



Formulation and Evaluation of Herbal Face Serum

Gayatri Shesharao Dalvi, Prof. Sneha Kanse, Prof. Swapnil Kale, Divya Amol Gore, Vishakha Shivaji Shinde, Afroaj A Shaikh

Arihant college of pharmacy, Ahmednagar India

Abstract:

Face serums are often used to manage specific skin concerns such as wrinkles, acne, dry skin and dullness. They are designed to brighten, hydrate and provide a variety of benefits, depending on the types of serum you use.

This study explores the formulation and evaluation of a herbal face serum utilizing natural and semi-natural ingredients including papaya seed extract, aloe vera gel, glycerine, vitamin E, rose water, and a preservative - methyl paraben. The serum aims to deliver antioxidant, anti-aging, moisturizing, and skin-repairing benefits through a synergistic blend of bioactive compounds. Papaya seeds offer natural exfoliating and anti-inflammatory properties, while aloe vera gel hydrates and soothes the skin. Glycerine acts as a humectant, vitamin E provides antioxidant protection, and rose water refreshes and tones the skin. The formulation seeks to provide a non-comedogenic, lightweight serum suitable for daily skincare use. The potential of this herbal serum to improve skin texture and health with minimal side effects makes it a promising alternative to synthetic skincare products.

Keyword :- Herbal face serum, Natural skincare, Antioxidant skincare, Non-comedogenic, Natural exfoliant, Plant-based cosmetics

Introduction :-

Cosmetics 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 the study of cosmetics and their application.

Serum is the concentrated solution which is commonly used in cosmetology. In water or oil the cosmetic serum is just as potent as any other cream therefore, it deals with the skin problem quickly and effectively. A skin care formulation must be able to deliver the powerful agent into the skin to fulfill 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. The skin serum are designed to penetrate the skin deeply and provide nourishment, hydration or address issues like wrinkles or pigmentation.

Face serum is a highly concentrated emulsion which is available in water based and oil based. Serums or Defined concentrates, 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.

In recent years, the demand for natural and herbal-based skincare products has significantly increased due to growing awareness about the adverse effects of synthetic chemicals. Among various cosmetic formulations, face serums have gained popularity for their concentrated active ingredients and ability to target specific skin concerns effectively.

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 neuroPeptide.

HISTORY OF FACE SERUM

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.

This study focuses on developing a herbal face serum using a combination of papaya seed extract, glycerine, aloe vera gel, vitamin E capsules, rose water, and methyl paraben. Papaya seeds contain enzymes like papain that aid in gentle exfoliation and skin renewal. Aloe vera gel is widely recognized for its healing, anti-inflammatory, and moisturizing properties. Glycerine is a natural humectant that draws moisture into the skin, while vitamin E acts as a powerful antioxidant, protecting the skin from oxidative stress and environmental damage. Rose water not only provides a pleasant aroma but also helps in toning and soothing the skin. Methyl paraben is used in minimal quantities to ensure product stability and prevent microbial growth.

TYPE of 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

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,

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.

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 active 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.

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.

INGREDIENTS USED IN FACE SERUM

1. PAPAYA



- Kingdom: Plantae
- Order: Brassicales
- Family: Caricaceae
- Genus: Carica
- Species: Carica papaya
- Botanical name: Carica papaya L.
- Synonyms:
 - Papaya carica (a misused name)
 - Carica hermaphrodita (obsolete synonym)
 - Carica peltata Hook. & Arn. (synonym in some classifications)

• Medical properties of papaya

1. Gentle Exfoliation
2. Brightening Effect
3. Anti-Acne
4. Anti-Aging

2. ALOEVERA



- Kingdom: Plantae
- Order: Asparagaleus
- Family: Asphodelaceae
- Genus: Aloe
- Species: Alovera
- Botanical name: Aloe barbadensis miller
- Synonym: Indian aloe

• Medicinal properties of alovera

1. Anti-inflammatory
2. Anti-aging
3. Antimicrobial
4. Anti-acne
5. Moisturizing effect
6. Lightens blemishes in face

3. ROSE WATER



- Kingdom: Plantae
- Order: Rosales

- Family: Rosaceae
- Genus: Rosa
- Species: Rosa damascena Mill.
- Botanical Name: Rosa damascena Mill.
- Synonyms:
 - Rosa × damascena Herrm.
 - Rosa gallica var. damascena
 - Rosa bifer (obsolete)

- **Medicinal properties of rose water**

1. Anti-inflammatory
2. Antioxidant
3. Antiseptic & Antibacterial
4. Astringent
8. Anti-aging & Skin Rejuvenation

4.VITAMIN E



- Kingdom: Plantae
- Order: Poales
- Family: Poaceae (Gramineae)
- Genus: Triticum
- Species: Triticum aestivum L.
- Botanical name: Triticum aestivum L.
- Synonyms:
 - Triticum vulgare Vill.
 - Triticum sativum Lam. (less common)

- **Medicinal properties of vitamin E**

1. Moisturizes Dry Skin
2. Reduces Scars and Marks
3. Anti-Aging
4. Treats Sun Damage
5. Improves Skin Tone
6. Soothes Skin Conditions

5. GLYCERINE

1. Deep Moisturizer (Humectant)
2. Skin Barrier Repair
3. Heals Wounds and Irritations
4. Anti-Aging Effects
5. Acne-Friendly (Non-Comedogenic)
6. Mild Antimicrobial Action

6. METHYL PARABEN

1. Prevents Microbial Contamination
2. Maintains Product Stability
3. Ensures Safety for Users

4. Compatible with Herbal Ingredients

1. Extraction of Papaya Seed :



1. Dry and Crush the Seeds:

- Use ripe papaya seeds.
- Wash thoroughly and dry in shade until moisture-free.
- Crush or lightly grind them to increase surface area for extraction.

2. Boil the Seeds:

- Add the crushed seeds to a pot with 200–250 ml of distilled water.
- Bring the mixture to a gentle boil.

3. Simmer:

- After boiling, reduce heat and simmer for 15–20 minutes.
- Stir occasionally.

4. Cool and Strain:

- Turn off the heat and let it cool slightly.
- Strain through a fine cloth or filter paper to remove solids.

5. Store:

- Pour the decoction into a sterilized amber glass bottle.
- Store in the refrigerator and use within 5–7 days (unless preserved).
- Clean and dry papaya seeds.
- Crush the seeds and soak them in distilled water or alcohol (ethanol) for 24–48 hours.
- Filter the extract and store it in a clean container.

2. Extraction of Aloe Vera



The leaves were collected and washed with distilled water.



A sterile scalpel was used to cut the leaf outlet lengthwise.



The colorless parenchymatous tissue of the aloe vera plant was then cut away with a clean scalpel.



The fibers and impurities are then removed with a muslin cloth.



A filter or filter product, which is a transparent aloe vera gel, was then used in the preparation.

3. . Phase 1 – Aqueous Phase:

- Mix rose water and glycerine in a beaker.
- Stir gently until uniform.

4. Phase 2 – Gel Phase:

- Take aloe vera gel and add the papaya seed extract.
- Stir continuously to avoid lump formation.

5. Phase 3 – Oil-Soluble Ingredients:

- Puncture the vitamin E capsules and add the contents to the mixture.
- Add methyl paraben (pre-dissolved in a small quantity of warm water if needed).

6. Final Mixing:

- Slowly combine all three phases.
- Stir the entire mixture using a magnetic stirrer or hand mixer until a uniform serum-like consistency is achieved.

7. Packaging:

- Store the serum in a dark, air-tight glass or PET bottle to protect from oxidation.
- Label appropriately.

Category and Function

Ingredients	Category	Function
Papaya Seed Extract	Active Botanical	Exfoliant, antioxidant, anti-aging
Aloe Vera Gel	Hydrating Agent	Moisturizer, soothing, anti-inflammatory
Rose Water	Toner/Soothing Agent	Skin toning, refreshing, fragrance
Vitamin E Capsule	Antioxidant	Protects skin from free radicals
Glycerine	Humectant	Attracts moisture, skin hydrator
Methyl Paraben	Preservative	Prevents microbial growth

Composition of Face serum

Sr.No.	Ingredients	Formula
1.	Papaya Seed Extract	12 ml
2.	Aloe Vera Gel	8 ml
3.	Rose Water	7 ml
4.	Vitamin E Capsule	1 Capsule(~0.5 ml)
5.	Glycerine	2 ml
6.	Methyl Paraben	0.2 g

METHOD OF PREPARATION

Step 1: Preparation of Papaya Seed Extract (Decoction)

1. Crush 10–15 g of dried papaya seeds gently with a mortar and pestle.
2. Add the crushed seeds to 200 ml distilled water in a pot.
3. Boil for 5 minutes, then simmer for 15–20 minutes with the lid on.
4. Allow it to cool to room temperature.
5. Strain the decoction using a muslin cloth or fine filter.
6. Measure and take 15 ml of this filtered extract.

Step 2: Dissolving the Methyl Paraben

1. Heat a small amount (approx. 5–10 ml) of rose water to lukewarm (not boiling).
2. Add 0.2 g of methyl paraben to the warm rose water.
3. Stir continuously until it fully dissolves (it dissolves better in warm water).
4. Add the rest of the rose water (to make up 20 ml) once it's dissolved.

Step 3: Mix Water-Based Phase

1. In a clean, sterile beaker, mix:

12 ml Papaya Seed Extract

8 ml Aloe Vera Gel

7 ml Rose Water with dissolved methyl paraben

2 ml Glycerine

2. Mix thoroughly using a glass rod or magnetic stirrer (if available) until smooth.

Step 4: Add Vitamin E

1. Puncture 1 Vitamin E capsule using a sterile pin or needle.
2. Squeeze the contents (approx. 0.5 ml) into the mixture.
3. Stir well to evenly disperse the oil-based vitamin into the aqueous base.

Step 5: Final Mixing and Bottling

1. Mix the entire formulation gently but thoroughly for 2–3 minutes to ensure uniformity.
2. Use a small funnel to pour the serum into a sterilized 50 ml amber glass bottle with a dropper or pump.
3. Label the bottle with the product name, ingredients, and manufacturing date.

Storage and Shelf Life

- Store in a cool, dark place away from sunlight and moisture.
- With methyl paraben added, the serum can last 2–3 months.

- If stored in the refrigerator, shelf life may extend slightly longer.

Usage Instructions

- Apply 2–3 drops of the serum to a clean face before bed.
- Gently massage into the skin in upward circular motions.
- Use once daily at night for best results.

EVALUATION TEST

1. Organoleptic Evaluation (Sensory)

- Color: Should be consistent (light green/clear or per your ingredients)
- Odor: Mild, pleasant (check for off smells over time)
- Texture: Smooth, gel-like
- Appearance: No separation, no particles, clear or slightly opaque

2. pH Test

- Use a pH strip or digital pH meter
- Ideal skin pH: 5.0–6.0
- Adjust with a few drops of citric acid (to lower) or sodium hydroxide (to raise) if needed

3. Viscosity/Consistency

- Check gel stability by observing how it flows
- Should be smooth and not too runny or too thick
- Use a viscometer (optional) or compare flow on a tilted surface

4. Spreadability Test

- Place a small amount between two glass slides
- Measure how much area it spreads under standard weight
- Indicates ease of application

5. Stability Test (Basic Home Version)

- Short-Term: Observe for 1–2 weeks at room temperature
- Accelerated: Store samples at:
 - Room temp (25°C)
 - Refrigerator (4°C)
 - Warm temp (40–45°C)

6. Microbial Test (if possible)

- Optional for DIY, but critical for commercial use

- Use simple home kits or send to a cosmetic testing lab
- Look for bacterial or fungal growth over time

7. Skin Irritation Test (Patch Test)

- Apply a small amount behind the ear or on the forearm
- Observe for 24–48 hours
- Look for redness, itching, swelling

RESULT :

Sr.No.	Test Parameter	Result
1	Colour	Light Green
2	Odour	Pleasant
3	Texture	Smooth
4	PH	5.5
5	Homogeneity	Good
6	Phase separation	Nil
7	Consistency	Semi solid
8	Irritancy	Nil

CONCLUSION :

The formulated herbal face serum offers a synergistic combination of moisturizing, soothing, and antioxidant properties that contribute to overall skin health. Regular application results in increased hydration, reduced irritation, and improved skin texture and tone. The natural ingredients chosen are gentle yet effective, making the serum suitable for a variety of skin types, particularly dry and sensitive skin.

The serum provides a natural alternative to commercial products, with the added benefit of customization and control over ingredients. The presence of methylparaben ensures microbiological safety, which is crucial for homemade skincare formulations.

In summary, this herbal face serum is an affordable, accessible, and effective skincare option that promotes healthier, more youthful-looking skin when used consistently as part of a daily routine.

REFERENCE :

1. Sri S.W. Deshpande & Sri Nilesh Gandhi, A Commentary on the Drugs and cosmetics Act 1940 and Rules 1945 submit publishers, Mumbai 400051.
2. B. Gouveia and P. Riju, "Good manufacturing practices for medicinal products for human use," Journal of pharmacy and Bio Allied Sciences, vol. 7, no. 2, pp. 87-96, 2015,
3. B. Anil Kumar S. Chinch olé, "A Review of Stability Guidelines by ICH Abd USFDA Guidelines for New Formulation and Dosage form," Pharma Tutor Magazine, vol. 2, no. 8, Pp. 32-53, 2014.
4. Akshay D. Thakur. Formulation and Development of De Pigment Serum Incorporating Fruits Extract 2017,2(12), 330-382.[6]. Silvia Surani, Helmy
5. Zoe Diana Drawls, Isabel Diaz, Jinn Nakong, Joanna Wu-Thomas Boyd. Efficacy Evaluation of a Topical Hyaluronic Acid Serum in Facial Photoaging, 2021, 1385-1394.

6. Drills and human. "Cosmetic formulation of skin care products" volume 30, 167-180.
7. Maria Teresa Sanz, Celia Campos, Massimo Milani, Monica Boyacá, et al., Bio revitalizing Effect of a Novel Facial Serum Containing Apple Stem Cell Extract, Pro-Collagen Lipopeptide, Creatine, and Skin Aging Sign 2016, 15, 24-30.
8. K.T.; Choti, N.P. Documentation and Records: Harmonized GMP Requirements. Journal of Young Pharmacists, 3(2), documents n vendor evaluation, 2011.
9. Verdi, Mandeep Singh. Emerging Trends in Oral Health Sciences and Dentistry Ultrasonic Instrumentation, 2015, page no. 609.
10. Shamsuddin, Aimi Monera, International Research Journal of Pharmacy, Formulation and evaluation of anti-aging cream, 2018, page no. 55-591. Tejal sejul, Kiran Kudal, Facial serum: Its formulation, usage, special ingredients, various, types and benefits, International journal of research and application, volume 8, Issue 2, 2023, 680-692.
11. Begoun P, The original beauti bible (skincare facts for ageless beauty), United State book trade publisher group, west 1700 fourth street Berkeley, California. Edition 1st, 2009; 113.
12. Purva S Rajdev, Prof. Gaikwad S.D, Miss Akanksha A Somvanshi, Miss. Shubhangi S Gunjal, Formulation and evaluation of face serum, 2011; 1: 19-20.
13. M. Itrat, Zamigar, Aloe vera a review of its clinical effectiveness, International research journal of Pharmacy, 2013; 4(8).
14. Glaser DA, Anti-aging producer and cosmaceuticals, Facial Plast Surg. Clin NAM, 2004, 12(4), 363-372.
15. Poljšak B, Dahmane R. Godić A. Intrinsic skin aging: the role of oxidative stress. Acta Dermatovenerol Alp Pannonica Adriat. 2012; 21(2):33-36.
16. Gaurav Kumar Sharma Jayesh Gadiya, Meenakshi Dhanawat, Text book of cosmetic Formulations, 2018, 1.8., 51-66
17. Rosann Kozlowski, how to calibrate a pH meter, Sciencing. February 10, 2020.
18. Agarwal S, Sharma TR, Aloe vera and its therapeutic efficacy, Asian journal of Pharmacy and life science, 2011; 1(2): 195-205.
19. Urvasi N and Bhardwaj R.L, Aloe vera for human nutrition, health and cosmetic use, International research journal of plant science, 2012; 3(3): 38-46.
20. Y. Cai, Q. Luo, M. Sun, H. Corke, Antioxidant activity and phenolic compounds of 112 traditional Chinese medicinal plants associated with anticancer, Life Sci. 74 (2004) 2157-2184.
21. Ashwini. R. Patil, Miss. Anjali. R. Patil, R. B. Lovhare, Formulation and evaluation of herbal face serum containing aloe vera and aegle marmelos, International Research Journal of Modernization in Engineering Technology and Science, Volume:05/ Issue:04/ April-2023.
22. V. Akey, A. Can, N. Sutlupinar, E. Candoken, N. Ozsay, T. Y. Ozden, R. Yanardag, E. Uzen, "Twenty years of research on Aloe vera", Istanbul Ecz.Fak.Derg. / J. Fac. Pharm. Istanbul 42(2)2015 pp.191-215.
23. S.Ojha, S. Sinha, S. D. Chaudhari, H. Chandha, B. Agrawal, S. M. Jain, Ajeet and Meenu, "Formulation of Evaluation of Face serum containing bee venom and aloe vera gel", world journal of Pharmaceutical Research Volume 8.
24. Anand A. Zanzwar, Sachin L. Badole, Rashmi Saini, Vitamin C (L-Ascorbic Acid): Antioxidant involved in skin care, 2013, 61-66.
25. Flavia Alvim Sant Anna Adoor, Antioxidants in dermatology, 2017; 92(3):356-362.