

Formulation and Evaluation of herbal Anti-aging face serum by using Citrus-peel and Fenugreek extract

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Abstract: As the demand for safe, natural skincare products that fight aging continues to grow. The creation and assessment of an anti-aging herbal face serum using a synergistic combination of botanical substances recognized for their skin-nourishing and rejuvenating qualities is the main goal of this study. Face serums are frequently used to treat certain skin issues like dullness, wrinkles, acne, and dry skin. Depending on the kind of serum you use, they can moisturize, brighten, and offer other advantages. Aloe Vera gel is frequently used as a wound healer, anti-inflammatory, antibacterial, and antifungal agent, as well as a treatment for various skin conditions, sunburns, small wounds, and insect bites. Rapid absorption and deeper skin layer penetration are two of serum's unique qualities. When it comes to active chemicals, serums often have a higher concentration than moisturizers. Furthermore, the healing and acne-fighting qualities of essential oils are present in serum. Unwanted effects of photodamage and ultraviolet (UV) radiation include wrinkles on the face and aging skin. Standard laboratory techniques were followed in the preparation of the serum to guarantee appropriate emulsification and stability. A number of physicochemical tests were performed on the produced serum to evaluate its stability over time, appearance, and pH. Based on preliminary findings, the herbal face serum designed to prevent aging has smooth texture, appropriate viscosity, and stable emulsion, among other desirable physicochemical qualities. Among the greatest benefits of taking anti-aging treatments is an increase in self-confidence. Having a nice appearance makes one feel happy.

Key-words: Anti-aging, face serum, Rejuvenating qualities, Physicochemical tests, Stability etc.

I. INTRODUCTION

The term cosmetic is derived from the Greek word "kosm tikos," which meaning "power, arranging and decorating skill." Cosmetics are defined as articles

intended to be rubbed, poured, sprinkled, or sprayed on, introduced into, or otherwise applied to the human frame for cleaning, beautifying, enhancing attractiveness or altering appearance under the Drugs and Cosmetics Act, 1940.^[1] Herbal cosmetics are cosmetics that include one or more herbal elements added to a base of different approved cosmetic ingredients to provide targeted cosmetic benefits.^[2] Phytochemicals derived from various botanical sources are used to make herbal cosmetics, which provide nutrients and influence skin functions for healthy skin. The science of ayurveda employed many herbs to make cosmetics that were both aesthetically pleasing and weatherproof. The personal care business is currently focusing more on herbal-based cosmetics because this is a rapidly expanding market with enormous potential for growth in the years to come. Herbal cosmetics are preferred over chemically manufactured ones because they have fewer or nonexistent negative side effects, are safe to use, practically work on all skin types.^[3]

I.I Skin

The skin is the body's outermost and most superficial tissue and also the biggest and most protective organ in the body. It makes up between 15 to 20 % of the body's overall mass. The skin is an organ that is constantly evolving and made up of numerous specialized cells and structures.^[4] The skin serves as a barrier to protect the body from pollutants and possible dangers in the environment.^[4,7]

Functions of Skin:

1. Provide protection from dangerous substances, as well as from heat, mechanical force, and physical harm.
2. Stops the loss of moisture.
3. Reduces the harmful effects of ultraviolet radiation.

4. Acts as a sensory organ, detecting things like temperature.
5. Assists in controlling temperature.

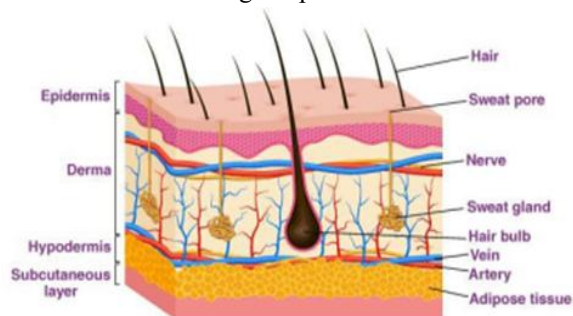


Fig 1: Skin

Sometimes skin is affected by various external and internal factors. One of them is aging of the skin that causes formation of wrinkles. Skin aging is known as a complex process influenced because of constant exposure to ultraviolet (UV) irradiation and damages human skin and skin wrinkling is analogous with collagen deficiency arises from reactive oxygen species (ROS) that is formed from UV which ultimately leads to anti-aging treatment. This treatment targets the treatment of any age-related illness as well as the root reasons of ageing. The intention behind it is to increase the healthy lifetime of humans with youthful traits. Anti-aging treatments encourage skin renewal and collagen production. Serum are the cosmetic products which consists very high concentration of active ingredient in their formulation. Antioxidant serums are a type of preparation that works to stop reactive oxygen species from oxidatively damaging tissues and cells. Anti-aging serums can help to avoid or reduce the appearance of fine lines and wrinkles.^[5]

A lot of people desire to have skin that glows. Some consider radiant skin as an obvious indicator of health, while others view it as a desirable appearance. A significant number of individuals we have seen exhibit dull skin, contributing to their diminished self-worth and ultimately affecting their physical and emotional health. Your confidence will soar if your skin radiates. This is because well-groomed skin is a sign of good health and facial hygiene. A less-than-ideal complexion can be harmful to your self-esteem. There are several ways to brighten skin, and dietary and lifestyle modifications can help people's skin function better. Additionally, there are a ton of skincare and

makeup products out there that can give your skin a radiant appearance.^[6]

I.II Serum

Serum is a skincare product we can apply to our skin just after cleansing but before moisturizing with the intent of distributing powerful ingredients directly into the skin.^[4,6] The serum may penetrate deeply into the skin to provide active substances to the skin. Serum is a very concentrated formulation product based on water or oil. A facial serum can plump up your face, minimize the visibility of pores and enhance its firmness and smoothness.^[6] It contains a gel or light lotion or moisturizer. A moisturizer, anti-aging, anti-wrinkle, or skin serum should all have components that are similar to skin, communicate with cells, and are antioxidants. To be as healthy as possible, these substances are required for all skin types.^[7] For oily to combination skin, gel and liquid preparations work best; for normal to dry skin, serums and light lotions work best; and for extremely dry to very dry skin, more emollient lotions and moisturizing creams work best. Skin-related elements such as antioxidants, cell-based components and skin-like substances should be present in any moisturizing, anti-aging, or anti-wrinkle serum.^[8]

In cosmetology, serum is a concentrated solution that is often utilized. The serum is as effective whether it is diluted in water or oil. As a result, it promptly and successfully treats the skin issue.^[9] Because serum is composed of tiny molecules that may thoroughly penetrate the skin and deliver a very high concentration of active ingredients. Because of this, they're an excellent tool for addressing particular skincare issues including pigmentation and age symptoms.^[4,9] The ultimate objective of using serum is to preserve the healthy skin conditions by making it protected from environmental hazards (sun rays).^[10] There is now a greater demand for serums due to the rising expense of living worldwide. Because more and more individuals desire to look young and appealing, serums have become increasingly valuable. The advanced moisturizing, skin brightening, antioxidant property, antiaging and depigmentation property of the face serum is fascinating consumers instead of any other cosmetic products such as gel, lotions and creams.^[10]

Since their introduction in the 1930s, serums have undergone significant development and advancement.

At that point, the first facial serums were made available for purchase. Naturally, their shelf life was quite limited due to their high susceptibility to bacterial and fungal illnesses; yet, the underlying idea of these items was developed. The original serums were designed to tighten the face and lessen wrinkles. These serums were typically based on albumin, the tightening agent found in egg whites, which have long been utilized as a face mask by women worldwide. The yolks were taken out of the egg whites, stirred, and then the mixture was applied to the face and neck for 15 to 20 minutes before being removed with cold water. It gave the effect of a serum, except that it was raised and tightened. A serum molecule is usually very small and delivers the ingredients to all skin layers without clogging the pores with any oil, glycerin, or other comedogenic fillers.^[17]

Advantages of Serum:

- Prevent all dark spots
- Promote collagen production
- Reduces sagging of skin
- Keeps skin moisturized
- Eliminating dead skin cells

Skin can occasionally become dry patches due to a variety of factors, including pollution, UV rays, and makeup that has been left on overnight that may irritate the skin or trigger an allergic reaction.^[10] Citrus peel and fenugreek seeds both have a unique anti-aging formulation to maintain healthy fresh-looking skin. These products are useful in various skin conditions like stimulate skin's metabolism, increase blood flow, nourish the skin and prevent wrinkles, dark spots, and infections. The limonene present in citrus peel has protection toward UV rays, making it a good natural sunscreen and when mixed with essential oils, it makes an excellent skin smoothening moisturizer and sun block lotions.^[13, 14] Fenugreek seeds extract has antibacterial and anti-fungal activities, which may help in the treatment of minor skin infections also and fight against acne.^[15] UV radiation and photodamage have the negative impact of causing wrinkles and skin aging on the face. Serum has a deep formula with a high concentration of active substances, a non-oily finish, quick absorption, and the capacity to reach deep layers of the skin. Based on these properties, the purpose of this work was to make anti-aging serum using citrus peel extract and fenugreek extract.

Benefits of serum:

- Boost collagen production
- Provide hydration and moisture
- Reduce hyperpigmentation
- Protect against sun damage
- Brightens Complexion

Types of Serum:

Oil Serum: The easiest face serum to create is the oil serum. The foundation of it is usually made up of only premium, quickly absorbing carrier oils (sometimes called dry oils). The luxurious oils in the serum have the ability to repair and moisturize the skin, as well as provide other nutrients that the skin can metabolize, such as polyphenols and vital fatty acids.^[11]

Gel Serum: Gel serums give the skin a "tightening" feeling that makes certain areas of the face appear temporarily lifted or tighter. Given that this formulation is water-based, the gel serum offers an excellent opportunity to incorporate some wonderful water-based (hydrophilic) plant extracts.^[11]

Water based Serum: Gel and water-based serums are comparable; however, water-based serums will have less thickeners and gums. To offer high performance hydrophilic plant extracts that are trapped against the skin beneath a cream or lotion, you would utilize a water-based face serum.^[17] Putting an anti-aging face mist underneath an emulsion and then an oil is the ideal technique to promote the deeper penetration of water-based compounds into the skin, sending their potent ingredients a little bit deeper into the skin's layers.^[11]

Emulsion Serum: An emulsion-based face serum is a type of moisturizer that delivers high-performance ingredients to the skin and fortifies the skin's barrier function. An emulsion is made up of two "immiscible" phases - phases that don't want to mix, such as water and oil.^[11] Water and oil are bound together and kept in a stable form by the application of an emulsifier. Using an emulsion gives you the best possibility of introducing potent actives deeper into the skin's tissues. Since the skin acts as a barrier, it is quite difficult for any cosmetic ingredient to get through the dermis; nonetheless, an oil and water combination works well to achieve this amazing result. The moisturizing properties of the emulsion will reinforce the skin's barrier function.^[14]

Pressed balm Serum: The balm serum solidifies, but the other serums remain liquid. This is the primary distinction between the balm serum and the others.^[17] In addition to the traditional balm base of oils, butters, and waxes, a balm serum contains active ingredients that are lipophilic (oil-soluble) and may benefit the skin. The butters and waxes create an occlusive barrier on the face, nourishing and moisturizing it as the active ingredients in the pressed serum are able to work their magic. Dozens of intriguingly unique butters and waxes can be blended with thousands of wonderful plant oils to create a balm serum.^[11]

How to apply serum on face:

Step 1. Cleanse

A serum should always be applied to clean skin in order to facilitate the proper absorption of the main constituents. It's important to use a gentle facial cleanser and scrub your skin before using a serum. In order to assist the serum, absorb better, this will help get rid of any extra sebum, debris or pollutants.

Step 2. Apply Serum

Apply a small amount of serum directly onto your skin using a dropper, and massage it in gently.

Note: Applying serums can be done in the morning or at night. On the other hand, we advise using this product in the evening routine for people with oily skin. By doing this, you'll be less greasy throughout the day.

Step 3. Use gentle circular motions

Massage your face gently in circular directions for 30 to 60 seconds after using the best natural face serum. This will promote more uniform skin absorption of the substances.

Note: The area surrounding your eyes is sensitive and susceptible to discomfort, so be sure to stay away from it.

Step 4. Allow time for absorption

After using the face serum, give your skin at least five minutes to absorb it before using a moisturizer or makeup.

Step 5. Apply Moisturizer

After a serum has been absorbed, use a moisturizer to hydrate your skin's surface and lock in those essential elements. For a more balanced complexion, moisturizers may help to increase general hydration and stop moisture loss.^[17]



Fig 2: How to apply serum on face

How long face serum take to show Result

Face serums are designed specifically to solve particular skin issues. They include components with smaller molecular sizes that permeate the skin more quickly. The effectiveness of a serum and the amount of time it takes to start showing results on a specific issue are entirely dependent on how well the basic formulation and added active ingredient work together. Numerous advantages such as hydration, brightness, flakiness, dullness, and moisturization require less time to manifest after a single application of a serum. On the other hand, severe skin issues including wrinkles, dark circles, acne, and hyperpigmentation take longer to resolve and may require different products.^[10]

II. AIM & OBJECTIVES

The aim of present study is "Formulation and Evaluation of herbal Anti-aging Face Serum by using Citrus peel and Fenugreek extract".

Objectives:

- Reduce the fine lines and wrinkles.
- Improve firmness and skin elasticity.
- Hydrate and nourish the skin.
- Protect against oxidative stress.

Key Ingredients Used in Face Serum

Citrus Peel

Scientific name: *Citrus aurantium* Linn

Kingdom: Plantae

Order: Sapindales

Family: *Rutaceae*

Genus: *Citrus*

Species: *Citrus sinensis*

The outer layer of the pericarp, which can be fresh or dried of *Citrus aurantium* Linn, a member of the

Rutaceae family. Citrus peel is a great source of protein, carotene, and vitamin C, among other nutrients. It can stimulate the skin's metabolism, increase blood flow, and nourish the skin.^[13] The major byproduct remains the peels, which make up 50–65% of the fruits' overall weight.

Chemical constituents: Numerous bitter-tasting flavonoid glycosides, such as neo hesperidin and naringin; non-bitter flavonoids, including hesperidin, rutoside, sinensetin, nobiletin, and tangeretin; 1-2% essential oil, primarily composed of limonene (>90%), perillyl alcohol, and geraniol; pectins; and furanocoumarins are all present in orange peel. The peel is also full in phenols, such as polymethoxylated flavones and a large number of hydroxycinnamates.^[14]

Uses:

Limonene, a monoterpene present in orange peel, strongly inhibits the formation of abnormal skin growths in people.

D-limonene, which functions as protection toward UV rays, making it a good natural sunscreen either rubbed onto the skin directly or applied to skin oils and lotions.^[14]

Citrus peel applied topically can also delay the onset of wrinkles, acne, and pimples.^[19]

Fenugreek Seeds

Scientific name: *Trigonella foenum graecum*

Kingdom: Plantae

Order: Fabales

Family: *Fabaceae*

Genus: *Trigonella*

Species: *Trigonella foenum graecum* L.

The annual plant fenugreek (*Trigonella foenum graecum*) is a member of the *Fabaceae* family. Fenugreek, or methi, has been used as a medicine for many ailments since ancient times. Fenugreek's natural anti-inflammatory, antibacterial, and antioxidant qualities are highly beneficial to the condition of our skin. Extract from fenugreek seeds is typically used to treat severe skin inflammation, chapped lips, and aged skin.^[22, 23] Fenugreek is a nutrient-dense superfood that protects your skin from free radical damage, encourages natural skin brightness, and offers superior nutrients.

Chemical constituents: Fenugreek contains a number of components such as iron, magnesium, potassium,

zinc, selenium, calcium, copper, folic acid, thiamin, and vitamins A, C, and K. Fenugreek seeds contain mucilage, which has both emollient and antioxidant properties.^[16] A diosgenin with antibacterial and anti-inflammatory properties is found in fenugreek seeds.

Uses:

Anti-inflammatory, antibacterial, and antioxidant qualities support the skin's ability to fight acne. Furthermore, it gets rid of free radicals from our bodies, which are the root cause of wrinkles, dark spots, and infections.

Mucilage from fenugreek seeds has emollient and antioxidant properties.

It also has healing, moisturizing, skin-whitening, and skin-soothing qualities.

It also aids in bringing your skin's pH levels into harmony.^[15]

Aloe Vera gel

Scientific name: *Aloe barbadensis* Mill.

Kingdom: Plantae

Order: Asparagles

Family: *Asphodelaceae* (*Liliaceae*)

Genus: *Aloe*

Species: *Aloe indica* Royle

Aloe is the dried latex of leaves from the plants *Aloe barbadensis* Mill., *Aloe indica* Royle, and *Aloe vulgaris* Lam. of *Liliaceae* family.^[9] The pulp of this plant contains polysaccharides, which are thought to have numerous positive applications. Numerous medical, cosmetic, and nutraceutical applications employ the transparent pulp, commonly referred to as the gel.^[30]

Chemical constituents: The aloe vera plant has a high-water content, up to 99.95%. The remaining 1.0% solid material has been shown to contain over 75 different potentially active chemicals, including water- and fat-soluble vitamins, minerals, enzymes, simple and complex polysaccharides, phenolic compounds, and organic acids.^[12] Aloe vera gel contains vitamins A (beta-carotene), C and E, which are antioxidants. Choline, folic acid, and vitamin B12 are also present. The essential oligo-elements found in aloe juice, manganese, and selenium are what constituents of the enzyme's glutathione peroxidase and superoxide dismutase, which are known to be potent antioxidants

and agents that slow down the aging process of the cells.

Uses:

Aloe vera stimulates fibroblasts to produce collagen and elastin fibers thereby making the skin more elastic and less wrinkled.

Aloe vera gel gloves improved skin integrity and decreased the appearance of fine wrinkles and erythema in the treatment of dry skin associated with occupational exposure indicating its moisturizing effects.^[9]

The strong antioxidant capacity of skin slows down aging. Significant antiaging benefits are achieved as a result of the skin becoming more elastic, moisturized, and smoother as well as being shielded from free radicals and their damaging effects.^[31]

Sandalwood Oil

Scientific name: *Santalum album tree*

Kingdom: Plantae

Order: Santalales

Family: *Santalaceae*

Genus: *Santalum*

Species: *Santalum album*

Sandalwood essential oil is extracted from the, *Santalum album tree*, which belongs to the Family *Santalaceae*.^[12] The several therapeutic and medical applications of sandalwood are believed to be attributed to its rich supply of phytochemicals, particularly sesquiterpenes. Sandalwood oil has been included into food, cosmetic, and pharmaceutical products for a number of uses throughout history. More people are starting to recognize its benefits for wrinkled skin.^[11,12]

Uses:

Sandalwood oil is mostly used for dry skin issues brought on by moisture loss and skin inflammations. It is calming, cooling and hydrating when applied topically.

It can be applied to treat acne and greasy skin as well as ease psoriasis and eczema.

Sandalwood's emollient qualities make it beneficial for skin care. When it comes to treating oily skin and acne, sandalwood oil is calming, cooling, and hydrating for dry skin issues brought on by dryness.^[32,33]

Sandalwood oil is also important in the perfume industry because of its strong, sweet scent.

Lavender Oil

Scientific name: *Lavandula angustifolia*

Kingdom: Plantae

Order: Lamiales

Family: *Lamiaceae*

Genus: *Lavandula*

Species: *Lavandula angustifolia Mill.*

It is made from *Lavandula angustifolia* flowers using steam distillation of the *Lamiaceae* family. It is well known that lavender oil has antimicrobial qualities.

Uses:

It prevents acne, cures and destroys bacteria.^[20]

Lavender oil has also been marketed as a treatment for psoriasis, dermatitis, and eczema, among other skin disorders.

Topical lavender oil administration has been proposed to block certain pathways involved in allergies.

Rose Oil

Scientific Name: *Rosa Damascena Mill.*

Kingdom: Plantae

Order: Rosales

Family: *Rosaceae*

Genus: *Rosa*

Species: *Rosa Centifolia L*

Rose oil is made from the petals of many Rosa species, particularly *Rosa damascena Mill. and Rosa centifolia L* of Family *Rosaceae*.

Chemical constituents: Citronellol (51.8%), geraniol (12.8%), and citronellyl acetate (5.2%) were the components of the oil.

Uses:

It lightens the complexion and evens out skin tone.

Lessens dark spots, acne scars, and imperfections.^[21]

Glycerin

Glycerin keeps the skin smooth and remarkably soft by assisting in the attraction and retention of moisture. Glycerin serves as a denaturant, an ingredient in fragrances, a humectant, a skin protectant, a skin conditioning agent, an oral care agent, a hair conditioner, and a medication for oral health.^[12]

III. MATERIALS AND METHODS

The serum was prepared which comprised extract of Citrus peel and Fenugreek seeds, were bought from a nearby store in 8th Mile, Nagpur. The serum was prepared by using Aloe vera gel, sandalwood oil,

lavender oil, rose oil, glycerin, vitamin E, sodium benzoate and required amount of water in a sufficient quantity to prepare 100 ml serum. The sandalwood oil, lavender oil and rose oil was purchased from Meesho.com. Aloe vera gel, glycerine and vitamin E capsules are purchased from nearby medical store.

Extraction Method

Method of Extraction of Citrus Peel

The orange fruits were cleaned with distilled water, then their edible parts were carefully separated after peeling. Citrus peels were air dried in a ventilated oven at 50°C for 1 hour. After they were dried, then processed in a mixer to a fine powder. 10gm of citrus peel powder was soaked in 120 ml distilled water at room temperature under constant stirring for uniform distribution. The mixture is allowed to stand at room temperature for 24 hours. The active components in the Citrus peel disperse into the water to create a Citrus peel extract. Then the extract was weighed and used for preparation of serum.^[26,29]

Method of Extraction of Fenugreek: The fenugreek seeds were cleansed with distilled water in order to

remove the unwanted particles. 10 gram of fenugreek seeds were dried at 50⁰ C. After they were dried, then processed in a mixer to a fine powder.

Distilled water would need to be the solvent utilized. In a sterile container, water was added to powdered fenugreek seeds. The mixture is stirred in order to make sure that the seeds are distributed uniformly throughout the water. The mixture is allowed to stand at room temperature for 72 hours. During this time, the active components in the fenugreek seeds disperse into the water to create a fenugreek extract.^[16, 22]

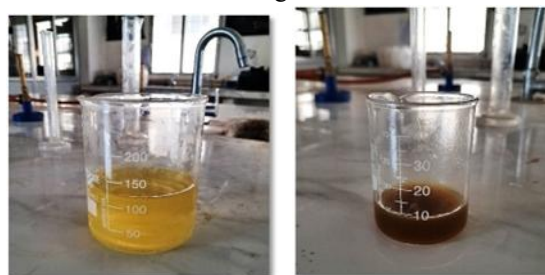


Fig 3: Fenugreek and Citrus peel Extract

IV. PHYTOCHEMICAL ANALYSIS

Table 1: Phytochemical analysis

Plant constituents	Citrus peel extract	Fenugreek seeds extract
Carbohydrates	--	--
Protein & amino acids	--	--
Flavonoids	++	++
Fats & oils	--	--
Alkaloids	--	++
Saponins	++	--
Tannins	++	++
Terpenoids	++	--
Anthraquinone	--	++
Glycoside	--	++

V. METHOD OF PREPARATION

The emulsion (o/w) was prepared according to the formula given below.

1. Preparation of water phase: The water phase is prepared by mixing Aloe vera gel, citrus peel extract, fenugreek extract, glycerin and water up to quantity sufficient. Add some amount of sodium benzoate as a preservative.

2. Preparation of oil phase: The oil phase consisting of sandalwood oil, lavender oil, rose oil and vitamin E, is mixed together for 10 minutes to obtain a homogenous solution.
3. Preparation of emulsion: Emulsion is prepared by adding oil phase into water phase drop wise under mechanical stirring at 1200 rpm to obtain o/w biphasic emulsion. The mixing of water phase and oil phase is crucial in order to create a stable

system over an extended period or longer product shelf life.

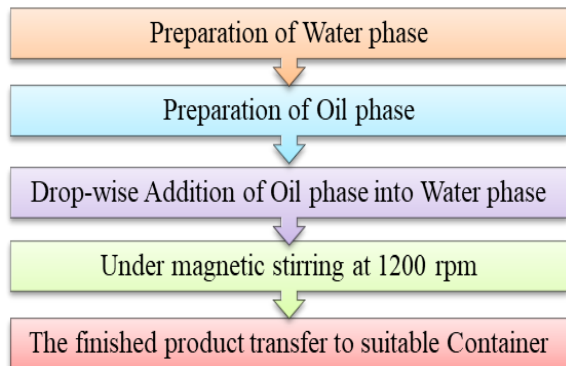


Fig 4: Method of preparation

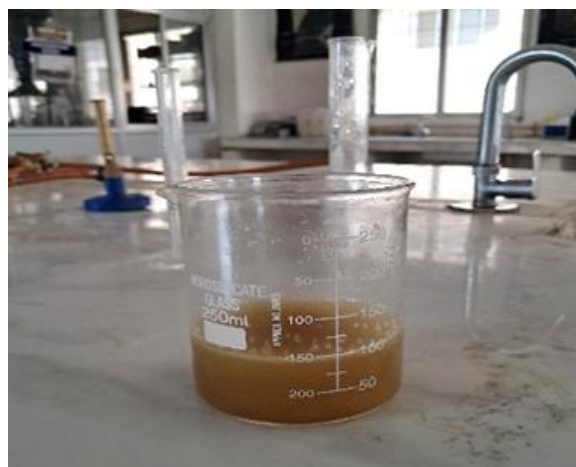


Fig 5: Face serum

FORMULA:

Table 2: Formulation table

Sr. No	Ingredients	Quantity (100ml)	Uses
1	Citrus peel Extract	25 ml	antioxidant, anti-microbial, anti-fungal
2	Fenugreek Extract	25 ml	anti-inflammatory, antibacterial
3	Aloe Vera Gel	8 ml	antioxidant, moisturizer
4	Glycerin	25 ml	Humectant, emollient
5	Sandalwood oil	1 ml	anti-inflammatory
6	Lavender oil	2 ml	antibacterial & prevents acne.
7	Rose oil	2 ml	moisturizer, anti-inflammatory
8	Vitamin E	7 ml	antioxidant
9	Sodium Benzoate	1 g	Antimicrobial preservative
10	Water	q.s	Vehicle

VI. EVALUATION PARAMETERS:

Physical Evaluation: The colour and appearance of the formulation is observed visually. The appearance of the serum was judged by its colour, odour, texture and grade.

Homogeneity: The homogeneity of the formulated face serum was judged by the touch and visual appearance.

pH determination: Serum formulations are designed for topically applied use. Thus, their pH should be comparable to skin. The pH of human skin typically ranges from 4.1 to 6.7 and 5.5 is considered to be average pH of the skin. As a result, the pH of formulations recommended for skin application should be quite near to this range.

Skin Irritation Test: Skin irritation is a local inflammatory response of normal skin that occurs

upon exposure to a chemical or substance that has irritant properties. Skin Irritation Test method can be used to predict the skin irritation potential of formulated product.

Determination of Spread ability: When applying serum to skin or an affected area, spread ability refers to the size of the area to which the serum spreads easily. The serum's spreading value has an impact on its bioavailability as well.

Stability studies: A proper stability analysis must be performed on a product formulation in order to assess its physical and chemical stability and, consequently, its safety. The ICH guidelines are followed in the conduct of the stability investigations. For a one month, a short-term accelerated stability evaluation of the serum was conducted. The samples were kept under various storage settings, including 5°C, 25°C & 40°C.

Determination of Viscosity: The viscosity is the most important parameter in the evaluation of cosmetic product. Viscosity of formulated face serum was determined by Brookfield viscometer. Spindle No. 62 of a Brookfield viscometer LV-DVE was used to measure the viscosity of the serum at 05 rpm. The viscosity was measured in cps.

Microbial growth: The formulated serum was inoculated on the varies agar plates by Streak plate method and Direct inoculation method which is incubated in incubator at 37°C for 24 hrs. There were no signs of microbial growth after 24 hrs. of incubation at 37°C. The formulation was free from microbes as they have not produced any microbial growth when they got inoculated in the varies agar medium.

VII. RESULTS AND DISCUSSION

Table 3: Physical evaluation

Sr. no.	Parameters	Results
1.	Color	Faint green
2.	Odour	Pleasant
3.	Texture	Smooth
4.	Spreadability	Spreadable
5.	Homogeneity	Uniform distribution, Homogenous

VIII. CONCLUSION

The goal of the research was to create and assess a serum that would moisturize, brighten the face, and prevent wrinkles and dark spots using extracts of two different herbs (citrus peel and fenugreek). Numerous internal and external variables might occasionally have an impact on the skin. One of them is the aging process of the skin, which results in wrinkle creation. Wrinkles and facial skin aging are unfavorable effects of UV radiation and photodamage. The deep formula of the serum has a high concentration of active ingredients, a non-greasy finish, quick absorption, and the ability to penetrate deep into the skin's layers. Your face might appear plumper, have less visible pores, and be smoother and firmer with the help of a serum. Fenugreek seeds and citrus peel both have a special anti-aging compound that keeps skin looking young and healthy. These products help with a number of skin disorders, including dark spots, wrinkles, and infections. They also improve blood flow to the skin, boost metabolism, and nourish the skin. Citrus peels contain limonene, which provides UV protection and works well as a natural sunscreen. When combined with essential oils, it also works well as a skin-smoothing moisturizer and sunblock lotion. The antibacterial and antifungal properties of fenugreek seed extract may aid in the treatment of minor skin infections as well as the prevention of acne. Aloe Vera,

glycerin, sandalwood oil, lavender oil, and rose oil are also ingredients in this anti-aging serum. Aloe Vera works wonders for healing eczema, acne, pimples, and radiation dermatitis, among other skin conditions. Aloe Vera has a variety of vitamins and minerals that have strong moisturizing and anti-aging effects. The main conditions for which sandalwood oil is utilized are dry skin caused by inflammations and moisture loss. When administered topically, it has relaxing, cooling, and moisturizing effects. There are antibacterial properties to lavender oil. It treats, eliminates, and prevents acne. Rose oil lightens the complexion and evens out skin tone. Additionally, it lessens scars from acne and dark spots.

In light of this, it can be concluded that the serum made of fenugreek and citrus peel extracts has the potential to treat bacterial infections, inflammations, and signs of aging on the face. It also hydrates the skin without harming it, leaving it feeling supple, smooth, and soft.

IX. CONFLICT OF INTEREST

No conflict of interest between any of the authors.

REFERENCE

- [1] Joshi LS, Pawar HA. Herbal cosmetics and cosmeceuticals: An overview. Nat Prod Chem Res. 2015 Feb 16;3(2):170.
- [2] Kamble R, Gamare D, Yeole P, Pathan MA, Indulkar A, Kale MK, Juvatkar PV.

- FORMULATION AND EVALUATION OF HERBAL BASED ANTI-AGING FACE SERUM. Foldscope & its applications. 2022:127.
- [3] Sumit K, Vivek S, Sujata S, Ashish B. Herbal cosmetics: used for skin and hair. *Inven. J.* 2012 Oct 10; 2012:1-7.
- [4] Thakre AD. Formulation and development of de pigment serum incorporating fruits extract. *International Journal of Innovative Science and Research Technology.* 2017 Dec;2(12):330-82.
- [5] Sonti S, Makino ET, Garruto JA, Gruber JV, Rao S, Mehta RC. Efficacy of a novel treatment serum in the improvement of photodamaged skin. *International journal of cosmetic science.* 2013 Apr;35(2):156-62.
- [6] Khade SS, Ugale SS, Udupurkar PP. REVIEW ON HERBAL USED FOR GLOWING SKIN.
- [7] Patil S, Deshmukh A, Patil S V, Patil P, Patil R, Patil P, et al. Formulation and Evaluation of Face Serum. *International Journal of Innovative Science and Research Technology.* 2023 May;9(12)
- [8] Ojha S, Chadha H, Aggarwal B. Formulation and Evaluation Of Face Serum Containing Bee. *World J Pharm Res.* 2019 Feb; 8:1100-5.
- [9] Patil B, Patil B. Formulation and Evaluation of Herbal Antiacne Face Serum. *Int J Res Appl Sci Eng Technol.* 2023 Jun 30;11(6):1231–7.
- [10] Thorat PS, Bhadane HB, Wagh SS, Gaikwad MS, Chhajed SS. GENERAL REVIEW ON FACE SERUM.
- [11] Vishnukant Gite DrPrachiPUdupurkar A. FORMULATION AND DEVELOPMENT OF FACE SERUM [Internet]. Vol. 11. 2023. Available from: www.ijcrt.org
- [12] Chande K, Dessai S, Bhutekar S, Choudhary T, Choudhary K, Bairagi S, et al. Issue 2 www.jetir.org (ISSN-2349-5162) [Internet]. Vol. 10, JETIR2302557 *Journal of Emerging Technologies and Innovative Research. JETIR;* 2023. Available from: www.jetir.orgf494
- [13] Ademoh NA, Akaba TA. Development of manually operated orange peeling device for domestic use. *Development.* 2015;5(5).
- [14] Reddy TU, Lakshmi SM, Rajyalakshmi KG, Sindhu G, Kumar AA, Harshavardhan P. PREPARATION OF POLY HERBAL ANTI-OXIDANT FACE PEEL OFF.
- [15] Waqas MK, Akhtar N, Ahmad M, Murtaza G, Khan HM, Iqbal M, Rasul A, Bhatti NS. Formulation and characterization of a cream containing extract of fenugreek seeds. *Acta Pol Pharm.* 2010 Mar 1;67(2):173-8.
- [16] Yeskar H, Makde P, Tiware SA, Shirbhate TM, Thakre S V., Darne CS, et al. Formulation and evaluation of a face serum containing fenugreek extract. *Int J Basic Clin Pharmacol.* 2023 Oct 25;12(6):799–804
- [17] Shirish Shejul T, Kiran Kudale P. Facial Serum: Its Formulation, Usage, Special Ingredients, Various Types and Benefits. *International Journal of Pharmaceutical Research and Applications* [Internet]. 8:680. Available from: www.ijprajournal.com
- [18] Miss. Purva S Rajdev, Prof. Gaikwad S. D, Miss. Akanksha A Somvanshi, Miss. Shubhangi S Gunjal. Formulation and Evaluation of Face Serum. *International Journal of Advanced Research in Science, Communication and Technology.* 2022 Jun 16;255–9.
- [19] Hosseini SM, Hoseinifar SH, Mazandarani M, Paknejad H, Van Doan H, El-Haroun ER. The potential benefits of orange peels derived pectin on serum and skin mucus immune parameters, antioxidant defence and growth performance in common carp (*Cyprinus carpio*). *Fish & shellfish immunology.* 2020 Aug 1; 103:17-22.
- [20] Cavanagh HM, Wilkinson JM. Biological activities of lavender essential oil. *Phytotherapy research.* 2002 Jun;16(4):301-8.
- [21] Hongratanaworakit T. Relaxing effect of rose oil on humans. *Natural product communications.* 2009 Feb;4(2):1934578X0900400226.
- [22] Gade J, More S, Bhalerao N. Formulation and characterization of herbal cream containing Fenugreek seed extracts. *Int J Sci Res.* 2015 Oct; 5:1-4.
- [23] Akhtar N, Waqas MK, Ahmed M, Ali A, Saeed T, Murtaza G, Rasool A, Aamir M, Khan S, Bhatti N. Effect of cream formulation of fenugreek seed extract on some mechanical parameters of human skin. *Tropical Journal of Pharmaceutical Research.* 2010;9(4).
- [24] Akbari S, Abdurahman NH, Yunus RM, Alara OR, Abayomi OO. Extraction, characterization and antioxidant activity of fenugreek (*Trigonella*

- Foenum Graecum) seed oil. *Materials Science for Energy Technologies*. 2019 Aug 1;2(2):349-55.
- [25] Budiasih S, Masyitah I, Jiyauddin K, Kaleemullah M, Samer AD, Fadli AM, Yusuf E. Formulation and characterization of cosmetic serum containing argan oil as moisturizing agent. In *Proceedings of the BROMO Conference*, Surabaya, Indonesia 2018 Jul (pp. 11-12).
- [26] Hong KB, Hong YH, Jung EY, Jo K, Suh HJ. Changes in the diversity of human skin microbiota to cosmetic serum containing prebiotics: Results from a randomized controlled trial. *Journal of Personalized Medicine*. 2020 Aug 17;10(3):91.
- [27] Sasidharan S, Joseph P. Junise. Formulation and evaluation of fairness serum using polyherbal extracts. *Int. J. Pharm.* 2014;4(3):105-12.
- [28] Kohakade MS, Karodi R. Formulation and Evaluation of Face Serum. *Latin American Journal of Pharmacy*. 2023 Jun 13;42(3):205-10.
- [29] Aggrihotri S. Formulation and development of botanicals-based herbal serum. *Pharmaspire*. 2021 Oct; 13:211-7.
- [30] Radha MH, Laxmipriya NP. Evaluation of biological properties and clinical effectiveness of Aloe vera: áAásystematic review. *Journal of traditional and complementary medicine*. 2015 Jan 1;5(1):21-6.
- [31] Malik I, Zarnigar HN. Aloe vera-A Review of its clinical effectiveness. *International research journal of pharmacy*. 2013;4(8):75-9.
- [32] Francois-Newton V, Brown A, Andres P, Mandary MB, Weyers C, Latouche-Veerapen M, Hettiarachchi D. Antioxidant and anti-aging potential of Indian sandalwood oil against environmental stressors in vitro and ex vivo. *Cosmetics*. 2021 Jun 19;8(2):53.
- [33] Dulal SR, Taher MA, Sheikh H. Sandalwood Oil Can Be a Miraculous Tackle on Skin Aging, Skin Appearance and Wrinkle Skin-A Review. *World J Pharm Res*. 2019; 5:51.