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COMPREHENSIVE DESIGN AND EVALUATION OF NATURAL COMPLEXATION ENHANCING CREAM IN RICHED WITH RICE ALOE TURMERIC EXTRACTS

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1. ABSTRACT[1,2,3]

This study focuses on the formulation, characterization, and performance assessment of a plant- based skin-brightening face cream developed using rice extract, aloe vera gel, and turmeric powder as the primary bioactive components. These natural ingredients were deliberately chosen due to their multi-functional therapeutic actions, long-established reliability in traditional medicinal practices, and compatibility with modern cosmetic science. The preparation of the formulation involved a stable oil-in-water (O/W) emulsion technique, optimized to ensure suitable texture, spread ability, and consumer acceptance. Rice extract was incorporated for its skin lightening potential, attributed to its enrichment with vitamins, ferulic acid, and amino acids that help regulate melanin synthesis while offering antioxidant protection against oxidative stress. Aloe vera gel, known for its high content of polysaccharides and essential micronutrients, was included to support skin hydration, barrier repair, and cell regeneration. Meanwhile, turmeric, with its bioactive compound curcumin, contributes anti-inflammatory, antimicrobial, and anti-aging advantages that assist in reducing hyperpigmentation, calming irritation, and preventing premature wrinkle formation.

Following formulation, the cream underwent a comprehensive series of physicochemical and stability evaluations to determine product quality and dermal safety. These tests included:

- pH analysis to ensure compatibility with the skin's natural acid mantle.
- Viscosity measurement to assess mechanical stability and user-friendly consistency.
- Spread ability testing to evaluate ease of topical application and uniform distribution.

KEYWORDS: Anti-inflammatory, formulation, antioxidant, emulsion, anti-aging, herbal cosmetics, natural skincare.[1,2,3]

2. INTRODUCTION

In recent years, consumer interest in naturally sourced and plant-based skincare formulations has risen dramatically. This shift is largely fuelled by growing awareness of the potential consequences associated with long-term use of synthetic cosmetic ingredients. Many conventional skin-lightening compounds and anti-aging substances—although widely incorporated in commercial beauty products—are frequently linked to negative outcomes such as excessive dryness, redness, irritation, photosensitivity, and in some cases, persistent dermal damage. As modern consumers prioritize safety and skin-friendly ingredients, the cosmetic industry is increasingly exploring herbal and bio-active alternatives that deliver comparable or superior therapeutic effects while ensuring enhanced biocompatibility, sustainability, and fewer side effects.

Among these traditional herbal components, rice water has gained remarkable attention due to its rich nutritional profile and long history of use in Asian beauty rituals. Rice water, the starchy liquid remaining after washing or soaking rice, contains a variety of skin-beneficial constituents, including vitamins B, C, and E, amino acids, ferulic acid, and essential trace minerals. These bioactive compounds contribute to improved elasticity, gradual tightening of the skin, and noticeable reduction in the appearance of enlarged facial pores. Moreover, rice water supports epidermal regeneration by stimulating keratinocyte proliferation, promotes improved microvascular blood circulation, and exhibits antioxidant properties that help neutralize free radicals—ultimately slowing cellular aging and the formation of fine lines.

From a functional perspective, rice water also helps maintain a balanced skin microbiome due to its mild pH, while its soothing nature makes it beneficial for calming irritated or inflamed skin. Its hydrating qualities further help reinforce the skin’s natural barrier, preventing trans epidermal water loss and maintaining overall moisture content.

To amplify these benefits, modern rice-based skincare products are often formulated with scientifically validated moisturizing and brightening agents such as **hyaluronic acid**, **niacinamide (Vitamin B3)**, and **glycerine**. Hyaluronic acid acts as a powerful humectant capable of retaining water within the deeper layers of the skin, resulting in enhanced smoothness and suppleness. Niacinamide helps improve skin tone by regulating melanin transfer, reduces dullness, and strengthens the skin's protective barrier. Glycerine further supports hydration by attracting and retaining moisture from the environment. Together, these ingredients create a synergistic effect, making rice face creams suitable for daily use across all skin types including dry, sensitive, and compromised skin.

Thus, rice-based formulations present a promising and eco-friendly approach toward maintaining skin health, offering a natural solution for hydration, barrier reinforcement, anti-aging support, and complexion improvement—without the drawbacks associated with synthetic alternatives.[2,3]

2. ANATOMY OF THE SKIN…

1. As body largest organ skin protects against germs regulates body temp and enables touch sensation
2. Skin main layer include epidermis, dermis and hypodermis and prone to many.[4]

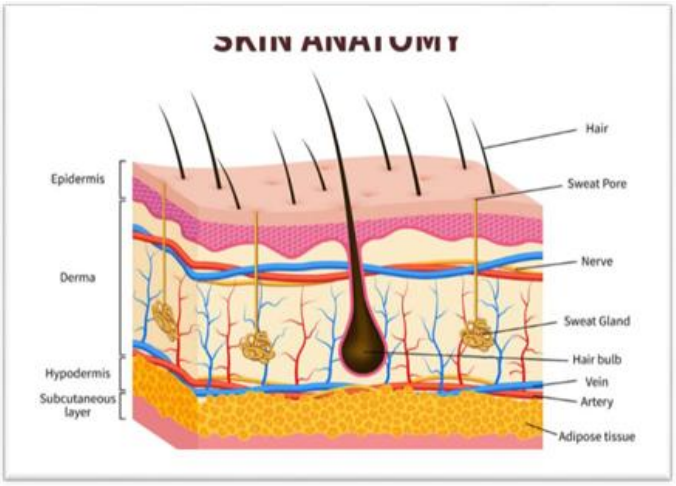


Fig. 3.1: Anatomy of the skin.

Anatomy Fig

1. Epidermis: the top layer[7]

- It keeps bacteria and germs from entering your body and blood stream and causing infection.

2. Dermis: the middle layer[4]

- Roots of hair follicle attach to the dermis and makes oil help regulate body temp.

- **Hypodermis:** bottom or fatty layer[7]
- It helps the nervous and blood vessels.
- Nerve and blood vessels in the dermis get larger in hypodermis.
- Nerve and blood vessels branch out to connect hypodermis to rest of the body.[4]

2. OBJECTIVES

1. Anti-Aging & Skin Soothing[9,10]

- **Reduces signs of aging:** Rich antioxidants help fight free radical damage, which reduces fine lines, wrinkles, and improves skin elasticity.[9]
- **Calms irritated skin:** Rice extract has natural soothing properties that help reduce redness and inflammation.

2. Improved Skin Tone & Texture

- **Brightens complexion:** Regular use helps fade dark spots, blemishes, and uneven pigmentation, giving the skin a naturally radiant glow.
- **Gentle exfoliation:** Rice-based particles provide mild exfoliation, removing dead skin cells and promoting fresh, healthy skin.
- **Tightens pores:** Helps reduce the appearance of large pores, making the skin look smoother and more refined.

3. Hydration & Skin Barrier Support

- **Deep moisturization:** The cream delivers long-lasting hydration, preventing dryness, roughness, and flaky skin.
- **Strengthens skin barrier:** Supports the repair of the skin's natural protective layer, reducing moisture loss and improving overall skin health.

4. Antioxidant Protection

- Rice extract contains natural vitamins and minerals that protect the skin against environmental stress, pollution, and UV-related damage.

5. Suitable for Sensitive Skin

- The mild nature of rice-based ingredients makes the cream ideal for sensitive or easily

irritated skin.

6. Natural Glow Enhancement[10]

- Regular application promotes a soft, luminous finish, improving overall skin radiance without harsh chemicals.

7. Oil Balance Control

- Helps regulate excess sebum production, making it beneficial for both dry and oily skin types

3. MATERIAL USED FOR FORMULATION

Fig. 5.1: RICE

1. Common name: Asian rice, Indica rice.[2,3,4]

Biological name: Oryza sativa Genus Oryza.[24]

Chemical constituent: Starch, protein, lipids (fats), dietary Fiber, vitamins, and minerals.

Family: *Poaceae* (Grass family)

Uses

1. Skin Lightening Naturally contains vitamins B and E and amino acids that help brighten the skin.

2. Anti-Aging Rich in antioxidants, it helps reduce free radical damage and signs of aging

2 Aloe Vera Gel[17]

Common Name: Aloe vera gel

Scientific Name: *Aloe barbadense*

Family: *Asphodelaceae*

Genus: Aloe

Uses: Moisturizes dry skin, reduces acne, and skin-repair Properties.[16]

Fig. 5.2: Aloe Vera.

3. Turmeric[2,3]

Common Name: Turmeric Powder

Biological/Scientific Name: Curcuma longa

Family: *Zingiberaceae*

Genus: Curcuma

Chemical constituents, turmeric rhizome contains moisture content (80%–90%), carbohydrates (12%– 13%), proteins (1%–2%), minerals (2%), and fatty acids.[27]

Fig. 5.3: Turmeric.

4. EXTRACTION OF MATARIALS

1. Extraction of aloe[14]

Aloe vera leaves Clean and wash

⇩

Cut base and tp portion, 2.5cm

⇩

Remove sharp spins from leaf margins

⇩

Extraction of gel by hand

⇩

Grinding and Homogenization”

⇩

Enzymatic treatment, pectinase 0.5 % for 30min

⇩

Filtration extracted juice

⇩

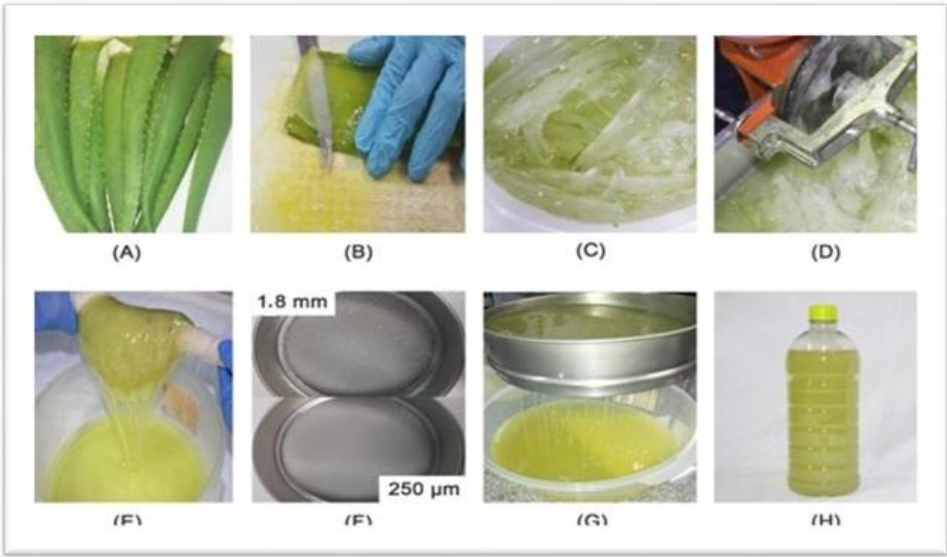
Raw aloe vera juice

⇩

Addition of ascorbic acid and citric acid

⇩

Pasteurization at 85 to 95 c for 2 min



Extraction of RICE

Crushed grains

⇩

Steeping water for 16 hr

⇩

Wet –Milling

⇩

Filtration through 70 no. Sieve

⇩

Centrifugation of the filtrate

⇩

Water suspension of pellet and adjust to the PH 4.5

⇩

Scraping the brown layer

⇩

Water suspension of the pellet

⇩

Centrifugation

⇩

Scraping off the brown layer

⇩

Dewatering and air drying

EXTRACTION OF TURMERIC[6,15,26]

Turmeric extraction is the process of separating curcumin, the yellow active compound, from turmeric powder. First, turmeric rhizomes are dried and ground into a fine powder. This powder is mixed with a solvent like ethanol and left to soak for 24–48 hours so the solvent can dissolve the useful compounds. After soaking, the mixture is filtered to remove solid particles. The yellow liquid obtained is then heated gently to evaporate the solvent. What remains is a thick yellow paste called turmeric oleoresin, which contains concentrated curcumin. This extract can be used in medicines, cosmetics, and food products.

7. FORMULATING INGREDIENTS[1,2,3]

Table No. 1: formulating ingredient.

Sr no.	*Ingredients*	*Quantity*
1	Rice extract	2gm
2	Aloe vera gel	1.5gm
3	Beeswax	3gm
4	Liquid paraffin	10ml
5	Methyl paraben	0.02gm
6	Distilled water	100ml Qs
7	Turmeric powder	1gm
8	Rose water	Qs

8. Properties and Roles of ingredients[1,2]

1. Aloe

Fig. 8.2: {Aloe}

Properties

1. Moisturizing
2. Anti inflammatory
3. Antibactarial
4. Laxative

Roles

1. Skin health: moisturizing skin.[18]
2. Aloe vera contains vitamins, enzymes, minerals, amino acids.[18]
3. Wound and burn healing speed up healing

Advantages

1. Topical side effects
2. Electrolyte imbalance
3. Treat kidney problem

2. Bee wax

Fig. 8.2: {Bee wax}.

Properties

1. Hydrophobic
2. Anti- bacterial

Roles

1. Skin care: moisturizing
2. provide thickness to preparation.[19]

4. Liquid paraffin

Fig. 8.3: {liquid paraffn}.

Properties

1. Soluble in organic solvent
2. Provide viscosity from light to heavy
3. Chemical stable and inert

Roles

1. Helps reduce straining during bowel moment
2. Promote smoother and regular bowel function
3. As a lubricant in cream or alkaline agent[19]

4. Methyl Paraben

Fig. 8.4: {methyl paraben}.

Properties

1. Broad spectrum anti-microbial
2. Poorly soluble in water
3. Stable across wide range of pH levels

Roles

1. Preservative
2. Self-life expander, Product stability

5. Turmeric

Fig. 8.4: Structure of Turmeric.

Properties

1. Ani oxidant
2. Anti inflammatory
3. Anti-microbial

Roles

1. Immune system support
2. Pain management
3. Digestive aid

6. Rice

Fig. 8.5: {Rice}.

Properties

1. Richer vitamin B
2. Minerals like Mg
3. Anti-oxidant like

Roles

1. Energy production
2. Anti-oxidant support
3. Provide B vitamin

9. FORMULATION PROCEDURE

1. Step-1

Aqueous Phase

1) A clean beaker add about 70-80ml distilled water and rose water.
2) Gently heat on bath on to -150c.

3) Add methyl paraben to heated water o stir until completely dissolves dissolve fully for effect) remove from heat set aside.

2. Step-2

Oil Phase

1) Combine beeswax & liquid paraffin in beaker.
2) Heat gently on water both until bees wax completely melted and mixture is clear temperature around 70-75°c.
3) Do not over heat it can degrade ingredients.
4) Emulsification final mixing once both the aqueous & all phase has reached similar temp. 70-7500, then carefully pour oil aqueous phase. Dom not pour phase into water in to oi ↓
5) While mixing stir gently white continue stir until creamy emulsion begins to form.
6) Cool to about 40 c add remaining ingredients. (rice aloe) turmeric powder.
7) Continue stir until all ingredients evenly distributed o cream reaches smooth & uniform consistency.
8) Allow to cool cream in room temperature.
9) Airtight transfer finish cream in sterilized container.

10. Evaluation of the face cream [1,2,3]

Table No. [Evalution parameters].

Sr no.	*Parameters*	*Result*
1	Colour	White grey
2	Odour	Characteristic
3	State	Solid
4	Consistency	Semi solid preparation
5	Spread ability.	3.38gm.cm/sec
6	Washability	Clearly washable
7	Non irritancy test	No irritation
8	Viscosity	4406.3cps
9	Homogeneity	Uniform
10	Removal	Removable
11	After feel	Emollience
12	Type of smear	Thin smear
13	Ph	7.0 to 7.2

11. Evaluation tests

1. spread ability [1,2]

Procedure

1. Take two clean glass slides of the same size.

2. Place 1 g of rice face cream at the centre of the lower slide.
3. Place the second slide on top and allow it to spread slightly.
4. Place a 25 g weight on the upper slide for 1 minute to form a uniform layer.
5. Attach a small string to the upper slide and connect it to a hanging pan.
6. Add small weights to the pan until the upper slide starts to move.
7. Measure the time (T) taken for the slide to move a fixed distance (6 cm).

Repeat the test three times.

Fig. 11.1.

***2. WASHABILITY TEST*[11][19]**

1. Apply a small amount (0.5 g) of the rice face cream on the back of the hand or a glass plate.
2. Allow it to stay for 5 minutes so it adheres properly.
3. Place the hand/plate under running tap water for 1 minute (without soap).
4. Rub gently with fingers or a soft cotton pad for 10–15 seconds.
5. Observe how much cream is removed.

Fig. 11.2.

3. NON irritancy test [12][22]

1. No irritancy or redness were visible during preparation condition observed for 24hrs.

4. Viscosity[13]

1. Measure with help of Brookfield viscometer.25 degree and 63 rpm, also use aNDJ 5S viscometer viscosity requirements when it is in the range of 2000-50000 cps.[20]

5. Removal

1. Apply cream on face and observe the cream was remove through water or not After feel, apply on skin and observe the[21]

6. Type of smear: After application of cream type of smear formed on the skin were non greasy.[23]

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12. CONCLUSION[1,2,3]

The successful development of this formulation and its positive performance across all evaluation parameters clearly demonstrate its stability, safety, and effectiveness. Each ingredient contributed valuable functional and therapeutic benefits, resulting in a final product with excellent texture, spread ability, and consumer-friendly characteristics. The formulation passed organoleptic, physicochemical, microbiological, and performance tests — confirming it meets high-quality standards suitable for cosmetic or dermatological applications.

This research highlights the promising potential of incorporating natural actives such as rice extract, turmeric, aloe vera, beeswax, and other supportive excipients to enhance skin nourishment and protection. The findings strongly support the commercial viability of this formulation, offering a safe, innovative, and market-ready skincare solution that aligns with current consumer demand for effective, nature- derived products.

The formulated herbal face cream enriched with rice extract, aloe vera gel, and turmeric

showcased remarkable potential as a natural skincare solution. These botanicals contributed to improved moisture retention, enhanced antioxidant activity, and visible reduction in pigmentation and fine wrinkles. The formulation was found to be physically stable, skin-friendly in terms of ph. and texture, and well accepted by users, indicating its safety and efficiency as an alternative to chemical-based cosmetics.

Rice-based ingredients, known for their vitamins, minerals, and soothing properties, further support skin nourishment, hydration, and complexion enhancement. Their gentle anti-inflammatory nature may help calm irritation and redness, making the cream suitable even for sensitive skin. However, the overall effectiveness may vary depending on individual skin type and lifestyle.

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