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Research Article

Design Development and Evaluation of Under Eye Herbal Serum Citrullus Lanatus with Kojic Acid

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ABSTRACT

In the market available so many options for reduce the dark circles under eye. Herbal serum one of the best options for this. The primary objective of preparing a herbal under eye serum is to formulate a natural, safe, and effective product that helps in reducing dark circles under the eyes, minimizing puffiness and eye bags, moisturizing and nourishing the delicate under-eye skin, preventing and reducing fine lines and wrinkles, improving blood circulation around the eyes using herbal extracts.This is achieved by incorporating herbal ingredients rich in antioxidants, anti-inflammatory agents, vitamins, and skin-rejuvenating properties (e.g., aloe vera, cucumber extract, green tea, almond oil, etc.). For the preparation we used watermelon extract: Ciitrullus lanatus & kajoic acid in combination of other herbal contents which provide better & efficient effect against dark circles. After evaluation such as color, odor, pH, density, sensitivity test , we concluded it is one of best product with safe & effective result.

INTRODUCTION

Cosmetic Science:

Cosmetic science is an interdisciplinary field that focuses on the research, development, formulation, manufacturing, and evaluation of cosmetic products intended to enhance or alter the appearance, texture, and health of skin, hair, nails, and other external body parts. It encompasses both the art and science of creating products that are safe, effective, aesthetically pleasing, and compliant with regulatory standards.

Skincare Products

- Moisturizers, serums, cleansers, exfoliants, sunscreens, and anti-aging treatments.

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- One of the fastest-growing segments due to increasing consumer focus on skin health and wellness.

Haircare Products

- Shampoos, conditioners, hair oils, styling products, and hair colorants.
- Driven by trends in fashion, hair loss solutions, and gender-neutral products.

Makeup or Color Cosmetics

- Foundations, lipsticks, eyeliners, blushes, and nail polish.
- Highly influenced by fashion, celebrity endorsements, and social media trends.

Fragrances

- Perfumes, body sprays, deodorants, and scented lotions.
- Represents a blend of artistry and chemistry.

Personal Hygiene and Toiletries

- Soaps, toothpaste, deodorants, shaving products, and sanitary goods.

Cosmeceuticals and Dermatological Products

- Hybrid products that combine cosmetic and therapeutic benefits (e.g., anti-acne serums, retinol creams).
- Prohibition of misbranded, adulterated, and spurious drugs
- Penalties for non-compliance

Herbal Under-Eye Serums

In the context of **"Design, Development and Evaluation of Under-Eye Herbal Serum"**, the Drugs and Cosmetics Act is crucial because:

- It ensures that the **formulated serum is safe for the delicate under-eye area**.
- Herbal ingredients like aloe vera, cucumber, and licorice must comply with safety and quality norms.
- The product must not make false therapeutic claims unless substantiated by research.
- It must meet labelling requirements (ingredient list, batch number, manufacturing date, expiry, etc.)

Recent Developments

With the growing herbal and Ayurvedic cosmetic market, the regulatory framework continues to evolve:

- The **Ministry of AYUSH** plays a role in regulating Ayurvedic, Siddha, and Unani drugs and related cosmetics.
- There's an increasing emphasis on **cruelty-free, non-toxic, and sustainable cosmetics**.
- BIS has updated guidelines for natural and organic cosmetics.

Introduction to under-eye herbal formulation

The human eye is one of the most expressive and sensitive areas of the face, and the skin surrounding it—particularly the under-eye region—is delicate, thin, and vulnerable to various dermatological concerns. The under-eye area is often the first place to show visible signs of aging, stress, fatigue, dehydration, and environmental damage. Common concerns include dark circles, puffiness, fine lines, wrinkles, and under-eye bags, which can significantly affect an individual's appearance and confidence. In response to these challenges, the cosmetic and pharmaceutical industries have invested heavily in developing topical solutions that are both safe and effective. Among these, **under-eye serums**, especially those formulated using **herbal or botanical**

ingredients, have gained remarkable attention for their gentle yet targeted therapeutic action.

Under-eye herbal serums represent a new frontier in the convergence of traditional herbal medicine and modern cosmetic science. These formulations are lightweight, fast-absorbing liquids enriched with concentrated active ingredients derived from medicinal plants. Unlike conventional creams and moisturizers, serums are designed to penetrate deeper into the skin, delivering potent herbal actives directly to the affected tissues. Their non-greasy texture and high efficacy make them ideal for use in the sensitive periocular region, where heavy creams may lead to pore clogging or milia formation.

Rationale for Herbal-Based Formulations

The growing inclination toward **natural and organic skincare products** has significantly influenced consumer preferences in recent years. This shift is driven by increasing awareness of the side effects associated with synthetic ingredients, including allergies, irritation, and long-term toxicity. Herbal ingredients, on the other hand, are biocompatible, environmentally friendly, and offer multifunctional benefits. Plants like **Aloe vera**, **Cucumber (Cucumis sativus)**, **Licorice (Glycyrrhiza glabra)**, **Green tea (Camellia sinensis)**, and **Chamomile (Matricaria chamomilla)** have demonstrated anti-inflammatory, antioxidant, depigmenting, and soothing properties that are especially valuable in under-eye treatments.

For example, Aloe vera is known for its skin-hydrating and anti-inflammatory effects, making it ideal for reducing puffiness and fine lines. Licorice extract contains glabridin, a natural skin-lightening agent that helps reduce hyperpigmentation and dark circles. Cucumber has a high-water content and cooling effect that alleviates swelling and refreshes tired eyes. The use of such herbs aligns with Ayurvedic and naturopathic traditions, while also being supported by modern pharmacological studies.

Market Trends and Demand

The global cosmetic industry has seen a substantial increase in the demand for targeted eye care products. According to market research, the eye care segment within the skincare industry is projected to grow steadily due to increased awareness of eye aesthetics, especially among the urban population. The demand for **under-eye serums** is being fueled by:

- Rising exposure to screens and blue light, which accelerates eye fatigue and dark circles.
- Stressful lifestyles, poor sleep, and pollution.
- Aesthetic consciousness among both men and women.
- A preference for non-invasive alternatives to cosmetic surgery.

Herbal formulations offer a niche yet growing market segment that combines efficacy with safety, a combination highly favored by health-conscious consumers. These products also cater to vegan, cruelty-free, and chemical-free trends, thus expanding their appeal globally.

Scientific Foundation and Formulation Challenge

Despite the popularity of herbal ingredients, designing an effective under-eye herbal serum involves several scientific challenges. These include:

- Selecting the right combination of herbs based on their pharmacological action and compatibility.
- Ensuring the stability of bioactive components, which may degrade upon exposure to light, heat, or air.
- Achieving a formulation with appropriate pH, viscosity, and absorption properties suitable for the sensitive eye area.

- Preventing microbial contamination, as water-based herbal formulations are susceptible to microbial growth.

Hence, a well-designed under-eye serum requires a multidisciplinary approach encompassing **pharmacognosy, pharmaceutics, dermatology, and cosmetic science**. Scientific evaluation through in vitro and in vivo studies is crucial to validate its safety and efficacy. Additionally, sensory testing and user acceptability are essential to ensure commercial viability.

The production and marketing of herbal cosmetics in India are regulated by the **Drugs and Cosmetics Act, 1940**, and subsequent amendments. Although herbal serums fall under the cosmetic category, they must comply with quality and safety standards, including microbial limits, preservative use, and labelling requirements. Compliance with **Good Manufacturing Practices (GMP)** and quality testing (e.g., pH, viscosity, skin irritation, and patch tests) is necessary to ensure consumer safety.

Regulatory and Quality Considerations

Table no.1: Summary of Under-Eye Problems with Symptoms, Causes, and Herbal Remedies

Under-Eye Problem	Symptoms	Causes
Dark Circles	Dark pigmentation under the eyes	Genetics, aging, lack of sleep, sun exposure, allergies
Puffy Eyes / Bags	Swelling or sagging under the eyes	Fluid retention, aging, sleep disturbances, allergies
Fine Lines & Wrinkles	Crow's feet, creases under and around the eyes	Aging, UV exposure, dehydration, repetitive expressions
Milia	White, keratin-filled bumps	Blocked follicles, heavy creams, skin trauma
Tear Trough Deformity	Hollow or sunken appearance under the eyes	Aging, genetics, fat loss
Dermatitis	Redness, itching, scaling	Allergens, harsh cosmetics, environmental triggers
Xanthelasma	Yellowish plaques around the eyes	Lipid metabolism disorders, high cholesterol
Periorbital Edema	Swelling around the eyes	Kidney disorders, allergies, hormonal changes
Hypervascularity	Blue or purple discoloration under thin skin	Thin skin, visible blood vessels, allergies
Eye Fatigue / Stress	Redness, dryness, tired appearance	Screen overuse, digital fatigue, poor sleep

Table no. 2: Types of Under-Eye Herbal Serums

Type of Serum	Primary Purpose	Formulation Type
1. **Anti-Dark Circle Serum**	Reduces pigmentation and brightens under-eye area	Water-based gel or lotion
2. **Anti-Puffiness Serum**	Reduces under-eye bags and swelling	Cooling gel or roll-on formula
3. **Anti-Wrinkle / Anti-Aging Serum**	Smooths fine lines and improves elasticity	Oil-based or emulsion-based
4. **Hydrating Serum**	Provides deep hydration to delicate under-eye skin	Gel or hyaluronic acid-based

5. **Soothing/Calming Serum**	Relieves irritation, itching, or inflammation	Water or gel-based
6. **Depigmentation / Brightening Serum**	Evens skin tone and reduce dullness	Water-based serum or light emulsion
7. **Antioxidant-rich Serum**	Fights oxidative stress and rejuvenates tired eyes	Emulsion or gel
8. **Firming / Collagen-Boosting Serum**	Enhances firmness and tightens skin	Light oil or water-based serum
9. **Herbal Eye Repair Serum**	Multi-functional: targets multiple issues (dark circles, wrinkles, hydration)	Multi-phase serum or lotion
10. **Ayurvedic Eye Serum**	Based on traditional Ayurvedic formulations	Herbal decoction-infused serum

MATERIAL & METHODS

Watermelon Extract



fig No1: Watermelon Extract

- **Botanical Name**: *Citrullus lanatus*
- **Synonyms**: Watermelon
- **Taxonomical Classification**:

Kingdom: Plantae
Phylum: Tracheophyta
Class: Magnoliopsida
Order: Cucurbitales
Family: Cucurbitaceae
Genus: *Citrullus*
Species: *C. lanatus*

- **Biological Source**: Fruit pulp of *Citrullus lanatus.*
- **Geographical Distribution**: Widely cultivated in tropical and subtropical regions worldwide
- **Chemical Constituents**: Lycopene, citrulline, vitamins A and C
- **Uses:** Hydrating and antioxidant properties; helps in moisturizing and revitalizing the under-eye area

Kajoic acid



fig no 2:- kajoic acid

- **Botanical Name***: Aspergillus flavus*
- **Synonyms:** Pyranone
- **Taxonomical Classification**

Kingdom: Fungi
Phylum: Ascomycota
Class: Eurotiomycetes
Order: Eurotiales
Family: Trichocomaceae
Genus*: Aspergillus*

Species:*Aspergillus oryzae*

- **Biological Source**: A secondary metabolite obtained from the fermentation of various species of fungi, mainly *Aspergillus oryzae*
- **Geographical distribution:** The fungi producing kojic acid are commonly found in: Japan (widely used in traditional fermentation industries),China,Korea,India. Other tropical and subtropical regions where the fungi can grow in agricultural and industrial fermentation setups.
- **Chemical Constituents**

Uses: Pharmaceutical and Cosmetic Uses: Skin Whitening, Hyperpigmentation Treatment, and Antioxidant, Antimicrobial, Anti-inflammatory

Liquorice Powder



Fig.no.3:Liquorice Powder

- **Botanical Name**: *Glycyrrhiza glabra*
- **Synonyms**: Liquorice, Sweet Root
- **Taxonomical Classification**:

Kingdom: Plantae
Phylum: Tracheophyta
Class: Magnoliopsida
Order: Fabales
Family: Fabaceae
Genus: *Glycyrrhiza*
Species: *G. glabra*

- **Biological Source**: Dried roots and rhizomes of *Glycyrrhiza glabra*
- **Geographical Distribution**: Native to Southern Europe and parts of Asia; cultivated in India, Iran, and China
- **Chemical Constituents**: Glycyrrhizin, liquiritin, glabridin, flavonoids
- **Uses**: Anti-inflammatory and depigmenting properties; effective in reducing dark circles and puffiness under the eye.

Aloe Vera Gel



Fig no 4. Aloe Vera Gel with (vitamin C) & (Cucumber extract)

- **Botanical Name**: *Aloe barbadensis* Miller
- **Synonyms**: Ghrit Kumari
- **Taxonomical Classification**:

Kingdom: Plantae
Phylum: Tracheophyta
Class: Liliopsida
Order: Asparagales
Family: Asphodelaceae
Genus: *Aloe*
Species: *A. barbadensis*

- **Biological Source**: Gel extracted from fresh leaves
- **Geographical Distribution**: Native to North Africa; cultivated globally in tropical and subtropical regions

- **Chemical Constituents**: Polysaccharides, vitamins (A, C, E), enzymes, amino acids
- **Uses:** Soothing and moisturizing effects; reduces puffiness and provides a cooling sensation to the under-eye area

Ascorbic Acid



- **Botanical Name** Vitamic C
- **Synonyms** L-Ascorbic acid
- **Taxonomical Classification**

Kingdom: Plantae
Phylum: Magnoliophyta (Angiosperms)
Class: Magnoliopsida (Dicotyledons)
Order: Malpighiales
Family:Phyllanthaceae
Genus: Phyllanthus
Species:*Phyllanthus emblica*

- **Uses-to treat and prevent vitamin C deficiency, including scurvy**

Potato Starch Extract



fig no 5. Potato Starch Extract

- **Botanical Name**: *Solanum tuberosum*
- **Synonyms**: Potato
- **Taxonomical Classification**:

Kingdom: Plantae
Phylum: Tracheophyta
Class: Magnoliopsida
Order: Solanales
Family: Solanaceae
Genus: *Solanum*
Species: *S. tuberosum*

- **Biological Source**: Tuber
- **Geographical Distribution**: Cultivated worldwide
- **Chemical Constituents**: Starch, vitamin C, phenolic compounds
- **Uses**: Natural bleaching agent; helps in lightening dark circles and reducing under-eye puffiness

Avacado Oil



Fig no 6 Avocado Oil

- **Botanical Name:** Persea americana
- **Synonyms:** Avocado
- **Taxonomical Classification**

Kingdom : Plantee
Phylum: Tracheophyta
Class: Magnoliopsida
Order: Laurales
Family: Lauraceae
Genus: *Persea*
Species: *P. americana*

- **Biological Source**: Fruit pulp
- **Geographical Distribution**: Native to Central America; cultivated in tropical and subtropical regions

- **Chemical Constituents**: Oleic acid, vitamins A, D, E, lecithin
- **Uses**: Deeply moisturizing; enhances skin elasticity and reduces lines

Jojoba oil



Fig no 7. Jojoba Oil

- **Botanical Name**: *Simmondsia chinensis*
- **Synonyms**: Goat Nut, Deer Nut, Pignut
- **Taxonomical Classification**:

Kingdom: Plantae
Phylum: Tracheophyta
Class: Magnoliopsida
Order: Caryophyllales
Family: Simmondsiaceae
Genus: *Simmondsia*
Species: *S. chinensis*

- **Biological Source**: Seeds
- **Geographical Distribution**: Native to Southwestern United States and Northern Mexico
- **Chemical Constituents**: Liquid wax esters, vitamin E, fatty acids
- **Uses**: Mimics skin's natural sebum; provides long-lasting moisture and helps in reducing under-eye dryness

Olive oil



Fig no 8. Olive Oil

- **Botanical Name**: *Olea europaea*
- **Synonyms**: Olive
- **Taxonomical Classification**:

Kingdom: Plantae
Phylum: Tracheophyta
Class: Magnoliopsida
Order: Lamiales
Family: Oleaceae
Genus: *Olea*
Species: *O. europaea*

- **Biological Source**: Fruit
- **Geographical Distribution**: Native to the Mediterranean region; cultivated worldwide
- **Chemical Constituents**: Oleic acid, polyphenols, squalene
- **Uses**: Antioxidant and anti-inflammatory properties; nourishes and protects the delicate under-eye skin.

Almond oil



Fig no 9. Almond Oil

- **Botanical Name**: *Prunus amygdalus*
- **Synonyms**: Sweet Almond
- **Taxonomical Classification**:

Kingdom: Plantae
Phylum: Tracheophyta
Class: Magnoliopsida
Order: Rosales
Family: Rosaceae
Genus: *Prunus*
Species: *P. amygdalus*

- **Biological Source**: Seeds (kernels)
- **Geographical Distribution**: Native to the Middle East and South Asia; cultivated globally

- **Chemical Constituents**: Oleic acid, linoleic acid, vitamin E
- **Uses**: Lightens dark circles; provides deep nourishment and improves skin tone under the eyes

Sandalwood Oil



Fig no 10 Sandalwood Oil

- **Botanical Name**: *Santalum album*
- **Synonyms**: Indian Sandalwood, White Sandalwood
- **Taxonomical Classification**:

Kingdom: Plantae
Phylum: Tracheophyta
Class: Magnoliopsida
Order: Santalales
Family: Santalaceae
Genus: *Santalum*
Species: *S. album*

- **Biological Source**: Heartwood
- **Geographical Distribution**: Native to Southern India and Southeast Asia
- **Chemical Constituents**: α-santalol, β-santalol
- **Uses**: Soothing and cooling effects; reduces inflammation and puffiness around the eyes

Saffron Oil



fig no11. Saffron oil

- **Botanical Name**: *Crocus sativus*
- **Synonyms**: Saffron Crocus
- **Taxonomical Classification**:

Kingdom: Plantae
Phylum: Tracheophyta
Class: Liliopsida
Order: Asparagales
Family: Iridaceae
Genus: *Crocus*
Species: *C. sativus*

- **Biological Source**: Stigmas of the flower
- **Geographical Distribution**: Cultivated in Iran, India (Kashmir), Greece, and Spain
- **Chemical Constituents**: Crocin, safranal, picrocrocin
- **Uses**: Natural skin brightener; helps in reducing dark circles and enhancing skin radiance

Tea tree oil



fig no.12-Tea Tree Oil

- **Botanical Name**: *Melaleuca alternifolia*
- **Synonyms**: Tea Tree
- **Taxonomical Classification**:

Kingdom: Plantae
Phylum: Tracheophyta
Class: Magnoliopsida
Order: Myrtales
Family: Myrtaceae
Genus: *Melaleuca*
Species: *M. alternifolia*

- **Biological Source**: Leaves

- **Geographical Distribution**: Native to Australia
- **Chemical Constituents**: Terpinen-4-ol, cineole
- **Uses**: Antimicrobial and anti-inflammatory properties; should be used with caution in under-eye formulations due to potential sensitivity

Methyl Paraben



fig 12 Methyl Paraben

- **Chemical Name:** Methyl 4-hydroxybenzoate
- **Synonyms:** Methylparaben, Methyl p-hydroxybenzoate
- **Chemical Formula:** $C_8H_8O_3$
- **Biological Source:** Synthetic (though parabens occur naturally in some fruits like blueberries)
- **Geographical Distribution:** Widely manufactured globally
- **Chemical Properties:** Esters of para-hydroxybenzoic acid
- **Uses:**
  - Commonly used as a preservative in cosmetics, pharmaceuticals, and foods
  - Prevents growth of bacteria and fungi
  - **Caution:** Can cause skin sensitivity or allergic reactions in some individuals; usage in sensitive areas (like under-eye) should be minimal

Glycerin



Fig-13 Glycerine

- **Chemical Name:** Glycerol
- **Synonyms:** Glycerine, 1,2,3-Propanetriol
- **Chemical Formula:** $C_3H_8O_3$
- **Biological Source:** Obtained from plant oils or synthesized from petrochemical sources
- **Geographical Distribution:** Universally produced and available
- **Chemical Properties:** Colorless, odorless, viscous, hygroscopic liquid
- **Uses:** Used as a humectant, emollient, and solvent in cosmetics, pharmaceuticals, and food, Helps retain moisture in skin and products
- **Caution:** Generally safe, but may cause mild irritation in very sensitive skin, especially in concentrated or occluded formulations near the eyes

Vitamin E



- **Chemical Name:** Tocopherol (commonly d-α-tocopherol in natural form)
- **Synonyms:** Tocopherol, α-Tocopherol
- **Chemical Formula:** $C_{29}H_{50}O_2$
- **Biological Source:** Extracted from vegetable oils (e.g., wheat germ, sunflower, safflower)
- **Geographical Distribution:** Globally sourced from natural and synthetic origins
- **Chemical Properties:** Fat-soluble antioxidant
- **Uses:** Acts as an antioxidant in formulations, protecting skin and product ingredients from oxidative damage. Provides moisturizing and anti-inflammatory benefits
- **Caution:** In high concentrations, may cause contact dermatitis or clog pores in sensitive individuals; use with care in delicate skin areas like around the eyes

Table No. 1: Under-Eye Herbal Serum Formulation Table

Phase	Ingredient	Function	Quantity Taken
Aqueous	Kojic acid	Skin brightening, anti-pigmentation	1 ml
	Liquorice powder	Anti-inflammatory, lightening	2 gm
	Watermelon extract	Hydration, antioxidant	2 ml
	Ascorbic acid (Vit C)	Antioxidant, brightening	2 gm
	Glycerine	Humectant, hydration	2 ml
	Aloe vera gel	Soothing, moisturizing	2 ml
	Potato starch extract	Depuffing, brightening	2 gm
Oil	Avocado oil	Nourishing, moisturizing	1 ml
	Jojoba oil	Moisturizing, balances sebum	1 ml
	Olive oil	Antioxidant, emollient	1 ml
	Almond oil	Reduces dark circles	1 ml
	Vitamin E oil	Antioxidant, improves elasticity	1 ml
	Sandalwood oil	Soothing, anti-inflammatory	1 ml
	Saffron	Brightening, skin tone enhancer	1 ml or few strands
	Methyl paraben	Preservative	2 ml
	Tea tree oil	Antibacterial (use with caution near eyes)	1 ml

Total Volume:

- Aqueous Phase: 10 ml
- Oil Phase: 10 ml
- Final Volume: 20 ml cucumber extract, green tea, almond oil, etc.).

Table No. 2: Formulation Table of Herbal Eye serum

Ingredients	F1	F2	F3	F4
Kojic Acid	1 ml	2 ml	1 ml	2 ml
Liquorice Powder	2 g	3 g	2 g	2 g
Watermelon Extract	2 ml	1 ml	2 g	1 ml
Ascorbic Acid	2 g	2 g	2 ml	2 ml
Glycerine	2 ml	2 ml	2 ml	1 ml
Aloe Vera Gel	2 ml	1 ml	2 ml	2 ml
Potato Starch Extract	2 g	1g	1g	2g
Avocado Oil	1 ml	1 ml	1 ml	1 ml
Jojoba Oil	1 ml	1 ml	1 ml	1 ml

Olive Oil	1 ml	1 ml	1 ml	1 ml
Almond Oil	1 ml	1 ml	1 ml	1 ml
Vitamin E Oil	1 ml	1 ml	1 ml	1 ml
Tea tree Oil	1ml	1ml	1ml	1ml
Methyl Paraben	0.5 ml	0.5 ml	0.5 ml	0.5 ml

Procedure

- **Preparation of Under Eye Serum**



Fig. no15. Weighing of ingredients

Preparations of Phases

Phase A: - Aqueous Phase

Mixed Liquorice Powder, Potato starch Extract, kojic Acid, Ascorbic Acid, Aloe Vera gel, Glycerine, Watermelon Extract, Methyl Paraben in water with continuous stirring at 30-40C

Phase B: - Oil Phase

Mixed Avocado oil, Jojoba Oil, Olive Oil, Almond Oil, Vitamin E, Tea Tree Oil with continuous stirring. Add Oil phase in Aqueous phase drops wise with continuous stirring at 40c until get the homogeneous phase.



Fig.no: 16 mixing of Oil & Aqueous phase in magnetic stirrer

Evaluation of herbal serum:

Density is calculated with the help of specific gravity bottle.

Weight of empty bottle (W1)
Weight of bottle + eye serum(W2)
Weight of bottle+ water (W3)
PH is observed with the help of pH meter.

Evaluation Table:

Parameters	F1	F2	F3	F4
Colour	Brown	Dark Brown	Brown	Brown
Odour	Fruity Flavour	Fruity Flavour	Fruity Flavour	Fruity Flavour
pH	5.9	6.4	6.3	6.7
Density	0.3 g/mol	0.5 g/mol	0.3g/mol	0.3g/mol
Irritability	No	No	No	No



Fig.no 17.Formulations F1,F2,F3,F4.

Irritation test

Selected voluntarily here eight girls of age 22-25 years & applied directly in their skin to observed the irritation if any. Due present of all herbal ingredients, **no irritation** caused by the freshly prepared Herbal eye serum of Citrullus lanatus with kojic acid**.**

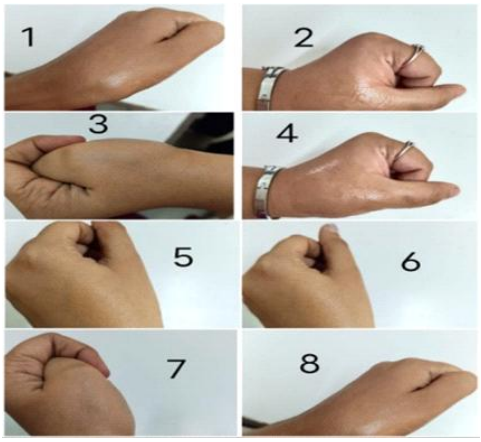


Fig no 18-Irritability Results

RESULT AND CONCLUSION

Herbal under eye serum preparations, formulated from ingredients like Citrullus lanatus (watermelon), have shown promising results in reducing dark circles, puffiness, and wrinkles, with most participants expressing high satisfaction. These herbal serums are generally considered safe and effective, offering a natural alternative to traditional cosmetic products. Further research is recommended to delve deeper into the specific mechanisms of action and optimize formulations. After evaluation studies it was observed that the F2 was suited best and effective for the treatment of dark circles.

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