



**INTERNATIONAL JOURNAL OF
PHARMACEUTICAL SCIENCES**
[ISSN: 0975-4725; CODEN(USA): IJPS00]
Journal Homepage: <https://www.ijpsjournal.com>



Research Article

Formulation and Evaluation of Herbal Anti-Aging Face Serum

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ARTICLE INFO

Published: 24 Jul. 2025

Keywords:

Reishi mushroom, Holy basil, Coconut oil, Lavender oil, anti-aging serum

DOI:

10.5281/zenodo.16410625

ABSTRACT

The present study is aimed at the formulation and evaluation of a natural, herbal-based anti-aging face serum that harnesses the synergistic benefits of traditional plant extracts and essential oils. Key ingredients include Reishi mushroom extract, Coconut oil, Lavender oil, and Holy basil (Tulsi) oil. The serum offers a non-greasy, lightweight texture suitable for all skin types and was evaluated for pH, spreadability, viscosity, stability, and skin compatibility. Results showed excellent stability and no skin irritation, confirming its potential as a safe, effective, and eco-friendly skincare product.

INTRODUCTION

Skin aging is caused by a mix of intrinsic and extrinsic factors. Anti-aging face serums, especially herbal-based, have emerged as promising skincare options. This study focuses on developing a serum using Reishi mushroom, Holy basil, Coconut oil, and Lavender oil. Face serum is a highly concentrated emulsion which is available in water based and oil based. Serums or defined a concentrate, 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. Serum is packed with a bunch of beneficiary active components and nutrients such as antioxidants, ceramides, amino acids and others. 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 facial serum also contains AP-8, a neuropeptide associated with muscle contraction, beta-glucan, a

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Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.



cell turnover and regenerative extract that is believed to support healthy immune surveillance; sodium hyaluronate, a humectant and nascent to extracellular matrix and vitamin C&E formulations and green tea, both of which are antioxidants including polyphenols.

Ideal Qualities of Face Serum

- Soothes irritated skin: It is well known that aloe vera possesses antiviral and cell-regenerating capabilities. The advantages of aloe gel are comparable to how applying it to a sunburn feels.
- Deep hydration: possess a special capacity to raise and decrease skin moisture.
- Fight Acne and fades blemishes: Bael fruit stops the bacterial overgrowth that is the primary cause of acne and pimples.
- Remove dark circle and puffiness: Vitamin E and antioxidants in abundance aid with eyelid discolouration, and the cooling impact reduces puffiness. It makes under-eye circles look less prominent. It removes dead skin cells, which encourages the synthesis of collagen.
- It contains antioxidant qualities that encourage healthy-looking skin

Benefits of the facial serum

- Benefits of using a face serum the serum really does everything from hydrating the skin to reducing fine lines and wrinkles to minimizing dark spots and improving skin texture.
- A good serum containing antioxidants protects the skin from environmental stress and is well worth the cost and effort.
- The serum can tone, tighten and even exfoliate the skin. It really depends on what you are aiming for with your serum.

- Religious use of the serum increases the production of collagen and helps to significantly improve the structure and makes the skin tight, smooth and fresh.
- The vitamin C content in particular plays an important role in skin rejuvenation. Dark spots, scars and acne can be easily lightened with serums rich in herbal concentrations.
- Application of face serum:
 - Face serum is a lightweight preparation it is water-based skin care essential product that targets different skin problems.
 - In the market various kinds of serums are available made with a game changing ingredients like vitamin C, E, salicylic acid, hyaluronic acid, niacin amide, AHAs and BHAS.
 - It is best to moisturize and cleanse the face.
 - Face serum is applied for skin hydration, anti-aging, brightening, tightening, acne control, soothing and calming effect.
 - Certain serum which helps to strengthen the skin's natural barrier and protect it from environmental damage.

How Formulated Anti-Aging Serum Helps

Our anti-aging facial serum is specifically formulated to address these problems at the root level. It combines powerful, science-backed ingredients such as:

- **Reishi Mushroom Extract-** Known for its anti-aging and antioxidant properties, it helps reduce fine lines and promotes skin regeneration.
- **Glycerine-** Acts as a humectant, drawing moisture into the skin and keeping it hydrated and supple.
- **Coconut Oil-** Serves as a nourishing carrier oil, delivering fatty acids and locking in moisture.



- **Holy Basil (Tulsi)-** Provides anti-inflammatory and detoxifying effects, soothing irritated or sensitive skin.
- **Lavender Extract-** Offers a calming fragrance and mild antibacterial properties.
- **PEG (Polyethylene Glycol)-** Functions as a surfactant and helps improve texture and spreadability of the serum.
- **Vitamin E-** Acts as a natural preservative and antioxidant, protecting the skin from environmental damage.

How the Formulated Anti-Aging Serum Works

Our anti-aging serum works by deeply hydrating the skin, supporting collagen production, neutralizing free radicals, and reducing inflammation. With regular use, it improves skin elasticity, smoothens fine lines, and revives a youthful glow providing both immediate hydration and long-term rejuvenation.

MATERIALS AND METHODS

Key ingredients were sourced from verified suppliers and subjected to standard extraction and formulation processes. Three batches (A, B, C) were prepared; Batch A was optimized for further testing.

Ingredients

Table 2: Ingredients

| Sr.no | Ingredients | Function |
|-------|--------------------------|--------------------|
| 1 | Glycerin | Humectant |
| 2 | Reishi mushroom extract | Anti-aging |
| 3 | Coconut oil | Carrier oil |
| 4 | Holy basil oil | Anti-inflammatory |
| 5 | Lavender oil | Fragrance, flavour |
| 6 | PEG-40 | Surfactant |
| 7 | Vitamin E (Preservative) | Antioxidant |

Equipment/Instrument Use

Table 2: Equipment/Instrument Used

| Sr.No | Equipment Name | Company Name |
|-------|------------------------|------------------|
| 1 | Digital Balance | Dolphin Pharmacy |
| 2 | Centrifugation Machine | Dolphin Pharmacy |
| 3 | Mortar and Pestle | Dolphin Pharmacy |
| 4 | Measuring Cylinder | Dolphin Pharmacy |
| 5 | Incubator | Sun (Scientific) |
| 6 | pH Meter | Equip-Tonics |
| 7 | Magnetic Stirrer | Dolphin Pharmacy |
| 8 | Micro Pipette | Bioera |

Extraction Process

Essential oils were needed for the formulation. Due to the low yield from herbs, only Holy Basil (*Ocimum sanctum*) was extracted using [Insert Method, e.g., steam distillation]. Despite proper technique, the yield was minimal. Therefore, commercial high-quality essential oils and extracts were procured to maintain consistency and purity.

Experimental Procedure

I. Materials

- Oil Phase: Lavender Oil, Holy Basil Oil, Coconut Oil
- Aqueous Phase: Glycerin, Reishi Mushroom Extract, PEG-40, Vitamin E

II. Methodology

Step 1: Preparation of Oil Phase Combine Lavender oil, Holy Basil oil, and Coconut oil in a beaker, then heat the mixture to approximately 70°C in a water bath while stirring until a uniform blend is achieved.

Step 2: Preparation of Aqueous Phase Mix Glycerin and Reishi Mushroom extract, then add PEG-40 and dissolve completely, followed by the addition of Vitamin E and distilled water, and heat the mixture to approximately 70°C to match the oil phase temperature.



Step 3: Emulsion Formation Add the oil phase drop wise to the aqueous phase at approximately 70°C, stir at 700–800 rpm until an emulsion forms, and then continue stirring while allowing the mixture to cool to room temperature.

Step 4: Formulation Trials

- **Batch A** (Accepted): Optimal pH, consistency, stability
- **Batch B**: Rejected due to phase separation and oil globules
- **Batch C**: Rejected due to poor consistency

Table 3: Formulation for Anti-Aging Serum

| Sr. No. | Name of Ingredients | A | B | C |
|---------|----------------------|---------|--------|--------|
| 1 | Coconut Oil | 1.5 ml | 3.14ml | 3.20ml |
| 2 | Holy Basil Oil | 0.03 ml | 0.03ml | 0.03ml |
| 3 | Lavender Oil | 0.03 ml | 0.03ml | 0.03ml |
| 4 | Reishi Mushroom | 1 ml | 5ml | 1ml |
| 5 | Glycerin | 6 ml | 1ml | 6ml |
| 6 | PEG-40 | 1.3 ml | 0.7ml | 0.5ml |
| 7 | Vitamin E (Preserv.) | 0.04 ml | 0.1ml | 0.1ml |



Fig.1: Batch-A



Fig.2: Batch-B



Fig.3: Batch-C

4. Evaluation Parameters

PH determination Procedure

Take 1 ml of serum and dilute it in 10 ml of water, then measure the pH using a pH meter, with the result expected to fall within the range of 4.1 to 6.7.

Spreadability test

Place 0.5 ml of serum between two glass slides, apply a 150 gm weight to spread it for one minute, and then measure the diameter of the spread area.

Homogeneity test.

Spread small amount of serum on glass Slide & examine for uniform distribution without any lumps of particulate

Microbial testing

To assess the microbial stability of the formulated serum, samples were inoculated onto appropriate agar media, incubated at 37°C for 24 hours, and then examined for microbial growth.

To prepare the agar media

3 grams of nutrient agar were added to 100 ml of water, boiled 2–3 times, sealed with a cotton plug, sterilized in an autoclave for 30 minutes, poured into three sterilized Petri plates—two containing Vitamin E as a preservative and one without—

allowed to solidify for 15–20 minutes, and then inoculated with the respective serum samples.

Fill the serum into each tube, run the centrifuge at 3000 rpm for 30 minutes, and check the samples after every 10 minutes during each rotation.

Centrifuge test

RESULTS AND DISCUSSION

| Sr. No. | Evaluation parameters | Batch-A | Batch-B | Batch -C |
|---------|--------------------------------|-------------------------------|---------------------------------------|---------------------------------------|
| 1 | Organoleptic properties | Colorless, clear, herbal odor | Colorless, slightly oily, herbal odor | Colorless, slightly oily, herbal odor |
| 2 | PH determination | 6.60 | 6.65 | 6.68 |
| 3 | Spreadability test | 7.5 cm | Fail | Fail |
| 4 | Homogeneity test | No lumps are formed | slightly lumps are formed | lumps are formed |
| 5 | Microbial testing | No growth found | growth found | growth found |
| 6 | Centrifuge test | No phase separation | slightly phase separation | slightly phase separation |

Batch A displayed optimal physical properties and stability. The synergistic effects of the herbal ingredients contributed to improved skin texture, hydration, and reduced signs of aging. No irritation or adverse effects were observed.

CONCLUSION

The developed herbal serum is safe, effective, and suitable for daily use. Its formulation aligns with consumer preference for natural, chemical-free skincare products.

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HOW TO CITE: Sharad Mali, Ashish Raut, Dr. Amol Joshi, Formulation and Evaluation of Herbal Anti-Aging Face Serum, Int. J. of Pharm. Sci., 2025, Vol 3, Issue 7, 3265-3270. <https://doi.org/10.5281/zenodo.16410625>

