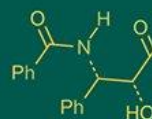


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Development and characterization of a natural herbal face pack for sebum management and skin hydration

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Abstract

Herbal face packs are developed and formulated with the goal of producing natural skincare products that offer a various advantages, including sebum management, exfoliating, cleansing, moisturizing, and calming effects. Herbal face packs are applied topically that, when rinsed off, remove excess of dirt, oil, and dead skin cells from the skin by creating a temporary layer of it on the skin. The preparation of a face pack with natural ingredients such as Multani Mitti (for oil absorption and deep cleaning), Urtica dioica (for sebum(oil) control), papaya powder (for exfoliation), glycerine (for hydration), and rose water (for soothing and maintaining skin pH) is the focus of this study. While maintaining stability and effectiveness, the formulation procedure guarantees a smooth, spreadable texture ideal for simple application. Consistency, skin compatibility, sebum management, and moisturizing effects were all taken into consideration when evaluating the product. The produced herbal face pack successfully reduced excess oil, exfoliated dead skin cells, and enhanced skin texture without irritating the skin, according to the results. This study demonstrates that a safe, efficient, and user-friendly herbal face pack that is appropriate for routine skincare usage may be created by mixing carefully chosen natural ingredients.

Keywords: Sebum management, skin renewal, soothing, exfoliation, hydration

Introduction

Cosmetics are products used to cleanse, beautify, enhance attractiveness, or change one's appearance. Various herbs are utilized to cleanse and enhance our faces. Herbs have been utilized for many reasons since ancient times ^[1]. The Greek term "kosmtikos," which means "having the power and skill in decorating," is where the word "cosmetic" originated ^[2]. An individual's skin depends on a number of things, including their health, lifestyle, regular work, climate, and upkeep. Overexposure to heat causes the skin to become dehydrated throughout the summer, which results in sunburns, wrinkles, freckles, pimples, and pigmentation. The harsh winters lead our skin to become cracked, cut, macerated, and infected. The Drugs and Cosmetics Act of 1940 defines a cosmetic as any substance that is meant to be rubbed, poured, sprinkled, or sprayed on, introduced into, or otherwise applied to the human body or any part thereof in order to cleanse, beautify, promote attractiveness, or alter appearance. Herbal cosmetics are preparations that contain phytochemicals from a range of botanical sources, which affect skin functions and supply nutrients required for healthy skin or hair. The adverse effects of these cosmetics are lower than those of the others. Natural herbs and their products are employed in cosmetic preparation because of their aromatic value. These organic herbs improve the health of our skin ^[3].

1.1 herbal face pack

The Ayurvedic word for the herbal paste used to cure facial pigmentation, scars, marks, acne, and pimples is "mukhalepa." Nowadays, this herbal concoction, called "mukhalepana," is often applied as a facial cosmetic procedure. A mild powder is also applied to the face as part of the "face pack" idea. A good herbal face pack should not only improve the skin's appearance but also reach the subcutaneous tissues and supply vital nutrients ^[4, 5]. A face pack is a smooth powder that is applied to the skin. After being applied to the face, these liquid or paste-based preparations are let to dry and solidify into a film that strengthens, tightens, and cleans the skin. They are commonly applied to the skin for 15 to 30 minutes to

let the water drain. This causes the film to compress and solidify, which simplifies removal. While the tightening and warming properties of the face pack offer the illusion of a regenerated face, adsorption and colloidal clays in these preparations help remove oil and debris from the face's skin [6]. The natural face packs are less complicated and relatively easy to use. They assist us in improving the flow of blood via the facial veins. The effects of the face packs are usually transient. For consistent radiance, use it two to three times a week [7]. These days, a variety of packs that are easy to use based on the skin type are available individually for oily, normal, and dry skin. Face packs must be used frequently to improve the skin's smoothness and fairness. Regular use of the face pack eliminates wrinkles, acne, pimples, and dark circles on the skin. Face packs which are recommended for oily skin prone to acne, black heads usually control the rate of sebum discharge from sebaceous glands and fight the harmful bacteria present inside acne lesion. Herbal face packs are widely utilized because of their many advantages over chemical-based packs. They don't cause toxicity, allergies, or habit formation. They are natural in every way and have a long shelf life. They can be simply prepared and kept for a longer period of time without the need for preservatives [8].

1.1.1 Benefits of Applying Face Pack [9, 10]

1. Depending on its herbal elements, helps lessen scars, marks, acne, and pimples.
2. A face pack typically eliminates dead skin cells.
3. The effects of these face packs are calming and relaxing.
4. Frequent use of a natural face pack improves the texture and complexion of the skin and gives it a glow.
5. The appropriate usage of face packs can successfully counteract the negative effects of pollution and severe weather.
6. They aid in preventing early skin aging.
7. Natural face masks are an effective way to prevent wrinkles, fine lines, and sagging skin.
8. A natural face pack gives the skin a youthful, healthy appearance.

1.1.2 Precautions to be taken while applying Herbal Face Pack [11]

- Choose a face pack based on the type of skin you have. Before using a face pack, get advice from a natural skin therapist or a concerned skin specialist.
- Don't leave the face pack on your face for longer than fifteen to twenty minutes. If the face pack is used for an extended length of time, wrinkles, skin sagging, and an

increase in open pores may result.

- Avoid scratching the dehydrated face pack. Water at room temperature must be sprayed on the skin before removing the dry face pack. After taking off the face pack, apply an ice cube to the skin on the face for a calming effect. This tightens the skin and helps to seal open pores. It also tones and calms the skin.
- Applying a face pack on allergic skin is not advised.
- Avoid scrubbing your face too hard as it could cause dark stains and pimples to appear.
- Avoid heat sources after applying a face pack.
- Because the skin around the eyes is so sensitive, face packs shouldn't be used close to the "eye zone." The skin surrounding the eyes may be harmed during the removal of a face pack.

1.1 Ideal properties of a Herbal Face Pack [12]

- It must be non-irritating and non-toxic.
- It should be physically and chemically stable.
- Gritty particles should not be present.
- The smell should be pleasant.

2. Materials

2.1 *Urtica dioica*

One of the most popular medicinal plants, it is valued for its many health-promoting properties, accessibility, and non-toxicity [13, 14]. Several phytochemicals from the family of secondary metabolites, including as terpenes, phenolic acids, flavonoids, chlorophylls, carotenoids, and fatty acids, are abundant in the plant [15, 16, 17, 18, 19].

Additionally, nettle extracts are used in cosmetics, and topical use has several benefits for skin health (including anti-inflammatory and anti-swelling qualities). However, nettle extracts are among the most intriguing substances for cosmetic applications due to their antioxidant and anti-aging properties. Because it gathers a variety of reactive oxygen species scavengers, nettle has anti-aging qualities that might lessen free radical damage to the skin [20-21]. Apart from its antioxidant qualities, the anti-aging effects can also be ascribed to the suppression of degrading enzymes such as collagenase or elastase, which reduce skin suppleness and lead to wrinkles [22].

Quercetin and ursolic acid are two substances present in nettle extracts that are especially promising for the development of anti-aging action [23, 24]. While quercetin, one of the most well-known antioxidants, is largely present in leaves [26], ursolic acid, a well-known elastase inhibitor, is mostly found in nettle roots [25]. Its exceptional antibacterial and antifungal properties also make it an excellent component for skin care [27].



A) *Urtica dioica* leaf B) stem

Fig 1: Morphological parts of *Urtica dioica*

2.2 Papaya powder

Papaya (*Carica papaya*), a tropical fruit in the Caricaceae family, is rich in bioactive phytochemicals with antioxidant qualities such as benzyl isothiocyanate [29] and dietary antioxidants include vitamin C, tocopherols, total phenols, and β -carotene [28]. Papayas contain the papain enzyme, which functions as a natural exfoliator to help eliminate

dead skin cells and enhance skin texture. Additionally, it includes vitamins A, C, and E, which protect and nourish skin. It can also be used to soothe damaged skin and treat sunburns because it contains a lot of healing enzymes. Papaya powder's flavonoids stimulate the skin to make more collagen, giving it a firm, supple, and velvety tone. [30].



Fig 2: Papaya plant showing tree, fruit, leaves, and flowers and powder
a) papaya tree, fruit, leaves, flowers b) papaya powder

2.3 Rose water

One of the oldest plants is the attractive and oil-rich rose. The genus *Rosa* has over a hundred different kinds of vines and shrubs. The plant has been utilized in the medical and cosmetic domains due to its numerous attributes [31]. By retaining moisture, it functions as a natural humectant, keeping the skin soft, smooth, and moisturized. Its anti-inflammatory qualities lessen redness, inflammation, and swelling, which helps calm sensitive or acne-prone skin [32]. Rose water's antioxidants also protect the skin from free radical damage and environmental stresses, postponing the development of premature aging and encouraging skin restoration [33].



A) Rose water

Fig 3: Rose water and rose flowers are used as soothing agent in face pack.

2.4 Multan mitti (fuller's earth)

Multani Mitti, another name for Fuller's Earth, is a versatile skincare ingredient with several benefits. By reducing pore size, removing freckles and sunburns, and eliminating blackheads and whiteheads, it helps create a smoother and more even complexion. Multani Mitti effectively detoxifies the skin with its natural cleansing properties, removing excess oil and pollutants and enhancing blood circulation for a healthier and more luminous complexion. Packed with essential nutrients, Multani Mitti cures acne and minimizes imperfections, leaving skin smoother and more evenly

Toned. Magnesium chloride also contributes to its skin-friendly properties [34, 35].



a) Multani Mitti

Fig 4: Multani Mitti used in herbal face pack formulation

2.5 Glycerine

Glycerol is a thick, colorless, odorless liquid that is also sold under the brand name glycerin. Food, cosmetics, pharmaceuticals, and polymers are just a few of the many industries that employ glycerin [36]. Because glycerin retains moisture, the skin remains hydrated, smooth, and supple. Because of its anti-inflammatory properties, it can lessen redness and inflammation in skin that is inflamed. Additionally, glycerin aids in shielding the skin from environmental stresses including wind, cold, and dry air. Glycerin makes skin more flexible, which lessens the appearance of fine lines and wrinkles. Dark patches and hyperpigmentation might be less evident by brightening the skin with glycerin [37].



A) Glycerine

Fig 5: Glycerine used in herbal face pack formulation

2.6 Raw material and formula for formulating herbal face pack:

The herbal face pack was prepared using natural ingredients selected for their cleansing, sebum control, exfoliating, and moisturizing properties. Each component

was carefully weighed and blended to obtain a uniform and smooth powder formulation suitable for topical application. The composition of the polyherbal face pack and the functional role of each ingredient are presented in Table 1.

Table: 1 Raw material that are used in herbal face pack

Raw materials	Uses	Quantity of sample per 50gm	References
Urticadioca	Sebum control: aids in controlling excessive sebum production, making it appropriate for skin that is oily and prone to acne.	20 gm	[38]
Papaya powder	Exfoliation: uses the natural enzyme papin to exfoliate dead skin cells.	10 gm	[38]
Multani mitti	Cleaning: gets rid of pollutants, grime, and filth from the skin.	10 gm	[38]
Glycerine	Moisturize: function as a humectant to hold onto moisture and maintain smooth, soft skin.	5ml	[38]
Rose water	Calming: lessens inflammation and redness while preserving the pH balance of the skin.	5ml	[38]

3. Methodology

3.1 Process of formation of herbal face pack: step-by-step

Choosing natural herbs that work well for various skin types is part of creating a herbal face pack. To treat particular skin issues like acne, dryness, pigmentation, or aging, a blend of these components is created.^[39] This is a complete, step-by-step procedure with theoretical justification:

Step 1: Selection of ingredients

The components used in a herbal face pack, such as Multani mitti, papaya powder, rosewater, glycerine, and Urtica dioica leaves, determine how efficient it is. The skin benefits from the bioactive substances included in these supplements. Based on its chemical makeup, each ingredient has distinct qualities (such as moisturizing, anti-acne, sebum control, and exfoliation).



Fig 6: Ingredients for face pack

Step 2: Preparing the base of the face pack

The consistency and application of a face pack are greatly influenced by its base. Common bases are powders or clays that create a paste when combined with liquids. Additionally, the base establishes the main purpose of the pack, such as hydration or oil absorption.

Step 3: Mixing the ingredients

When the chosen components are mixed together, their chemical characteristics work in concert to offer a variety of skin benefits. The base is multanimitti, which has great cleaning and oil-absorbing qualities. Papaya powder exfoliates dead skin cells, while urtica dioica helps control sebum production and lessens inflammation. Rose water and glycerine help to hydrate, calm, and tone skin, giving it a smooth, nourished, and well-balanced appearance^[38].

Add base materials

Take the required quantity of Multani mitti as the main foundation.

It absorbs extra oil, gets rid of debris and pollutants, and gives the face pack a smooth base.

Add herbal powders

Add papaya and urtica dioica powder to the base gradually. Papaya powder promotes skin renewal and exfoliation, while urtica dioica helps regulate sebum production.

Add liquid component

To get a smooth, spreadable mixture, gradually add the glycerine and rose water while stirring continuously.^[38] Rose water calms, tones, and hydrates the skin, while glycerine holds onto moisture and keeps the skin from drying out.

Add preservatives

Finally, incorporate a tiny quantity of sodium benzoate into the face pack.

Without changing the face pack's texture or advantages, sodium benzoate prolongs its shelf life and protects the formulation by stopping microbiological development.^[39]

Consistency adjustment

Add a little extra liquid (rose water) if the pack is too thick.

For a smooth, spreadable paste, add extra powder if it's too thin

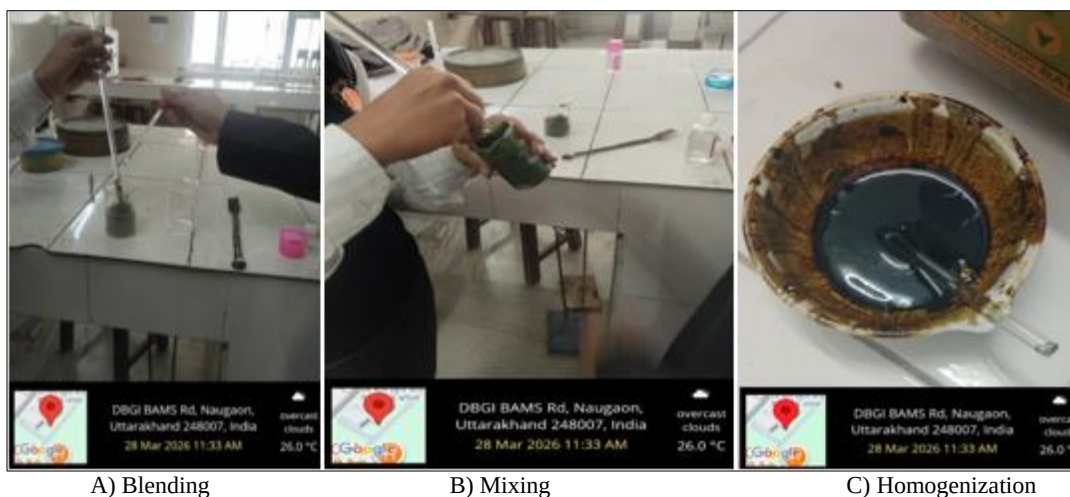


Fig 7: Preparation of face pack

Step 4: Application of the face pack

- Effective skin penetration of the active substances is ensured by proper application. The face pack works best when applied to dry, clean skin.
- Clean the skin. To get rid of pollutants, oil, and dirt, wash your face with a mild cleanser. This guarantees

that surface-level dirt won't interfere with the pack's ingredients' ability to function.^[38]

- Apply evenly: Avoid the areas around the lips and eyes when applying the face pack. Use your fingers or a brush.
- The uniform distribution guarantees that the substances are beneficial to every area of the skin.^[39]



Fig 8: Application of the face pack

Step 5: Let the Pack Sit and Dry

When the pack is applied to the skin for a set amount of time, the active substances have a better chance of penetrating the skin. When using clay-based packs, drying also helps remove excess oil and impurities from the skin.

- Let it sit on your face for ten to fifteen minutes. If there

is clay in the pack, it will begin to dry. This helps to Tighten pores and remove excess oil.^[39]

- The pack may stay moist if moisturizing substances like glycerine are used, providing hydration and calming properties.



Fig 9: Drying of Face pack

Watch for skin reaction

Always perform a patch test to check for any allergic reactions or skin sensitivity before applying a face pack to your entire face.

Step 6: Rinse off

- Rinsing the face pack eliminates any absorbed contaminants as well as the active ingredients.
- After the procedure, proper removal guarantees that the skin won't feel dry or irritated.
- Use warm water to rinse. Use lukewarm water to gently rinse off the face pack.
- To exfoliate dead skin cells, gently massage your face in circular motions with your fingertips while you rinse.
- After washing, use a gentle towel to gently dry your face. After treatment, the skin may become sensitive, so avoid rubbing.

Step 7: Moisturize

- Applying a moisturizer is crucial to seal in moisture and stop moisture loss because the skin may be a little dry or irritated after using a face pack.
- Use an appropriate moisturizer To restore moisture balance, use a heavier cream for dry skin or a lightweight, non-comedogenic moisturizer for oily skin.

3.2 Evaluation Studies

Physicochemical evaluation Moisture content, extractive values, pH, and ash levels were among the physicochemical parameters that were determined. ^[40]

Organoleptic evaluation: The physical characteristics of the material were manually assessed using organoleptic parameters, which include its nature, colour, odour, feel, and consistency.

Table: 2 organoleptic evaluation parameters of face pack

S. No	Parameters	Observation
1	Colour	Light Green
2	Odour	Characteristic
3	Appearance	Paste
4	Smoothness	Fine
5	Texture	Gritty

Irritancy test: This test determines whether a substance or chemical has the potential to irritate the skin, eyes, or mucosal tissues locally.

Table 3: Irritancy test of Face pack

S.NO	PARAMETERS	OBSERVATIONS
1	Irritation	-
2	Swelling	-
3	Redness	-

Angle of repose: A granular material can be stacked on a horizontal surface at the steepest angle without sagging.

Table: 4 Flow property and Angle of repose

Flow property	Angle of repose (degrees)
Excellent	25-30
Good	31-35
Fair - aid not needed	36-40
Passable - may hang up	41-45
Poor - must agitate, vibrate	46-55
Very poor	56-65
Very very poor	>66

Stability testing: Under the designated stability conditions, including at 40 °C, no appreciable changes in colour, odour, texture, smoothness, or pH were noted.

Table: 5 Stability Testing

PH	Room temperature (25±2°C)	40 degree c
6.91	6.89	6.85

Viscosity Test: This test establishes the face pack's thickness and flow characteristics, which have an influence

on spreadability and application.

Table: 6 Viscosity testing

S.NO	Parameters	Observation
1	Consistency/Thickness	Good, semi-thick paste
2	Flow/Spreadability	Easily spreadable
3	Smoothness/Uniformity	Smooth

Sebum Control Test: This test assesses how well the face pack reduces skin oiliness.

Table: 7 Sebum control test using blotting paper

S. No	Parameters	Obsevation
1	Amount of oil absorbed	Moderate to high oil absorption observed
2	Skin appearance(shine/greasiness)	Reduced shine and non-greasy appearance
3	Duration of oil control	Oil control maintained for 2-3 hours

Discussion

The present study focused on the formulation and evaluation of a Polyherbal face pack containing natural ingredients such as Multani mitti, *Urtica dioica*, papaya powder, glycerine, and rose water for sebum management, exfoliation, and skin hydration. The selection of herbal ingredients was based on their traditional use and reported dermatological benefits. Multani mitti acted as an effective oil-absorbing agent and helped in deep cleansing of the skin pores. The inclusion of *Urtica dioica* contributed to sebum regulation and helped reduce excessive oiliness, while papaya powder provided mild exfoliating action due to the presence of natural enzymes that aid in the removal of dead skin cells. Glycerine served as a humectants that enhanced moisture retention, and rose water helped in soothing the skin and maintaining pH balance.

The formulated herbal face pack showed desirable physicochemical properties including smooth texture, good spreadability, and ease of application. The consistency of the formulation was found to be appropriate for topical application without causing discomfort. The washability of the face pack was satisfactory, and no irritation or redness was observed during the skin compatibility test, indicating that the formulation is safe for routine use. The pH of the formulation was found to be within the acceptable range for skin application, which helps prevent skin dryness and irritation. Overall, the combination of selected natural ingredients demonstrated synergistic effects in providing cleansing, exfoliation, oil control, and hydration. The developed formulation was found to be stable, safe, and effective for routine skincare application. This study supports the use of Polyherbal formulations as a natural alternative to synthetic cosmetic products, offering multiple skin benefits with minimal risk of adverse effects.

Conclusion

The herbal face pack's development and composition highlight the importance of developing the skincare product that is safe, effective, and suitable for oily and acne-prone skin. Based on natural components like Multani Mitti, *Urtica dioica*, papaya powder, glycerine, and rose water, this face pack promotes hydration and general skin health while addressing a number of skin issues like excessive sebum production, acne, dullness, and uneven skin texture. This formulation's success hinges on the careful selection of ingredients, appropriate mixing methods, and assessment of the product's effectiveness. A synergistic effect that improves skin texture and complexion is produced by combining Multani Mitti as a cleansing and oil-absorbing base, *Urtica dioica* for sebum management, Papaya powder for exfoliation, Glycerine as a humectant, and Rose water for soothing and hydration. A smooth, stable, and long-lasting product is ensured by paying attention to the sequence in which the ingredients are mixed, stirring constantly when adding liquids, and adding preservatives such as sodium benzoate. The formulation gentleness, non-irritating nature, and suitability for frequent use are confirmed by safety and performance assessments, which include irritancy and sebum control tests. In addition to being non-toxic, environmentally safe, and suitable for sensitive skin, this herbal face pack is a prime example of how natural ingredients may offer cosmetic benefits. This product offers a comprehensive approach to skincare by fusing the therapeutic qualities of herbs with scientific formulation principles, making it a useful supplement to regular personal care routines.

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