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Formulation, Evaluation, In vitro Antioxidant Assessment of a Facial Serum for Antiaging Properties

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ABSTRACT

UV radiation and photodamage can cause unwanted skin ageing and wrinkles on the face. There are currently no practical methods for delaying the ageing process of the skin. A highly concentrated cosmetic product is a face serum containing aloe Vera, glycerine, and honeybee venom. Aloe Vera serum has the capacity to enter deeper layers of the skin and absorb quickly, providing both immediate cosmetic benefits and psychological peace of mind. Aloe Vera gel is frequently used as a wound healing, anti-inflammatory, anti-bacterial, and anti-fungal treatment for various skin diseases, sunburns, small cuts, and bug bites. Bee venom is a protective poison that the bees create; it has been shown to improve collagen synthesis and blood flow. The globule size, consistency, pH, and physiochemical characteristics of the face serum were assessed. The stability study's findings demonstrated that globule size, homogeneity, and visual appearance were unchanged.

INTRODUCTION

The examination of human skin is a crucial field for research and development in the fields of dermatology, toxicology, pharmacology, and cosmetology. This is because it allows for the evaluation of exogenous agents' effects, interactions, absorption mechanisms, and/or toxicity towards various cutaneous structures. Humanity has recognised the value of aesthetics since the prehistoric era, and the desire to appear well and attractive has grown across society.

The Greek term "cosmetic" means "to adorn," as in adding something ornamental to a person or something. The study and practice of cosmetic treatments is known as cosmetology. It is the art or science of studying cosmetics and how to apply them, as well as the beautifying and improving of the skin, nails, and hair. To get the desired result, a skin care formulation needs to be able to penetrate the skin and release the potent ingredient. Face serum is the solution for delivering the valuable active ingredient into the skin, doing away with the need for dangerous chemicals to produce immediate results. In the field of cosmetics, serum is a concentrated product that is frequently utilised. The term "professional cosmetology" originates from the field itself. Like any other cream, the cosmetic serum has the same concentration of water or oil.

A concentrated solution with ten times more organic matter than cream is called a serum. Consequently, takes care of the aesthetic issue swiftly and efficiently. Face serum is an oil-and water-based emulsion that is extremely concentrated. Because serums, also known as concentrates, have roughly 10 times the amount of biologically active ingredients than creams do, they can cure skin issues more effectively. Within a month or less, adding a few drops of face serum to your regular skin care routine will show results. This is because face serums are composed of minuscule molecules that facilitate rapid penetration of the product deep into the skin. For optimal health, these nutrients are required for all skin types. For oily and 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 moisturising creams work best. Texture is largely determined by skin type, however no matter what product, texture, or individual choice, everyone may benefit from the same amazing nutrients for healthy skin. Although the skin is the body's largest and most protective organ, it can develop dry patches for a variety of causes, including exposure to UV rays, pollution, and makeup left on overnight that may irritate the skin or trigger allergic reactions. The facial serum contains a number of components, including a neuropeptide that are linked to enhanced barrier function and a reduction in the appearance of fine lines and wrinkles. Additionally, the facial serum contains green tea, which is an antioxidant that contains polyphenols, sodium hyaluronate, a humectant that is close to extracellular matrix, beta-glucan, a cell turnover and regenerative extract that is thought to support healthy immune surveillance, and AP-8, a neuropeptide linked to muscle contraction. The absence of certain ingredients in the formulation is the primary distinction between a serum and a cream or lotion. Additionally, they have less thickening and lubricating ingredients than nut or seed oils. Since most serums are water-based, oils are completely excluded.

Ideal Properties of Face Serum

1. Soothes itchy skin: Aloe vera is well known for its antiviral and cell-regenerative properties. The benefits of aloe gel are similar to how applying it to a sunburn feels.
2. Deep hydration: possess a unique ability to increase and reduce skin moisture [11].
3. Reduces acne and blemishes: Bael fruit inhibits bacterial growth, which is the primary cause of acne and pimples.
4. Reduce dark circles and puffiness: Vitamin E and antioxidants help with eyelid discolouration, while cooling effects reduce puffiness [12].
5. It makes under-eye circles appear less apparent.
6. It eliminates dead skin cells and promotes collagen formation.
7. It has antioxidant properties that promote healthy-looking skin [13].

- **Benefits**

Enhances Skin Elasticity,
Minimises Pores,
Hydrates And Nourishes The Skin,
And Improves Skin Texture.

- **Negative aspects**

People with chronic skin diseases like rosacea or eczema, which damage the skin barrier, may find it difficult to use serums because of their liquid or gel-like texture. Serums may penetrate too quickly, irritating these individuals.

THE FACIAL SERUM HISTORY

The dictionary defines a serum as the clear, yellowish fluid that remains after whole blood has been separated into its solid and liquid components and allowed to clot. Therefore, it is not surprising that the ancestors of modern serums were derived from horse blood, egg albumin, and bovine placenta. These products were commercially available when they were packaged in sterile ampoules maintained with oxyquinoline (and later, parabens). This has been a common practice since the early days of limited product shelf life, when small amounts needed to be produced and consumed right away to prevent spoilage. In the 1800s, skincare, cleanliness, and exercise were all highly valued. To lighten, zinc oxide was utilised. skin, but frequently resulted with allergic responses.

TYPE OF FACE SERUM

The oil serum

The oil serum is the easiest to manufacture of all the face serums. Premium, fast-absorbing carrier oils, sometimes known as "dry" oils, are commonly used as the base. The serum's premium oils not only moisturise and restore the skin barrier, but also include polyphenols, vital fatty acids, and other skin-friendly compounds.

The gel-based serum

Gel serums give the skin a "tightening" feeling that makes your customer's skin appear temporarily lifted or tightened in specific facial areas. Because this formulation is water-based, the gel serum gives you the opportunity to incorporate some amazing water-based (hydrophilic) plant extracts.

The water-based serum

Water-based serums are similar to gel serums, but may contain minimal gums and thickeners. To apply hydrophilic plant extracts to the skin beneath creams or lotions, use a water-based face serum. Layering an anti-aging face mist with an emulsion and oil enhances the penetration of water-based compounds into the skin, delivering high-performance ingredients deeper into the layers. The oils will produce an occlusive barrier, promoting increased component penetration.

The emulsion serum

An emulsion-based face serum is a moisturiser that improves skin barrier function and provides high-performance ingredients. An emulsion is formed by combining two "immiscible" phases, such as oil and water, which do not mix. An emulsifier binds water and oil, keeping them stable. Emulsions are the most effective way to penetrate the skin's tissues and deliver high performance actives. The skin's barrier function makes it difficult for cosmetics to permeate the dermis. However, an oil and water mixture is the most effective solution. The moisturising properties of the emulsion will help to strengthen the skin's barrier function.

The pressed balm serum

Balm serums combine traditional balm ingredients such butters, waxes, and oils with oil-soluble, lipophilic active ingredients that may benefit the skin. The butters and waxes create an occlusive barrier on the skin, providing hydration and nourishment while allowing the serum's active ingredients to work effectively.

Balm serums can contain a variety of butters and waxes, as well as plant oils.

MATERIAL AND METHOD

Aloe Vera Gel

Applying aloe vera to the face can help moisturise the skin. Applying aloe vera on the face can heal skin issues like acne, eczema, and sunburn.

Olive oil

Reduces acne by destroying the bacteria that causes it. Olive oil is proven to moisturise and hydrate the skin.

Sandalwood Oil

Sandalwood essential oil has anti-inflammatory and skin-clearing characteristics, making it effective in treating acne, pimples, and soothing skin.

Glycerin

According to scientific study, glycerin is completely safe for use on the face. Glycerin is beneficial for the skin because it functions as a humectant, allowing it to retain moisture. It can improve skin moisture, reduce dryness, and refresh the surface.

Coconut Oil

This product contains nourishing fatty acids and linoleic acid, which help maintain moisture, protect, and hydrate skin.

Papaya Seed Oil

aid in the promotion of scar and other skin problem recovery. An enzyme is present in papaya seed oil.

Grapeseed Oil

Using grapeseed oil can moisturize to dull, dehydrated skin, even out your skin tone, and reduce the appearance of fine lines and wrinkles.

Orange Peel Oil

Antibacterial, antifungal, pain-relieving, antioxidant, anti-inflammatory, and insecticidal effects

SR.NO	Ingredients	Collection	Category
1	Aloe Vera Gel	Local market	Anti-aging
2	Olive oil	Local market	Moisturizer
3	Sandalwood Oil	Local market	anti-inflammatory and skin-clearing
4	Glycerine	Local market	Moisturizer
5	Coconut Oil	Local market	Moisturizer
6	Papaya Seed Oil	Local market	Brightening agent(lighten dark spot)
7	Grapeseed Oil	Local market	Moisturizer
8	Orange Peel Oil	Local market	Anti-oxidant Anti-bacteria

Evaluation of Face Serum

Physical evaluation: The colour and appearance of the formulation were visually assessed. The formulation technique is uniform. Distribution of extracts. This test was supported by both visual appearance and touch.

pH Value:

A standard buffer solution was used to calibrate a pH meter. After accurately measuring and dissolving nearly 1 millilitre of the face serum in 50 millilitres of distilled water, the pH of the mixture was determined. Since the pH of skin serum should range from 4.1 to 6.7, the skin has an acidic range.

Spreadability:

Spreadability was measured by applying two grammes of blood sample to a surface. A slide was attached to a pan, and 20 grammes of weight were added. The time (in seconds) required to detach the upper slide from the surface was used to calculate spreadability31.

Irritancy: The area was monitored for up to 24 hours following serum application and time recording in order to look for erythema, oedema, and irritation before reporting any findings. The results showed that there were no indications of irritation, erythema, or oedema with the formulation32.

After feel: Users indicated to us that the serum had a soothing and pleasant effect after using it, indicating that it had an emollient and moisturising function in addition to being non-irritating and non-sensitive to the skin33.

Microbiological Analysis of the Product:

Using this technique, liquid agar medium tubes are filled with diluted mixed culture. To facilitate the complete dispersion of the inoculum, the medium is kept liquid at 45°C. After the agar medium has been inoculated, it is placed into petri dishes, allowed to solidify, and then incubated. Using sterile water or saline solution, the initial inoculum can be diluted in the series dilution procedure to progressively lower the microbe concentration. In 20 ml of liquid nutrient agar medium at 45°C, mix 1 ml of dilution. Pour the nutrient agar liquid medium into a sterile petri plate, give it a shake, let it solidify, and then incubate it.

Stability Studies:

Without a thorough stability analysis to ascertain the product's chemical and physical stability and, consequently, safety, the formulation and development of a pharmaceutical product is incomplete. The stability studies are conducted in accordance with ICH recommendations. For a few months, a short-term accelerated stability study was conducted for the developed formulation. The samples were held at various temperatures, including 3-5oC, 250C with a relative humidity of 60%, and 40oC with a relative humidity of 75%.

In Vitro Antioxidant Activity -

Determination of Anti-oxidant activity

Antioxidant activity in the sample compounds was estimated for their free radical scavenging activity by using DPPH (1, 1-Diphenyl-2, Picryl-Hydrazyl) free radicals (George et al., 1996). 100µLof test compounds water were taken in the micro titer plate. 100µL of 0.1% ethanolic DPPH was added over the samples and incubated for 30 minutes in dark condition. The samples were then observed for discoloration; from purple to yellow and pale pink were considered as strong and weak positive respectively and read the plate on Elisa plate reader at 490nmRadical scavenging activity was calculated by the following equation:

DPPH radical scavenging activity (%) =

[(Absorbance of control - Absorbance of test sample) / (Absorbance of control)] x 100

RESULT AND DISCUSSION

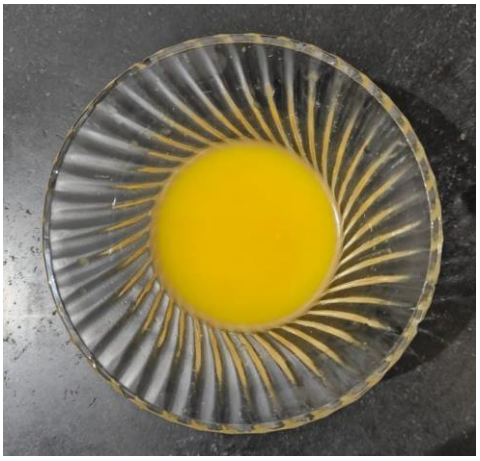
The formulation was tested for the following parameters:

Organoleptic Evaluation

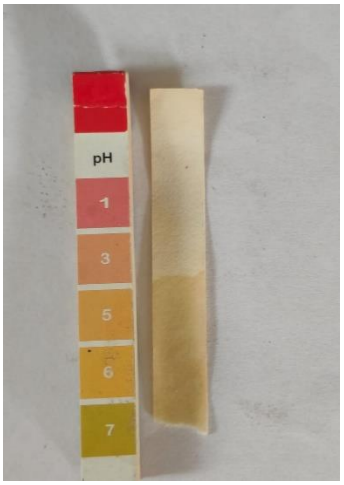
Physical properties of serum, including colour, odour, texture, pH, and appearance. Physical appearance: The serum formulation was a reddish brown viscous liquid with a smooth, uniform texture and glossy appearance. Consistency was proven to be beneficial.

Organoleptic evaluation of formulated face serum

Sr.no	Parameters	Results
1	Colour	Yellow
2	Odour	Floral
3	Texture	Smooth homogenous
4	Appearance	Translucent
5	pH	5.1-6.1



Formulation of Face Serum



pH of Face Serum

Determination spreadability

The liquid formulation's spreadability refers to the face serum's capacity to evenly distribute throughout the skin and is a crucial factor in the application of a normal dosage of medication to the skin. It was discovered that the face serum has a 5–6 cm spreadability.

Homogeneity

The homogeneity of the prepared serum was assessed using visual appearance and touch. The serum appeared and felt nice.

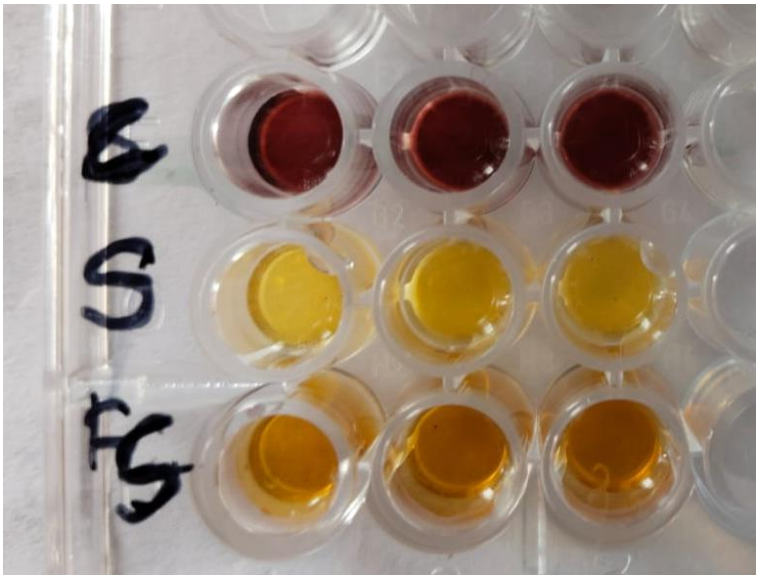
Microbiological Analysis of the Goods

Using this procedure, liquid agar medium tubes are used to immediately dilute the mixed culture. The medium is kept at 45 degrees Celsius in a liquid state.

Determination of Anti-oxidant activity –

Sample code	Concentration	Absorbance	Mean	% inhibition
Control		2.767 2.865 2.765	2.799	
Standard	100µl	0.387 0.395 0.398	0.393	85.95
Face Serum	100µl	0.612 0.625 0.628	0.623	**77.74**

The delocalization of electron also gives rise to the deep violet colour, characterized by an absorption band in ethanol solution centered at about 517 nm. When a solution of DPPH is mixed with that of a substrate(AH) that can donate a hydrogen atom, then this gives rise to the reduced form with the loss of this violet colour. According to table, the Face Serum was performed for the DPPH activity, at the concentration 1000 µg/ml showed moderate antioxidant property as compared to Standard.



Anti-oxidant activity of Face Serum

CONCLUSION

The study's goal was to create a serum with several herbs that would nourish and brighten the skin of the face. Aloe vera and Papaya oil are the primary ingredients in the serum. The gel from the inner middle

portion of the leaf, known as burn plant, has been shown to be extremely effective in treating radiation dermatitis, burns caused by heat or sun exposure, and acne, pimples, and other skin conditions. Aloe vera and Papaya oil is a rich source of vitamins and minerals that can effectively moisturise and prevent ageing of the skin, maintaining youthful, healthy-looking skin. There was good spreadability found. There were no leftovers, and cleaning was simple. The serum promotes cell proliferation, which improves the skin's ability to heal itself. The study aimed to develop a serum with moisturising and antioxidant properties for the skin. Cosmeceuticals are skin-care products that serve as both cosmetics and medications. The serum mostly contains olive oil, Papaya oil, Aloe vera used. The Papaya oil has a very good action on acne, pimples, and other skin issues, burns caused by Heat, sun exposure, and the treatment of radiation dermatitis. Papaya oil are high in vitamins and minerals. Have an excellent moisturising capacity and anti-aging effects to preserve healthy-looking skin and avoid the pigmentation of skin. Olive oil contains antioxidants that can help heal sunburn and UV damage. It also slows and prevents premature ageing. It contains fatty acids like omega 6 and 9, which prevent dry skin. Stability studies found no significant variation between the physical and pH parameters. Thus, the formulation was determined to be stable. The Spread ability was found to be satisfactory. There were no residues and they were easy to wash away. The emulsion promotes cell development, aiding in the restoration of damaged skin. So, this serum can be utilised to cure skin problems.

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