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A HERBAL FACE PACK'S FORMATION AND EVALUATION: AN EXPERIMENTAL STUDY

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1.0 ABSTRACT

Herbal cosmetics have gained significant popularity in recent years as consumers gravitate toward natural, safe, and eco-friendly alternatives for skincare. The creation and experimental assessment of a herbal face pack using widely accessible plant-based substances are presented in this research study. For the study three herbal face packs (F1, F2 and F3) were prepared using the extracted herbal ingredients in different proportions. The physicochemical and organoleptic properties of the formulations, such as Hausner's ratio, bulk density, tapped density, and angle of repose, bulk density, tapped density, Hausner's ratio, and washability test were then evaluated. Formulation F1 showed the most desirable characteristics with a reddish brown colour, pleasant sandalwood-like odour, uniform appearance, and the smoothest texture indicating excellent blending and ingredient compatibility. The parameters like angle of repose (F2- 37.98°), tapped density (0.50 g/mL), bulk density (0.42 g/mL), Hausner's ratio (1.14- 1.15), washability test were within the acceptable limit and revealed that F1 and F3 are the most ideal for consumer use by displaying the most desirable characteristics, including ease of application, good flowability, and non-irritancy. Through methodical laboratory testing, the study seeks to evaluate the prepared face pack for safety, effectiveness, and physical attributes.

2.0 KEYWORDS: Herbal face pack, Formulation, Evaluation, Aloe vera, manjistha, sandalwood, bael.

3.0 INTRODUCTION

- Originating from the Greek word "kosmeticos," which means "to adorn" or beautify, the word "cosmetics" refers to products made to improve a person's look and preserve personal cleanliness.[1] "Cosmeceuticals" is a blend of the words "cosmetics" and "pharmaceuticals." However, because the U.S. Food and Drug Administration (USFDA) does not recognize or regulate this phrase, it lacks official legal status, especially in the United States.[2]
- Herbal cosmetics are cosmetic products formulated by combining herbal (plant-based) ingredients with standard cosmetic bases. These products are designed to provide cosmetic benefits only, not to treat or cure diseases, and are therefore known as "Herbal Cosmetics". Natural beauty products have been used since ancient times, despite their current label. Because they come from nature and are thought to be kinder to the skin, herbal cosmetics are also sometimes referred to as natural cosmetics.[3] Raw or extracted forms of herbs are used.
- India's herbal medicine business expanded at a Compound Annual Growth Rate (CAGR) of 26.7% from 2008 to 2013. This growth reflects a significant consumer shift from allopathic (modern) medicine to

herbal remedies. As of 2022, the Indian Cosmeceuticals market reached a size of approximately US$ 26.3 billion, with a CAGR of 6.45%, indicating a strong and steady demand for herbal and natural beauty products.[4]

- There are no dangerous synthetic ingredients in herbal cosmetics. Instead of artificial substances, they contain plant parts and extracts such as Aloe vera which hydrates and soothes the skin, Coconut oil which Moisturizes and nourishes, Vitamin E which acts as an antioxidant to keep skin healthy and glowing These ingredients are biocompatible, making them more suitable for long-term use without adverse effects.
- All skin types can safely use natural cosmetics because they are typically hypoallergenic and dermatologically- tested. They are less prone to result in itching, rashes, allergic reactions, or skin irritation.
- Today's consumers are more ingredient-conscious and prefer products with Traceable botanical sources, No artificial fragrances, parabens, or mineral oils and Clear labelling and transparency.
- This demand has pushed brands to innovate and produce more clean, green, and ethical cosmetics.[5,6]
- Herbal face packs are widely appreciated cosmetic formulations designed to rejuvenate, cleanse, and treat facial skin using natural ingredients. With the increasing demand for organic and chemical-free skincare solutions, herbal face packs have gained popularity due to their minimal side effects and environmentally friendly nature.[7]
- These face packs are made with components like turmeric, bael, sandalwood, multani mitti (Fuller's Earth), and gram flour, all of which have antibacterial, anti-inflammatory, and skin-brightening qualities.[8] Unlike synthetic products, herbal face packs help detoxify the skin, reduce acne and blemishes, and improve complexion without harsh chemicals.
- They are suitable for different skin types and are often customized based on specific skin concerns such as oiliness, dullness, or acne-prone conditions.[9] These preparations also help in enhancing blood circulation, removing dead skin cells, and tightening the pores, thereby promoting a natural and healthy glow.[10]
- Incorporating medicinal plants in cosmetic formulations not only ensures efficacy but also contributes to sustainable and holistic skincare practices. With rising consumer awareness, herbal face packs offer a reliable and safe alternative for routine skin care and facial treatment.[11]
- Different types of herbal face packs are available such as cleansing face pack, which is formulated with multani mitti, neem, or besan to deep-cleanse and remove impurities from the skin,[12] acne-control face pack containing turmeric, neem, and Tulsi to reduce acne, inflammation, and bacterial growth,[13] brightening/ glow face pack which includes sandalwood, rose petal powder, and saffron to enhance skin radiance and tone,[14] moisturizing face pack which is made using aloe vera, honey, and cucumber to hydrate and soothe dry or irritated skin[15] and Anti-ageing face pack which uses herbal antioxidants like amla, green tea, or liquorice to reduce signs of ageing and rejuvenate the skin.[16]
- These products are gaining preference due to their biocompatibility, eco-friendliness, and reduced risk of allergic reactions.[17] Aloe vera, coconut oil, rose water, turmeric, sandalwood, and beetroot are common natural ingredients that have antibacterial, antioxidant, and anti-inflammatory qualities.[18, 19, 20, 21]
- Natural ingredients harmonize well with the skin's physiology, reducing the likelihood of irritation or adverse reactions. They also support holistic skin health by improving blood circulation, offering nutrients, and enhancing regeneration.
- Herbal ingredients are often sustainably sourced and biodegradable, making them more environmentally friendly. The growing awareness of synthetic chemical risks (e.g., BHA, BHT) has led consumers to prefer herbal alternatives that are safe, effective, and ethically produced.[22]

- **Objective and Need of the Study**

This study's main goal was to create and assess a safe, natural, and effective cosmetic product, specifically, a herbal face pack, using medicinal plant-based elements that are well-known for their skin-improving and therapeutic qualities. The focus was to develop alternatives to synthetic cosmetics that often pose risks of skin irritation, allergic reactions, and environmental harm.

The increasing demand from consumers for personal care products devoid of chemicals and herbs is what made this study necessary. Natural formulations are becoming more popular as people become more conscious of the negative effects of synthetic chemicals included in traditional cosmetics. These formulations are safer and more environmentally friendly. This research addresses that demand by incorporating plant-based ingredients like aloe vera, beetroot, shea butter, multani mitti, turmeric, and manjistha into cosmetic formulations. Additionally, the study seeks to validate the functionality, stability, and consumer acceptability of the products through standard evaluation parameters under recognized regulatory guidelines. Ultimately, the research contributes to the growing body of knowledge supporting the integration of herbal ingredients in modern cosmeceuticals, providing safer and more effective options for consumers.

The search for natural skincare solutions has elevated traditional herbal face packs from ancient home remedies to the subject of modern scientific inquiry.[23] Herbal face packs, typically composed of powdered herbs, clays, and natural extracts, claim benefits ranging from skin

cleansing and oil control to complexion enhancement and anti-aging effects. Herbal face packs are widely appreciated cosmetic formulations designed to rejuvenate, cleanse, and treat facial skin using natural ingredients.[24] With the increasing demand for organic and chemical-free skincare solutions, herbal face packs have gained popularity due to their minimal side effects and environmentally friendly nature.[25] These face packs are composed of ingredients such as multani mitti (Fuller's Earth), bael, sandalwood, turmeric, and gram flour all of which possess therapeutic benefits including anti-inflammatory, antibacterial, and skin brightening properties.[26] Despite their widespread use, there is a need for scientific validation of their efficacy and safety.

This paper examines the choice, creation, and testing of a herbal face pack, emphasizing on components like bael, Multani mitti that are well-known for their skin-benefitting qualities. The study looks into the finished product's physicochemical characteristics, microbiological safety, and user acceptability.

- **HERB DETAIL**

1. Herb Name: Bael powder (*Aegle marmelos)*

Aegle marmelos belonging to Rutaceae family are used for various purposes, particularly in traditional Ayurvedic medicine. Its parts are utilized in different forms, such as fresh pulp, dried powder, decoctions, and oils.[27]

Fig No. 1: Bael.

2. Herb name: Gram flour (*Cicer arietinum)*

It is also known as Bengal gram or garbanzo bean, which is milled to produce gram flour (or besan). It is from the family of Fabaceae (legume or pulse family).[28]

Fig No. 2: Gram.

3. Manjistha Powder *(Rubia cordifolia)*

The Manjistha roots have brownish red bark and are used to produce a red dye. The stems and roots are commonly used. It belongs to Rubiaceae family.[29]

Fig No. 3: Manjistha.

4. Lodhra Powder *(Symplocos racemosa)*

The bark is the most commonly used part of the Symplocos racemosa tree, known as lodhra. The leaves, roots, and flowers also have medicinal uses, but the bark is the primary component for most traditional Ayurvedic formulations. It belongs to a unigeneric family Symplocaceae.[30]

Fig No. 4: Lodhra.

5. Sandalwood Powder *(Santalum album)*

The Indian sandalwood tree's heartwood is boiled to create sandalwood powder, sometimes referred to as chandan or sandal churna. The Santalaceae is the name of the sandalwood family.[31]

Fig. No. 5: Sandalwood.

6. Turmeric Powder *(Curcuma longa)*

It is derived from the rhizomes of the plant. It belongs to the family Zingiberaceae family.[32]

Fig No. 6: Turmeric.

4.0 LITERATURE REVIEW

4.1 Palanivelu M *et al.* (2022) thoroughly analysed a comprehensive review on the use of herbal cosmetics in skincare, emphasizing the safety, effectiveness, and therapeutic benefits of herbal formulations over synthetic products. The study detailed various herbal ingredients such as Aloe vera, turmeric, neem, jojoba oil, olive oil, and green tea highlighting their anti-aging, antioxidant, moisturizing, and antimicrobial properties. Herbs like amla, henna, and shikakai were also noted for their roles in scalp and skin treatments. The review presented evidence that herbal products promote healthy skin without causing toxicity or irritation, commonly associated with chemical-based cosmetics.[33]

4.2 Devi N *et al.* (2018) focused on the growing significance of herbal cosmetics as safe, effective, and eco-friendly alternatives to synthetic products. The aim was to explore the formulation, classification, and applications of herbal cosmetics, emphasizing their therapeutic potential and reduced risk of adverse effects. By analysing various plant-derived ingredients such as aloe vera, neem, brahmi, and turmeric, the study highlights their multipurpose benefits in skincare, haircare, and oral hygiene.[34]

4.3 Ashawat MS *et al.* (2009) highlighted the increasing use of herbal cosmetics, emphasizing their antioxidant, antimicrobial, and anti-inflammatory benefits. Despite being published over a decade ago, the core findings remain relevant in 2025 due to the continued global shift toward safer, sustainable, and plant-based skincare alternatives. Consumer demand for natural ingredients, reduced side effects, and eco-conscious formulations has only grown. The incorporation of herbs like Aloe vera, turmeric, neem, and chamomile in modern skincare supports the ongoing preference for natural over synthetic cosmetics, validating the article's conclusions in today's cosmetic industry.[35]

4.4 Gyawali R and Paudel P N (2022) conducted a review with the primary aim of exploring the use of herbal remedies in cosmetic formulations, specifically highlighting their medicinal benefits, active components, and safety concerns. The authors focused on herbs used in Nepal for skincare, emphasizing their role in improving skin appearance while reducing side effects associated with synthetic cosmetics.[36]

4.5 Gupta RK *et al.* (2018) presented a review focusing on the role of medicinal plants and herbs in cosmeceutical formulations, with the primary aim of highlighting the use of natural ingredients in improving skin health, appearance, and treating common skin issues. The review emphasized the growing popularity of herbal cosmetics due to their compatibility with the skin, wide availability, and fewer side effects compared to synthetic products. The authors compiled information on various herbs, such as aloe vera, neem, turmeric, and coconut oil, which are used for their antioxidant, anti-aging, moisturizing, and skin-soothing benefits.[37]

4.6 Joshi LS and Pawar HA (2015) aimed to highlight the growing importance of herbal cosmetics and cosmeceuticals as safer, natural alternatives to synthetic products. The main objectives are to explore their dual role in beauty and skin treatment, emphasize their low toxicity and compatibility with all skin types, and discuss the benefits of plant-based ingredients like antioxidants and anti-inflammatory agents. The study also addresses the need for regulatory clarity in distinguishing cosmeceuticals from traditional cosmetics and drugs. Overall, it supports the shift toward natural, effective, and skin-friendly cosmetic solutions.[38]

4.7 Shaikh MA *et al.* (2023) formulated and evaluated a herbal lip balm using beetroot powder along with natural ingredients such as beeswax, cocoa butter, castor oil, Vaseline, orange peel powder, and Vitamin C. The study was conducted to meet the growing demand for natural cosmetics, focusing on minimizing the use of synthetic additives that may cause side effects or environmental harm.[39]

4.8 Abhang DC *et al.* (2024) examined the formulation and evaluation of a cosmetic herbal face pack aimed at enhancing skin glow using natural ingredients. With a growing preference for herbal and chemical-free skincare, this research emphasizes the development of facial cosmetic products that utilize the therapeutic benefits of traditional Ayurvedic components. The primary objective is to prepare and assess a polyherbal face pack using ingredients such as multani mitti (Fuller's earth), turmeric, aloe vera, sandalwood, rose powder, hibiscus, and methi (fenugreek).[40]

4.9 Vakhariya RR *et al.* (2024) focused on the creation and evaluation of a polyherbal face pack using Ayurvedic powders to promote healthy and glowing skin. The researchers developed formulations using traditional ingredients like sandalwood, orange peel, green tea, aloe vera, tulsi, multani mitti, and more—each selected for their therapeutic and cosmetic benefits. The study concludes that all tested formulations showed promising results in terms of skin compatibility and physical parameters. However, the authors suggest further optimization to maximize their effectiveness and support broader cosmetic use.[41]

4.10 Desai S *et al.* (2025) conducted a study aimed at formulating a herbal face pack using traditional plant-based ingredients known for their skin-enhancing properties. The formulation included Beal, Multani mitti, Turmeric, Aloe vera, Sandalwood, Mint, Manjistha, Lodhra, and gram flour. These ingredients were dried, powdered, and evaluated based on various parameters such as texture, pH, appearance, and flow properties.[42]

4.11 Dhiman *D et al.* (2023) analysed the formulation and evaluation of a herbal face pack using organic and natural ingredients aimed at improving skin health and glow. The study incorporates ingredients such as turmeric, neem, sandalwood, rose petal, orange peel, aloe vera, and Tulsi—each chosen for their skin-nourishing and therapeutic effects. The purpose of the project was to evaluate the face pack through tests on physical stability, sensitivity, microbial load, and organoleptic features. Drawing from Ayurvedic practices, the face pack was prepared to improve elasticity, reduce pigmentation, and revitalize facial muscles.[43]

4.13 Hewlings SJ and Kalman DS (2017) conducted a comprehensive review on Curcumin, the active compound found in Curcuma longa (Turmeric), highlighting its significant role in skin health. The study emphasized Curcumin's antioxidant, anti-inflammatory, and antimicrobial properties, making it a beneficial ingredient in cosmetic formulations like herbal face packs. The authors reported that Curcumin helps combat oxidative stress, reduces skin inflammation, and prevents microbial infections, thereby promoting healthy and glowing skin.[44]

4.14 Sandanshiv SY *et al.* (2023) focused on the formulation and evaluation of a poly-herbal face pack using natural ingredients such as Multani mitti, neem leaves, rose petals, sandalwood, and hibiscus powder. The main objective was to develop a herbal cosmetic that enhances skin nourishment, improves appearance, and addresses common skin issues without harmful side effects associated with synthetic products. The prepared face pack was assessed for its physical characteristics, including texture, colour, aroma, pH, and flow properties. The study reported that the face pack had a smooth, fine texture with good flowability and a pleasant aroma.[45]

4.15 Mouna A *et al.* (2023) carried out the formulation and evaluation of a polyherbal face pack using ingredients such as turmeric, neem, orange peel, Multani mitti, gram flour, rose petals, sandalwood, rice flour, and Aloe vera. The study aimed to develop a herbal cosmetic product that improves skin appearance, promotes nourishment, and enhances the natural glow of the skin without causing irritation or side effects. The prepared formulations (F1–F4) were assessed for organoleptic, physicochemical, and rheological properties.[46]

4.16 Somwanshi SB *et al.* (2017) formulated and evaluated a cosmetic herbal face pack aimed at improving skin glow using natural ingredients such as Multani mitti, orange peel, turmeric, sandalwood, rose powder, and neem leaves. The objective was to develop a stable, effective herbal face pack that enhances skin appearance and provides cleansing, soothing, and oil control benefits without adverse effects. The study concluded that the developed herbal face pack was safe, effective, and contributed to improved skin glow, making it a suitable alternative to chemical-based cosmetic products.[47]

4.17 Chaudhari KA *et al.* (2023) focused on the formulation and evaluation of a natural herbal face pack using readily available ingredients like multani mitti, turmeric, sandalwood, saffron, milk powder, rice flour, orange peel, and banana peel. The primary objective was to create a safe, effective, and skin-friendly cosmetic product that enhances skin health and beauty without causing side effects.[48]

5.0 PLAN OF WORK

The herbal face pack was formulated using natural ingredients for enhanced face care and evaluated using the physical and functional properties. Three herbal face packs (F1, F2 & F3) were formulated using the herbal ingredients and out of these three formulations, the most suitable formulation adhering to all the organoleptic and physiochemical properties was identified.

Extraction Methods for herbal ingredients

Extraction is a crucial process in herbal formulation, aimed at isolating and concentrating the active phytoconstituents from plant materials to enhance their efficacy in cosmetic applications. The goal of extraction is to draw out beneficial compounds such as alkaloids, flavonoids, phenolics, essential oils, and pigments without compromising their stability and activity. Several aspects influence the extraction method selection, such as the type of plant part (fruit, bark, root, or leaf), the required active ingredients, and the solvent system that is most suited for those chemicals.[49]

Common techniques include:

- **Maceration** – Soaking the crushed plant material in a solvent (usually alcohol or water) at room temperature for a specified duration. Its affordability, ease of usage, and capacity to maintain heat-sensitive phytochemicals make it popular.[50]

- **Infusion and Decoction** – Methods similar to brewing tea, typically used for leaves and flowers (infusion) or harder plant parts like roots and barks (decoction).[51]
- **Percolation** – Involves a continuous flow of solvent through powdered plant material.[52]
- **Soxhlet Extraction** – Uses heat and reflux to extract active compounds using solvents in a laboratory setup.[53]
- **Cold Pressing** – Often used for extracting oils from seeds and fruits.[55]

Drying and Powdering – Includes methods like shade drying, oven drying, and air drying followed by mechanical grinding and sieving. This is especially effective for preparing herbal powders used in face packs as it preserves bioactivity and improves the uniformity of the final product.[55]

• **Blending and Sifting** – Dry ingredients are homogenized and passed through a fine mesh to enhance consistency and improve topical application. In this study, maceration was employed as a convenient method for extracting active constituents from plant materials using hydroalcoholic solvents under ambient conditions. The method was selected for its practicality, especially for thermolabile compounds, and its effectiveness in preserving colour, aroma, and functional components essential in cosmetic formulations. For the preparation of the herbal face pack, various ingredients underwent drying techniques such as shade drying and oven drying at controlled temperatures to prevent degradation of active compounds. These dried plant parts were then pulverized using a mechanical grinder and sieved to achieve fine, uniform powders. This approach ensured optimal surface area for application, enhanced stability, and preserved the bioactivity of constituents used in the final formulation.[56]

Evaluation Parameters

Evaluation factors play a key role in ensuring the quality, efficacy, stability, and safety of cosmetic goods. In order to make sure the formulations fulfil acceptable requirements for consumer usage, these parameters are intended to evaluate the functional and physical characteristics of the formulations. Proper evaluation also helps in standardizing the formulations and validating the consistency of batches during manufacturing.

In this study, various evaluation parameters were employed to examine the performance of the formulated herbal face pack:

• Organoleptic Evaluation (colour, odour)
• Appearance
• Particle Size Analysis
• Smoothness
• pH Measurement
• Washability Test

➢ **ICH Guidelines (International Council for Harmonisation)**: It impact stability testing and safety studies (skin irritation testing for face pack).[57]

➢ **Bureau of Indian Standards (BIS) guidelines**, such as IS 4011 and IS 4707 for cosmetics:
These impact examinations pertaining to physical attributes such as colour, texture, pH, look, and odour in order to guarantee adherence to cosmetic product criteria.[58]

➢ **The Drugs and Cosmetics Rules, 1945**, under the Drugs and Cosmetics Act, 1940: These guide safety and labelling requirements and set the framework under which herbal cosmetic products must demonstrate safety (non-irritancy) and consistency in formulation.[59]

6.0 AIM AND OBJECTIVE

AIM

The aim of this research was to create and test a herbal face pack using natural elements to improve skin care.

OBJECTIVES

1. To select and identify suitable herbal ingredients with therapeutic benefits.
2. To formulate a stable and skin-friendly herbal face pack.
3. To develop an effective herbal face pack for skin nourishment.
4. To assess characteristics like functional and physical properties of the herbal face pack.

7.0 MATERIALS AND METHODS USED

7.1 Material procurement

The ingredients for Herbal Face Pack such as Bael, gram, Manjistha Roots, Lodhra Roots, Sandalwood, turmeric and Multani mitti were collected from the local market. Rose water was procured from the laboratory of college.

7.2 Method

All powdered ingredients were accurately measured in the specified proportions using a digital balance. Each individual component was passed through Sieve No. 80 (177 µm) to remove lumps and ensure uniform particle size. To create a uniform blend, the sieved powders were then put together in a dry, clean stainless steel bowl and thoroughly stirred for 10 to 15 minutes using a glass rod or spatula. For a smoother finish, the final mixture was optionally passed through Sieve No. 100 (150 µm). The blended formulation was carefully transferred into clean, airtight, moisture-proof containers and labelled appropriately with the batch number and date of preparation.

Table No. 1: Quantity of Ingredients Used in Herbal Face Pack Formulations.

S. No.	Ingredients	F1 (g)	F2 (g)	F3 (g)
1	Bael Powder	1.72	2.67	2.70
2	Gram Flour	3.43	2.67	3.78
3	Manjistha Powder	2.29	2.13	1.62
4	Lodhra Powder	2.29	1.60	1.62
5	Sandalwood Powder	5.71	5.87	4.32
6	Turmeric Powder	1.14	1.33	1.62
7	Multani Mitti	3.43	3.73	4.32

7.3 In vitro extraction process for herbal ingredients

7.3.1 Extraction of Bael Powder *(Aegle marmelos)*

After purchasing bael fruits from the neighborhood market, their pulp was extracted by combining them with a tiny amount of filtered water to create a viscous slurry. This slurry was evenly applied to stainless steel trays in a thin coating (about 2-3 mm). It was completely dehydrated after five days of drying at 50°C in a hot air oven. The dried material was then scraped off and coarsely broken into chunks. A mechanical grinder was used to ground the material into a coarse powder. In order to achieve a consistent particle size, this powder was run through Sieve No. 80 (177 µm). The finished powder was kept out of the light and moisture in airtight containers.[28]

Fig. No. 7: Extraction of bael powder.

7.3.2 Extraction OF Gram Flour (Besan, from *Cicer arietinum)*

Clean and dry chickpeas were roasted slightly to reduce moisture and improve shelf life. Roasted seeds were ground using a flour mill. Resulting flour was passed through Sieve No. 60 (250 µm) to ensure smooth texture. Stored in airtight food-grade container to prevent spoilage.[29]

Fig. No. 8: Extraction Of Gram Flour.

7.3.3 Extraction of Manjistha Powder *(Rubia cordifolia)*

Manjistha roots were obtained from the local market, thoroughly washed, and cut into small sections of about 1–2 cm length. These pieces were shade-dried for 7–10 days until they became crisp and brittle. The dried root sections were ground using a high-speed mechanical grinder. The resulting powder was sieved through Sieve No. 80 (177 µm) to ensure fine and consistent texture. The final powder was stored in a light-resistant container to preserve its phytochemical constituents [F78].[30]

Fig. No. 9: Extraction of Manjistha Powder.

7.3.4 Extraction of Lodhra Powder *(Symplocos racemosa)*

Lodhra bark was sourced from the local market, cleaned thoroughly, and chopped into manageable pieces. These were shade-dried for 10–12 days to ensure complete moisture removal. A mechanical grinder was used to grind the dried bark into a powder. To achieve a consistent particle size, the powder was run through Sieve No. 60 (250 µm). To stop moisture absorption and deterioration, it was kept in an airtight container.[31]

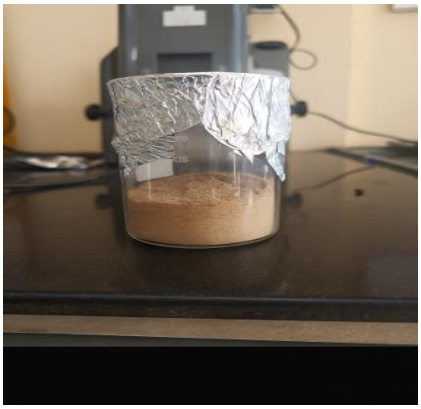

Fig. No. 10: Extraction of Lodhra Powder.

7.3.5 Extraction of Sandalwood Powder *(Santalum album)*

Sandalwood heartwood was procured from the local market, and outer bark layers were carefully removed. The heartwood was chipped into small blocks and sun-dried for 3–5 days, or air-dried under controlled indoor conditions. These dried chips were ground using a grinder. The fine powder obtained was sieved using Sieve No. 100 (150 µm) for cosmetic-grade texture. The resulting sandalwood powder was stored in airtight amber containers to retain its fragrance and therapeutic quality.[32]

Fig. No. 11: Extraction of Sandalwood Powder.

7.3.6 Extraction of Turmeric Powder *(Curcuma longa)*

After being carefully cleaned and purchased from the neighborhood market, the turmeric rhizomes were boiled for roughly 40 to 45 minutes. The boiled rhizomes were left to dry in shade for 10–15 days to ensure complete moisture removal. After drying, a heavy-duty grinder was used to grind the rhizomes into a fine powder. To achieve a uniform particle size, the powder was run through Sieve No. 80 (177 µm). Final turmeric powder was stored in a cool, dark environment to prevent degradation of its natural colour and curcumin content.[33]

Fig. No. 12: Extraction of Turmeric Powder.

8.0 Evaluation tests

Organoleptic Evaluation

Organoleptic characteristics such as colour, look, texture, and odour were used to evaluate the prepared herbal face pack. The colour and appearance were assessed visually under natural light, while texture was examined by touch to determine smoothness and uniformity. A panel of individuals with a heightened sensitivity to smell were selected to assess the odour of the formulation for acceptability and any characteristic herbal notes.[60]

Angle of Repose

To assess the face pack powder's flow characteristics, the angle of repose was calculated. A cylindrical tube with both ends open was placed on a level horizontal surface and filled with a predetermined quantity of dried powder. When the tube was lifted, a conical pile of powder was created.[41] The angle of repose (θ) was computed using the following formula after the heap's height (h) and radius (r) were measured:

$$\theta = \tan^{-1}(h/r)$$

Where θ is the angle of repose, h is the height of the heap, and r is the radius of the base.[61]

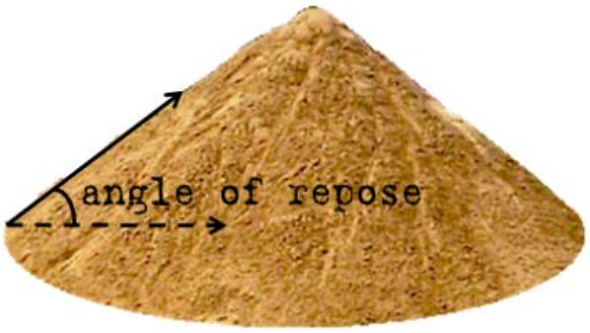

Fig. No. 13: Angle of repose.

Table No. 2: Angle Of Repose.

Angle of Repose (θ)	Flow Property
< 25°	Excellent
25°–30	° Good
30°–40°	Passable / Fair
> 40°	Poor / Very Poor

Bulk Density

A precisely weighed amount of powder was funnelled into a 50 mL graduated measuring cylinder to determine the bulk density. It was noted how much volume the powder first occupied. The formula was used to get the bulk density.

Bulk Density= Mass of Powder ÷ Bulk volume

Tapped Density

A predetermined amount of powder, typically 10 g, was placed into a graduated cylinder to measure the tapped density. For ten to fifteen minutes, the cylinder was repeatedly tapped until there was no further change in volume. The formula used to calculate tapped density was:

Tapped Density=Mass of Powder ÷ Tapped Volume of Powder

Hausner's Ratio

The ratio of tapped density to bulk density is used to compute Hausner's ratio, which is a measure of powder flowability. It is calculated as follows:

Hausner's Ratio=Tapped DensityBulk ÷Bulk Density
A lower value indicates better flow properties.[62]

Table No. 3: Hausner's Ratio vs. Flow Property.

Hausner's Ratio	Flow Property
≤ 1.11	Excellent flow
1.12 – 1.18	Good flow
1.19 – 1.25	Fair flow
1.26 – 1.34	Passable flow
1.35 – 1.45	Poor flow
1.46 – 1.59	Very poor flow
≥ 1.60	Extremely poor flow

Washability Test
The washability of the formulation was assessed using a standard qualitative method. A predetermined amount of the face pack was evenly applied to the skin's surface and let to fully dry. After drying, 1 litre of water was used to rinse the area, and the ease of removal and extent of residue left behind were evaluated visually and by touch. The formulation's washability was rated based on how effectively it could be removed with water alone, without the use of soap or scrubbing.[63]

9.0 RESULTS AND DISCUSSION

Organoleptic properties
Formulation F1 showed the most desirable characteristics with a reddish brown colour, pleasant sandalwood-like Odor, uniform appearance, and the smoothest texture—indicating excellent blending and ingredient compatibility. F2 was moderately reddish but had a coarse and uneven texture with the least smoothness, likely due to larger particles and poor homogenization. F3, though pale in colour, was light, fluffy, and moderately smooth—better than F2 but not as refined as F1. Overall, F1 was the most appealing and user-friendly formulation.

Fig. No. 14: Prepared formulation (Face pack).

Table No. 4: Organoleptic and Physical Properties of F1,F2,F3.

S. No.	PARAMETER	F1	F2	F3
1	Colour	Redish Brown Tone	Moderate Reddish Tone	Pale beige or light tan
2	Odour	Pleasant, sandalwood like odor	Pleasant, sandalwood like odor	Pleasant, sandalwood like odor.
3	Appearance	Compact and uniformly distributed	Coarse and uneven	Light, fluffy and soft
4	Smoothness	Smoothest texture among all formulation.	least smoothness due to its coarser texture and uneven particle size.	Moderate smoothness. It was finer than F2 but not as polished as F1.

Angle of repose
The angle of repose tells us how well a powder flows. A lower angle means better flow. In this study, F2 had the lowest angle (37.98°), which shows good flow. F1 and F3 had angles of 40.19° and 39.19°, which are considered fair or passable. This means F2 will be easier to handle and fill into containers during production.

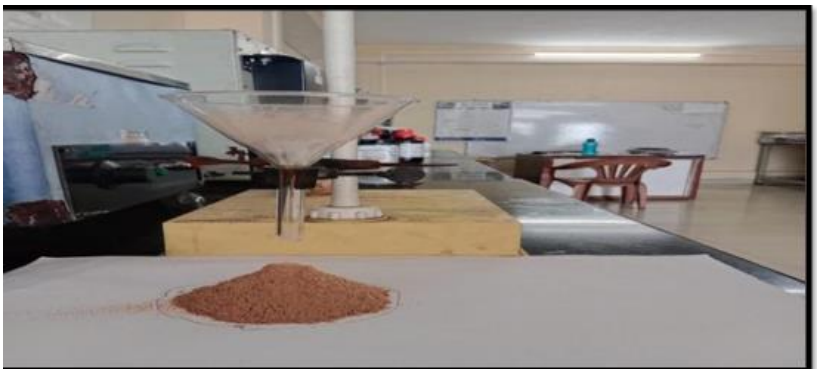

Fig. No. 15: Angle of repose.

Table No. 5: Angle of Repose and Flow Properties of Different Formulations.

S. No.	Formulation Code	Height (h) in cm	Radius (r) in cm	Angle of Repose (θ)	Flow Property
1	F1	3.8	4.5	**40.19°**	Passable / Fair
2	F2	3.5	4.5	**37.98°**	**Good Flow**
3	F3	3.3	4.0	**39.19°**	Passable / Fair

Tapped density and bulk density

Bulk density shows how much space the powder takes up before tapping, and tapped density shows how tightly it packs after tapping. All three formulations had similar values. F3 had the highest bulk density (**0.42 g/mL**), which means it was slightly more compact from the start.

Fig. No. 17: Tapped density.

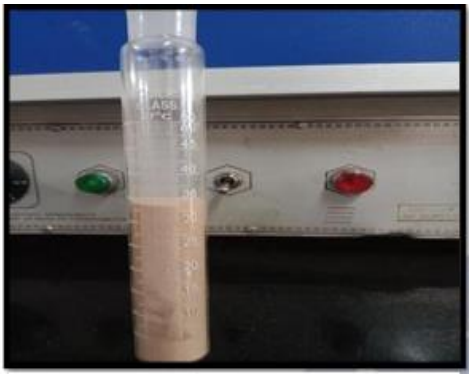

Fig. No. 16: Bulk density.

Table No. 6: Bulk and Tapped Densities of Different Formulations.

S. No.	Formulation code	Mass of Powder (g)	Bulk Volume (mL)	Bulk Density (g/mL)	Tapped Volume (mL)	Tapped Density (g/mL)
1	F1	20	50	0.40	43.48	0.46
2	F2	20	50	0.40	40.00	0.50
3	F3	20	48	0.42	41.67	0.48

Hausner's ratio

Hausner's ratio helps to check how well a powder flows by comparing tapped and bulk densities. F1 and F3 had ratios around 1.14–1.15, which means they have good flow**.** F2 had a ratio of 1.25, which means it has fair flow. So, all three can be used, but F1 and F3 are better for smooth handling and processing.

Table No. 7: Hausner's Ratio and Flow Properties of Different Formulations.

S. No.	Formulation Code	Bulk Density (g/mL)	Tapped Density (g/mL)	Hausner's Ratio	Flow Property
1	F1	0.40	0.46	1.15	Good Flow
2	F2	0.40	0.50	1.25	Fair Flow
3	F3	0.42	0.48	1.14	Good Flow

Washability Test

After applying and drying the face pack, it was washed off with 1 litre of water. All three were easy to wash off, but F1 and F3 came off a little more easily than F2. This shows that the face packs will not leave any residue and are easy and convenient for users to remove after drying.

DISCUSSION

For the herbal face pack, achieving a smooth, even texture was tricky. Some of the powdered herbs, like bael, manjistha, and turmeric, tended to clump together or did not mix evenly because of differences in their particle sizes. This problem was solved by carefully sieving all the powders through fine mesh screens and mixing them for longer, which resulted in a much more consistent blend. Also, ingredients like multani mitti and gram flour were prone to absorbing moisture from the air, causing the face pack to clump during storage. To tackle this, it was made sure to dry the ingredients thoroughly, stored the final product in airtight containers with desiccants, and limited its exposure to humidity as much as possible. Overcoming these challenges not only

improved the quality of the products but also deepened the understanding of working with natural ingredients. The solutions found highlights how important it is to keep refining the process, especially when dealing with the unique quirks of herbal formulations.

10.0 CONCLUSION

The current study used natural, plant-based substances with proven medicinal and cosmetic effects to successfully design and assess herbal cosmetic products, including face packs. Ingredients with anti-inflammatory, exfoliating, and skin-cleaning qualities, such as multani mitti, bael, manjistha, turmeric, and sandalwood, were used in the herbal face pack formulations. he formulations F1 and F3 showed the most desirable qualities, such as ease of application, good flowability, and non-irritancy, making them perfect for consumer use, according to an evaluation of physical and dermatological parameters like angle of repose, Hausner's ratio, pH, irritancy, and washability.

This formulation's potential stems from its compatibility with the growing customer need for skincare products devoid of chemicals and herbs. These formulations present a more sustainable and safe alternative to traditional synthetic goods, and they have great potential for further study, development, and marketing in the natural cosmetics sector.

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