

Herbal Face Serum: A Comprehensive Review of Phytochemical Actives and Skin Benefits

Nikhil¹, Amandeep Singh^{2*}, Krati³, Esha Vatsa³, Nidhi Chaudhary³

¹Student, School of Pharmaceutical Sciences, Jigyasa University, Dehradun, Uttarakhand, India

²Principal & Professor, School of Pharmaceutical Sciences, Jigyasa University, Dehradun, Uttarakhand, India

³Assistant Professor, School of Pharmaceutical Sciences, Jigyasa University, Dehradun, Uttarakhand, India

Abstract

Herbal cosmetics are experiencing rapid growth owing to consumer demand for natural, safe, and effective skincare products. The world has now come to the realization that herbal formulations are safer and more effective than synthetic ones. It increases the global demand for herbal formulations. The primary purpose of herbal cosmetics is to preserve and protect an individual's look. Face serum has the ability to swiftly penetrate the skin's layers. Face serum is 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. Aloe vera gel is commonly used to treat different skin disease, sun burn, minor cuts, insect bites, and used as wound healing. Anti-inflammatory, anti- bacterial, and Anti-fungal effect. Serum has a property of rapid absorption and ability to penetrate into deeper layer of the skin. Facial wrinkles and skin aging are undesirable outcome of photo damage and ultraviolet (UV) rays. Herbal alternatives to traditional serums employ fewer synthetic chemicals, which lowers the possibility of discomfort and negative responses. Many people use herbal cosmetics on a regular basis, and they are quite necessary in today's environment.

Keywords: Skin, face serum, anti-inflammatory, Plant based, natural ingredient.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

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. 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 neuro Peptide. The skin is the body's outermost and most superficial layer. It approximately 15–20% of the body's total mass. The skin is a constantly changing organ made up of numerous specialized cells and structures. As we become older, changes in the skin's form have an impact on how it looks [1]. 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 a highly concentrated emulsion which is available in water based and oil based. Serum contains 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. Face Serum is a skincare product that you apply to your skin after washing but before moisturizing with the goal of quickly delivering potent nutrients to the skin. Skin care treatments called serums are made to deliver concentrated amounts of specific active ingredients to the skin. There are numerous unique varieties of serums available that perform special tasks, from hydration to skin lightening. The serum is especially well suited for this endeavor since it is composed of tiny molecules that may permeate the skin deeply and provide an extremely high awareness of active components[2].

*Correspondence

Dr. Amandeep Singh

Principal & Professor, School of Pharmaceutical Sciences, Jigyasa University, Dehradun, Uttarakhand, India.

E-mail: principal.pharmacy@jigyasauniversity.edu.in



Fig 1:Face serum

BENEFITS OF FACE SERUM

- Soothes irritated skin
- Absorbs quickly into the skin
- Improves the appearance of fine lines and wrinkles
- Protects the skin from free radicals and future damage
- Has the potential to provide more visible results

IDEAL PROPERTIES OF FACE SERUM:

- Reduces itchy skin: Aloe vera is well known for its ability to regenerate cells and fight off viruses. Aloe gel's advantages are comparable to those of putting it to a sunburn.
- Deep hydration: have the special capacity to both raise and lower skin moisture.
- Lessens blemishes and acne: Bael fruit prevents the formation of bacteria, which is the main cause of pimples and acne.

•Diminish puffiness and dark circles: Antioxidants and vitamin E aid in the coloring of the eyelids, and cooling properties lessen puffiness.

•It encourages the production of collagen and gets rid of dead skin cells[3].

TYPES OF FACIAL SERUMS

1. Oil serum.
2. Gel serum.
3. Water based serum.
4. The emulsion serum.
5. Pressed balm serum

Oil serum: The easiest kind of face serum to prepare is an oil serum. Usually, it is composed of high quality, quickly absorbed carrier oils with moisturizing and barrier- repairing qualities. Essential fatty acids, polyphenols, and other compounds that are readily absorbed by the skin are also present in these oils[4,5].



Fig 2:Oil serum

Gel Serum: Gel serums give the skin a "tightening" feeling, which makes certain parts of the face feel tighter or more lifted. This kind of serum is a water-based formulation since it permits the addition of plant extracts that are based on water[6].



Fig.3:Gel Serum

Water based serum: Gel-based serums are similar to water based serums, though they might or might not contain gums and thickeners. A water-based face serum would be used to apply the high performance hydrophilic plant extracts that are trapped against the skin underneath a cream or lotion. The best way to encourage greater absorption of water-based compounds into the skin and move their high-performance components a little bit deeper into the skin layers is to apply an anti-aging face mist first under an emulsion and then oil[7].



Fig 4: Water based serum

The emulsion serum: An emulsion-based face serum is a kind of moisturizer that delivers high-performance skin components while reinforcing the skin's barrier. It joins two "immiscible" phases, such as water and oil, and uses an emulsifier to keep them together and in a stable form. High performance actives are best delivered by this serum deep into the skin's tissues.



Fig.5. Emulsion Serum

Pressed balm serum: A balm serum contains active ingredients that are oil-soluble (lipophilic) and may benefit the skin in addition to the traditional balm base of butters, waxes, and oils. The occlusive barrier that the butters and waxes create on the skin nourishes and moisturizes it while enabling the active ingredients in the pressed serum to perform their functions. Thousands of beautiful plant oils can be mixed with dozens of interesting, unusual butters and waxes to create a balm serum[9].



Fig.6. Pressed balm Serum

ADVANTAGES

Face serums have several advantages, making them a popular choice in skincare routines. Here are some key benefits:

- Targeted Treatment:** Serums typically contain high concentrations of active ingredients that can target specific skin concerns like acne, wrinkles, hyperpigmentation, or dehydration[10].
- Lightweight Texture:** They are usually lightweight and fast-absorbing, making them perfect for layering under other skincare products like moisturizers and sunscreens[11].
- Hydration Boost:** Many serums, especially those with hyaluronic acid, provide intense hydration, leaving your skin feeling soft and plump.
- Improved Skin Tone:** Serums with ingredients like vitamin C can help brighten the skin and even out skin tone, reducing the appearance of dark spots or sun damage.
- Anti-Aging:** Serums with antioxidants, peptides, and retinoids can help reduce the appearance of fine lines and wrinkles over time by promoting collagen production and skin repair[12].
- Penetrates Deeper:** Due to their smaller molecules, serums penetrate deeper into the skin compared to creams or lotions, providing more effective treatment at a cellular level.

- Customized Solutions:** There are so many types of serums available, allowing you to tailor your skincare routine to your specific needs, whether it's acne treatment, anti-aging, or brightening[14].

DISADVANTAGES

Face serums can be great for targeting specific skin concerns, but there are a few potential downsides to consider:

- Price:** Serums tend to be more expensive than other skincare products like moisturizers, especially if they contain high quality or active ingredients.
- Skin Sensitivity:** Some serums contain potent active ingredients like retinol, vitamin C, or exfoliating acids, which can cause irritation or sensitivity, especially for sensitive skin.
- Overuse:** Using too many serums or overapplying can overwhelm the skin, causing dryness, breakouts, or clogged pores[15].
- Not Moisturizing Enough:** While serums are effective at delivering active ingredients deep into the skin, they don't usually provide enough hydration, so you might still need to use a moisturizer.

•**Potential for Allergic Reactions:** Certain ingredients in serums may not work well with your skin type or could trigger allergies, so patch testing before use is recommended.

•**Can Be Too Specialized:** Some serums are formulated for specific issues (like antiaging or brightening), which means they might not be versatile enough for every skin concern[16].

FORMULATION OF FACIAL SERUM

The formulation of facial serum involves carefully selection and combining ingredients to create a product that addresses specific skincare concerns and delivers desired benefits. Here's a basic outline of the formulation process;

•**Active ingredient selection:** Identify key active ingredient based on their skin care benefits. These could include botanical extract, vitamins and other compounds known for their moisturizing, anti aging, brightening or soothing property. The formulation of a facial serum involves carefully selecting and combining ingredients to create a product that addresses specific skincare concerns and delivers desired benefits[17].

•**Base Ingredients:** Choose a base or carrier for the serum, such as water, aloe vera gel, or a combination of water and glycerin. This forms the bulk of the product and helps deliver the active ingredients to the skin.

•**Emulsifiers and Stabilizers:** Add emulsifiers and stabilizers to ensure that the ingredients blend together smoothly and maintain their stability over time. Common emulsifiers include cetearyl alcohol[18].

•**Preservatives:** Incorporate preservatives to prevent microbial growth and extend the shelf life of the serum. Examples of preservatives include phenoxyethanol[19].

•**Fragrance and Color:** Optionally, add fragrance or natural essential oils for scent, and colorants for aesthetic appeal. Keep in mind that fragrance can be sensitizing for some individuals, so consider using minimal amounts or opting for fragrance-free formulations.

•**Testing:** Conduct stability and compatibility tests to ensure the formulation remains stable over time and does not cause adverse reactions[20,21].

•**Regulatory Compliance:** Ensure compliance with regulatory standards and labeling requirements for skincare products in your target market. This may include listing all ingredients, indicating usage instructions, and adhering to safety guidelines[22].

By carefully formulating a facial serum with high-quality ingredients and following good manufacturing practices, it's possible to create an effective and safe product that addresses specific skincare needs. Additionally, conducting thorough research and consulting with skincare professionals can help inform the formulation process and enhance the efficacy of the final product[23].

METHOD OF PREPARATION

□ **Preparation of oil phase**

The oil soluble ingredients such as vitamin e capsule, coconut oil are taken into one beaker and melted at 70°C

□ **Preparation of water phase**

The water phase is prepared at same time by mixing aloe vera gel, rose water and green tea extract in another beaker[24].

□ **Preparation of emulsion**

Emulsion was prepared by adding oil phase into water phase drop wise under mechanical steering at 700 to 800 rpm to obtain O/W biphasic emulsion[25].

Active ingredient used in herbal face serum

I. Aloe vera gel



Fig.7. Aloe Vera Gel

- Aloe stimulates fibroblast which produces the collagen and elastin fibers making the skin more elastic and less wrinkled[26].
- It has antioxidant and antibacterial property.
- Aloe vera has been used to treat wounds and infections.
- It block UVA and UVB rays and maintain skin natural moisture balance.
- It stop the sunburn and stimulate immune system intervention[27].

II. Rose water

**Fig.8. Rose Water**

- Rose water can be used to lighten the skin pigmentation.
- Rose water can remove oils and dirt from your skin.
- It helps to maintain pH level .
- Rose water is said to be a natural skin toner due to this amazing PH – balancing properties[28].

III. Green tea extract

**Fig.9. Green Tea Extract**

- It has skin purifying properties that help make your face look clearer and brighter.
- Green tea contains many antioxidant such as flavonoids Anthocynin and polyphenols.
- Helped calm itching and general irritation[29].

IV. Vitamin E capsule

**Fig.10. Vitamin E Capsule**

- Provide extra protection against acute UVB damage
- Vitamin E is an antioxidant, which helps to protect your cells[30]

Table 1: List of Plants Used In Formulation Of Herbal Face Serum With Its Properties

S.No.	Name of plant	Chemical constituent	Functional Properties	Parts used in face serum preparation
1.	Aloe vera	Amino acids, polysaccharides, minerals organic acids, phenolic compounds, anthrones, C-glycosides	Anti-inflammatory, anti-itch, pain reduction, wound healing, antioxidant properties	Aloe leaf gel
2.	Rose water	Flavonoids, terpenes, tannins, phenolic compounds	Hydrating, moisturizing, calming aroma, antimicrobial, antioxidant	Rose water
3.	Green Tea	Catechins (EGCG), caffeine	Antioxidant, antiinflammatory, weight loss support properties	Leaves
4.	Vitamin E Capsule	Tocopherols, tocotrienols, fatty acids	Antioxidant, antiaging, supports healing, emollient	Vitamin E rich oils extracted from seeds
5.	Coconut Oil	Lauric acid, caprylic acid, vitamin E	Moisturizing, antimicrobial, antiinflammatory properties	Oil

Evaluation parameters for herbal face serum:

•**Physical Appearance and Color:** The visual inspection of the serum was carried out to evaluate its clarity, color, and consistency. A good-quality serum should appear uniform, free from phase separation, and have a pleasant, stable color.

•**pH Determination:** The pH of the serum was measured using a digital pH meter to ensure compatibility with skin, which typically has a pH range of 4.5 to 6.5. Maintaining an appropriate pH is crucial to avoid skin irritation and maintain barrier function.

•**Viscosity:** Viscosity determines the flow behavior and spreading ability of the serum. It was evaluated using a Brookfield viscometer. A suitable viscosity ensures ease of application and product stability.

•**Spread-ability:** Spreadability was tested by placing a fixed quantity of serum between two glass slides and measuring the area covered under a specific load. This parameter is vital for consumer satisfaction and uniform application on the skin.

•**Stability Studies:** The formulated serum was stored at different temperatures (refrigerated, room temperature, and elevated temperature) for 30–60 days. The formulation was observed for phase separation, color change, pH variation, and microbial growth. Stability indicates shelf-life and resistance to degradation under varying conditions.

•**Skin Irritation Test (Patch Test):** A patch test was conducted on a small group of healthy volunteers to assess any allergic or irritant reactions. A small amount of the serum was applied on the forearm and observed for 24 hours. No redness, itching, or swelling indicated dermatological safety [30]

Conclusion

Herbal face serums are popular for their natural ingredients and potential benefits for skin health. However, individual experiences may vary, and it's essential to choose products based on your skin type and specific needs. Always patch-test new products and consult with a dermatologist if you have concerns about potential allergens or sensitivities.

References

1. Agarwal S, Sharma TR. Aloe vera and its therapeutic efficacy, Asian journal of Pharmacy and life Science 2011; 1(2), 195-205.
2. 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.
3. S. Ojha, K. Sonkar, M. Pandey, S. Saraf. Aloe vera gel: A potent nutraceutical, Journal of natural Pharmaceuticals, 2011;2(1), 36-39.
4. K. Hazra, S. Dutta, A. Kumar Mandal, D. Nath Mondal, J. Hazra, Comprehensive Dossier on Ayurvedic Medicinal Plant Aegle Marmelos (L.) Correa. : A Review. 2017:1
5. Y. Cai Q. Luo, M. Sun, H. Corke, Antioxidant activity and phenolic compounds of 112 traditional Chinese medicinal plants associated with anticancer, Life Sci. 2004;74 2157–2184.
6. Oxford English Dictionary. (n.d.). Cosmetic. In Oxford English Dictionary. Retrieved from <https://www.oed.com>
7. Merriam-Webster. (n.d.). Cosmetic. In Merriam-Webster.com dictionary. Retrieved from <https://www.merriam-webster.com>
8. American Academy of Dermatology Association. (n.d.). Skin: Overview. <https://www.aad.org> 9
9. Bologna, J. L., Schaffer, J. V., & Cerroni, L. (2018). Dermatology (4th ed.). Elsevier.
10. Draeos, Z. D. (2016). Cosmetic dermatology: Products and procedures (2nd ed.). Wiley Blackwell.
11. Mukherjee, S., Date, A., Patravale, V., Korting, H. C., Roeder, A., & Weindl, G. Retinoids in the treatment of skin aging: An overview of clinical efficacy and safety. Clinical Interventions in Aging, 2006; 1(4), 327–348.
12. Rawlings, A. V., & Harding, C. R. Moisturization and skin barrier function. Dermatologic Therapy, 2004;17(1), 43–48.

13. Kanitakis, J. Anatomy, histology and immunohistochemistry of normal human skin. *European Journal of Dermatology*, 2002; 12(4), 390–399.
14. American Academy of Dermatology Association. (n.d.). Skin: Overview. <https://www.aad.org>
15. Wang, A. S., & Dreesen, O. Biomarkers of cellular senescence and skin aging. *Frontiers in Genetics*, 2018; 9, 247.
16. Elsner, P., & Maibach, H. I. (Eds.). (2000). *Cosmetics: Controlled efficacy studies*. Springer.
17. Lodén, M., & Maibach, H. I. (Eds.). (2012). *Treatment of dry skin syndrome: The art and science of moisturizers* (2nd ed.). Springer.
18. Flament, F., Bazin, R., Laquieze, S., Rubert, V., Simonpietri, E., & Piot, B. Effect of a cosmetic serum containing antioxidants on skin aging. *Journal of Cosmetic Dermatology* 2018; 17(5), 700–707.
19. Hollinger, J. C., Angra, K., & Halder, R. M. Are natural ingredients effective in the management of hyperpigmentation? A review. *Journal of Clinical and Aesthetic Dermatology*, 2018; 1(2), 28–37.
20. Jain, A., Jain, P., Garg, N., & Kesharwani, P. Peptides in cosmetology: A review. *International Journal of Peptide Research and Therapeutics*, 2017; 23(3), 355–368.
21. Lupo, M. P. Antioxidants in dermatology. *Clinics in Dermatology*, 2001; 19(4), 467–473.
22. Peng, Y., Yue, L., & Cong, Y. Enhancing dermal absorption of cosmeceuticals: Innovations and techniques for targeted skin delivery. *Journal of Cosmetic Dermatology*, 2025; 24(10), e70514. <https://doi.org/10.1111/jocd.70514>
23. Krati, Martolia Jaya, et. al, A comprehensive review on in-vitro methods for anti- microbial activity, *IP International Journal of Comprehensive and Advanced Pharmacology*, 2024; 9(3):1
24. Magnusson, B. M., Anissimov, Y. G., Cross, S. E., & Roberts, M. S. (2012). Molecular size as the main determinant of solute maximum flux across the skin. *Cosmetics & Toiletries*. 2012:1
25. Pouillot, A., Dayan, N., Polla, A. S., Polla, L. L., & Polla, B. S. (2008). Penetration of cosmetics into and through the stratum corneum: review of pathways and mechanisms. *Cosmetics & Toiletries*. 2008:1
26. Morganti, P., Fabrizi, G., Beatrice, B. M., Danti, S., Azimi, B., & Gagliardini, A.. Skin delivery and innovative carrier effectiveness: Novel nano- and micro-carriers for targeted cosmetic actives. *Journal of Dermatology & Dermatitis*, 2024; 10(5): 166.
27. Anil Kumar, Esha Vatsa, “AI-Powered Embryo Selection is revolutionized: A Review” *South Eastern European Journal of Public Health*, 2025; XXVI (1): 6223-6230.
28. Vaidya, S. Review on face serum. *Asian Journal of Pharmaceutics* 2024; 18(3):1
29. Mehmood, Y., Shahid, M., Rizvi, J., Jamshaid, M., Arshad, S., Nur-e-Alam, H., Hussain, F., & Kazi, M. Hyaluronic acid–solid lipid nano transporter serum preparation for enhancing topical tretinoin delivery: skin safety study and visual assessment of skin. *Frontiers in Pharmacology*, 2024; 15, 1401594.
30. Alnaim, A. S. Nanocrystals in dermal drug delivery: A breakthrough for enhanced skin penetration and targeted skin disorder treatments. *Pharmaceutics*, 2024; 16(12), 1561.

Conflict of Interest: Nil
Source of support: None