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## FORMULATION AND DEVELOPMENT OF FACE SERUM

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### ABSTRACT :

Facial wrinkles and skin aging are undesirable outcome of photo damage and ultraviolet (UV) rays. Currently no effective strategies are available to delay skin aging process. Aloe Vera, glycerin and honeybee venom face serum is a highly concentrated cosmetic product. When using aloe Vera we get not only a quick cosmetic effects but also psychological satisfactions, serum has a property of rapid absorption and ability to penetrate into deeper layer of the skin.

Aloe Vera gel is commonly used to treat different skin disease, sun burn, minor cuts, insect bites, and used as wound healing, anti-inflammatory, anti-bacterial and anti-fungal effect. Bee venom is a defensive toxin produced by bees and is reported to increase blood flow and collagen production.

The face serum was evaluated for its physiochemical parameters, pH, globule size, consistency. The stability study results showed that there was no change in visual appearance, homogeneity and globule size

### INTRODUCTION:

Study of human skin represents an important area of research and development in dermatology, toxicology, pharmacology, and cosmetology, in order to assess the effects of exogenous agents, their interaction, their absorption mechanism, and/or their toxicity towards the different cutaneous structures. The importance of beautification to the mankind has been known since the prehistoric time and the desire to look beautiful and healthy has been developing in the society.

Cosmetic is a Greek word which means to 'adorn' (addition of something decorative to a person or a thing). Cosmetology is the study and application of beauty treatment. It's an art or science of beautifying and improving the skin, nails and hair and the study of cosmetics and their application.

A skin care formulation must be able to deliver the powerful agent into the skin to fulfil the intended objective. Face serum is the answer to deliver the precious active ingredient into the skin thus eliminating the use of hazardous chemicals in giving instant results.

Serum is a concentrated product which is widely used in Cosmetology. The name comes from itself in professional cosmetology. The cosmetic serum is as concentrated in water or oil as any other cream. Serums are defined as concentrated product that contains ten times more organic matter than cream. Therefore, deals with the cosmetic problem quickly and effectively.

Face serum is a highly concentrated emulsion which is available in water based and oil based. Serums or defined a concentrate, contain approximately ten times more of biologically active substances than creams, therefore allows better skin problems treatment. Incorporating a few drops of face serum with daily skin care routine will deliver noticeable results within a month or less. This is because face serums are made of very small molecules that help it to penetrate deep into the skin quickly.

Serum is packed with a bunch of beneficiary active components and nutrients such as antioxidants, ceramides, amino acids and others. This explains why face serum always being the costliest item in a skin care set. Weather it is moisturizer, anti-wrinkle or anti-aging product or skin serum, all these products should contain antioxidants, cell-communicating ingredients and skin-identical ingredients.

All skin type needs these ingredients to be as healthy as possible. Gel and liquids preparations are best for oily and combination skin, serums and light lotions are best for normal to dry skin, more emollient lotions and moisturizing creams are best for dry to very dry skin. Texture is all about skin type- but the brilliant ingredients for healthy skin the same for everyone, regardless of product, texture, or personal preference.

Skin is a protective and largest organ of body which is struggles to heal and repair itself 24 hours, but sometimes skin can develop dry patches for many reasons like UV rays, pollutants, makeup left on overnight can cause irritation or allergic reactions. The facial serum includes several ingredients associated with improvement in the appearance of fine lines and wrinkles and increased barrier function including a neuro peptide.

The facial serum also contains AP-8, a neuropeptide associated with muscle contraction, beta-glucan, a cell turnover and regenerative extract that is believed to support healthy immune surveillance ; sodium hyaluronate, a humectant and nascent to extracellular matrix and vitamin C&E formulations and green tea, both of which are antioxidants including polyphenols.

The biggest difference between a serum and a cream or lotion is what the formulation doesn't include. They also contain fewer lubricating and thickening agents, like nut or seed oils. Most serums are water-based, eliminating oils altogether.

## **HISTORY OF FACIAL SERUMS :**

As defined in the dictionary – a serum is the clear, yellowish fluid obtained upon separating whole blood into its solid and liquid components after it has been allowed to clot, so it is not surprising that the precursors of modern-day serums were based on horse blood, egg albumin, and bovine placenta.

Packaging these products in sterile ampoules preserved with oxyquinoline (and later, the invention of parabens) made them available commercially. This is a practice that stayed with us since the early days of short product shelf life, which meant small batches had to be made and used up quickly before the product spoiled. Exercise, cleanliness, and skincare were all held in high regard during the 1800s. Zinc oxide was used to lighten skin, but often caused allergic reactions.

### **Objective of Research**

The main objective of this study is to determine the optimum and stable face serum. The specific objectives of this study are:

- To optimize the thickeners and emulsifiers of face serum formulation with regard to the viscosity and pH value.
- To determine the most stable face serum formulation in term of its physicochemical stability study and microbiological study.
- To characterise the face serum formulation in term of its flow behavior and sensory profile.

### **Types of face serum :**

#### **1. The oil serum**

The oil serum is the simplest to make of all the face serums. It often starts with a base of just premium, fast-absorbing carrier oils, also referred to as "dry" oils. In addition to having moisturising and barrier-repairing characteristics, the premium oils used in the serum also include polyphenols, essential fatty acids, and other substances that may be broken down by the skin.



Figure 1: Oil serum

## 2.The gel serum

Gel serums provide the skin a "tightening" sensation, giving your consumer the impression that their skin is momentarily lifted or tightened in particular regions of the face. The gel serum provides you the chance to include some fantastic water-based (hydrophilic) plant extracts because this formulation is water-based,



figure 2 : Gel serum

## 3.The Water based serum

Water-based serums are comparable to gel serums, although they may contain none or very little gums and thickeners. To administer high-performance hydrophilic plant extracts that are trapped against the skin beneath a cream or lotion, you would utilise a water-based face serum. Layering an anti-ageing face mist under an emulsion and then under an oil is the ideal technique to promote higher penetration of water-based compounds into the skin, delivering their high performance elements slightly deeper into the layers of the skin. The oils will form an occlusive barrier that will promote higher component penetration.



Figure 3 : Water based serum

## 4.The emulsion serum

An emulsion-based face serum is a moisturiser that strengthens the skin's barrier function while also delivering high performance components to the skin. Two "immiscible" phases-phases like oil and water that don't want to mix-are combined in an emulsion. An emulsifier is used to bind water and oil together and retain them in a stable state.

The best chance of delivering high performance actives deeply into the tissues of the skin is through an emulsion. Given the skin's barrier function, it is highly difficult for any cosmetic component to penetrate the

dermis, yet an oil and water mixture is best suited to accomplish this remarkable feat. The skin's barrier function will be strengthened by the emulsion's moisturising characteristics.



Figure 4: Emulsion serum

## 5. The pressed balm serum

A balm serum has a conventional balm basis of butters, waxes, and oils but also includes active substances that are oil-soluble (lipophilic) and may help the skin. The butters and waxes form an occlusive barrier on the skin that hydrates and nourishes it while allowing the pressed serum's active components to do their job. In a balm serum, dozens of intriguing unique butters and waxes can be combined with thousands of exquisite plant oils.



Figure 5: Pressed balm serum

### Ideal Qualities of Face Serum

#### 1. Soothes irritated skin:

It is well known that aloe vera possesses antiviral and cell-regenerating capabilities. The advantages of aloe gel are comparable to how applying it to a sunburn feels.

#### 2. Deep hydration:

possess a special capacity to raise and decrease skin moisture.

#### 3. Fight Acne and fades blemishes:

Bael fruit stops the bacterial overgrowth that is the primary cause of acne and pimples.

#### 4. Remove dark circle and puffiness:

Vitamin E and antioxidants in abundance aid with eyelid discolouration, and the cooling impact reduces puffiness.

It makes under-eye circles look less prominent.

It removes dead skin cells, which encourages the synthesis of collagen.

#### 5. It contains antioxidant qualities that encourage healthy-looking skin

### Advantages

- Improves skin texture.
- Minimizes the skin pores.
- Hydrates and nourishes the skin.
- Improves skin elasticity.

## Disadvantages

- The liquid or gel-like texture of a serum can be a poor match for people with chronic skin conditions like eczema or rosacea, which weaken the skin barrier.
- For these people, serums may penetrate too quickly, causing irritation

## FORMULATION OF FACIAL SERUMS

In formulating a face serum, the physical properties and stability are the main characteristics in determining its quality. A face serum formulation is basically an emulsion consists of two immiscible liquids. In order to prevent emulsion instabilities, thickener and emulsifier are introduced to the system.

Emulsifier will balance the system by minimizing the interfacial tension between the two immiscible liquids and at the same time stabilizes the dispersion phase from coalescence. Contributing to the system, thickener also plays an important role as rheology modifier and provides flexibility to the flow characteristic of the emulsion.

A chemical property which is considered important in formulating is pH value. If the pH value of the skin is changed, the skin's natural microbiology and function will be interrupted. This in turn causes numerous skin problems including acne, skin flakiness, excessive sebum secretion and other serious conditions.

The natural skin micro flora is intact on the skin with pH value ranging from 4 to 4.5, while pH value ranging from 8 to 9 eliminates the skin natural micro flora. Formulating a face serum with suitable pH range can help in improving the skin barrier function.

Formulating a face serum or any other formulation can be challenging. This is because the traditional One Factor at a Time' (OFAT) method was highly time consuming and may result in unnecessary experiment that consume costs. OFAT was done by changing one factor at a time while keeping the other factor as constant. It requires large number of tests. On the contrary, optimization using Design Expert software could save time, costs and labor. D-optimal design is suitable to be used in formulating cosmetic formulations thus it is applied in the formulation studies widely.

In formulating a face serum, 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. Naturally, the oil and water systems are thermodynamically unstable. Incorporation of emulsifiers into the system can minimize the interfacial difference between the water and oil phases thus mix the system

### Method Of Preparation :

The emulsion (o / w) was prepared according to the formula given below. The oily component consisting of Olive oil, sandalwood oil, tween 20 and coconut oil is mixed together for 10 minutes to obtain a uniform solution. At the same time the water phase was prepared by mixing aloe vera gel, glycerin, and a small amount of distilled water uniformly. The oil phase is added to the liquid phase by drop wise under mechanical vibration at 2500 rpm to obtain oil in water based on biphasic emulsion.



## Prepared Face Serum

A proper method has to be carried out while formulating the herbal face serum.

1. Selection of active
2. collection of active ingredient
3. Extraction method of Aegle marmelos, aloe vera.
4. formulation of placebo herbal face serum
5. formulation of herbal face serum
6. Evaluation of herbal face serum
7. Result

## Active Ingredient Used In Herbal Face Serum

### 1) Aloe Vera

Kingdom : Plantae

Order : Asparagales

Family : Asphodelaceae

Subfamily : Asphodeloideae

Genus : Aloe

Species : Aloe vera

Botanical name : Aloe barbadensis miller • English : India aloe

Aloe Vera has been used to treat wounds and infections. Aloe Vera is now recognised as a crucial ingredient in makeup thanks to advancements in beauty. It has nearly 20 amino acids, enough amounts of nutrients like calcium, magnesium, and sodium, enzymes, vitamins, and its polysaccharides, nitrogen, and other ingredients make it a wonder plant for attractiveness. Here is a short explanation of some of the most significant uses of aloe Vera for cosmetic purposes.



Figure: aloe vera

## 2) Sandalwood Oil

With its anti-inflammatory and skin-clearing properties, sandalwood essential oil can help clear acne and pimples and soothe skin.



Figure : sandalwood oil

## 3) Olive oil

Help to decrease our acne by killing off the bacteria that causes the acne. Olive oil is also known to moisturize and hydrate your skin,



Figure : Olive oil

## 4) Coconut oil

It contains nourishing fatty acids and linoleic acid which help retain the moisture in the skin and help protect and hydrate your skin.



Figure : Coconut oil

) **Rose water**

Rose water is said to be a natural skin toner due to this amazing pH- balancing properties.



Figure : rose water

### Material and collection

Sr.no.	Ingrident	Collection	Catergory
1	Aloe vera	Kishori college of pharmacy, Beed,	Anti-aging
2	Olive oil	Kishori college of pharmacy, Beed,	Moisturizer
3	Scandalwood oil	Kishori college of pharmacy, Beed,	Essencial oil
4	Glycerin	Kishori college of pharmacy, Beed,	Toner (skin hydrate)
5	Coconut oil	Local market	Moisturizer

**Table.1. composition of face serum**

Ingredients	Standard Formula (100 ml)	Working Formula (30 ml )
Aloe vera gel	50%	10%
Olive oil	9%	1.8ml
Sandalwood oil	0.1%	0.02ml
Glycerin	25%	5ml
Coconut oil	2%	0.4ml
De-mineralized Water	Qs to 100 ml	Qs to 30ml



## EVALUATION OF FACE SERUM

### Physical Evaluation :

The Colour and appearance of the formulation was observed visually. The formulation procedure uniform distribution of extracts. This test was confirmed by visual appearance and by touch.

### pH Value :

A pH meter was calibrated using a standard buffer solution. Nearly 1 ml of the face serum was properly weighed and dissolve in 50 ml of distilled water and finally its pH was calculated.

The skin has an acidic range and the pH of the skin serum should be in the range of 4.1-6.7.

### Determination of Spreadability :

2 gm of serum sample was placed on a surface. A slide was attached to a pan to which 20 gm weight was added. The time (seconds) required to separate the upper slide from surface was taken as a measure of Spreadability.

### Microbial Examination of the Product :

In this method, the mixed culture is diluted directly in tubes of liquid agar medium. The medium is maintained in a liquid state at a temperature of 45°C to allow thorough distribution of the inoculum. The inoculated agar medium is transferred into petri plates, allowed to solidify and incubated. In the series dilution technique, the original inoculum may be diluted by using sterile water or saline solution so that the concentration of the microbes gradually become less. Mix 1 ml dilute in 20 ml of liquid nutrient agar medium at 45°C. Shake the liquid agar nutrient agar medium & pour in a sterile petri plate, solidify and incubate it.

### Stability Studies :

Formulation and development of a pharmaceutical product is not complete without proper stability analysis carried out on it to determine physical and chemical stability and thus safety of the product.

The stability studies is carried out as per ICH guidelines. Short term accelerated stability study was carried out for the period of few months for the prepared formulation.

The samples were stored at different storage conditions of temperatures such as 3-5oC, 25oC RH=60% and 40oC±2% RH=75%.

### Cyclical Temperature :

Test These test is not carried out at any fixed temperature and humidity. In this test, temperature was changed cyclically every day. At room temperature and frizzing temperature to stimulates the changes in temperature.

Physical evaluation :

Table 2 : Physical evaluation

Colour	White translucent
Odour	Characteristics odour
Teste	Tasteless
Texure	Smooth homogenous
Homogeneity	Good
pH	5
Washability	Washable

#### **pH Value:**

The pH of formulation was found to be 6.4. As the skin having an acidic pH around 4.1-6.7, this range of formulation is suitable for skin.

#### **Determination of Spreadability :**

Spreadability of liquid formulation that is ability of the face serum to spread over the skin and play important role in administration of standard dose of medicament formulation on skin.

Spreadability of face serum 5 to 6 cm was found.

#### **Determination of Viscosity :**

Viscosity is a critical parameter for topical formulation. Topical solutions with low viscosity have faster clearance than viscous solutions. In addition, highly viscous solutions can have an undesirable effect on the skin. Viscosity of the Face Serum was found to be 13759 Pa. s

#### **Microbial Examination of the Product :**

The formulation was free from microbes as they do not show zone of inhibition, when they got inoculated in the agar.

### Stability Studies :

The formulation was undertaken stability studies for physical and chemical changes. No considerable variations in properties of the formulation were observed.

Table 3: Stability Studies

Visual Apperance	White translucent
Phase speration	Null
Homogenetic	Good

### Cyclic Temperature Test :

Table 3 : Cyclic Temperature Test:

Sr.no	Parameter	Sutability
1	Freezer temperature	Unstable
2	Room temperatre	Stable

### Benefits of using a face serum

From hydrating the skin in order to reduce the appearance of fine lines and wrinkles, to minimizing the appearance of dark spots and refining skin's texture, serum truly does it all. A good serum that contains antioxidants will protect the skin from environmental stressors and is worth the cost and effort alone. Serum can smooth the skin, firm the skin, and even exfoliate. It really just depends on what you're looking for your serum to accomplish.

Religious usage of serum boosts collagen production and assists in improving the texture drastically and makes the skin firm, smooth and fresh. Especially vitamin C content plays a vital role in the rejuvenation of the skin. Dark spots, scars, and pimple marks can be easily lightened with serums that have high plant-based concentrates.

Also, it can prevent you from harmful inorganic treatments like chemical peels, which in turn makes your skin susceptible to sun damage.

### Application Of a Facial Serum

Face serum is a lightweight water-based skincare essential that targets different skin concerns.

There are various kinds of serums that are made with break through or game-changing ingredients like niacinamide, hyaluronic acid, vitamin C, AHAs and BHAs. If you truly want to reap the benefits of a face serum, you must know how to choose one that matches your skin type and skin concern. With such a plethora

of serums available on the market, and with so many options to pick from and each claiming that they solve a skincare concern,

- Which serum do we pick?
- How many do we really need in our routine?
- When and how should we use them?
- When should I apply a serum? Is it when the skin is damp? If so, why?

It is best to cleanse face and gently pat semi dry. While the skin is damp, it is best to then apply serums which generally contain a higher concentration of actives. This is when the skin is more permeable, and penetration is improved.

Once the serum has been applied with upward sweeping motions to the face, from the décolletage and neck and has fully absorbed, eye cream, moisturizer, and sunscreen can be applied. Unlike other skincare products like thick face creams and moisturizers that you massage into your skin in an upward direction, serums are meant to be applied to your face in small tapping motions with your fingertips or your palms.

Do not rub your skin excessively, let the serum absorb into your skin on its own

#### **CONCLUSION :**

The aim of this report was to study about what exactly are facial serums and their history along with their overall importance. The study includes its proper selection and correct sequence of application. With tremendous amount of serums available in the market for each and every skin type and skin problem these days, it's essential for one to know what they are looking for in a serum precisely.

When a righteous formulation is selected by scrutinizing every major skin issue, it is safe to say that significant improvements can be seen, leading to good results. Skin health is a crucial element of the altogether health of the body and having a proper skin care routine with an accurate serum for you, can sustain the ageing skin and ward off the ongoing damage. It eliminates fine lines, wrinkles, dark spots, and further blemishes if paired with appropriate moisturizer and sunscreen.

Specific ingredients deal with a certain skin concern, as a result a combination of all the finest ingredients could show miraculous benefits. The report also shows numerous skin care brands for serums available in the market and a brief description of each product. This concludes that a facial serum is a boon for the cosmetic community and it's addition is crucial in the skin care regime.

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