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Formulation and Development of under Eye Cream by Using Aqueous Extract of *Syzygium cumini*



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ABSTRACT

Dark circles under the eyes are a common complaint of both men and women, although they can occasionally be seen in children. When there is more melanin produced around the eyes, giving them a darker color. The breakthrough herbal actives reduce the appearance of dark circles and protect the sensitive area under the eyes from sunlight. Herbs and spices have been used in maintaining and enhancing human beauty since the ancient times. Indians use natural herbs and spices such as cucumber, turmeric, tea, potato, rice water etc. *Syzygium cumini* known as Jamun can also be used in cosmetic for treatment. Jamun contain flavonoid which give antioxidant property. In the present research, an attempt has been made to formulate under eye cream by using aqueous extract of Jamun leaves for dark circle. The formulated under eye cream was applied to subject for evaluation of cream. The results obtained after 6 weeks were satisfactory.



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INTRODUCTION

The eyes and their gaze always aroused interest both for aesthetic and verbal human communication. The appearance and their expression are in direct relationship with the health, but also the beauty of a person. Standards of beauty, extremely changeable during the human history in terms of body contours, have remained constant for the luminosity and the eye expressiveness. (1)

Pigmentation of the periorbital skin is very common in skin color because of the increased melanin content. Genetics, rubbing, and inflammatory skin diseases such as eczema may play a role in make the pigmentation of the thin under-eye skin. (2)

Nowadays herbs are widely used as remedial agents because herbs are easily available at less expensive and nontoxic so the people have good trust in such remedies. From the ancient time people are using herbs for cleaning, beautifying and to maintain healthy skin.

Cosmetics are defined as the beauty products which have desirable physiological activity such as healing, smoothing appearance, enhancing and conditioning properties. These days Acne, blackhead, pimples, dark circle are common among youngsters and person who suffers from it. According to Ayurveda, Skin problems are normally due to impurities in blood. Accumulated toxins in the blood during improper food and lifestyle are causing skin related diseases.

Tyrosinase is known to be the key enzyme in melanin biosynthesis. Hyperpigmentation of the skin occurs due to overactivity of tyrosinase enzyme melanogenesis can be controlled by inhibiting the activity of tyrosinase or other related melanogenic enzymes. Among melanogenic enzymes, tyrosinase is the rate-limiting enzyme for controlling the production of melanin. The use of tyrosinase inhibitors is the most preferred method for melanogenesis inhibition. Tyrosinase inhibitors specifically interact with melanogenic cells and do not lead to side effects compared with other melanogenesis inhibitors. The number and location of phenolic hydroxyl of the flavonoids will significantly influence the inhibition of tyrosinase activity and give antioxidant property. (3)

Various type of herbs are used for reduce dark circle like tomato, potato, cucumber, tea, orange etc. Jamun also used for reducing dark circle it contains flavonoids which is responsible for antioxidant. Antioxidant help to reduce dark circle.

Jamun is a very common, large evergreen beautiful tree of Indian subcontinent. The scientific name of *Jamun* *Eugenia jambolana* Lam or *Syzygium cumini* Linn belongs to family *Myrtaceae*. (4) *Syzygium cumini* leaves contain tannin, flavonoids and polyphenols which are responsible for antioxidant. (5)



Figure No. 1: Jamun and leaves (6)



Figure No. 2: Jamun (7)



Figure No. 3: Jamun tree (8)

Origin and Distribution

Syzygium cumini is originated from India or the East Indies. It is found in Thailand, Madagascar, Philippines and some other countries. The plant present into sub-tropical region including Florida, California, Algeria and Israel. It also occurs in lower range of Himalayas up to an elevation of 1300 meters and in kumaon hills up to 1600 meters. It is widely grown in the larger parts of India from Indo-Gangetic plains in the north to Tamilnadu in the south. [9, 10]

Morphology Character

It is a long lived big evergreen tree, height up to 25-30 meter. The trunk has 3 to 4 meter circumference with a semi spreading crown up to 10 meter in diameter and it is thick and grayish white in color. The branches are wide extend and bend at the ends. It has deep tap root system and root is wiry, while the lateral roots are many, long and distributed down the main root. Leaves are simple, glossy elliptic, pinnately veined with lateral veins close

together. It carries with a few flowers in a panicle. Flowers are light yellow and hermaphrodite, carry in the axils of leaves on branchlet, calyx tube, calyx lobes, petals, stamens, white spreading, ovary inferior and 2 celled. Fruit is a berry, purplish red, ovoid and edible. [11]

Chemical constituents of *Syzygium cumini* leaf

Acylated flavonol glycosides, quercetin, myricetin, myricitin, myricetin 3-O-4-acetyl-L-rhamnopyranoside, triterpenoids, esterase, galloyl carboxylase, and tannin. (13)

Cosmetic uses

According to Yamaguchi, the flavonoids show antioxidant and anti-aging properties and also protect the skin from UV radiation. In phenolic antioxidant activity due to their redox potential which allows them to act as hydrogen donors, singlet oxygen quenchers, and metal chelators. [12] Blue light is high energy visible light emitted from mobile phone or screens which cause wrinkle, acne pigmentation via free radical generation induce oxidative stress in live skin which leads to damage DNA causing inflammation and breakdown of collagen and elastin. To prevent damage caused by blue light, natural antioxidant can be used. *Syzygium cumini* extract has antioxidant property it prevents formation of reactive oxygen species by free radicals and reduce dark circle. *Syzygium cumini* of methanol extract and leaf essential oil can be considered good sources of natural antioxidants. *Syzygium cumini* can help lighten skin pigmentation. It help to purifying your blood and keeping your skin clean and glowing. It is rich in iron and also improves the hemoglobin content in the body. (13)

EXTRACTION (14, 15, 16)

Extraction methods used in cosmeceutical involves the separation of active portions of plant tissues from the inactive/inert components by using selective solvents. The purpose of standardized extraction procedures for crude drugs (plant parts) is to attain the therapeutically desired portions and to eliminate unwanted material by treatment with a selective solvent known as menstrum. The extract thus obtained, after standardization, may be used as cosmeceutical agent as such in the form of tinctures or fluid extracts or further processed to be incorporated in any product. This product contains complex mixture of many plant metabolites, such as alkaloids, glycosides, terpenoids, flavonoids and lignans. The general techniques of plant extraction include maceration, infusion, percolation, digestion, decoction,

hot continuous extraction (Soxhlet). For aromatic plants, hydrodistillation techniques (water distillation, steam distillation, water and steam distillation), hydrolytic maceration followed by distillation, expression and effleurage (cold fat extraction) may be employed.

Some of the latest extraction methods for aromatic plants include headspace trapping, solid phase microextraction, protoplast extraction, micro distillation, therm micro distillation and molecular distillation.

Collection of material – Leaves of *Syzygium cumini* was collected from seminary hills Nagpur.

Selection of solvent - For the extraction of leaves of *Syzygium cumini* water was selected because flavonoids are soluble in water which is used in formulation of eye cream to reduce dark circle.

Selection of extraction process- For the extraction of leaves of *Syzygium cumini* was carried out by distillation process.

Hydro Distillation separates two or more liquid components in a mixture using the principle of relative volatility or boiling points. The greater the difference in relative volatility the greater the nonlinearity and the easier it is to separate the mixture using distillation. The process involves production of vapour by boiling the liquid mixture in a still and removal of the vapour from the still by condensation. Due to differences in relative volatility or boiling points, the vapour is rich in light components and the liquid is rich in heavy components.

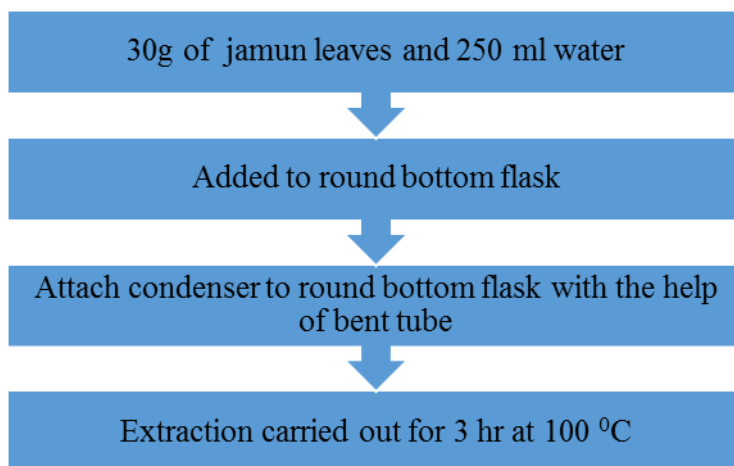


Figure No. 4: Extraction of actives *Syzygium cumini* (Jamun) leaves.

Preparation of material

The plant materials leaves of *Syzygium cumini* were air dried at room temperature for 1 week. The leaf extract prepared by hydrodistillation method. 30g of sample with 250 ml water transferred in round bottom flask. Round bottom flask attach to condenser with the help of bent tube, extraction was carried out for 3 hr at 100°C.

Procedure



Phytochemical screening (17, 18)

Preliminary screening of phytochemicals is a valuable step in the detection of bioactive principles present in plants. It contains bioactive like flavonoid, alkaloid, saponin, tannin, steroids etc. which give cosmetic and pharmacological properties.

Constituents	Test	Observation
Alkaloids	2 ml of dilute hydrochloric acid was added to the 5 ml of extract then treated with Dragondroff's reagent	appearance of an orange brown precipitate
Glycosides	The extract was hydrolysed with dilute hydrochloric acid for few hours on a water bath. 1 ml of pyridine and a few drops of sodium nitroprusside solution were added. Then 2-3 drops of dilute NaOH was mixed	The pink colour produced which turn into red
Triterpenoids	About 5 ml of extract was mixed in 2 ml of chloroform; 2 ml of acetic anhydride and a few drops of conc. H ₂ SO ₄ was added	Reddish violet colour
Steroid	10ml of chloroform was mixed with 2ml of extracts and conc. H ₂ SO ₄ was added to form lower layer	A reddish yellow colour at the interface
Saponins	15 ml of distilled water was added to the extract and shaken vigorously	formation of a stable persistent froth
Flavonoids	Few drops of dilute NaOH was mixed with 2 ml of extract.	A yellow solution that turns colourless
Tannins	In a test tube containing little quantity of extract few drops of 1 % lead acetate were added	Yellow precipitate
Carbohydrates	The small portion of extract was mixed with 2ml of Molisch's reagent and the mixture was shaken properly. After that 2ml of concentrated H ₂ SO ₄ was poured carefully along the side of the test tube	Violet ring at the interphase was not formed which indicates absence of carbohydrate.
Anthocyanins	2 mL of the plant extract with 2 mL of 2 N HCl.	The appearance of a pink-red color that turns purplish blue after addition of ammonia
Polyphenols	2 mL portion of the plant extract was added two drops of alcoholic solution of 2 % ferric chloride	The appearance of a more or less dark blackish-blue or green color
Quinones	2 mL of the plant extract are evaporated to dryness. The residue was triturated in 5 mL of HCl diluted 1/5 and then brought the solution to the boiling water bath for 30 min in a test tube. After cooling under a stream of cold water, the hydrolyzate was extracted with 20 mL of chloroform in a test tube. The chloroform layer was then collected in another test tube and then, 0.5 mL of ammonia diluted twice was added thereto	The appearance of a color ranging from red to purple
Coumarin	1 gm powdered drug kept with water in test tube, covered with paper soaked in NaOH and diluted and boiled	Yellow fluorescence
Amino acid and proteins	Millon's test- mixed the extract with million's reagent	Formation of brick red precipitate

FORMULATION TABLE

Ingredient	Function	Quantity (100%)	Quantity (50g)	
			1 st trial	2 nd trial
Oil phase (A)				
Stearic acid	Govern consistency	24%	12g	10g
Lanolin	Emollient	2%	1g	1g
Cetyl alcohol	Conditioning agent	4%	2g	2g
Silicone oil	Emollient	2%	1ml	1ml
Propyl paraben	Preservative	0.2%	0.1g	0.1g
Water phase (B)				
Glycerin	Humectant	10%	5ml	6ml
Triethanolamine	Emulsifier	4%	2ml	2ml
Propylene glycol	Humectant	4%	4ml	3ml
water	Diluent	Upto 100	50ml	50ml
Methyl paraben	Preservative	0.2%	0.1g	0.1g
Phase (C)				
Jamun extract	Active(tyrosinase inhibitor)	4%	2ml	2ml

Selection of base- Stearic acid and Triethanolamine base cream was formed, it is called moisturizing base which help to moisturize the under eye skin area and prevent from drying. Cream contain silicone oil, lanoline which help to give emolliency property to cream and also help to reduce fine lines and wrinkles from under eye skin.

Procedure - Phase A: The emulsifying agent stearic acid was dissolved in cetyl alcohol, lanolin, silicone oil, propylparaben and heated to 75⁰c. It can be named as oil phase.

Phase B In this phase mix the water soluble components like methylparaben triethanolamine propylene glycol, and heated to 75⁰c. It can be named as aqueous phase.

After heating aqueous phase was added into oil phase at same temperature with continuous trituration the smooth & homogenous cream was prepared. After fall in temperature at 45⁰C added Jamun aqueous extract and again triturate.

Observation

Color- white

Consistency- semisolid

Texture- smooth

Irritancy- no

pH- 6

Antioxidant

Antioxidant play important role by prevent the formation of reactive oxygen species by reducing hydroperoxides and scavenging free radicals. Antioxidant activity may be due to compound such as flavonoids, isoflavones, flavones, vitamin C, E and beta carotene. [19] In phenolic antioxidant activity due to their redox potential which allow them to act as hydrogen donors, singlet oxygen quenchers, metal chelators. [12] Leaf extract of *Syzygium cumini* rich in phenolic, saponin, flavonoids, and tannins.



Figure No. 5: Under Eye Cream with active

SUBJECT EVALUATION

The subject assessment was done on the basis of some parameters such as redness, itching, allergy, burning, rashes, etc. cream was applied to subject under the eye for 6 weeks further changes in the skin condition were noted throughout the study. After 6 weeks changes in the skin condition were observed. The result showed in picture.

Under eye cream which contain Jamun aqueous extract, it help to reduce dark circle. The cream was applied to client for treatment of under eye dark circle.



Plate No. 1: Effect of under eye cream

CONCLUSION

The present study involves Formulation, Development and Evaluation of under eye Cream. The present work mainly focuses on the potential of extracts from cosmetic purposes. The uses of cosmetic have been increased in many folds in personal care system. The prepared eye cream was o/w type emulsion, hence can be easily washed with plain water which gives better customer compliance. Our study indicated that the formulations were more stable. The prepared formulations showed good spreadability, no evidence of phase separation. Formulations had almost a constant pH, emollient property, they were not greasy and easily removable after the application. The stable formulations were safe and skin irritations and allergic sensitizations were scarce. The formulation contains water extract of *Syzygium cumini* leaves which has antioxidant property because of flavonoid content in extract. Subjective showed that eye cream gave satisfactory result an application of cream for 6 weeks. It help to reduce dark circle from under eye area. Further studies can be conducted for more accurate results like antityrosinase, antiwrinkle.

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