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Formulation and Evaluation of Herbal Anti-Aging Gel based Face Serum from Ficus Carica

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Abstract: ***The popularity of anti-aging face serums as a crucial part of skincare routines has been driven by the desire for youthful and radiant skin. This research aims to provide a comprehensive analysis of the effectiveness behind these serums. By extensively examining scientific literature, we explore the wide range of active ingredients commonly found in these serums, such as retinoids, hyaluronic acid, peptides, antioxidants, and growth factors.we delve into how these ingredients work, including collagen stimulation, hydration retention, oxidative stress reduction, and cellular repair***
This research focuses on developing an anti-aging serum leveraging the synergistic benefits of aloe vera, green tea extract, and fig fruit oil. The formulation process involves meticulous blending to harness the individual properties of each ingredient, aiming to create a potent solution for combating signs of ageing. We also consider the clinical evidence supporting the effectiveness of anti-aging face serums, with a particular focus on their ability to reduce wrinkles, improve skin texture, and rejuvenate the overall appearance of the skin. There are various types of serums available, including gel-based and oil-based serum,etc.
Various types of evaluation parameters were studied. Our formulation showed good viscosity, pH range was also within limits, it exhibited good spreadability, and serum stability was maintained at all temperatures. By integrating scientific analysis with natural ingredients, this study aimed to contribute to the development of effective skincare solutions.
Keywords: Face serum,, Anti-aging , Collagen , green tea extract, fig fruit oil, aloe vera.

I. INTRODUCTION

Anti-aging Serum is a rapidly advancing field in medical science and applied medicine. Its primary focus is on addressing the root causes of ageing and improving age-related ailments [1]. The ultimate objective is to prolong the healthy lifespan of individuals by maintaining youthful characteristics.

The study of human skin plays a crucial role in various disciplines such as dermatology, toxicology, pharmacology, and cosmetology. It aims to evaluate the effects of external agents on the skin, including their interactions, absorption mechanisms, and potential toxicity on different skin structures. The desire for beauty and good health has been ingrained in society since ancient times [2]. Initially, cosmetics were associated with activities like hunting, fighting, religion, and superstition. Over time, they became linked to medicine. However, relying solely on allopathic medicine has proven inadequate, leading to the need for herbal remedies. Consumers are increasingly aware of the benefits of herbal drugs, herbal cosmetics, nutraceuticals, and natural dyes. Consequently, the personal care industry is now focusing more on herbal-based cosmetics, which is a rapidly growing segment with immense potential for expansion in the future [3].There are various seed oils , leaf extract which showing antioxidant activity like cordia obliqua seed oil, leaf extract of clerodendrum, which have various medicinal activities also.[4,5,6]

In this formulation of face serum, the active ingredients used are fig fruit oil, aloe vera, and green tea extract. Fig fruit is high in antioxidants and nutrients, including vitamin A and vitamin C, which can help to hydrate and nourish the skin, reducing dryness and improving the overall health and appearance of the skin. Ficus carica has anti-inflammatory properties that can help to reduce inflammation and irritation on the skin [7]. Various types of phytosterol, amino acids, and Vitamin C present in active ingredients are beneficial for anti-aging activity for serum.Aloe vera gives the impression of freshness and aids in the distribution of blood, allowing for faster oxygen exchange among cells and thereby nourishing them [8]. Aloe Vera also has a remarkable ability to alleviate the pain of sunburn [9]. Green Tea Extract is known to exhibit effects that help diminish the signs of ageing, such as wrinkles and fine lines [10].To ensure maximum benefits upon application, these ingredients are carefully extracted under suitable environmental conditions and specific temperatures in the laboratory [11].

A. Advantages of Face Serum

1) Serums boast a rapid absorption rate into the skin, thanks to their lightweight formulation compared to moisturisers, facilitating easy penetration due to their thinner consistency.
2) Facial serums enhance collagen production in the skin, promoting firmness, and minimising the visibility of fine lines and wrinkles.
3) Serums provide defence against free radicals, contributing to the preservation of a healthy complexion.[12]

B. Disadvantages of Face Serum

1) May trigger allergic reactions in some individuals.
2) Could be costly due to the use of premium oils.
3) Overuse may lead to skin dryness.
4) Not suitable for all skin types; some may find oil serums too heavy or pore-clogging.[13]

II. TYPES OF FACE SERUM

1) *Oil base Serum:* Oil serums are among the simplest facial serums to create. They typically begin with a base of high-quality, highly absorbent carrier oils, often referred to as "dry" oils. These premium oils not only provide moisturising and barrier-repairing benefits but also contain polyphenols, essential fatty acids, and other substances that can be absorbed and utilised by the skin.
2) *Gel serum:* Gel serums offer the skin a "tightening" sensation, temporarily lifting or tightening specific areas of the face. Their water-based formulation allows for the inclusion of excellent hydrophilic (water-loving) plant extracts, enhancing their effectiveness in providing hydration and other benefits to the skin.
3) *Water Base Serum:* Water-based serums typically contain minimal or no gums or thickeners. They are ideal for delivering potent hydrophilic plant extracts that can linger on the skin beneath creams and lotions. This technique enhances the effectiveness of skincare products.
4) *Emulsion base Serum:* Emulsion-based serums act as moisturisers that not only strengthen the skin's barrier function but also deliver potent ingredients to the skin. These serums combine two "immiscible" phases, such as oil and water, using emulsifiers to bind them together and maintain stability.. However, the combination of oil and water in emulsions facilitates this remarkable performance.
5) *The pressed balm serum:* Balm serums are based on a traditional balm base of butters, waxes, and oils, but also contain oil-soluble (lipophilic) active ingredients to help the skin. Butters and waxes form an occlusive barrier on the skin, moisturising and nourishing it while the active ingredients in the pressed serum work together.[14]

III. METHODOLOGY

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 green tea extract
4) Preparing formula
5) Formulation of herbal face serum

A. Active Ingredient Used In Herbal Face Serum

1) *Fig Fruits Oil*

a) *Biological source: Ficus carica*, commonly referred to as the common fig, belongs to the Moraceae, or mulberry family. It is a deciduous shrub or small tree [15]
b) *Chemical constituents:* Research on Ficus carica phytochemicals has led to the identification of various compounds, including phytosterols, anthocyanins, amino acids, organic acids, fatty acids, phenolic components, hydrocarbons, aliphatic alcohols, volatile components, and several other classes of secondary metabolites found in its different parts. The highest concentration of these phytochemicals is typically found in the latex, followed by leaves, fruit, and roots. Certain phytoconstituents of Ficus carica are utilised in the production of sunscreen and colouring products.[16]

c) *Uses:* Fig fruit, abundant in antioxidants and nutrients like vitamin A and vitamin C, serves to hydrate and nourish the skin, diminishing dryness and enhancing its overall health and appearance. Ficus carica, the botanical name for the fig plant, possesses anti-inflammatory properties, which can alleviate inflammation and irritation on the skin. This is particularly beneficial for individuals with sensitive skin or those dealing with conditions such as acne and eczema. Furthermore, the antioxidants present in figs shield the skin from damage caused by free radicals, thus reducing the risk of premature aging and other skin conditions.[7]

Fig no.1: Fig fruit oil

2) *Green Tea*

a) *Biological sources:* Green tea, derived from the plant *Camellia sinensis* within the Theaceae family..

b) *Chemical constituents:* Its main constituents include phenols, alkaloids, flavonoids, tannins, and steroids. Approximately one-third of green tea comprises polyphenols, notably catechins like epigallocatechin gallate (EGCG), epigallocatechin (EGC), epicatechin-3-gallate, and epicatechin (EC). Other polyphenols present are flavonoids and their glycosidic derivatives, along with carotenoids, quinic acid, chlorogenic acids, and tri galloyl glucose.[17]

c) *Uses :*

- It shields against skin cancer by repairing DNA damage caused by UV rays, as demonstrated by a 2010 study.
- It combats premature ageing.
- It reduces redness and irritation.[18]

3) *Aloevera Gel*

a) *Biological source :* The botanical name of aloe is *Aloe barbadensis miller*. The biological source of aloe is dried latex of leaves. It is also known as curacao aloe, cape aloe and socotrine aloe. It belongs to the liliaceae family.

b) *Chemical constituents:* Aloe is composed of several chemicals that can be classified into three major classes. The first category, complex sugars (among which acemannan stands out), are found within the gel of the leaves and have an immunostimulant effect. The anthraquinones, which are found in the skin's outermost layer and have a powerful laxative activity, come next. Minerals, vitamins, essential, non-essential, and semi-essential amino acids, organic acids, phospholipids, enzymes, lignin, and saponins round out the list of compounds having diverse functions.[19-22]

c) *Uses:* Aloe vera gives the impression of freshness. It aids in the distribution of blood, allowing for faster oxygen exchange among cells and thereby nourishing them.[21] Aloe Vera has a remarkable ability to alleviate the pain of sunburn. It is rubbed directly on the skin for this reason. Sunburns can be treated with fresh plant fluid or Aloe vera-containing after-sun lotions.[9]Aloe vera can be used to soften and moisturise the skin. There are numerous products on the market that contain Aloe vera and can be used after showering to achieve exceptionally smooth skin. When aloe vera gel, cream, or lotion is applied to the face, it forms a pleasant cover that protects the skin from dust and other natural factors that can be harmful to the skin [24-25]

4) *Glycerin*

a) *Biological Source:* Glycerin, also referred to as glycerol, originates from natural sources such as vegetable oils or animal fats.

b) *Chemical Composition:* Glycerin is classified as a polyol compound featuring three hydroxyl groups and three carbon atoms. Each hydroxyl group forms a covalent bond with a carbon atom.

c) *Uses:* When applied topically, glycerin effectively retains moisture within the skin, resulting in a radiant and youthful appearance. It diminishes wrinkles by attracting moisture to the skin's surface layers, maintaining softness and smoothness. Additionally, glycerin improves skin functionality and slows the ageing process.[24]

B. Material and Collection

Materials required for our formulation included aloe vera gel, fig fruit oil, green tea extract, and other excipients such as propyl paraben and humectant glycerine. Some ingredients, like aloe vera gel, fig fruit oil, and green tea extract, were obtained from the market, while excipients such as propyl paraben and glycerine were sourced from our college laboratory.

C. Extraction Method

1.5 g of one type of green tea was placed in a 250 mL flask and 100 mL water was added. The flask was covered, and the plant was macerated for 48 h at room temperature in the dark.[27]

Fig no.2: green tea extract

D. Formula

Sr.No.	Ingredients	F1	F2	F3
1	Fig fruit oil	2 gm	1.5 gm	1 gm
2	Aloe Vera gel	5 gm	5 gm	7.5 gm
3	Green tea extract	2 gm	3 gm	1 gm
4	Propylparaben	0.02 gm	0.02 gm	0.02 gm
5	Glycerine	Q.s. to 10 gm	Q.s.to 10 gm	Q.s.10 gm

E. Formulation Process

In this study, the ingredients were separated into two phases. Phase A consisted of locally sourced aloe vera gel, green tea extract, glycerine, and fig fruit oil, while Phase B contained propyl paraben. Initially, the ingredients from Phase A were blended in aloe vera gel in the first beaker with ongoing stirring. Subsequently, Phase B, containing propyl paraben, was introduced into Phase A while stirring. The resulting gel-based serum was then packaged into an appropriate container and labelled accordingly.[28-29]

IV. EVALUATION PARAMETERS :[2,30,31,32]

1) *Physical Assessment:* The gel-based serum exhibited a green hue, with its ingredients uniformly dispersed throughout.

Fig no.3: appearance of gel

2) *Odour:* The formulation's scent was evaluated by applying it to the hand, revealing a distinct aroma.
3) *Consistency :* Upon visual inspection, the face serum displayed a semi-liquid consistency, smooth in nature.

Fig no.4: consistency of gel

4) *Spread:* To assess spreadability, a slide was laden with an appropriate amount of gel-based serum, upon which another slide was placed with 20 grams of weight for five minutes to measure detachment time.
5) *ph:* Examination: Using pH paper, the serum's pH was determined by mixing an appropriate quantity in a suitable solvent. Skin serum ideally falls within a pH range of 4.1 to 6.7 , the formulation was found to have a pH of 6.

Fig no.5: pH of gel serum

Fig no.6 :pH of gel serum

6) *Irritancy:* Following application to the skin, observations were made over 24 hours for signs of inflammation, erythema, and edema, indicating the formulation's performance in the irritancy test.

Fig no.7: Before testing.

Fig No.8:After testing

7) *Washability:* The serum's ability to be washed off the skin was evaluated after a period of application, confirming its effectiveness in the washability test.

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8) *Phase Separation:* Stored in a sealed container at room temperature away from light, the formulation underwent examination for phase separation after 24 hours. The absence of phase separation indicated successful passage of this test.
9) *Temperature Cycling Test:* Varied temperatures were applied daily to simulate environmental changes, with results showing the serum's stability across all temperature fluctuations.

V. RESULTS

Sr.No.	Parameter	Result F1	Result F2	Result F3
1	Colour and homogenecity	Green and homogeneous	Green and homogeneous	Green and homogeneous
2	Odour	Characteristics	Characteristics	Characteristics
3	Consistency	Watery	Watery	Semisolid gel
4	Spreadiability	20.5	18.42	17.5
5	pH test	6	5	6
6	Irritancy	No rashes were seen	No rashes were seen	No rashes were seen
7	Wash ability	No traces of serum was seen	No traces of serum was seen	No traces of serum was seen
8	Phase separation	No phase separation was seen	No phase separation was seen	No phase separation was seen
9	Cyclic temprature a)Freezer b)Room temperature	Appear thick and viscous Stable	Appear thick and viscous Stable	Appear thick and viscous Stable

VI. DISCUSSION

The evaluation parameters conducted on the serum revealed several significant findings. For instance, the serum labelled as F3 exhibited a green coloration, characteristic odour, and a semisolid consistency, whereas F1 and F2 displayed a watery texture. Moreover, all formulations, F1, F2, and F3, demonstrated good spreadability and a pH level of 6. Additionally, there were no signs of irritancy observed for any of the formulations. Furthermore, the washability was deemed satisfactory across all formulations, with no phase separation detected. However, during the cyclic temperature study, it was observed that F1 and F2 and F3 were unstable when exposed to freezer conditions but remained stable at room temperature, from result F3 formulation is better than two formulations (F1&F2).

VII. CONCLUSION

The aim of the study was to develop a serum that could nourish and safeguard the skin from ageing. The serum comprised anjir oil, green tea extract, and aloe vera, known for their anti-inflammatory, anti-aging, and skin-healing properties, including treating burns caused by heat and sun exposure.

Aloe vera, rich in vitamins and minerals, provides moisturization and anti-aging benefits, maintaining youthful, healthy skin. Green tea extract, containing catechin and flavonoids, contributes to skin radiance and youthfulness. The gel-based serum was easy to apply and rinse off, leaving no oily residue. Being herbal-based, the serum exhibited no adverse effects on the skin. It maintained an optimal pH and facilitated cell regeneration, aiding in skin repair. Consequently, this serum holds promise for addressing various skin concerns.

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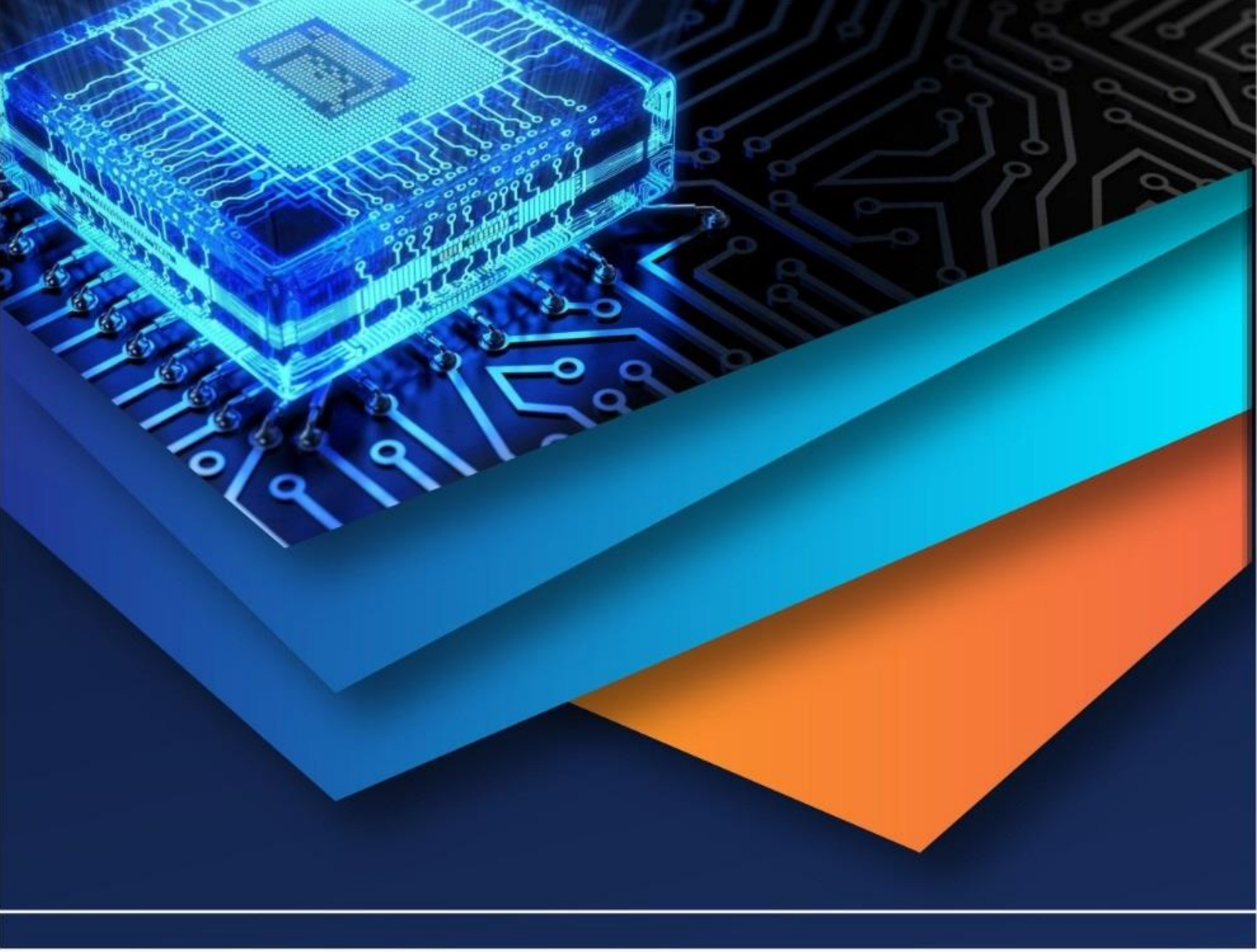

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