

## **FORMULATION AND DEVELOPMENT ON HERBAL FACE SERUM FOR ANTI-AGING AND HYPERPIGMENTATION BY USING ON THE SKIN**

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### **❖ ABSTRACT:**

Wrinkles on the face and skin results in aging and hyperpigmentation which are unfavorable and unwanted effects of photodamage and give UV radiation exposure serum gives quick absorption deep penetration to the different layers of the skin such as dermis, epidermis. and hypodermis serum having non oily finished and a deep formula with a high concentration of active ingredients which makes them more preferable over other conventional formulation like creams, lotion . the goal of this research was to create a serum using polyherbal extract based on their potential medicinal properties properties which makes them ideal serum for different skin concerns. Face serum made of aloe vera gel, glycerine,is highly concentrated beauty product.

Face serum made of aloe vera ,glycerine,and rose oil highly potent cosmetic.when we use aloe vera we obtain not only immediate beauty effects but also psychological satisfactions because serum has the potential to absorb quickly and enter deeper layers.

**Keywords:** polyherbal ,psidium guajava, face serum skin rejuvenation UV protection, antioxidant

### **INTRODUCTION:**

The skin is the largest and most visible organ of the human body, accounting for approximately 15–20% of total body weight. It serves as the primary protective barrier, composed of three main layers: the epidermis, dermis and hypodermis. This multilayered structure acts as a shield against environmental aggressors such as ultraviolet (UV) radiation, microbial pathogens, chemical irritants, and physical damage. Due to its continuous exposure to environmental stressors—especially UV rays, air pollutants, and residual makeup—the skin is vulnerable to a range of disorders. These include wrinkles, premature aging, hyperpigmentation, acne, and dryness, which not only affect appearance but also deteriorate overall skin health and function.

The use of skincare products such as cleansers, face washes, toners, moisturizers, creams, and serums is critical for maintaining skin hygiene and supporting skin regeneration. Among these, facial serums have gained considerable popularity due to their lightweight nature, high concentration of active ingredients, and deep-penetrating ability. Unlike conventional creams and lotions, serums are formulated with smaller molecular sizes, allowing them to penetrate deeper layers of the skin and deliver targeted results more rapidly.

Serums are especially effective for addressing specific dermatological concerns such as uneven skin tone, hyperpigmentation, fine lines and wrinkles, melasma, acne scars, and dehydration. Their mechanism of action is based on delivering potent antioxidants, hydrating agents, vitamins, and plant-derived bioactive directly to the skin cells, thus enhancing cellular repair and promoting youthful, radiant skin.

In recent years, there has been a significant shift toward natural and herbal skincare formulations, driven by increased consumer awareness of synthetic chemicals and their potential side effects. Herbal serums are increasingly preferred due to their gentle nature, low allergenic potential, customizability, and minimal adverse reactions. These plant-based products typically avoid artificial preservatives, fragrances, and harsh chemical agents, making them suitable even for sensitive skin types.

Herbal serums offer multi-functional benefits through the inclusion of plant extracts known for their medicinal and dermatological properties. Key herbal ingredients used in facial serums include aloe vera, rose oil, vitamin E, guava, and carrot, each contributing unique benefits such as exfoliation, hydration, antioxidant protection, and collagen synthesis. Two particularly potent ingredients in herbal skincare are carrot (*Daucus carota*) and guava (*Psidium guajava*). Carrot extract is a rich source of beta-carotene, vitamin A, vitamin C, and antioxidants. These compounds support cellular regeneration, protect against UV damage, enhance skin texture, and stimulate collagen production.



**Figure No. 1: Visible effect of wrinkle and hyperpigmentation on the skin**

### **HERBAL FACE SERUM:**

A herbal face serum is lightweight and concentrated skincare product made with natural herbal extract, plant oil, and botanical ingredients. It is applied to the face to improve skin health and treat problems such as aging, dryness, acne wrinkles, and hyperpigmentation.

Herbal face serum is low-viscosity cosmetic preparation containing active herbal ingredients that penetrate deeply into the skin and provide nourishment, hydration, and skin repair.

A herbal serum is concentrated cosmetic formulation containing natural bioactive compounds obtained from herbs, fruits, flower, leaves, roots, or seed.

### **Aim & Objective:**

#### **Aim:**

To formulation and develop a herbal face serum for anti-aging and hyperpigmentation treatment using natural herbal ingredients that is safe, effective, and suitable for skin application.

#### **Objective:**

1. To select suitable herbal ingredients with anti-aging and skin -brightening properties.

2. To prepare herbal extracts such as guava leaf, carrot, aloe vera or other medicinal plant extracts for serum formulation.
3. To formulate a stable herbal face serum using appropriate excipients and preservatives.
4. To evaluate the physical properties of the serum such as colour, Odor, pH, viscosity, and appearance.
5. To study the effectiveness of the serum against wrinkles, fine line, and hyperpigmentation.
6. To evaluate the stability and skin compatibility of the formulated serum.
7. To develop a herbal cosmetic product with minimal side effects and good patient acceptability.

## **Plants profile:**

### **1. Guava leaves**

Plants are a predominant natural source of numerous bioactive compounds. The projected growth of the plant preparation market is around USD 86.74 billion by 2022, with the largest market share belonging to the pharmaceutical sector, followed by the nutraceutical industry. Interestingly, the utilization of plant preparations for cosmetics, beverages, food, and medicine is mainly dependent on plant leaves. Among all plant organs, leaves are the largest accumulators of bioactive compounds, such as secondary metabolites. Several recent studies reported phytochemical profiles and biological activities of leaf extracts of various cultivated plants. Hence, although plant leaves are considered as agricultural waste, they are a rich source of high value Nutraceutical compounds.



**Fig No 2: Guava Leaves**

**Synonyms:** Guava foliage, Guava leaves, Tropical guava leaf

**Botanical name:** *Psidium Guajava L.*

**Family:** *Myrtaceous*

**Part used:** Green leaves

**Chemical constituents:**

**1.flavonoids**

**2.alkoloids**

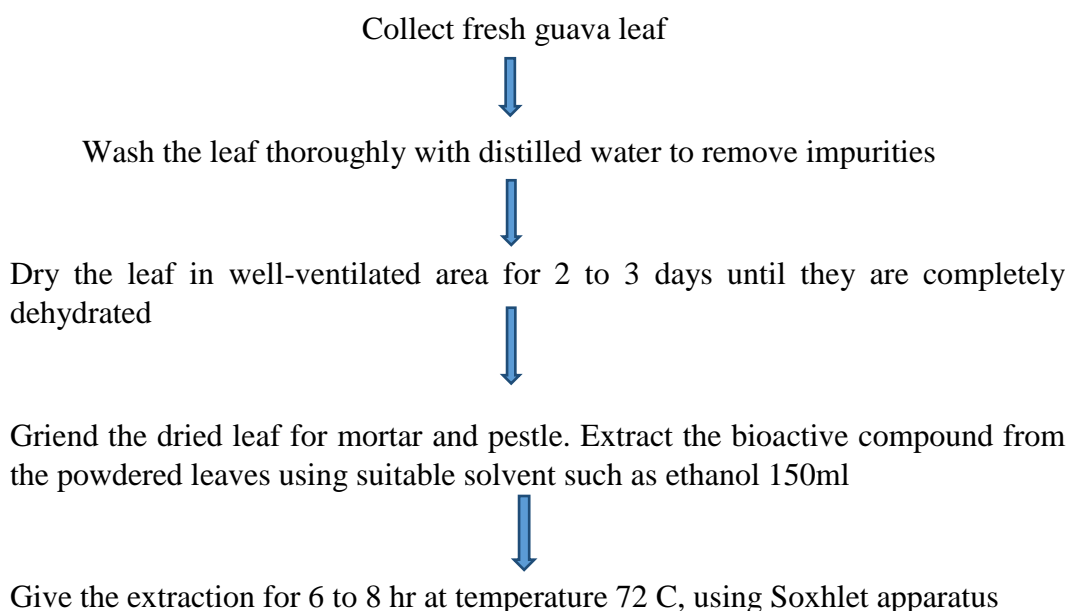
**3.tannin**

### **Collection and Preparation of Guava Leaves Extract**

Guava leaf was washed with tap water properly dried and placed into a blender to be grounded into powdered form and kept in an airtight container for further use.

The solvent extraction method was used for the extraction of vitamin C from guava leaves Powder.

The Soxhlet thimble was filled with the guava leaf powder and inserted into the Soxhlet main chamber and closed. Solvent vapor moves up to the Coolum and floods into the chamber housing the thimble of solid. Some part of non-volatile compounds dissolves in solvent. Process repeats many times until we get desired concentrated compounds in flask. Process has been done at boiling 72 temperature of solvent and extraction has been done in 150 ml ethanol for 6 hr.



**Fig: process of extraction**



**Guava fresh leaves**



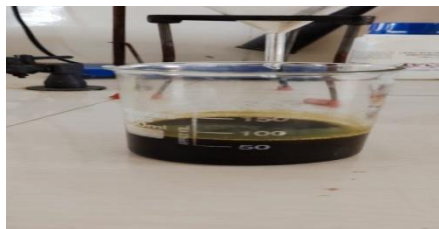
**Dried leaves of Guava**



**Extraction process**



**Powder of dried leaves**



## Extraction of Guava leaves

### METHODOLOGY

#### 1.preparation of herbal extract :

- Coolect and dry the guava leaves
- Powder the dry material.
- Extract using water or ethanol by soxhlet extraction
- Filter and concentration the extract

#### 2.preparation of serum base

- Take the required of distilled water
- Add the rose water slowly with continuous stirring

#### 3.addition of humectants

- Add glycerin and mix thoroughly
- Add aloe vera gel and continue stirring until a uniform mixture is obtained.

#### 4.addition of herbal extract:

- Add the prepared herbal extract slowly into the serum base.
- Stir continuously to ensure uniform distribution.

#### 5.Ph adjustment :

- Check the PH and adjust it 5.0-6.0,which is suitable for skin application

#### 6.filtration:

- Filter the serum if necessary to remove any undissolved particles.

#### 7.filling and packaging:

- Transfer the prepared serum into clean,sterilized amber colored serum bottles.
- Seal and herbal properly.

### **Natural Ingredients in Face Serums:**

**1. Guava leaves extract**

**2. Aloe vera**

**3. Vitamin E Oil**

**4. Rose oil**

**5. Rose water**

**FORMULATION TABLE:**

<b>Ingredients</b>	<b>F1(5%) 15ml</b>	<b>F2(10%) 15ml</b>	<b>F3 (20%) 15ml</b>
Guava leaf extract	0.75ml	1.5 ml	3 ml
Rose water	9 ml	8.25 ml	6.75 ml
Aloe vera gel	2 ml	2 ml	2 ml
Glycerine	1 ml	1 ml	1 ml
Vitamin E	0.5 ml	0.5 ml	0.5 ml
Preservative (sodium benzoate)	0.5 ml	0.5 ml	0.5 ml
Essential oil (rose oil)	0.25 ml	0.25 ml	0.25 ml

**EVALUATION OF PARAMETER:--**



**Fig: Herbal Face Serum**

**1. Physical appearance / visual inspection:** -The prepared serum was tested for physical appearance and homogeneity by visual inspection.

**2. 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 5.4-5.6

**3. Viscosity studies:** - serum formulation was tested for their rheological parameters at 25° C using Brookfield Viscometer. The measurements were made over a whole range of speed setting from 10 rpm with the 30 s between two successive speeds and then in descending order.

**4. Determination of Spread ability:** - 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 Spread ability.

**5. 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 are 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%

**6. Microbial Examination of the Production:** 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 becomes 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

**7.Homogeneity:** The formulation was tested for the homogeneity by visual inspection and touch. A good preparation should be free from clumping of particles.

**8.Stability Studies:** The stability studies are carried out as per ICH guidelines. Short term accelerated stability study was carried out for the period of few months for the prepared formulation at 25oC ±5oC

## **RESULTS AND DISCUSSION:**

Phytochemical screening revealed the presence of alkaloids, tannins, and flavonoids, confirming strong antioxidant and antimicrobial potential (Table

1). **Table 1: Phytochemical Screening of Guava Leaf Extract**

Sr. no	Test	Reagent	Results
1.	Alkaloids	Drangendroff's reagent	+
		Mayer's reagent	+
		Hager's reagent	+
2.	Tannins	Ferric chloride reagent	+
3.	Flavonoids	Alkaline reagent	+

All formulations (F1–F3) showed green colour and pleasant odour, with F2 exhibiting the best physicochemical properties (smooth, homogeneous, pH 5.69, easily washable). The comparative evaluation is shown in Table 2.

**Table 2: Physical Evaluation of Serum Formulations (F1–F3)**

Formulation	colour	Odour	Texture	pH	Homo geneity	Washability
F1	Light brown	Characteristic	Watery, phase Separation	5.2	Very poor	Very poorly washable
F2	Light brown	Characteristic	Smooth, homogeneous	5.69	Excellent	washable
F3	Light brown	Characteristic	Thick, phase Separation	6.1	poor	washable

The optimized formulation (F2) exhibited ideal viscosity (8.402 Pals), excellent spread ability (5–6 cm), and no microbial contamination. FTIR analysis confirmed compatibility between extract and excipients. Stability testing over 4 weeks showed no significant change in colour, odour, or pH (Table 3).

**Table 3: Stability Study of Optimized Formulation (F2)**

Temperature	Parameter	1st week	2nd week	4th week
25°C	Visual appearance	Light brown	Light brown	Light brown
25°C	Phase separation	Nil	Nil	Nil
25°C	Homogeneity	Good	Good	Good

Overall, formulation F2 demonstrated optimal physicochemical stability, excellent cosmetic acceptability, and microbial safety, confirming its suitability as a natural skincare product.

### ➤ CONCLUSION:

Anti-Aging & Hyperpigmentation Serum with Guava Leaf Extract. The combination of guava leaf extract in an anti-aging and hyperpigmentation serum offers a powerful, natural solution for achieving healthier, youthful skin. Carrot extract, rich in beta-carotene and vitamin A, promotes cell regeneration, improves skin texture, and reduces the appearance of fine lines and wrinkles. Its antioxidant properties protect the skin from free radical damage, helping to prevent premature aging and maintain a vibrant complexion. On the other hand, guava leaf extract brings its potent antibacterial and anti-inflammatory qualities to the serum, making it an effective treatment for hyperpigmentation and dark spots. The high vitamin C content in guava leaves brightens the skin, helping to fade discoloration and even out the skin tone. Additionally, guava leaf extract helps regulate oil production, reducing the risk of acne, while its rich antioxidants provide protection against environmental damage and inflammation. Together, these ingredients create a potent formula that not only fights the signs of aging but also addresses skin discoloration and imperfections. The serum works to rejuvenate the skin, leaving it visibly brighter, smoother, and more even-toned. Ideal for all skin types, it offers a natural, gentle way to combat hyperpigmentation, fine lines, and other signs of aging, providing an overall radiant and youthful appearance. Regular use can promote clearer, healthier skin, making this serum an essential addition to any skincare routine.



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