

Formulation and Evaluation of Poly Herbal under Eye Derma Gel

¹Patibandla Shriya, ²B. Jahnavi Reddy, ³Dr.N. Srilakshmi

¹Student, ²Student, ³Associate Professor

Affiliated to Osmania University,

Sri Venkateshwara college of Pharmacy, Hi-Tech city, Hyderabad, Telangana
500081, India

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ABSTRACT:

Dark circles under the eyes are defined as bilateral, homogeneous pigment macules on the infraorbital regions. Dark circles under eyes are common beauty problem. These under eye dark circles give us an appearance of illness. They make us to feel worse and rather detrimental to our self-esteem. The Poly herbal under eye derma gel is a cosmetic gel which is prepared by using natural ingredients by weighing accurately. It is formulated and evaluated by using blue berries, carrot, almond oil, flax seed oil, green tea leaves, honey, konjac gum and rose water. It has a goodness of blue berries, carrot and green tea leaves. Gel base is prepared by using konjac gum. Honey is great for skin because it acts as a humectant and allows to retain moisture in skin. Methylparaben is used as a preservative. Poly herbal under eye derma gel was prepared by homogenous mixing of all the herbals extracts. The herbal under eye derma gel was evaluated by different parameters such as organoleptic evaluation, pH test, irritancy test, wash ability, spread ability, transparency and phase separation were observed.

Key words: Poly herbal under eye derma gel, dark circles, blue berries, carrot, green tea leaves, almond oil, flax seed oil, konjac gum.

I. INTRODUCTION

Cosmetics plays a significant role in today's life style. Current trend is going green in almost all industries including cosmetics to adopt more natural way of life. The usage of herbal cosmetics has been increased in personal care system. The word Organic indicates that it is safety as compared to synthetic products which are having various adverse effects on human health [1]. The "Windows of our Soul" are human eyes. One of the most prevalent conditions that people of all ages experience is dark circles. Blood seeps through the delicate skin beneath the eyes. The skin turns into blue as the blood flows through the large veins.

Dark circles can develop when the skin surrounding the eyes is excessively thin. Darken even more when melanin production is at its highest higher than usual, giving the area surrounding the eyes a darker appearance [2]. Dark circles can form under the eyes due to stress or lack of sleep. These are typically most noticeable near the inner corner of the eyes and then spread under the eye, towards the outer corner.

Dark circles are most often associated with tiredness, sleep deprivation and fatigue however, there are numerous other extrinsic and lifestyle-related triggers, including illness/infections, allergies, stress, hormonal changes, chronic irritation of the eye area, eye strain, exposure to UV light, dehydration, poor nutrition, vitamin deficiency, excessive alcohol consumption and smoking. Medicines, such as non-steroidal anti-inflammatory drugs and chemotherapy drugs, are also suspected to trigger the occurrence of dark circles [3-4].

1.1 Types of Under Eye Circles

There are four types of dark circles, which are discussed below.

1. Bluish, purple Tone / Vascular Dark Circles
2. Mixed Dark Circles
3. Structural Dark Circles
4. Brownish Tone / Pigmented Dark Circles

1. Bluish, Purple Tone / Vascular Dark Circles:

Enlarged veins and thin under eye skin causes bluish dark circle. Vascular dark circles exhibit a bluish or purplish tint around the lower eyelid. Failure of the blood and lymphatic microcirculation in the eye contour causes vascular dark circles. Slow circulation leads to the accumulation of blood pigments, resulting in distinctive purplish-blue color. These enlarged veins are caused by caffeine, and other medications.

2. Mixed Dark Circles: Mixed dark circles refer to under-eyediscoloration caused by a combination of various factors, including pigmentation, vascular issues, and structural changes in the skin. These dark circles often manifest as a blend of different hues, including blue or purple tones due to visible blood vessels, brown or black pigmentation caused by excess melanin production, and shadows or hollows resulting from loss of fat and collagen under the eye.

3. Structural Dark Circles: These dark circles appear as shadows under the skin that are caused

by factors such as genetics, bone structure, skin laxity, fat loss under the skin and the natural aging process.

4. Brownish Tone / Pigmented Dark Circles: These are caused due to post-inflammatory pigmentation. These clusters of brown pigment collect under the eye due to sun damage, genetics, or chronic rubbing, making the dark circles look brownish-black. These dark circles can appear in individuals with poor blood circulation or transparent skin in the under-eye area.



Vascular Pigmented Mixed Structural

Fig 1: Types of under eye circles

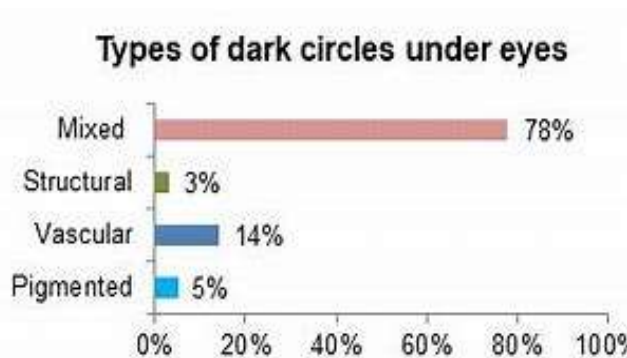


Fig 2: Recent statistics of people with dark circles

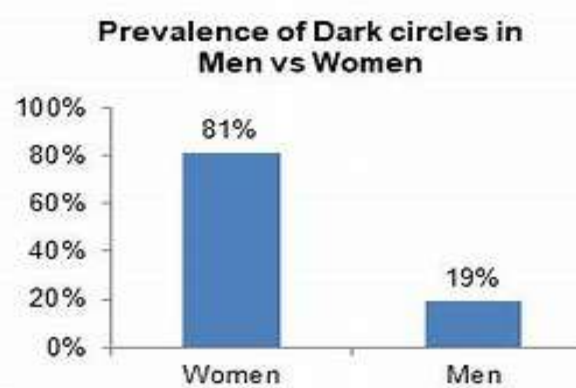


Fig 3: Prevalence of Dark circles in Men vs Women

1.2 GEL

A gel is a semi solid substance that has properties between those of liquids and solids. It

typically consists of a liquid dispersed in a solid matrix, forming a jelly like consistency.[5]

A gel is a semi solid that can have properties ranging from soft and weak to hard and tough. Gels are defined as a substantially dilute cross linked system, which exhibits no flow when in the steady state, although the liquid phase may still diffuse through this system. A gel has been defined phenomenologically as a soft, solid or solid-like material consisting of two or more components, one of which is a liquid, present in substantial quantity.

Advantages and Disadvantages of Herbal Under Eye Gels

Advantages:

- **Reduced Puffiness:** Poly herbal under-eye gels often contain natural ingredients that help reduce puffiness around the eyes. These ingredients can soothe and calm the delicate skin, making it appear less swollen.[6]
- **Dark Circle Reduction:** Some herbal gels target dark circles. Ingredients like aloe vera, turmeric, and almond oil may help lighten dark areas under the eyes.
- **Anti-Aging Properties:** Herbal gels can minimize the appearance of wrinkles and fine lines. They often contain antioxidants and vitamins that promote skin health and elasticity.
- **Moisturization:** These gels provide hydration to the under-eye area, keeping the skin supple and preventing dryness.
- **Natural Ingredients:** Herbal gels use pure and organic ingredients, which can be gentler on the skin compared to synthetic products.
- **Skin Glow:** Regular use of herbal creams can contribute to a healthy and radiant complexion.

Disadvantages:

- **Individual Sensitivity:** While herbal ingredients are generally well-tolerated, some people may be sensitive to specific herbs or essential oils. Always carry out a patch check earlier than the use of any new product.
- **Limited Scientific Evidence:** Although herbal remedies have been used for centuries, scientific studies on their efficacy can be limited. Some claims may lack robust evidence.
- **Slower Results:** Herbal products may take longer to show noticeable effects compared to chemical-based products.
- **Specific Skin Concerns:** Not all herbal gels address every skin concern.
- **Temporary Effects:** Like most topical treatments, the effects of under-eye gels are

temporary. Consistent use is necessary for lasting results.

II. AIM

This project aims to identify the optimal herbal blend that maximizes the reduction of common under eye concerns, providing a basis for an advanced skin care solution.

III. MATERIALS

Blue berries, Carrot, Green tea leaves, Honey, Almond oil, Flax seed oil, Konjac gum, Rose water, Methyl paraben.

A. Blue Berries

Biological source: Obtained from fruits of *Vaccinium angustifolium*.

Family: Ericaceae

Chemical constituents: Anthocyanins (anthocyanidins, or phenolic aglycone, conjugated with sugar), chlorogenic acid, flavonoids, alpha-linolenic acid, pterostilbene, resveratrol, and vitamins.

Uses: Blue berries are rich in anti-oxidants, anti-inflammatory[7], gives skin brightening effect and collagen support.



Fig 4: Blue berries

B. Carrots

Biological source: Obtained from roots of *Daucus carota*.

Family: Apiaceae

Chemical constituents: Carotenoids, Polyphenols, caffeic acid and vitamins

Uses: Rich in vitamin A, promote skin renewal and maintains skin health, reduce dark circles



Fig 5: Carrots

C. Almond oil

Biological source: Obtained from seeds of *Prunus amygdalus*

Family: Rosaceae

Chemical constituents: Monounsaturated fatty acids, with oleic acid as the main compound and an important amount of tocopherol and phytosterol content.

Uses: Rich in vitamin A, promote skin renewal and maintains skin health, reduce dark circles.



Fig 6: Almond oil

D. Flax seed oil

Biological source: Obtained from ripen seeds of *Linum usitatissimum*

Family: Linaceae

Chemical constituents: Omega-3 and Omega-6 Fatty Acids, α -linolenic acid (ALA) and Lignans.

Uses: Anti-inflammatory, reduce puffiness, moisturizer, rich in vitamin B. [8]



Fig 7: Flax seed oil

F. Green tea leaves

Biological source: Green tea comes from leaves of the *Camellia sinensis*.

Family: Theaceae

Chemical constituents: Polyphenols, alkaloids, amino acids, polysaccharides and volatile components

Uses: Reduce fine lines and wrinkles [9], provides rejuvenation.



Fig 8: Green tea leaves

G. Honey

Biological source: Honey is sweet secretion stored in the honey comb by various species of bees, such as *Apis mellifera*.

Family: Apidae

Chemical constituents: Honey is an aqueous solution containing 35% glucose, 45% fructose, & 2% Sucrose.

Uses: Honey is used to hydrate skin, reduce wrinkles [10] and acts as moisturizer.



Fig 9: Honey

H. Konjac gum

Biological source: Konjac gum is obtained from *Amorphophallus konjac* plant.

Family: Araceae

Chemical constituents: KGM consists of d - glucose and d -mannose joined by β -1,4 glycosidic linkages.[11]

Uses: Used as stabilizer, gelling agent and nourishes the skin.



Fig 10: Konjac gum

I. Rose water

Biological source: Obtained from petals of Rosa damascene.

Family: Rosaceae

Uses:Hydrating, maintains skin pH balance and remove unwanted spots.



Fig 11: Rose water

IV. FORMULATION TABLE

S. No	Ingredients	F1	F2	F3	F4	F5
1	Blue berry extract(ml)	5	-	2.5	2.5	2.5
2	Carrot extract(ml)	-	5	2.5	2.5	2.5
3	Almond oil (ml)	1	1	2	-	1
4	Flax seed oil (ml)	1	1	-	2	1
5	Green tea leaves extract (ml)	1	1	1	1	1
6	Honey (ml)	1.5	1.5	1.5	1.5	1.5
7	Konjac gum (gm)	0.15	0.15	0.15	0.15	0.15
8	Rose water (ml)	q. s	q. s	q. s	q. s	q. s
9	Methyl paraben (gm)	0.02	0.02	0.02	0.02	0.02



Fig 12: Prepared formulation

V. METHODOLOGY

All extracts of desired quantity are measured and mixed together in a beaker. Desired

quantity of konjac gum is weighed and taken in a china dish. The above mixture is added to the konjac gum with continuous stirring using glass rod to avoid clumps formation. Rose water and honey

mixed together in a separate beaker and then slowly added to the mixture in china dish. Flax seeds oil and almond oil of desired quantities are measured and added to the mixture. Mixture is mixed uniformly to attain uniform gel formation.

VI. EVALUATION TESTS

6.1 Organoleptic evaluation

- Color
- Odour
- Texture
- State

6.2 pH test : At constant temperature, the pH of the formulation was determined using digital pH meter.



Fig 13: Digital pH meter

6.3 Washability: After applying a tiny amount of gel to the hand, it was washed with tap water, observe its wash ability.

6.4 Spreadability: The spread ability was measured by the time it took two slides to slip away from the gel, which was placed in between

the slides, under a specific force. The better the spread ability, the less time it takes to separate the two slides. Two sets of standardized glass slides were taken. The gel mixture was then placed on a slide of appropriate size. The formulation was then placed on top of another slide. The gel between the two slides was then pushed uniformly to form a thin layer when a weight or specified load was placed on the upper slide. The weight was then removed and any excess formulation stuck on the slides was scraped away. The force of weight attached to the upper slide allowed it to glide off effortlessly. The length of time it took for the upper slide to fall off was recorded.[12]

Spreadability was calculated by using the following formula,

$$S = M \times L / T$$

Where, S = Spreadability

M= Weight tied to upper slide

L=Length of the glass

T=Time

6.5 Irritancy test: Gel is applied to the dorsal side of the hand and left it overnight. After 6 hours irritability and allergic reactions are assessed.

6.6 Phase Separation: The prepared gel was maintained at a temperature of 25-100 °C, away from light, in a sealed container. Then over the next 30 days, phase separation was monitored every 24 hours. The phase separation was examined and confirmed for any changes.

VII. RESULTS

Organoleptic evaluation

Formulation code	Color	Odour	Texture	State
F1	lavender	Pleasant	Smooth	Semi solid
F2	orange	Pleasant	Smooth	Semi solid
F3	Pale orange	Pleasant	Smooth	Semi solid
F4	orange	Pleasant	Smooth	Semi solid
F5	orange	Pleasant	Smooth	Semi solid

Physicochemical Assessment

At constant temperature, the pH of the formulation was determined using digital pH meter

Formulation code	pH
F1	6.6
F2	6.5
F3	6.6
F4	6.8
F5	6.8

Washability

Formulation code	Wash ability
F1	Easily washable
F2	Easily washable
F3	Easily washable
F4	Easily washable
F5	Easily washable

Spreadability

S.No	Formulation code	Time(sec)	Spread ability (cm/g)
1	F1	8	4
2	F2	8	4
3	F3	7	3.5
4	F4	9	5
5	F5	5	2.5

Irritancy test

S.No	Formulation code	Irritant effect	Edema
1	F1	No	No
2	F2	No	No
3	F3	No	No
4	F4	No	No
5	F5	No	No

Phase Separation

S.No	Formulation code	Phase separation
1	F1	No
2	F2	No
3	F3	No
4	F4	No
5	F5	No

VIII. CONCLUSION

Under eye dark circles is a common benign problem. Though, there are number of treatments available for the same, the developed formulation made from blue berries and carrot extract and some other essential oils was found to be better and more promising herbal under eye derma gel. The fact that poly herbal under eye derma gels is chemical-free and more effective than synthetic under eye gels is the most significant quality they have. Thus, in this research work, the prepared herbals under eye derma gel makes the

skin refreshing and free from dark circles. From the obtained results it is concluded that the formulated gel showed good consistency and spread ability, homogeneity, pH, non-greasy and there is no phase separation during study period of research. The uses of cosmetic have been increased in many folds care system. The prepared herbal gel has best properties and having nutritional values using less chemical which overcome the various skin problem. Based on the results we can say that all formulations F1,F2,F3,F4 and F5 were stable at room temperature and can be a safely used on the

skin. Among the various formulations F5 formulation was found to be optimized from formulation and evaluation point of view. This F5 formulation gave best results when both blue berries extract and carrot extract taken in equal amount. The present work focuses on the potential of herbal extracts for cosmetic purpose.

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