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FORMULATION AND EVALUATION OF FACE CREAM BY USING *CLITORIA TERNATEA* AND *AZADIRACHTA INDICA*

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ABSTRACT

Herbal cosmetics are becoming increasingly popular due to the growing preference for natural ingredients in skincare products. The current study was carried out to formulate and evaluate a herbal face cream using Butterfly Pea flower (*Clitoria ternatea*) and Neem leaf (*Azadirachta indica*) extracts. These herbs are known for their traditional uses and the presence of various beneficial phytochemicals. *Clitoria ternatea* flowers contain anthocyanins, which are responsible for their antioxidant properties and may help protect the skin from oxidative damage. Neem leaves contain flavonoids, tannins, and other natural constituents that are traditionally associated with antibacterial properties. Considering these properties, both plant extracts were selected for the preparation of the herbal face cream. The collected plant materials were dried, powdered, and extracted. The extracts were then incorporated into a suitable cream base containing different ingredients such as emulsifying agents, moisturizing agents, and preservatives. Three formulations F1, F2, and F3, were prepared by changing the concentrations of emulsifying agents to obtain a cream with good physical properties. The formulations were evaluated for different parameters such as colour, odour, appearance, homogeneity, pH, consistency, spreadability, greasiness, and phase separation. The ability of the prepared cream to reduce free radicals was examined using the DPPH free radical scavenging method". From the evaluation results, formulation F3 showed comparatively better characteristics, with a smooth texture, suitable pH, and good spreadability. Overall, the study highlights the possibility of using Butterfly Pea and Neem extracts in herbal cosmetic preparations and their potential role in the development of natural skincare products.

KEYWORDS: Face cream; *Clitoria ternatea; Azadirachta indica;* Acne; antioxidant property; antibacterial activity.

INTRODUCTION

Cosmetics are products used for cleansing, beautifying, protecting and maintaining the appearance of the skin and other external parts of the body. They play an important role in personal hygiene and daily skincare routines. Cosmetic preparations are available in different forms, such as creams, lotions, gels, powders and face washes. Among these, face creams are widely used to keep the skin soft, smooth and moisturized. They keep the skin moisturized, reduce dryness, and help maintain its natural moisture balance. The formulation of cosmetics involves the use of various ingredients such as oils, waxes, emulsifying agents, preservatives and fragrances. In recent years, herbal cosmetics have gained considerable attention due to the increasing interest in plant-based skincare products. Medicinal plants contain natural compounds that may provide antioxidant, soothing and skin-protective effects. The herbal

ingredients used in cosmetic preparations has encouraged the development of new and innovative skincare formulations. Therefore, the preparation of herbal face creams using suitable plant extracts is an important area of cosmetic research.

FACE CREAM

Face cream is a semi-solid cosmetic preparation specially designed for application on the facial skin.it is commonly used in everyday skincare to keep the skin hydrated, make it smoother, and prevent dryness. Face creams are prepared by mixing oil and water based ingredients with emulsifiers, preservatives and other necessary substances. These ingredients were contribute to the consistency, stability and expected qualities of the prepared cream.

Depending on their composition and purpose, the face creams are available in different types, such as moisturizing creams, nourishing creams, cleansing creams, vanishing creams and protective creams. Regular application of a suitable face cream helps to maintain skin softness and smoothness by reducing moisture loss. The performance of a face cream is influenced by the ingredients used, the preparation process and the overall quality of the final product.

In recent years, herbal face creams have gained popularity due to the growing interest in plant-based cosmetic products. Natural plant extracts contain various bioactive compounds that may offer antioxidant, soothing and skin-conditioning properties. The incorporation of herbal extracts into face cream formulations provides an opportunity to develop cosmetic preparations using plant-based ingredients.

BENEFITS OF FACE CREAM

- Helps to maintain the natural moisture of the skin.
- Prevents excessive dryness and roughness.
- Makes the skin soft and smooth.
- Supports the skin's protective barrier.
- Helps enhance the skin’s overall appearance.
- Helps to reduce moisture loss from the skin.

SIDE EFFECTS OF FACE CREAM

- Although face creams are generally suitable for topical use, some individuals may experience unwanted effects depending on their skin type and the ingredients used.
- May cause skin irritation in sensitive individuals.
- Can produce redness and itching.
- Some components may trigger allergic reactions in sensitive individuals.
- May contribute to clogged pores in some formulations.
- Improperly preserved creams may become contaminated and cause skin problems.
- Fragrances and certain chemicals may cause skin sensitivity**.**

MATERIALS AND METHODS

Plant profile

➢ **Clitoria ternatea**



Fig. No. 1: Butterfly pea.

Clitoria ternatea, popularly known as Butterfly Pea Flower, is a perennial climbing plant from the Fabaceae family. It belongs to the order Fabales and is commonly found in tropical and subtropical regions, especially in India and other parts of Southeast Asia.

The plant grows up to 3 metres tall, with slender stems and compound leaves containing 5–7 oval leaflets. Its flowers are usually bright blue, but white varieties are also available. The fruits are narrow pods containing around 5–10 dark brown seeds. The plant contains various phytochemicals, such as anthocyanins, flavonoids, tannins, alkaloids, saponins and glycosides. Anthocyanins give the flowers their characteristic blue colour, while polyphenols contribute to their antioxidant properties. *Clitoria ternatea* has been used in traditional medicine because of its antioxidant and inflammation-reducing properties. It also shows potential antidiabetic, antimicrobial, antihyperlipidemic and neuroprotective effects, along with possible benefits for memory, cognitive function and stress relief.

Benefits

- Antioxidant activity: Helps protect skin cells from damage caused by harmful free radicals.
- Skin protection: Its antioxidant constituents may help protect skin cells against environmental stress.
- Skin conditioning: May contribute to maintaining healthy-looking and smooth skin.
- Anti-ageing potential: Antioxidant activity may help reduce oxidative stress associated with premature skin ageing.
- Natural colouring: The flower extract can provide a natural blue colour to cosmetic preparations.

➢ **Azadirachta indica**



Fig. No. 2: Neem leaves.

Azadirachta indica, popularly known as Neem, is an evergreen tree belonging to the Meliaceae family and the order Sapindales. It is mainly found in India and other tropical regions, including Kerala, where it grows well even in dry conditions. The tree can reach a height of about 10 metres. Its leaves are made up of several small leaflets arranged along a central stalk, with pointed ends and toothed edges. The leaves are dark green on the upper side and lighter underneath. The leaf section contains upper and lower epidermal layers, as well as palisade and spongy tissues responsible for photosynthesis and gas movement. The veins contain xylem and phloem, which are responsible for transporting water and food throughout the plant. Neem leaves are rich in various phytochemicals, including flavonoids, phenolic compounds, tannins, alkaloids, glycosides and saponins. These constituents are associated with several medicinal properties. Neem leaves are commonly used in traditional medicine and are known for their antibacterial, anti-inflammatory, antioxidant and anti-acne activities.

Benefits

- Anti-acne activity: May help reduce acne-associated skin problems.
- Antibacterial property: "*Azadirachta indica* contains compounds that may act against certain skin-associated bacteria".
- Anti-inflammatory effect: May help soothe skin redness and inflammation.
- Antioxidant activity: Helps reduce oxidative damage by neutralizing harmful free radicals.
- Skin cleansing: Traditionally used in preparations for cleansing oily and acne-prone skin.
- Antifungal property: Neem extracts have shown activity against certain fungi in laboratory studies.
- Skin protection: May support the maintenance of healthy-looking skin.

Excipients used in Face cream

1. White soft paraffin

It works as a skin softening agent or an emollient by forming a protective layer on the skin and reducing moisture loss. It helps to keep the skin soft and hydrated.

2. *Ceto stearyl alcohol*

It acts as a thickening and stabilising agent, giving the face cream a smooth and creamy texture.

3. *Almond oil*

It acts as an emollient that moisturizes and softens the skin. It helps to reduce dryness and improve skin smoothness.

4. *Olive oil*

Olive oil contains vitamin E, fatty acids and squalene, which provide antioxidant properties. It acts as a natural emollient, helping to moisturize, soften and maintain skin hydration.

5. *Methyl paraben*

It acts as a preservative and prevent microbial growth in the face cream and helps maintain its quality during storage.

6. *Rose oil*

It acts as a fragrance agent and provides a pleasant aroma to the face cream. It also helps to improve the sensory properties of the formulation.

7. *Demineralised water*

It serves as the water-based phase of the cream and helps dissolve ingredients that are soluble in water.

Preparation of plant extract

❖ **Azadirachta indica**

Fresh neem leaves were collected and thoroughly washed with tap water, followed by distilled water to remove impurities. The leaves were then crushed using a mortar and pestle to obtain coarse particles. About 50g of the crushed leaves was mixed with 40 ml of distilled water and heated until the volume was reduced to approximately 20ml. The mixture was filtered through muslin cloth and allowed to cool at room temperature. The resulting filtrate was collected and used for further studies.



Fig. No. 3: Extraction of neem leaves.

❖ **Clitoria ternatea**

The collected butterfly pea flowers were shade dried and ground into a fine powder. The powdered material was mixed with distilled water and stirred gently. The mixture was kept in a temperature- controlled water bath at 60°C for 60 minutes. Finally, the mixture was filtered using Whatman filter paper, and the filtrate was stored under refrigerated condition.



Fig. No.4: Extraction of butterfly pea.

Formulation table

Table No. 1: Formulation table.

COMPOSITION OF FACE CREAM	F1	F2	F3
Clitoria ternatea(ml)	1.5	1.5	1.5
Azadirachta indica(ml)	2.5	2.5	2.5
Cetostearyl alcohol(g)	**4.68**	**5.15**	**6.12**
White soft paraffin(g)	6.56	6.56	6.56
Almond oil(ml)	7.5	7.5	7.5
Olive oil(ml)	7.5	7.5	7.5
Methyl paraben(g)	0.1	0.1	0.1
Distilled water(ml)	q.s	q.s	q.s
Rose oil(ml)	q.s	q.s	q.s

Procedure

To prepare the oil phase, mix the required amount of cetostearyl alcohol, white soft paraffin, almond oil and olive oil were heated to 75°C to form the oil phase. Methyl paraben was dissolved in the water phase and heated to the same temperature. The aqueous phase was gradually mixed into the oil phase while stirring continuously. Once the cream cooled to 40°C, the extracts of *Clitoria ternatea* and *Azadirachta indica* were added and blended thoroughly. Finally, rose oil was added and stirring was continued until a smooth and uniform cream was obtained.

Evaluation Studies

1. **Physical Evaluation:** The prepared cream was examined for its colour, odour and consistency by visual observation, smelling and manual application.
2. **pH Measurement:** About 0.5 g of cream was mixed with 50 mL of distilled water. The pH was measured using a calibrated digital pH meter.
3. **Spreadability:** A small quantity of cream was placed between two glass slides. A standard weight was applied to spread the cream into a thin layer. The time required for the upper slide to move was recorded, and spreadability was calculated using the formula:

$$\textbf{Spreadability} = (m \times l) / t$$

Where: m = Standard weight applied to the upper slide(30g) l = Length of the glass slide (5 cm)
t = Time taken for the upper slide to slip off (in seconds).

4. **Phase separation:** The cream was kept in a tightly closed container at room temperature for 24 hours and observed for any separation.
5. **Greasiness:** The cream was checked manually to assess its oily or greasy nature.
6. **Antioxidant activity:** The antioxidant potential was evaluated by the DPPH (2,2-diphenyl-1-picrylhydrazyl) free radical scavenging assay. For the control, 0.7ml of 0.4mm DPPH solution was transferred into a 5ml volumetric flask and the volume was adjusted using distilled water. The mixture was thoroughly blended and kept away from light for 30 minutes. The absorbance was then measured at 516nm using a UV- visible spectrophotometer.

For sample preparation, 10 mg of the formulated cream was dissolved in 10ml of distilled water and centrifuged for 10 minutes. The supernatant was collected and diluted to obtain different concentrations. Each prepared sample was mixed with DPPH solution, and the mixture was stored in a dark for 30 minutes. Finally, the absorbance was recorded at 516nm using a UV- visible spectrophotometer.

7. **Antibacterial activity:** The antibacterial potential of the formulated gel was evaluated by the agar well diffusion technique using nutrient agar medium. Wells were prepared in the agar plate and filled with 100 µL and 200 µL of the gel sample. Different wells were assigned for the positive and negative control samples. The plates were allowed to stand for 15 – 30 minutes to facilitate sample diffusion. Subsequently, they were incubated at 37^{o}C for 18-24 hours. After incubation, the antibacterial activity was assessed by measuring the diameter of the inhibition zones around the wells.

RESULT AND DISCUSSION

1. CHEMICAL TEST

Table No. 2: Chemical test.

Herbs	Phytoconstituents	Chemical Tests	Result
Azadirachta indica	Phenol	Ferric chloride test	+
	Flavonoid	Alkaline reagent test	+
	Tannin	Gelatin test	+
	Glycoside test	Keller killiani test	+
Clitoria ternatea	Anthocyanin	Sulfuric acid test	+
	Anthocyanin	Sodium Hydroxide test	+

2. PHYSICAL CHARACTERISTICS

Table No. 3: Physical Characteristics.

Parameter	Result
Colour	Purple colour
Odour	Pleasant
Consistency	Smooth

3. MEASUREMENT OF pH, SPREADABILITY, PHASE SEPARATION AND GREASINESS

Table No. 4: Greasiness, pH, Spreadability, Phase separation.

Parameters	Result
Greasiness	Slightly greasy
pH	6.48
Spreadability	Easily spreadable
Phase separation	No phase separation

4. ANTI BACTERIAL ACTIVITY

The antibacterial activity of the F3 formulation was tested against Staphylococcus aureus by the disc diffusion method. The bacterial culture was spread evenly over Mueller-Hinton Agar (MHA) plates using a sterile cotton swab. The F3 formulation was applied to the prepared plates, which were then kept at 37°C for 24 hours. After incubation, the plates were examined for clear zones around the sample, which indicate inhibition of bacterial growth. The test was repeated four times for each sample.



Fig No. 5: E.coli.



Fig. No. 6: Staphylococcus Aureus.

CONCLUSION

In this study, a face cream was prepared using extracts of *Clitoria ternatea* flowers and *Azadirachta indica* leaves. The formulated creams exhibited acceptable physical characteristics, including balanced pH, smooth consistency, even texture, good spreadability and an attractive appearance. They also showed good stability and no signs of skin irritation during the evaluation. Among all the formulations, F3 gave the best results, particularly in spreadability, antioxidant activity, and antibacterial activity. These properties may be due to the natural compounds present in the plant extracts, including anthocyanins, flavonoids, phenols, and tannins. The overall findings indicate that the prepared cream may be a useful natural cosmetic product for maintaining healthy skin. It may also have potential benefits in skin protection, anti-ageing, acne care, and skin brightening. However, further studies on long-term stability and clinical testing are needed to confirm its effectiveness and determine its suitability for commercial use.

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