



Development and Evaluation of a Polyherbal Face Pack for Natural Skin Care Applications

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ABSTRACT

*The largest organ in the human body, the skin acts as a barrier to keep out dangerous substances, microbes, UV rays, and contaminants from the environment. Numerous skin issues, including acne, pigmentation, dryness, and early aging, have been linked to increased exposure to pollution, stress, poor diet, and artificial cosmetics. Because they use natural plant-based substances with little side effects, herbal cosmetics have grown in favour as safer and more environmentally responsible substitutes for traditional products. Using Neem (*Azadirachta indica*), Turmeric (*Curcuma longa*), Sandalwood (*Santalum album*), Multani Mitti (Fuller's Earth), Orange Peel (*Citrus sinensis*), and Aloe Vera (*Aloe barbadensis* Miller), the current study sought to create and assess a herbal face pack. Antibacterial, anti-inflammatory, antioxidant, cleaning, moisturizing, cooling, and skin-brightening actions are just a few of the therapeutic qualities that each ingredient was chosen for. Aloe Vera gel was introduced as an additive to the mixture, contributing to smooth consistency after the powdered materials were precisely weighed, dried, sieved, and mixed evenly. The developed face pack formulation was assessed for stability, washability, irritancy, pH, and organoleptic properties. During the patch test, the formulation showed no evidence of skin irritation, a light brown colour, a nice Odor, a smooth texture, a pH of 6.8, ease of washing, and satisfactory stability at room temperature. Deep cleansing, oil management, hydration, acne prevention, and overall skin appearance enhancement are all successfully supported by the mix of herbal substances. Outcomes of the study reveal that the herbal face pack is not only stable and safe but also economical and fit for daily cosmetic use. The formulation is a promising herbal skincare product that could effectively replace synthetic face packs and promote healthy, glowing skin because of its natural composition and positive assessment findings.*

Keywords: *Neem, Turmeric, Sandalwood, Multani Mitti, Orange Peel, stability, therapeutically effective.*

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INTRODUCTION

The largest organ in the human body, the skin acts as a barrier to keep out UV rays, dangerous chemicals, microbes, and pollutants from the environment. In addition to protecting the body, healthy skin also conveys personality and general well-being. These days, a variety of skin issues, such as acne, pimples, pigmentation, dryness, wrinkles, and early aging, are caused by factors like pollution, stress, poor diet, excessive use of synthetic cosmetics, and changing lifestyles. Consequently, maintaining healthy and appealing skin now requires adequate skin care [1,2].

The rising preference for herbal-based cosmetic products stems from their natural origin and reduced likelihood of adverse effects compared to synthetic formulations. Among these, the herbal face pack remains a widely used preparation valued for its cleansing, nourishing, and skin-revitalizing properties. Plant-based components that are high in vitamins, minerals, antioxidants, and antibacterial compounds are used in these formulations to naturally improve the texture and look of skin. Herbal-based cosmetic products are generally associated with a reduced incidence of side effects and are appropriate for long-term usage, in contrast to chemical-based cosmetics. Herbal cosmetics are all-natural beauty products made with plant-based components like fruits, flowers, roots, herbs, and essential oils. These products minimize the usage of artificial chemicals while improving the concerning health of skin and hair condition [3,4]. Herbal cosmetics have been increasingly popular worldwide as people become more conscious of health, wellbeing, and environmental sustainability. Herbal cosmetics concentrate on the inherent therapeutic and nourishing qualities of medicinal herbs, in contrast to conventional cosmetics that

frequently contain artificial colors, scents, and preservatives. Because of their calming, antimicrobial, and revitalizing properties, ingredients like aloe vera, neem, turmeric, sandalwood, rose, and tulsi are frequently employed. Creams, lotions, shampoos, face packs, and soaps are among the many skincare, haircare, and personal hygiene products that contain herbal cosmetics [5,6]. Considered safe for prolonged application, they are compatible with all skin types, including sensitive skin.

Each botanical ingredient selected for the present formulation contributes a distinct therapeutic and cosmetic function. Neem (*Azadirachta indica*) is valued for its antibacterial and anti-inflammatory constituents, including nimbidin, azadirachtin, nimbin, and quercetin, which control acne-causing bacteria and reduce redness and irritation [7-11]. Turmeric (*Curcuma longa*), owing to its active compound curcumin, exhibits potent anti-inflammatory, antioxidant, and antibacterial activity that helps regulate sebum secretion and diminish acne-related inflammation [12-14]. Sandalwood (*Santalum album*) contributes santalols and related sesquiterpenoids with anti-inflammatory, antibacterial, and antiseptic properties that impart a cooling, calming effect while minimizing pore size [15-18]. Multani mitti (Fuller's earth), rich in hydrated aluminum silicates and minerals such as magnesium, calcium, and iron oxides, acts as a natural astringent that absorbs excess sebum and impurities from the skin surface [19-21]. Orange peel (*Citrus sinensis*) supplies flavonoids, vitamin C, and limonene, which function as antioxidants and natural exfoliants that brighten skin tone and reduce acne scarring. [22,23]. Aloe vera (*Aloe barbadensis* Miller), through bioactive constituents such as acemannan, anthraquinones, glucomannans, salicylic acid, and vitamins A, C, and E, provides deep hydration along with antibacterial and skin-repairing action suited to all skin types, including sensitive skin [24].

The creation and assessment of a herbal face pack utilizing organic components like neem, turmeric, sandalwood, multani mitti, orange peel, and aloe vera represents the primary aim of this study. Every component has special therapeutic and cosmetic properties that are beneficial for skin health. Orange peel brightens skin, aloe vera hydrates and repairs damaged skin tissues, neem and turmeric help reduce acne and irritation, multani mitti eliminates excess oil and impurities, and sandalwood has cooling and calming benefits. The aim of this research is to prepare a safe, effective, and economical herbal face pack that can improve skin glow, reduce skin problems, and maintain healthy skin naturally. The prepared face pack underwent evaluation for a range of physicochemical characteristics, including appearance, pH, texture, stability, irritancy, and washability to ensure its quality, safety, and effectiveness for cosmetic use [7, 25].

Advantages of Herbal Face Pack

- **Made from natural ingredients** – Contains herbs, fruits, and plant extracts with minimal synthetic chemicals.
- **Suitable for a wide range of skin types** – When properly formulated, it tends to minimize the occurrence of adverse reactions.
- **Nourishes the skin** – Provides essential vitamins, minerals, and antioxidant properties that aid in preserving healthy skin
- **Cleanses deeply** – Removes dirt, excess oil, and impurities from the skin.
- **Improves skin complexion** – Helps brighten the skin and promotes a natural glow.
- **Controls excess oil** – Useful for oily and acne-prone skin by reducing sebum production.
- **Helps prevent acne and pimples** – Many herbal ingredients possess antimicrobial and anti-inflammatory characteristics.
- **Reduces premature aging signs** – Herbal antioxidants are believed to minimize the visibility of fine lines and wrinkles[8,9,12,25].

Precautions to be Followed During Face Pack Application

- The face pack should be selected based on individual skin type.
- Application once or twice a week is generally sufficient.
- The pack should not be left on the skin beyond the recommended duration.
- Only a thin, even layer should be applied to the skin.
- Application over open wounds or broken skin must be avoided.
- The pack should be applied using gentle, upward strokes.
- All makeup and cosmetic residues should be removed prior to application.
- The face pack should not be allowed to dry completely and crack on the skin.
- Cosmetics should not be applied immediately after removing the pack.
- The face should be rinsed thoroughly with water once the pack is removed [9, 24].

Skin Types and Benefits (Table 1)

Human skin is broadly classified into five major types: normal, dry, oily, combination, and sensitive skin. These classifications are based on factors such as sebum production, moisture content, pore size, and skin sensitivity. Normal skin is characterized by a balanced level of oil and moisture, resulting in a smooth

texture and healthy appearance. Dry skin lacks sufficient natural oils, making it prone to roughness, flaking, and premature wrinkles. Oily skin produces excessive sebum, leading to enlarged pores, acne, blackheads, and a shiny appearance. Combination skin exhibits both oily and dry characteristics, typically with an oily forehead, nose, and chin (T-zone) and dry cheeks. Sensitive skin is highly reactive to environmental factors and cosmetic products and often presents with redness, itching, irritation, or inflammation. Understanding different skin types is essential for selecting suitable cosmetic formulations that effectively address individual skin care needs (7,13,16).

TABLE 1: Types of Skin and associated Benefits of face pack

S.No	Skin Type	Benefits of Face Pack
1.	Oily Skin	Controls oil and acne
2.	Dry Skin	Provides hydration
3.	Sensitive Skin	Reduces irritation
4.	Combination Skin	Balances moisture

MATERIAL AND METHODS

The following materials and herbal components were utilised in the preparation of the herbal face pack formulation (**Table 2**), (**Figure 1**):

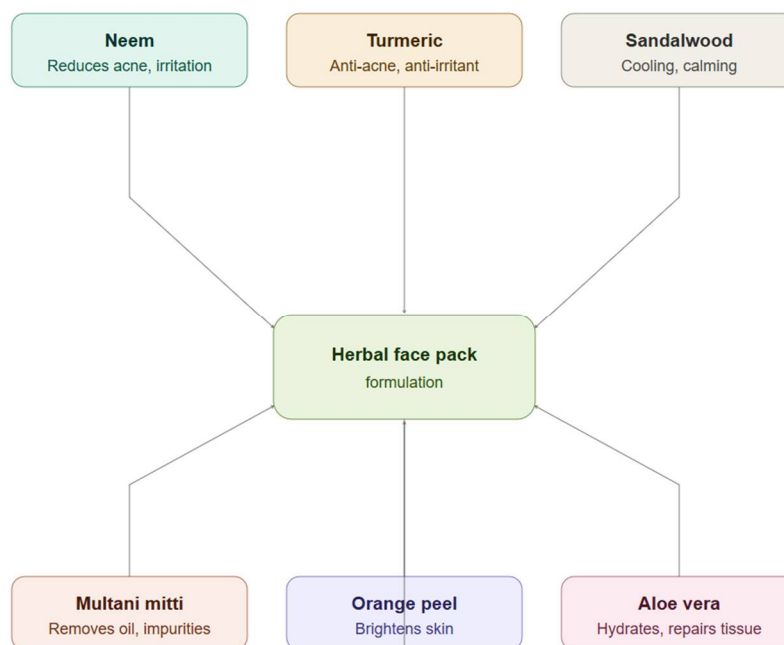


Fig 1: Schematic representation of herbal face pack formulation showing the six ingredients (neem, turmeric, sandalwood, multani mitti, orange peel, aloe vera), their key skin benefits.

TABLE 2: Schematic representation of ingredients used in formulation of Face Pack

S.No	Ingredient	Quantity	Role
1	Neem Powder	20 g	Antibacterial
2	Turmeric Powder	10 g	Anti-inflammatory
3	Sandalwood Powder	15 g	Cooling agent
4	Multani Mitti	25 g	Cleansing agent
5	Powdered Orange Peel	15 g	Skin brightening
6	Aloe Vera Gel	15 g	Moisturizer

Formulation Procedure for the Herbal Face Pack

- All ingredients were accurately weighed.
- Each drug was subjected to drying in a hot air oven set at a temperature of 50°C
- Powders were sieved separately to remove coarse particles.
- All components were blended homogeneously using geometric mixing.
- Aloe Vera gel was introduced into the mixture slowly to obtain smooth consistency.
- The developed face pack was placed into an airtight container for storage[24].

How to apply?

Take prepared face pack paste in a bowl as per the requirement and add honey or water. Mix it well and apply over the facial skin. Let it dry for 15-20 minutes and then wash it with cold water.

Evaluation Parameters

Organoleptic Evaluation

Organoleptic evaluation pertains to assessing the herbal face pack based on human sensory attributes such as sight, touch, and smell. It represents a significant preliminary quality control test used to ensure the product is acceptable, stable, and pleasant for consumer use [25].

- Colour
- Odor
- Texture
- Appearance
- Smoothness

pH Test: The pH is then measured using a pH meter or pH indicator strips.

Irritancy Test: An irritancy test of a herbal face pack is performed to evaluate whether the formulation causes skin irritation before it is considered safe for use.

Washability: The face pack was easy to remove with normal water.

Stability Study

The prepared formulation was kept at ambient temperature and monitored for any variations in colour, odour, and texture.

Spreadability

The spreadability of the herbal face pack was determined using the slip and drag method. A small quantity of the sample was placed on a glass slide, over which a second slide was positioned. A weight of 100 g was applied on top to allow the formulation to spread uniformly as a thin film between the two slides, after which the excess weight was removed. A standard weight of 20 g was then tied to the upper slide, and the time taken for the upper slide to travel a fixed distance was recorded. The procedure was repeated three times, and the average value was used for calculation. Spreadability was determined using the following formula:

$$S = M \times L / T$$

Where, S = Spreadability, M = Weight tied to the upper slide (20 g), L = Length of the glass slide (6.5 cm), T = Time taken (in seconds) (4, 8, 13, 15, 17, 24, 25).

RESULTS AND DISCUSSION

Formulation and evaluation of the herbal face pack were successfully carried out, and the corresponding findings are presented in Tables 3 and 4. Preformulation studies involved assessing the formulation's organoleptic and physicochemical characteristics.

On organoleptic evaluation, the prepared face pack exhibited a light brown colour with a pleasant odour, attributable to the combined natural pigments and aromatic constituents of the incorporated herbs. The formulation displayed a smooth, homogeneous texture with no lump formation, and was non-gritty on application, indicating uniform mixing and adequate particle size reduction of the powdered ingredients.

The pH of the formulation was found to be 6.8, which lies within the skin-compatible range and is close to the natural pH of the skin surface (Figures 2). This suggests that the face pack is unlikely to disrupt the skin's acid mantle or cause dryness and irritation upon regular use.

The irritancy test revealed no signs of redness, swelling, or irritation on the skin, confirming the formulation's safety for topical application. This can be attributed to the mild and skin-friendly nature of the selected herbal ingredients, particularly aloe vera and sandalwood, which are known for their soothing properties.

Spreadability, determined by the slip and drag method, was found to be 4.9 ± 0.5 g·cm/sec (mean of three trials), indicating that the formulation spreads evenly and smoothly over the skin surface without excessive dragging, an important attribute for consumer acceptability of a topical face pack (Figure 3).

Upon stability testing, the formulation remained stable at room temperature over the storage period, with no significant changes observed in colour, odour, or texture, indicating good physical stability of the formulation under ambient storage conditions.

The prepared face pack was found to be easily washable with normal water, non-irritating, and suitable for skin application. Collectively, these findings indicate that the developed herbal face pack meets the essential quality attributes required for a safe, stable, and cosmetically acceptable topical formulation.

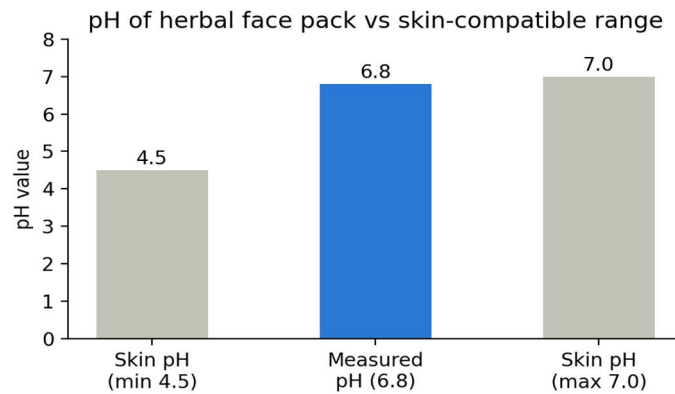
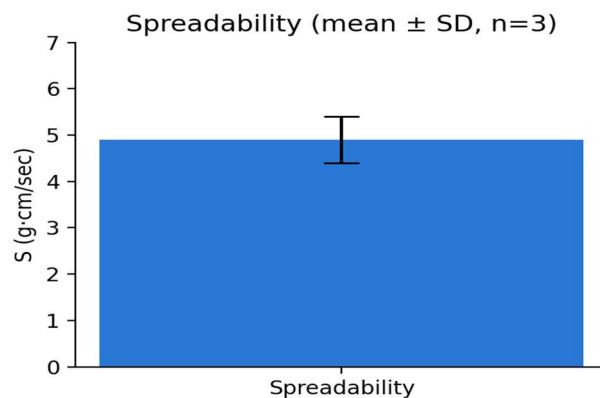
TABLE 3 : Evaluation parameters of the prepared herbal face pack

S. No.	Parameter	Method	Result
1	Colour	Visual inspection	Light Brown
2	Odour	Sensory evaluation	Pleasant
3	Texture	Sensory evaluation	Smooth
4	Appearance	Visual inspection	Homogeneous, no lump formation
5	Smoothness	Sensory evaluation	Smooth and non gritty
6	pH	pH meter / pH strips	6.8
7	Irritancy test	Patch test on skin	No irritation
8	Washability	Rinsing with normal water	Easily washable
9	Stability	Storage at ambient temperature	Stable at room temperature
10	Spreadability ($S = M \times L / T$)	Slip and drag method	4.9 ± 0.5 g-cm/sec

Table 4 Spreadability trial data of herbal face pack

Trial	Weight tied, M (g)	Length of slide, L (cm)	Time taken, T (sec)	Spreadability $S = M \times L / T$ (g-cm/sec)
1	20	6.5	29.5	4.4
2	20	6.5	26.5	4.9
3	20	6.5	24.1	5.4
Mean $\pm$ SD	—	—	26.7 ± 2.7	4.9 ± 0.5

Spreadability was determined using the slip and drag method ($S = M \times L / T$), where M = weight tied to the upper slide (20 g), L = length of the glass slide (6.5 cm), and T = time taken (in seconds) for the slide to travel the fixed distance. The procedure was repeated three times and the mean value was used for calculation.

**Figure 2: pH of formulation compared to skin-compatible range****Figure 10: Spreadability of formulation (mean $\pm$ SD, n=3)**

CONCLUSION

The herbal face pack formulated using neem, turmeric, sandalwood, multani mitti, orange peel, and aloe vera demonstrated satisfactory results across all evaluation parameters. Neem and turmeric effectively

reduced acne and inflammation through their antimicrobial and anti-inflammatory activity, while multani mitti absorbed excess oil and cleansed the skin pores. Sandalwood imparted cooling and soothing effects, orange peel improved skin brightness, and aloe vera maintained skin hydration and softness. The formulation exhibited good physical stability, an acceptable pH close to the skin's natural range, a smooth texture, and no signs of irritation, confirming its suitability for topical use.

Overall, the developed herbal face pack proved to be safe, effective, and cosmetically acceptable, combining the therapeutic benefits of multiple medicinal plants in a single formulation for maintaining healthy skin. Being free from synthetic chemicals, herbal cosmetics of this kind offer a safer and more economical alternative to conventional products, with a reduced likelihood of adverse effects on long-term use. Based on these findings, the prepared herbal face pack can be recommended as a natural, skin-friendly option for regular skincare.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest, financial or otherwise, related to this work.

AUTHOR'S CONTRIBUTION

Shiva: Conceptualization, study design, and formulation of the herbal face pack.

Krati: Experimental work and data collection.

Dr. Esha Vatsa: Data analysis and manuscript drafting.

Swati Pandey: Experimental work and data collection.

Jyoti Pandit: Experimental work and data collection.

Nidhi Chaudhary: Data analysis and manuscript drafting

Dr. Amandeep Singh: Supervision, manuscript review, and final approval.

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Data Availability

The data supporting the findings of this study are available within the article. No additional external datasets were generated or analyzed during this study.

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