

**FORMULATION AND EVALUATION OF HERBAL HAIR SERUM
CONTAINING ALMOND OIL AND ALOEVERA GEL**

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ABSTRACT

Nowadays, cosmetics have become an important part of daily life and are widely used by people to enhance their appearance and maintain a youthful and attractive look. Among various cosmetic products, herbal cosmetics are gaining increasing popularity because they are believed to have fewer side effects and better safety. Hair is one of the important parts of the body that provides protection and contributes to overall appearance. Therefore, the present study was aimed at developing a herbal hair serum for general and daily use by using different herbal ingredients. The prepared herbal hair serum formulations were evaluated for their physical appearance, pH, homogeneity, viscosity, spreadability, and stability. Three different formulations, namely H1, H2, and H3, were prepared using different concentrations of the selected ingredients. All the

formulations were evaluated using various physicochemical parameters, and the results obtained were found to be satisfactory and within the acceptable limits. The present study revealed that the developed herbal hair serum formulations may be effective in improving hair quality and maintaining healthy-looking hair.

KEYWORDS: Almond oil, Aloe vera gel, Herbal hair serum, conditioner, Nourishment.

INTRODUCTION

The ornamental word concluded from Greek word "kosmeticos" means to "beautify". According to the drug and ornamental act 1940 and rules 1944, cosmetics are any composition intended to be rubbed, poured, sprinkled, scattered on, introduced into or otherwise applied to the mortal body or any part thereof for cleaning, beautifying, promoting, attractiveness or altering the appearance. The word cosmetics stems from its use in ancient Rome. The material used to promote appearance or enhance beauty is called as ornamental. Cosmetics are used to promote appearance. Nowadays, makeup plays an important role for both women and men. Cosmetics are available in the different form's creams, lipsticks, perfumes, eye shadow, nail polish, hair serum etc. Herbal cosmetics are the formulations that contain one or further herbal constituents used to cure colorful problems. Herbs use as maintain and enhance mortal beauty. Indian herbs and its significance are popular worldwide. Herbal cosmetics demand is growing in world demand day by day. The science of Ayurvedic had employed numerous herbs and procedures to make cosmetics for beautification and protection from external affects. The herbal cosmetics don't cause large side effects on the mortal body. Hair is a simple structure made from root and shaft. Root enclosed in hair follicle submerged into skin; hair shaft is a port of hair present above the skin. Hair is made up of a tough protein called keratin. Keratin is a large molecule made up of a lower unit called amino acid. Hair follicle is the point from which hair grows. At the end of Follicle, a network of blood vessels supplies nutrition to hair help to grow called papillae. The most important Sebaceous gland that secretes oil helps keep hair condition. The hair bulb has special cells known as melanocytes, which produce color called melanin. Melanin gives color to hair. The part of hair seen above the skin called has a shaft. Hair shaft made up of dead cells, keratin cells. Keratin makes hair both strong and flexible. These helices are connected by strong bonds between amino acids. The bonds make hairs strong.^[2]

Medulla: - Deepest layer of hair shaft seen in large & thick hair. Honeycomb like keratin structure.

Cortex: - Middle layers of hair shaft provide Strength, colour & texture of hair fibre. Made thin layer of keratin. Hair cortex Contain melanin. Made from specialized cells called as melanocytes melanin.

Cuticle: - Outer layer of hair shaft. Thin & colourless protect the cortex. Made up of 6–11-layer Keratin cells. Take importance care of hair shaft & follicle.^{[1],[43]}

Structure and Composition of Human Hair

1. Hair Shaft

→ The visible part of the hair that protrudes above the skin.

2. Hair Root

→ The part of the hair embedded in the skin, surrounded by the hair follicle.

3. Hair follicle

→ A tubelike pocket of the epidermis that encloses a small section of the dermis at its base, where new hair cells are constantly being made.

4. Hair Layers

→ Human hair consists of three main layers

- **The Cuticle** - The outermost layer made up of tightly packed scales that protect the inner layers from damage and moisture loss.
- **The Cortex** - The middle layer responsible for hair strength, elasticity, and pigment. It contains melanin, which determines hair colour.
- **The Medulla** - The innermost layer, which is sometimes absent in fine or light-colored hair. It provides structural support to the hair shaft.^{[44],[45]}

5. Keratin

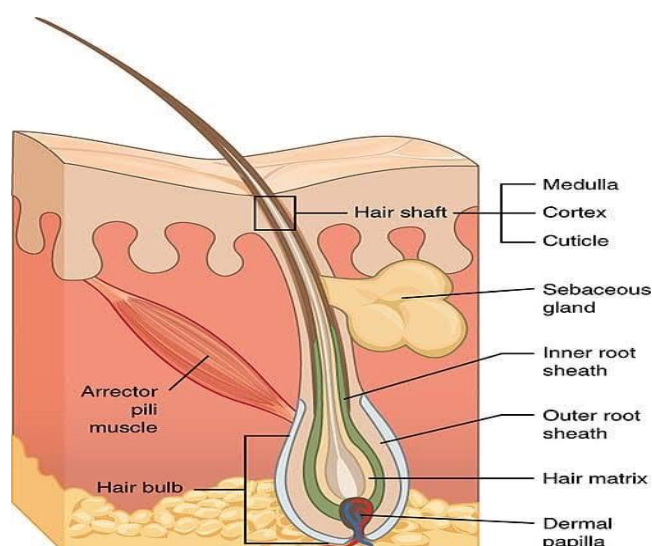
→ Hair is mainly made of keratin, a strong fibrous protein that also forms skin and nails.

6. Sebaceous Glands

→ Follicles are also connected to sebaceous glands, which produce oil.

7. Arrector Pili Muscles

→ Each hair follicle is attached to a tiny muscle (arrector pili) that can make the hair stand up (like goosebumps).^[46]



PHASES OF HAIR GROWTH

1) Anagen Phase

First stage of hair growth cycle & roughly 1,000 days. It begins in the papilla and can last from. Two-six times. Eighty to ninety percent of all mortals in anagen stage. Period of growth when cell around the Follicle is fleetly dividing of depositing materials within the hair. The hair being suitable to grow 1 measure. The hair growth is determined by genetics. The cells in the papilla divide to produce new hair threads & Follicle buries itself into dermal layer of Skin to nourish the strand.

2) Catagens phase

At the end of the anagen phase, hair enters Catalan phase. Short transitional phase, lasts roughly 10 days. First sign of Catalan is conclusion of melanin product in hair bulb & apoptosis of follicular melanocytes. Also known as the transitional phase follicle renews itself. Two weeks hair follicle shrinks. Due to breakdown & papilla detaches & rest Cutting hair strand out of its nutritional blood supply. Hair not growing during this phase. The length of terminal fiber increases. The follicle pushes them upward.

3) Telogen phase

The final stage of hair growth. During phase, the hair follicle is dormant/resting, and hair fluently lost 10–18 hair in telogen phase. Follicle also remains inactive for 3 months. The epidermal Cells lining the follicle Channel Continue to grow & concentrate around the base of hair. The follicle will begin to grow phase within two weeks; the new hair shaft will begin to crop once the telogen phase is complete. The process results in normal hair loss known as shedding.

4) Exogen phase

For long hair shedding function has been assumed to be part of telogen phase, but now it has been slipping actually occurs as distinct phase nominated as oxygen phase. The shedding of hair fiber largely controlled the active process. The process different from quiescence typically found during hair follicle cycling.

The process of has two steps: After telogen, the follicle base cells admit signal initiate oxygen. Turn on the effects of slipping.^[3]



Suitable types of hairs for using hair serum

1. Straight 2. Wavy 3. Curly 4. Coily^[34]

Benefits of Hair Serum

- 1) Protect hair:** it acts against the heat, sun damage, dirt, dust, pollution. When hair serum is applied on hair, it forms a thin layer on the hair. It protects the hair from hair damage.
- 2) Gives shine to the hair:** Hair serum forms a thin layer which reflects the light. The serum provides a shiny appearance to the hair. Hair serum contains amino acids which protect colored and chemically treated hair.
- 3) Multipurpose:** Hair serum is used to treat various hair-related problems. A few drops of hair serum make your hair shiny and silky, turning your bad day into a good day. It is one remedy for multiple hair issues.
- 4) Nourished hairs:** Hair serum fills the follicular cracks and acts on damaged hairs. Hair serum makes hair manageable, making them lustrous and easy to carry.
- 5) Best for hair dry:** Most commonly, hair serums are used for damaged, dry, and frizzy hairs. Hair serum locks and provides moisture to the hair, making them smooth and shiny.
- 6) Prevent hair fall from breakage:** When our hair becomes frizzy, damaged, messy, and tangled, in further conditions, we lose a lot of hair follicles. Hair serums act as a lubricant in such cases and make them detangle easily. It may also help to stop hair fall problems.^[4]

OBJECTIVE

1. Herbal hair serum can effectively smoothen, soften, and make hair silky.
2. Serums protect hair excellently, guarding against heat damage, sun damage, dirt, dust, and pollution.
3. They give shine to the hair, prevent hair fall from breakage, are best for dry hair, nourish hair, and make them manageable.

4. To provide alternative to synthetic hair serum
5. To carried out preparation oh herbal hair serum
6. To improve hair condition and texture
7. To carry out evaluation oh herbal hair serum.^[5]

Advantages Of Hair Serum

1. Hair serum can effectively smoothen, soften and make your hair silky.
2. It protects the hair from environmental aggressors.
3. Both pre styling treatment and finishing product.
4. It can be used before or after using heat styling.
5. Controls frizz.
6. If your hair is weak and damaged, it may look frizzy or dry.
7. Boosts smoothness.
8. The anti-frizz effect of hair serum also helps improve the smoothness of hair serum.
9. Hair serum is also reduces the tangles and promote the shine.
10. To enhances the straightness and curls.
11. It protects against the damage.^[6]

Disadvantages Of Hair Serum

1. After several days of continued use, this build-up weights down your hair, making it appear flat and dull.
2. Accumulation on your scalp can cause dryness, flaking, and skin irritation.^[7]

Side Effects of Using Hair Serum

1. Regular use and over application can make the hair unhealthy and ultimately dry.
2. Applying the serum on the scalp can lead to inflammation.
3. Silicones present in the hair serum can be harmful for the hair in the long hair.
4. Scalp application should be avoided as it might make it oily or can lead to inflammation.^[8]

Function of Hair Serum

1. **Smoothen the Hair Shaft:** Hair serum coats the hair cuticle, sealing it and making the hair smooth and shiny.

2. **Repairs Damage:** Contains ingredients like vitamins and oils that repair hair damage caused by styling, sun exposure, or pollution. Helps in temporarily sealing split ends and reducing the appearance of damage.^[47]
3. **Adds Protection:** Acts as a protective barrier, shielding hair from environmental factors like UV rays, pollution, and humidity.
4. **Improves Hair Manageability:** Softens the hair, making it easier to style or comb without tugging. Reduces static and flyaway, providing a sleeker appearance.^[48]
5. **Boosts Hair Growth:** Some hair serums are formulated with growth-boosting ingredients (e.g., rosemary, amla, bhringraj) that stimulate the scalp and promote hair growth.

Table No. 1. ^[49,50]

Do's	Don'ts
Start with small amount	Overapply Serum
Apply to damp and clean hair	Apply to dry or unwashed hair
Focus on hair length and scalp	Rinse it out

Benefits of Using Hair Serum

It is important to know hair serum benefits before you finalize the product. A hair serum generally has the following benefits

- 1) **Multipurpose:** A hair serum solves a lot of hair issues and not just one problem. There is a reason it is called a one-stop result for all your hair straits. Hair serum transforms a bad hair day into a good hair day. With just a few drops, your hair will feel and look different.
- 2) **Protects Hair Serum** forms a subcaste on hair beaches. It therefore acts as an excellent cover against heat, sun damage, dirt, dust and pollution. It prevents your hair from getting damaged. This is why it is advised to use a heat guarding serum before using hot styling tools.
- 3) **Gives Shine to the Hair.** The subcaste formed by hair serum acts as a glass of light, therefore making your hair look can descent and lustrous. Hair serums correspond to amino acids that cover colored and chemically treated hair.
- 4) **Prevents Hair fall From Breakage.** When our hair becomes an involved mess, we tend to lose a lot of hair beaches because of the wear and tear and gash that goes into detangling. Hair serum acts as a lubricant for similar hair and makes detangling easy. And the result is less hair fall.

5) Stylish for Dry Hair. The most to profit from hair serums are those who have dry and limp hair. Hair serums lock in the humidity and make hair smooth and can descent.

6) Nourishes Hair and Makes them Manageable. Hair serums fill the follicular cracks and revive brittle and damaged hair. Hair serum makes hair more manageable, which further makes it easy to term them. Time, energy, tolerance. Everything is saved.^[9,10]

How to use hair serum?

Knowing how to use hair serums properly is crucial to getting the most benefit. Below are some recommendations when using hair serums.

- Do: Wash hair before application

Hair serum is generally a leave-in product and stylishly applied to recently shampooed hair. The serum's primary purpose is to secure the hair from impurities. Using it on evil hair defeats the purpose. Also, applying it on ignoble hair can make the hair look unctuous and weighed down. After a person washes their hair, they can tissue dry it and also apply the product. A person can also use some after taking a shower at night for lustrous,, soft hair in the morning. Still, a person may also use hair serums to touch up their hair throughout the day.

- Don't: Overapply serum

Over-applying serum can cause the hair to go flat and greasy. Ideally, people should begin with a small amount and gradually add more as needed to prevent this.

- Do: Warm it up before applying to the hair

Most hair serums have a thick consistency, making them hard to apply. Warming up the product by placing a little product on the palm and rubbing it for a few seconds can make it smoother, which helps ensure a more even application.

- Don't: Apply on roots

It is important to avoid applying hair serum on the roots as this can weigh the hair down, make the roots appear greasy, and cause product buildup. Since the hair tips are naturally drier, applying the hair serum from the ends to the midshafts is best.

- Do: Consider a person's hair type and hair goals

Hair serums may have different formulations, meaning certain hair types may benefit more than others, depending on the serum type. It is not only important to know which serum

works best for a person's hair type, but vital to check their ingredients to ensure that the serum will provide their desired hair goals.

- Don't: Rinse the serum after application

Hair serums are leave-in products that work on the hair's surface to moisturize, smoothen, and protect the hair. Washing it off removes this coating.^[11]

Which hair serum works best for each hair type?

The stylish way to get the most benefit from a hair serum is to choose the stylish product for a person's hair type.

People with coarse hair types can conclude for serums that offer violent moisturizing. Serums chapeau protect against moisture and seal in hydration may be beneficial for this hair type since this type is prone to dizziness and dryness. A person with coarse hair can look for castor, Marla, and rosewood products for violent hydration.^[35]

Lightweight, hydrating serums can add energy and definition to curled hair. Also, people with fine hair can also profit from serums with lighter formulas.

People with straight hair who want to boost its straightness can also use serums. As the serum smoothen and moisturizes the hair, the straighter and glossier it will appear.^[36]

People with damaged hair and split ends should consider keratin serums to bring back the protein in their hair. These serums are frequently known as "repairing" and "fortifying." Meanwhile, people who use straightening irons or hairdryers may wish to conclude for heat-protective serums.^[12]

Highlights of Hair Serum

- Hair serum is the styling product that coats the surface of the hair known as hair serum.
- It is basically a hair care product in liquid form, its consistency thicker than water.
- Hair serum is not just meant for hair styling. They are also for treating multiple hair concerns like dry hair, dull hair, and unmanageable hair.
- There are different types of hair serums for different hair goals. Depending on the products formula, a hair serum might reduce frizz, add shine, or straighten the hair.
- This is silicone based styling product that is designed to coat the surface of hair to help impart added shine, smoothness hydration, humidity and pollution protection.

- Intended to be used on wet hair.^[41,42]

PRINCIPLE

The primary principle of hair serums is to create a protective barrier on the hair shaft, offering various benefits like reducing frizz, enhancing shine, protecting against heat and environmental damage, and improving manageability. They are often formulated with silicones, which form a smooth, reflective layer that improves hair texture and appearance.^[13,14]

Elaboration

Protection

Hair serums form a protective layer that shields hair from heat, UV rays, pollution, and other environmental stressors.

Frizz Control

Serums help to smooth and flatten the hair cuticle, reducing frizz and static.

Shine Enhancement

The silicone-based layer reflects light, resulting in a smoother, shinier finish.

Hair Management

Serums make hair more manageable, easier to style, and less prone to tangles.

Nourishment

Some serums contain ingredients like essential oils and amino acids that nourish and hydrate the hair.

Versatility

Hair serums can be used both before and after styling, offering a range of benefits depending on their formulation and application.

Herbal Serums

Herbal serums often incorporate natural ingredients like essential oils, plant extracts, and vitamins that may offer additional benefits like hair growth stimulation or scalp health support.

Silicone-Based

Many hair serums rely on silicones like dimethicone, which are known for their ability to form a smooth, protective layer on the hair.^[15,16,17,18,19]

Hair Problems and their Causes

1. Dandruff

Problem: Flaky scalp and itchy skin.

Causes: Overactive yeast on the scalp, dry skin, and certain medical conditions.

2. Hair Loss

Problem: Excessive shedding of hair, leading to thinning or baldness.

Causes: Genetics, hormonal imbalances, stress, poor nutrition, and certain medical conditions.

3. Split Ends

Problem: Damaged hair ends that split and fray.

Causes: Heat styling, chemical treatments, and improper hair care.

4. Dry Hair

Problem: Hair that lacks moisture, appears dull, and is prone to breakage.

Causes: Over-shampooing, harsh chemicals, heat styling, and poor nutrition.

5. Oily Hair

Problem: Excess oil production on the scalp, making hair appear greasy and weighed down.

Causes: Overactive sebaceous glands, certain products, and stress.

6. Frizzy Hair

Problem: Unruly, dry, and unmanageable hair.

Causes: Dryness, humidity, and improper hair care.

7. Dull or Damaged Hair

Problem: Hair that lacks shine and appears lifeless or brittle.

Causes: Heat styling, chemical treatments, and poor hair care.^[20]

HISTORY OF HAIR SERUM

1. Traditional Origins (Ancient Times – 19th Century)

- Though hair serum as a product is modern, its concept originates from ancient hair care practices.

In Ayurveda, Traditional Chinese Medicine, and Egyptian cultures, people used herbal oils like:

- Coconut oil, AMLA oil, castor oil, sesame oil, bhangra, etc.
- These natural treatments were used to add shine, reduce dryness, strengthen hair, and maintain scalp health — similar goals as modern serums.^[37]

2. Evolution of Cosmetic Science (Early 1900s – 1970s)

- The 20th century saw the rise of shampoos and conditioners, but there was no specific product for shine, frizz-control, or hair protection.
- In the 1960s and 70s, with the development of synthetic ingredients like silicones and polymers, a new kind of product started forming — the early version of hair serum.^[38]

3. Invention of Hair Serum (1980s)

- Hair serum was first introduced in the 1980s, focusing on frizz control, shine, and smoothness.
- The first popular serum was "Frizz-Ease Hair Serum" by John Frieda, launched in 1989.
- These serums were silicone-based, using ingredients like dimethicone and cyclomethicone, which created a smooth coating on the hair, sealing moisture and giving instant shine.^[39]

4. Rise in Popularity (1990s – 2010s)

- Hair serums became a regular part of hair care routines, especially for people with frizzy, dry, or heat-styled hair.
- The market expanded with serums offering benefits like:
 - Heat protection
 - Color protection
 - Split-end repair
 - Straightening or curl defining
- Ingredients like argan oil, jojoba oil, keratin, vitamin E, and panthenol (B5) became popular in serum formulas.^[40]

5. Herbal/Natural Revolution (2010s – Present)

- Recently, there's been a shift towards herbal, organic, and natural hair care.
- Serums now include extracts like onion, aloe vera, neem, hibiscus, bhringraj, amla, and essential oils.
- Consumers demand silicone-free, paraben-free, cruelty-free, and eco-friendly products.^[21]

TYPES OF HAIR SERUM

- Based on Therapeutic Action

1. Frizz-Control Hair Serum

Purpose: To tame dry, rough, and frizzy hair.

How It Works: Coats the hair strands to reduce friction and lock in moisture, giving smooth and manageable hair.

Best For: People with curly, dry, or unmanageable hair; especially in humid climates.

2. Hair Growth Stimulating Serum

Purpose: To stimulate hair follicles and promote new hair growth.

How It Works: Improves blood circulation in the scalp, nourishes follicles, and activates the anagen (growth) phase of hair.

Best For: People with hair thinning, slow hair growth, or early-stage baldness.

3. Anti-Hair Fall Serum

Purpose: To reduce hair breakage and prevent hair loss.

How It Works: Strengthens the hair shaft, prevents hair damage due to styling or pollution, and reinforces root health.

Best For: People facing seasonal hair fall, stress-related shedding, or post-partum hair loss.

4. Split-End Repair Serum

Purpose: To seal and repair damaged hair ends.

How It Works: Binds broken cuticles temporarily, smooths out rough ends, and prevents further splitting.

Best For: Chemically-treated or long hair prone to split ends.

5. Heat Protection Serum

Purpose: To protect hair from damage caused by heat-styling tools (straighteners, curlers, blow dryers).

How It Works: Forms a protective barrier on the hair shaft to minimize direct heat damage and moisture loss.

Best For: Regular users of heat styling tools.

6. Scalp Nourishing Serum (Leave-in Treatment)

Purpose: To treat scalp issues like dandruff, itching, or bacterial infections.

How It Works: Penetrates the scalp, unclogs follicles, reduces inflammation, and kills microbes.

Best For: Dandruff-prone or oily scalp; people with seborrheic dermatitis or itchiness.

7. Colour Protection Serum

Purpose: To maintain colour vibrancy in dyed or chemically-treated hair. How It Works: Shields hair from UV damage, reduces oxidation of hair colour, and nourishes chemically stressed strands.

Best For: People who frequently colour or bleach their hair.

8. Overnight Repair Serum

Purpose: Deep nourishment and repair while sleeping.

How It Works: Penetrates deeper layers of hair overnight, repairing damage and hydrating intensely.

Best For: Damaged, dry, or lifeless hair needing deep conditioning.^[22]

DRUGS AND EXCIPIENTS

1. Almond Oil

The nutritional oil can soften and strengthen your hair. It is rich in vitamin B-7, or biotin, so almond oil helps to keep hair and nails healthy and strong. It can also help protect your hair from sun damage, with a natural SPF 5. You can use almond oil as a scalp treatment. The almond oil as nutritional oil can soften and strengthen your hair. The almond oil helps to keep hair and nails healthy and strong. It can also help cover your hair from sun damage. Applying almond oil deeply hydrates the scalp and fortifies the hair follicles, performing in thick, lustrous, and beautiful hair. Almond oil helps in getting rid of dandruff. It has antibacterial characteristics. It also has some anti-inflammatory conditioning. It increases the gloss of the hair.



2. Aloe Vera

Aloe vera has long been used for treating hair loss. It also soothes the scalp and conditions hair. It can reduce dandruff and open hair follicles that may be blocked by spare oil painting oil. You can apply pure aloe vera gel to your scalp and hair a multitude times per week. It can reduce dandruff and free hair follicles that may be blocked by spare oil painting oil. You can apply pure aloe vera gel to your crown and hair a multitude times per week. it is element of makeup products. The gel made from the leaves is full of bioactive substances that support plant health. Aloe vera gel promotes hydration. It relives and repair minor cut skin irritation to make stronger hair, it provides antioxidant parcels and also acts an emollient. Improve texture of hair, form dead skin on the crown; aloe vera gel is slightly thick & clear liquid having good moisturizing plots.



3. Vitamin E Capsule

Vitamin E-rich oil can help replace that defensive layer and bring back shine. Oil in general also helps seal out moisture, reduce breakage, and cover the hair from damage. Vitamin E-rich oil can help replace that defensive layer and bring back shine. Oil in general also helps seal out moisture, reduce breakage, and protect the hair from damage for the health and appearance of hair vitamin E capsules to hair vitamin E for the moisturizing properties which can help hydrate and brittle hair perfecting manageability. A vitamin-rich oil can help to restore shine by rebuilding the defensive layer. Generally, oil helps to seal in moisture, minimize breakage, and protect the hair from detriment. Vitamin E may help support a healthy crown and hair since it contains natural antioxidants that may promote hair growth.

Vitamins and antioxidants can reduce the volume of oxidative stress and free radicals that lead to the deterioration of the hair follicle cells in one's crown.



4. Rose Water

Rose water is a mild astringent that may help to reduce oiliness and dandruff. It has anti-inflammatory properties, which may make it salutary for certain scalp conditions, like psoriasis and eczema. Numerous women with curled hair swear by rose water's capability to calm down frizz and add shine.



5. Methyl Paraben

It is a stable, non-volatile compound used as an antimicrobial preservative in foods, drugs and cosmetics for over 50 years. Methyl paraben is readily and completely absorbed through the skin and from the gastrointestinal tract.^[23,24,25]

METHOD OF PREPARATION

Procedure of Herbal Hair Serum Formulation

1. Clean all the glassware and dry them properly as per bribe.
2. Measure the accurate quantity of aloe vera, and transfer it in a beaker.
3. Mix required quantity of vitamin E in aloe vera.

4. Now mix rose water to the below mixture of aloe vera and vitamin E.
5. After stirring for many minutes, heat the set result for many minutes.
6. Add many drops of almond oil.
7. After that stir the preparation with the help of a glamorous stirrer.
8. Transfer the preparation to the measuring cylinder and adjust the final volume to 30 ml.
9. Transfer final result into container.^[26]

Formulation Table

Table 2: Formulation Table of Herbal Hair Serum.

Ingredients	Batch H1	Batch H2	Batch H3	Role of Ingredients
Aloe vera	3.5gm	4gm	4.5gm	Conditioner
Vitamin E	1ml	1ml	1ml	Hair growth
Rose water	16 ml	18 ml	20 ml	Perfume
Distilled water	8.5ml	9ml	6 ml	Vehicle
Almond oil	1ml	1ml	1ml	Nourishment
Methyl paraben	0.02g	0.02g	0.02g	preservative

EXPERIMENTLE WORK

Evaluation of Herbal Hair Serum

The following parameters are used to evaluate the prepared herbal hair serum:

1. Physical Appearance

Physical appearance was evaluated by observation on the texture, color and smell of the formulated cosmetic serum.

2. pH

The pH test will be determined by using Digital pH Meter. Dipper of digital pH will be deep into the sample of serum formulation and the pH value will be recorded. The pH of the formulation should having acidic pH as the skin is having an acidic pH of around 4–6.

3. Homogeneity Test

A clean and dry object glass was smeared with the hair serum, and a cover glass was sealed. The appearance under the light of some coarse particle/homogeneity was investigated. Herbal hair serum was tested by visual examination for homogeneity and tested for some lumps, flocculates, or aggregates.⁸

4. Viscosity

Viscosity of the formulation is determined by Brookfield Viscometer at 100rpm, using spindle type model S6 4.5 ml of the serum. The serum will placed in a big mouth container with the spindle dipped in it for about 5 minutes before the measurement.

5. Spreadability Test

Spreadability was measured by a parallel plate process typically used to assess and measure the spreadability of semisolid preparations. One gram hair serum was pressed between two horizontal plates of dimension 20× 20 cm, the upper of which weighed 125 g. The spread diameter was measured after 1 min. Spreadability was calculated using the following formula

$$S = M \times L / T$$

Where,

S= Spreadability,

M= Weight in the pan (tied to the upper slide),

L= Length moved by the glass slide, and

T = Time (in sec) taken to separate the slides completely 10

6. Stability Test

The herbal hair serum was kept for three months at two separate temperatures of 4± 2°C and 30± 2°C, with 65% RH. Compared with the original pH and viscosity, the pH and viscosity of the herbal hair serum were determined after three months.^[28,29]

RESULTS AND DISCUSSION

1. Physical Appearance

The physical appearance, color, odour and texture of the prepared herbal hair serum are visually tested. Table 2 reflects the outcomes.

Table 4: Physical Appearance of Herbal Hair Serum.

Parameter	Batch H1	Batch H2	Batch H3
Colour	Milky	Milky	Milky
Odour	Rose type	Rose type	Rose type
Texture	Smooth	Smooth	Smooth

2. pH, Viscosity, Homogeneity and Spreadability Test

The pH scale is used to specify the acidity or basicity of a product in order to ensure that it is safe to use. Brookfield viscometer is used to determine the viscosity of the formulation. The value obtained is recorded in table 3.

Table 5: pH, Viscosity, Homogeneity and Spreadability Test of Herbal Hair Serum.

Parameter	Batch H1	Batch H2	Batch H3
pH	5.3	5.4	5.4
Homogeneity Test	Good	Good	Very Good
Viscosity	217	223	229
Spreadability Test	Easily Spreadable	Easily Spreadable	Easily Spreadable

3. Stability Studies

Table 4 reveals that the herbal hair serum was stable during the research time, as these serums showed no physical instability, and there was no noticeable difference in the pH before and after the study.

Table 6: Stability Study of Herbal Hair Serum.^[30,31]

Sr. No.	Parameter	Initial	Final
1	pH	5.3	5.4
2	Viscosity	217	229

CONCLUSION

All the parameters showed that they are within the limits and since all the constituents added have numerous advantages, this hair serum will help in maintaining good growth of hair, turning slate hair to black, essential nutrients demanded to save the proper function of the sebaceous glands and support the growth of natural hair. In the particular hygiene and health care system, the use of herbal cosmetics has changed by several folds. Thus, the herbal cosmeceuticals individual care or particular health care industry, which is actually concentrating and paying redundant care on the production of herbal-based cosmetics, has a considerable glamour.^[32,33]

SUMMARY

This review focuses on the development and evaluation of a polyherbal hair serum designed to improve hair quality using natural ingredients. The serum combines aloe vera, vitamin E, rose water, almond oil, and other components known for conditioning, nourishing, and protecting hair. The study aimed to create a natural alternative to synthetic serums with fewer side effects and better safety.

Three formulations (H1, H2, H3) were prepared and evaluated for physical appearance, pH, viscosity, homogeneity, spreadability, and stability. All batches were found to be effective and within acceptable cosmetic standards.

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