



REVITALIZING BEAUTY: A COMPREHENSIVE STUDY ON FENUGREEK-INFUSED HERBAL PEEL OFF MASK ENHANCED WITH CHARCOAL, ORANGE PEEL, AND COCONUT OIL

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ABSTRACT

This research article presents the formulation and evaluation of a novel herbal peel-off mask designed to rejuvenate and enhance skin health. The formulation integrates a blend of natural ingredients including Fenugreek, charcoal, orange peel powder, and coconut oil, along with additives such as cabopol, polyvinyl alcohol, glycerine, methyl paraben, propyl paraben, rose water, and triethanolamine. The study begins with the meticulous selection of each ingredient for its individual therapeutic properties and compatibility within the formulation.^[1] Subsequently, various formulations are prepared and evaluated for their physical characteristics, such as consistency, spreadability, and homogeneity.^[2]

KEYWORDS: Herbal peel-off mask, Fenugreek extract, Activated charcoal, Skin rejuvenation, Antioxidant properties, Moisturizing effects, Detoxification, Formulation optimization, Skin compatibility.

INTRODUCTION

The pursuit of skincare products that harness the therapeutic potential of natural ingredients has gained significant momentum in recent years. Herbal formulations, in particular, have garnered attention for their perceived efficacy and safety in promoting skin health and rejuvenation. In line with this trend, the present study introduces a novel herbal peel-off mask formulated with a blend of potent botanical extracts, aimed at enhancing skin vitality and radiance.^[3]

A peel-off gel in the formulation of a herbal peel-off mask typically refers to the base or vehicle that provides the gel-like consistency to the mask and allows it to be easily applied and peeled off the skin once it dries. In the context of a herbal peel-off mask made with fenugreek, charcoal, orange peel, and coconut oil, the peel-off gel serves as the carrier for these active ingredients.^[4]

Here's a more detailed breakdown of each component and its role in the formulation:

- Peel-off Gel Base:** The base of the peel-off gel is usually a combination of water, glycerin, and a gelling agent such as carbomer or agar. This base provides the gel-like consistency and forms a film on the skin when applied. It allows the mask to adhere to the skin and facilitates easy peeling once it dries.
- Fenugreek:** Fenugreek is known for its anti-inflammatory and antioxidant properties. In the peel-off mask formulation, fenugreek may help soothe the skin, reduce redness, and provide a healthy glow.
- Charcoal:** Activated charcoal is a popular skincare ingredient known for its ability to draw out impurities and toxins from the skin. It helps in detoxifying the skin and absorbing excess oil, making it a valuable addition to a peel-off mask, especially for those with oily or acne-prone skin.^[5]



4. **Orange Peel:** Orange peel is rich in vitamin C and antioxidants, which help brighten the skin, fade dark spots, and promote a more even skin tone. In the peel-off mask formulation, orange peel adds a refreshing scent and contributes to the overall rejuvenating effect on the skin.

5. **Coconut Oil:** Coconut oil is a nourishing ingredient that helps moisturize and soften the skin. It contains fatty acids that penetrate the skin to provide hydration and support the skin's natural barrier function. In the peel-off mask, coconut oil can help counteract any potential drying effects of the other ingredients and leave the skin feeling smooth and supple.

To formulate the peel-off gel for the herbal mask, these ingredients would be carefully combined with the gel base using a magnetic stirrer or other mixing equipment to ensure even dispersion. The resulting gel would then be applied to the skin, allowed to dry, and peeled off, leaving behind a refreshed and rejuvenated complexion.^[6]

Drug profile & Excipients profile

1. Fenugreek



- **Common Name:** Fenugreek

- **Scientific Name:** *Trigonella foenum-graecum*

- **Family:** Fabaceae (Leguminosae)

Taxonomical Information:

- **Kingdom:** Plantae

- **Order:** Fabales

- **Family:** Fabaceae

- **Genus:** *Trigonella*

- **Species:** *T. foenum-graecum*

Pharmacology

- **Active Constituents:** Fenugreek seeds contain various active compounds, including:

- **Alkaloids:** Trigonelline is a major alkaloid known for its potential hypoglycemic effects.

- **Saponins:** Diosgenin is a prominent saponin with potential pharmacological activities such as anti-inflammatory and antioxidant effects.

- **Flavonoids:** These compounds possess antioxidant properties and contribute to fenugreek's therapeutic effects.

- **Fiber:** Fenugreek seeds are rich in soluble fiber, which can help regulate blood sugar levels and promote digestive health.

- **Pharmacological Actions:** In the context of skincare:

- **Anti-inflammatory:** Fenugreek exhibits anti-inflammatory properties, which can help soothe and calm irritated skin.

- **Antioxidant:** Its antioxidant compounds help protect the skin from oxidative stress and environmental damage.

- **Moisturizing:** Fenugreek contains emollient properties that can help hydrate and nourish the skin.

- **Regenerative:** Some studies suggest fenugreek may aid in wound healing and tissue repair due to its potential to stimulate collagen production.^[7]

Physiology

- **Skin Benefits:** Fenugreek's anti-inflammatory and antioxidant properties make it suitable for skincare formulations, where it can help improve the overall health and appearance of the skin.

- **Moisturization:** Fenugreek can help maintain skin hydration by forming a protective barrier and preventing moisture loss.

- **Skin Healing:** Its regenerative properties may promote wound healing and reduce the appearance of scars and blemishes.

- **Antimicrobial:** Fenugreek possesses antimicrobial activity, which can help prevent bacterial and fungal infections on the skin.



- Anti-aging: Some research suggests that fenugreek may have anti-aging effects due to its ability to protect against oxidative damage and support collagen production.^[8]

2. Charcoal



- **Common Name:** Charcoal

- **Scientific Name:** Charcoal is a form of carbon produced by heating organic material in the absence of oxygen, such as wood, coconut shells, or peat.

- **Family:** Not applicable, as charcoal is a product rather than a living organism.

Pharmacology:

- Adsorption: Charcoal has a porous structure that allows it to adsorb (not absorb) toxins, impurities, and excess oil from the skin's surface. This property makes it useful in skincare formulations for detoxifying and purifying the skin.

- Neutralization: Charcoal can help neutralize harmful substances and pollutants that may contribute to skin issues such as acne, blackheads, and blemishes.

- Exfoliation: In a peel-off mask, charcoal particles can act as a gentle exfoliant, helping to remove dead skin cells and unclog pores, resulting in smoother and clearer skin.

- Antimicrobial: While not a direct antimicrobial agent, charcoal's ability to absorb excess oil and impurities can create an environment less conducive to the growth of acne-causing bacteria and fungi.^[9]

Physiology:

- Detoxification: Charcoal works by binding to toxins and impurities on the skin's surface, effectively pulling them out of the pores and leaving the skin feeling clean and refreshed.

- Pore Cleansing: Its porous structure allows charcoal to penetrate deep into the pores, where it can absorb excess oil, dirt, and other impurities, helping to minimize the appearance of pores and prevent breakouts.

- Oil Control: Charcoal can help regulate sebum production by absorbing excess oil from the skin's surface, making it particularly beneficial for those with oily or acne-prone skin.

- Skin Smoothing: As a mild exfoliant, charcoal helps slough off dead skin cells, revealing smoother, more radiant skin underneath.

3. Orange Peel





- **Common Name:** Orange Peel
- **Scientific Name:** Citrus sinensis (Sweet Orange)
- **Family:** Rutaceae

Taxonomical Information:

- **Kingdom:** Plantae
- **Order:** Sapindales
- **Family:** Rutaceae
- **Genus:** Citrus
- **Species:** C. sinensis

Pharmacology

- **Active Constituents:** Orange peel contains various bioactive compounds, including:
 - **Citrus Essential Oils:** Rich in limonene, linalool, and other terpenes, which possess antioxidant and antimicrobial properties.
 - **Flavonoids:** Such as hesperidin and naringin, known for their antioxidant and anti-inflammatory effects.
 - **Vitamin C:** A potent antioxidant that helps brighten the skin and protect against oxidative damage.
- **Pharmacological Actions:**
 - **Antioxidant:** Orange peel is rich in antioxidants that help neutralize free radicals and protect the skin from oxidative stress, thereby reducing signs of aging.
 - **Antimicrobial:** The essential oils in orange peel have antimicrobial properties that can help inhibit the growth of acne-causing bacteria and fungi on the skin.
 - **Skin Brightening:** Vitamin C and flavonoids in orange peel contribute to skin brightening by reducing hyperpigmentation and promoting a more even skin tone.
 - **Anti-inflammatory:** Compounds like flavonoids may help reduce inflammation and soothe irritated skin.^[10]

Physiology

- **Exfoliation:** Orange peel contains natural acids, such as citric acid, which can gently exfoliate the skin, removing dead skin cells and promoting cell turnover.
- **Oil Control:** The astringent properties of orange peel help regulate sebum production, making it beneficial for oily and acne-prone skin.
- **Skin Brightening:** Vitamin C in orange peel inhibits melanin production, reducing the appearance of dark spots and promoting a brighter complexion.
- **Antioxidant Protection:** Antioxidants in orange peel help protect the skin from damage caused by free radicals, UV radiation, and environmental pollutants.
- **Soothing:** Orange peel contains anti-inflammatory compounds that can soothe irritated skin and reduce redness and inflammation.^[11]

4. Coconut Oil



- **Common Name:** Coconut Oil
- **Scientific Name:** Cocos nucifera
- **Family:** Arecaceae (Palm family)



Taxonomical Information:

- **Kingdom:** Plantae
- **Order:** Arecales
- **Family:** Arecaceae
- **Genus:** Cocos
- **Species:** C. nucifera

Pharmacology

- **Composition:** Coconut oil is rich in medium-chain fatty acids, particularly lauric acid, which possesses antimicrobial properties. It also contains other fatty acids such as caprylic acid and capric acid, as well as vitamin E, which contributes to its antioxidant properties.
- **Pharmacological Actions:**
 - **Moisturizing:** Coconut oil is an excellent emollient, meaning it helps to soften and hydrate the skin by forming a protective barrier that reduces moisture loss.
 - **Antimicrobial:** Lauric acid in coconut oil exhibits antimicrobial activity against bacteria, viruses, and fungi, making it beneficial for maintaining skin health and preventing infections.
 - **Anti-inflammatory:** Coconut oil contains compounds like polyphenols and vitamin E, which possess anti-inflammatory properties that can help soothe irritated or inflamed skin.
 - **Antioxidant:** Vitamin E in coconut oil acts as an antioxidant, protecting the skin from oxidative stress caused by free radicals and environmental factors.^[12]

Physiology

- **Skin Hydration:** Coconut oil’s emollient properties help to lock in moisture, keeping the skin hydrated and preventing dryness and flakiness.
- **Barrier Function:** When applied topically, coconut oil forms a thin layer on the skin’s surface, which acts as a protective barrier against environmental aggressors and pollutants.
- **Wound Healing:** The antimicrobial and anti-inflammatory properties of coconut oil may aid in wound healing by preventing infection and reducing inflammation.
- **Skin Softening:** Regular use of coconut oil can help soften rough or dry patches of skin, leaving it feeling smooth and supple.
- **Soothing:** Coconut oil has a soothing effect on the skin, which can help relieve itching, redness, and irritation.

Materials and Equipment

1. **Mixing bowls:** For blending and mixing the ingredients to prepare the mask formulation.
2. **Measuring instruments:** Such as graduated cylinders, spoons, or weighing scales, for accurate measurement of ingredients.
3. **Blender or grinder:** To grind or blend ingredients such as fenugreek seeds or orange peels into powder form.
4. **Heating apparatus:** Such as a water bath or microwave, for melting and liquefying coconut oil if needed.
5. **Stirring rods or spatulas:** For thorough mixing and homogenization of the formulation.
6. **pH meter:** To monitor and adjust the pH of the mask formulation, ensuring optimal stability and skin compatibility.
7. **Sterile containers:** To store the prepared mask formulation, maintaining hygiene and preventing contamination.
8. **Packaging materials:** Such as jars or tubes, for packaging the final mask product for storage and distribution.
9. **Magnetic stirrer :** A magnetic stirrer is used in the formulation of a herbal peel-off mask to ensure thorough mixing of ingredients. It helps in achieving a homogeneous mixture, ensuring even distribution of ingredients for consistent results in the final product.

By utilizing these ingredients, materials, and equipment, the formulation and evaluation of the herbal peel-off mask can be conducted with precision and efficiency, ensuring the development of a high-quality skincare product with desirable properties and efficacy.^[13]

Formula:

| Sr. No | Ingredients | Category | Quantity Taken (gm) | | |
|--------|--------------------|------------------------------|---------------------|------|------|
| | | | F1 | F2 | F3 |
| 1) | Fenugreek | Antioxidant | 1 | 1 | 1 |
| 2) | Charcoal | Deep cleanser and detoxifier | 1 | 1 | 1 |
| 3) | Orange peel powder | Exfoliant | 1 | 1 | 1 |
| 4) | Coconut oil | Moisturizer | 1 ml | 1 ml | 1 ml |
| 5) | Carbopol 934 | Gelling agent | 0.25 | 0.25 | 0.25 |
| 6) | Poly vinyl alcohol | Film forming agent | 10 | 12 | 14 |



| | | | | | |
|-----|-----------------|-----------------|-------------|-------------|-------------|
| 7) | Propyl paraben | Preservatives | 0.20 | 0.20 | 0.20 |
| 8) | Methyl paraben | Preservative | 0.20 | 0.20 | 0.20 |
| 9) | Glycerin | Humectant | 5 ml | 5 ml | 5 ml |
| 10) | Rose water | Perfuming agent | Q.S | Q.S | Q.S |
| 11) | Triethanolamine | Neutralizer | Q.S | Q.S | Q.S |
| 12) | Water | Solvent | Upto 100 ml | Upto 100 ml | Upto 100 ml |



Fig: Formulated Batches

Experimental Method

- 1) Firstly collect all the required ingredients and weigh it.
- 2) Then in one breaker dissolve 0.25gm of carbopol in 20ml of water by using magnetic stirrer.
- 3) In second beaker dissolve 12gm of poly vinyl alcohol in 40ml of water by using heat at 80degree.
- 4) Then in third breaker mix all other ingredients as per required quantity.
- 5) After this add dissolve ploy vinyl alcohol solution into carbopol solution containing beaker and mix it properly to obtained gel like consistency.
- 6) Add third beaker solution into carbopol and poly vinyl alcohol solution containing beaker and mix it properly.
- 7) In last add 2-3 drops of triethanolamine into this solution to neutralize it.
- 8) Pack and labelled it into air tight container.

Evaluation Test

Evaluation Parameters for Peel off gel formulation:

1.Physical evaluation:

Physical parameters such as colour, appearance and consistency and feel were checked of the prepared formulation.

Colour:-The colour of the formulation was checked out against white background.

Consistency:-The consistency was checked by applying on skin.

Odour The odour of the gels was checked by mixing the gel in water and taking the smell.

2.Determination of pH:

The pH of formulation was determined using digital PH paper.



3. Spreadability:

For determination of Spreadability excess of sample gel was applied in between two glass slides and was compressed to uniform thickness by placing 50 gm. of weight in pan. The time required to separate two slides, i.e. time in which upper glass slide moves over lower plate was taken as a measure of Spreadability.

Formula -

$$S = m \times l/t, 20 \times 3.9/7 = 11.14$$

Where,

S - Spreadability

m - Weight tied to upper slide

l - Length moved on glass slide

t - Time taken

4. Status of the peel-off film

After drying film was able to remove from the applied site and it was soft to hard. Drying time took longer time (30-35min)

5. Film drying test :



6. Washability :

The prepared formulation were administered to the skin, and a thorough evaluation was conducted to assess both the extent and ease of water washing. This assessment involved a manual examination to determine how effectively and easily the formulations could be removed with water. The goal was to gauge the formulations' wash off characteristics, considering factors such as adherence to the skin and the simplicity of the removal process through water rinsing.^[14]

7. Skin irritation study:

In the skin irritation study, twenty volunteers were subjected to gel masks with and without tea leaf extract and fenugreek powder, and no significant irritation, including burning, redness, or swelling, was observed. The gel mask formulations were consistent, except for the presence or absence of the mentioned extracts. Application was randomized, and participants were closely monitored for primary and secondary skin reactions.^[15]

8. Peel Off Test:



The formulation film of 4x4mm was spread on backside of the hands skin. Leave it for 25-30 minutes to dry properly. After 25-30 minutes, peel off the dry film from the skin surface. Easy removal of peel without any complications was observed.^[16]

9. Folding Endurance :

| | | | | |
|-----|------------------------|-------------------------|-------------------------|--------------------|
| 1) | Colour | Black | Black | Black |
| 2) | Odour | Sweet | Sweet | Sweet |
| 3) | Consistency | Semi solid gel | Semi solid gel | Semi solid gel |
| 4) | Washability | Good | Good | Good |
| 5) | PH | 6.2 | 6.4 | 6.7 |
| 6) | Spreadability | 10.15 | 11.14 | 11.76 |
| 7) | Skin irritation | No irritation | No irritation | No irritation |
| 8) | Peeling time | 40-45min | 25-30 min | 33-37min |
| 9) | Homogeneity | Homo | Homo | Homo |
| 10) | Status of peel of film | Peel not form perfectly | Peel formed (excellent) | Peel formed (Good) |
| 11) | Folding Endurance | 10 | 11 | 13 |

The formulation film was applied onto the skin. After drying, a portion of film (3x3cm) was cut and folded it at the same place until it was broken. Folding endurance can be defined as the value of number of times the film can be folded without breaking.^[16]

All the formulations were light blackish in colour. The formulations are translucent. On application to the skin, all formulations producing smooth and cooling effect. The consistency and homogeneity of all prepared formulations were good. The results of this investigation showed formulation F1, F2 and F3 has semisolid consistency. All the formulations were found homogenous and easily washable. All the formulations had very slightly alkaline pH which was compatible with the normal skin physiology. The normal range of pH of skin is 4.5-7. Amongst all the formulations batches F1, F2 and F3, F2 batch is the effective one because it is having very optimum pH and spreadability than other batches and also the peeling time is less as compared to other prepared batches. All the evaluation parameters of F2 batch are within the normal range, so by considering this, F2 batch is more effective than other prepared batches.

CONCLUSION AND INTERPRETATION

Topical peel-off gel formulation was prepared by using Fenugreek powder as the main drug, which was already known for its Anti-aging, Anti-acne, Anti-inflammatory activity and also having the property to treat oily skin and other skin related problems. There are 3 batches of topical peel-off gel formulation were prepared. Among all batches F1, F2 and F3, batch F2 was the best formulated gel. Thus, this peel-off gel formulation could be the safe and efficacious remedy for treating this skin related disorders and could be the safe alternative for synthetic anti-acne gels.

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