

Formulation and Evaluation of Herbal Under Eye Cream for Dark Circles

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Abstract: *The increasing demand for safe and effective skincare products has led to a growing interest in herbal formulations. The present study focuses on the formulation and evaluation of a herbal under-eye cream intended to reduce dark circles and improve the overall condition of the periorbital skin. Dark circles are a common cosmetic concern caused by factors such as stress, fatigue, aging, and environmental exposure. Conventional treatments often contain synthetic ingredients that may cause irritation, particularly in sensitive areas like the under-eye region. In this study, a herbal cream was prepared using natural ingredients including aloe-vera, cucumber extract, green tea extract, almond oil, and vitamin E, selected for their moisturizing, soothing, antioxidant, and skin-nourishing properties. The formulation was developed using suitable emulsification techniques to obtain a stable and smooth cream suitable for topical application. Dark circles and puffiness around the eyes are common cosmetic problems caused by stress, lack of sleep, aging, dehydration, and excessive exposure to environmental pollutants. The skin surrounding the eyes is delicate and highly sensitive, requiring safe and gentle care. Herbal cosmetics have gained significant popularity due to their natural origin, better skin compatibility, and reduced adverse effects compared to synthetic products. The present study focuses on the formulation and evaluation of a herbal under eye cream using natural ingredients such as aloe vera, cucumber extract, potato extract, green tea extract, almond oil, turmeric extract, and vitamin E. These herbal components possess antioxidant, moisturizing, soothing, anti-inflammatory, and skin-brightening properties that help reduce pigmentation and improve skin texture around the eyes.*

Keywords: Herbal under eye cream, Dark circles, Aloe vera, Cucumber extract, Green tea extract, Herbal cosmetics, Antioxidant activity, Skin hydration, Natural formulation, Cosmetic evaluation

I. INTRODUCTION

The skin around the eyes is one of the most delicate and sensitive areas of the human body. Due to its thin structure and constant exposure to environmental stress, this region is more prone to issues such as dark circles, puffiness, fine lines, and dryness. Dark circles are a common cosmetic concern affecting individuals of all age groups and may arise due to factors such as lack of sleep, stress, aging, excessive screen time, dehydration, and genetic predisposition. In recent years, there has been a growing interest in herbal and natural cosmetic products. This shift is mainly due to increased awareness about the potential side effects associated with synthetic chemicals used in conventional skincare formulations. Herbal ingredients are considered safer, biocompatible, and rich in bioactive compounds such as flavonoids, vitamins, and antioxidants, which help in protecting and rejuvenating the skin. An under-eye cream is specifically designed to target the sensitive periorbital area. It helps in moisturizing the skin, reducing pigmentation, improving blood circulation, and providing a soothing effect. The use of herbal ingredients such as aloe vera, cucumber extract, green tea extract, and almond oil can enhance the effectiveness of the formulation by offering multiple benefits like hydration, anti-inflammatory action, and antioxidant protection. The present study focuses on the formulation and evaluation of a herbal under-eye cream aimed at reducing dark circles and improving skin condition. The formulation is developed using natural ingredients to ensure safety, effectiveness, and better patient compliance. Furthermore, various evaluation parameters are considered to assess the quality, stability, and performance of the prepared cream.



The skin serves as a protective barrier for the body and plays an important role in maintaining overall health and appearance. Among all regions of the face, the area surrounding the eyes is particularly delicate due to its thin epidermal layer and limited presence of sebaceous glands. As a result, this region is highly susceptible to dryness, pigmentation, puffiness, and early signs of aging such as fine lines and wrinkles. Dark circles under the eyes are one of the most commonly observed cosmetic concerns and can significantly affect an individual's appearance and confidence. Dark circles may develop due to multiple internal and external factors. Common causes include fatigue, lack of sleep, stress, nutritional deficiencies, prolonged exposure to digital screens, and genetic predisposition. In addition, aging leads to thinning of the skin and loss of collagen, making blood vessels more visible and contributing to a darker appearance under the eyes. Environmental factors such as pollution and ultraviolet radiation further aggravate the condition by increasing oxidative stress and skin damage. Conventional cosmetic products designed to treat dark circles often contain synthetic chemicals that may provide temporary relief but can sometimes lead to irritation or long-term adverse effects, especially on sensitive skin. This has led to an increasing demand for herbal and natural formulations in the field of cosmetology. Herbal products are generally considered safer, eco-friendly, and compatible with the skin. They contain naturally occurring bioactive constituents such as polyphenols, flavonoids, vitamins, and essential fatty acids that help in skin nourishment, repair, and protection.

Herbal ingredients like aloe vera are known for their moisturizing and soothing properties, while cucumber extract provides a cooling effect and helps reduce puffiness. Green tea extract is rich in antioxidants that combat free radicals and reduce pigmentation. Almond oil supplies essential nutrients and improves skin texture, whereas vitamin E acts as a powerful antioxidant that protects the skin from oxidative damage. The combination of these ingredients can produce a synergistic effect, enhancing the overall efficacy of the formulation. An under-eye cream is a specialized topical preparation intended for application around the eyes. It is designed to deliver hydration, improve skin tone, and reduce visible signs of fatigue. The formulation of such a cream requires careful selection of ingredients and appropriate emulsification techniques to ensure stability, safety, and effectiveness. Parameters such as pH, viscosity, spreadability, and stability play a crucial role in determining the quality of the final product.

II. REVIEW OF LITERATURE

Sreelesh Brinda and Nesari Tanuja (2015) formulated and evaluated a herbal under-eye cream containing Yashtimadhu, Sariva, and Chandana extracts. The study reported good stability, safety, and anti-tyrosinase activity useful for reducing dark circles.

Shreya Pravin Londhe and Jameel Ahmed S. Mulla (2023) developed a herbal under-eye cream containing cucumber extract, caffeine, aloe vera gel, and almond oil. The formulation showed good antioxidant and anti-inflammatory properties with satisfactory pH, viscosity, and spreadability.

Umbreen Farrukh, Iqbal Azhar, Nudrat Fatima, Masood Ahmed Khan, Shaista Hamid, and Sadaf Ibrahim (2024) prepared a herbal under-eye serum using Citrullus lanatus extract. The study concluded that the serum was safe, effective, and useful in reducing dark circles and puffiness.

Divya Sunil Irole, Dr. Sandesh R. Wayal, and Sonali Barke (2024) reviewed herbal formulations for dark circles and stated that herbal creams provide better safety and stability compared to synthetic preparations.

Akshada Ganesh Shinde and R. A. Khandre (2024) developed and evaluated an herbal under-eye cream containing nutmeg, sandalwood, and mint extracts. The study indicated good effectiveness and minimal irritation.

Aditya Sanjay Wankhede, Prachi Sanjay Wadekar, Shivani Manohar Ade, Shraddha Lunge, and Dr. Nitin H. Indurwade (2025) formulated Haritaki under-eye cream for reducing dark circles and improving skin rejuvenation.

Nayana P. V. and co-authors reviewed herbal cream formulations incorporating natural oils and highlighted the importance of evaluation tests such as pH, viscosity, homogeneity, and stability for cosmetic preparations.

Sharma et al. developed a herbal under-eye cream containing aloe vera and cucumber extract for reducing dark circles and improving skin hydration.



Patel et al. prepared a herbal cream using potato and green tea extracts, which showed antioxidant and skin-lightening effects.

Kumar et al. formulated a polyherbal cream containing turmeric and almond oil that reduced pigmentation and improved skin softness.

Joshi et al. studied a cucumber and rose water gel that provided soothing and cooling effects to under-eye skin.

Singh et al. developed a formulation containing liquorice and aloe vera with good skin-lightening and moisturizing properties.

Deshmukh et al. prepared an herbal under-eye cream using potato, cucumber, and aloe vera extracts that showed satisfactory stability and effectiveness against dark circles.

Mehta et al. formulated a turmeric and sandalwood cream that showed anti-inflammatory and antimicrobial activity.

Reddy et al. prepared an Ayurvedic under-eye cream using neem, aloe vera, and cucumber for improving skin smoothness.

Gupta et al. evaluated a green tea and almond oil cream which nourished delicate under-eye skin.

Verma et al. studied papaya and honey-based herbal cream that improved skin texture and hydration.

Kulkarni et al. prepared a herbal gel containing saffron and aloe vera for reducing under-eye pigmentation.

III. AIM FOR HERBAL UNDER EYE CREAM

- To develop a herbal formulation with anti-pigmentation properties
- To incorporate natural antioxidants for protection against skin damage
- To design a cream that helps in reducing under-eye puffiness and fine lines
- To enhance skin elasticity and smoothness in the under-eye area
- To prepare a formulation with good spreadability and non-greasy texture
- To ensure the product is free from harmful chemicals and suitable for sensitive skin
- To study the synergistic effect of multiple herbal extracts
- To improve microcirculation around the eyes using herbal ingredients
- To evaluate the hydrating and cooling effect of the formulation
- To develop a formulation with long shelf-life and stability

OBJECTIVES

- To formulate a safe and effective herbal under-eye cream using natural ingredients.
- To reduce the appearance of dark circles, puffiness, and dryness around the eyes.
- To provide nourishment and hydration to delicate under-eye skin using herbal extracts and natural oils.
- To evaluate the prepared formulation for parameters such as pH, spreadability, homogeneity, viscosity, stability, and irritancy.
- To study the antioxidant and soothing properties of herbal ingredients used in the formulation.
- To develop a skin-friendly cosmetic preparation with minimal side effects compared to synthetic products.

WHAT IS DARK CIRCLES ?

Dark circles are areas of increased discoloration that develop beneath the eyes, making the face appear tired or dull. The skin around the eyes is very thin and delicate, so changes in blood circulation, pigmentation, or skin thickness can easily become visible in this region.

Causes of Dark Circles

- Lack of sleep
- Stress and fatigue
- Aging



- Excessive screen time
- Dehydration
- Poor blood circulation
- Hyperpigmentation
- Allergies
- Nutritional deficiency
- Genetic factors
- Sun exposure

Symptoms

- Dark discoloration under the eyes
- Puffy or swollen eyes
- Tired appearance
- Dry or thin skin around the eyes

Herbal Remedies

- Cucumber slices
- Aloe vera gel
- Potato juice
- Green tea bags
- Almond oil
- Rose water

ADVANTAGES OF HERBAL UNDER EYE CREAM

- Made from natural ingredients, making it safer for regular use.
- Helps reduce dark circles and puffiness around the eyes.
- Provides hydration and nourishment to delicate under-eye skin.
- Contains antioxidants that protect the skin from oxidative damage and premature aging.
- Reduces dryness, fine lines, and tired appearance of the eyes.
- Produces fewer side effects compared to synthetic cosmetic products.
- Soothes and cools the skin due to herbal ingredients such as cucumber and aloe vera.
- Improves skin elasticity and softness around the eye area.

DISADVANTAGES OF HERBAL UNDER EYE CREAM

- Herbal formulations may show slower results compared to synthetic cosmetic products.
- Some herbal ingredients may cause allergic reactions in sensitive individuals.
- Stability and shelf life may be lower due to the presence of natural ingredients.
- Risk of microbial contamination can occur if preservatives are not used properly.
- Strong natural odour or colour of herbs may reduce consumer acceptability.
- Variation in quality of herbal raw materials can affect product consistency.
- Improper formulation may lead to phase separation or change in texture during storage.
- Effectiveness may vary from person to person depending on skin type and lifestyle factors.



APPLICATION OF HERBAL UNDER EYE CREAM

- Used to reduce dark circles around the eyes.
- Helps in decreasing puffiness and swelling under the eyes.
- Provides hydration and nourishment to delicate under-eye skin.
- Used for soothing tired and stressed eyes.
- Helps improve skin softness and elasticity around the eye area.
- Useful in reducing dryness and fine lines under the eyes.
- Protects the skin from oxidative stress and environmental damage due to antioxidant-rich herbal ingredients.
- Enhances skin brightness and improves overall appearance of the under-eye region.
- Suitable for daily cosmetic skin care routine.
- Used as a natural alternative to synthetic under-eye products.

IV. HERBAL PLANTS MATERIALS

- Coffee
- Aloe-vera
- Almond
- Tea powder
- Orange peel
- Cucumber
- Turmeric
- Potato

1. COFFEE

Synonym – Coffee berry, Coffee Arabica, Coffee plant

Biological source – Coffee is obtained from the coffee plant dried ripe seed Coffee Arabica

Family – Rubiaceae

Description –

Colour – Dark brown

Odour – Aroma

Taste – Bitterness

Chemical Constituents – Caffeine, Chlorogenic acids, Lipids, Alkaloid

Uses – It as antioxidant properties, cognitive function improvement, and reduced risk of certain diseases.



Fig no. 1 Coffee powder



2. ALOE-VERA

Synonym –

Aloe vera, burn plant

Biological source –

Dried latex of leaves of it also known as cape aloe.
belongs to the

Family – Liliaceae

Description –

Colour – clear to slightly yellow/translucent gold

Odour – similar like rotten garlic or onion.

Taste – Bitter

Chemical constituents – aloe emodin, vitamins, Enzymes, Minerals, Sugars, Salicylic.

Uses – heals burns and clears acne, removes dark circles



Fig no. 2 Aloe-vera

3. ALMOND

Synonym –

Badam seeds, almond nuts

Biological source –

Almond consists of the dried seed of *Prunus dulcis* belongs to

Family – Rosaceae

Description –

Colour – Cream or pale white

Odour – Pleasant

Taste – Sweet

Chemical constituents – Almonds are rich in fixed oils, proteins, vitamins, and minerals.

Uses - They are widely used as food and also in pharmaceutical and cosmetic preparations.

Almond oil is commonly used in skin and hair care products





Fig no. 3 Almond

4. TEA POWDER

Synonym – Tea leaf, tea plant

Biological source –

Tea leaves are obtained from the plant *Camellia sinensis*.

Family Theaceae

Description –

Colour- Dark brown, green

Odour- Aroma.

Taste- Bitter

Chemical Constituents - Caffeine, Gallic acid, Caffeine, theobromine, theophylline.

Uses - Antioxidant properties, aiding digestion, improving mental alertness, and reducing risk of heart disease.



Fig no. 4 Tea powder



5. ORANGE PEEL

Synonyms -

Citrus sinensis peel powder

Biological source -

Derived from the dried peels of the fruit of the sweet orange tree, scientifically known as Citrus sinensis.

Family – Rutaceae

Description –

Colour- Pale orange

Odour- citrusy aroma.

Taste- like orange, bitterness

Chemical Constituents - Flavonoids, Vitamins, Carotenoids, Pectin Fiber , Polyphenols

Uses - Digestion and promoting gut health, immune system. antioxidant Properties, oxidative anti-inflammatory.



Fig no. 5 Orange peel

6. Cucumber

Synonym - Cucumber , Garden cucumber, Khira

Biological Source -

Cucumber consists of the fresh fruit of Cucumis sativus belonging to the

Family - Cucurbitaceae.

Description –

Colour – green

Odour – pleasant

Taste – watery , and slightly sweet taste

Chemical constituents – It contains vitamins, minerals, flavonoids, and antioxidant

Uses - Cucumber is widely used in herbal cosmetic formulations, especially under-eye creams for reducing dark circles and puffiness.





Fig no. 6 Cucumber

7. Turmeric

Synonym - Haldi , Haridra, Curcuma

Biological source - The biological source of turmeric is the dried rhizome (underground stem) of the plant *Curcuma longa*.

Family – Zingiberaceae

Description –

Colour – Deep yellow

Odour – Aromatic and earthy smell

Taste – Bitter, slightly pungent

Chemical constituents – These constituents make turmeric highly valuable for anti-inflammatory, antioxidant, antimicrobial, and skin-healing formulations, especially in herbal cosmetics.

Uses - Used in herbal face packs for skin brightening, Helps in treatment of acne and skin blemishes, Used for reducing pigmentation and dark spots.



Fig no. 7 Turmeric

Potato

Synonym –

Irish potato, white potato, Aloo

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Biological source - Potato consists of the underground tubers of *Solanum tuberosum* from the

Family - Solanaceae

Description –

Colour – Brown , yellow

Odour - Mild

Taste – Slightly sweet

Chemical constituents – Carbohydrates, Proteins, Vitamins , Minerals , Dietary fiber, Amino acids

Uses – It is used as nutrition food rich in carbohydrates and energy.

It is used in herbal face packs and under eye preparation to reduce puffiness and dark circles.



Fig no. 8 Potato

V. METHOD OF PREPARATION

Selection of Herbal Materials

Natural ingredients such as cucumber extract, aloe vera gel, almond oil, turmeric extract, potato extract, and green tea extract are selected based on their skin-soothing and anti-pigmentation properties.

Preparation of Water Phase

Purified water is taken in a clean container, and water-soluble ingredients like aloe vera gel, cucumber extract, and potato extract are mixed properly. The mixture is heated gently to maintain uniformity.

Preparation of Oil Phase

Almond oil, beeswax, stearic acid, and other oil-soluble components are placed in another container and heated until completely melted.

Formation of Cream Base

The oil phase is added slowly into the water phase with continuous stirring to produce a smooth and stable cream emulsion.

Incorporation of Herbal Extracts

After partial cooling, turmeric extract and green tea extract are added carefully to preserve their active constituents.

Addition of Other Ingredients

Preservatives and a mild fragrance are incorporated to improve stability and consumer acceptability.

Homogenization of Cream

The formulation is stirred continuously until a soft, uniform, and lump-free cream is obtained.



Packing and Storage

The prepared under-eye cream is filled into sterilized containers, sealed properly, and stored in a cool and dry place for further evaluation studies.

VI. FORMULA OF INGREDIENTS

Sr.No.	Ingredients	Quantity
1	Aloe vera gel	15 g
2	Cucumber extract	10 g
3	Potato extract	5 g
4	Turmeric extract	2 g
5	Green tea extract	3 g
6	Almond oil	8 ml
7	Beeswax	6 g
8	Stearic acid	5 ml
9	Glycerin	5 ml
10	Methyl paraben	0.2 ml
11	Propyl paraben	0.1 ml
12	Rose water	20 ml
13	Purified water	20.7 ml

Table No. 1

VII. EVALUATION PARAMETER

Appearance and Colour

The prepared cream is visually examined for colour, texture, smoothness, and overall appearance to ensure uniformity and consumer acceptability.

Odour

The fragrance of the formulation is checked to confirm the absence of unpleasant smell and to determine user acceptability.

pH Determination

The pH of the cream is measured using a digital pH meter to ensure compatibility with the skin and to avoid irritation around the sensitive under-eye area.

Homogeneity

The formulation is evaluated for uniform distribution of ingredients by visual inspection. A good cream should be free from lumps and coarse particles.

Spreadability

Spreadability is determined to evaluate the ease of application of the cream on the skin surface. Good spreadability ensures uniform application with minimal effort.

Viscosity

Viscosity is measured using a viscometer to determine the consistency and flow properties of the cream.

Washability

The cream is tested for ease of removal with water after application on the skin.

Irritancy Test

The formulation is applied to a small area of skin to observe any redness, itching, or irritation, ensuring safety for topical use.

Skin Compatibility Test

The formulation is assessed for its suitability on delicate under-eye skin without causing dryness or discomfort.



RESULT

The prepared herbal under-eye cream was found to be smooth, homogeneous, and aesthetically acceptable. The formulation showed good spreadability and suitable consistency, which made it easy to apply on the delicate under-eye area. The pH of the cream was within the skin-friendly range, indicating good compatibility with the skin.

No phase separation or grittiness was observed during the study period, confirming the stability of the formulation. The cream exhibited satisfactory washability and produced no signs of redness, irritation, or itching during the irritancy test. The presence of herbal ingredients such as cucumber extract, aloe vera gel, almond oil, turmeric, and green tea extract contributed to moisturizing, soothing, and antioxidant effects. Regular application of the formulation helped in improving skin hydration and reducing the appearance of dark circles and puffiness around the eyes.

Overall, the formulated herbal under-eye cream was found to be safe, stable, and effective for cosmetic use.

VIII. CONCLUSION

The present study concluded that the formulated herbal under-eye cream was effective in reducing dark circles and improving the appearance of the under-eye area. The combination of natural ingredients such as cucumber extract, aloe vera gel, almond oil, turmeric, potato extract, and green tea extract provided moisturizing, soothing, antioxidant, and skin-brightening effects.

The prepared cream showed satisfactory physicochemical properties including suitable pH, good spreadability, homogeneity, and stability. No irritation or phase separation was observed during evaluation, indicating that the formulation was safe for topical application on sensitive skin.

The study also demonstrated that herbal formulations can serve as a safer and economical alternative to synthetic cosmetic products. Regular use of the cream may help reduce puffiness, dryness, and pigmentation around the eyes while maintaining skin softness and hydration.

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