



Formulation and evaluation of herbal under eye cream with antioxidant and anti-inflammatory properties

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ARTICLE DETAILS	ABSTRACT
<p><i>Article history:</i> Received on 5 August 2022 Modified on 20 October 2022 Accepted on 27 October 2022</p> <p><i>Keywords:</i> Under eye cream, Aloe vera, Cucumber extract, Caffeine extract, Almond Oil, Antioxidant, Anti-inflammatory.</p>	<p>Although they can occasionally be noticed in youngsters, dark circles beneath the eyes are a typical complaint for both men and women. When the eyes seem darker due to increased melanin production; herbal remedies lessen the visibility of dark circles and shield the delicate area beneath the eyes from the sun. Formulating and assessing herbal under-eye cream with caffeine and cucumber extract is the main goal of this study. Stearic acid, cetyl alcohol, caffeine extract, cucumber extract, methyl paraben, distilled water, rose water, and aloe vera gel were used to make the cream base. All of the excipients and the herbal extract were mixed together to create the cream. Numerous characteristics, including physical assessments, pH, viscosity, spread ability, and phase separation, were assessed for the developed formulation. Significant efficacy was demonstrated by the formulation that contained herbal components. The formulation is stable and safe for use as an under-eye cream, according to the results.</p>

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INTRODUCTION

Creams are circumfluous conflation lozenge forms containing further than 20% water or unpredictable factors and generally lower than 50% hydrocarbons, waxes as vehicles. Cream is classified as oil in water and water in oil. The eye is the main location where visible signs of aging first appear ^[1], and the skin surrounding the eye is extremely thin and made up of subcutaneous fat tissues ^[2]. Many exogenous and endogenous factors can cause dark circles under the eyes, a hyperpigmentation disorder. Periorbital hyperpigmentation (POH), periocular hyperpigmentation, periorbital melanosis, black circles, infraorbital discoloration, infraorbital darkening, or idiopathic cutaneous hyperchromia of the orbital region are other names for dark circles ^[3]. It affects both personal satisfaction and people's eager prosperity. Among the causes are bulging fat tissue, muscle loss, loss of fatty tissue in the eyelid or surrounding the eye, increased pigmentation (deposition of melanin), which is frequently brought on by post-inflammatory pigmentation, The most significant causes include periorbital

edema, excessive vascularity, shadowing from skin laxity and tear, aging, heredity, lack of sleep and stress ^[1], puffy eyelids, thin translucent skin, and shadowing from the orbit's anatomic form ^[4].

Our primary goal is to create herbal cream with the best possible results. To this end, we use herbal ingredients in our preparation, such as caffeine, Cucumber Aloe vera gel and Almond oil. Because of its high biological activity and capacity to pass through the skin's barrier, caffeine is being used in cosmetics more and more. Strong antioxidant qualities are possessed by caffeine. It aids in shielding cells from ultraviolet light ^[5]. According to reports, the chemicals derived from *Cucumis sativus* (Cucumber) that are part of this safety evaluation work as skin conditioning agents in cosmetics ^[6]. Aloe vera gel as moisturizer, reduce acne and skin irritation. Almond oil is used to lessen puffiness and lighten dark circles beneath the eyes. It shows anti-inflammatory and antioxidant properties. Almond oil is used to keep skin elegant. In market there are large no of eyes cream is currently available. But in

marketed eye cream have side effects like redness, irritation, itching. To make activities from naturally occurring traditionally plant materials belong to Ayurvedic.

Caffeine

Caffeine is a natural stimulant most commonly found in coffee, tea, chocolate, and certain soft drinks and energy drinks. It works by stimulating the central nervous system, helping to reduce fatigue, improve alertness, and boost concentration. Caffeine primarily affects the brain by blocking adenosine receptors, which are responsible for promoting sleep and relaxation. This leads to increased levels of neurotransmitters like dopamine and norepinephrine, enhancing focus and energy.

Cucumber

Cucumbers (*Cucumis sativus*) are a type of gourd, belonging to the Cucurbitaceae family, and are commonly grown worldwide for their mild, refreshing taste and high water content. Cucumbers are low in calories, making them a healthy snack, and are rich in vitamins (like vitamin K and C), minerals (such as potassium), and antioxidants. Cucumbers possess notable antioxidant properties, which contribute to their overall health benefits. The primary antioxidants in cucumbers include: Vitamin C, Beta-carotene, Flavonoids, Tannins and Lignans. The antioxidants in cucumbers help combat oxidative stress in the body, preventing cell damage, and potentially reducing the risk of inflammation and chronic diseases.

Aloe vera gel

Aloe vera (*Aloe barbadensis miller*) is a succulent plant that is widely known for its medicinal and cosmetic uses. It belongs to the Asphodelaceae family and is native to the Arabian Peninsula, though it is now grown in many parts of the world. Aloe vera contains several bioactive compounds, such as: Polysaccharides, Vitamins, Amino Acids and Enzymes and Minerals.

Almond oil

Almond oil is a popular oil derived from the seeds of the almond tree (*Prunus amygdalus*), which belongs to the Rosaceae family. Almond oil is rich in essential fatty acids, vitamins, and antioxidants, which provide numerous benefits for health and beauty. Almond oil contains oleic acid (omega-9 fatty acid), which is beneficial for heart health and skin hydration. Almond oil is an excellent source of vitamin E, which has powerful

antioxidant properties. It also contains vitamin K which is important for skin health and healing. Almond oil is richly used for skincare and anti-aging property. Due to its high vitamin E content, almond oil can help in reducing fine lines and wrinkles. It helps promote a youthful appearance and may reduce dark circles under the eyes.

MATERIALS AND METHODS

Materials

Caffeine extract and cucumber extract were obtained from College Laboratory. Aloe vera plant was used from College Garden. Stearic acid, cetyl alcohol, propyl paraben, sodium hydroxide, potassium hydroxide, triethanolamine, methyl paraben and glycerine were purchased from Loba Chemicals, Mumbai. Almond oil and rose water were purchased from local market. All other solvents used were of analytical grade.

Extraction of caffeine

Dichloromethane (DCM), 5ml was added to the sample after it had been put into a separating funnel. The funnel was inverted at least three times, with the funnel being vented after each inversion, in order to extract the caffeine. The extraction process was carried out twice more; combining the solvent layers after the bottom layer containing dichloromethane (DCM) was removed to a clean flask, leaving behind the layer of water. By heating the flask on a mantle or covering it with perforated aluminum foil and letting it evaporate for a while, the dichloromethane was removed from the extract. Then, using the Heat Reflux Extraction method, it was recovered in the other beaker. The resulting residue was a white powder that was thought to be pure caffeine.

Extraction of cucumber

Fresh cucumbers were mashed, put in a beaker, and then extracted for three hours at 80 °C in a hot water bath. Gelatinized extract was obtained by filtering the extract after it had been cooled to room temperature [7].

Preparation of aloe vera gel

First clean the aloe vera leaves. Using a knife chop the leaves, remove the pulp and blend it.

Formulation of under eye cream

After dissolving the emulsifying agent stearic acid in cetyl alcohol and heating the liquid to 75°C, propyl paraben was added (Oil phase or phase I) Water-soluble chemicals such as sodium hydroxide, potassium hydroxide,

triethanolamine, and methyl paraben were combined with water and heated to 75 degrees Celsius to generate phase II, also known as the aqueous phase. After the extract was made, glycerine and aloe vera gel were also added. Once everything was well blended, rose water was added (herbal phase). An aqueous phase was added to the heated oil phase at the same temperature while being constantly stirred. As a result, the cream was smooth and even. After the temperature had dropped to 45 °C, the herbal phase was added and stirred [8].

Table 1: Formulation of under eye cream

Ingredients	Quantity
Caffeine extract	4 ml
Cucumber extract	4 ml
Aloevera gel	2 gm
Almond oil	3 ml
Stearic acid	3 gm
cetyl alcohol	150 mg
Propyl paraben	2 mg
sodium hydroxide	30 mg
potassium hydroxide	40 mg
triethanolamine	200 mg
Methyl paraben	2 mg
glycerine	2 ml
Rose water	1 ml
Distilled water	5 ml

Evaluation

Physical evaluation

This examination assessed the cream's color, odor, texture, and physical state [9].

Irritancy

Make a mark (1cm²) on the dorsal surface of the left hand. After applying a cream to the affected area, the time was noted. It is then assessed for irritability and any edema for a maximum of 24 hours [10].

Washability

A small amount of cream was applied to the hand, and then tap water was used to wash it [11, 12].

pH

By inserting 0.5 grams of gel in the beaker at room temperature, the digital pH meter was calibrated and used to test the pH [13, 14].

Phase separation

The prepared cream was kept in a covered container away from light and between 25 and 100 °C for 30 days. Phase separation was monitored every 24 hours. The phase separation was examined and confirmed for any changes.

Viscosity

A Brooke field viscometer with spindle number 63 running at 2.5 rpm was used to measure the viscosity of cream at 25 °C [15, 16].

RESULTS AND DISCUSSION

Physical evaluation

The texture of an under-eye cream is a key factor in consumer satisfaction and the product's effectiveness. A smooth, creamy texture was observed. It allows for easy application and absorption, which is crucial for delicate skin around the eyes.

Table 2: Physical evaluation of under eye cream

Sr. No	Parameter	Observation
1	Color	White
2	Odor	Pleasant
3	Texture	Smooth, creamy
4	Physical State	Semisolid

Irritancy

There is a mark of 1 cm on the dorsal surface of the left hand. After applying the lotion to the afflicted area, the time was noted. It is then assessed for irritability and any edema for a maximum of 24 hours and reported. The results indicated that no formulation exhibited edema or irritability.

Washability

The formulation was found to be easily washable. Eye creams typically need to have a good balance between being effective in their treatment and easy to clean off without excessive effort. Washability can be particularly important for the eye area, where residue left behind can cause irritation, discomfort, or even affect makeup application later. The observation suggests that under eye cream is a well-balanced, non-greasy, and lightweight product.

pH

Using a pH meter, the pH test was conducted. The cream's pH was found to be 5.3. The skin around the eyes is particularly delicate and sensitive. Therefore, the pH of eye creams needs to be carefully formulated to avoid irritation or

disruption of the skin's natural balance. A pH of 5.3 places the under-eye cream slightly on the acidic side of the pH scale, which is very close to the skin's natural pH. This makes it suitable for the skin around the eyes, as it is likely to support the skin's natural barrier without causing irritation or imbalance.

Phase separation

After a 24-hour period, phase separation was examined, but it was not seen. The fact that phase separation was not seen indicates that the under-eye cream is stable and well-formulated. The ingredients have been successfully emulsified and are unlikely to break down or separate under normal usage conditions within the first day.

Viscosity

The eye cream's viscosity was determined to be 23,500 cPs. Eye creams often have higher viscosity to ensure they do not run into the eyes or spread uncontrollably. The viscosity of 23,500 cPs suggests that the cream is quite thick. This is typical for more luxurious or intensive formulations, often designed to hydrate or treat delicate under-eye skin without dripping. A high-viscosity eye cream will likely have a heavier, richer texture, which might feel more moisturizing and soothing upon application.

CONCLUSION

In conclusion, the formulation of an under-eye cream with antioxidant and anti-inflammatory properties holds great potential in the skincare market. It offers a natural, effective, and safe solution for addressing common under-eye concerns while promoting skin health and vitality. The inclusion of ingredients such as caffeine, aloe vera, almond oil, and cucumber extract in the cream formulation has demonstrated promising results. The under-eye cream shows effectiveness in improving skin texture, reducing puffiness, and promoting a more youthful appearance. Its antioxidant and anti-inflammatory properties help in minimizing the signs of aging, fatigue, and inflammation, while also providing a protective barrier against free radicals and environmental stressors.

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