WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.453
Volume 14, Issue 11, 1534-1544. Research Article ISSN 2277–7105

FORMULATION AND EVALUATION OF BANANA LEAF FACE SERUM

[1*]Arun G. Krishnan, [2]Tincy Thomas, [3]Sona Susan Sunil, [4]Aadil Sathar, [5]Josna Johnson, [6]Anjana S.

*[1,2,3]Associate Professor, Department of Pharmaceutics, [4,5,6]B. Pharmacy Students, Department of Pharmaceutics.

Dr. Joseph Mar Thoma Institute of Pharmaceutical Sciences and Research, Kattanam, Kerala, India.

Article Received on
10 April 2025,

Revised on 30 April 2025,
Accepted on 20 May 2025

DOI: 10.20959/wjpr202511-36915

***Corresponding Author**
Arun G. Krishnan
Associate Professor, Department of Pharmaceutics, Dr. Joseph Mar Thoma Institute of Pharmaceutical sciences and Research, Kattanam, Kerala, India.

ABSTRACT

This study has been undertaken to investigate on Banana Leaf Face Serum. Face serums are made of very small molecules that help it to penetrate deep into the skin quickly. Banana leaf face serum is a cosmetic product containing banana leaf extract, Jojoba oil, Rose hip oil, Vitamin E, Glycerin, Rose water were used to formulate Face Serum. The goal of this research work was to create a face serum using banana leaf extract based on immediate beauty effects and psychological satisfaction. The face serum was evaluated for its physiochemical parameters, pH, globule sizes, consistency. The stability study results showed that there was no change in visual appearance, homogeneity and globule size. Results have shown that different evaluation parameters of prepared face serum resembled standard values and with the marketed inflation, oil prices, interest rate and exchange rate.

KEYWORDS: Banana leaf extract, Jojoba oil, Evaluation, standard values, marketed inflation.

1. INTRODUCTION

Cosmetics means any article intended to be sprayed, poured, rubbed or sprinkled on, or introduced into or any parts for cleansing, beautifying, promoting attractiveness or altering the appearances. The term *cosmetics* originates from the Greek word *kosmetikos*, which refers

to the art of adornment and the skill of enhancing appearance. In modern times, cosmetics have become an essential part of personal care, encompassing a wide range of products such as skincare, makeup, fragrances, and hair treatments. These products are designed to improve aesthetic appeal while meeting individual preferences and needs.

Today's cosmetics industry is not only fast-growing but also increasingly focused on health-conscious and eco-friendly innovations. Consumers are now more aware of the ingredients in their products, leading to a shift toward natural, safe, and effective alternatives powered by advanced scientific techniques.

In skincare, effective delivery of active ingredients is crucial. Face serums have emerged as a powerful solution for this purpose. These are lightweight, highly concentrated formulations designed to penetrate deeply into the skin, targeting specific issues like dryness, dullness, fine lines, and acne, often more effectively than traditional creams or lotions.

Face serums typically include a blend of moisturizing agents, antioxidants, essential oils, stabilizers, and preservatives. These ingredients work together to improve skin texture, reduce signs of aging, and enhance skin hydration. The unique molecular structure of serums allows them to absorb quickly, delivering nutrients deep into the skin for faster and more noticeable results.

Serums are available in both water-based and oil-based forms and usually contain up to ten times more active ingredients than standard creams. Their potency makes them suitable for treating a range of skin conditions, including irritation, inflammation, and even mild burns. Natural ingredients like banana leaf extract offer added benefits, such as soothing effects and antioxidant properties, without the adverse effects often associated with synthetic chemicals.

This project aims to formulate and evaluate a face serum enriched with banana leaf extract, leveraging its natural properties to create a safe, effective skincare product. The goal is to develop a formulation that not only enhances skin health but also aligns with the growing demand for clean, green beauty solutions.

1.1 Ideal Qualities of Face Serum

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

- Deep hydration
- Possess a special capacity to raise and decrease skin moisture.
- Fight Acne and fades blemishes
- Banana leaf stops the bacterial overgrowth that is the primary cause of acne and pimples.
- Remove dark circle and puffiness
- Vitamin E and antioxidants in abundance aid with eyelid discoloration, 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.
- Prevents ageing
- It contains antioxidant qualities that encourage healthy-looking skin

1.2 How to use Serum

Use of serum also depends on the season and climate where a person permanently lives. In hot climate, concentrates are based on water (for normal and dry skin) or accompanied by antiseptic concentrates (for oily skin as they have a slight drying effect). Use of oily bases is not recommended in this case as it may lead to pore bridging. For this reason, oil bases of any cosmetics whether it is a cream or a concentrate, are recommended for cold or variable climate, in winter. To get the most benefits from a serum, use it as the label recommends. In general, you should put on serum before heavier products. In the morning apply serum after cleansing, but before moisturizer and sunscreen. In the evening apply serum after cleansing but before night cream. Always put the serum on first after cleansing, because you want those expensive, active ingredients to penetrate as deeply as they can prior to applying other creams that might create a barrier.

2. MATERIALS AND METHODS

2.1 Active Ingredients used in Banana Leaf Face Serum

2.1.1 Banana leaf

Scientific Name: *Musa spp.*

Common Name: Banana Leaf

Family: Musaceae

Geographical Origin: Native to Southeast Asia, banana plants are now grown in tropical and subtropical regions worldwide, including South Asia, Africa, Central America, and parts of the Caribbean.

Physical Characteristics

- **Size:** The leaves can grow as large as 3–5 feet in length and 2–3 feet in width.
- **Color:** Typically, bright green, although they may have a slight yellow or brown tint as they mature or are exposed to the elements.
- **Shape:** The leaves are elongated and oblong, with a prominent central vein.
- **Texture:** The surface is smooth with a waxy coating that provides water resistance and helps the leaf maintain its shape and integrity.

Chemical Composition

- **Cellulose and Lignin:** Like most plant fibres, banana leaves are high in cellulose, which contributes to their strength and durability.
- **Moisture Content:** Fresh banana leaves typically have a moisture content of 70–85%, which makes them pliable for wrapping but also requires quick use or preservation techniques to avoid spoilage.
- **Tannins:** Banana leaves contain tannins, which give them some antimicrobial properties, making them suitable for food wrapping and storage.

Properties of Banana Leaf

- Reduce fine lines and wrinkles.
- Improve skin elasticity.
- Protect the skin from environmental damage (e.g., pollution, UV rays).
- Beneficial for soothing irritated or inflamed skin.
- They can be applied topically to reduce skin redness, swelling, and discomfort caused by conditions like rashes, sunburn, acne, allergies.

Figure-1: Banana Leaf.

2.1.2 Jojoba oil

- **Scientific Name** : *Simmondsia chinensis*
- **Common Name** : Jojoba
- **Family** : Simmondsiaceae

- **Geographical Origin**: Native to the southwestern United States, Mexico, and parts of California, Arizona, and Sonora (Mexico). It is now grown in many arid regions around the world.
- Jojoba oil is a versatile and highly prized ingredient in cosmetics due to its skin-friendly properties, its similarity to human sebum (the natural oil produced by the skin), and its ability to hydrate, soothe, and protect the skin.

Figure 2: Jojoba Oil.

2.1.3 Rose hip oil

Botanical source: *Rosa canina* (commonly known as the dog rose)

Family: Rosacea

- Rose hip oil is derived from the seeds of the wild rose, primarily the *Rosa canina* species, which grows in the wild in Europe, Africa, and parts of Asia.
- Improves Skin Texture, Hydrates and nourishes dry or aging skin, reduces fine lines, wrinkles, and signs of aging, Fades dark spots, acne scars, and hyperpigmentation. Soothes and calms irritated or inflamed.

Figure 3: Rose Hip Oil.

2.1.4 Rose Water

Botanical Source

- **Scientific Name**: *Rosa damascene* (Damask rose) is the most commonly used variety for rose water production.
- **Family**: Rosacea
- **Plant Part Used**: Petals

- It Soothe skin irritation, redness, and acne and reduce the appearance of wrinkles and blemishes, brighten the skin, balance skin pH., tighten and tone the skin.

Figure 4: Rose Water.

3. FORMULATION OF FACE SERUM

3.1 General Procedure

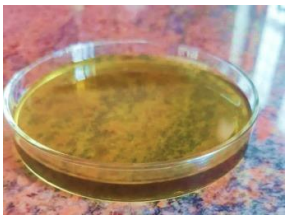
The ingredients as per the formulation chart was weighed accurately.

A. Extraction of banana leaf

Choose fresh, young, and healthy banana leaves. Wash the leaves thoroughly to remove dirt, dust, and any pesticides. Pat the leaves dry with a clean cloth or paper towels, cut them into small pieces (2–3 inches), dry them in shade, and grind into powder.

- Weigh 50 gm, put it in a glass jar and add 100 ml ethanol (1-2 ratio by Maceration Method).
- Seal the jar and store in a cool, dark place for 2–4 weeks. Shake it daily.
- strain the mixture using a cloth or strainer, dark liquid extract obtained.
- Pour the extract into a beaker and place it in a water bath at 40–60°C. Stir occasionally.
- Heat until all ethanol evaporates, leaving behind concentrated banana leaf extract.

Maceration of Banana leaves



Banana Leaf Extract

B. Formulation of serum

The emulsion (o / w) was prepared according to the formula given below. The oily component consisting of Jojoba oil, Rosehip oil, Tween 20 is mixed together for 10 minutes to obtain a uniform solution. At the same time the water phase was prepared by mixing banana leaf extract, rose water, glycerin, and a small amount of distilled water uniformly. The oil phase is added to the liquid phase by drop wise to obtain oil in water based on biphasic emulsion.

Table No. 1: Formulation chart for the development of Banana leaf face serum.

SL. NO	INGREDIENTS	F1	F2	F3	F4
1	Banana leaf extract	2 ml	4 ml	6 ml	8 ml
2	Jojoba oil	4 ml	4 ml	4 ml	4 ml
3	Rose hip oil	2 ml	2 ml	2 ml	2 ml
4	Sandalwood oil	0.5ml	0.5ml	0.5ml	0.5ml
5	Rosewater	2ml	2ml	2 ml	2 ml
6	Tween 20	0.8ml	0.8ml	0.8ml	0.8ml
7	Glycerin	5 ml	5 ml	5 ml	5 ml
8	Distilled Water	Up to 30ml	Up to 30ml	Up to 30ml	Up to 30ml

Banana leaf face serum

4. RESULTS AND DISCUSSION

4.1 Physical Appearance and Organoleptic Characters

Physical appearance for the developed formulations were evaluated and tabulated as follows. All the formulations complied with the standard color and odor.

Table 2: Physical Appearance and Organoleptic Characters.

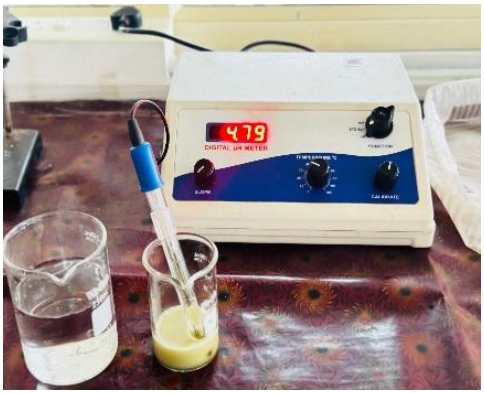
SL.NO	PARAMETER	OBSERVATION
1.	Color	Pale green
2.	Odor	Characteristic
3.	Texture	Smooth Homogenous

4.2 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 4.1-6.7.

Table 3: Determination of Viscosity.

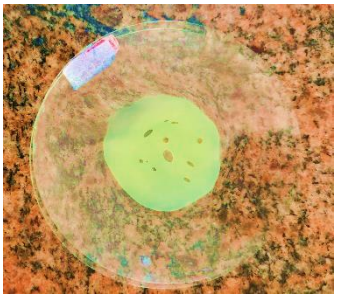
SL. NO	pH
1	4.79 ± 0.11



Determination of pH

4.3 Determination of Spread ability

2 ml 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. Optimal spread ability allows the serum to distribute evenly across the skin, ensuring uniform coverage and enhancing absorption.



Determination of Spread ability

4.4 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.

Table 4: Stability Studies.

SL. NO	PARAMETER	FORMULATION
1	Visual appearance	Pale green
2	Phase separation	No
3	Homogeneity	Good

4.5 Cyclical Temperature Test

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

Table 5: Cyclical Temperature Test.

SL. NO	PARAMETER	STABILITY
1.	Freezer Temperature **(-4°C or 25°F)**	Unstable
2.	Room Temperature **(30°C-40°C or 86°F-104°F)**	Stable

4.6 Wash Ability Test



The formulation was easily removed by washing with tap water.

4.7 SKIN COMPATIBILTY TEST

The formulated face serum shows no signs of redness, itching, irritation and inflammation during study.



Before Testing **Application of serum** **After Testing**

5. CONCLUSION

The Banana leaf face serum was formulated to utilize the rich antioxidant and anti-inflammatory properties of banana leaf extract. The formulated serum showed appropriate pH (4.79), which matches the natural pH of the skin, suggesting good skin compatibility. However, viscosity was slightly lower than expected, possibly due to the high aqueous content of the formulation. From the parameters F4 met all the standard observations and

selected as ideal formulation. Overall, the serum was well-accepted in sensory evaluation, improved skin hydration and limitations of this study include lack of long-term stability data. Challenges such as extraction efficiency and stability were addressed through formulation adjustments. Further studies, including clinical trials and long-term stability testing, can be conducted to enhance the formulation and explore its commercial viability.

This study focused on the formulation and evaluation of a banana leaf face serum incorporating jojoba oil, rosehip oil, sandalwood oil, glycerin, and rose water. Banana leaf extract was selected for its antioxidant, antibacterial, and anti-inflammatory properties, skin nourishment and skin hydration, repair, and overall health and the formulated banana leaf face serum proved to be a stable and skin-friendly product with beneficial skincare properties. Physicochemical parameters like pH, viscosity, and stability were evaluated. The results confirmed that banana leaf extract is a promising natural ingredient for skincare applications. The formulated serum was stable, skin-compatible, Further optimization, particularly regarding long-term stability, is recommended for commercial development.

6. REFERENCE

1. Birnbaum LP, Buresh PH, Kintner SA. A study on the efficacy of topical treatments in the delivery of serums to improve skin hydration and elasticity. J Dermatol Sci., 2004; 34(3): 173-182.
2. Gomes JM, Mariz J, Rodrigues C, Alves AL, Moreira J, Vieira B, Silva RM, Zille A, Silva CJ. Bioactive compounds from banana leaf extracts, 2011 Nov 30; 17(23): 5884.
3. Udapurkar.PP. Formulation and development of face serum, Int J Creative Res Thoughts, 2023 Jun; (6): 1-5.
4. Pattnaik.SVR. Subramanyam and Kole C, Anti-bacterial,Anti-fungal activity often essential oils invitro, Microbios, 1996; 237-246.
5. Bano M, Maurya GP, Srivastava P K, A review on rosehip oil in topical drug delivery systems. World J Pharm Res., 2023; 438-445.
6. Lee MH, Nam TG, Lee I, Shin EJ, Han AR, Lee P, Lee SY, Lim TG. Skin anti-inflammatory activity of rose petal extract (Rosa gallica) through reduction of MAPK signaling pathway. Food Sci Nutr., 2018 Oct 25; 6(8): 2560-2567.
7. 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; 8(5): 53.

8. Rajdev PS, Gaikwad SD, Somvanshi AA, Gunja SS. Formulation and evaluation of face serum. Int J Adv Res Sci Commun Technol., 2022; 2(5): 255-259.