



FORMULATION AND EVALUATION OF HERBAL HAIR SERUM FROM LEAVES EXTRACT OF ALTERNANTHERA SESSILIS LINN

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ABSTRACT:

Human hair significantly influences one's personality, and various cosmetic products are used to maintain it. Herbal remedies often outperform synthetic formulations due to their effectiveness and minimal side effects. This study aimed to evaluate the benefits of polyherbal products in addressing common hair issues such as baldness, alopecia, hair loss, grey hair, dryness, and dandruff. Many cosmetics are utilized daily for their diverse applications. People use these products to enhance their appearance and maintain a youthful, appealing look. Activating hair roots is essential for promoting hair growth and reducing hair loss. Herbal treatments remain popular among the general public due to their lower risk of side effects and high safety profile. The objective of this study was to develop a general-use herbal hair serum using various natural ingredients. The formulated oil was tested for viscosity, pH, acidity, and saponification value, among other properties, and all parameters were found to be within acceptable standards.

Keywords: Polyherbal, Alopecia, Cosmetics, Formulation, Viscosity, Dandruff.

I. INTRODUCTION

The cosmetic word derived from Greek word "kosmesticos" means to "adorn". According to drug and cosmetic act 1940 and rules 1944 cosmetics are any article intended to be rubbed, poured, sprinkled, sprayed on, introduced into or otherwise applied to the human 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 called as cosmetic. Cosmetics are used to promoting appearance. Now adays makeup plays 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 which contain one or more herbal ingredients used to cure various problems. Herbs use as maintain and enhancing human beauty. Indian herbs and its significance popular worldwide. Herbal cosmetics demand growing in world market day by day. The science of Ayurvedic had utilized many herbs and floras to make cosmetics for beautification and protection from external affects the herbal cosmetics does not cause large side effects on human body. Hair is simple structure made from root and shaft. Root enclosed in hair follicle submerged into skin, hair shaft is port of hair present above the skin. Hair is made up

of tough protein called as keratin. Keratin is large molecule made up of smaller unit called amino acid. Hair follicle is point from which hairs grows. At the end of Follicle network of blood vessels supply nutrition to hair help to grow called papillae. The most important Sebaceous gland that secret oil help keep hair condition. The hair bulb has special cells known as melanocytes, which produce pigment called as melanin. Melanin gives color to hair. The part of hair seen above the skin called have 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.^[1]

- **Medulla:** - Deepest layer of hair shaft seen in large & thick hair. Honeycomb like keratin structure
- **Cortex:** - Middle layers of hair shaft provide Strength, color & texture of hair fiber. Made thin layer of keratin. Hair cortex Contain melanin. Made from specialized cells called as melanocytes melanin.
- **Cuticle:** - Outer layer of hair shaft. Thin & colorless protect the cortex. Made up of 6–11-layer Keratin cells. Take importance care of hair shaft & follicle.^[2]

II. PHASES OF HAIR GROWTH:

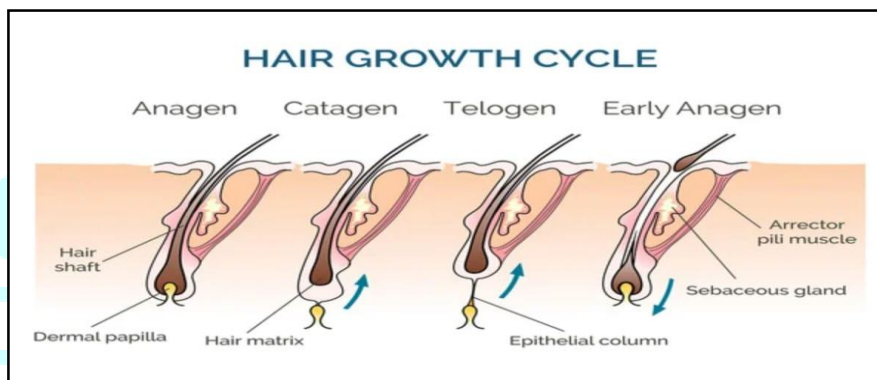


Figure: 1 Hair Growth Cycle

- 1) Anagen Phase:** First stage of hair growth cycle & approximately 1,000 days. It begins in papilla & can last from two - six years. Eighty to ninety percent of all human in anagen stage. Period of growth when cell around the Follicle rapidly dividing of depositing materials within the hair. The hair being able to grow 1 meter. The hair growth determined by genetics. The cells in papilla divide to produce new hair Fibers & Follicle buries itself into dermal layer of Skin to nourish the strand.^[3]
- 2) Catagens phase:** At the end of anagen phase, hair enters catagen phase. Short transitional phase, lasts approximately 10 days. First sign of Catagen is cessation of melanin production in hair bulb & apoptosis of follicular melanocytes. Also known as transitional phase follicle renew itself Two weeks hair follicle shrinks. Due to disintegration & papilla detaches & rest Cutting hair strand off from its nourishing blood Supply. Hair not grows during this phase length of terminal fiber increases follicle pushes them upward.^[3]
- 3) Telogen phase:** - The final stage of hair growth. During phase hair follicle is dormant/ resting & hair easily lost 10-18% hair in telogen phase. Follicle then remain inactive for 3 months. The epidermal Cells lining follicle Channel Continue to grow & accumulate around base of hair. The follicle will begin to grow phase within two weeks the new hair shaft will begin to emerge once the telogen phase is complete. The process results in normal hair loss known as shedding.^[4]
- 4) Exogen phase:** For long hair shedding function has been assumed to be part of telogen phase, but now it has been shedding actually occurs as distinct phase termed as exogen phase. The shedding of hair fiber highly controlled active process. The process different from quiescence normally found during hair follicle cycling. The process of has two steps: After telogen the follicle base cells receive signal initiate exogen. Turn on effectors of shedding.^[4]

5] **Kenogen phase:** The empty hair follicle noticed after shedding of hair fiber. kenogen means hair follicle remains empty after telogen & before new anagen hair reappears. Hair loss, hair thinning & problems with hair growth occur when growth cycle is disrupted. [5]

Suitable types of hairs for using hair serum:

1. Straight 2. Wavy 3. Curly 4. Coily

Benefits of Hair Serum:

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

III. AIM AND 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

IV. MATERIALS AND EQUIPMENT:

➤ ALOE VERA



Figure: 2 Aloe vera

- **SYNONYME:** Aloe, Musab bar, kumari.
- **BIOLOGICAL SOURCE:** It is the leaves of various species of aloe-vera- aloe barbedensis, aloe perryi, aloe spicata, aloe African
- **KINGDOM:** Plantae
- **ORDER:** Asparagales
- **FAMILY:** Liliaceae
- **GENUS:** Aloe L.- aloes
- **CHEMICAL CONSTITUENTS:** Aloe vera are measure source of anthraquinone glycoside. Aloe vera contain aloin, barbaloin, aloe-emodin.
- **USES:** To make stronger hair, it provides antioxidant properties and also act an emollient, Improve texture of hair, Repair dead skin on the scalp, aloe vera gel is slightly viscous & clear liquid having good moisturizing properties.

➤ **FLAXSEED:**



Figure: 3 Flaxseed

- **BOTANICAL NAME:** *Linum usitatissimum*
- **FAMILY –** Linaceae
- **SYNONYM-** Linseed, flaxseed
- **BIOLOGICAL SOURCE -** It consists of the dried fully ripe seeds of *Linum usitatissimum* Linn. omega-3 fatty acid, lignans, etc
- **USES –** anti-inflammatory, anti-oxidants, hair growth stimulator

➤ **TRIGONELLA FOENUM GRASEUM**



Figure: 4 Trigonella foenum

- BOTANICAL NAME: Trigonella foenum- graecum
- FAMILY – Leguminous
- SYNONYM – Methi, Methika, Alholva, Chandrika.
- BIOLOGICAL SOURCE – It is obtained from the dried seeds to Trigonella foenum- graecum.
- CHEMICAL CONSTITUENTS- Vitamin B, alkaloids, flavonoids, saponins, etc
- USES – Hair growth stimulant, antibacterial.

➤ ROSE WATER

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



Figure: 5 Rose water

List of Instruments:

Table: 1 List of Instruments

Sr. No.	Name of Equipment/ Instruments
1.	Soxholet Apparatus
2.	Weighing balance ,hot air oven, beaker ,stirrer, measuring cylinder
3.	Digital PHmeter,
4.	Brookfield viscometer

List of Chemicals:-

Sr. No.	Name of Chemicals
1	Ethanol (Extraction) Methanol
2	Ferric Chloride
3	Sodium Hydroxide
4	Mayers Reagent

Table: 2 List of chemicals

V. EXPERIMENTAL WORK:

1. Collection of selected plant: The leaves of *Alternanthera sessilis* were gathered from the roadside of our college in Khanapur. The leaves were thoroughly cleaned and sorted for the best leaves, which were then dried in the shade. An electric grinder was used to grind a sufficient amount of leaves into a fine, coarse powder.



Figure: 6 Dried Leaves



Figure: 7 Fine Powder

2. Authentication of plant: The plant material was verified and identified according to taxonomy by renowned plant taxonomist Dr. Shirodkar of the Botanical Survey of India and Pune. Following are the instructions for depositing a specimen as a herbarium sheet:

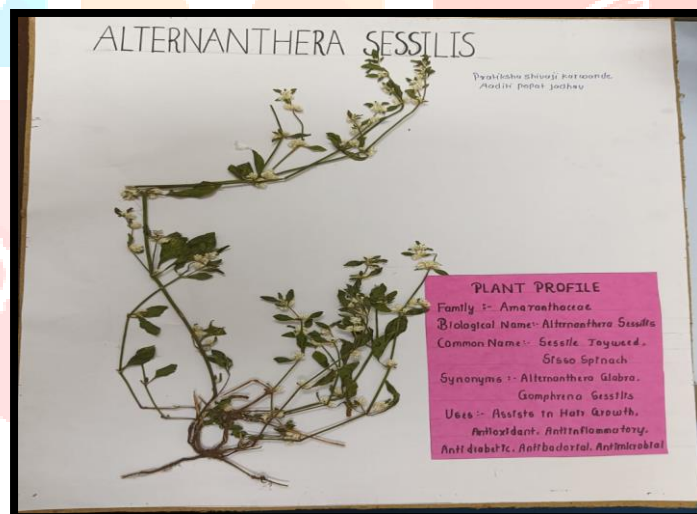


Figure: 8 Herbarium Sheet

3. Preparation of herbal extract:

After collecting fresh *Alternanthera sessilis* plants, they were thoroughly cleaned four to five times under running tap water and then given a last rinse with sterile water. After that, they were left to dry for 20–25 days at room temperature in the shade. After being dried, the plant material was ground into a coarse powder, sieved, and used for crude extraction. For the extraction process, a variety of solvents were used, including water, ethanol, methanol, acetone, ethyl acetate, chloroform, and petroleum ether.



Figure: 9 Soxhlet apparatus



Figure: 10 Extract

4. Phytochemical tests *alternanthera sessilis*:



Figure: 11 Phytochemical tests

Sr.No	Test Name	Test	Observation	Conclusion
1.	Test for tannins	1ml plant extract+2ml 5% ferric chloride	Dark blue or greenish black	Tannins are present
2.	Test for saponins	2ml plant extract+2ml distilled water shaken for 15 minutes	1cm layer of foam	Saponins are present
3.	Test for carbohydrate	2 ml plant extract+1ml Molisch's reagent+ew drop of conc. Sulphuric acid	Purple or reddish colour	Carbohydrate are present
4.	Test for flavonoids	2ml plant extract+1ml of 2N sodium hydroxide	Yellow colour appeared	Flavonoids are present
5.	Test for Alkaloids	2ml plant extract+2ml conc.hydrochloricacid+few drop of mayer's reagent	Green colour or white precipitate	Alkaloids are present

5. Preparation of Rose water Extract:

Steps:-

Add your clean rose petals to the glass bottle. Add enough distilled water to just cover the petals. Don't add too much water, or you'll dilute your rose water. Place the glass bottle in the sunlight for 2 days. After the first day, add 1 to 2 drops of water. Simmer until the petals lose their colour. Strain the water into a spray bottle or jar. Refrigerate and use for up to a month.



Figure: 12 Preparation of Rose water Extract

6. Preparation of Herbal Hair Serum (30ml)

STEP 1 :-

In a beaker, add 5g flaxseeds in 50ml distilled water and apply heat. Continue heating until clear, slight viscous gel is formed. Filter the gel using muslin cloth. To the obtained gel. Mix the solution using magnetic stirrer for 30 minutes.

STEP 2 :-

In a beaker, add 1g of dried fenugreek seeds in 20ml of distilled water and boil the solution for 5 mins. Filter the solution and add about 5g of aloe vera gel and keep the mixture at room temperature. Additionally, add distilled water to the solution in order to make a solution free from any lumps.

STEP 3:-

In a beaker, add solution 1 and solution 2 with continuous stirring with a stirrer. Then, add the alternant *Hera sessilis* leaves extract continue stirring with a glass rod. To this solution, add about 0.02 gm 1ml of sodium benzoate that acts as a preservative. Added 1-2 drops of rose water which acts as perfuming agent. Mix the solution using magnetic stirrer for 15 minutes. Store serum in well closed container.

VI. FORMULATION TABLE:

Sr. No	Ingredients	Batch F1	Batch F2	Batch F3	Batch F4	Batch F5	Role of Ingredient
1.	Leaves extract	3ml	4ml	2ml	4ml	5ml	Stimulate hair growth
2.	Fennugreek	5ml	3ml	----	7ml	5ml	Increasing blood circulation to the scalp
3.	Flexseed	---	10ml	5.5ml	-----	2.5ml	Nourishing hair roots
4.	Aloe vera	2.5ml	3ml	3.5ml	2.10ml	6ml	Cooling agent
6.	Rose water	1 ml	1-2 drops	1ml	1ml	1ml	Perfuming agent
7.	Sodium Benzoate	0.02gm	0.02gm	0.02gm	0.02gm	0.02gm	Preservative
8.	Distilled water	Q.S	Q.S	Q.S	Q.S	Q.S	Q.S

Table: 3 FORMULATION**Figure:13 Batches of formulation****VII. EVALUATION OF HERBAL HAIR SERUM:**

- Physical Appearance:** The set herbal hair serum is visually evaluated for appearance, colour, and texture.
- Homogeneity Test:** The hair serum was applied to a dry, clean object glass, and then a cover glass was bonded over it. Investigated was the appearance in the presence of some coarse particles or homogeneity. Herbal hair serum was visually inspected for homogeneity and the presence of lumps, flocculates, or aggregates.
- Viscosity:** The viscosity measurement was performed with spindle number 6 on a Brookfield viscometer (RVDV-II+PRO). In the beaker, 50ml of hair serum was placed, and the viscosity was measured at various rpm, I.e. 10,20,50,100



Figure: 14 Brookfield viscometer

4. **pH** :The pH meter was calibrated using pH 4 and pH 7 buffer solutions. Then, the electrode was soaked in the hair serum and left until the pH normalized after a few minutes
5. **Skin Irritation Test**: After applying the serum to the skin, it is checked for any redness or itching after two hours.
6. **Sensitivity Test**: The procedure involves putting the serum to the skin, exposing it to sunlight for 10 minutes, and checking for rashes or itching
7. **Spreadability**: A similar plate procedure that is frequently used to evaluate and measure the spreadability of semisolid medicines was utilised to measure spreadability. One gramme of hair serum was compressed between two 20 x 20 cm vertical plates, the upper of which weighed 125 g. After one minute, the spread periphery was measured. Spreadability was calculated using the following formula:

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

Where, S = Spreadability

M = Weight in the visage (tied to the upper slide).

L = The glass slide changed the length.

T = Time (in sec) taken.

8. **Stability**:

Three months were spent storing the herbal hair serum at two different temperatures of 42 °C and 302 °C, with 65 RH. After three months, the herbal hair serum's pH and density were measured and compared to their initial values.

VIII. RESULT AND DISCUSSION:

1. Physical appearance:

The physical appearance, odor and texture of the prepared herbal hair serum are visually tested.

Parameter	Batch F1	Batch F2	Batch F3	Batch F4	Batch F5
Color	Light Yellowish Brown	Yellowish Brown	Yellowish Brown	Dark Brown	Dark Brown
Odor	Rose type	Rose type	Rose type	Rose type	Rose type
Texture	Smooth	Smooth	Smooth	Smooth	Smooth

Table: 4 The physical appearance, odor and texture of the prepared herbal hair serum

2. pH ,Homogeneity and Spreadability Test :

The pH scale is used to specify the acidity basicity of a product in order to ensure that it is safe to use.

Parameter	Batch F1	Batch F2	Batch F3	Batch F4	Batch F5
pH	5	5	5.5	6	6.5
Homogeneity	Good	Good	Very Good	Good	Very Good
Spreadability	Easily spreadable	Easily spreadable	Easily spreadable	Easily spreadable	Easily spreadable

Table: 5 pH, Homogeneity and Spreadability Test

3. Viscosity:

RPM	10 rpm	20 rpm	50rpm	100rpm
CPS	6700	2950	1760	1110

Table: 6 Viscosity

IX. CONCLUSION:

In contrast to other beauty products that are overly available in the market, natural cosmetics are both safe and effective to use. Fits all types of hair. According to findings, herbal hair serum offers a variety of vital nutrients required to maintain the sebaceous glands' normal function and promote the development of natural hair. Since ancient times, medicinal plants have been used to treat hair disorders due to their lower risk of side effects and hypersensitivity reactions. Since ancient times, medicinal plants have been used to treat hair disorders due to their lower risk of side effects and hypersensitivity reactions. Many herbal medications are recommended by India's traditional medical system to stimulate hair growth. The best part is that herbal extracts will give hair adequate nourishment and microprotein supplements, resulting in safe hair. Because they don't contain parabens or sulphates, herbal cosmetics are becoming more and more popular in the personal care sector and are in high demand in daily life. Trial and error led to the successful formulation and evaluation of the herbal hair serum. The study's findings indicate that it has natural ingredients that support the growth and upkeep of hair. Flaxseed and fennugreek antioxidant qualities, along with other ingredients like amino acids, help to stimulate hair growth and prevent premature hair greying. Plant extract from *Alternanthera sessilis* is nutrient-rich and can help nourish the scalp while shielding it from dandruff and irritation. In addition to relieving scalp irritation, *Alternanthera sessilis* promotes hair growth. Both hair loss and new hair growth are decreased by it. Their safety and lack of danger make them an excellent alternative to synthetic chemicals.

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