

Formulation And Evaluation of Face Pack Using Orange Peel

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Abstract— The present work was designed to formulate and evaluate a powder-based herbal face pack using orange peel powder as the main active ingredient. Herbal cosmetics are gaining wider acceptance because they are based on plant materials, are comparatively economical, and are perceived as safer for routine skin care than many synthetic cosmetic preparations. Orange peel, obtained from *Citrus sinensis*, is a valuable by-product that contains flavonoids, phenolic compounds, vitamin C, pectin and volatile constituents. These bioactive components have been associated with antioxidant, antimicrobial, cleansing and skin-conditioning potential. In this study, orange peel powder was combined with multani mitti, gram flour, sandalwood powder, neem powder, turmeric powder and rose powder to prepare an herbal face pack. The selected ingredients were dried, sieved, mixed geometrically and stored in an airtight container. The prepared formulation was evaluated for organoleptic properties, physicochemical parameters, powder flow characteristics, pH, moisture content, ash value, spreadability, washability and preliminary skin irritancy. The formulation showed a light orange-brown colour, pleasant herbal odour, fine texture and uniform appearance. The pH was found to be 6.4, which is suitable for topical application. The moisture content was 4.8%, total ash value was 6.2%, Carr's index was 17.64%, Hausner's ratio was 1.21 and angle of repose was 29.5 degrees, indicating acceptable flow properties. No redness, itching, swelling or irritation was observed during the preliminary irritancy study. The results suggest that an orange peel-based herbal face pack can be formulated as a simple, safe and economical cosmetic preparation for cleansing, oil control and skin refreshing purposes. Further stability, microbial limit and clinical acceptability studies are recommended before commercial development. (1)

Index Terms— Orange peel; *Citrus sinensis*; herbal face pack; herbal cosmetics; antioxidant; face care; formulation evaluation.

I. INTRODUCTION

Cosmetics are externally applied preparations intended to cleanse, protect, beautify and improve the appearance of the skin. The skin is continuously exposed to dust, sunlight, pollution, microorganisms and oxidative stress. These factors may contribute to excess sebum secretion, acne, dullness, pigmentation, dryness and premature ageing. Because of these concerns, face packs remain a widely used cosmetic dosage form in household and professional skin-care practices. A good face pack should cleanse the skin, absorb excess oil, remove superficial impurities, provide a cooling effect, improve skin texture and remain easy to apply and remove. (2)

Herbal cosmetics are prepared by incorporating plant powders, extracts, oils, gums or other natural materials into cosmetic bases. They are preferred because they are generally well accepted by consumers, are culturally familiar and can be prepared from locally available materials. In pharmacy practice, the development of herbal cosmetics requires appropriate selection of ingredients, standardization of raw materials, hygienic processing, compatibility assessment and evaluation of finished formulations. A powder-based face pack is especially convenient because it can be stored in dry form and converted into paste with rose water, milk, curd, honey or plain water at the time of use. (3)

Orange peel is the outer rind of *Citrus sinensis* and is commonly generated as fruit waste. Instead of being discarded, orange peel may be converted into a value-added cosmetic ingredient. Recent reviews have described *Citrus sinensis* as a source of phenolic acids, flavonoids and essential oil components with antioxidant, antibacterial and antifungal properties. Hesperidin, a major flavanone glycoside found in orange peel, has attracted attention as a possible clean-

label skin-care bioactive due to its antioxidant and skin-protective potential. (4)

Orange peel powder has several desirable cosmetic properties. Its fine particles act as a mild exfoliant, helping to remove dead cells from the superficial skin layer. Its aromatic volatile constituents contribute to a fresh odour. Its phenolic and flavonoid components may support protection against free radicals. In oily skin,

orange peel powder may help reduce greasiness and give a brighter appearance. These properties make it suitable as the chief ingredient of an herbal face pack.

(5)

A polyherbal approach was selected in the present formulation because different herbs and natural materials contribute complementary functions. Multani mitti acts as an adsorbent and oil-control agent. Gram flour improves cleansing and texture. Sandalwood powder provides a cooling effect and pleasant odour. Neem powder is traditionally used for acne-prone and oily skin. Turmeric powder is included

for its traditional antimicrobial and anti-inflammatory use, while rose powder improves fragrance and user acceptability. The present article describes the preparation and evaluation of a face pack using orange peel powder as the major active ingredient. (6)

II. MATERIALS AND METHODS

Collection and Processing of Orange Peel

Fresh sweet oranges were obtained from a local market. The peels were separated manually, washed thoroughly with potable water and then rinsed with distilled water to remove adhering dirt and residues. The peels were cut into small pieces and shade-dried at room temperature until they became brittle. Shade drying was preferred to protect colour and volatile constituents from excessive heat. The dried peels were ground using a mixer grinder and passed through sieve no. 60 to obtain fine orange peel powder. The powder was stored in a clean, dry and airtight container until formulation.

Ingredients Used

S. No.	Ingredient	Quantity for F1	Quantity for F2	Role in Formulation
1	Orange peel powder	30 g	35 g	Chief active, antioxidant, mild exfoliant
2	Multani mitti	25 g	20 g	Adsorbent, oil-control and cleansing agent
3	Gram flour	15 g	15 g	Mild cleanser and texture-improving agent
4	Sandalwood powder	10 g	10 g	Cooling, soothing and fragrance agent
5	Neem powder	10 g	10 g	Antimicrobial and anti- acne supportive ingredient
6	Turmeric powder	5 g	5 g	Antimicrobial and complexion-supporting ingredient
7	Rose powder	5 g	5 g	Fragrance, freshness and acceptability enhancer
Total		100 g	100 g	Powder face pack formulation

Table 1. Composition of orange peel herbal face pack formulations

Method of Formulation

All powdered ingredients were weighed accurately according to the formula. The powders were separately passed through sieve no. 60 to ensure uniform particle size and to remove coarse material. Geometric mixing was performed in a clean and dry mortar and pestle. Initially, orange peel powder and turmeric were mixed, followed by neem powder, sandalwood powder, rose powder, gram flour and multani mitti. The final blend was mixed for 15 minutes to obtain a uniform powder. The prepared powder was packed in an airtight amber- coloured container, labelled and stored in a cool and dry place. (7)

For application, approximately 5 g of powder was mixed with a sufficient quantity of rose water to form a smooth paste. The paste was applied as a thin and uniform layer on the face, avoiding the eye and lip area. It was allowed to dry for 15 to 20 minutes and then washed with normal water using gentle circular movements. (8)

Evaluation Parameters

The prepared face pack was evaluated by standard cosmetic and powder evaluation methods. Organoleptic parameters included colour, odour, texture, appearance and grittiness. Physicochemical evaluation included pH, moisture content, total ash and acid-insoluble ash. Powder flow properties were

determined through bulk density, tapped density, Carr's index, Hausner's ratio and angle of repose. Functional evaluation included spreadability, washability and preliminary skin irritancy. (9)

III. RESULTS AND DISCUSSION

Organoleptic Evaluation

Parameter	F1 Observation	F2 Observation
Colour	Light orange-brown	Deep orange-brown
Odour	Pleasant herbal-citrus odour	Strong herbal-citrus odour
Texture	Fine and smooth	Fine and smooth
Appearance	Uniform powder	Uniform powder
Grittiness	Absent	Absent
Lump formation	Absent	Absent

Table 2. Organoleptic evaluation of prepared formulations

Both formulations showed acceptable organoleptic characteristics. F1 had a lighter colour and balanced herbal odour, whereas F2 showed a stronger citrus note due to the higher proportion of orange peel powder. No visible lumps or grittiness were observed after sieving and mixing. F1 was selected as the optimized formulation because it showed better sensory balance and smoother application after mixing with rose water.

Physicochemical Evaluation

Parameter	F1	F2	Inference
pH of paste	6.4	6.2	Suitable for topical application
Moisture content	4.8%	5.1%	Low moisture; better storage stability
Total cash value	6.2%	6.5%	Acceptable inorganic residue
Acid-insoluble ash	1.1%	1.2%	Low siliceous matter
Loss on drying	5.0%	5.3%	Acceptable for dry powder formulation

Table 3. Physicochemical evaluation of formulations

The pH values of F1 and F2 were found to be 6.4 and 6.2 respectively, indicating compatibility with skin application. The normal skin surface is slightly acidic; therefore, extremely acidic or alkaline cosmetic preparations may produce irritation. Low moisture content is desirable for a powder-based herbal formulation because it reduces the chance of microbial

growth and caking during storage. Ash values provide an indication of inorganic material and help assess the quality and purity of herbal powders. (10)

Powder Flow Properties

Parameter	F1	F2	Inference
Bulk density	0.42 g/ml	0.44 g/ml	Acceptable packing property
Tapped density	0.51 g/ml	0.54 g/ml	Acceptable tapped volume reduction
Carr's index	17.64%	18.51%	Fair flow
Hausner's ratio	1.21	1.22	Fair flow
Angle of repose	29.5°	30.2°	Good to fair flow

Table 4. Powder flow properties of formulations

Flow property evaluation is important for filling, packing and handling of powder formulations. F1 showed an angle of repose of 29.5 degrees, Carr's index of 17.64% and Hausner's ratio of 1.21, suggesting fair to good flow. The findings indicate that the prepared powder could be conveniently transferred and packed without major flow-related difficulty. F1 showed slightly better flow than F2, possibly because the lower proportion of orange peel powder reduced the cohesiveness of the blend. (11)

Functional Evaluation

Test	Observation	Result
Spreadability	Smooth paste formed with rose water; uniform application	Good
Washability	Removed easily with normal water; no sticky residue	Good
After-feel	Skin felt clean and fresh	Acceptable
Drying time	15-20 minutes	Acceptable
Irritancy	No redness, itching, swelling or burning sensation	Skin felt clean and fresh

Table 5. Functional evaluation of optimized formulation F1

The optimized formulation produced a smooth paste when mixed with rose water. The paste could be spread easily and uniformly on the skin surface. After drying, the formulation was removed easily with water and did not leave an oily or sticky residue. Preliminary irritancy testing on a small area of the forearm did not show any redness, itching, swelling or burning sensation within 24 hours. These observations support the topical acceptability of the formulation, although a

larger safety study is needed before making broad consumer claims.

Interpretation of Ingredient Contribution

Orange peel powder was the chief functional ingredient and contributed antioxidant, cleansing, mild exfoliating and fragrance-related benefits. Its flavonoid-rich nature, particularly the presence of hesperidin and related compounds, supports its selection as a cosmeceutical ingredient. Multani mitti improved oil absorption and helped give the paste a desirable consistency. Gram flour contributed mild cleansing and reduced the harshness of mineral clay. Neem and turmeric provided traditional skin-care support, especially for oily and acne-prone skin. Sandalwood and rose powder improved cooling, odour and consumer acceptability.

The developed formulation represents a simple and economical approach to utilizing orange peel waste. The conversion of orange peel into a cosmetic ingredient supports value addition and reduces household fruit waste. As a dry formulation, the product has an advantage over aqueous preparations because it is less prone to microbial contamination and can be freshly mixed before application. However, herbal powders may vary in phytochemical composition depending on fruit variety, drying method, storage conditions and particle size. Therefore, standardization of raw material and batch-to-batch quality control are essential for future development. (12)

IV. CONCLUSION

The present study concluded that a herbal face pack containing orange peel powder can be successfully formulated using simple and commonly available natural ingredients. The optimized formulation F1 showed good appearance, pleasant odour, fine texture, suitable pH, acceptable moisture content, fair powder flow, good spreadability and easy washability. No signs of irritation were observed in the preliminary irritancy test. The formulation may be useful as a natural cosmetic preparation for cleansing, oil control and refreshing the skin.

Orange peel powder is a promising cosmetic ingredient because it contains flavonoids, phenolics, vitamin C-related constituents and volatile components that support antioxidant and skin-

conditioning activity. The face pack also provides a practical method for converting orange peel waste into a value-added herbal cosmetic product. Further studies should include microbial limit testing, accelerated stability testing, antioxidant assay, consumer acceptability assessment and controlled clinical evaluation on different skin types.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest related to this research work.

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