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Research Article

Formulation and Evaluation of a Peel-Off Gel Mask with Fenugreek

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ABSTRACT

Fenugreek's natural antibacterial, anti-inflammatory, and antioxidant qualities help to improve skin. Peel-off gel masks are a popular cosmetic formulation that effectively removes impurities and dead skin cells to treat wrinkles and fine lines. The active ingredient in the formulation is fenugreek; the film-forming agent is polyvinyl alcohol; the surfactant is polyethylene glycol; the humectant is glycerine; and the base is distilled water. The formulation was tested using standard procedures for Spreadability, pH, skin irritation, peel test, physical appearance, viscosity, moisture content, and stability On human skin, the formulation demonstrated good exfoliation. Different concentrations of polyvinyl alcohol were used to formulate three concentrations, F1, F2, and F3. Formula F3 demonstrated the greatest spread ability (8.2 cm), while Formula F1 showed an ideal pH (5.8) that was close to skin pH. Additionally, F1 demonstrated the highest viscosity (43,820 cP), lowest moisture content (14.4%), and fastest drying time (10 min), all of which indicated good stability and film strength. For peel-off gel mask application, Formula F1 was found to be the most optimized formulation overall, exhibiting optimal consistency, rapid drying, and superior stability. The main component of the topical peel-off gel formulation was fenugreek powder, which was already recognized for its anti-aging, anti-wrinkles, and whitening qualities. Our investigation's findings indicate that it doesn't irritate human skin. Every formulation evaluation study was finished, recorded, and the results were found to be ideal.

INTRODUCTION

The skin protects the body's internal organs from the sun. Human skin can be harmed by too much sunlight. Free radicals, which are produced by excessive UV exposure, can show up as wrinkles, dryness, and scales on the skin. The skin ages more quickly and gets black spots in addition to appearing dull and wrinkled. Antioxidants must work to lessen the effects of free radicals. The most useful masks for preventing premature aging are peel-off gel masks, or masks that can be

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quickly removed after drying. Antioxidants are chemicals that can neutralize and eliminate free radicals while also inhibiting oxidation in cells, minimizing cell damage such as

premature aging. These masks have natural antioxidants and are available in multiple formats [1].

Cosmetics are beauty products that serve physiological functions like conditioning, healing, calming, enhancing attractiveness, improving skin shine, and treating oily skin. Natural ingredients like fenugreek, green tea, honey, and lemon are used in the formulations of these products. Among people between the ages of 18 and 25, acne is a common skin condition that can be treated with gels, creams, lotions, and face washes. Renowned for its therapeutic qualities, fenugreek is selected for its skin benefits, which include treating oily skin and reducing acne. Because they lessen oxidative damage, antioxidants especially green tea are crucial for anti-aging skincare [2].

Since natural cosmetics are thought to be safer, better, and more environmentally friendly, gel masks made of natural materials especially peel-off facial masks are popular for face skin care because they may revitalize skin [3].

Peel-off gel masks are useful and simple skincare products that efficiently moisturize and cleanse the skin. These masks, which are made with polyvinyl alcohol (PVA), help remove dirt, dead skin cells, and extra oil by forming a thin layer that is simple to remove once dry. This procedure helps reduce blackheads, unclog pores, and leave the skin feeling smooth and renewed [4]. Regular use of peel-off gel masks improves moisture balance, tightens pores, and reduces wrinkles, among other skin benefits. Additionally, they provide therapeutic and cosmetic benefits like improving skin elasticity, softening, and exfoliating. These masks nourish the skin and encourage a healthier, more radiant complexion because they are enhanced with natural ingredients like fenugreek, ginger, turmeric, aloevera, honey, and lemon [2]. Wrinkles, dryness, and sagging are caused by the skin's natural loss of collagen and elastin as it ages. Peel-off masks can reduce these symptoms by boosting skin renewal and circulation. They also help to purge impurities and revitalize the skin's appearance. All things considered, peel-off gel masks are a great complement to a cleansing and anti-aging regimen because they combine ease of use with efficient skincare [3].

Fenugreek is an annual legume from the Fabaceae family, native to regions from Iran to northern India [5]. Its seeds provide antioxidant, moisturizing, calming, and anti-wrinkle properties because they are high in proteins, vitamins, minerals, and diosgenin. The seeds' mucilage has emollient qualities that aid in skin hydration and healing [6]. Fenugreek has long been used in Asia and the Mediterranean to treat conditions like diabetes, fever, ulcers, hair loss, and to encourage lactation. It is now prized for its nutritional and aesthetic qualities, promoting general wellness and healthy skin [7].

2. MATERIALS AND METHODS

2.1 MATERIALS

2.1.1 Active Drug

Fenugreek seeds (*Trigonella foenum-graecum L.*) were obtained from local market of Mysuru.

2.1.2 Excipient and Chemicals

The other ingredients such as **polyvinyl** alcohol (PVA), Glycerine, Polyethylene glycol (PEG), Polysorbate (tween twenty), Methanol, Ascorbic acid and were obtained from laboratories of

Cauvery College of Pharmacy. Rose oil was obtained from local market of Mysuru.

Polyvinyl alcohol (PVA) is commonly used for its adhesive properties, which help the mask adhere to the skin. It also forms a film when dried, providing a barrier that allows other ingredients in the mask to penetrate the skin effectively.

Glycerine is often included for its moisturizing properties. It helps hydrate the skin, leaving it feeling soft and smooth after the mask is removed.

PEG is commonly used as surfactant.

Tween-20 is used for its emulsifying, enhanced texture and solubilizing properties.

Methanol is used as solvent.

Ascorbic acid used for its skin-brightening and antioxidant properties.

2.2 METHODS

2.2.1 Extraction of Fenugreek seeds

The maceration process was used to extract fenugreek seeds. Fenugreek seeds were first cleaned, dried, and crushed. The solvent was distilled water. Crushed fenugreek seeds were mixed with water in a 1:10 ratio (one part seeds to ten parts water) in a clean container, and the mixture was allowed stand at room temperature for 72 hours. A fenugreek extract was developed at this time as the seeds' active components absorbed the water. The extract was kept out of direct sunlight in a sterile, airtight container to avoid the degradation of the active constituents [8].

2.2.2 Preparation of Peel-off gel mask

In this study, 3 formulations (F1, F2, and F3) were made with varying concentrations of polyvinyl alcohol (PVA), respectively by 14%, 13% and 12%. The composition of peel-off gel mask was shown in [Table 1].

The procedure involves addition of five different phases:

Phase I: This phase involves the addition of 14%) of polyvinyl alcohol to distilled water (60%) in the beaker at 80°C temperature with a constant vigorous stirring. Further this mixture is allowed to cool down at 40°C.

Phase II: In this phase a mixture of Glycerine and PEG in the ratio of 3:1 is added to Phase I at 40°C temperature and mix well.

Phase III: Add (0.5%) Polysorbate (tween–twenty)

Phase IV: Add Methanol 1ml and add (0.5) distilled water with (0.1%) ascorbic acid into the phase III mixture and mixed well.

Phase V: Add fenugreek and stirred well and cooled for few minutes.

Table 1

Sl. no	Ingredients	F1	F2	F3
01	Polyvinyl alcohol(PVA)	14%	13%	12%
02	Water	60%	60%	60%
03	Glycerine	03%	03%	03%
04	Polyethylene glycol(PEG)	01%	01%	01%
05	Polysorbate (Tween-twenty)	0.5%	0.5%	0.5%
06	Methanol	01%	01%	01%
07	Distilled water	0.5%	0.5%	0.5%
08	Ascorbic acid	0.1%	0.1%	0.1%
09	Fenugreek	01%	01%	01%
10	Rose oil	0.1%	0.1%	0.1%

2.2.3 Evaluation Tests

1. **Test for spreadability:**

This test was carried out by carefully placing a 0.5g gel mask preparation on a petri plate. Then add 125g of weight and top with another petri plate. After one minute, the diameter was measured.

2. Determination of pH:

The pH of formulation was determined using digital pH meter.1g of gel was dissolved in100ml of distilled water and stored for 2hours. The measurements of pH of the formulation were done in triplicate and average value was taken.

3. Test for skin irritation:

This test is performed by placing 1g of gel mask preparation to the back of hand's skin, leaving it on for 15 minutes and then removing it and observing changes in the form of itching, redness and swelling of the skin.

4. Peel test:

The peel off gel was applied on the skin surface uniformly. The peel was allowed to dry. After 15 minutes the peel was removed from the skin surface it was observed that the peel was removed easily without breaking.

5. Organoleptic Evaluation:

Odor, Colour, Consistency.

6. Viscosity measurement:

This test was performed by dipping the spindle into the gel mask preparation and then performing the test. The viscosity was then measured using a Brookfield viscometer at a speed of 10rpm using spindle number 64.

7. Moisture content:

The moisture content of the film was determined using Sartorius moisture analyser. The formulated film was exposed to moisture for 72 hours and difference in initial and final weight was calculated.

8. Stability testing of the formulation:

The stability testing was done at various temperatures of 10ºC, 20ºC, 30ºC, 40ºC, 50ºC, 60ºC. The visual was done at each temperature. The formulation was found to be stable and good till 40ºC. The formulation was found to be unstable at 50ºC and 60ºC.

3. RESULTS AND DISCUSSION

The formulations were evaluated to various evaluation tests, as per standard procedures.

3.1 RESULTS

3.1.1 TEST FOR SPREADABILITY:

A good dispersion of 5-7 cm is required. The dispersion findings in formulas F1 and F2 are in the range of 5-7 cm indicates that there is a good dispersion.

Formula	Initial Diameter	Final Diameter
F1	1.5	6.8
F2	1.7	7.5
F3	2	8.2

3.1.2 DETERMINATION OF pH:

Amongst all the formulas F1 formula is the effective one because it is having very effective pH i.e. 5.8 than F2 and F3.

Formula	Ph	Formula
F1	5.8	F1
F2	6.1	F2
F3	6.0	F3

3.1.3 TEST FOR SKIN IRRITATION:

There was no alteration in the form of redness, itching, or swelling of the skin in the skin irritation test.

3.1.4 PEEL TEST:

The drying time of gel mask preparation varies between 10 to 30 minutes.

F1	10min
F2	15min
F3	15min

3.1.5 ORGAOLEPTIC EVALUATION

Odor	Aromatic
Colour	Pale yellow
Consistency	Semi-solid

3.1.6 VISCOCITY MEASUREMENT:

The viscosity was measured using a Brookfield viscometer. A good viscosity according to SNI 1996 is between 3000 to 50,000 CP.

Formula	Viscosity (CP)
F1	43,820
F2	40,700
F3	38,420

3.1.7 MOISTURE CONTENT:

The moisture content of the film was determined using Sartorius moisture analyzer.

Formula	Weight Taken (Gm)	Weight After Drying (Gm)
F1	0.721	0.617
F2	0.721	0.589
F3	0.721	0.573

3.1.8 STABILITY TESTING:

The stability testing was done at various temperatures of 10ºC, 20ºC, 30ºC, 40ºC, 50ºC, 60ºC. The visual was done at each temperature. The formulation was found to be stable and good till 40ºC. The formulation was found to be unstable at 50ºC and 60ºC.

Sl No	Temperature	Physical Appearance	Ph
1	10ºC	Good	5.8
2	20ºC	Good	5.8
3	30ºC	Good	5.8
4	40ºC	Good	5.8
5	50ºC	More viscous	5.6
6	60ºC	Solidified	5.3

3.2 DISCUSSION

The peel-off gel mask containing fenugreek was prepared using varying concentration of polyvinyl alcohol (PVA). Three formulations F1, F2 and F3 were prepared with 14%, 13% and 12% PVA concentrations, respectively, were evaluated for appearance, pH, viscosity, drying time, spread ability, peel ability, and moisture content. Overall, all three formulations were homogeneous and free from phase separation, indicating good compatibility between PVA, fenugreek extract, and the chosen excipients (PEG, glycerine, Tween-20). The peel-off gel mask containing 14% PVA showed optimal viscosity, drying time, and peel ability compared to other formulations, indicating that polymer concentration strongly influences film characteristics

The pH values of all the formulations were within the range 5.5-5.6 similar to skin's pH. Similarly skin compatible pH values 4.5-6.5 have been reported in prior peel-off gel mask moringa leaves extract formulations [9]. if the pH is not compatible to skin, then it may cause irritation.

Viscosity of gel increases as PVA concentration increased, more the PVA make gel thicker. All formulation's viscosities ranged within 3000 and 50,000 cP, which is an ideal range, indicating good spread ability and ease of application. The PVA mixed clay and aloevera based formulation reported that increasing PVA concentration strengthens film formation and peel ability [10].

Moisture content decreases as PVA concentration increases because thicker polymer network holds

less water. In our study F1 retained less moisture after drying, while F3 retained the most. Similar results were reported that higher polymer level reduces moisture content but improve mask stability and peel quality [11].

Therefore, fenugreek based peel-off gel masks can be considered a potential cosmetic for skin.

4. CONCLUSION

Topical peel-off gel formulation was prepared by using fenugreek powder as the main drug, which was already known to have Anti-aging, Anti-wrinkles, Whitening property. Our study concluded that fenugreek peel off gel mask containing 14% (F1) of polyvinyl alcohol (PVA) showed good peeling property among 12% (F3) and 13% (F2). The formulation was found to be non-irritant on human skin. All evaluation studies of the formulation were done, recorded and results was found to be ideal and optimum. The formulation revealed good exfoliate on human skin.

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