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Research Article

Formulation And Evaluation Of An Eco-Friendly Banana Peel Cosmeceutical Face Mask

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ABSTRACT

The objective is to develop and evaluate a formulation for a herbal face mask made from various natural ingredients, including banana peel powder, turmeric powder, honey, sodium alginate, tea tree oil, polyvinyl alcohol, vitamin E capsules, and rose water. This face mask is designed to be soft and smooth, easy to apply, and removable after 10 minutes. Its intended effects include promoting skin glow, moisturizing, providing an oil-free finish, and addressing issues such as wrinkles, dark spots, and pimples while curing skin problems. Skin care preparations are created for local application on the skin and mucous membranes, encompassing various forms such as lotions, gels, ointments, creams, and face masks. The study emphasizes the formulation of a face mask using dried banana peels ground into powder, resulting in a free-flowing, non-sticky, smooth, and soft product that interacts with the dermis and epidermis. The natural enzymes in banana peels aid in exfoliation and possess antioxidant properties that help protect against free radical damage. Various formulations will be developed and evaluated based on critical parameters including Spreadability, pH, stability, and peel-off time.

INTRODUCTION

A banana peel face mask is a natural skincare product made from the outer layer of the banana fruit. It is commonly used in herbal and cosmetic formulations due to its bioactive compounds. Banana peels are rich in nutrients such as vitamin E and contain antioxidant phenolic compounds, which help moisturize the skin and protect it from

environmental damage. They also provide high levels of protein, dietary fibre, fatty acids, and essential amino acids. Banana peel face masks are often used to improve skin texture and control oil production while offering antiseptic effects, natural radiance, and antioxidant benefits [1] [2]. These masks hydrate the skin, repair damage, and supply essential nutrients to promote healthy skin regeneration. Additionally, they possess

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antioxidant and anti-inflammatory properties, making them beneficial for treating skin issues such as pimples and irritation [3]. Various types of face mask products are available in the market, with peel-off gel masks being some of the most practical options as they can be peeled off immediately after drying [4].

Types of Banana Peel Face Masks: [5] [6]

- 1. Peel-off:** This type consists of a single continuous sheet that is applied to the skin, dries in about 15 minutes, and can then be peeled off. It effectively removes the top layer of old and dead skin cells, revealing a healthier-looking layer underneath. Common ingredients include Polyvinyl alcohol (PVA) and Sodium alginate, which help with dead cell removal and improve skin smoothness.
- 2. Gel peel mask:** This mask has a transparent gel base that dries and peels off easily, providing a cleansing and cooling effect on the skin. It is commonly used for skin hydration and dead cell removal.
- 3. Herbal natural face mask:** This type is prepared from natural ingredients, such as plant extracts, including banana peel extract and orange peel extract.
- 4. Clay peel face mask:** This mask, made from clay, is specifically designed to be washed off and is used to absorb excess oil.

Benefits of Herbal Face Masks: [7]

1. Herbal face masks moisturize and hydrate the skin, providing antibacterial properties.

2. They can help reduce pimples, acne, scars, and marks, depending on the specific skin issues.
3. Turmeric powder and banana peel powder are commonly used in these masks, helping to decrease acne development while turmeric contributes to skin radiance.
4. Facial masks are recommended for acne, pimples, and blackheads as they help control excess sebum production and eliminate harmful bacteria.

Advantages of Banana Peel Face Masks:

1. They are easy to apply and remove from the skin.
2. They provide maximum effects for skin glow and improve skin texture.
3. They possess antiseptic and antibacterial properties.
4. They can help remove blackheads, whiteheads, skin scars, and pimples, addressing various skin concerns.
5. Regular use may result in glowing skin, making it appear brighter and healthier.
6. The vitamin C and antioxidants found in banana peels can offer anti-aging effects by reducing fine lines and wrinkles.
7. Banana peel powder can help control excess oil in the skin naturally. [8] [9][10]

How to Use:

1. Begin by washing the face thoroughly.
2. Rub and apply the banana peel onto the face.
3. Leave it on for 5 to 10 minutes.
4. Wait for an additional 10 to 15 minutes.
5. Rinse with normal water.

Table 1: Review Of Literature:

Sr. No.	Name of Author	Year	Work
1	Patihul Husn et al.	2019	Using polyvinyl alcohol (PVA) as the basis and hydroxypropyl methyl cellulose (HPMC) as a viscosity-



			enhancing ingredient, the study's objective was to create a peel-off gel mask with mung bean (<i>Vigna Radiata</i> (L.) Wilczek) extract and control its antioxidant activity. The DPPH (1,1-diphenyl-2-picrylhydrazyl) assay was used to measure antioxidant activity. 96% ethanol was used to macerate the mung bean. According to the study's findings, the gel exhibited a brownish-yellow organoleptic appearance, a pH of roughly 6, a viscosity of 196-513 cps, a gel spreadability of 0.0646-0.0730 cm/g, an exposure-to-air period of 27.6-54.5 seconds, and the ability to form films. F3 containing mung bean extract 4%, PVA 10%, HPMC 2%, propylene glycol 15%, potassium sorbate 0.2%, olive oil 0.5%, alpha-tocopherol 0.05%, and distilled water ad 100% w/w was the best formula with an IC50 value of 85.2793 µg/ml and was significantly different than F1 and F2 ($p < 0.05$).
2	Priyanka Shukla et al.	2023	These face masks are used to cleanse, moisturise, and nourish the skin on the face; this peel-off mask has the advantage of being practical due to its peeling property and lifting like an elastic membrane. In this article, we developed an activated charcoal peel-off mask and evaluated it using various test methods. The formulation showed promising results after application.
3	Rini Tri Hastuti et al.	2023	One fruit variety with potential antioxidant qualities is apples. They have a lot of antioxidants, which are good for skin. Green apples are rich in fibre, minerals, and several vitamins, including A, B, and C. Phytochemicals such catechins, epicatechins, phlorizin, quercetin, ellagic acid, and chlorogenic acid are also present in these fruits. This study used an experimental methodology, concentrating on a gel mask formulation made from green apple fruit juice and the ultrasonic extraction technique. The peel-off mask made from green apple juice had an IC50 value of 9.771 ppm for antioxidant activity, while the peel-off mask made from green apple ultrasonic extract had an IC50 value of 30.544 ppm.
4	Pooja Birade et al.	2024	Along with additional active ingredients including honey, which is well-known for its anti-inflammatory, anti-aging, and anti-acne qualities, the peel-off gel composition contains fenugreek and green tea powder. These components are also useful in treating oily skin and other skin conditions. The Peel-off Mask has been successful in treating dermatological disorders and is thought to be safe to use. Crucially, green tea contributes antioxidant advantages to the mixture, guaranteeing its durability in terms of pH, drying time, and viscosity even after prolonged storage.

5	Mohammad Mehdi	2024	Higher concentrations of PVA and PVP had a prominent impact on the drying time. The amounts of PVP and PVA had a significant impact on the consistency of the formulations, which consequently affected their applicability. Improved applicability was achieved by decreasing the concentration of PVA and PVP. The most effective combination for the peel-off face mask consisted of 10% PVA, 0.02% PVP, and 2% Curcumin. The number of microbes present was $<1 \times 10^1$ CFU/g for both fungi and bacteria. Optimized formulation significantly prevents both gram- negative and gram- positive bacteria. Curcumin diffusion from formulation to skin show that Curcumin successfully diffuses from formulation from skin barriers. Peel- off experimental result shows that prepared mask effectively remove ink from kin surface.
6	Rifka Azizia	2024	Flavonoid compounds are present in the 70% ethanol extract of Sawo Manila leaves (<i>Manilkara zapota</i> L.), and phenolic has a very strong antioxidant activity with an IC_{21} of 8.26 μ g/m. As a result, it may be developed into pharmaceutical preparations for facial skin, such as a peel-off gel mask. Using variants of PVA 12%, 13%, and 14% and PVP K30 1%, 5%, and 10%, this study was conducted experimentally. The findings of the organoleptic study revealed dark yellow, yellow, and pale yellow colours, unique odours, semisolid and homogenous dosage forms with pH values between 4.9 and 5.7, viscosity between 19046 and 19626 m Pa.s, spreadability between 5.5 and 9.5 g.cm/second, drying time between 12.84 and 20.48 minutes, and elasticity between 8.3 and 9.6 cm.
7	Shreya Lokhande	2024	A peel-off face mask made of tulsi was ready. Tulsi extract reduces acne, balances skin tone, and delays skin ageing. The formulation contains excipients such as polyvinyl alcohol (PVA), citric acid, and glycerol. Peeling time, spreadability, pH, and stability studies were among the characteristics of many formulations that were investigated. The formulation is found to be within the specified range when the parameters are examined.
8	Shraddha M. Purnapatre	2025	This study focuses on framing a Banana powder extract peel-off face mask. Banana powder is rich in potassium, vitamin B6, vitamin C, and various minerals that provide multiple skin benefits including moisturization, anti-aging properties, and skin brightening effects. The natural enzymes in banana help in gentle exfoliation while its antioxidant properties protect against free radical damage. The formulation incorporates sodium alginate, glycerine, gelatine, and citric acid as excipients. The optimized formulation demonstrated



			parameters within acceptable standard ranges, indicating its potential as an effective cosmetic preparations.
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RATIONALE OF THE STUDY - NEED FOR WORK:

Research is prompted by the rising demand for natural, effective, and safe skincare products that harness the advantages of fruit-based ingredients. The current skincare market is shifting towards organic and plant-derived formulations as consumers seek alternatives to chemical-heavy products that may cause skin irritation and adverse reactions. Banana peel powder, which is enriched with vitamins and minerals, provides various beneficial properties such as hydration, protection, antioxidant effects, and anti-aging benefits, positioning it as a suitable option for skincare applications. This study centres on banana-based formulations, particularly those intended for exfoliation and moisturizing. It incorporates sodium alginate, rose water, honey, tea tree oil, and polyvinyl alcohol (PVA). Key factors in this formulation include stability and spreadability,

along with the assessment of parameters like pH and peeling time, which are essential for product quality and consumer safety. The goal of this study is to develop an innovative peel-off mask that utilizes the skin-enhancing properties of banana peel powder. By optimizing and evaluating the formulation, this research aims to advance the field of natural cosmetic products.

OBJECTIVE:

1. To formulate and evaluate a banana peel-off mask that utilizes the natural bioactive compounds found in banana peels for effective skin benefits.
2. To explore rehydration skincare through herbal cosmetic preparations.
3. To assess the physicochemical properties of the mask, including pH, viscosity, and peeling characteristics.

Table 2: Material And Method:

Sr. No	Name of Excipient	Authentication test	Observation
1	Polyvinyl Alcohol	Iodine – Boric Acid Test	The formation of blue or green color confirms the presence of PVA
		Solubility Test	PVA dissolves in hot water to form a clear solution, while inorganic compounds remain insoluble.
		Film Forming Test	A clear and flexible film forms on glass plate
		Viscosity Test	A thick and viscous solution forms
2	Sodium Alginate	Ethanol Precipitation Test	Sodium alginate precipitates out as fibrous or stringy material
		pH Test	pH typically ranges from 6 to 8



Table 3: Active Drug Profile:

Sr. No.	Name of Ingredient	Image	Biological name	Family	Part to be used	Medicinal uses
1	Banana peel		<i>Musa acuminata</i>	Musaceae	Outer skin	Antioxidant, anti-aging, topical preparation, acne treatment.
2	Rose water		<i>Rosa sinensis</i>	Rosaceae	Flowers	Cosmetic preparation, acne treatment, topical preparation, perfume.
3	Honey		<i>Apis mellifera</i>	Apidae		Antiseptic, use in cosmetics, Antibacterial, wound healing.
4	Turmeric powder		<i>Curcuma longa</i>	Zingiberaceae	Roots and Rhizomes	Antiseptic, antioxidant, antibacterial
5	Tea tree oil		<i>Melaleuca alternifolia</i>	Myrtaceae		Antioxidant, antibacterial, acne treatment, skin infection
6	Vit. E capsule		Tocopherol			Antioxidant

Table 4: List of Material:

Ingredients	Category
Polyvinyl Alcohol	Film Forming Agent
Sodium Alginate	Thickening Agent
Banana Peel Powder	Active Ingredient
Turmeric Powder	Antiseptic
Honey	Binding Agent
Tea Tree Oil	Preservative
Evion Vit. E Capsule	Moisturizing Agent
Rose Water	Perfume

Table 5: Formulation Table:

Ingredients	F1	F2	F3
Polyvinyl Alcohol	1.2 gm	1.6 gm	1.6 gm
Sodium Alginate	0.15 gm	0.15 gm	0.15 gm
Banana Peel Powder	2.5 gm	2.8 gm	3 gm
Turmeric Powder	0.5 gm	0.6 gm	0.7 gm
Honey	3 gm	3.4 gm	3 gm
Tea Tree Oil	0.2 ml	0.2 ml	0.2 ml
Evion Vit. E Capsule	1 capsule	1 capsule	1 capsule
Rose Water	0.4 ml	0.5 ml	0.5 ml

**Figure 1: Banana Peel Powder**

METHOD: [11] [12]

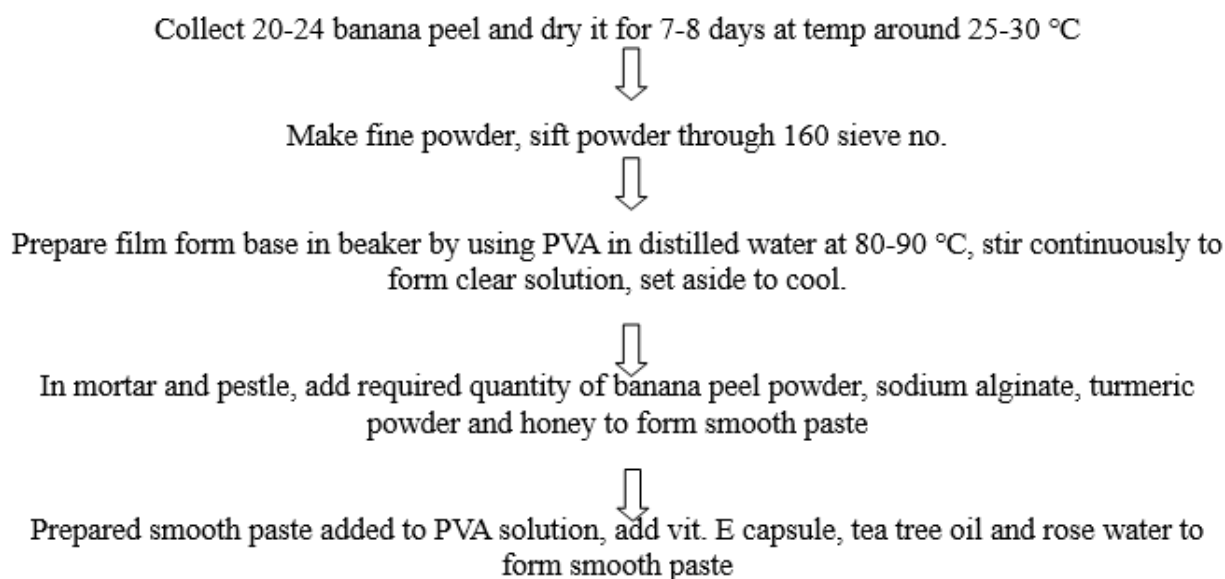


Figure 2: Formulations of Banana Peel Off Mask

EVALUATION: [13]

pH: 5.5.

1. Organoleptic Evaluation:

Viscosity: 3200cp

Appearance: The product has a pale yellow-brown color.

Dry time: 10-15 minutes under normal room conditions.

Odour: Pleasant.

Peel Off Strength: The mask could be removed easily without discomfort.

State: Semi-solid.

2. Physiochemical Evaluation: -



- 3. Stability:** No significant changes in color, odour, or pH were observed over 3 months under different storage conditions.
- 4. Spreadability Test:** - One gram of the formulation was placed on butter paper in a watch glass for 2 minutes to compress the sample into a uniform thickness and diameter.[14]
- 5. Irritancy Test:** - An irritancy test was conducted by applying the formulation on the back of the hand and leaving it for 15 minutes to check for irritation such as swelling, itching, and redness. [15]
- 6. Peel Off Test:** - The formulation was spread on the back of the hand and left for 15-20 minutes to dry. After this period, the dry film formed on the skin was easily removed without complications. [16]



Figure 3: Peel Off Mask

OBSERVATION TABLE:**Table 6: Identification test of banana peel powder**

Sr . No .	Parameter	Observation
1 .	Colour	Pale Brown
2 .	Odour	Pleasant
3 .	State	Semi solid
4 .	pH	5.5

Table 7: Irritancy Test

Sr. No.	Parameters	Observation
1 .	Irritation	No
2 .	Redness	No
3 .	Swelling	No

Table 8: Stability Test:

Sr. No	Parameters	Room Temperature	40°C
1 .	Colour	No change	No change



2 .	Odour	No change	No change
3 .	pH	5.5	5.5
4 .	Texture	Semi solid	Semisolid
5 .	Smoothness	Smooth	Smooth

Table 9: Morphological Evaluation Table

Sr . No.	Parameters	Observation
1.	Colour	Pale brown
2.	Odour	Characteristic banana odour
3.	Appearance	Smooth paste
4.	Texture	Semi - solid
5.	pH	5.5
6.	Homogeneity	Uniform
7.	Consistency	Good
8.	Spreadability	Good
9.	Stability	Good

CONCLUSION:

The use of herbal peel face masks, such as those made from banana peels, represents a natural and effective approach to skincare. The banana peel mask offers beneficial properties derived from herbal ingredients. This formulation is created with natural and functional components that exhibit excellent physicochemical properties in terms of stability, safety, and user acceptability, positioning it as an eco-friendly and effective skincare product. The pH and viscosity of the mask fall within the optimal range for facial application. Stability studies suggest a good shelf life, while the absence of irritation and positive feedback from volunteers indicate its suitability for regular use. The formulation demonstrates that the banana peel face mask is a promising cosmetic product, characterized by favourable sensory, physicochemical, and safety properties. In the context of holistic wellness, the use of natural ingredients aligns with principles that focus on the overall health of the skin. Different herbs target specific skin concerns, such as acne, dryness, or

signs of aging, allowing for customized skincare solutions. Overall, herbal peel masks not only contribute to healthier skin but also support a more sustainable and natural approach to beauty. Future research directions include comparative studies to assess efficacy against economical face masks, mechanistic studies to explore the molecular mechanisms of active ingredients, formulation optimization by experimenting with different concentrations and additional botanicals, and packaging studies to evaluate the impact of various materials on product stability.

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