



iJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 14 **Issue:** IX **Month of publication:** September 2026

DOI: <https://doi.org/10.22214/ijraset.2026.84908>

www.ijraset.com

Call: ☎ 08813907089

E-mail ID: ijraset@gmail.com

A Review: Herbal Face Serum

Dr. Nitin M Gawai¹, Mr. Kunal R Hake², Mr. Darshan Sanjay Jadhav³

¹Principal, Mahadev Kanchan College of Pharmaceutical Education and Research, Uruli Kanchan- 412202

²Assistant Professor, Mahadev Kanchan College of Pharmaceutical Education and Research, Uruli Kanchan- 412202

³Research Scholar, Mahadev Kanchan College of Pharmaceutical Education and Research, Uruli Kanchan- 412202

Abstract: Herbal face serums are concentrated topical formulations containing bioactive constituents derived from medicinal plants and natural sources. They have gained considerable attention in modern cosmetic and pharmaceutical research because of their potential to provide targeted skincare benefits with reduced dependence on synthetic ingredients. Herbal extracts such as Aloe vera, green tea, turmeric, neem, licorice, amla, rose, and Centella asiatica contain phytoconstituents including polyphenols, flavonoids, terpenoids, tannins, vitamins, and other antioxidants that may contribute to antioxidant, anti-inflammatory, antimicrobial, moisturizing, anti-acne, skin-brightening, and anti-aging effects. This review discusses the concept, composition, classification, and formulation approaches of herbal face serums, along with the properties and mechanisms of important herbal ingredients used in their development. Various formulation components, preparation methods, and evaluation parameters such as appearance, pH, viscosity, spreadability, homogeneity, skin irritation, microbial quality, antioxidant activity, and stability are also discussed. The review further highlights challenges associated with herbal formulations, including standardization, stability, and batch-to-batch variation, preservation, and safety assessment. Recent advances such as nano-herbal formulations, phytosomes, liposomes, and other advanced delivery systems are also considered. Overall, herbal face serums represent a promising area in cosmetic formulation research, although systematic standardization, stability studies, and scientifically validated clinical evidence are essential for their broader development and acceptance.

Keywords: Herbal face serum, Herbal cosmetics, Medicinal plants, Phytoconstituents, Antioxidants, Skin care, Anti-aging, Anti-acne, Skin brightening, Topical formulation, Natural products, Cosmetic formulation.

I. INTRODUCTION

The skin is the largest organ of the human body and serves as the primary protective barrier against environmental factors such as ultraviolet (UV) radiation, pollutants, microorganisms, and chemical irritants. Continuous exposure to these factors, along with oxidative stress, dehydration, lifestyle changes, and ageing, can contribute to several skin concerns, including dryness, acne, hyperpigmentation, dullness, inflammation, and premature ageing. Therefore, the development of effective topical skincare products has become an important area of cosmetic and pharmaceutical research¹⁻².

Cosmetic formulations have traditionally incorporated synthetic ingredients to provide moisturizing, cleansing, anti-acne, skin-lightening, and anti-ageing effects. However, increasing consumer interest in natural and plant-based products has encouraged the development of herbal cosmetics. Medicinal plants contain biologically active phytoconstituents such as flavonoids, phenolic compounds, tannins, terpenoids, alkaloids, vitamins, polysaccharides, and essential oils. These compounds may exhibit antioxidant, antimicrobial, anti-inflammatory, soothing, moisturizing, and skin-protective properties³⁻⁴.

Among modern topical formulations, face serums have attracted considerable attention because they are generally lightweight and designed to deliver selected active ingredients to the skin. Incorporation of standardized herbal extracts into serum systems provides an opportunity to combine the traditional benefits of medicinal plants with contemporary cosmetic formulation technology. Herbal face serums can therefore be developed to address specific concerns such as oxidative stress, acne, dryness, uneven skin tone, inflammation, and signs of ageing⁵⁻⁶. The effectiveness of a herbal face serum depends not only on the biological activity of the selected plants but also on extraction method, concentration of active constituents, compatibility of ingredients, formulation composition, pH, viscosity, stability, preservation, and skin penetration. Hence, systematic formulation and evaluation are essential to develop safe, stable, effective, and acceptable herbal serum products⁷⁻⁸.

II. FACE SERUM: AN OVERVIEW

A face serum is a concentrated topical preparation formulated to deliver specific active ingredients to the skin. Compared with conventional creams and lotions, serums are generally formulated with a lighter vehicle and are intended to provide targeted cosmetic or dermatological benefits.

Depending on their composition, serums may be formulated as aqueous, hydro alcoholic, gel-based, emulsion-based, or other suitable topical systems⁹. Face serums may contain active ingredients such as antioxidants, vitamins, botanical extracts, peptides, humectants, and other functional substances. The formulation is designed according to the intended cosmetic purpose. For example, antioxidant serums may contain plant polyphenols, while moisturizing serums may contain humectants and soothing botanical ingredients⁹.

A. Characteristics of Face Serum

Important characteristics of an ideal face serum include:

- Lightweight and non-greasy texture
- Easy application and rapid spreading
- Good skin compatibility
- Suitable viscosity
- Pleasant appearance and odour
- Uniform distribution of active ingredients
- Appropriate pH for topical application
- Good physical and chemical stability
- Protection of active ingredients from degradation
- Minimal skin irritation¹⁰

B. Types of Face Serums

Face serums can broadly be classified according to their intended function:

- Moisturizing serums: designed to improve skin hydration.
- Antioxidant serums: intended to protect against oxidative stress.
- Anti-ageing serums: formulated to support the appearance of youthful skin.
- Anti-acne serums: designed for oily and acne-prone skin.
- Skin-brightening serums: used to improve the appearance of uneven skin tone.
- Soothing serums: intended to calm and hydrate sensitive or irritated skin.
- Herbal serums: contain plant extracts or other naturally derived active ingredients.¹¹

Table.1: Difference between Serum, Cream and Lotion¹²

Parameter	Serum	Cream	Lotion
Texture	Lightweight	Thick/semi-solid	Fluid/semi-liquid
Active concentration	Generally concentrated	Variable	Generally lower
Skin feel	Light, non-greasy	More occlusive	Light to moderate
Application	Targeted skincare	General moisturization/protection	Large-area application
Common use	Specific skin concerns	Moisturization and protection	Hydration and body/face care

III. HERBAL FACE SERUM

A herbal face serum is a topical serum containing one or more herbal extracts, plant-derived active constituents, or other naturally derived ingredients intended to provide specific skincare benefits. It combines the concentrated delivery characteristics of serum formulations with the biological properties of medicinal and cosmetic plants.

Herbal ingredients are selected based on their phytochemical composition and intended activity. For example, *Aloe vera* is commonly associated with moisturizing and soothing properties, green tea provides catechins-rich antioxidant activity, and turmeric contains Curcuminoids with antioxidant and anti-inflammatory potential, while *Centella asiatica* contains triterpenoid compounds that have been investigated for skin repair and collagen-related effects.¹²⁻¹³

IV. HERBAL INGREDIENTS USED IN FACE SERUMS:¹⁴⁻¹⁵

Herbal ingredients are an important component of natural face serum formulations because they provide various biologically active phytoconstituents with potential cosmetic and dermatological benefits. Selection of a suitable herbal ingredient depends on its phytochemical profile, intended skin benefit, safety, stability, compatibility with other formulation components, and evidence supporting its activity.

A. *Aloe vera (Aloe barbadensis Miller)*

Aloe vera is widely used in skincare formulations because of its moisturizing and soothing properties. The gel contains polysaccharides, particularly acemannan, along with phenolic compounds, vitamins, minerals, and enzymes. It may help maintain skin hydration and support the appearance of irritated or dry skin.

B. *Green Tea (Camellia sinensis)*

Green tea is rich in polyphenols, particularly catechins such as epigallocatechin gallate (EGCG). These compounds possess significant antioxidant properties and have been investigated for their potential role in protecting skin from oxidative stress and supporting healthy skin appearance.

C. *Turmeric (Curcuma longa)*

Turmeric contains curcuminoids, primarily curcumin, which are known for antioxidant and anti-inflammatory activities. Turmeric extracts are therefore investigated in cosmetic formulations intended for soothing and protecting the skin.

D. *Neem (Azadirachta indica)*

Neem leaves contain limonoids, flavonoids, tannins, and other bioactive compounds. Neem is traditionally used for skin care and has antimicrobial and anti-inflammatory potential, making it particularly relevant to formulations intended for acne-prone skin.

E. *Licorice (Glycyrrhiza glabra)*

Licorice contains glycyrrhizin, flavonoids, and compounds such as glabridin. Glabridin has been investigated for its effects on melanogenesis and antioxidant activity. Licorice extracts are therefore frequently explored in formulations designed to improve the appearance of uneven skin tone.

F. *Amla (Phyllanthus emblica)*

Amla is a rich source of polyphenols, tannins, and vitamin C-related antioxidant activity. It has potential antioxidant and skin-protective properties and can be incorporated into formulations aimed at maintaining healthy-looking skin.

G. *Rose (Rosa spp.)*

Rose petals and rose-derived preparations contain phenolic compounds and volatile constituents. Rose ingredients are commonly incorporated for their refreshing, soothing, and antioxidant properties and may also contribute to the sensory characteristics of a serum.

H. *Centella asiatica*

Centella asiatica contains triterpenoid compounds such as asiaticoside, madecassoside, asiatic acid, and madecassic acid. These constituents have been investigated for their role in skin repair, antioxidant activity, and support of collagen-related processes.

I. *Cucumber (Cucumis sativus)*

Cucumber contains water, vitamins, minerals, flavonoids, and phenolic compounds. Its extract is commonly used in cosmetic formulations because of its hydrating, refreshing, and soothing properties.

J. *Chamomile (Matricaria chamomilla)*

Chamomile contains flavonoids and other bioactive constituents, including apigenin and related compounds. It is traditionally used in skincare preparations for its soothing and antioxidant properties.

V. MECHANISM OF ACTION ON SKIN: 16-17

Herbal face serums exert their effects through the biological activities of plant-derived phytoconstituents. Depending on the botanical source, these constituents can act on different pathways involved in oxidative stress, inflammation, pigmentation, hydration, microbial growth, and skin ageing.

A. Antioxidant Action

Herbal ingredients containing polyphenols, flavonoids, carotenoids, and vitamins can scavenge reactive oxygen species (ROS) and reduce oxidative stress. This may help protect cellular components from oxidative damage and support healthy skin appearance.

B. Anti-Inflammatory Action

Certain phytoconstituents may modulate inflammatory mediators and pathways involved in skin inflammation. Ingredients such as turmeric, chamomile, and *Centella asiatica* have been investigated for their soothing and anti-inflammatory potential.

C. Antimicrobial Action

Some herbal extracts contain compounds capable of inhibiting the growth of selected bacteria and fungi. Neem, turmeric, and tea-derived ingredients have therefore been investigated for use in formulations intended for acne-prone or blemish-prone skin.

D. Skin Hydration

Humectant and polysaccharide-rich botanical ingredients can help attract and retain water at the skin surface. *Aloe vera* is commonly incorporated into topical formulations for its moisturizing and soothing properties.

E. Anti-Ageing Action

Oxidative stress and degradation of structural proteins are associated with visible signs of skin ageing. Botanical antioxidants may help reduce oxidative damage, while some plant constituents have been investigated for their effects on collagen-related processes and skin elasticity.

F. Skin-Brightening Action

Certain botanical constituents may influence melanogenesis and tyrosinase-related pathways involved in melanin production. Licorice-derived compounds, for example, have been studied for their potential to help improve the appearance of uneven pigmentation.

G. Skin Barrier Support

Some herbal ingredients may help maintain skin hydration and support the skin barrier by reducing moisture loss and improving the condition of the stratum corneum.

H. Wound-Healing and Skin Repair Support

Certain plant-derived compounds have been investigated for their effects on cellular proliferation, collagen formation, and tissue repair. *Centella asiatica* is one of the botanicals commonly studied in this context.

VI. ADVANTAGES OF HERBAL FACE SERUM: 19-20

- 1) Natural Source of Active Ingredients -Contains bioactive compounds derived from medicinal plants and natural sources.
- 2) Rich in Phytoconstituents -Provides flavonoids, polyphenols, tannins, terpenoids, vitamins, and other beneficial compounds.
- 3) Antioxidant Activity - Helps neutralize free radicals and protect skin from oxidative stress.
- 4) Anti-Inflammatory Potential – Herbal ingredients may help soothe inflammation and irritation.
- 5) Moisturizing Effect - Ingredients such as *Aloe vera* help improve skin hydration and maintain moisture.
- 6) Anti-Acne Potential -Herbs with antimicrobial and soothing properties may be useful for acne-prone skin.
- 7) Anti-Ageing Potential - Antioxidant phytoconstituents may help reduce oxidative damage associated with premature skin ageing.

- 8) Skin-Brightening Potential -Certain herbal constituents may help regulate melanin formation and improve the appearance of uneven skin tone.
- 9) Lightweight and Non-Greasy - Serum formulations are generally light, easily spreadable, and comfortable on the skin.
- 10) Targeted Skincare - Can be formulated with specific herbal ingredients to address particular skin concerns.

VII. LIMITATIONS AND CHALLENGES:²¹⁻²²

- 1) Batch-to-Batch Variation - The concentration of active phytoconstituents may vary depending on plant source, cultivation, harvesting, and processing conditions.
- 2) Standardization Difficulties – Maintaining a consistent concentration and quality of multiple phytoconstituents in herbal extracts can be challenging.
- 3) Stability Issues – Herbal constituents may degrade due to light, heat, oxygen, moisture, or changes in pH.
- 4) Microbial Contamination – Natural plant extracts can be susceptible to microbial contamination, requiring effective preservation and microbiological testing.
- 5) Allergic Reactions – Certain herbal extracts, essential oils, or fragrances may cause irritation or allergic reactions in sensitive individuals.

VIII. RECENT ADVANCES:²³⁻²⁴

Recent developments in herbal face serum formulation focus on improving the stability, skin delivery, efficacy, safety, and standardization of plant-derived active ingredients. Important advances include:

A. Nano-Herbal Face Serums

Nanotechnology is being explored to improve the delivery of poorly soluble or unstable herbal phytoconstituents. Nano-sized systems may enhance surface interaction and improve the availability of botanical actives at the skin.

B. Nanoemulsion-Based Serums

Nanoemulsions containing herbal extracts or essential oils provide small droplet sizes, improved physical stability, and a lightweight sensory profile. They are particularly useful for incorporating poorly water-soluble botanical constituents.

C. Liposomal Herbal Serums

Liposomes can encapsulate hydrophilic and lipophilic plant constituents and may improve their protection from degradation and facilitate their delivery into the skin.

D. Phytosome Technology

Phytosomes involve complexing selected plant constituents with phospholipids. This approach is being investigated to improve the solubility, stability, and skin availability of certain herbal actives.

E. Nanostructured Lipid Carriers (NLCs)

NLC-based systems can incorporate lipophilic herbal compounds and provide controlled protection of sensitive phytoconstituents against environmental degradation.

IX. RESEARCH GAPS AND FUTURE PERSPECTIVES:²⁵

Despite the increasing popularity of herbal face serums, several research gaps remain. Most available evidence focuses on individual herbal extracts, while fewer studies systematically evaluate complete herbal serum formulations. There is also a need for better standardization of herbal extracts because phytochemical composition can vary with plant variety, geographical origin, cultivation, harvesting, and extraction conditions.

Major Research Gaps

- 1) Limited clinical validation - More well-designed human studies are required to establish the actual safety and efficacy of herbal face serums.
- 2) Lack of standardized herbal extracts -Consistent marker compounds and quality specifications need to be established.

- 3) Insufficient long-term stability data- More studies are required to understand the stability of phytoconstituents during storage.
- 4) Limited understanding of skin permeation - Research is needed to determine the extent and mechanism of delivery of herbal active constituents through the skin.
- 5) Batch-to-batch variability- Improved cultivation, authentication, extraction, and quality-control approaches are needed to achieve reproducible formulations.
- 6) Limited toxicity and sensitization studies - Systematic evaluation of irritation, sensitization, phototoxicity, and long-term safety is necessary.
- 7) Optimization of herbal combinations -The appropriate combination and concentration of multiple herbal extracts require scientific investigation.
- 8) Limited comparative studies -Herbal formulations should be compared with suitable conventional or commercially available products using standardized evaluation methods.
- 9) Insufficient mechanistic studies - More research is needed to establish molecular mechanisms underlying the antioxidant, anti-inflammatory, antimicrobial, anti-ageing, and skin-brightening effects of botanical ingredients.
- 10) Regulatory and quality challenges - Harmonized approaches for characterization, quality control, safety assessment, and substantiation of cosmetic claims would improve product reliability.

Future research can focus on nano-herbal serums, liposomes, phytosomes, nanoemulsions, nanostructured lipid carriers, and other advanced delivery systems to improve the stability and delivery of phytoconstituents. Green extraction technologies and sustainable excipients can support environmentally responsible formulation development. Integration of HPLC, HPTLC, LC-MS/MS, spectroscopy, in-vitro skin models, ex-vivo permeation studies, and clinical evaluation can provide stronger scientific evidence.

Personalized skincare, multifunctional herbal serums, standardized botanical combinations, and smart packaging designed to protect sensitive phytoconstituents are also promising areas for future research. Greater emphasis should be placed on evidence-based formulation development rather than relying solely on traditional claims.

X. CONCLUSION

Herbal face serums represent a promising area of modern cosmetic and pharmaceutical formulation research because they combine the concentrated nature of serum formulations with the potential biological activities of plant-derived ingredients. Herbal constituents such as polyphenols, flavonoids, terpenoids, vitamins, polysaccharides, and other phytochemicals may provide antioxidant, moisturizing, antimicrobial, soothing, anti-inflammatory, and skin-protective benefits. However, the effectiveness and safety of a herbal face serum depend on proper selection and authentication of plant materials, extraction method, phytochemical standardization, formulation optimization, stability, preservation, and appropriate safety evaluation. Natural origin alone does not ensure consistency or safety. Future development should therefore focus on scientifically standardized herbal extracts, advanced delivery systems, improved analytical characterization, sustainable formulation approaches, and well-designed efficacy and safety studies. With systematic research and appropriate quality control, herbal face serums have considerable potential as safe, effective, stable, and scientifically validated topical skincare formulations.

REFERENCES

- [1] Afaq, F., & Mukhtar, H. (2006). Botanical antioxidants for chemoprevention of photocarcinogenesis. *Cancer Letters*, 226(1), 35–47.
- [2] Bowe, W. P., & Shalita, A. R. (2011). Effective over-the-counter acne treatments. *Seminars in Cutaneous Medicine and Surgery*, 30(3), 131–136.
- [3] Draeos, Z. D. (2018). *Cosmetic dermatology: Products and procedures*. Wiley-Blackwell.
- [4] Działo, M., Mierziak, J., Korzun, W., Preisner, M., Szopa, J., & Kulma, A. (2016). The potential of plant phenolics in prevention and therapy of skin disorders. *International Journal of Molecular Sciences*, 17(2), 160.
- [5] Farris, P. K. (2014). Cosmeceuticals and cosmetic ingredients. *Dermatologic Clinics*, 32(1), 1–9.
- [6] Fiume, M. M., Bergfeld, W. F., Belsito, D. V., Hill, R. A., Klaassen, C. D., Liebler, D., Marks, J. G., Shank, R. C., Slaga, T. J., & Snyder, P. W. (2019). Safety assessment of plant-derived ingredients as used in cosmetics. *International Journal of Toxicology*, 38(2_suppl), 1S–75S.
- [7] Ganceviciene, R., Liakou, A. I., Theodoridis, A., Makrantonaki, E., & Zouboulis, C. C. (2012). Skin anti-aging strategies. *Dermato-Endocrinology*, 4(3), 308–319.
- [8] Gupta, A. K., & Gover, M. D. (2009). The role of herbal medicines in dermatological disorders. *International Journal of Dermatology*, 48(1), 1–12.
- [9] Heinrich, M., Barnes, J., Gibbons, S., & Williamson, E. M. (2018). *Fundamentals of pharmacognosy and phytotherapy* (3rd ed.). Elsevier.
- [10] Huang, Y., Fang, Y., & Tang, Z. (2020). Recent advances in herbal ingredients for skin care and cosmetic applications. *Journal of Cosmetic Dermatology*, 19(5), 1–10.
- [11] Kaur, I. P., Kapila, M., & Agrawal, R. (2007). Role of novel delivery systems in developing topical formulations for skin disorders. *Dermatology Research and Practice*, 2007, 1–15.
- [12] Korać, R. R., & Khambholja, K. M. (2011). Potential of herbs in skin protection from ultraviolet radiation. *Pharmacognosy Reviews*, 5(10), 164–173.

- [13] Kumar, N., & Jaiswal, S. (2019). Herbal cosmetics: Trends and prospects. *International Journal of Pharmaceutical Sciences and Research*, 10(6), 1–8.
- [14] Lourith, N., & Kanlayavattanukul, M. (2013). Natural ingredients in cosmetics: Anti-ageing and skin-whitening applications. *Journal of Cosmetic Dermatology*, 12(3), 1–9.
- [15] Michalak, M. (2023). Plant-derived antioxidants: Significance in skin health and cosmetic applications. *Antioxidants*, 12(2), 1–20.
- [16] Mukherjee, P. K., Nema, N. K., Maity, N., & Sarkar, B. K. (2011). Phytochemical and therapeutic potential of cucumber (*Cucumis sativus* L.). *Journal of Ethnopharmacology*, 138(3), 1–10.
- [17] Mukherjee, P. K., Maity, N., Nema, N. K., & Sarkar, B. K. (2011). Bioactive compounds from natural resources against skin aging. *Phytomedicine*, 19(1), 1–12.
- [18] Nunes, A. R., Gonçalves, M. C., Barreto, S. G., & others. (2021). Natural compounds and their role in skin health and dermatological applications. *Molecules*, 26(19), 1–25.
- [19] Saxena, M., Saxena, J., Nema, R., Singh, D., & Gupta, A. (2013). Phytochemistry of medicinal plants. *Journal of Pharmacognosy and Phytochemistry*, 1(6), 168–182.
- [20] Sahu, P. K., Giri, D. D., Singh, R., Pandey, P., Gupta, S., Shrivastava, A. K., Kumar, A., & Pandey, K. D. (2013). Therapeutic and medicinal uses of Aloe vera: A review. *Pharmacology & Pharmacy*, 4(8), 599–610.
- [21] Saraf, S., & Kaur, C. D. (2010). Phytoconstituents as photoprotective novel cosmetic formulations. *Pharmacognosy Reviews*, 4(7), 1–11.
- [22] Schagen, S. K. (2017). Topical peptide treatments with effective anti-aging results. *Cosmetics*, 4(2), 16.
- [24] Sies, H. (2017). Hydrogen peroxide as a central redox signaling molecule in physiological oxidative stress: Oxidative eustress. *Redox Biology*, 11, 613–619.
- [25] Zillich, O. V., Schweiggert-Weisz, U., Eisner, P., & Kerscher, S. (2015). Polyphenols as active ingredients for cosmetic products. *International Journal of Cosmetic Science*, 37(5), 455–464.
- [26] Zouboulis, C. C., & Makrantonaki, E. (2012). Clinical aspects and molecular diagnostics of skin aging. *Clinical Dermatology*, 30(1), 1–7.



10.22214/IJRASET



45.98



IMPACT FACTOR:
7.129



IMPACT FACTOR:
7.429



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089  (24*7 Support on Whatsapp)