

Formulation and Evaluation of Herbal Face Serum

Harsha D. Jadhav^{1,*}, Sulbha G. Patil², Sunil P. Pawar³

Abstract

The cosmetics industry has witnessed steady growth over the past decade, driven largely by an expanding youth demographic. Globally, women are increasingly conscious of their skin focusing not only complexion improvement but also wrinkle reduction and the maintenance of a youthful, radiant appearance. This trend has stimulated rising demand across a wide range of skincare products. In response, the objective of this study is to formulate, develop, and evaluate an herbal face serum based on natural ingredients, with ashwagandha extract as the principal active component. This plant-based serum is specifically designed to deliver antiaging, anti-inflammatory, and antioxidant effects, ultimately promoting healthier, more vibrant skin. The formulation combines several herbal agents, including ashwagandha, flaxseed oil, olive oil, rosemary oil, vitamin E (sourced from capsules), and glycerin. The efficacy and quality of the serum will be assessed using a comprehensive set of evaluation parameters: organoleptic properties (appearance, color, odor, and texture), pH level, spreadability, viscosity, homogeneity, stability, and washability. Herbal cosmetics are widely recognized for offering multiple skin benefits while minimizing side effects compared to many synthetic alternatives. The primary goal of this formulation is to provide potent antiaging and antioxidant benefits while nurturing naturally healthy skin, all using botanical and natural ingredients. By leveraging a carefully balanced blend of herbal oils, extracts, and emollients, this serum aims to meet growing consumer demand for safe, effective, and nature-based skincare solutions.

Keywords: Ashwagandha extract, anti-inflammatory, antiaging, antioxidant, Herbal materials

INTRODUCTION

Nowadays, scientists are more interested in creating natural products than artificial ones [1]. The primary source of cosmetics is skin care items [2]. The Greek term “kosmeticos,” which implies to possess strength, arrangement, or decorative ability, is where the word “cosmetic” originates [3]. Cosmetology is the study and application of cosmetic procedures [4].

Cosmetics, usually referred to as make-up items, are frequently used by young adults to enhance and show off their beauty. According to the Food and Drug Administration of America, “cosmetics are advertised as being applied to the human body for beautifying, cleansing, altering the appearance, and promoting attractiveness without affecting or altering the functions of the body’s structure” [5].

A concentrated product that is frequently used in cosmetics is serum. In the field of professional cosmetics, the name is self-explanatory. The water or oil concentration of the cosmetic serum is the same as that of any other cream. Ten times as much organic stuff is present in serums and other concentrated products as in creams. Thus, address the aesthetic issue as soon as possible [6]. The serum must have good physical stability and nonirritating qualities to be used safely [7].

*Author for Correspondence

Harsha D.Jadhav

E-mail: harshajadhav2508@gmail.com

¹Student, Department of Pharmaceutics, P.S.G.V.P. Mandal’s College of Pharmacy, Shahada, Nandurbar, Maharashtra, India.

²Assistant Professor, Department of Pharmaceutics, P.S.G.V.P. Mandal’s College of Pharmacy, Shahada, Nandurbar, Maharashtra, India

³Principal, Department of Pharmacognocny, P.S.G.V.P. Mandal’s College of Pharmacy, Shahada, Nandurbar, Maharashtra, India

Received Date: July 28, 2025

Accepted Date: August 30, 2025

Published Date: September 01, 2025

Citation: Harsha D. Jadhav, Sulbha G. Patil, Sunil P. Pawar. Formulation and Evaluation of Herbal Face Serum. Research & Reviews: Journal of Herbal Science. 2025; 14(3): 30–40p.

Ayurvedic cosmetics are very reliable, Because of its natural herbal extract and safe, all-purpose activity. The main portion of ashwagandha that is useful is the root. Fruits, leaves, and seeds can also be utilized medicinally. Ashwagandha has several potent antioxidant-like compounds. Ashwagandha serum is recommended for skin wrinkles, early aging, and premature hair graying. It is used to treat skin conditions like vitiligo [8].

A face serum can penetrate deeper to release active substances into the skin and has a gel, light lotion, or hydrating consistency [9]. Additionally, it has moisturizing antioxidant, antiaging, and anti-wrinkle properties [10].

TYPES OF FACE SERUM [11]

- The Emulsion serum.
- Oil-based serum.
- Gel-based serum.
- Water-based serum.
- Pressed balm serum.

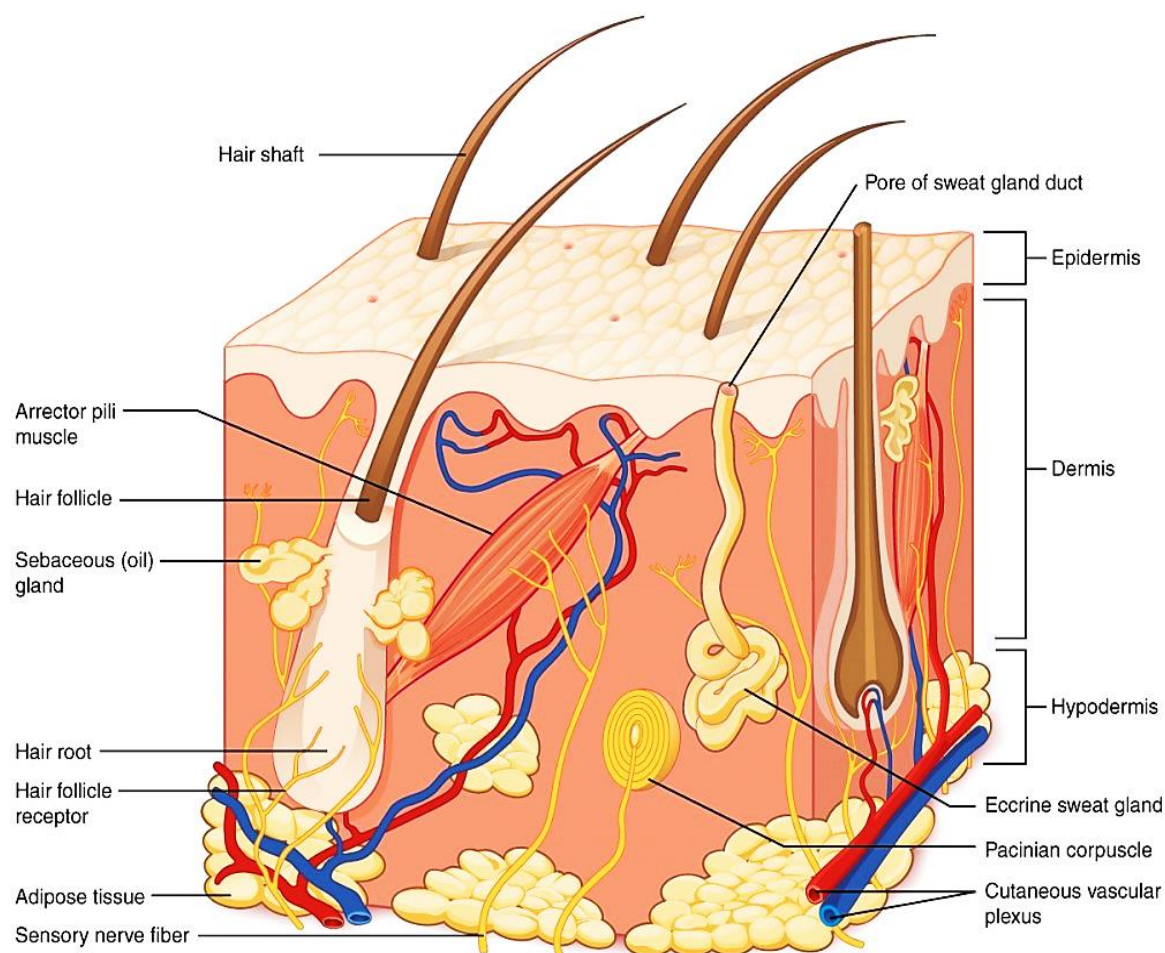


Figure 1. Structure of skin.

Mechanism of Face Serum

Face serum work in the through several complex procedures that are intended to distribute active ingredients to specific skin areas and produce particular result. The structure of the skin is given the (Figure 1). Although the precise method may differ according to the serum's particular composition and components, the following are some typical mechanisms of action.

- Hydration and moisturization.
- Antiaging effect.
- Nourishment.
- Brightening and even toning.
- Anti-inflammatory and soothing effect.
- Protection against environmental damage.

STAGES OF PENETRATION OF FACE SERUM IN SKIN LAYER

There are multiple steps involved in face serum penetration into the skin's layers, and each one is essential to getting the active ingredients to their intended locations. The general phases of penetration into the skin layers are as follows:

- Stratum Corneum.
- Epidermis.
- Dermis.
- Hypodermis.

PROPERTIES, ADVANTAGES AND DISADVANTAGES OF FACE SERUM [12]

Ideal Properties

- It should not cause skin irritation.
- Eliminate puffiness and dark circles.
- Create healthy skin by eliminating dead skin cells.
- It should have a smooth texture.
- It should be nontoxic and nonsensitive.

ADVANTAGES

- Increase the suppleness of the skin.
- Enhances the texture of skin.
- Reduces the number of skin pores.
- Nourishes and hydrates the skin.

DISADVANTAGES

- Because chronic skin diseases, like rosacea or eczema, impair the skin barrier, people with these illnesses may find that the liquid or gel-like texture of a serum is not the best option.
- These individuals may experience irritation from serums that absorb too quickly.

The objective of the current research was to formulate the herbal face serum by using the ashwagandha as an active component, other ingredients included in this serum are flaxseed gel, olive oil, rosemary oil, vitamin E capsule, glycerin, water. The prepared herbal serum formulation is subjected to various evaluation tests. Such are, organoleptic property, pH, spreadability, stability, etc., to prove the effectiveness of the herbal face serum which provides healthy and bright skin.

There are various skin related problems that cause an unhealthy effect on the skin. The problems are early aging, inflammation, acne, eczema, rashes, sunburn, itching pain, etc. This all are treated by this face serum; mainly, this face serum is used to treat the early aging effect on the skin. Herbal face serum using the ashwagandha, which provides the above all effects with less side effects.

DRUG AND EXCIPIENT PROFILE

Ashwagandha

- *Botanical name:* *Withania somnifera* (Linn) (Figures 2 and 3).
- *Family:* Solanaceae.
- *Synonyms:* Winter cherry, Indian ginseng, Turanghwa, Gokarna, Aswarohaka, Varahkarni, Varda, Balya, Vajikari, Vrasa.

- **Biological Source:** *Withania somnifera*, a low-growing evergreen shrub in the Solanaceae (nightshade) family.
- **Geographical Source:** Widely distributed in Northwestern India, Bombay, Punjab, Gujarat, Rajasthan, UP, MP. Also found at Afghanistan, South Africa, Island, etc.
- **Chemical ingredients:** Steroidal alkaloids, lactones, withanolides, withaferin A, Withanine, Withaniol, Anaferin, Tropine and many other Alkaloids and Steroids are present. (Structure given in Figure 4).
- **Description:** 1. Direct seeding (broadcasting) is the propagation technique, and the planting season runs from June to September.
 - Fruit and flowers are produced by the plants throughout December and January.
 - All the parts of Ashwagandha, like roots, leaves, flowers and whole plants, are used for various purposes.
- **Uses:** Antiaging, anti-inflammatory, antibacterial activity, antioxidant, etc. [13].



Figure 2. Ashwagandha roots.



Figure 3. Ashwagandha plant.

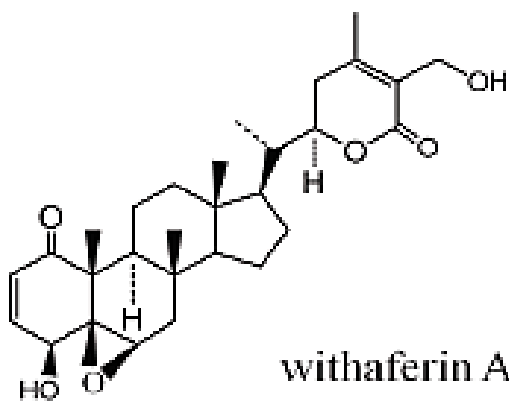


Figure 4. Chemical structure of ashwagandha.

Flaxseed

- *Botanical name:* *Linum usitatissimum* (Figure 5).
- *Family:* Linaceae.
- *Synonym:* Linseed, oil rich seed, oil seed.
- *Biological source:* It consist of a died fully ripe seed of *Linum usitatissimum* linn.
- *Chemical Constituents:* Alpha linoleic acid (ALA), Omega-3 fatty acid, Lignans, etc.
- *Uses:* Anti-inflammatory, antioxidant, skin hydration [14].



Figure 5. Flaxseed.

Rosemary Oil

- *Botanical name:* *Rosmarinus officinalis* L. (Figures 6 and 7).
- *Family:* Lamiaceae.
- *Synonyms:* Rosemary essential oil, Salvia Rosmarinus oil, etc.
- *Biological name:* Flowering on top of a plant, *Rosmarinus officinalis*.
- *Chemical Constituent:* 1,8-cineole, camphor, and α -pinene.
- *Uses:* Essential oil, tightening the skin, antioxidant, moisturizing the skin, anti-inflammatory, etc.



Figure 6. Rosemary plant.



Figure 7. Rosemary oil.

Olive Oil

- *Botanical name:* *Olea europaea sativa* (Figure 8).

- *Family*: Oleaceae.
- *Synonym*: Refined olive oil, virgin olive oil.
- *Biological name*: Derived from the ripe fruits of the olive tree, *Olea europaea*.
- *Chemical Constituent*: Triacylglycerols (triglycerides or fats).
- *Uses*: Carrier oil, skin care, etc.



Figure 8. Olive oil.

Vitamin E Capsule

- *Botanical name*: Tocopherol and tocotrienol (Figure 9).
- *Description*: 1. A nutrient that the body needs in small amounts to stay healthy and work the way it should. A nutrient that the body needs in small amounts to stay healthy and work the way it should.
- It requires making healthy skin and nourishes the skin.
- *Found in* seeds, nuts, leafy green vegetables, and vegetable oils.
- *Uses*: Antioxidant, anti-wrinkles, anti-inflammatory, etc.



Figure 9. Vitamin E-capsule.

MATERIALS AND METHOD

List of the material used depicts in Table 1 and formulation of the serum depicts in Table 2.

Table 1. List of materials and its role.

S.N.	Ingredients	Quantity Taken (for 100 ml)	Quantity Taken (for 30 ml)
1.	Ashwagandha extract (ashwagandha powder + olive oil)	35% (35 ml)	10 ml.
2.	Flaxseed gel	20% (20 ml)	6 ml.
3.	Rosemary oil	2% (2 ml)	0.6 ml (2–3 drops).
4.	Vitamin E	10% (10 ml)	3 ml.
5.	Glycerin	q.s to 100 ml	q.s. to 30 ml.

METHOD OF PREPARATION OF HERBAL FACE SERUM

[A] Extraction Procedure of Ashwagandha (Figure 10)

- *Prepared the Jar*: The jar was first sterilized with hot water and then allowed the air to dry completely.

- *Included Ashwagandha:* Approximately one part by weight of ashwagandha was added to the jar – 50 grams.
- *Added Olive Oil:* Four parts by volume of olive oil were added, i.e., 200 ml of olive oil were mixed with 50 grams of ashwagandha, ensuring the herb was fully immersed in the oil.
- *Sealed and Stored:* The jar was tightly closed and stored in a cool, dark place (such as a cupboard) for about 4–6 weeks.
- *Shake Occasionally:* The jar was gently shaken every 1–2 days to support the infusion process.
- *Strained the Oil:* After 4–6 weeks, the oil was poured into a clean basin using a fine mesh strainer.
- *Stored in a Bottle:* The strained oil was transferred into a dark glass bottle and kept out of direct sunlight.

Table 2. Formula for herbal face serum.

S.N.	Materials	Roles & Uses	Supplier
1.	Ashwagandha	Active ingredient (Antiaging property)	Local Market.
2.	Flaxseed	Gelling agent	Local Market.
3.	Olive oil	Carrier oil	P.S.G.V.P Mandal's College of Pharmacy, Shahada.
4.	Rosemary oil	Essential oil (fragrance)	Online Market.
5.	Glycerin	Moisturizing agent & Toner	P.S.G.V.P Mandal's College of Pharmacy, Shahada.
6.	Vitamin E	Preservative	Local Market.



Figure 10. Extraction of ashwagandha.

[B] Preparation of Flaxseed Gel (Figure 11)

- Flaxseed was first bought from local market.
- The aqueous extract of flaxseed was prepared by adding flaxseeds to boiling water with constant stirring until a gel was obtained.
- Then the gel was stored at room temperature until further use.

PROCEDURE OF HERBAL FACE SERUM

- For preparation of herbal face serum, All the herbal ingredients including main ingredient ashwagandha infusion extract and flaxseed gel weigh them properly.
- Then take a sterile beaker and add 10 ml of ashwagandha extract and 6 ml of flaxseed gel.
- Then stir the above mixture either manually or by a magnetic stirrer to make uniform mixing.
- After the preparation of the above solution, add 2–3 drops of rosemary oil for fragrance.
- Then add a vitamin E capsule as a preservative.

- Then glycerin was added to make the volume up to 30 ml.
- Then again, the whole mixture of an herbal face serum was stirred by using the magnetic stirrer for homogeneous mixing.
- This prepared herbal face serum was stored in an airtight container (Figure 12).

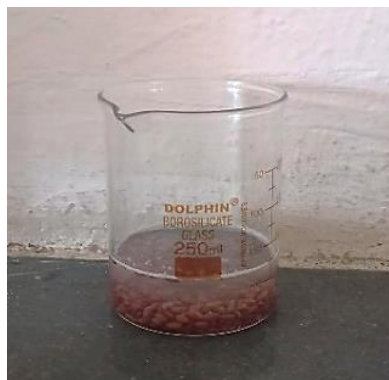


Figure 11. Flaxseed gel.



Figure 12. Herbal face serum.

Evaluation Parameters

Phytochemicals evaluation, method testing, and results are given in the (Table 3).

EVALUATION OF HERBAL FACE SERUM [17–20]

The prepared herbal face serum evaluated for organoleptic property, pH measurements, spreadability, washability, homogeneity, etc.

- *Organoleptic property:* The formulation's color and look were visually assessed. Serum is uniformly distributed as part of the formulation process. This test was verified by touch and appearance.
- *Determination of pH:* The serum's composition is intended for topical use. Their pH should, therefore, be comparable to that of skin. The pH of the skin serum should be between 5 and 9 because the skin has an acidic range. Chemical inertness, or not being overly acidic or alkaline, is crucial for ensuring that skin serum has the necessary shelf life. According to the aforementioned fact, skin's normal pH should fall between 4 and 5.5.
- *Homogeneity:* By applying a small amount of the serum formulation to the clear glass and watching it, this will be verified. The serum should be distributed uniformly by the formulation.
- *Determination of spreadability:* A sample of serum weighing two grams was put on a surface. Twenty grams of weight were added to a pan that had a slide attached to it. Spreadability was

measured by measuring the amount of time (seconds) needed to separate the upper slide from the surface.

- *Washability*: A tiny amount of the formulation was applied to the hand, and it was then washed with tap water to assess its washability.
- *Stability Studies*: Without a suitable stability analysis, the formulation and development of a pharmaceutical product is incomplete. The goal was to ascertain the product's safety by assessing its chemical and physical stability.
- *Cyclic temperature*: There is no set temperature or humidity for these tests. The test involved daily cycle temperature changes. Both room temperature and frizzling temperature are used to encourage temperature variations.

Table 3. Phytochemical evaluation of ashwagandha extract [15, 16].

S.N.	Phytochemicals	Method of Testing	Results
1.	Alkaloids	2 ml of ashwagandha extract + 2 ml Wagner's reagent.	Brownish precipitation developed (means alkaloid is present).
2.	Glycosides	2 ml of extract diluted with 2 ml of chloroform.	Deep reddish brown color is obtained (means glycoside is present).
3.	Flavonoids	2 ml of extract + 2 ml of 10% lead acetate.	Yellowish green color is obtained (means flavonoid is present).
4.	Tannins	2 ml of extract + 0.1% ferric chloride.	Brownish green coating is obtained (means tannin is present).
5.	Terpenoids	2 ml of extract + 2 ml of conc. sulphuric acid and 2 ml of chloroform.	Reddish brown color is obtained (means terpenoid is present)
6.	Saponins	2 ml of extract and 2 ml of benedict's reagent.	Blue black precipitation is obtained (means saponin is present).
7.	Carbohydrate	1 ml of extract + 1 ml of Fehling's A and B. Heat for 10 minutes.	Yellow, dark red precipitation is obtained (means carbohydrate is present).
8.	Protein	Mix 3 ml extract with 1 ml conc sulphuric acid.	White colloidal precipitate is obtained (means protein is not present).

Table 4. Result of evaluation parameters.

S.N.	Phytochemicals	Results
1.	Alkaloids	Brownish precipitation developed (means alkaloid is present).
2.	Glycosides	Deep reddish brown color is obtained (means glycoside is present).
3.	Flavonoids	Yellowish green color is obtained (means flavonoid is present).
4.	Tannins	Brownish green coating is obtained (means tannin is present).
5.	Terpenoids	Reddish brown color is obtained (means terpenoid is present)
6.	Saponins	Blue black precipitation is obtained (means saponin is present).
7.	Carbohydrate	Yellow, dark red precipitation is obtained (means carbohydrate is present).
8.	Protein	White colloidal precipitate is obtained (means protein is not present).

Result of evaluation of herbal face serum given in Table 4.

Organoleptic Property

- Color-Slightly brownish color.
- Oduor-Characteristic odor.
- Texture-Smooth homogenous.
- Uniformity-Good.

pH

The formulation of herbal face serum pH was discovered to be 5.6. Since the pH of skin is acidic, ranging from 4.1 to 6.7, this range of formulations is appropriate for skin (Figure 13).

- *Homogeneity*: Homogeneity of herbal face serum is uniform and good.
- *Spreadability*: Spreadability of liquid formulation refers to the face serum's capacity to distribute over the skin and is crucial for applying a standard dosage of medication formulation to the skin. Face serum was found to be 5–6 cm spreadable.
- *Washability*: The formulation of herbal face serum was easily washable.
- *Stability*: Stability test of herbal face serum is ongoing.
- *Cyclic temperature test*: The parameters & stability of the cyclic test depicts in Table 5.



Figure 13. pH test.

Table 5. Cyclic temperature test.

S.N.	Parameter	Stability
1.	Freezer temperature	Unstable
2.	Room temperature	Stable

DISCUSSION

This study focusses on the formulation and evaluation of herbal face serum by using the method of preparation of emulsion gel formation in which active ingredient ashwagandha infusion extract with olive oil, flaxseed gel was prepared. Phytochemicals evaluation of ashwagandha extract shows the presence of alkaloid, glycosides, flavonoids, tannins, saponins, terpenoids, and carbohydrates. The prepared formulation was evaluated by various parameters which includes, organoleptic property such as slightly brownish color, characteristic odor, smooth texture, and good uniformity. pH was found to be in range of 5–6. Homogeneity of the serum was good. Spreadability of the serum was found to be 5–6 cm. The herbal face serum was easily washable, and it is stable at room temperature.

CONCLUSIONS

In conclusion, the developed herbal face serum demonstrated promising results in terms of its physical properties, washability, spreadability, and stability, with potential skin benefits. This study successfully developed herbal face serums which offer a natural and effective approach to skincare, harnessing the power of plant-based ingredients to nourish, hydrate, and rejuvenate the skin. Free from harsh chemicals and synthetic additives, it is beneficial for individuals seeking a gentle yet potent solution to dryness, acne, aging, and dullness.

Acknowledgments

We are grateful to P.S.G.V.P. Mandal's college of pharmacy shahada, department of pharmaceutics, for providing the resources and facilities that made this research possible.

REFERENCES

1. Janakiraman AK, Afroze S, Chew YL, Yee YJ, Zenli C, Subramanian, et al. An expedition towards formulating natural face serum with *Garcinia mangostana*. *Curr Trends Biotechnol Pharm*. 2023;17(4A(Supplement)):61–63. doi: 10.5530/ctbp.2023.4s.91.
2. Kamble R, Gamare D, Indulkar A, Mk K, Pv J. Formulation and evaluation of herbal based anti-aging face serum. In: *Foldscope & its Applications*. 2022;2:127–130.
3. Sasidharan S, Joseph P, Junise. Formulation and evaluation of fairness serum using polyherbal extracts. *Int J Pharm*. 2014;4(3):105–112.
4. Thakre AD. Formulation and development of de-pigment serum incorporating fruits extract. *Int J Innov Sci Res Technol*. 2017;2(12):330–382.
5. Fathima A, Varma S, Jagannath P, Akash M. General review on herbal cosmetics. *Int J Drug Formul Res*. 2011;2(5):140–145.
6. Rajdev PS, Gaikwas SD, Somvanshi AA, Gunjal SS. Formulation and evaluation of face serum. *Int J Adv Res Sci Commun Technol*. 2022;2(5). doi: 10.48175/IJARSCT-4807.
7. Huth S, Schmitt L, Marquardt Y, Heise R, Lüscher B, Amann PM, et al. Effects of a ceramide-containing water-in-oil ointment on skin barrier function and allergen penetration in an IL-31 treated 3D model of the disrupted skin barrier. *Exp Dermatol*. 2018;27(9):1009–1014. doi: 10.1111/exd.13697.
8. Meher SK, Das B, Panda P, Bhuyan SC, Rao MM. Uses of *Withania somnifera* (Linn) Dunal (Ashwagandha) in Ayurveda and its pharmacological evidences. *Res J Pharmacol Pharmacodyn*. 2016;8(1). doi: 10.5958/2321-5836.2016.00006.9.
9. Gite A. Formulation and development of face serum. *Int J Creat Res Thoughts*. 2023;11(6):833.
10. Patidar M, Deshmukh N, et al. Formulation and evaluation of face serum containing phytosome of gingerol oil, *Carica papaya* pulp extract and *Aloe vera* gel. *World J Pharm Res*. 2023;12(18):726–735. doi: 10.20959/wjpr202318-29901.
11. Hansan M, P R, Mubarakath P S, Dilip D, Nishal K M, Mathew SE.. Breakthroughs in facial serum innovation and skin absorption technique. *J Pharm Sci Res*. 2024;16(7):47–52.
12. Udupurkar PP. Formulation and development of face serum. *Int J Creat Res Thoughts*. 2023;11(6).
13. Mishra LC, Singh BB, Dagenais S.. Scientific basis of therapeutic uses of *Withania somnifera* (Ashwagandha): A review. *Altern Med Rev*. 2000;5(4):334–346.
14. Dureja H, Kaushik D, Gupta M, Kumar V, Lather V. Cosmeceuticals: An emerging concept. *Indian J Pharmacol*. 2005;37(3):155–159. doi: 10.4103/0253-7613.16211.
15. Yeskar H. Formulation and evaluation of face serum containing fenugreek extract. *Int J Basic Clin Pharmacol*. 2023;12(6):799–804. doi: 10.18203/2319-2003.ijbcp20233189.
16. Sukumar BS, Tripathy TB, HK S. Phyto physio-chemical profile of Ashwagandha (*Withania somnifera* Dunal). *J Ayurveda Integr Med Sci*. 2020;5(6). doi: 10.21760/jaims.5.6.17.
17. Badgujar AV. Formulation, development and evaluation of herbal face serum by using herbal materials. *World J Pharm Res*. 2023;13(23):1182–1193.
18. Thorat PS, Bhadane HB, Wagh SS, Gaikwad MS, Chhajed SS. General review on face serum. *World J Pharm Res*. 2023;12(6):445–462.
19. Thakre AD. Formulation and development of de-pigment serum incorporating fruits extract. *Int J Innov Sci Res Technol*. 2017;2(12):330–382.
20. Samarth S. Formulation and evaluation of herbal face serum. *Int J Creat Res Thoughts*. 2024;2(12).