

PREPARATION AND EVALUATION OF POLY HERBAL SKIN SOAP USING “*CAMELLIA SINENSIS*”Dr. K. Sobhan Babu, Dr. J. N. Suresh Kumar, K. Venkata Ramana, *G. Sudheer Babu, P. Krishna Reddy,
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ABSTRACT

Soap is one of the daily needs used as a body cleansing agent. The variety of commercially available soaps is the type, fragrance, color, and benefits offered. Green tea is one of the herbal plants, green tea contains polyphenols. The famous polyphenols are catechins. Catechins have antibacterial properties. This research used experimental research. *Camellia sinensis* (L.) Kuntze is a member of the family Theaceae and is one of the most widely consumed beverages throughout the world. It is an evergreen shrub or small tree native to Southeast Asia and is extensively cultivated in countries such as India, China, Sri Lanka, and Japan. Traditionally, tea has been used as a refreshing beverage as well as a therapeutic agent for various ailments. It exhibits several pharmacological activities such as antioxidant, antimicrobial, anti-inflammatory, anti-Diabetic, cardioprotective, neuroprotective, and anti-obesity effects. Tea has also been found beneficial in conditions like digestive disorders, fatigue, stress, cardiovascular diseases, and microbial infections. The present study was aimed at the identification of phytochemicals present and evaluation of the biological activity of tea leaf extract. Phytochemical screening of the extract revealed the presence of **alkaloids, flavonoids, polyphenols, tannins, glycosides, saponins, carbohydrates, and amino acids**. These phytoconstituents are responsible for the medicinal and health-promoting properties of tea. The biological activity of *Camellia sinensis* leaf extract was evaluated using standard laboratory methods, and the results support the traditional use of tea as a natural source of therapeutic agents.

KEYWORDS: *Camellia sinensis*, Polyherbal soap, Catechins, Theaceae, Herbal formulation, Antioxidant activity, Evaluation tests.

INTRODUCTION

- The term **Herb** has been originated from the Latin term **Herba** and an old French term **Herbe** and was used for non-woody plants, including those that come from trees and shrubs.
- But at the present time, the term **herb** is used for any part of the plant such as fruit, seed, stem, bark, flower, leaf, stigma, root, or a non-woody plant. Herbs are also used as food, flavonoid, medicine, perfume, etc. Medicinal use of plants has started long before pre-historic period, and can be seen in ancient Unani manuscripts, Egyptian papyrus, and Chinese writings.
- These reasons have increased the dependency on

plant materials as a source of medicines for various human ailments.

Structure of skin

Although you may not typically think of the skin as an organ, it is in fact made of tissues that work together as a single structure to perform unique and critical functions. The skin and its accessory structures make up the **integumentary system**, which provides the body with overall protection. The skin is made of multiple layers of cells and tissues, which are held to underlying structures by connective tissue (Figure 1). The skin or cutaneous membrane covers the external surface of the body. It is the largest organ of the body in surface area and weight. The function of the skin is body temperature regulation,

a reservoir for blood, protection from the external environment, cutaneous sensations, excretion and absorption, and vitamin - D synthesis. Skin is the most exposed part of the body to the sunlight, environmental pollution and also to some protection against the pathogens. The most common skin disorders are eczema, warts, acne, rashes, psoriasis, allergy, etc. Staphylococcus aureus (*S. Aureus*) is a Gram- positive

bacterium that can live as a commensal organism on the skin and in the nose and throat. *Aurus* causes approximately 30% of healthy people are asymptotically colonized by *S. aureus*. a range of infections, from minor skin infections to abscesses, endocarditis, and sepsis. *S. aureus* is also a major cause of food poisoning induced by heat resistant enterotoxin A and is a leading cause of nosocomial infections.

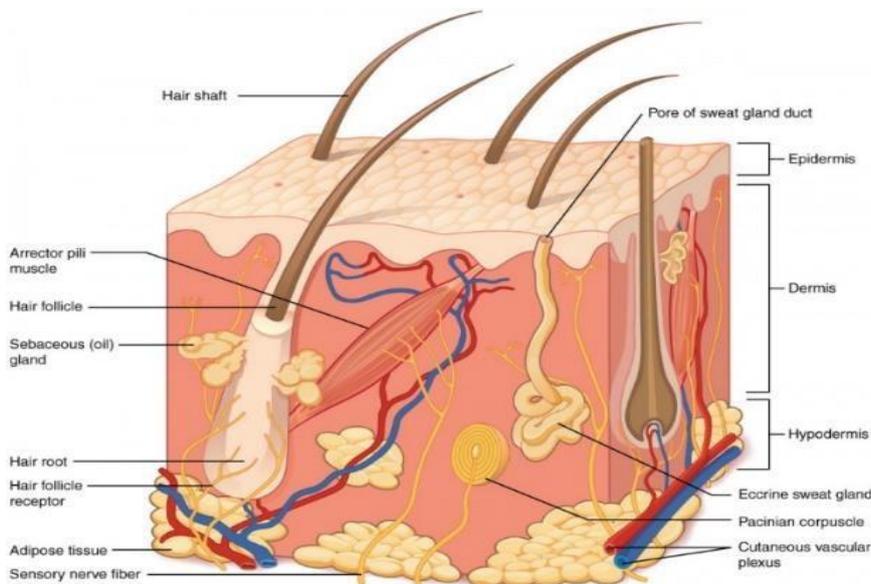


Fig no: 1: Structure of skin.

Figure 1. Layers of skin. The skin is composed of two main layers: The epidermis, made of closely packed epithelial cells, and the dermis, made of dense, irregular connective tissue that hoses blood vessels, hair follicles,

sweat glands, and other structure. Beneath the dermis lies the hypodermis, which is composed mainly of loose connective tissues.

Table No. 1: Structure and Function of skin.

Para meters	Epidermis	Dermis	Subcutaneous
Structure	Superficial part of the skin; stratified squamous epithelium. Composed off our of five strata	Deep part of the skin. connective tissue composed of two layers	Not part of the skin; loose connective tissue with abundant deposits adipose tissue
Function	Prevents water loss and the entry of chemicals and microorgan isms. protects against abrasion and ultraviolet light produces Vitamin D; gives rise to hair, nails, and glands	It is responsible for the structural strength and flexibility of the skin; the epidermis exchanges gases, nutrients, and waste products with blood vessels in the dermis	Attaches the dermis to underlying structures. adipose tissue provides energy storage insulation, and padding. blood vessels and nerves from the subcutaneous tissue supply the dermis

SOAP INTRODUCTION

Definition

Soap is a water-soluble cleansing agent created by reacting alkali (sodium or potassium hydroxide) with fats or oils, a process called saponification. It works by lowering water's surface tension to remove dirt and grease from skin, clothes, or surfaces. Common forms include bars, liquids, and powders, often featuring perfumes or moisturizers.

Herbal soap definition

Herbal soap is a natural, plant-based cleansing bar formulated with herbs, essential oils, and botanical extracts rather than synthetic chemicals. It offers therapeutic benefits like soothing, moisturizing, and antiseptic properties, making it ideal for sensitive skin. These eco-friendly, cruelty-free soaps address conditions such as acne, eczema, and psoriasis while providing natural aromatherapy.

Functions of Herbal Soap

- **Gentle Cleansing:** Removes dirt, oil, and impurities without stripping natural oils, thanks to plant-based cleansers.
- **Moisturizing:** Enriched with natural oils (coconut, olive) and butters (shea) to hydrate and soften skin.
- **Therapeutic Properties:** Delivers antibacterial, antifungal, antiseptic, and anti-inflammatory benefits from herbs like tea tree, neem, or chamomile.
- **Nourishing:** Supplies vitamins, antioxidants, and essential nutrients from botanical extracts.
- **Skin Barrier Protection:** Helps maintain skin's natural pH balance and acts as a protective barrier.

COLLECTION OF MATERIAL

Neem, tulsi, aloe vera gel, turmeric Sodium Hydroxide, stearic acid, ethanol, propylene glycol, sorbitol, glycerine.

CAMELLIA SINENSIS



Fig. No. 2: Thea Sinensis.

Camellia Sinensis is a species of evergreen shrub or small tree in the flowering plant family Theaceae. Its leaves, leaf buds, and stems are used to produce tea. Common names include **tea plant**, **tea shrub**, and **tea tree** (unrelated to *Melaleuca alternifolia*, the source of tea tree oil, or the genus *Leptospermum* commonly called tea tree).

Kingdom:	Plantae
Clade:	Tracheophytes
Family:	Theaceae
Genus:	Camellia
Species:	C.sinensis
Biological Name:	Camelia sinensis (L.) Kuntze
Synonym :	Camellia thea, Thea sinensis.

TAXANOMY

Linnaeus did not consider this plant a *Camellia* but placed it in a separate genus *Thea*. Then in 1818, Robert Sweet merged the two genera, selecting *Camellia* for the merged genus, and shifted all the former *Thea* species to that genus.

Health effects

Green tea has been consumed for health purposes for thousands of years and is currently promoted for various health benefits though scientific studies show mixed results, with some evidence suggesting modest effects in certain populations; the United States Food and Drug Administration has approved a specific green tea extract ointment for treating genital warts. Black tea is rated by the Natural Medicines Comprehensive database of Natural Standard as likely effective for improving mental alertness, possibly effective for conditions like low blood pressure, heart attack risk, osteoporosis, ovarian cancer, and Parkinson's disease, possibly ineffective for various cancers and diabetes, and lacks sufficient evidence for other uses.

NEEM



Fig. No. 3: Neem.

Azadirachta indica, commonly known as **neem**, **margosa**, **nimtree** or **Indian lilac**, is a tree in the mahogany family Meliaceae. It is one of the two species in the genus *Azadirachta*. It is native to the Indian subcontinent and to parts of Southeast Asia, but is naturalized and grown around the world in tropical and subtropical areas. Its fruits and seeds are the source of neem oil. Nim is a Hindustani noun derived from Sanskrit nimba (निम्ब).

USES

Benefits for the skin

- The use of neem oil in general skincare or as a treatment for skin conditions of the available research into medicinal uses of neem concluded that its extracts can help treat a variety of skin conditions, including:

Fighting skin infections

- The antibacterial properties of cosmetic products containing neem compounds. The authors found that soaps

Antibacterial Activity

- Neem contains azadirachtin, nimbidin, nimbin, and other compounds that kill or inhibit bacteria.

Antifungal Activity

- Active against fungi like *Candida* and dermatophytes.

Anti-inflammatory Activity

- Reduces skin redness, swelling, and irritation.

Antioxidant Activity

- Neem leaves contain flavonoids and polyphenols.

Antiseptic & Detoxifying Activity

- Purifies skin by removing toxins.

TURMERIC**Fig. No. 4: Turmeric.**

Turmeric or *Curcuma longa* is a flowering plant in the ginger family Zingiberaceae. It is a perennial, rhizomatous, herbaceous plant native to the Indian subcontinent and Southeast Asia that requires temperatures between 20 and 30°C (68 and 86°F) and high annual rainfall to thrive. Plants are gathered each year for their rhizomes, some for propagation in the following season and some for consumption or dyeing.

USES**Antimicrobial Activity**

- Helps prevent skin infections, acne-causing bacteria *Staphylococcus aureus*, and fungal growth.

Anti-inflammatory Activity

- Curcumin reduces inflammation, redness, and irritation.
- Useful for sensitive or acne-prone skin.

Skin Brightening & Complexion Enhancing

- Traditional use as a **natural complexion enhancer**.
- Helps reduce

Anti-acne Activity

- Reduces sebum production and fights acne-causing bacteria.

TULSI**FIG. No. 5: Tulsi**

Ocimum tenuiflorum, commonly known as tulasi, tulsi, or holy basil, is an aromatic perennial plant in the family Lamiaceae.

Tulasi is cultivated for religious and traditional medicine purposes, and also for its essential oil. It is widely used as an herbal tea, commonly used in Ayurveda.

USES**Acne**

- Tulsi may be beneficial for acne due to its antibacterial properties.

Healthy skin aging

- Antioxidants are an essential part of caring for aging skin, as they reduce free radical production.

Pigmentation

- Tulsi antioxidant properties, it may also help tackle pigmentation.

Antimicrobial Activity

- Killing or inhibiting bacteria, fungi, and viruses, preventing skin infections Maintaining healthy and clean skin This makes Tulsi ideal for soaps used in acne-prone or sensitive skin types.

Antioxidant Activity

- Protects skin from free radicals and pollution damage Slows down premature aging Supports healing of damaged skin cells.

Anti-inflammatory Activity

- Phytochemicals like ursolic acid and rosmarinic acid reduce:

ALOEVERA**Fig. No. 6: Aloe vera.**

Aloe vera is a succulent plant species of the genus *Aloe*. It is widely distributed and is considered an invasive species in many world regions.

Common names Common names use *aloe* with a region of its distribution, such as *Chinese aloe*, *Cape aloe* or *Barbados aloe*.

Description

Aloe vera is a stemless or very short-stemmed plant growing to 60–100 centimetres (24–39 inches) tall, spreading by offsets.

Leaves

The leaves are thick and fleshy, green to grey-green, with some varieties showing white flecks on their upper and lower stem surfaces.^[26] The margin of the leaf is serrated and has small white teeth.

STEARICACID

- **IUPAC NAME:** Octadecanoic acid
- **OTHER NAMES:** Palmitoleic acid
- **CHEMICAL FORMULA:** C₁₈H₃₆O₂
- **MOLECULAR WEIGHT:** 284.48g/mol
- **APPEARANCE:** White Solid
- **ODOUR:** Pungent, oily
- **MELTING POINT:** 69.3 °C
- **BOILING POINT:** 361 °C

SOLUBILITY: Insoluble in water and soluble in ethanol, alkyl acetates, phenyls.

USES OF STEARIC ACID

- When added to soap formulations, Stearic Acid derivatives function as thickeners that help to harden the formulas into solids and that help to eliminate the thin and runny feeling of watered-down soaps.

SODIUM LAURYL SULPHATE

- **IUPAC NAME:** Sodium dodecyl sulphate

- **OTHER NAMES:** Sodium lauryl sulphate
- **CHEMICAL FORMULA:** C₁₂H₂₅NaO₄S
- **MOLECULAR WEIGHT:** 288.38g/mol
- **APPEARANCE:** White to pale yellow paste or liquid.
- **ODOUR:** Mild odour
- **MELTING POINT:** 205.5 °C
- **BOILING POINT:** 288.4 °C

SOLUBILITY: Sodium lauryl sulphate is a surfactant, which means a molecule that has amphiphilic properties. This means the sulphate head group is hydrophilic and water soluble, while the 12-carbon-long chain is hydrophobic and water insoluble.

USES OF SODIUM LAURYL SULPHATE

SLS is known as a “surfactant.” This means it lowers the surface tension between ingredients.

PROPLYENE GLYCOL

- **IUPACNAME:** Propane-1,2-diol
- **OTHERNAMES:** 1,2-Propyleneglycol, 1,2-dihydroxypropane, 2-Hydroxypropanol
- **CHEMICALFORMULA:** C₃H₈O₂
- **MOLECULARWEIGHT:** 76.09g/mol
- **APPEARANCE:** Colourless viscous liquid.
- **ODOUR:** Odourless
- **MELTING POINT:** -60 °C
- **BOILINGPOINT:** 187.6 °C

SOLUBILITY: Soluble in water, ethanol and acetone.

USES OF PROPLYENE GLYCOL

- Humectant, solvent, emollient, and preservative.

GLYCERINE

- **IUPACNAME:** Propane-1,2,3-triol
- **OTHER NAMES:** Glycerol, 1,2,3-propanetriol
- **CHEMICAL FORMULA:** C₃H₈O₃
- **MOLECULAR WEIGHT:** 92.094g/mol
- **APPEARANCE:** Colourless viscous liquid.
- **ODOUR:** Odourless
- **MELTINGPOINT:** 17.8 °C
- **BOILING POINT:** 290 °C

SOLUBILITY: It is soluble in water but has limited solubility in most organic solvents such as acetone, chloroform, and diethyl ether.

USES OF PROPLYENE GLYCOL

Glycerine is used as a humectant in soap products. In other words, glycerine helps to ensure that your skin will maintain its own moisture in order to protect it from damage caused by dryness. Instead of creating a barrier, humectants such as glycerine still allow your skin to breathe.

Table 2: Table indicates the formulation of the soap base quantity.

INGREDIENTS	QUANTITY	USES
Sodium hydroxide	8.6gm	Alkali
Coconut Oil	35gm	Saponifying agent
Satiric Acid	15gm	Emulsifier, Hardening
Lye Water	8.6gm	Alkali
Glycerine	8.6gm	Humectants
Ethanol	35gm	Antimicrobi al
Propylene Glycol	45gm	Humectants
Sorbitol	50gm	Thickening Agent
Distilled Water	q. s to 100ml	Vehicle
Mulvane mitt	1 Tablespoon	Absorbent

PROCEDURE FOR SOAP BASE

- Heat the oil stock 102oC
- Follow all safety protocols while handling NaOH, Lye water.
- Add lye water to the heated oils with continues stirring until the saponification reaction is complete.
- Allow the solution for settled down for 2 minutes.
- Heat separately glycerine and propylene glycol and ethanol gently.
- Now add ethanol to the mixture of oils and lye solution.
- Then mix glycerine, propylene glycol thoroughly.
- Now add sorbitol to this mixture.
- Pour into the mould sallow to hardened and there move from mould.

FORMULA FOR SOAP PREPARATION**Table No. 3: Table indicating formula of soap.**

INGREDIENTS	WEIGHT (gm)
Soap base	1000
Tea powder	50
Neem powder	30
Aloe vera gel	15
Tulasi powder	20
Turmeric powder	10

PROCEDURE

- Weigh 1000 gm of previously prepared glycerine soap base solution
- Then weight all of the herbal ingredients as mentioned in the formula table
- Now gentle heat soap base at 45°C.
- After complete liquification of base add all the ingredients one after another with gentle stirring and maintain temperature at 45°C.
- Stir until a uniform solution appears.
- Pour this solution into soap mould and form the soap.
- Wrapped and submit with labelling.

Identification of Catechins in Green Tea leaves

(Catechins are flavonoid-type polyphenols present in green tea)

1. Ferric Chloride Test (Test for Phenolic –OH Groups)

- Catechins contain phenolic hydroxyl groups.
- Ferric chloride reacts with phenolic compounds to form a coloured complex.

Procedure

1. Take 1 g of green tea powder (or crushed leaves).
2. Add 10 ml distilled water.
3. Heat gently for 5–10 minutes.
4. Cool and filter the extract.
5. Take 2 ml of filtrate in test tube.
6. Add 2–3 drops of 5% FeCl₃ solution.

Observation

Formation of greenish-blue or dark blue colour.

Inference: Presence of phenolic compounds (catechins).

**Fig. No. 7: Ferric chloride test.****2. Lead Acetate Test**

1. Take 1 g of herbal soap and dissolve it in 10 ml of ethanol or distilled water.
2. Filter the solution to obtain a clear extract.
3. Take 2–3 ml of the filtrate in a test tube.
4. Add 2–3 drops of 10% lead acetate solution.
5. Shake the test tube gently and observe the reaction.

Observation

- Formation of a yellow or white precipitate indicates

the presence of flavonoids such as catechins.

Result

- Positive test: Yellow/white precipitate formed → Catechins present.

3. Vanillin–HCl Test (Specific for Catechins)

Vanillin reacts with catechins in acidic medium producing red colour complex.

Procedure

1. Prepare methanolic extract of tea.
2. Add 1 ml of vanillin solution.
3. Add few drops of concentrated HCl.
4. Mix properly and allow to stand for 5 minutes.

Observation

Development of red or pink colour.

Inference

Presence of catechins (condensed flavan-3-ols). This test is more specific for catechins.

Results

Test	Target	Positive Result
Ferric chloride	phenols	Blue/green colour
Lead acetate	Flavonoids	Yellow/white ppt
Vanillin-HCL	Tannins	Pink/red colour

EVALUATION PARAMETER FOR POLY HERBAL SOAP

Physical parameters

Clarity and colour were checked by naked eyes against the white background and the odour was smelled.

pH



Fig. no. 8: Ph detection test.

Procedure

- A digital pH meter is used to determine the Ph of the produced mixtures. The 1g of formulations were diluted in
- 100 mL of distilled water and kept in the refrigerator for two hours. The pH of the formulation was measured using a pH meter that had previously been calibrated.

Foam Height Procedure

- Take 1 g of herbal soap and dissolve it in 50 ml of distilled water in a measuring cylinder.
- Shake the cylinder vigorously for about 1 minute.
- Allow it to stand for 5 minutes.
- Measure the height of the foam formed in the cylinder.
- Record the foam height in centimetres (cm).

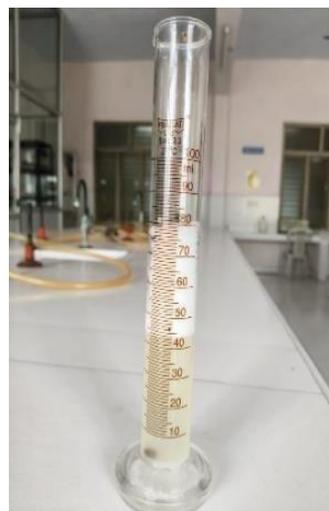


Fig. no: Foam height detection test.

Foam Retention

- A 100 ml graduated measuring cylinder was filled with 25 ml of the 1% soap solution. Hands were placed over the cylinder, and it was shaken 5 - 10 times.
- For 4 minutes, the volume of foam was measured at 1-minute intervals.



Fig. No: 9: Foam retention test.

Anti-microbial test

- The given sample of the soap was tested for its antimicrobial properties. By cup plate method.
- The micro-organism used were E. coli. In this method soap solution was prepared by dissolving 1g of soap in distilled water.

- The plates were then kept for incubation for about 24 hours at a temperature of 37 °C. Calculate the zone of inhibition.



Fig. No. 10: Zone of inhibition by cup plate method.

Moisture content

- Take a clean, dry porcelain or glass dish and weigh it (W1).
- Cut the herbal soap into small pieces and weigh about 2–5 g of the sample in the dish.
- Record the weight (W2).
- Place the dish with the soap sample in a hot air oven at 105 °C.
- Dry the sample for 2–3 hours to remove moisture.
- Remove the dish, cool it in a desiccator for about 15–20 minutes.
- Weigh the dried sample and dish again (W3).

RESULTS AND DISCUSSION

Various evaluation tests and studies on herbal soap on *camellia sinensis* leaves were studied.

S.N O	CONSTITU ENTS	OBSE RVAT ION	Readings
1	Test for PH Detection	+	6.96
2	Test for foam	+	4.8-5
3	Test for foam retention	+	0.5
4	Test for Anti-microbial	+	20mm
5	Test for moisture content	+	50°c
6	Test for hardness	+	5.0

- Pass the test (+)
- Fails the test (-)

CONCLUSION

The polyherbal soap containing *Camellia sinensis* was successfully prepared and evaluated. The formulation showed good physicochemical properties such as acceptable pH, foamability, hardness, and moisture content. The presence of natural antioxidants and antimicrobial compounds in *Camellia sinensis* may provide beneficial effects for skin. Hence, the formulated soap is safe, effective, and suitable for skin care use.

REFERENCE

- Rakesh K. Sindhu, Mansi Chitkara, Gagandeep Kaur, Arashmeet Kaur, Sandeep Arora, I. S. Sandhu,

- Repeat drying until a constant weight is obtained.

Hardness test

- Take a dry herbal soap sample and keep it at room temperature.
- Place the soap bar under the Monsanto hardness tester.
- Adjust the instrument so that the plunger touches the surface of the soap.
- Apply pressure slowly using the screw knob of the tester.
- Note the force required to break or penetrate the soap from the scale reading.
- Repeat the test 2–3 times for accuracy and calculate the average value.



Fig. No. 11: Hardness test.

- Formulation development and antimicrobial evaluation of polyherbal soap, *Plant Archives*, 2019; 19(2): 1342-1346.
- G. Sucharita, V. Ganesh, Siva Krishna, D. Sireesha, S. Pawan kumar, Formulation and evaluation of polyherbal antibacterial soap, *International Journal of Engineering Science and Computing*, 10: 8.
- Ashlesha Ghanwat, Sachin Wayzod, Vanjire Divya, Formulation and Evaluation of Herbal Soap, *Current Trends in Pharmacy and Pharmaceutical Chemistry*, 2020.
- Dr. A. Seetha Devi, D. V Sivani, D. Anusha, G. Sarath, Syed Maraj Sultana, Formulation and

- Evaluation antimicrobial Herbal Soap, International Journal of Pharmaceutical Sciences Review and Research, Article no. Published on Dec. 2021; 122–125.
5. Seema U. Shinde, Nikita D. Gidde, Jamir A. Tamboli, Development and Evaluation of Antibacterial Polyherbal Bath Soap, International Journal of Pharmaceutical Sciences and Medicine (IJPSM), May- 2021; 6(5): 45-52, ISSN: 25.
 6. Prof. Chandrakant Kokare, Pharmaceutical Microbiology principles and application, sixteenth edition, Nirali prakashan, Feb. 2019; 21.13–21.14.
 7. Sunhyo R, Peter I. S, Chang H. S, Hyeonsook C, Yoon Kyung P, Colonization and Infection of the Skin by *S. aureus* Immune Evasion and the Response to Cationic Antimicrobial Peptides, International Journal of Molecular Science, Published on.
 8. N. Benchikha, m menaceur and z. Barhi, extraction, and antioxidant activities of two species *Origanum* plant containing phenolic and flavonoid compounds, journal of fundamental and applied science, 2013; 5(1): 120-128.
 9. Ara, I.; Siddiqui, B.S.; Faizi, S. and Siddiqui, S, Tricyclic diterpenes from the stem bark of *Azadirachta indica*. *Planta medica*, 1990; 56(01): 84-86.
 10. Noorafshan A, Ashkani-Esfahani S. A review of therapeutic effects of curcumin. *Curr Pharm Des*, 2013; 19: 2032–46.
 11. Reddy, Y. R. R., Kumari, C. K., Lokanatha, O., Mamatha, S., & Reddy, C. D, Antimicrobial activity of *Azadirachta Indica* (neem) leaf, bark and seed extracts. *Int. J. Res. Phytochem. Pharmacol*, 2013; 3(1): 1-4.
 12. Kumar, K. P., Bhowmik, D., Tripathi, K. K., & Chandira, M, Traditional Indian Herbal Plants Tulsi, and Its Medicinal Importance. *Research Journal of Pharmacognosy and Phytochemistry*, 2010; 2(2): 93-101.
 13. Badwani, N., Nandwana, A., Dubey, A., & Dubey, P.K. Formulation and Evaluation of Herbal Soap for Fairness and Glowing Skin. *International Journal of Pharmaceutical & Biological Archive*, 2025; 16(1).
 14. Jacob, B., Ciyamol, & Chandu, V. Formulation and Evaluation of Herbal Soap. *Research & Reviews: A Journal of Pharmacology*, 2019; 9(2): 22–29.
 15. Das, S., Agarwal, S., Samanta, S., Kumari, M., & Das, R. Formulation and Evaluation of Herbal Soap. *Journal of Pharmacognosy and Phytochemistry*, 2024; 13(4): 14–19.
 16. G, M., K., S. P., Ch. V., V. L., R., H., T., V., & T., V. Formulation and Evaluation of Polyherbal Soap. *Journal of Pharmaceutical and Biological Research*, 2025; 13(1): 40–43.
 17. Manjusha, G., Balakrishnaiah, P., Syamala, R., et al. (2019). Formulation and Evaluation of Herbal Bath Soap Containing Methanolic Extracts of Ayurvedic Herbs. *Asian Journal of Pharmaceutical and Clinical Research*.
 18. Raj, S., Kumari, A., & Kumar, I. (2025). Formulation and Evaluation of Herbal Soaps: A Comprehensive Review of Natural Ingredients and Approaches. *International Journal of Scientific Research in Science and Technology*. Badwani N, Nandwana A, Dubey A, Dubey PK. Formulation and evaluation of herbal soap for fairness and glowing skin. *Int J Pharm Biol Arch*, 2025; 16(1): 1-6.
 19. Verma N, Sahu T. Formulation and evaluation of herbal soap. *Int J Prog Res Sci Eng.*, 2024; 5(3): 16-19.
 20. Rani SRMV, Kumari K, Reddy PN. Formulation and evaluation of antimicrobial herbal soap of *Tridax procumbens* for skin care. *J Pharm.*, 2023; 3(1): 1-8.
 21. Das S, Agarwal S, Samanta S, Kumari M, Das R. Formulation and evaluation of herbal soap. *J Pharmacogn Phytochem*, 2024; 13(4): 14-19.
 22. Mahesh G, Kumar P, Sharma R. Formulation and evaluation of polyherbal soap. *J Pharm Biol Res.*, 2025; 13(1): 40-43.
 23. Raj S, Kumari A, Kumar I. Formulation and evaluation of herbal soaps: a comprehensive review. *Int J Sci Res Sci Technol*, 2025; 12(5): 421- 433.