test: Prepare aqueous suspension of clay. Measure using pH paper, slight alkaline

METHOD OF PREPARATION

1. Preparation of Soap Base

Table no.9.1 Formulation table for soap base.

Sr.no	Materials	Quantity
1.	Virgin coconut oil	65gm
2.	Stearic acid	30gm
3.	Isopropyl alcohol	80gm
4.	Sodium Hydroxide	17gm
5.	Glycerine	135gm
6.	Refined sugar	200gm
7.	Sodium lactate	50gm
8.	Coco betaine	50gm
9.	Distilled water	50gm

Procedure

Add Refined sugar and Distilled water to dissolve the sugar into a stainless-steel vessel. Boil until completely dissolved, stirring to avoid burning. The temperature will be around 90°C . Set this syrup aside. Weigh & add coconut oil and stearic acid in another stainless-steel container. Melt and heat to approx. 90°C / 195°F and turn off the heat source. Add the isopropyl alcohol into the melted oil and whisk well until it froths. Wear protective gear - gloves, goggles & face mask Weigh the Sodium hydroxide & distilled water in another stainless-steel container Prepare the lye solution by adding the lye to the distilled water. Check the temperature and wait for it to reach $60\text{--}65^\circ\text{C}$ / $140\text{--}150^\circ\text{F}$ Transfer the Oil +

Stearic acid + Alcohol into a larger container. Heat this mixture to 60-65°C / 140 - 150°F stirring occasionally. Turn off the heat source. Slowly pour the lye water into the oil and alcohol mixture a small quantity at a time

while stirring continuously with the whisk. Continue to whisk for half a minute. The mixture should froth well. Avoid splashing. Pour the sugar syrup into the mixture using a strainer and whisk well. Add Glycerine into the mixture and whisk until clear. Add Sodium Lactate and Coco Betaine. Whisk gently until clear and pour through a strainer into the Mold. Spray isopropyl alcohol on the surface to get rid of bubbles.

Allow it to set in the fridge (not freezer) for a few hours until firm to touch Unmold, and let the condensation evaporate.



Preparation of soap

Table no.9.2 Formulation table for soap.

Sr. no	Materials	F1	F2	F3
1.	Glycerine soap base	85 gm	100mg	120gm
2.	Fuller's Earth powder	5 gm	7.5gm	10gm
3.	Turmeric powder	1gm	3gm	5gm
4.	glycerine	3 ml	3ml	3ml
5.	Distilled water	3 ml	3ml	3ml
6.	Rose oil	2 ml	2.5ml	3ml
7.	Methyl Paraben	q.s	q.s	q.s

Three different batches of herbal soap were prepared by changing the quantities of glycerine soap base, Fuller's earth powder, Turmeric powder, and Rose oil. The purpose of preparing multiple formulations was to identify the batch with the best foaming ability, stability, and Physiochemical characteristics.

- F1 showed lighter colour and smoother appearance due to lower concentration of herbal

ingredients.



- F2 showed darker colour with slightly rough and uneven appearance and bubble layer formation.



- F3 showed uniform texture, pleasant appearance, and better colour intensity because of higher incorporation of turmeric powder and Fuller's earth, making it the best batch.



Procedure

Accurately weigh API (turmeric powder and fuller's earth powder). Now take the prepared soap base & cut it into small pieces. Melt the soap base on the low flame in water bath. Now add the powders as per quantity mentioned in above formulation table. Turn off the flame. Pour the above mixture in silicon soap mould. Place the mould at room temperature till the liquid mixture gets solidify. Herbal soap is ready.

Sr. no	Materials	Quantity
1.	Glycerine soap base	120gm
2.	Fuller's Earth powder	10gm
3.	Turmeric powder	5gm
4.	glycerine	3ml
5.	Distilled water	3ml
6.	Rose oil	3ml
7.	Methyl Paraben	q.s

EVALUATION PARAMETERS

1. Physical characteristics:

- Colour determination-
- Odour determination
- Shape: determination
- pH: The pH is measured by using pH paper.



Fig no:9.1 pH.

2. 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.

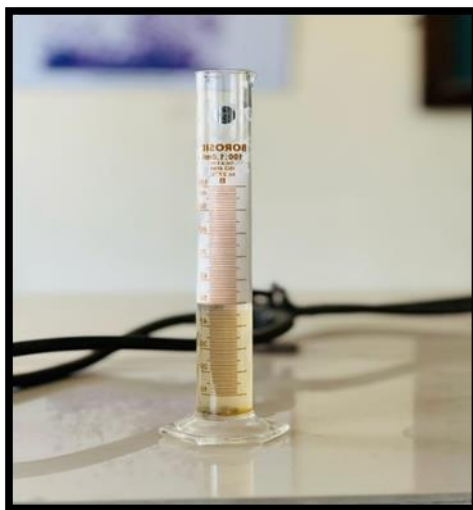


Fig no:9.2 Foam Height.

3. Moisture content: A sample of the 10g scrapped soap was put into a petri dish and placed in an oven for 1 hour at 110°C. It was allowed to cool down and then weighed. The moisture content in percentage was calculated.



Fig no:9.3 Moisture content.

Calculation of moisture content:

Weight of empty petri plate(W1)

Weight of petri plate with soap (W2)

Weight of petri plate after heating for 1hr (W3)

Moisture content (%) = $\frac{W2 - W3}{W2 - W1} \times 100$

4. Antimicrobial tests: The prepared soap was subjected to antimicrobial screening by the agar well diffusion standard cup plate method. Organisms used were E. coli. One gram of soap was mixed with 5ml of sterile water.



Fig no:9.4 Antimicrobial test.

5. Irritation test: A small amount of the soap solution is applied to a volunteer's skin, typically for 24 hours, and observed for any signs of irritation like redness or scaling.



Fig no:9.4 Irritation test.

RESULT AND DISCUSSION

PREFORMULATION RESULTS

1. Preformulation study of Turmeric:

Organoleptic characterisation:

Colour: Bright yellow to orange

Odour: Characteristic aromatic

Taste: Bitter, slightly pungent

Appearance: Fine yellow powder.

Phytochemical tests

Table no 10.1 results for turmeric.

Test	Observation	Inference
Test for curcuminoids (NaOH)	Reddish-brown color turns yellow on	Passes the

test)	adding acid	test
Test for alkaloids (Dragendorff's test)	Orange precipitate forms	Passes the test
Test for phenols (Ferric chloride test)	Blue-green coloration	Passes the test

Result: The given sample of turmeric is found to be pure and complies with the standards of IP.

2. Preformulation study of Fuller's earth:

Organoleptic characterisation:

Colour: Pale brown

Odour: odourless.

Taste: Not applicable.

Appearance: Fine soft clay powder.

Phytochemical tests:

Table no 10.2 results for fuller's earth.

Test	Observation	Inference
Test for silicates	Insoluble residue remains after acid treatment	Passes the test
Test for aluminium (NaOH test)	White ppt soluble in excess NaOH	Passes the test

Result: The given sample of fuller's earth is found to be pure and complies with the standards of IP.

➤ Evaluation of soap:

Sr no	Parameter	Observation
	Physical characteristics Colour Odour shape	Brown Pleasant Rectangle
	pH	7
	Foam height	30cm
	Moisture content	9%
	Antimicrobial test	Zone of inhibition of 1.3cm
	Irritation	Non irritant
	Cleansing ability	Passes the test

Calculation of moisture content:

- Weight of empty petri plate= 30.5 gm (W1)
- Weight of petri plate with soap=40.5gm (W2)
- Weight of petri plate after heating for 1hr= 39.6 gm (W3)
- Moisture content (%) = $\frac{W2 - W3}{W2 - W1} \times 100$
- $= \frac{0.9 \times 100}{10} = 9\%$
- The moisture content was found to be 9%

DISCUSSION

The above given table describes the colour, odour, shape, pH, irritation, foam height of the herbal soap. The colour of the formulation is brown. The odour of the formulation was pleasant. The shape of the formulation was rectangle. As per evaluation test formulation may be the most standard formulation because the pH of formulation was 7 which is likely close to skin pH and there is no irritation the formulation may be much better than other formulation.

SUMMARY AND CONCLUSION

The present work involves the formulation of herbal soap by using glycerine base. Literatures regarding herbal soap form preparation, herb and excipients selection, preparing method etc., has been collected and reviewed. based on the optimization of the parameters concluded that herbal soap can be prepared by soap base and Turmeric, Rose oil, Fuller's earth, Glycerine. The evaluation was done for all these formulations shows all the evaluation parameters satisfied for herbal soap like shape, colour, odour, best balance of ingredients, pH, and performance, making it suitable for sensitive skin, effective cleansing, balanced hydration, Anti-inflammatory and antioxidant benefits.

Product Image:



Fig 11.1 Formulated herbal soap.

Summary

The report outlines the process of formulating herbal soap using natural ingredients known for their skin benefits and anti-bacterial and anti-inflammatory properties. Common herbal components include turmeric, fuller's earth. These ingredients were selected for their therapeutic effects such as cleansing, moisturizing, anti-inflammatory, and antimicrobial actions.

REFERENCES

3. Shaikh Nihal Nijam Formulation and Evaluation of Herbal Antimicrobial Soap International Journal of Creative Research Thoughts (IJCRT) Volume.11, issue may 2023 pages: 1656-1668.
4. Munde Govind Anant, Dr. Hingane L.D, Miss. Shinde R. Formulation and evaluation of herbal soap by using natural ingredients by simple matched International Research Journal of Modernization in Engineering Technology and Science Volume:03/Issue:11/November-2021 pages:172-177
5. Rekha Goukonde, Jagruti Rajput, Bhakti Bansod and Gajanan Sanap, Formulation and evaluation of herbal scrub soap World Journal of Biology Pharmacy and Health Sciences,2024, Pages 354-370.
6. Rupali A. Mendake, Shriyog V. Amalkar, Pooja R. Hatwar, Ravindra L. Bakal Formulation and Evaluation of Polyherbal Soap Journal of Drug Delivery and Therapeutics 2024, pages:9-104.
7. Dr.A.Seetha Devi, D.V.Sivani, D.Anusha, G. Sarath, Syed Meraj Sultana, Formulation and Evaluation of Antimicrobial Herbal Soap, Int. J. Pharm. Sci. Rev. Res., 71(2), November - December 2021; Article No. 19, Pages: 122-125.
8. Siddhartha Das, Sejal Agarwal, Sudipta Samanta, Muskan Kumari and Rajat Das Formulation and evaluation of herbal soap Journal of Pharmacognosy and Phytochemistry 2024, pages:14-19.
9. Ms.Sonali Patel, Ms.Manisha Sengar , Mrs. Vinita Patidar, Ms. Nisha Hirve, formulation and evaluation of herbal soap, International Journal of Novel Research and Development, April 2024, Page no.1404-1413.
10. Patel Anu, Patel Anar, Patel Jahanvi and Bhavsar Hemal Formulation and Evaluation of Herbal Soap International Journal of Scientific Research and Review 2022, pages: 42-47.
11. Sajiya Anjum A Sheikh, Mayuri N Deshmukh, Vaibhav P Uplanchiwar, Vinod M Thakare and Nisha L Gaikwad Formulation & evaluation of herbal soap for tanning

- removal & skin smoothening International Journal of Pharmaceutical Sciences and Drug Analysis 2023, pages:104-108.
12. Shubham Wankhade, Manish Bhise, Manoj Shinde, Jayprakash Suryawanshi, Harshal Tare⁴ Formulation and Evaluation of Soap Containing Extracts of Various Ethnomedicines IJDDT, Volume 14 Issue 2, April - June 2024, pages:1001-1003.
 13. R. Margret Chandira, Lokeshwaran S² and S. Gracy Gladin² Formulation and Evaluation of Herbal Soap by using Melt and Pour Method Indian Journal of Natural Sciences 2022 pages:44244-44626
 14. Mr. Amol Shingade, Prof Vitthal Kaulage, Dr. Amol Khedkar, Mr. Prasad Wagh⁴, Mr. Shubham Devkate⁵ Formulation and Evaluation of Herbal Soap International Journal for Research Trends and Innovation 2024, pages:353-362
 15. Annapurna Jagannath Pradhan, Prathamesh Manohar Pawar, Mayuri Maruti Pukale, Anjali Jagdishchandra Rajbhar⁴, Ranjit Prakash Rathod⁵ Formulation and Evaluation of Herbal Soap International Journal for Multidisciplinary Research (IJFMR) Volume 6, Issue 3, May-June 2024, pages: 1-13
 16. Shailesh Sanjay Pawar, Dr Prachi P. Udupurkar, Formulation and Evaluation Herbal Soap Journal of Emerging Technologies and Innovative Research (JETIR) 2024, pages:509-526
 17. <https://www.britannica.com/plant/rosemary>
 18. <https://pubmed.ncbi.nlm.nih.gov/19079803/>
 19. Gohane, Tushar; Gupta, Anjali; Patel, Mayur; Shewale, Vaishali; Mahajan, Vaishali; Salunke, Shantavan; Valvi, Mangesh; Sonawane, Rohit; Sharma, Priyanka, Formulation and Evaluation of Herbal Soap. ISSN 0972-5075, Publication type: Academic Journal, DOI:10.51470/bca.2025.25.2.2351