

Formulation and evolution of herbal soap – A review

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ABSTRACT:

This review article explores the formulation and evaluation methods for an herbal bathing soap containing multani mitti (fuller's earth), aloe vera gel, and lemongrass oil. The article highlights the potential benefits of these natural ingredients for skin health, including multani mitti's cleansing properties, aloe vera's moisturizing and soothing effects, and lemongrass oil's antimicrobial activity. The formulation process is described, encompassing ingredient selection, incorporation techniques, and curing methods. Various evaluation methods are explored to assess the quality and efficacy of the final soap product, including sensory evaluation, physicochemical analysis, microscopic examination, chemical evaluation, and quality control measures. This review provides valuable insights for developing and evaluating herbal soap formulations that are both safe and effective for consumers seeking natural skincare alternatives.

Keywords: bathing soap, cleansing, antimicrobial activity, multani mitti, formulation, microscopic examination, chemical evaluation, physicochemical analysis.

I. INTRODUCTION:

The formulation and evaluation of an herbal bathing soap incorporating Multani Mitti (Fuller's Earth), Aloe Vera, and Lemongrass Oil is a compelling area of study within the context of modern skincare trends and the growing preference for natural, plant-based products. Herbal bathing soaps have garnered increased attention due to their perceived benefits for skin health and sustainability compared to conventional synthetic soaps. Multani Mitti, known for its deep-cleansing and oil-absorbing properties, offers a natural solution for pore cleansing and skin detoxification. Aloe Vera, with its renowned soothing, moisturizing, and healing qualities, contributes essential vitamins and minerals to nourish the skin while promoting hydration and skin repair. Lemongrass Oil, prized for its antibacterial and antifungal properties,

complements the blend by providing a refreshing scent and added benefits in combating skin infections. The synergy of these ingredients in a bathing soap formulation presents an opportunity to create a product that not only cleanses but also rejuvenates and nourishes the skin, appealing to consumers seeking holistic skincare solutions. The formulation process involves meticulous selection and combination of these ingredients to achieve optimal efficacy and sensory appeal, ensuring the soap is gentle and suitable for different skin types. Evaluation of the soap's performance encompasses criteria such as cleansing efficiency, moisturizing ability, skin compatibility, and overall user satisfaction. This review aims to delve into the methodology of formulating and evaluating such an herbal bathing soap, shedding light on the scientific principles behind ingredient selection, formulation techniques, and quality control measures. By exploring this topic, we contribute to the broader discourse on herbal skincare and pave the way for the development of innovative, effective natural alternatives in personal care that align with contemporary consumer preferences and values.

1. Herbal Ingredients:

Multani Mitti:

○ Properties: Multani Mitti, also known as Fuller's Earth, is a naturally occurring clay rich in minerals like magnesium, aluminum, calcium, and silica. It has a fine texture and a high absorption capacity.



Fig: 1. Multani Mitti.

- **Benefits for Skin:** Multani Mitti is known for its cleansing properties. It absorbs excess oil and dirt, leaving the skin feeling clean and refreshed. Additionally, it has mild astringent properties that tighten pores and improve skin texture. Its mineral content is believed to contribute to a radiant complexion.
- **Historical Use:** Multani Mitti has been used for centuries in various cultures for its medicinal and cosmetic benefits. Evidence suggests its use in ancient Egypt, Greece, and India for skin cleansing and treating various skin conditions.

Aloe Vera:

- **Soothing Properties:** Aloe vera gel contains a wealth of beneficial compounds, including polysaccharides, vitamins, and minerals. These components contribute to its ability to soothe irritated skin, reduce inflammation, and promote healing.
- **Moisturizing Effects:** Aloe vera is a humectant, meaning it attracts and retains moisture in the skin. This helps to keep the skin hydrated, supple, and prevent dryness.
- **Healing Benefits:** Aloe vera gel has been shown to promote wound healing and reduce scarring. This is attributed to its ability to stimulate cell proliferation and collagen synthesis.



Fig: 2. Aloe Vera.

Lemongrass Oil:

- **Antimicrobial Properties:** Lemongrass oil possesses significant antimicrobial activity against various bacteria and fungi that can contribute to skin problems like acne and athlete's foot.
- **Fragrance:** Lemongrass oil is known for its fresh, citrusy scent with a hint of herbal aroma.

It provides a pleasant and invigorating fragrance to the soap.

Synergistic Effects:

Combining these ingredients in a bathing soap can lead to several synergistic effects:

- **Enhanced Cleansing:** Multani Mitti's oil-absorbing properties are complemented by the antibacterial action of lemongrass oil, offering a deeper cleanse and potentially reducing the occurrence of acne.
- **Improved Hydration:** Aloe vera's ability to retain moisture works alongside Multani Mitti's gentle cleansing action, preventing excessive drying of the skin.
- **Soothing and Refreshing:** The soothing properties of aloe vera and the refreshing fragrance of lemongrass oil can create a calming and uplifting bathing experience.



Fig:3. Lemongrass Oil.

Extraction and Preparation:

- **Multani Mitti:** Commercially available Multani Mitti can be used directly. However, for better quality control, it can be sourced in its raw form and then:
 - Sun-dried to remove excess moisture.
 - Pulverized into a fine powder to ensure even distribution in the soap.
- **Aloe Vera:**
 - Fresh aloe vera leaves can be used. The gel is carefully extracted by removing the outer spiny layer and scraping the inner translucent gel.
 - Alternatively, commercially available concentrated aloe vera extract can be used for consistency.

- **Lemongrass Oil:**

- Pure lemongrass essential oil, obtained through steam distillation of the lemongrass leaves, is used.

Formulation Process:**Ingredients:**

- Multani Mitti powder: The amount can range from 5-10% of the total oil weight. Higher percentages can enhance the cleansing effect but might also be more drying.
- Aloe vera gel or extract: The inclusion level can vary from 10-20% of the total oil weight. This range balances the moisturizing benefits of aloe vera with maintaining the soap's structure.
- Lemongrass Oil: A small amount, typically between 1-2% of the total oil weight, is sufficient to provide a pleasant fragrance and retain the antibacterial properties.

Soap base (melt and pour or shredded) Soap molds.

Procedure:

Prepare the mold: Lightly grease the soap mold with carrier oil, such as coconut oil.

Melt the soap base: Using a double boiler method, melt the soap base according to the package instructions.

Incorporate the dry ingredients: Once the soap base is melted, remove it from the heat and stir in the multani mitti powder.

Add the wet ingredients: Next, stir in the aloe vera gel and lemongrass oil. If using, you can also add honey and essential oils at this time.

Pour the soap: Carefully pour the soap mixture into the prepared mold.

Let the soap cure: Allow the soap to cure in a cool, dry place for 24-48 hours.

Unmold: Once the soap is fully cured, unmold it and cut it into desired sizes. Store the soap in an airtight container at room temperature.



Fig: 4. Harbal Soap.

Organoleptic Evaluation:

After the soap has cured for a sufficient time (typically 4-6 weeks), an organoleptic evaluation is conducted to assess its sensory characteristics:

- **Color:** The color of the final soap will depend on the natural pigments present in the herbal ingredients. Multani Mitti typically lends a light brown or greenish hue, while aloe vera is colorless. The final color might be influenced by the carrier oils used.
- **Odor:** The soap should have a pleasant and refreshing aroma due to the inclusion of lemongrass oil. The intensity of the fragrance can be adjusted based on personal preference.
- **Texture:** The soap should have a firm yet smooth texture. It should lather well and rinse cleanly without leaving a greasy residue on the skin.

1. Physicochemical Evaluation:

A thorough evaluation of the physical and chemical properties of the formulated herbal soap is crucial for ensuring its quality, safety, and efficacy. Here's a look at some key tests:

- **pH:**
 - The pH of the soap is measured using a pH meter. Ideally, the pH should be slightly on the acidic side, ranging from 5.5 to 7.0. This range is close to the natural pH of healthy skin and helps to minimize potential irritation.
 - Soaps with a high pH can be drying and disrupt the skin's natural barrier function. The presence of aloe vera in the formulation can help to buffer the pH and maintain a skin-friendly range.



Fig.: pH Test

- **Foaming Ability:**

- The foaming ability of the soap is assessed by generating lather in a standard solution and measuring various parameters.

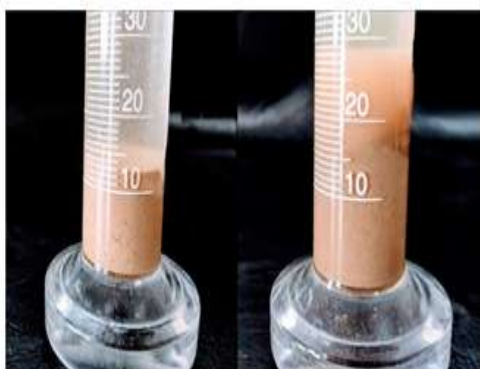


Fig.: Foaming Test

- **Foam Height:** The height of the lather column is measured to evaluate the initial lathering capacity.
- **Foam Drainage Time:** The time it takes for the lather to collapse indicates the stability and quality of the foam. A longer drainage time suggests a more luxurious and cleansing lather.

The presence of carrier oils like coconut oil contributes to good foaming, while aloe vera might slightly reduce the foam height. However, the cleansing ability is not solely dependent on the amount of lather produced.

- **Stability:**

- The stability of the soap is evaluated by subjecting it to various conditions that might mimic real-world storage scenarios:

- **Accelerated Storage:** The soap is stored at elevated temperatures and humidity to assess its resistance to melting, cracking, or color changes.

- **Freeze-Thaw Cycles:** The soap is repeatedly frozen and thawed to test its ability to withstand temperature fluctuations without crumbling or losing its shape.

- A stable soap should maintain its physical characteristics and intended properties throughout its shelf life.

1. Microscopic Characteristics:

Examining the soap under a microscope offers a deeper understanding of its internal structure and potential performance. Here's what we can observe:

- **Particle Size:**

- The size and distribution of particles in the soap will be analyzed. Ideally, the herbal ingredients (Multani Mitti powder) should be well-dispersed throughout the soap matrix.

- Multani Mitti:

- Under a microscope, Multani Mitti particles, primarily composed of clay minerals like

magnesium aluminum silicate, exhibit a variety of irregular shapes and sizes. Some particles appear large and angular, while others are smaller and plate-like. Their color ranges from light brown to greenish-grey. The surface texture of Multani Mitti particles is rough and uneven, with visible cracks and crevices, contributing to its mild exfoliating properties.

- Aloe Vera:
- Due to the processing involved in extracting aloe vera gel, intact plant cells or large fibers are unlikely to be visible under a microscope. However, very small, fragmented plant fibers might be observable. Aloe vera is rich in polysaccharides like acemannan, which, under high magnification, appear as translucent, gel-like aggregates dispersed throughout the soap base, contributing to its hydrating properties.
- Lemongrass Oil:
- Lemongrass oil, being a volatile oil, does not appear as distinct droplets under a microscope due to its tendency to evaporate. However, variations in the refractive index within the soap base might indicate its presence, depending on the formulation process. This oil is known for its antimicrobial properties and refreshing fragrance.
- Soap Base:
- The soap base contains fatty acid salts (soap molecules) that can appear as needle-like crystals under the microscope, depending on the type of fats or oils used in the soap-making process. Ideally, the soap should exhibit homogeneity under low magnification, with a uniform distribution of all ingredients throughout the bar.
- Additional Observations:
- Microscopic analysis may reveal small air pockets within the soap base, which are harmless and can occur during manufacturing. Slight color variations within the soap may also be observed, depending on ingredient concentrations and the presence of natural coloring agents.
- Limitations of Microscopic Analysis:
- While microscopic analysis provides valuable insights into the physical characteristics of the soap, it has limitations. It cannot definitively identify specific components, especially organic materials like aloe vera extract. Additionally, it cannot provide information

about the chemical composition or quantify the presence of specific ingredients.

- **Homogeneity:**
 - The overall homogeneity of the soap mixture is assessed. A uniform distribution of all ingredients throughout the soap base ensures consistency in its properties throughout the bar.
 - The presence of any large clumps or aggregates of herbal ingredients or undissolved soap components would indicate a lack of homogeneity. This can lead to uneven cleansing or potential irritation.
 - Microscopic analysis helps to identify potential issues in the formulation process, such as inadequate mixing or grinding of the herbal ingredients. By ensuring a well-dispersed and uniform structure, the soap can provide a more consistent and comfortable user experience.

2. Chemical Evaluation:

A comprehensive chemical evaluation delves deeper than just the overall pH of the soap. It focuses on analysing the presence and activity of the key compounds within the herbal ingredients and ensuring the final product adheres to safety standards.



Fig.: Preparation

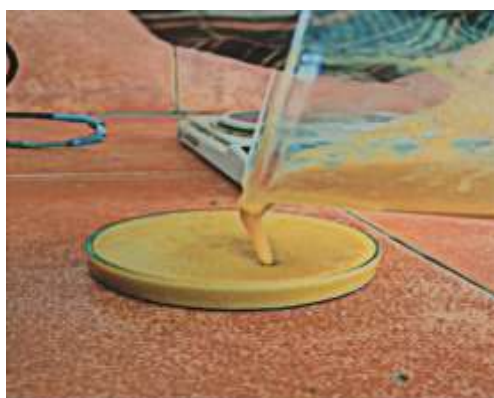


Fig.: Soap Form

Phytochemical Screening:

1. Multani Mitti: While primarily composed of minerals like magnesium, aluminum, calcium, and silica, Multani Mitti might also contain trace amounts of secondary metabolites. Identifying these can provide insights into potential benefits beyond cleansing.

- **Phenolic compounds:** These possess antioxidant properties that could contribute to some skin protection benefits.
- **Glycosides:** Their presence might be indicative of potential anti-inflammatory or antimicrobial properties.

Analysis methods:

- **X-Ray Diffraction (XRD):** This non-destructive technique helps identify the crystalline mineral composition of Multani Mitti. It can confirm the presence of major minerals like magnesium, aluminum, calcium, and silica.
 - **Energy-Dispersive X-ray Spectroscopy (EDS):** Often coupled with XRD, EDS provides a more detailed elemental analysis of Multani Mitti. It can not only confirm the presence of major minerals but also detect trace elements that might be present in smaller quantities.
 - **Ultraviolet (UV) Spectroscopy:** While less common for mineral analysis, UV spectroscopy might be used to detect the presence of certain organic compounds like phenolic compounds, if any. This technique involves measuring the absorption of UV light by the sample and identifying characteristic peaks associated with specific functional groups present in the molecules.
- 2. Aloe Vera:** Aloe vera gel is rich in various bioactive compounds that contribute to its well-known benefits.
- **Polysaccharides:** Primarily acemannan, these contribute to the gel's moisturizing and wound healing properties.
 - **Vitamins:** Look for the presence of Vitamin A (important for cell turnover), Vitamin C (antioxidant), and Vitamin E (moisturizing and skin protection).
 - **Minerals:** Aloe vera contains various minerals like calcium, magnesium, and zinc, which might play a role in overall skin health.
 - **High-Performance Liquid Chromatography (HPLC):** This is a powerful separation technique ideal for identifying and quantifying

specific polysaccharides (like acemannan) present in Aloe vera gel. HPLC separates the components of a mixture based on their polarity, allowing for the detection and quantification of individual polysaccharides.

- **Mass Spectrometry (MS):** This technique can be used in conjunction with HPLC (HPLC-MS) for more definitive identification of the polysaccharides. MS helps determine the molecular weight and structure of the compounds separated by HPLC, providing a more precise confirmation of their identity.
- **Spectrophotometric Assays:** Specific colorimetric assays can be used to measure the concentration of vitamins like Vitamin A, C, and E in Aloe vera gel. These assays involve reactions that produce colored products, and the intensity of the color is proportional to the amount of vitamin present.

3. Lemongrass Oil: The primary focus here is on the volatile constituents responsible for its fragrance and potential biological activity:

- **Citral:** This is a mixture of monoterpene aldehydes, the major component of lemongrass oil. It contributes to the oil's antimicrobial properties and refreshing fragrance.
- **Other terpenes:** Look for the presence of geraniol and myrcene, which might also contribute to the oil's antimicrobial and anti-inflammatory activities.
- **Gas Chromatography (GC):** This technique is highly effective for separating and identifying volatile compounds like the essential oils present in lemongrass. GC separates components based on their boiling points, and the retention times of specific peaks can be used to identify individual constituents like citral, geraniol, and myrcene.
- **Gas Chromatography-Mass Spectrometry (GC-MS):** Similar to HPLC-MS, GC-MS combines the separation power of GC with the identification capabilities of MS. After separation by GC, the individual components are ionized and analyzed by MS, providing both information on their volatility and molecular structure.

Safety is paramount when formulating a cosmetic product. Chemical evaluation plays a crucial role in ensuring the final soap meets quality control standards:

- **Free Fatty Acid Analysis:** This test measures the amount of unreacted fatty acids remaining

after the saponification process. High levels can indicate a potential for skin irritation.

- **Microbial Limits Testing:** The soap is evaluated for the presence of harmful bacteria or fungi that might pose a health risk to users.
- **Heavy Metal Analysis:** The levels of potentially harmful heavy metals like lead, arsenic, or mercury are assessed to ensure they fall within safe limits set by regulatory bodies.
- **Quality Control:** Maintaining the safety and efficacy of the herbal soap with Multani Mitti, Aloe Vera, and Lemongrass Oil requires a robust quality control (QC) program. This program ensures the soap adheres to established safety standards and delivers a consistent, high-quality product for consumers. Here's a breakdown of key QC measures to consider:

Raw Material Control:

- **Sourcing:** Implementing strict sourcing guidelines to ensure the quality and safety of the raw materials – Multani Mitti, Aloe vera extract, and Lemongrass oil – is crucial. Partnering with reputable suppliers who adhere to Good Agricultural Practices (GAP) or organic farming principles can help guarantee the purity and absence of contaminants.
- **Incoming Material Inspection:** Upon receiving the raw materials, a thorough inspection process should be implemented. This might involve:
 - **Physical Inspection:** Visually examining the materials for any signs of contamination, discoloration, or foreign objects.
 - **Laboratory Analysis:** Utilizing techniques like X-ray diffraction (XRD) for Multani Mitti to verify its mineral composition and ensure the absence of harmful substances like heavy metals. High-performance liquid chromatography (HPLC) can be used for Aloe vera extract to quantify its polysaccharide content and assess potential microbial contamination. Gas chromatography (GC) analysis of Lemongrass oil can confirm its composition and ensure the presence of the desired constituents like citral and geraniol.

In-Process Control:

- **Manufacturing Process Monitoring:** Implementing strict adherence to standardized manufacturing procedures is essential. This includes monitoring parameters

like temperature, pressure, and mixing times during the soap production process.

- **In-Line Testing:** Performing specific tests at various stages of the production line can help identify and rectify any potential issues early on. This might involve measuring the pH of the soap to ensure it falls within a safe range for skin contact. Additionally, checking the moisture content can help maintain the desired bar hardness.

Finished Product Testing:

- **Physicochemical Testing:** Analyzing the finished soap for various physicochemical properties ensures quality and consistency. This might include:
 - **Weight and Dimensions:** Verifying the soap bars meet the specified weight and dimension specifications.
 - **pH Testing:** Measuring the final pH of the soap to ensure it falls within a safe range (typically between 5.5 and 7.0) for skin use.
 - **Microbial Testing:** Conducting tests to ensure the absence of harmful bacteria or fungi in the final soap product.
- **Safety Testing:** While the natural ingredients present a lower risk, safety testing might be considered depending on regulations and market requirements. This could involve:
 - **Acute Toxicity Testing:** Evaluating the potential for irritation or allergic reactions by applying the soap to animal skin models (**Note:** Ethical considerations and potential alternatives to animal testing should be explored).
 - **Human Patch Testing:** Conducting voluntary patch tests on a small group of people to assess any potential skin irritation caused by the soap.

Documentation and Record Keeping:

- Maintaining meticulous records of all QC procedures is crucial. This includes documenting raw material inspection results, in-process control data, and finished product test results. This data serves as a historical record and allows for trend analysis to identify and address any recurring issues.

Regulatory Compliance:

- Staying up-to-date with regulatory requirements for cosmetic products in your target market is essential. This might involve adhering to regulations like the European Union Cosmetics Regulation (EC 1223/2009)

or the US Food and Drug Administration (FDA) regulations for cosmetics.

4. Benefits and Applications:

The formulated herbal soap from Multani Mitti, Aloe Vera, and Lemongrass Oil holds promise for offering a variety of benefits and applications:

Skin Health:

- **Cleansing and Exfoliation:** Multani Mitti's natural cleansing properties, combined with the gentle lathering action of the soap, can help remove dirt, excess oil, and impurities from the skin. Additionally, the fine particles of Multani Mitti might provide a mild exfoliating effect, promoting smoother and brighter skin.
- **Hydration and Nourishment:** Aloe vera's ability to retain moisture can help keep the skin hydrated and supple. The presence of vitamins and minerals in aloe vera might further contribute to overall skin health.
- **Improved Texture and Tone:** The combined action of Multani Mitti and aloe vera can potentially improve skin texture by reducing the appearance of enlarged pores and promoting a more even tone.

Therapeutic Effects:

While further clinical studies are necessary, the natural ingredients in the soap might offer some therapeutic benefits:

- **Soothing Irritated Skin:** Aloe vera's anti-inflammatory properties might help soothe irritation and itching caused by dry skin or mild eczema.
- **Antimicrobial Activity:** Lemongrass oil's antimicrobial properties could potentially help reduce acne-causing bacteria on the skin, although its efficacy compared to conventional acne treatments needs further investigation.

Eco-Friendly Aspect:

This herbal soap is formulated with natural ingredients and avoids harsh chemicals or synthetic additives commonly found in commercial soaps. Additionally:

- **Biodegradability:** The natural ingredients in the soap are readily biodegradable, minimizing its environmental impact compared to conventional soaps derived from animal fats or petroleum products.
- **Sustainability:** Sourcing herbal ingredients from renewable plant sources promotes

sustainability compared to soaps relying on non-renewable resources.

- **Reduced Risk of Irritation:** By avoiding harsh chemicals and synthetic fragrances commonly found in commercial soaps, this herbal formulation minimizes the risk of skin irritation, particularly for those with sensitive skin.

Applications:

Oily or Combination Skin: The cleansing properties of Multani Mitti can help regulate excess oil production, leaving the skin feeling refreshed and balanced.

Dry or Flaky Skin: Aloe vera's hydrating properties come to the rescue for those with dry or flaky skin. The soap helps to retain moisture and keeps the skin feeling supple and comfortable.

Mild Acne: While not a cure, the potential antimicrobial activity of lemongrass oil might offer some additional benefits for managing acne-prone skin.

3. Comparisons and Future Directions:

Comparisons with Existing Herbal Soaps:

Direct comparisons with existing herbal soaps require a detailed analysis of their specific ingredients and formulations. However, here's a general comparison based on potential advantages:

- **Efficacy:** The combination of Multani Mitti for cleansing and exfoliation, Aloe vera for hydration and soothing, and Lemongrass oil for potential antimicrobial activity offers a well-rounded approach to skin health.
- **Safety:** Utilizing natural ingredients minimizes the risk of irritation compared to soaps containing harsh chemicals or synthetic fragrances.
- **User Satisfaction:** The inclusion of aloe vera can promote a more pleasant user experience by leaving the skin feeling soft and hydrated, while lemongrass oil provides a refreshing fragrance.

However, existing herbal soaps might incorporate other beneficial ingredients like turmeric for brightening or oatmeal for additional soothing properties. User preference can also be influenced by factors like lathering capacity and bar hardness.

Future Directions:

Here are some areas for further research and optimization of this herbal soap formulation:

- **Clinical Studies:** Conducting controlled clinical trials to evaluate the efficacy of the soap for specific skin concerns like acne or eczema would strengthen its claims and marketability.
- **Optimization of Ratios:** Fine-tuning the ratios of Multani Mitti, Aloe vera, and Lemongrass oil can further optimize the soap's cleansing, hydrating, and potential therapeutic effects.
- **Exploration of Additional Ingredients:** Investigating the incorporation of other natural ingredients with complementary benefits, such as essential oils with specific calming or antibacterial properties, could broaden the soap's appeal to different skin types and concerns.
- **Sustainability Practices:** Exploring sustainable sourcing practices for the herbal ingredients and developing eco-friendly packaging can further enhance the soap's environmental credentials.

II. CONCLUSION:

This review has explored the formulation and potential benefits of a herbal bathing soap made with Multani Mitti, Aloe vera, and Lemongrass oil. The review delved into the properties of each ingredient, highlighting their potential contributions to skin health. The formulation process, along with various evaluation methods – physical, chemical, and microscopic – were discussed to ensure a high-quality and safe product.

The synergy between Multani Mitti, Aloe vera, and Lemongrass Oil creates a unique blend with potential benefits for various skin types. Multani Mitti's gentle cleansing action removes impurities without compromising the skin's natural moisture barrier. This not only promotes a refreshed feel but also helps minimize the appearance of blemishes, revealing a brighter and more radiant complexion. Aloe vera, with its hydrating properties and potential for soothing irritation, offers a comforting touch, especially for those with dry or sensitive skin. The presence of vitamins and minerals within aloe vera further contributes to overall skin health. Lemongrass oil, while requiring further research to fully validate its efficacy, holds promise for managing acne-prone skin due to its potential antimicrobial activity.

The benefits of this herbal soap extend beyond the realm of skin health. Its formulation prioritizes the use of natural and biodegradable ingredients. Unlike conventional soaps derived from animal fats or petroleum products, which can linger in landfills and potentially harm the environment, the components of this herbal soap readily decompose, minimizing its environmental impact. Additionally, sourcing the ingredients from renewable plant sources like Multani Mitti and Aloe vera promotes sustainability. This approach breaks the cycle of dependence on non-renewable resources and fosters a more responsible way to care for our skin.

REFERENCES:

- [1]. Karnavat DR, Amrutkar SV, Patil AR, Ishikar SK. A review on herbal soap. *Research Journal of Pharmacognosy and Phytochemistry*. 2022;14(3):208-13.
- [2]. Ruckmani K, Krishnamoorthy R, Samuel S, Kumari HL. Formulation of herbal bath soap from vitex negundo leaf extract. *Journal of Chemical and Pharmaceutical Sciences* ISSN. 2014;974:2115.
- [3]. Sharma SK, Singh S. Antimicrobial herbal soap formulation. *Journal of Pharmaceutical Research International*. 2020;32(36):82-8.
- [4]. Devi DA, Sivani DV, Anusha D, Sarath G, Sultana SM. Formulation and Evaluation of Antimicrobial Herbal Soap. *Int. J. Pharm. Sci. Rev. Res.* 2021;71(2):122-5.
- [5]. Rafiq SJ. Formulation of herbal soap against acne causing bacteria. *Asian J Biol Life Sci.* 2021 Sep;10(3):609.
- [6]. Joshi J, Bhandari DP, Ranjitkar R, BHANDARI L, Yadav PM. Formulation and Evaluation of Herbal Soap, Shampoo and Face Wash Gel. *Journal of Plant Resources*. 2019;17(1):112
- [7]. Madzinga M, Kritzingner Q, Lall N. Medicinal plants used in the treatment of superficial skin infections: from traditional medicine to herbal soap formulations. In *Medicinal plants for holistic health and well-being 2018* Jan 1 (pp. 255-275). Academic Press.
- [8]. MV A, Hasna MP, Jaseena MH, Safna K, Sajna CV, Shamly MK. Anti-microbial evaluation of herbal soap containing neem oil and nalpamaradhi oil.
- [9]. Devendra N, Amit K, Rajesh K, Abhishek K. A REVIEW ON LATEST TREND OF HERBAL COSMETICS. Organized by. 2018:103.
- [10]. Trak NH, Chauhan MF. *Skin Care Secrets from Herbal World*. Notion Press; 2022 Jul 12.
- [11]. Sharma N, Singh P, Gupta SK. A review on role of various medicinal plants in cosmetics and cure health. *Current Research in Pharmaceutical Sciences*. 2019 Oct 15.
- [12]. Shukla P, Tiwari S, Singh S, Yadav A. Formulation and Evaluation of Activated Charcoal Peel Off Mask. *Journal of Pharmaceutical Sciences and Research*. 2023 Feb 1;15(2):1020-4.
- [13]. Tabasum H, Ahmad T. *Principles and Short Practice of Cosmetic Care in Unani Medicine*. Educreation Publishing; 2018 May 20.
- [14]. Inglis K. *Ayurveda: Asian Secrets of Wellness, Beauty and Balance*. Tuttle Publishing; 2012 May 29.
- [15]. Kumar MA. *Education Policy 2020: Distance and Open Learning Challenges*. *International Journal for Social Studies*. 2023 Sep 27;9(9):19-24.
- [16]. Shruthan K. *Pharmaceutico Analytical Study and Evaluation of Antihistaminic Activity of MallaSindoora in Guinea Pigs* (Doctoral dissertation, Rajiv Gandhi University of Health Sciences (India)).
- [17]. Ghadage PK, Mahamuni SS, Kachare DS. Formulation and evaluation of herbal scrub using tamarind peel. *Research Journal of Topical and Cosmetic Sciences*. 2021;12(1):40-3.
- [18]. Kekane K, Rayate A, Vikhe P, Mulay T. Formulation and Evaluation of Red Lentils Herbal Face Scrub. *International Journal of Pharmaceutical Sciences*. 2023 Jul 26;1(07):1-.
- [19]. Kumar P. Multani Mitti—Is it more than a placebo? *Journal of Pakistan Association of Dermatologists*. 2019 Oct 21;29(3):345-8.
- [20]. Gor T, Gondaliya N. Formulation and physicochemical evaluation of polyherbal acne soap using selected medicinal plants. *International Journal of Management, Public Policy and Research*. 2023 Jan 29;2(Special Issue):18-24.
- [21]. Devendra N, Amit K, Rajesh K, Abhishek K. A REVIEW ON LATEST TREND OF

- HERBAL COSMETICS. Organized by. 2018:103.
- [22]. Nagansurkar SB, Bais SK, Bagale J. A REVIEW: FACE PACK CONTAINING HERBAL PLANT SHOWING ANTI-AGING ACTIVITY.
- [23]. Patil HK, Patil BP, Patil NS, Patel VV, Pardeshi TR. REVIEW ON HERBAL SCRUB USING TAMARIND PEEL. Singh N. HANDICRAFTS OF RAJASTHAN: LOOKING THROUGH THE LENS OF UTILITARIAN PURPOSE, THE CONSTRUCTION AND ART OF POTTERY MAKING.
- [24]. ZAITON SN, AZMAN HA, HAMBALI N, ONN M, MOHAMAD SN, MUSTAFA MH. PHYSICOCHEMICAL PROPERTIES OF HERBAL SOAP MADE FROM AVERRHOA BILIMBI LEAF AND FLOS LONICERAE. Malaysian Journal of Science. 2024 Mar 31:1-0.
- [25]. Sharma SA, Pradhan SU, Pandit BI, MOHANTY JP. Formulation and Evaluation of Herbal
- [26]. Soap Taking Different Bioactive Plants by Cold Saponification Method. Int J Curr Pharm Res. 2022;14(5):30-5.
- [27]. Arun SK. FORMULATION AND EVALUATION OF HERBAL SOAP.
- [28]. Choi SR, Seo BI, Koo JS. Effects of herbal Cp soap on acne skin. The Korea Journal of Herbology. 2019;34(3):37-44.
- [29]. Chakraborty B, Bera A, Banerjee D, Ghosh S, Dutta R. Production of Non-toxic, Non-polluting Herbal Soaps Using Plant Extracts Having Antimicrobial Activity. In International conference on Multidimensional Sustainability: Advanced Technologies for Industrial Pollution Control 2022 Dec 21 (pp. 379-394). Cham: Springer Nature Switzerland.
- [30]. Pardeshi YD, Patel VR, Kasar OB, Amrutkar GS. Formulation and Evaluation of Herbal Soap from Tridax Procumbens. International Journal of Pharmaceutical Sciences. 2024 Jan 15;2(01):1-.
- [31]. Kinanti AP, Darmawan MA, Muryanto M, Gozan M. Formulation of herbal solid soap with illipe oil as raw material with ginger extract as antibacterial. In AIP Conference Proceedings 2024 Mar 7 (Vol. 3080, No. 1). AIP Publishing.
- [32]. Rani S, Vardu S, Jamalbi P, Vandana M, Dheeraj C, Naik B, Kullayappa AC. Formulation and Evaluation of Antimicrobial herbal soap of Tridax procumbens for skin care. Journal of Pharmacy. 2023 Jan 31;3(1):1-8.
- [33]. Santoso IH, Katias P, Herlambang T, Tafrikan M, Oktafianto K, Firdaus AA, Arof H. Application of Mamdani Fuzzy Method in Herbal Soap Production Planning. Nonlinear Dynamics and Systems Theory. 2024;24(2):193.
- [34]. Hamid H, Pahirulzaman KA. POTENTIAL USE OF FUNGI ISOLATED FROM DEAD ARTHROPOD FOR ANTIFUNGAL AGENT. EMPIRICAL STUDIES OF AGRO-BASED INDUSTRY: VOLUME 2 (PRODUCT DEVELOPMENT TECHNOLOGY)(Penerbit UMK). 2023:20.
- [35]. Yulyuswarni Y, Ardini D, Mulatasih ER. TRAINING FOR THE MAKING OF NATURAL HERBAL SOAP AND CLAY MASK AS SOUVENIR PRODUCTS IN SUSUNAN BARU VILLAGE, BANDAR LAMPUNG. Pharmacy Action Journal. 2023 May 1;2(2):28-31.
- [36]. Peter M, Kanathila H, Bembalagi M, Santhosh VN, Vas R, Patil S, Roy TR, Monsy M, Gopu BN, Chindak S. An In Vitro Comparative Evaluation of Conventional and Novel Thymus vulgaris Derived Herbal Disinfectant Solutions against Pathogenic Biofilm on Maxillofacial Silicones and Its Impact on Color Stability. The Journal of Contemporary Dental Practice. 2024 Jan 31;24(12):967-73.
- [37]. Pandey J, Acharya S, Bagale R, Gupta A, Chaudhary P, Rokaya B, Manju KC, Aryal P, Devkota HP. Physicochemical evaluation of Prinsepia utilis seed oil (PUSO) and its utilization as a base in pharmaceutical soap formulation. Quality Assurance and Safety of Crops & Foods. 2023 Apr 19;15(2):188-99.
- [38]. Zhang Y, Liu K, Zhan Y, Zhao Y, Chai Y, Ning J, Pan H, Kong L, Yuan WA. Impact of Chinese herbal medicine on sarcopenia in enhancing muscle mass, strength, and function: A systematic review and meta-analysis of randomized controlled



- trials. *Phytotherapy Research*. 2024 Feb 29.
- [39]. Łusiak P, Różyło R, Mazur J, Sobczak P, Matwijczuk A. Evaluation of physical parameters and spectral characterization of the quality of soaps containing by-products from the food industry. *Scientific Reports*. 2024 Feb 26;14(1):4687.
- [40]. Chithambharan A, Pottail L, Sharma SC, Mirle RM, Rajalakshmi R, Ponnusamy A. Conventional and Scientific uses of Rice-washed water: A Systematic Review. *Journal of Food Science and Technology*. 2024 Mar;61(3):414-28.
- [41]. Asti HT, Mamoribo SN. Masih Pentingkah Perilaku Hidup Bersih dan Sehat (PHBS) Pada Era New Normal Covid-19. *Journal of Human and Education (JAHE)*. 2024 Jan 16;4(1):458-65.