

Formulation and assessment of an under-eye cream with Terminalia Chebula and Coffee extracts.

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ABSTRACT

Under the eyelids or around the eyes, People of all ages are frequently affected by the condition known as "dark circles.". Factors that cause excessive pigmentation, tear troughs, thin skin above the orbicularis oculi muscle, and vein running are all signs of dark circles. The concentrated form of Terminalia Chebula, a protected and effective de-pigmenting agent, has fantastic potential. The primary cause of skin and hair color is melanogenesis, which also acts as an effective UV radiation defense mechanism. Different skin dermatological conditions like age spots, actinic damage sites, and other hyperpigmentation are caused by melanin overproduction. Fatigue, stress, excessive sun exposure, lack of sleep, an unbalanced diet, dehydration, and illnesses connected to the kidney, thyroid, and anaemia contribute to dark circles under the eyes. A powdered extract of T. Chebula that has been finely pulverized with a pestle and mortar, and levigates was created. The coffee seeds were ground into a fine powder for use in subsequent extraction. Propylparaben was added after the emulsifying agent stearic acid had been dissolved in cetyl alcohol, and the mixture had been heated to 75°C. Irritation, erythema, and edema were monitored and reported at regular intervals for up to 24 hours. The cream was kept in a sealed container at 25 to 100°C, away from light. When the cream between the two slides was uniformly compressed to create a thin layer after applying weight or other predetermined load to the upper slide. Semi-solid cream formulations, including semi-solid topical preparations, are preferred because they have better release characteristics and a longer residence time on the skin. The spreadability grade indicates how easy it is to apply the cream formulation. It was discovered that the produced formulation F2, which contains 3ml of each of the aqueous extracts of

Terminalia Chebula and coffee, is a potential herbal under-eye treatment to cure dark circles.

Index terms:- Dark circles, Terminalia Chebula, Hyperpigmentation, Antitanning.

I. INTRODUCTION

It is a common goal of humans to want to seem attractive, young, and lovely. Compared to other parts of the skin, the skin is thinner and has less fat in the area around the eyes. For this reason, The earliest indicators of aging include puffiness, bags, pigmentation, dark circles beneath the eyes, stress, illness, environmental pollution, melanin deposition, lifestyle, and genetics.¹ One of the most prevalent conditions people of all ages experience is dark circles.^{1,2} Blood traveling through the large veins beneath the skin beneath the eye gives it a bluish tint since the skin there is so thin. Dark circles get darker when the skin around the eyes dries out too much.³ Periorbital hyperpigmentation describes the condition when more melanin than usual is produced around the eyes, giving them a darker hue under the eyelids or around the eyes. Everyone, regardless of age, frequently experiences dark circles. It is sometimes referred to as a consistent, circular darkening of the skin under or around both eyes.^{3,4} Dark circles may be a result of a variety of extrinsic and intracellular factors, such as sex, aging, anatomical variations, atopic dermatitis, dryness, heredity, and other physical issues. Excessive pigmentation, tear troughs, shadowing from wrinkles and infraorbital laxity, thin, translucent skin above the orbicularis oculi muscle, shadowing from an infra-orbital fat herniation, and vein running are all clinical factors that contribute to dark circles^{5,6}. The concentrated form of Terminalia Chebula, a protected and effective de-pigmenting agent, has fantastic potential.^{7,8} A methanolic concentration of Terminalia Chebula had a melanin-inhibitory effect of about 90% at 100 ppm. Khanna A.K. et al.^{9,10} showed that giving regular rodents continuous care

of the ester-dissolvable portion of the alcoholic concentrate of Terminalia Chebulastem for 30 days raised HDL-C levels while lowering LDL-C levels.^{4,9,10}

A dark circle is described as having uniform, smooth skin under one or both eyes. The following categories of basal pigmentation and vascular pattern exist Vascular (blue, pink, or purple), structural, and pigmented (brown color). Melanogenesis is the primary cause of skin and hair color, which also acts as an effective UV radiation defense mechanism.^{1,3} Different skin dermatological conditions like age spots, actinic damage sites, and other hyperpigmentation are caused by melanin overproduction. Fatigue, stress, excessive sun exposure, lack of sleep, long work hours, an unbalanced diet, dehydration, and illnesses connected to the kidney, thyroid, and anemia contribute to dark circles under the eyes.^{5,6} One of the most popular cosmetics worldwide is eye care equipment. There are a lot of under-eye creams on the market right now. However, numerous frequent adverse effects are associated with the under-eye creams that are now on the market, including redness, burning, itching, peeling, and swelling.^{3,11} Multiple investigations on adverse responses to cosmetics have revealed that scents are frequently to blame for allergic reactions to cosmetics.³ As a result, most treatments used to treat skin hyperpigmentation or discoloration have typical side effects such as minor skin irritation, an increased risk of UV damage or sensitivity, and minor skin cracking.^{2,3,11}

Furthermore, numerous research studies have demonstrated that naturally occurring hues and scents are consistently linked to reduced or absent adverse effects.³ In the current study, an effort has been made to utilize naturally arising traditional plant ingredients from the Ayurvedic category of Complexion Enhancers to lighten these dark eye outlines. For the current research project, Terminalia Chebula (Terminalia Chebula), a crude medication from Classical Ayurvedic literature, was chosen as the treatment for dark undereye circles.^{7-10,12} Tyrosinase plays a catalytic role in the formation of melanin; hence substances having tyrosinase-inhibiting effects have been utilized in cosmetics for skin lightening. The cytotoxicity and inhibitory effect of T. Chebula on melanin formation in B16/F10 melanoma cells were previously examined.¹² T. Chebula has shown high

tyrosinase inhibitory action in previous research.^{4,9,10} The formulation and evaluation of the under-eye cream were based on the studies.

II. MATERIALS AND METHODS

Collection of Plants

The Terminalia Chebula seeds And Coffee seeds are obtained from a local shop and verified by the Pharmacognosy department of the Ideal College of Pharmacy and Research, Bhal, Kalyan. Vitamin E capsules were bought from the medical store.

Chemicals and Reagents

Stearic acid, Cetyl alcohol, Potassium hydroxide, Sodium hydroxide, Triethanolamine, Glycerin Methyl paraben, Propyl paraben

Preparation of extract

A powdered aqueous extract of T. Chebula that has been finely pulverized with a pestle, mortar, and levigates was created. The coffee seeds were sieved and ground into a fine powder for use in subsequent extraction.

Procedure for Formulation of Under eye cream

Propylparaben was added after the emulsifying agent stearic acid had been dissolved in cetyl alcohol, and the mixture had been heated to 75⁰C. This process, which we call phase I and the "Oil phase," is. Phase II, the aqueous phase, was created by combining water-soluble substances with water, including sodium hydroxide, potassium hydroxide, triethanolamine, and methylparaben, and heating the mixture to 75⁰C. The aqueous phase is phase II. Glycerin and aloe vera gel was also added to the extract after it was created. A vitamin E capsule and some coconut oil were added after everything had been thoroughly combined, and then the appropriate amount of rose water was added. The heated oil phase received an equal-temperature addition of an aqueous phase while stirring continuously once the heating of the aqueous phase was complete. This resulted in a cream that was even and smooth. The herbal phase was added and mixed once the temperature had dipped to 45⁰C.

Table 1.1:-Formula of Under Eye Cream

Sr. No.	INGREDIENTS	F1	F2	F3
1.	Terminalia Chebula Extract	4ml	3ml	2.5ml
2.	Coffee Extract	3ml	3ml	4ml
3.	Aloevera gel	2gm	1gm	1.5gm
4.	Stearic acid	3.6gm	3.6gm	3.1gm
5.	Cetyl alcohol	0.1gm	0.1gm	0.1gm
6.	Potassium hydroxide	0.04gm	0.04gm	0.04gm
7.	Sodium hydroxide	0.032gm	0.032gm	0.032gm
8.	Triethanolamine	0.24gm	0.24gm	0.24gm
9.	Glycerin	2ml	3.5ml	3ml
10.	Methyl paraben	0.002gm	0.002gm	0.002gm
11.	Propyl paraben	0.004gm	0.004gm	0.004gm
12.	Vitamin E capsule	1 Capsule	1 Capsule	1 Capsule
13.	Distilled water	6ml	5ml	6ml

Evaluation Parameters

Physical evaluation: For the Formulation, physical features such as color, appearance, and consistency were assessed.^{2,3,13}

pH: The pH of the topical under-eye ointment was measured digitally. In 50 ml of distilled water, 0.5 grams of the formulation were dissolved for an hour. Results were calculated to determine each formulation's pH values.³

Viscosity: On a Brookfield Viscometer, the viscosity of cream compositions was tested.¹³

Washability: The creams' ease of removal was assessed by rinsing the region with tap water where they had been applied.^{3,13}

After feel: After applying a set amount of cream, the emolliency, slipperiness, and amount of residue was assessed.³

Irritancy study: Mark a 1-square-centimeter square on the left dorsal surface. The time was noted after administering the cream to the targeted location. For up to 24 hours, erythema, edema, and irritation were observed and reported at regular intervals.¹³

Phase Separation: The prepared cream was stored in a dark, tightly-sealed container at a temperature of 25 to 100 °C. Phase separation was then monitored every 24 hours for the next 30 days. The phase separation was verified, and any changes were examined.¹³

Spreadability: The time it took two slides to separate from the cream, which was positioned in

between the slides under a given force, was used to gauge the spreadability. The quicker the two slides can be separated, the better the spreadability. There were taken two sets of regular-sized glass slides. The cream mixture was next put on a slide that was the proper size. The formulation was then covered in the following slide. The cream between the two slides was evenly pushed to create a thin layer when a weight or other prescribed load was applied to the upper slide. The slides then had any remaining formulation scraped off of them once the weight was removed. The weight was then taken off, and the slides had any extra formulation scraped off of them. Weight coupled with the upper slide's force enables it to slide off readily. It was timed how long it took for the upper slide to detach.^{2,3,13}

$$= \frac{M_{\text{weight tied to upper slide}} \times L_{\text{length of glass slides}}}{T_{\text{Time is taken to separate slides}}}$$

Type of smear: After applying the cream, the film or smear that developed on the skin was examined.¹³

Homogeneity: By looking at it and touching it, the uniformity of the formulation was evaluated.¹³

III. RESULT

Generally speaking, cream formulations, including semi-solid topical preparations, are preferred because they have better release characteristics; due to their occlusive qualities, they have a more extended skin-residence period, a high viscosity, greater bio adhesiveness, reduced irritation, and a moisturizing impact on flaky skin.

The herbal under-eye cream composition was made with these properties in mind. It was noted that the manufactured cream was consistent and had a decent look and consistency. Due to the highly narrow pH range of all the formulations (5.3 to 5.6), the skin shouldn't be irritated by them. The type of smear that developed on the skin after the cream application was non-greasy. The Brookfield

Viscometer (DV II+ Pro model), with spindle number S-64, measured viscosity at 25 °C and 20 rpm. The calculations were done in three copies, and the average of the three readings was noted. The viscosity was measured to be 3200, and the spreadability grade indicates how easy it is to apply the cream formulation. The results are shown in Table 2.

Table No.2: Evaluation Results of the formulation

Formulation code	F1	F2	F3
Evaluation Parameters			
Colour	Light Brown	Light Brown	Light Brown
Odor	Sweet	Sweet	Sweet
Consistency	Semi-solid	Semi-solid	Semi-solid
Washability	Good	Good	Good
pH	5.4	5.4	5.6
Spreadability	5	5	5
Skin Irritation	Non-irritant	Non-irritant	Non-irritant
Phase Separation	No Separation	No Separation	No Separation
Viscosity(centipoise)	3200	3200	3200
Homogeneity	Homogenous	Homogenous	Homogenous
Type of smear	Non-Greasy	Non-Greasy	Non-Greasy

Viscosity-by Brooks field viscometer with spindle 64 at 20 rpm, in cps(centipoise) at 25 °C

IV. CONCLUSION

The created herbal under-eye cream formulation's anti-tanning properties could be attributed to the inclusion of coffee and Terminalia Chebula. It was discovered that the produced formulation F2, which contains 3 ml each of aqueous extracts of Terminalia Chebula and coffee, is an effective herbal under-eye cream for reducing dark circles. For patients with periorbital hyperpigmentation, additional clinical studies may support the use of this formulation. The most crucial feature of herbal under-eye cream is that it works better than synthetic under-eye creams and is free of chemicals. Because this study's manufactured herbal under-eye cream has anti-tanning properties, it can be concluded that using it will leave your skin looking fresh and free of dark circles.

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Conflict of Interest

Authors have no competing interests.

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