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Research Article

Formulation and Evaluation of Anti-Ageing Polyherbal Soap

Pratik Mahajan[1], Vaishnavi Patil[2], Shrutika Bhavsar[2], Chetan Sawale[2], Purva Patil[2], S. D. Barhate[3], M. A. Chaudhari*[4]

[1]*Assistant Professor, Dept of Pharmacology, Arunamai College of Pharmacy, Mamurabad, Jalgaon*
[2]*B. Pharmacy Students, Arunamai College of Pharmacy, Mamurabad, Jalgaon*
[3]*Principal, Arunamai College of Pharmacy, Mamurabad, Jalgaon*
[4]*Associate Professor, Dept of Pharmacology, Arunamai College of Pharmacy, Mamurabad, Jalgaon*

Growing interest in safe, plant-based skincare has encouraged the development of herbal anti-ageing products. This study presents an herbal anti-ageing soap formulated using natural ingredients known for skin benefits. Aloe vera provides hydration and soothing effects, orange peel offers antioxidant protection, and neem contributes antimicrobial action. Enriched with essential oils and vitamin E, the formulation supports skin nourishment and rejuvenation. The soap is prepared through saponification using natural oils and avoids synthetic additives to enhance safety and compatibility. It is evaluated for physical properties, stability, antioxidant activity, and skin tolerance, demonstrating its potential as an effective and gentle cosmeceutical product.

Keywords: Herbal anti-ageing soap, cosmeceuticals, Aloe vera, orange peel extract, neem, natural skincare, antioxidants, saponification, essential oils, vitamin E, skin rejuvenation, plant-based formulation.

INTRODUCTION

Anti-ageing herbal soaps represent a class of cosmeceutical cleansing formulations that integrate phytochemicals with dermatologically beneficial properties. Unlike conventional syndet or soap-based cleansers, these formulations emphasize bioactive plant-derived compounds known to modulate skin ageing at the cellular and molecular levels [3,7]. Skin ageing is primarily driven by intrinsic factors (genetic and chronological ageing) and extrinsic factors such as ultraviolet (UV) radiation, pollution, and oxidative stress [12,13]. A central mechanism involves the overproduction of reactive oxygen species (ROS), which leads to degradation of dermal extracellular matrix components like collagen and elastin through activation of matrix metalloproteinases (MMPs). Herbal ingredients incorporated into anti-ageing soaps are selected for their antioxidant, anti-inflammatory, and antimicrobial activities, which collectively help mitigate these processes. Common phytoconstituents include polyphenols, flavonoids, tannins, terpenoids, and vitamins. For instance, Curcuma longa (turmeric) contains curcumin, a potent antioxidant and anti-inflammatory agent that inhibits lipid peroxidation and downregulates pro-inflammatory cytokines. Azadirachta indica (neem) exhibits antimicrobial and immunomodulatory effects, supporting skin barrier integrity [8, 10,14]. Aloe barbadensis (aloe vera) provides mucopolysaccharides that enhance hydration and stimulate fibroblast activity, promoting collagen synthesis [11]. Similarly, Santalum album (sandalwood) contains sesquiterpenes with soothing and mild astringent properties. From a formulation perspective, herbal soaps are typically prepared via saponification of natural oils (e.g., coconut oil, olive oil) with alkali, followed by incorporation of standardized herbal extracts [4,5]. The pH is maintained within a skin-compatible range to

minimize disruption of the acid mantle. The inclusion of essential oils not only imparts fragrance but also contributes additional bioactivity, such as antimicrobial or antioxidant effects. Scientific studies suggest that regular application of antioxidant-rich topical formulations can reduce oxidative damage, improve skin hydration, and enhance elasticity [12,13]. Although the contact time of soap is relatively short compared to leave-on products, consistent use may provide cumulative protective benefits [1]. In summary, anti-ageing herbal soaps function as multifunctional dermatological agents that combine cleansing with bioactive phytotherapy. Their efficacy is primarily attributed to antioxidant defense, modulation of inflammatory pathways, and support of skin structural proteins, making them a promising adjunct in preventive skincare strategies. Skin is the largest organ of the human body, serving as a crucial barrier against environmental insults, regulating temperature, preventing water loss, and contributing significantly to one's appearance and psychosocial well- being. With aging, the skin undergoes a series of morphological, physiological, and biochemical changes that manifest visibly as wrinkles, loss of elasticity, dryness, sagging, hyperpigmentation, and dullness. The demand for skincare formulations that can delay or reverse these changes has grown dramatically over the past few decades. Among such formulations, soaps occupy a primary position owing to their daily use, ease of application, and potential as carriers for bioactive substances. The concept of herbal anti- ageing soap represents an intersection of traditional medicinal wisdom and modern cosmetic science leveraging botanical extracts, phyto-constituents, and natural oils to mitigate or slow down skin aging. In the context of pharmacy, developing such soaps demands a deep understanding of skin-aging mechanisms, pharmacognosy, formulation science, stability, safety, and efficacy evaluation [2].

MATERIALS & METHOD:

Orange peel powder, Lemon peel powder, Aloe vera gel, Rose water, Ethanol, Distilled Water, Neem Powder, Reetha (Soapnuts), Glycerine soap base were used for the preparation of anti-ageing herbal soap. Lavender oil essence for the aroma to the herbal soap. Equipments used are Soxhlet apparatus, Funnel, Measuring cylinder, Weighing balance, pH meter, Penetrometer, Test tubes, Test tube holder, Test tube stand.

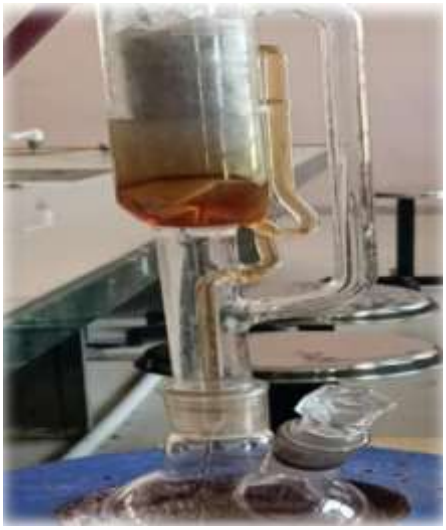
Table No.1: Ingredients & their roles:

Sr. No	Ingredients	Use
1	Glycerine Soap Base	Base
2	Orange Peel Extract	Brightening, Anti-ageing
3	Reetha Extract	Foaming agent
4	Neem Powder Extract	Antimicrobial
5	Aloe Vera Gel	Moisturizer
6	Castor Oil	Conditioning agent
7	Vitamin E Oil	Antioxidant
8	Rose Water	Hydrating agent
9	Lavender Oil	Fragrance

Method for Extraction:

The extraction of bioactive compounds from orange and lemon peels was carried out using an ethanolic Soxhlet extraction method, which is widely recognized as an efficient and reliable technique for obtaining phytochemicals from dried plant materials [6]. Fresh orange (Citrus sinensis) and lemon (Citrus Limon) fruits were collected from a local market to ensure easy availability and freshness of the raw materials. The peels were carefully separated from the edible portions of the fruits by hand, taking care to avoid contamination with pulp, seeds, or damaged tissue. Only healthy, unspoiled peels were selected for further processing, as the quality of the raw material directly influences the efficiency and composition of the final extract. The collected peels were washed thoroughly under running tap water to remove adhering dust, soil particles, and other visible impurities. This was followed by rinsing with distilled

water to ensure the complete removal of any residual contaminants, including traces of pesticides or microorganisms that might interfere with the extraction process or subsequent analysis. Proper cleaning of the peels is a crucial preparatory step, as it helps in obtaining a pure extract and improves reproducibility. After washing, the peels were subjected to a drying process to reduce their moisture content. Initially, the peels were shade dried at room temperature for several days in a well-ventilated area to allow gradual removal of surface moisture without exposing the material to direct sunlight, which could degrade sensitive bioactive compounds. To ensure complete drying and achieve constant weight, the peels were further dried in a hot air oven maintained at 40–50 °C. Controlled drying not only prevents microbial growth but also enhances solvent penetration during extraction by reducing the water content in the plant matrix. Once the peels were completely dried, they were ground into a fine powder using a mechanical grinder. The powdered material was sieved to obtain a uniform particle size, which is important for achieving consistent extraction efficiency. Finely powdered plant material provides a larger surface area for solvent contact, thereby facilitating better diffusion of bioactive compounds into the extraction solvent. The prepared orange and lemon peel powders were stored in clean, airtight containers at room temperature and protected from moisture and light until the extraction process was carried out. For the extraction of phytochemicals, ethanolic soxhlet extraction was selected due to its ability to provide exhaustive extraction through continuous solvent reflux. Ethanol was chosen as the solvent because of its effectiveness in extracting a broad range of bioactive compounds such as flavonoids, phenolic acids, antioxidants, and certain essential oil components [6, 9]. In addition, ethanol is relatively safe, environmentally acceptable, and suitable for extracts intended for food, pharmaceutical, or nutraceutical applications. A measured quantity of peel powder, generally between 5 and 10 g, was accurately weighed using an analytical balance and placed inside a cellulose extraction thimble. The thimble was then positioned within the Soxhlet extractor, which was connected to a round-bottom flask containing approximately 150–200 mL of ethanol and fitted with a condenser. The entire assembly was placed on a heating mantle and heated at a controlled temperature of about 70–80 °C. As the ethanol heated, it vaporized and traveled upward into the condenser, where it cooled and condensed back into liquid form. The condensed solvent dripped onto the peel powder in the extraction chamber, allowing the solvent to penetrate the plant matrix and dissolve the bioactive constituents present in the peels. Once the solvent level in the Soxhlet chamber reached the siphon point, it flowed back into the round- bottom flask along with the dissolved phytochemicals. This cycle of solvent evaporation, condensation, extraction, and siphoning was repeated continuously for a duration of 6–8 hours, ensuring thorough and efficient extraction of the bioactive compounds from the peel powder.



After completion of the extraction process, the heating was stopped and the apparatus was allowed to cool to room temperature. The ethanolic extract collected in the round- bottom flask was then carefully

removed and filtered through Whatman No. 1 filter paper to eliminate any fine suspended particles or insoluble residues. The clear filtrate obtained represented the crude ethanolic extract of orange or lemon peel. To obtain a concentrated extract, the solvent present in the filtrate was removed by evaporation. This was carried out using a rotary evaporator under reduced pressure to minimize thermal degradation of heat-sensitive compounds. In situations where a rotary evaporator was not available, solvent evaporation was performed using a water bath maintained at 40–50 °C. The removal of ethanol resulted in the formation of a semi-solid, viscous crude extract containing concentrated phytochemicals derived from the citrus peels. The final crude extract was carefully transferred into clean, dry, amber-colored airtight containers to protect it from light, oxidation, and moisture.The extract was stored at 4°C until further use for phytochemical screening, antioxidant assays, or other biological evaluations. The percentage yield of the extract can be determined by calculating the ratio of the weight of the extract obtained to the initial weight of the peel powder used, multiplied by 100. Theoretically, this extraction method provides a high yield of phenolic and flavonoid compounds, with orange peel generally yielding a slightly higher amount of extract compared to lemon peel due to its richer content of essential oils and flavonoids [6].

Method of Preparation:

Step 1: Preparation of Soap Base

Take 24 g of glycerine soap base. Cut it into small pieces to facilitate uniform melting. Melt the soap base using the water bath method. Ensure indirect heating to prevent burning or degradation.

Step 2: Cooling Phase

Once completely melted, remove the soap base from heat. Allow it to cool slightly (not solidify) to avoid damaging active constituents.

Step 3: Addition of Herbal Extracts Add the semisolid herbal extracts:

Orange peel extract – 1 g
Ritha extract – 1 g
Neem extract– 0.5g

Step 4: Initial Mixing

Stir the mixture slowly and continuously. Ensure uniform dispersion of herbal extracts in the soap base.

Step 5: Addition of Moisturizers

Add the following ingredients:

Aloe vera gel-1.5 g
Castor oil- 0.5 g
Vitamin E- 0.3 g Rose water- 0.8 g

These components improve skin hydration, nourishment, and texture.

Step 6: Gentle Stirring

Stir gently to avoid formation of air bubbles. Maintain uniform consistency throughout the mixture.

Step 7: Addition of Fragrance

Add lavender oil about 0.4 g. Mix properly to distribute fragrance evenly.

Step 8: Final Mixing

Perform final mixing to ensure homogeneity. The mixture should be smooth and uniform.

Step 9: Molding and Solidification

Pour the prepared mixture into suitable molds. Allow it to cool and solidify at room temperature. Remove the soap carefully after complete hardening.

Characterization of Formulated Anti-Ageing Herbal Soap:

Parameter	Observation
Color	Dark Brownish Or Amber Coloured Shade
Odour	Astringent And Pleasant, Strong Essence Of Lavender Oil
Shape	Rectangular With Rounded Corners & Edges
Size	7.5 X 5 X 1.2

Weight	Around 45 Grams
Appearance	Translucent Opacity
Texture	Smooth & Glossy Texture With Minor Visible Specks And Small Indentation
Hardness Test	14 Units (14 Mm Depth)
Foam Height	11 Cm
Foam Retention Time	3–5 Minutes
pH Value	8.6 (Slightly Alkaline In Nature)

Biological Evaluation for Formulated Anti-Ageing Herbal Soap:

The skin patch test showed no redness, itching, or swelling after application, indicating that the soap is non-irritant and safe for topical use. The antimicrobial activity test was performed using the agar well diffusion method, where the soap solution produced a 10 mm zone of inhibition against test microorganisms after incubation at 37°C for 24 hours, demonstrating strong antimicrobial activity. The antioxidant activity test was conducted using the DPPH radical scavenging method, in which the soap extract showed 50% inhibition, indicating moderate antioxidant activity and the ability to neutralize free radicals. The microbial reduction test compared microbial load on skin before and after washing with the soap, and the results showed a 77% reduction in microbial count, reflecting moderate to good cleansing and antimicrobial effectiveness. Overall, the soap passed all evaluation parameters and demonstrated good safety, antimicrobial, antioxidant, and hygiene performance.

CONCLUSION:

The prepared herbal soap containing natural ingredients such as orange peel, lemon peel, neem, aloe vera gel, and essential oils demonstrated excellent physical, chemical, microbiological, dermatological, and stability characteristics. The soap showed good appearance, smooth texture, adequate hardness, rich lathering, and easy rinsability. Chemical evaluation confirmed acceptable pH, satisfactory TFM, low moisture content, and negligible free alkali, indicating good quality and safety. Microbiological analysis revealed absence of pathogenic organisms, while dermatological tests confirmed non-irritant and skin-friendly nature. Stability studies showed no significant changes over time. Overall, the herbal soap formulation is safe, effective, stable, and suitable for cosmetic and personal care applications. In conclusion, herbal anti-ageing soap offers a promising and sustainable approach in pharmaceutical cosmetology. Beyond meeting consumer demand for natural skincare, it highlights the therapeutic potential of medicinal plants in dermatology. This research contributes to the advancement of herbal formulations and supports the exploration of safe, effective, and eco- friendly cosmeceutical alternatives. However, developing an herbal soap that is truly anti-ageing involves overcoming formulation challenges: maintaining the stability of herbal actives (many of which are sensitive to heat, pH, and light), ensuring adequate skin penetration without causing irritation, achieving acceptable sensory properties (foam, fragrance, hardness, lather), and preserving the product safely without synthetic preservatives that undermine its “natural” appeal.

REFERENCES

1. Khandelwal, K.R. Practical Pharmacognosy. Nirali Prakashan.
2. Kokate, C.K., Purohit, A.P. & Gokhale, S.B., Pharmacognosy, Nirali Prakashan.
3. Pandey, N., et al. “Herbal Cosmetics and their Evaluation.” International Journal of Pharmaceutical Sciences Review and Research.
4. Verma, N. & Sahu, T. “Formulation and Evaluation of Herbal Soap.” International Journal of Progressive Research in Science and Engineering, 2024.
5. Mahesh, G. et al. “Formulation and Evaluation of Polyherbal Soap.” Journal of Pharmaceutical and Biological Research, 2025.
6. Rajan, M. et al. “Formulation and Evaluation of Polyherbal Soap by Hot Process Method.”

International Journal of Research in Pharmacology & Pharmacotherapeutics, 2024.
7. Raj, S. et al. "Formulation and Evaluation of Herbal Soaps: A Comprehensive Review." International Journal of Scientific Research in Science and Technology, 2025.
8. Manjusha, G. et al. "Formulation and Evaluation of Herbal Bath Soap Containing Ayurvedic Herbs." Asian Journal of Pharmaceutical and Clinical Research, 2019.
9. Journal of Pharmacognosy and Phytochemistry. "Herbal Soap Preparation and Evaluation Parameters." 2024.
10. 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.
11. Desale, A. Y., Shirode, P., & Nikam, M. (2024). Formulation and evaluation of herbal soap for anti-aging and antibacterial activity using Aloe. International Journal of Pharmaceutical Sciences.
12. Usman, R.M. et al. (2025). Anti-Aging Effects of Phytochemicals using Carthamus tinctorius.
13. Yıldırım, A., Şen, A., Yücer, R., & Bitiş, L. (2025). Herbal ingredients in anti-aging cream formulations: Bioactive components and molecular mechanisms. ScienceDirect Journal (2025).
14. Adeleye IA, Opiah L, Ojo EO. The antimicrobial assessment of some Nigerian herbal soap. J Complement Integr Med.2013;10. PMID: 24311879.

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