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FORMULATION AND EVALUATION OF MOISTURIZING CREAM CONTAINING MUSA PARADISIACA EXTRACT

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ABSTRACT

Herbal cosmetics are a formulation primarily used to protect and nurture a person's look. A semi-solid product for enhancing skin tone is a moisturizing cream. Moisturizers are often used in the prevention and treatment of irritant contact dermatitis. Moisturizers are one of the most widely used cosmetic preparations and have been extensively used by consumers to soften the skin. Moisturizers effectively combat dry skin which may cause pain, tightness, itch, stinging, or tingling. The present study focussed on the long-term daily use of a moisturizer on normal skin would affect skin barrier function or hydration state. The current work's objective was to create and assess a moisturizing cream that contains *Musa paradisiaca* extract, Paraffin wax, Bees wax, petroleum jelly and coconut oil. The aforementioned cream was assessed based on factors including pH, viscosity, greasiness, washability, appearance (colour), homogeneity by visual and tactile means, saponification value and antibacterial activities.

Keyword: *Musa paradisiaca* extract, Paraffin wax, Bees wax, petroleum jelly, coconut oil

INTRODUCTION:

Uneven pigmentation, more wrinkles, elasticity loss, dryness, and roughness are signs of aging skin. The popularity of natural chemicals in reducing the effects of aging on the skin is demonstrated by their use in skin protection, particularly in the topical use of antioxidants **[1, 2]**. Choosing a feature extraction technique is perhaps the most crucial step in getting good recognition performance **[3]**. Similar to the textile industry, the cosmetics sector also heavily relies on tactile technology to understand the tactile comfort of their products. The tactile feel of cosmetics plays a significant role in how consumers perceive its worth **[4]**.

There are numerous cosmetic formulae on the market, including gels, suspensions and emulsions. Cosmetic products have a lot of promise in the emulsion system which includes lotions and creams. The several methods of preparing emulsions have been thoroughly researched **[5]**. Acne vulgaris is uncomfortable especially in teens and adolescents. Only 3% of adults between the ages of 35 and 44 will have acne vulgaris, according to global statistics, while 85% of persons between the ages of 12 and 25 will encounter this skin ailment. A person may experience negative psychological impacts from some skin illnesses, such as low self-

esteem, social isolation due to embarrassment, and in the worst-case scenario, suicidal ideation, even if some of these conditions are self-limiting **[6]**.

Fruits and vegetables are considered to be partially protected against these diseases due to the high concentrations of phenolics, which possess strong antioxidant properties **[7]**. Reactive free radicals are produced when human skin is exposed to UV light for an extended period. This oxidative stress causes the skin to develop erythema, sunburn, hyperplasia, immunosuppression, photoaging, melanogenesis, and DNA damage that can result in skin cancer **[8]**. Three factors are associated with skin moisture: the rate at which fluids reach the lower layer's stratum corneum (through trans epidermal transfer and eccrine glands), the rate at which fluids evaporate, and the stratum corneum's capacity to retain fluids based on the hydrolipid layer's integrity, the presence of NMF, the availability of sufficient intercellular water, membrane integrity cells, and intercellular semen derived from supporting lipids **[9]**.

This study looked at the long-term effects of daily moisturizer use on normal skin in terms of skin barrier function, skin hydration, and irritant susceptibility. Trans-epidermal water loss (TEWL) and electrical capacitance measurements were used to assess skin responses **[10]**. The lotion works well to combat common skin conditions such as acne, pimples, boils, and blemishes. Because its active components have demonstrated medical benefits **[11]**.

Banana crop has rich antioxidant value. When antioxidants are employed as active components in cosmetic emulsion preparations, very beneficial results are obtained **[12, 13]**. Cosmetic creams are typically applied to enhance the appearance of the skin. The cream provides moisturizing qualities for the skin, and it was shown that the formulation greatly reduced TEWL, which has anti-wrinkle effects **[14, 15]**. Skin barrier disruption has resulted in a variety of skin disorders. The most prevalent one is a loss of moisture and other symptoms including roughness, scaling, fissures, redness, and an uncomfortable tightness that can occasionally cause itching and stinging **[16]**. It is commonly recognized that regular exposure to the sun and dust can cause a variety of issues, including pigmentation, acne, sunburn marks, and pimples **[17]**.

Face cream is applied cosmetically to have a softening and purifying effect. One of the most significant medical systems that uses herbal plant and extracts for the therapy of a variety of diseases is the Ayurvedic system **[18]**. Water, soap, and cleansing cream are the greatest cleaning agents. Cosmetic creams are skin food for dry, chapped, and hard skin. By providing a uniform skin tone, the cream also serves as a skin tone in daily life. Vitamin E enriched moisturizer gives necessary nutrients to the skin **[19, 20]**.

The chemistry and purpose of moisturizers and dry skin present a difficult topic for practicing dermatologists as well as development scientists working in the pharmaceutical and cosmetic sectors **[21]**. We have used *Musa paradisiaca* extract in our research which is a good source of vitamins A, B, and E which are essential for glowing and healthy skin **[22]**.

EXPERIMENTAL SECTION:

A. Method of extraction.

Banana extract: Fresh bananas were clean and peeled out. An hour was spent cooking 20g of pulp at 50°C in 100ml of distilled water. After cooling, the mixture was twice

filtered through Whatman filter sheets 41 and 42 to remove any remaining contaminants. The pulp extract was stored for later usage at 4°C.

B. Formulation of cream.

Formulation 1: 0.5 gm Bess wax, 0.5 gm paraffin wax, 10 gm petroleum jelly and 20 mL Coconut oil were heated in an oil phase in a borosilicate glass beaker at 75°C. The mixture was stirred continuously until it formed a smooth texture. Add 5 gm banana extract and 2 mL Lavender oil with continuous stirring. keep the mixture at room temperature. Weight of formulation 2 – Moisturizer cream = 35 gm

Formulation 1 and Formulation 2 tested for the phytochemical analyses via FTIR & confirmed Hydroxyl, Ketone, ester, ether linkage & natural linoleic oil which are present in banana extract.

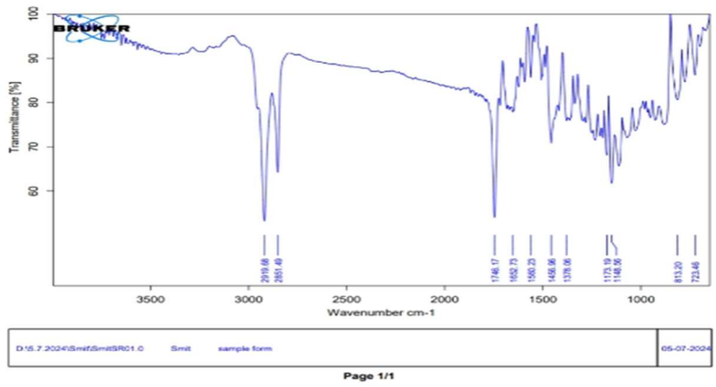

Figure 1: FTIR Spectra of Formulation 1

Table 1: FTIR Spectra interpretation of Formulation 1 (F1)

IR Frequency (Cm^{-1})	Functional Group
3500-3000	-OH group
2919.68	Alkyl group of natural oil
2851.49	C-H of alkyl group
1746.17	Ester group
1652.73	Ketone group
1378.06	Methyl group of alkyl chain

Formulation 2: 0.5 gm Bess wax, 0.5 gm paraffin wax, 10 gm petroleum jelly and 20mL Coconut oil were heated in a borosilicate glass beaker at 75°C temperature. The mixture was stirred continuously until it forms a smooth texture. Add 5 gm banana extract and 2mL cinnamon oil with continuous stirring. keep the mixture at room temperature. Weight of formulation 2 – Moisturizer cream = 35 gm.

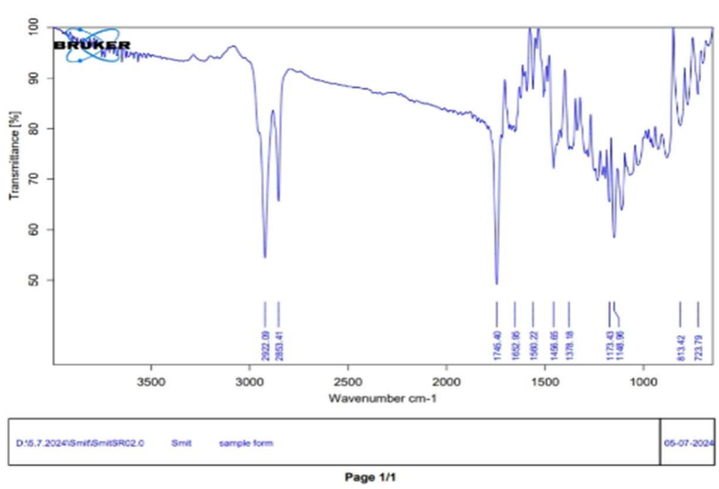

Figure 2: FTIR spectra of Formulation 2

Table 2: FTIR Spectra interpretation of Formulation 2 (F2)

IR Frequency Cm^{-1}	Functional Group
3500-3000	-OH group
2922.09	Alkyl group of natural oil
2853.41	C-H of alkyl group
1745.50	Ester group
1652.95	Ketone group
1378.18	CH_3 group
1173.43	C-O ether group

RESULT & DISCUSSION:

Antibacterial study of both formulations had been done using Disc plate method. This technique assesses the efficacy of antibiotics against a specific type of bacteria. The antibacterial study was done using *E. coli (gm-Ve), Pseudomonas aeruginosa (gm-Ve), Staphylococcus aureus (gm+Ve), Bacillus subtilis (gm+Ve)* bacterial strains.

The antibacterial activity of the organisms was assessed using cultures that had been Cultivated for the organisms for 24 hours. The nutrient agar medium plates were created using 15 to 20 ml of nutrient agar media and 90 cm of sterile petri dishes. The dishes were allowed to solidify for 5 to 10 minutes before being injected with 0.1 percent inoculum. Agar discs with a 5 mm diameter were made using the agar disc diffusion method, and they were Autoclaved with No. 1 Whatman filter paper or newspaper to sterilize them. The discs were then treated with Varied amounts of plant extracts in the following phase. The plates were then incubated for 24 hours at 37 °C. The plates were let to stand for 30 minutes before being Incubated for 24 hours at 37 °C. Antibacterial activity was assessed by calculating the Width of the inhibitory zone in millimetres.

Table 3: Antibacterial activity of F1 and F2

Antibacterial activity					
Name of sample	Conc. (µg/ml)	Microorganisms and zone of inhibition(mm)			
		Gram-positive bacteria		Gram-negative bacteria	
		Staphylococcus aureus	*Bacillus subtilis*	*Escherichia. coli*	*Pseudomonas aeruginosa*
F1	10	16	14	16	13
F2	10	12	9	14	13
Control (Penicillin G)	10	8	10	14	12

Physical parameters: This is basically used to check colour, odour, texture and stability of cream.

Stability Test: Prepared sample was kept for 30 days at both room temperature (25.0 ± 3.0 °C) and refrigeration (4± 2.0 °C) for accelerated stability testing.

Solubility: The prepared sample was dissolved in different organic solvents to check the solubility.

Melting point: The melting point of an organic solid can be determined by introducing a tiny amount into a small capillary tube, attaching this to the stem of a thermometer centered in a heating bath, heating the bath slowly, and observing the temperatures at which melting begins and is complete.

Measurement of pH value: This is basically refers to acidity levels of substances. The normal value of Ph (cream)) is pH 4 - 7. This test was measured either by using digital pH meter.

Measurement of Saponification Value: Saponification value is determined by the number of milligrams of KOH required to completely hydrolyse one gram of the oil/fat. Saponification number can be

calculated by the difference between blank titration (except fat) and actual titration (with fat) multiplied by the molecular weight of KOH. Take 1 g of fat and dissolve in 3 ml of ethanol. Filter it and wash with 7 ml of ethanol. Take an RBF and reflux the residue with 25 ml of alcoholic KOH for 30 min, add 0.1 ml of phenolphthalein and titrate against 0.5N HCl. Take the blank reading in the same way as before.

Measurement of Acid value: Take 1 g of fat in a 250 ml conical flask add 25 ml of ethanol and then place in a heating metal for methanol to dissolve the fat. Cool the solution, add 0.1 mL phenolphthalein indicator, and titrate against 0.1 N methanolic KOH.

Ester value: The Ester value is the number if milli grams of potassium hydroxide required to saponify the esters in 1gm of substance. Also, the difference between Saponification value and acid value represents the Ester Value.

Irritancy: This is used to check the quality of materials as well as chemicals and whether it is harmful to skin/mucosal or not. First of all, we have to mark area on left hand (dorsal surface). After that we have to applied formulation of cream to that area and time was noted. Then we have to leave formulation for few minutes by this we can checked for irritancy.

Washability: This test is also used to check quality of cream. In this first of all we have to add small amount of cream which was applied on the hand. After that we have to washed with tap water.

Phase separation: This test is basically checked in 24 hr to 30 hr. For this we have to put cream in a closed container at a temperature (30–80°C). Keep this formulation away from light.

Viscosity: This test is basically used to check or predict how materials used in cream will behave in the real world. It is mainly used to check efficacy.

Greasiness: This test is basically used to check nature of cream either oily or greased. According to result we can say that all formulations were non greasy.

Table 4: Evaluation of physical parameters

Sr. No.	Parameters	F1	F2
1	Colour	Faint green	Faint green
2	Odour	Pleasant	Pleasant
3	Texture	Smooth	Smooth
4	State	Semisolid	Semisolid

Table 5: Stability study of formulation

Sr. No.	Formulation	April 2024	May 2024	June 2024	July 2024
1	F1	64gm	63.5gm	62gm	62gm
2	F2	74gm	73.2gm	72gm	72gm

Table 6: Solubility

Sr. No.	Formulation	Methanol	Ethanol	n-hexane	Ethyl acetate
1	F1	Insoluble	Insoluble	Soluble	Soluble
2	F2	Insoluble	Insoluble	Soluble	Soluble

Table 7: Melting point and pH value

Sr. No.	Formulation	M.P	pH
1	F1	80°C	5.6
2	F2	87°C	5.8

Table 8: Evaluation of chemical parameters

Sr. No.	Formulation	Saponification value	Acid value	Ester value
1	F1	80.20	39.3822	40.8678
2	F2	84.15	45.9459	38.2041

Table 7: Irritancy, Washability, Phase separation, Viscosity and Greasiness of moisturising cream

Sr. No.	Parameters	F1	F2
1	Irritant effect	Nil	Nil
2	Washability (sec)	9	8
3	Phase separation	No Phase Separation	No Phase Separation
4	Viscosity (cps)	2345	4322
5	Greasiness	No greasy	No greasy

Table 8: Costing of moisturizing cream (Price in INR)

Ingredients	Quantity (gm or ml)	Price/1 gm or ml	Price/quantity (F1-35 gm)	Price/quantity (F2- 35 gm)
Bees wax	0.5 gm	0.34	0.17	0.17
Paraffin wax	0.5 gm	0.15	0.8	0.8
Coconut oil	20 mL	0.425	8.5	8.5
Petroleum jelly	10 gm	0.135	1.35	1.35
Banana	5 gm	40	0.2	0.2
Lavender oil	2 mL	7.86	15.72	-
Cinnamon oil	2 mL	11.93	-	23.86
Total price			26.74	34.88

CONCLUSION:

The study's investigation led to the discovery that both formulations F1 and F2 shows stability and chemical compatibility. This moisturizing cream lightens skin pigmentation and lessens other imperfections' visibility. Formulated products are less costly than the market price. So, it can be good for the commercialization scope. Based on the results we suggest that both these formulations are safe for skin.

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