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Topical Benefits of Banana Flower (Musa paradisiaca L.): Formulation and Characterization ofa Herbal Cream

Tanisha Patel[1], Rajshree Puwar[1], Radhika Soni[2]
[1]*Final Year B. pharm, Department of Pharmacognosy, Anand Pharmacy College,Gujarat Technological University, Anand, Gujarat, India.*
[2] *Assistant professor of Department of Pharmacognosy, Anand Pharmacy College,Gujarat Technological University, Anand, Gujarat, India.*

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ABSTRACT:
Musa paradisiaca (MP) is a medicinal plant of high worth under the family Musaceae of India. It is also known as a plantain or banana. Alkaloid, phenol content, saponin, glycoside, tannin, flavonoid, terpenoid, and steroid are a few of the significant phytochemicals found in banana flower and exhibit a significant effect on human skin in terms of antioxidant and anti-inflammatory activity. The study was designed as a formulation of herbal cream containing Musa paradisiaca extract.
A banana flower cream formulation offers an effective, natural way to harness this extract's antioxidant and anti-inflammatory benefits. The cream delivers these bioactive compounds directly to the skin, where they can provide protection against oxidative stress, reduce inflammation, soothe irritated skin, and promote faster healing. The added benefits of moisturization and the ease of use make it an ideal choice for those seeking a safe, gentle, and effective skincare solution for various skin concerns.
The evaluation tests were performed such as physical characteristics, washability, pH, spreadability, Irritability, and phase separation.
KEYWORDS: Musa paradisiaca, Herbal cream, Antioxidant, Extract.

I. INTRODUCTION:

Creams are semisolid emulsions that can be either oil-in-water (o/w) or water-in-oil (w/o) typeand are designed for external use. These emulsions are typically applied to the surface or outer layer of the skin, and their primary purpose is to remain at the application site for an extended period. The main functions of a skin cream are to safeguard the skin from various environmental factors, such as weather conditions, and to provide a soothing effect.[[2]]The herbal cosmetics market is experiencing rapid growth, fueled by increasing consumer demand for natural, high-quality products. With their gentle, nutrient-rich, and moisturizing properties, herbal formulations are becoming a preferred choice for those seeking effective, chemical-free skincare solutions.[[1]]Our work aimed to develop and evaluate herbal cream from banana flower extract which can give antioxidant and anti-inflammatory effects like reducing inflammation, soothing irritated skin, protecting against oxidative stress, and promoting faster healing. We have used banana flower as a herbal ingredient known for its antioxidative effect.[[1]]We usedMusa paradisiaca L. flower extract as a herbal ingredient containing a high amount of phenol and flavonoids which can give antioxidant properties, making it ideal for cell health and anti-aging properties.[[3]]

The Musa species a member of the Musaceae family has been a cornerstone in traditional medicine for centuries offering relief from a multitude of ailments. The therapeutic properties of this plant can be attributed to the presence of its constituent parts of bioactive compounds. Key among these compounds are alkaloids, flavonoids, tannins, and phenolic compounds which have been extensively studied for their health benefits. With over 12,000 alkaloids 2,500 terpenoids and 8,000 Phenolics identified in plants, the pharmaceutical industry still does not have a significant biological reserve of potential therapeutic agents.Research has shown that these compounds exhibit a range of bioactivities including antioxidant, antimicrobial antibody protection and anticancer properties. They show their immense potential for promoting human health.[[4]]

II. MATERIALS AND METHODS:

Collection of plant material
Musa paradisiaca was collected from the local farm in Anand.

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Table 1: Excipients and herbal ingredients with their roles

S.No.	Ingredients	Roles
1.	Banana flower extract	Antioxidant, antiaging, anti-inflammatory
2.	Bees wax	Emulsifying agent
3.	Cetearyl alcohol	Emulsifier
4.	Xanthan gum	Thickening agent
5.	Benzyl Alcohol	Preservative
6.	Coconut oil	Additional oil
7.	Glycerin	Humectant, Moisturizing agent
8.	Dist. water	Solvent

Extraction process

Extraction was carried out by the maceration method. Mature, healthy and fresh banana flowers were collected and washed with distilled water. Then dry the flowers naturally for 4-5 days. After that also dried in a hot air oven. Then ground in the mixtureand the ground powder was soaked in methanol for 48 hrs. The extract was filtered using a muslin cloth to remove impurities and excess methanol was evaporated using an evaporator and the dried extract was collected.

Flower Dried banana flower Methanolic extraction Evaporation and collection of dried extract

Formulation of cream[[7]]

In one beaker, heat bees wax, cetearyl alcohol and coconut oil in borosilicate glass beaker at 70℃ and keep that temperature in existing state (Oil phase). In second beaker, dissolve xanthan gum in distilled water and heat at 70℃ until get a clear solution (Aqueous phase). Then slowly add oil phase to aqueous phase by continuous stirring and maintain both at 60-70℃. Then after in a measured amount add flower extract in it. Allow the cream to cool around 40°-50° C and then add benzyl alcohol and stir until well combined to form a smooth cream.

[F1][F3][F2]

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Table 2: Formulation composition

S.No.	Ingredients	F1	F2	F3
1.	Banana flower extract	0.1%	0.1%	0.1%
2.	Bees wax	0.1%	0.15%	0.02%
3.	Cetearyl alcohol	0.05%	0.1%	0.15%
4.	Xanthan gum	0.02%	0.02%	0.02%
5.	Benzyl alcohol	0.02%	0.02%	0.02%
6.	Coconut oill	0.2%	0.35%	0.05%
7.	Glyverin	0.3%	0.3%	0.3%
8.	Dist. Water	2.21%	1.78%	1.21%

III. PHYTOCHEMICAL SCREENING:

Test for flavonoid[[8]]

A small quantity of the plant material's methanolic extract was treated with one to five drops of concentrated hydrochloric acid (HCl). The immediate development of a red color indicated the presence of flavonoids.

Test for phenol [[8]]

One to two drops of iron(III) chloride (FeCl3) were added to a mixture of a small amount of ethanolic extract and 1 mL of water in a test tube. The appearance of a blue, green, red, or purple color confirmed a positive reaction.

Test for tannin [[8]]

Five mL of the flower extract was placed in a test tube, and 2 mL of 5% iron(III) chloride (FeCl3) solution was added. The formation of a greenish-black precipitate indicated the presence of tannins.

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Test for saponin [[8]]

One mL of the tepal extract was diluted to 20 mL with distilled water and shaken vigorously in a graduated cylinder for 15 minutes. The formation of a one-centimeter layer of stable foam indicated the presence of saponins.

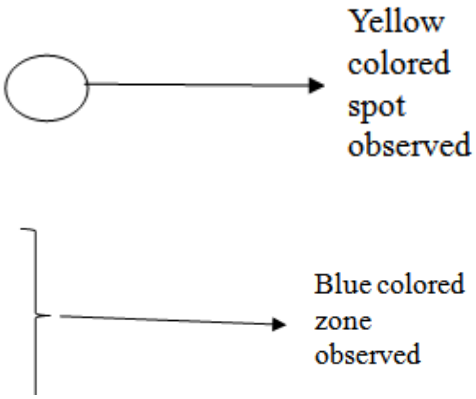
Thin layer chromatography (TLC) [[9]]

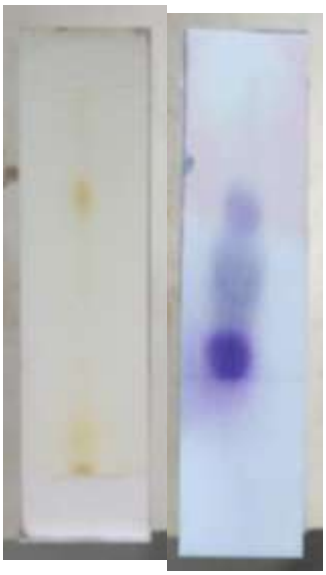
Flavonoid

Mobile phase: Ethyl Acetate :Butanone: formic acid:water(5:3:1:1)
Stationary Phase: Silica gel
Sample: Methanolic extract of flower
Spraying Reagent: 1% ethanolic aluminum chloride reagent
RF value: 0.66
Standard RF value: 0.3-0.7

Phenol

Mobile phase : Toluene:Acetone: formic acid(4.5:4.5:1)
Stationary Phase: Silica gel
Sample: Methanolic extract of flower
Spraying Reagent: Folin cio-calteu reagent
RF value: 0.53
Standard RF value: 0.5-0.7





[Flavonoid] [Phenol]

IV. EVALUATION PARAMETERS:

Physical appearance[[5]]

The cream's physical attributes were evaluated, by observing its color, smell, texture, andphysical state.

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Table 3:color, odor, texture, and physical state of the cream were documented

Sr.No.	Parameters	F1	F2	F3
1.	Color	Light cream	Light cream	Light cream
2.	Odor	Odorless	Odorless	Odorless
3.	Texture	Smooth	Smooth	Smooth
4.	State	Semisolid	Semisolid	Semisolid

Irritancy[[5]]

To assess potential skin irritation, a one-square-centimeter region on the left hand's dorsal surface was marked. The cream was applied, and the time of application was noted. Over the next 24 hours, the site was repeatedly examined for the presence of irritancy, redness (erythema), or swelling (edema), with findings being recorded.

Table 4: Observation

Sr.No.	Formulation	Irritancy	Redness	Swelling
1.	F1	Nil	Nil	Nil
2.	F2	Nil	Nil	Nil
3.	F3	Nil	Nil	Nil

Washability[[7]]

To determine how easily the creams could be washed off, a small amount of each formulation was applied to the hand and then rinsed with tap water. Results indicated that all three formulations were readily removed.

Table 5: Observation

Sr.No.	Formulation	Washability
1.	F1	Easily washable
2.	F2	Easily washable
3.	F3	Easily washable

pH [1]

A pH measurement was performed by dispersing 0.5 grams of the cream into 50 milliliters of distilled water, and then using a pH strip to obtain the pH value.

Table 6: Observations

Sr.No.	Formulation	pH
1.	F1	6.5
2.	F2	6.2
3.	F3	6.4

Phase separation [[5]]

To assess the cream's stability, samples were stored in closed containers at 25-100°C, shielded from light. Phase separation was evaluated over a 30-day period, with checks performed at 24-hour intervals. Any observed phase changes were noted.

Table 7: Observation

Sr.No.	Formulation	Phase separation
1.	F1	No phase separation
2.	F2	No phase separation
3..	F3	No phase separation

Spreadability [[1]]

The spreadability of the cream was determined by measuring the time it took for two

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glass slides, containing a thin layer of cream between them, to slide apart under a controlled weight. A shorter separation time indicates higher spreadability. The test involved placing the cream on one slide, covering it with another, applying a 30g weight, and then measuring the time for the top slide to slide off.

The spreadability was calculated using the formula:

Spreadability=(m × l) / t
where m = Standard weight
l =length of slide
t = time taken in seconds

Table 8: Observation

Sr.No.	Formulation	Spreadability(g×cm/sec)
1.	F1	26.25
2.	F2	21
3.	F3	26.25

Greasiness [[5]]

A thin layer of the cream was applied to the skin, and the resulting smear was assessed for the presence of oiliness or greasiness.

Table 9: Observation

Sr.No.	Formulation	Greasiness
1.	F1	Non-greasy
2.	F2	Non-greasy
3.	F3	Non-greasy

V. RESULT:

Phytochemical screening of the flower extract confirmed the presence of phenols, flavonoids, tannins, and saponins. The formulated creams (F1, F2, and F3) underwent a series of evaluations to assess their suitability for topical application.

Physical Appearance: All three formulations exhibited consistent physical characteristics, with no observed variations in color, odor, texture, or state.

Skin Irritancy: Dermatological testing revealed no evidence of irritancy, erythema, or edema in any of the formulations (F1, F2, and F3) following 24 hours of application to the dorsal surface of the hand.

pH: The pH values of all formulations (F1, F2, and F3) were determined to be within a range compatible with skin pH, suggesting potential for safe topical use.

Phase Stability: Stability testing, conducted over 30 days at 25-100°C in the absence of light, demonstrated no phase separation in any of the formulations.

Washability: All three formulations were readily removed from the skin with tap water, indicating excellent washability.

Spreadability: Spreadability assessments revealed that formulation F2 exhibited the shortest separation time between glass slides under a standardized load, indicating superior spreadability compared to F1 and F3.

Greasiness: Sensory evaluation indicated that all three formulations (F1, F2, and F3) were non-greasy upon application to the skin.

VI. CONCLUSION:

Based on the above results we conclude that our cream is stable for skin applicability after performing evaluation parameters like physical stability, spreadability, phase separation, pH and more and can give the antioxidant property due the presence of flavonoids and phenol. Formulations F1, F2 and F3all were stable at room temperature but F3 is most stable among the all.On the other hand,for precision further studies are remaining.

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