

# Formulation and Evaluation of a Polyherbal Face Pack Using Amla Seed, Beetroot Peel, Multani Mitti, Sandalwood and Rice Flour

S.Kiruthika<sup>1</sup>, S. kishore<sup>2</sup>, M. kokila<sup>3</sup>, , S. Jeevanandham<sup>4</sup>

S.Kiruthika<sup>1</sup>, S. kishore<sup>2</sup>, M. kokila<sup>3</sup> *Department of Pharmaceutics, Sri Vijay Vidyalyaya College of Pharmacy, Dharmapuri, Tamil Nadu, India*

S. Jeevanandham<sup>2</sup> *Department of Pharmaceutics, Sri Vijay Vidyalyaya College of Pharmacy, Dharmapuri, Tamil Nadu, India*

## Abstract

This study aimed to formulate and evaluate a herbal face pack using natural ingredients, namely amla seed powder, beetroot peel powder, Multani mitti, sandalwood powder and rice flour, selected for their antioxidant, antimicrobial, anti-inflammatory, skin-brightening, cleansing and soothing properties. The herbal powders were blended by the geometric dilution method to obtain a uniform formulation. Four formulations (F1-F4) were prepared by varying ingredient ratios and evaluated for morphological, physicochemical and physical characteristics, including colour, odour, texture, pH, moisture content, particle size, ash value, angle of repose, bulk and tapped density, Hausner ratio, Carr's index, washability, irritancy, spreadability and stability. All formulations showed acceptable appearance, pleasant odour, smooth texture and a skin-friendly pH of 5.5, together with good flow properties, low moisture content, satisfactory stability and no signs of skin irritation. Based on the overall evaluation, formulation F4 exhibited the most favourable combination of properties and was selected as the optimized batch. The developed herbal face pack is safe, stable, economical and represents a promising natural alternative to synthetic face packs for cleansing, brightening and nourishing the skin.

**Keywords:** *Herbal face pack; Amla seed; Beetroot peel; Multani mitti; Sandalwood; Geometric dilution; Cosmeceutical.*

## I. Introduction

Cosmetics are products applied to the body to cleanse, beautify or improve appearance, and range from skin and hair care products to oral care and decorative make-up. Conventional cosmetic formulations often rely on synthetic chemicals that may cause irritation, allergic reactions or long-term health concerns, prompting growing consumer and industry interest in herbal (natural) cosmetics. Herbal cosmetics, sometimes termed cosmeceuticals when they combine cosmetic and therapeutic benefit, are generally regarded as safer, hypoallergenic, affordable and free of harsh synthetic preservatives such as parabens, BHA and BHT.

The skin, the body's largest organ, is composed of the epidermis, dermis and subcutaneous tissue, and performs protective, thermoregulatory and barrier functions. A face pack is a semi-solid or powder preparation applied as a thin layer to facial skin, left to dry, and then washed off; it exfoliates dead skin, absorbs excess oil, and imparts soothing, cleansing, toning and brightening effects depending on its ingredients. In the present work, a polyherbal face pack was formulated using amla (*Phyllanthus emblica*) seed powder for its antioxidant and anti-inflammatory activity, beetroot (*Beta vulgaris*) peel powder for its betalain and phenolic antioxidant content, Multani mitti (Fuller's earth) for oil absorption and cleansing, sandalwood powder for its cooling, antibacterial and anti-ageing action, and rice flour as a gentle exfoliant and skin brightener. Four formulations were prepared by varying the proportions of these ingredients and evaluated for morphological, physicochemical, physical, and safety/performance parameters to identify the optimized batch.

## II. Materials and Methods

### 2.1 Materials

Amla seed powder, beetroot peel powder, Multani mitti, sandalwood powder and rice flour were procured, along with analytical-reagent-grade distilled water, ethanol, hydrochloric acid, sodium hydroxide and standard pH buffers for evaluation. Equipment used included an electronic weighing balance, mixer grinder, mechanical sieve (No. 60/120), hot-air oven, desiccator, digital pH meter, glass beakers, measuring cylinder, mortar and pestle, and airtight storage containers.

## 2.2 Role of Ingredients

| Ingredient           | Function                            |
|----------------------|-------------------------------------|
| Amla seed powder     | Antioxidant, skin rejuvenation      |
| Beetroot peel powder | Antioxidant, natural colourant      |
| Multani mitti        | Cleansing, oil absorption           |
| Sandalwood powder    | Cooling, soothing effect            |
| Rice flour           | Exfoliating agent, skin brightening |

Table 1: Role of ingredients used in the herbal face pack.

## 2.3 Formulation (Geometric Dilution / Solid Blending Method)

All powdered ingredients were passed through sieve no. 120 and accurately weighed. The powders were blended by geometric dilution using a mortar and pestle to ensure uniform mixing, and the resulting dry mixture was stored in an airtight container. Four batches (F1-F4) were prepared by varying the relative proportions of amla seed powder, beetroot peel powder, Multani mitti and sandalwood powder while keeping rice flour constant, with a total batch weight of 50 g (Table 2). For application, a small quantity of the powder was mixed with rose water or distilled water to form a smooth paste, applied to the face, left to dry for 15-20 min, and removed with lukewarm or cold water.

| Ingredient           | F1   | F2   | F3   | F4   |
|----------------------|------|------|------|------|
| Amla seed powder     | 15 g | 15 g | 10 g | 10 g |
| Beetroot peel powder | 15 g | 10 g | 15 g | 10 g |
| Multani mitti        | 10 g | 15 g | 10 g | 15 g |
| Sandalwood powder    | 5 g  | 5 g  | 10 g | 10 g |
| Rice flour           | 5 g  | 5 g  | 5 g  | 5 g  |
| Total                | 50 g | 50 g | 50 g | 50 g |

Table 2: Composition of herbal face pack formulations F1-F4.

## 2.4 Evaluation Parameters

Prepared formulations were evaluated for: (i) morphological characteristics (colour, odour, appearance, texture, smoothness) by visual inspection; (ii) physicochemical parameters - pH (10% w/v aqueous dispersion, digital pH meter), particle size (I.P. sieve method), moisture content (loss on drying) and total, water-soluble and acid-insoluble ash values; (iii) physical (powder flow) parameters - angle of repose, bulk density, tapped density, Hausner ratio and Carr's index; and (iv) performance and safety parameters - washability, skin irritation (patch application with observation for redness, itching and burning over 24 h), spreadability, and stability on storage at room temperature and 40°C for one month.

## III. Results and Discussion

All four formulations were pale-yellow, fine, smooth powders with a pleasant odour, consistent with the requirements of an acceptable cosmetic preparation (Table 3).

| Parameter  | Observation    |
|------------|----------------|
| Colour     | Pale yellowish |
| Odour      | Pleasant       |
| Appearance | Powder         |
| Texture    | Fine           |
| Smoothness | Smooth         |

Table 3: Morphological evaluation.

The surface pH of all batches was 5.5, close to the natural pH of skin and therefore suitable for topical application. Moisture content (1.81-1.94%) and total, water-soluble and acid-insoluble ash values increased marginally with

increasing Multani mitti and sandalwood content, while particle size decreased from 250  $\mu\text{m}$  (F1) to 220  $\mu\text{m}$  (F4), indicating a finer, more uniform powder in the higher Multani mitti/sandalwood batches (Table 4).

| Parameter                       | F1   | F2   | F3   | F4    |
|---------------------------------|------|------|------|-------|
| pH                              | 5.5  | 5.5  | 5.5  | 5.5   |
| Moisture content (%)            | 1.81 | 1.86 | 1.90 | 1.94  |
| Particle size ( $\mu\text{m}$ ) | 250  | 240  | 230  | 220   |
| Total ash value (%)             | 8.42 | 9.18 | 9.76 | 10.24 |
| Water-soluble ash (%)           | 4.36 | 4.82 | 5.14 | 5.48  |
| Acid-insoluble ash (%)          | 1.24 | 1.38 | 1.52 | 1.67  |

Table 4: Physicochemical evaluation.

Powder flow properties were satisfactory across batches, with angle of repose values of 13.7-15.5° and Carr's index mostly below 10 (except F2), indicating generally free-flowing, non-sticky powders suitable for cosmetic handling (Table 5).

| Parameter             | F1   | F2   | F3   | F4   |
|-----------------------|------|------|------|------|
| Angle of repose (°)   | 14.9 | 13.7 | 15.5 | 14.8 |
| Bulk density (g/mL)   | 0.50 | 0.51 | 0.57 | 0.60 |
| Tapped density (g/mL) | 0.54 | 0.66 | 0.54 | 0.64 |
| Hausner ratio         | 1.08 | 1.29 | 0.94 | 1.06 |
| Carr's index (%)      | 7.40 | 22.7 | 5.55 | 6.25 |

Table 5: Physical (powder flow) evaluation.

All formulations were easily washable, with F3 and F4 (higher sandalwood content) showing the best washability. None of the formulations produced redness, itching or burning during the 24-hour irritation study, confirming that all batches were non-irritant and safe for topical use. Colour, odour and texture remained unchanged on storage at room temperature and 40°C over one month, indicating satisfactory physical stability, and spreadability was good to very good across batches, with F3 and F4 spreading most smoothly and uniformly (Tables 6-9).

| Test                | F1           | F2           | F3           | F4           |
|---------------------|--------------|--------------|--------------|--------------|
| Washability         | Good         | Good         | Excellent    | Excellent    |
| Irritation          | Non-irritant | Non-irritant | Non-irritant | Non-irritant |
| Stability (1 month) | Stable       | Stable       | Stable       | Stable       |
| Spreadability       | Good         | Good         | Very good    | Very good    |

Tables 6-9 (summarised): Washability, irritation, stability and spreadability results.

Taken together, the physicochemical, physical, safety and performance data indicate that all four formulations possessed satisfactory cosmetic properties. Formulation F4 (10 g amla seed powder, 10 g beetroot peel powder, 15 g Multani mitti, 10 g sandalwood powder, 5 g rice flour) showed the most favourable overall profile - a skin-friendly pH of 5.5, acceptable moisture and ash values, the smallest particle size, good powder flow, excellent washability, absence of irritation, good stability and very good spreadability - and was therefore selected as the optimized formulation, with F3 performing comparably well on several parameters.

## IV. Conclusion

A polyherbal face pack combining amla seed powder, beetroot peel powder, Multani mitti, sandalwood powder and rice flour was successfully formulated by the geometric dilution (dry blending) method and evaluated across four batches (F1-F4). All formulations exhibited acceptable morphological, physicochemical and physical properties, a skin-compatible pH of 5.5, good washability and spreadability, freedom from skin irritation, and satisfactory short-term stability. Formulation F4 offered the best overall balance of properties and represents a safe, stable, economical and effective natural alternative to synthetic face packs, combining the cleansing, exfoliating, antioxidant and skin-brightening benefits of its herbal ingredients. Further work on microbiological stability, long-term storage and clinical/consumer evaluation is recommended to support commercial development.

## References

- [1] Kumar S, Dwivedi A, Singh AK. Herbal cosmetics: used for skin and hair. *Int J Pharm Sci Rev Res*. 2012;17(2):86-89.
- [2] Bijauliya RK, Alok S, Kumar M, Chanchal DK, Yadav S. A comprehensive review on herbal cosmetics. *Int J Pharm Sci Res*. 2017;8(12):4930-4949.
- [3] Joshi LS, Pawar HA. Herbal cosmetics and cosmeceuticals: an overview. *Nat Prod Chem Res*. 2015;3(2):170.
- [4] Kumar D, Rajora G, Parkash O, Himanshu, Antil M, Kumar V. Herbal cosmetics: an overview. *Int J Adv Sci Res*. 2016;1(4):36-41.
- [5] Khan AD, Alam MN. Cosmetics and their associated adverse effects: a review. *J Appl Pharm Sci Res*. 2019;2(1):1-6.
- [6] Babar SR, Gaikwad K, Kulkarni K. Formulation and evaluation of herbal face pack. *Anveshana's Int J Res Pharm Life Sci*. 2025;10(4):80-89.
- [7] Sandanshiv SY, Patil SR, Wagh VD, Shinde PA, Mali RP. Formulation and evaluation of herbal face pack. *J Drug Deliv Ther*. 2023;13(3):120-124.
- [8] Vaishnrya RR, Shaikh RR, Patil S, Salunkhe SB, Mahure SS. Formulation, development and evaluation of herbal face pack using Ayurvedic powders for gleaming and healthy skin. *Int J Pharm Sci Rev Res*. 2024;87(1):207-213.
- [9] Kumar R, Komal. Formulation and evaluation of herbal face pack. *Asian J Pharm Res*. 2021;11(1):9-12.
- [10] Rajpoot I, Mohammad M, Farooqui NA. Formulation and evaluation of herbal face pack by using natural ingredients. *Int J Pharm Sci Rev Res*. 2023;82(1):29-34.
- [11] Unhawane SR, Narsale VA, Jadhav NN. Formulation and evaluations of herbal face pack. *Int J Pharm Sci*. 2024;2(6):977-986.
- [12] Pawar S, Gosavi T, Jain BV, Shaikh T, Baviskar KD, Usman MRM. Formulation and evaluation of herbal face pack powder for enhanced skin care applications. *Afr J Biomed Res*. 2024;27(3):3072-3078.
- [13] Sundriyal A, et al. Herbal cosmetics: a review on herbal face pack. *Int J Pharm Res Appl*. 2022.
- [14] Pal RS, et al. In-house preparation and standardization of herbal face pack. *Int J Res Ayurveda Pharm*. 2017.
- [15] Londhe SS, Bhosale MG, Joshi AA. Formulation and evaluation of polyherbal face pack. *World J Pharm Med Res*. 2020;6(7):159-169.
- [16] Rashmi S, Yogendra Pal, Pranav. In-house preparation and standardization of herbal face pack. *Open Dermatol J*. 2017;11:72-80.
- [17] Chhikara N, Kushwaha K, Sharma P, Gat Y, Panghal A. Bioactive compounds of beetroot and utilization in food processing industry: a critical review. *Food Chem*. 2019;272:192-200.
- [18] Bangar SP, Sharma N, Sanwal N, Lorenzo JM, Sahu JK. Bioactive potential of beetroot (*Beta vulgaris*). *Food Res Int*. 2022;158:111556.
- [19] Prananda AT, Dalimunthe A, Harahap U, et al. *Phyllanthus emblica*: a comprehensive review of its phytochemical composition and pharmacological properties. *Front Pharmacol*. 2023;14:1288618.
- [20] Ghosal S, Tripathi VK, Chauhan S. Active constituents of *Emblca officinalis*: part I. The chemistry and antioxidative activity of two new hydrolysable tannins, emblicanin A and B. *Indian J Chem*. 1996;35B:941-948.