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Research Article

Formulation and Evaluation of Anti-Aging Cream From Bakuchiol and Moringa Extract

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A B S T R A C T

Skin aging is influenced by both intrinsic factors (like age and genetics) and extrinsic factors (like UV exposure and pollution). Conventional treatments such as retinoids are effective but may cause irritation or are unsuitable for pregnant women. Recent studies highlight the anti-aging potential of plant-derived compounds like Bakuchiol and Moringa. This study focuses on developing and evaluating a natural anti-aging cream made from herbal ingredients Bakuchiol ethanolic extract, Moringa oleifera ethanolic extract, and green tea (Camelliasinensis) decoction. With the growing interest in plant-based skincare, the aim of this research was to create a safe, effective, and non-irritating alternative to chemical-based anti-aging products.

Bakuchiol, known as a gentle substitute for retinol, helps improve collagen production and reduce wrinkles without causing redness or dryness. Moringaextract is packed with skin-repairing nutrients like polyphenols and vitamins, and greentea contributes antioxidant and anti-inflammatory benefits that soothe and protect the skin. The extracts were obtained using simple and traditional methods—maceration for Bakuchiol and Moringa, and decoction for green tea.

The cream was prepared using standard emulsification techniques with cosmetic ingredients like stearic acid, cetyl alcohol, glycerin, and light liquid paraffin. It was then evaluated for physical properties such as pH, appearance, spreadability, viscosity, and stability. The results showed that the cream had a skin-friendly pH (5.5–5.7), remained stable over a month, and had good texture and ease of application with no phase separation or color change. Overall, this herbal cream showed promising results in reducing signs of aging like fine lines and dullness, supporting its potential as a natural, effective anti-aging skincare product.

Keywords: Bakuchiol, Retinoids, MoringaExtract, Anti-Aging

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INTRODUCTION

Aging leads to structural and functional changes in the skin, such as loss of elasticity, increased dryness, and appearance of fine lines. Although retinol is widely used for its anti-aging benefits, it often causes peeling, redness, and photosensitivity. Bakuchiol, derived from the seeds of *Psoralea corylifolia*, offers similar benefits to retinol without these side effects. Moringa (*Moringa oleifera*) is known for its nourishing, antioxidant, and anti-inflammatory properties.[1]

This project focuses on the formulation of an anti-aging cream using Bakuchiol extract, Moringa ethanolic extract, and Green Tea decoction, aiming to create a herbal, safe, and effective topical formulation. The formulation avoids synthetic preservatives, uses minimal processing, and is designed with pharmaceutical principles for both efficacy and skin safety.[2]

Scientific Background of Key Ingredients

Bakuchiol:

- Source**:** Bakuchiol is a natural compound found in the seeds of the Babchi plant, scientifically called *Psoralea corylifolia*. This plant has long been used in Ayurveda and traditional medicine. Family: Leguminosae[3].
- Key Components: Bakuchiol itself is the main active ingredient. It also contains helpful compounds like psoralen, isopsoralen, and flavonoids such as bavachin

and bavachinin, which contribute to its skincare benefits. (4)

- A 2018 study published in the *British Journal of Dermatology* compared Bakuchiol 0.5% to Retinol 0.5% in a 12-week trial. Both showed significant reduction in wrinkles and hyperpigmentation, but Bakuchiol caused less skin irritation. (5)
- Bakuchiol stimulates collagen production, improves cell turnover, and has antioxidant properties that protect skin from free radical damage.(6)

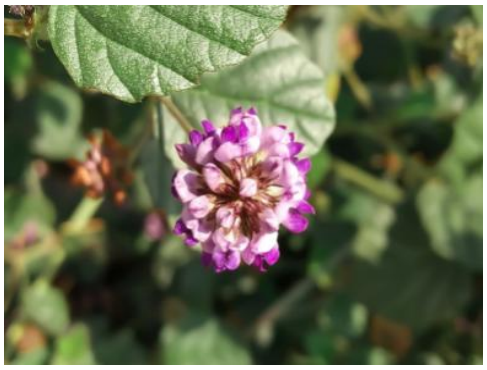

Figure 1: Flowering tops of *Psoralea corylifolia*

Moringa:

- Source: Moringa is commonly known as the drumstick tree (*Moringa oleifera*). Its leaves are especially rich in nutrients and used in skincare and health formulations. Family : Moringaceae.(7)
- Key Components**:** Moringa leaves are packed with vitamins A, C, and E, flavonoids like quercetin and kaempferol, chlorogenic acid, minerals, and some beneficial plant proteins that moisturize and nourish skin.(8)
- A study in the *Journal of Ethnopharmacology* (2014) showed that topical application of Moringa leaf extract improved skin elasticity and reduced wrinkle depth in human subjects.
- Moringa oil has antimicrobial, antioxidant, and anti-inflammatory effects, making it suitable for sensitive and aging skin.(9)

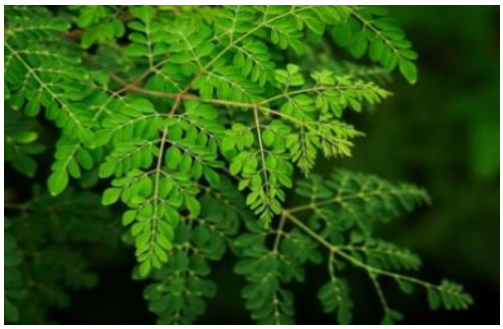

Figure 2: Leaves of *Moringa oleifera*

Green Tea:

- Source**:** Green tea is made from the unfermented leaves of the *Camellia sinensis* plant. It's widely known for its health and skin benefits. Family : Theaceae (10)
- Key Components**:** Green tea contains catechins (especially EGCG), tannins, vitamins, flavonoids, and theanine, which all contribute to its powerful effects. (11)
- Green tea (*Camellia sinensis*) is a widely researched botanical known for its high content of catechins, especially epigallocatechin gallate (EGCG). These compounds provide antioxidant, anti-inflammatory, and photoprotective benefits. (12)
- Green tea helps to protect skin from UV-induced damage, supports collagen integrity, and improves overall skin texture. (13)

Figure 3: Leaves of *Camellia sinensis*

Materials and Methods

Constituent of Formulation:-

Table 1: Constituents of formulation

Ingredient	Concentration (% w/w)	Role
Bakuchiol extract	1.0	Active (anti- aging)
Moringa extract	2.0	Antioxidant, healing agent
Green tea	5.0	Antioxidant, soothing
Stearic acid	4.0	Emulsifier
Cetyl alcohol	2.0	Emollent, stabilizer
Glycerin	3.0	Humectant
Light liquid paraffin	4.0	Moisturizer
Propylene glycol	2.0	Solvent, humectant
Phenoxy ethanol	0.2	Antimicrobial (Preservative)
Essential oil	q.s.	Fragrance
Distilled water	q.s.to 100	Vehicle

Extraction Procedures:

Ethanolic Extraction of Bakuchiol:-

The seeds of *Psoralea corylifolia* were shade-dried and coarsely powdered. About 100g of the powder was soaked in 70% ethanol for 4 days with intermittent shaking. The extract was filtered using muslin cloth followed by Whatman filter paper, and concentrated under reduced pressure using a rotary evaporator. The semisolid extract was stored in a dark glass container at 4°C until further use.[14]

Figure 4: Ethanolic Extraction of Bakuchiol

Ethanolic Extraction of Moringa leaves

Fresh *Moringa oleifera* leaves were cleaned, shade-dried, and powdered. 100g of the powder was macerated in 70% ethanol for 4 days. After filtration and concentration using a rotary evaporator, the extract was stored in an airtight amber container in a refrigerator.[15]

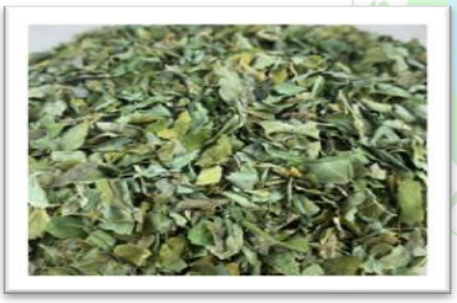

Figure 5: Ethanolic Extraction of Moringa leaves

Preparation of Green Tea Decoction

20g of *Camellia sinensis* dried leaves were boiled in 200 ml of distilled water for 30 minutes. The decoction was cooled, filtered, and used fresh during the cream formulation process.[16]

Figure 6: Dried leaves of *Camellia sinensis*

Formulation Procedure of the Anti-Aging Cream

The herbal anti-aging cream was formulated using standard emulsification techniques, divided into oil and aqueous phases, followed by emulsification and active ingredient incorporation as described below.(17)

1. **Phase A – Oil Phase Preparation:-**

   Stearic acid, cetyl alcohol, and light liquid paraffin were accurately weighed and transferred into a clean, dry beaker. The mixture was then heated using a water bath and maintained at a temperature of 70–75°C until all components were completely melted and a uniform oil phase was obtained.

2. **Phase B – Aqueous Phase Preparation:-**

   In a separate beaker, distilled water was measured, and glycerin along with the green teadecoction and Propylene glycol was added. The contents were stirred to ensure uniform mixing and then heated to 70–75°C using a water bath. A suitable paraben-free preservative was added to this aqueous phase and stirred until dissolved.

3. **Emulsification Process:-**

   The hot aqueous phase (Phase B) was slowly added to the oil phase (Phase A) with continuous stirring using a magnetic stirrer (or homogenizer) operated at 1000–1500rpm. Emulsification was continued for 10–15minutes while maintaining the temperature to obtain a stable emulsion.(18)

4. **Cooling and Active Addition:-**

   The emulsion was then allowed to cool gradually to approximately 40°C. At this stage, the Bakuchiolextract, Moringaextract, and Vitamin E were added to the formulation. The mixture was stirred gently for an

additional 10–15 minutes to avoid disruption of the emulsion structure.

5. Final Adjustment and Packaging:-

The final weight of the cream was adjusted to 100 g using distilled water. The prepared cream was then filled into presterilized, airtight glass jars or laminated tubes, labeled appropriately, and stored at a cool temperature (4–8°C) for further evaluation.(19)

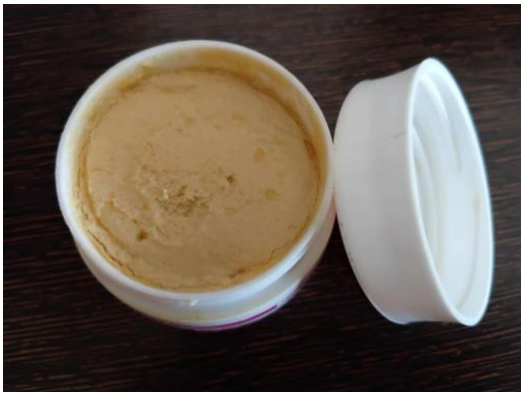

Figure 7: Cream preperation

Evaluation of Anti-aging Cream Parameters

1. Organoleptic Properties :

The cream was visually inspected for:

Table 2: Organoleptic Properties of prepared cream

Parameter	Observation
Color	Light greenish cream (depending on extract concentration)
Odor	Characteristic herbal scent
Appearance	Smooth, uniform, and glossy
Texture	Non-sticky, non-greasy, easily spreadable

2. pH Measurement

- Measured using a digital pH meter.
- Target range: 5.0 – 6.5, which is ideal for skin compatibility. (20)

3. Spreadability Test

- Method: 1g of formulation was placed between two glass slides and compressed with a fixed weight. Spread diameter was measured. (21)

4. Stability Studies

- Conducted atRoomTemperature (for 1–3 months).
- Monitored for:
  - Phase separation
  - Color and odor change
  - pH variations
  - Microbial growth (22)

5. Viscosity Test

- Measured using a Brookfield viscometer.
- Ensures appropriate thicknessandconsistency for skin application. (23)

6. Homogeneity Test

- Visual inspection and rubbing a small quantity on the skin surface. (24)

7. Washability

- The cream was applied and then washed off with water.

8. Irritancy Test (Patch Test)

- Conducted on human volunteers (after ethical approval).
- A small quantity was applied on the forearm and observed for 24hours.

Table 3: Analysis of prepared cream

Parameter	Observation	Method Used
Appearance	Smooth, off-white cream	Visual inspection
pH	5.7	Digital pH meter
Spreadability	Good	Slip and drag test
Viscosity	Moderate	Brookfield viscometer
Homogeneity	Uniform	Touch and visual test
Stability (1 month)	Stable	Room temp/ accelerated storage
Skin irritation	No irritation	Patch test on volunteers

RESULTS:

The formulated herbal anti-aging cream containing Bakuchiolethanolicextract, Moringaethanolicextract, and Green tea decoction was evaluated for various physicochemical parameters and performance attributes. The findings are summarized below:

1. Physical Appearance:

The cream exhibited a smooth, non-greasy, light green texture with a pleasant herbal fragrance. No phase separation or crystallization was observed during the 30-day observation period.

2. **pH:**
   The pH of the cream was found to be in the range of 5.5 to 5.7, which is compatible with the skin's natural pH, indicating good dermal acceptability.
3. **Viscosity:**
   Measured using a Brookfield viscometer, the cream showed a viscosity of approximately 45,000–55,000cps, ensuring good spreadability and adherence to the skin surface.
4. **Spreadability:**
   The cream showed excellent spreadability with an average spread diameter of 5.9 cm, indicating ease of application without stickiness.
5. **Stability Study:**
   The formulation was stable at room temperature for 30days. No change in color, consistency, or pH was observed, confirming physical stability.
6. **Washability:**
   The cream was easily washable with water, leaving no residue on the skin, confirming good cosmetic acceptability.
7. **Preliminary Efficacy:**
   After 4 weeks of application, volunteers reported improvements in skin texture, softness, and reduction in dullness, supporting its potential anti-aging efficacy

DISCUSSION

Both Bakuchiol and Moringa are shown to have strong anti-aging effects based on current scientific evidence. Bakuchiol acts on the same skin pathways as retinol but without side effects like irritation or sensitivity to sunlight, making it safe for daily use, even in sensitive skin and pregnancy .

Moringa contributes through its high antioxidant content and essential fatty acids. It supports barrier function, provides long-term hydration, and reduces oxidative stress in skin cells, thereby preventing premature aging .

Together, these botanicals offer a holistic approach to anti-aging skin care.

CONCLUSION

In this research, we successfully made a herbal cream that includes Bakuchiol**,** Moringa**,** andGreenTeaextracts, all known for their benefits on aging skin. The final cream is smooth, non-irritating, and easy to apply. It uses only natural ingredients and avoids strong chemicals, making it safer for long-term use.

Bakuchiol acts as the main anti-aging agent, showing similar effects to retinol but without its harsh side effects. Moringa supports healing and protects the skin with its antioxidant and anti-inflammatory powers. GreenTea adds a calming, soothing, and antibacterial benefit, making the cream more suitable for all skin types.

The cream was prepared using simple methods—ethanol extraction and decoction—which are easy to do in small labs or home-based settings without needing expensive machines. With further testing like stability and skin compatibility studies, this cream could be a useful, affordable, and natural option in the growing market of herbal skincare.

In short, this project proves that herbal ingredients from commonly available Indian plants can be combined to make a powerful, gentle, and effective anti-aging cream, offering a clean and green alternative to chemical-based skincare products

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Conflict of Interest

There is no conflict of interest

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