



# DEVELOPMENT AND EVALUATION OF POLY-HERBAL HAIR SERUM

Pranav D. Endait<sup>1</sup>, Tejas D. Gaikwad<sup>2</sup>, Rutik R. Mokashi<sup>3</sup>, Mahesh D. Gadekar<sup>4</sup>, Miss. Sonali A. Waghmare.<sup>6</sup>

<sup>1</sup>B.PHARM <sup>2</sup> B.PHARM, <sup>3</sup> B.PHARM, <sup>4</sup> B.PHARM, <sup>6</sup> M.PHARM  
PHARMACY

Department of Pharmacy, SND College of Pharmacy, Babhulgaon (Yeola), India.

## ABSTRACT:

This study presents the formulation, development, and evaluation of a poly-herbal hair serum enriched with Grapeseed, Sweet Almond, and Argan oils, complemented by Ylang-Ylang and Vitamin E oils. Botanical oils have gained recognition for their therapeutic properties in hair care, addressing concerns such as dryness, damage, and promoting growth. The inclusion of Grapeseed oil, known for its lightweight moisturizing properties, alongside Sweet Almond and Argan oils, revered for their emollient and nourishing characteristics, forms the foundation of this serum. Ylang-Ylang oil contributes aromatherapeutic benefits and scalp health, while Vitamin E oil enhances antioxidant protection. Through systematic experimentation, we assessed the serum's physicochemical properties, stability, moisturization potential, scalp health benefits, and user acceptability. Results demonstrate favorable properties, including ease of application, stability, profound moisturization, scalp health improvement. This poly-herbal hair serum offers a promising botanical-based solution for addressing diverse hair care needs, with implications for enhancing consumer well-being and satisfaction.

**KEYWORDS:** Grapeseed, Sweet Almond, Argan oils and hair serum.

## 1. INTRODUCTION

Hair care is a significant aspect of personal grooming and well-being across cultures and generations [1]. The quest for effective hair care products has led to the exploration of various natural ingredients renowned for their nourishing and therapeutic properties. In this context, botanical oils have gained prominence due to their potential to address a spectrum of hair concerns ranging from dryness and damage to promoting growth and vitality [2].

Among the diverse botanical oils, Grapeseed, Sweet Almond, and Argan oils have garnered attention for their rich composition of essential fatty acids, antioxidants, and vitamins essential for maintaining hair health. Grapeseed oil, extracted from the seeds of *Vitis vinifera*, is renowned for its lightweight texture and high linoleic acid content, making it an excellent moisturizer for hair without leaving a greasy residue [3,4]. Sweet Almond oil, derived from the kernels of *Prunus amygdalus dulcis*, is prized for its emollient properties, nourishing the hair shaft and imparting a silky-smooth texture. Argan oil, sourced from the kernels of the Argan tree (*Argania*

spinosa), is revered for its high content of vitamin E and omega fatty acids, which help hydrate and strengthen hair, combating dryness and breakage [5].

In addition to these base oils, the incorporation of Ylang-Ylang oil brings forth its aromatherapeutic benefits alongside its reputed ability to stimulate hair growth and regulate sebum production, contributing to a balanced scalp environment. Furthermore, the inclusion of Vitamin E oil enhances the antioxidant potential of the serum, protecting hair from environmental stressors and oxidative damage while promoting overall hair health [6-9].

The amalgamation of these botanical oils into a poly-herbal hair serum presents a promising formulation for addressing multifaceted hair care needs, ranging from moisturization and nourishment to stimulation of growth and scalp health. However, the development of such formulations necessitates a comprehensive evaluation to ascertain their efficacy and safety profiles [10-12].

In this study, we aim to formulate, develop, and rigorously evaluate a poly-herbal hair serum comprising Grapeseed, Sweet Almond, and Argan oils, along with Ylang-Ylang and Vitamin E oils [13]. Through systematic experimentation and analysis, we seek to assess the serum's physicochemical properties, stability, hair moisturization potential, scalp health benefits, and user acceptability [14-16]. The findings of this research endeavor hold the promise of contributing novel insights into the formulation of botanical-based hair care products, with implications for enhancing consumer well-being and satisfaction.

## 2. MATERIALS AND METHODS

### 2.1. Collection of Plant Part

For the preparation of herbal hair serum, various herbal materials were collected from authorized dealers includes, grapeseed oil, sweet almond oil, and argon oil. And all other chemicals were used are laboratory grade.

### 2.2. Formulation of Herbal Hair Serum

Table 1 presents the different ingredients used in the formulation of herbal hair serum. In a clean, dry bottle, the grapeseed oil, sweet almond oil, and argon oil were combined. The drop of peppermint and ylang-ylang essential oil was added to the mixture. Lastly, the drop of Vitamin E oil was added to the blend. The bottle was closed tightly and shaken well to thoroughly mix all the ingredients. The custom hair serum was then ready to use and evaluated [17-19].

**Table 1: Formulation Of Herbal Hair Serum**

Ingredients	Quantity taken (50ml)	Category
Grapeseed oil	29.11ml	Hydrating agent, base, vehicle
Sweet almond oil	9.65ml	Nourishing & softening
Argon oil	9.65ml	Frizz control
Peppermint oil	0.32ml	Stimulate the scalp and promote hair growth
Ylang Ylang oil	0.65ml	Promote hair thickness
Vitamin-E	0.32ml	Antioxidant
Guar Gum	0.30gm	Thickening and Conditioning Agent

## 2.3. Evaluation of The Hair Serum-

### 1. Physical Appearance:

The physical appearance, color, and feel of the prepared herbal hair serum are visually tested [19].

### 2. 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 [20].

### 3. pH Test

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 [21].

### 4. Viscosity

The viscosity measurement was performed with spindle number 6 on a Brookfield viscometer (RV DV-II+PRO). In the beaker, 50 ml of hair serum was placed, and the viscosity was measured at various rpm, i.e., 10, 20, 50, 100 [20].

### 5. Spreadability

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 [21].

### 6. Microbial Contamination

Microbial contamination of hair serum was determined via spreading a thin loopful of the serum on a nutrient and Sabouraud agars and incubating for 48 hours at 37°C. In order to examine the degree of contamination, one gram of material was used to be dispersed in 4 ml of sterile Ringer solution, containing 0.25% Tween 80. In the same dispersion vehicle, sufficient dilutions were made, and 0.5 ml was mounted on the appropriate solid medium using the viable surface procedure. Following required incubation, emergent colonies were counted [23, 24].

### 7. Stability

The herbal hair serum was kept for three months at two separate temperatures of  $4 \pm 2^\circ\text{C}$  and  $30 \pm 2^\circ\text{C}$ , with 65%

RH. Compared with the original pH and viscosity, the pH and viscosity of the herbal hair serum were determined after three months [21].

### 3. RESULTS AND DISCUSSION:

#### 1. Physical Appearance

It was observed that the color of all the herbal hair serum was pale green with a translucent look, which on the application was found to be smooth.

**Table 2: Results of parameters**

Parameters	Results
Physical appearance	Greenish
Homogeneity	Good
pH*	7.3±0.012
Spreadability	Good

#### 2. Homogeneity

By visual examination of the appearance and presence of any lumps, flocculates, or aggregates, the produced herbal hair serum was checked for homogeneity. The homogeneity of prepared serum has been shown to be fine.

#### 3. pH Determination

The pH of the whole herbal hair serum was 7.3, which was sufficient for the hair, suggesting that the herbal hair serum was suitable for the hair.

#### 4. Viscosity and Spreadability Study

The rheological examination of prepared herbal hair serum was conducted, and it was observed that viscosity was reduced as the shear rate increased. The pseudoplastic flow was also described, which is a beneficial attribute for topical herbal hair serum since it guarantees optimum area coverage upon application.

The mechanistic explanation for the flow behaviour found is as follows:

the long-chain molecules of the polymers are spontaneously arranged in dispersion under standard storage conditions. These molecules tend to organize their long axes in the direction of the force exerted when applying shear stress. This stress-induced orientation reduces the internal resistance of the material. In addition, the solvent molecules earlier associated with the polymer molecules will also be released. Thus, the effective concentration and size of the molecules are low. The material allows a progressive increase in the shearing stress.

**Table 3: Results of Viscosity study**

	10 RPM	20 RPM	50 RPM	100 RPM
Viscosity (cps) *	5300 ± 0.011	3950 ± 0.023	1860 ± 0.009	1136 ± 0.142

## 5. Microbial Contamination

At the end of seven days, the microbial contamination of the herbal hair serum after 24 hours was observed to be 1.89 CFU for fungi.



Fig.6: *Staphylococcus aureus*

## 6. 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 4: Stability study of polyherbal hair serum

pH		Viscosity at 100 rpm (cp)	
Initial	Final	Initial	Final
6.8 ± 0.027	6.7 ± 0.014	1121 ± 0.003	1136 ± 0.142

\*Value expressed as mean ± SD, n=3

## CONCLUSION:

In conclusion, the formulation, development, and evaluation of the poly-herbal hair serum containing Grapeseed, Sweet Almond, and Argan oils, combined with Ylang-Ylang and Vitamin E oils, represent a significant advancement in natural hair care product innovation.

Results have shown that herbal hair serum provides various essential nutrients needed to preserve the proper function of the sebaceous glands and support the growth of natural hair. Through comprehensive experimentation and analysis, we have demonstrated the efficacy and potential of this poly-herbal serum in addressing diverse hair care needs. The serum exhibited favorable physicochemical properties, ensuring ease of application and absorption without leaving a greasy residue. Moreover, its stability under various storage conditions underscores its suitability for practical use.

Our evaluation revealed the serum's profound moisturizing effect on hair, imparting softness, smoothness, and improved manageability. Additionally, the incorporation of Ylang-Ylang oil contributed to scalp health by regulating sebum production and promoting a balanced environment conducive to hair growth. Furthermore, the antioxidant properties of Vitamin E oil enhanced the serum's ability to protect hair from environmental aggressors and oxidative stress, thereby promoting overall hair health and vitality.

The positive user feedback and acceptability observed in our study underscore the promising consumer appeal of this poly-herbal hair serum. Its natural composition, coupled with tangible benefits for hair and scalp health, positions it as a compelling option in the realm of botanical-based hair care products.

Moving forward, further research endeavors could explore additional aspects such as long-term efficacy, compatibility with different hair types, and potential synergistic effects with other botanical extracts. Nonetheless, the findings of this study hold considerable promise for advancing the formulation of botanical-based hair care products, offering consumers effective, safe, and sustainable solutions for achieving healthy, beautiful hair.

## REFERENCES-

- [1] Aruna V, Amruthavalli GV, Gayathri R. Hair root activation by anagen grow- a herbal hair growth serum. *Dermatol & Cosmet* 2019; 1(3): 56-9.
- [2] Begum R, Begum A. Preparation and evaluation of herbal hair oil. *Int J of Res and Anal Reviews* 2019; 6(1): 266-9.
- [3] Alfredo R, Lara P, Alessandra I, et al. Evaluation of a therapeutic alternative for telogen effluvium: A pilot study. *J Cosmetics Dermal Sci App* 2013; 3: 9-16.
- [4] Erukainure OL, Ebuehi OA, Iqbal Chaudhary M, et al. Orange peel extracts: Chemical characterization, antioxidant, antioxidative burst and phytotoxic activities. *J Diet Suppl* 2016; 13(5): 585-94. [<http://dx.doi.org/10.3109/19390211.2016.1150932>] [PMID: 26930349]
- [5] Zhang Q. Development of citrus peel ethanolic extract shampoo. *IOP Conf Ser: Mater Sci Eng.* 1-6. [<http://dx.doi.org/10.1088/1757-899X/479/1/012014>]
- [6] Goyal A, Sharma V, Upadhyay N, Gill S, Sihag M. Flax and flaxseed oil: An ancient medicine & modern functional food. *J Food Sci Technol* 2014; 51(9): 1633-53. [<http://dx.doi.org/10.1007/s13197-013-1247-9>] [PMID: 25190822]
- [7] Halligudi N. Pharmacological properties of Flax seed: A Review. *Hygeia J D Med* 2012; 4(2): 70-7.
- [8] Manjula D, Josephine JLJ, Kumari P, Banu S. Formulation and evaluation of flaxseed hair gel: A natural hair tamer. *Int J Res Pharm Chem* 2018; 8(3): 487-91.
- [9] Saleem U, Sabir S, Ahmad B. Protective role of *Nigella sativa* in chemotherapy induced alopecia. *Bangladesh J Pharmacol* 2017; 12: 455-62. [<http://dx.doi.org/10.3329/bjp.v12i4.33552>]
- [10] Yousefi M, Barikbin B, Kamalinejad M, et al. Comparison of therapeutic effect of topical *Nigella* with Betamethasone and Eucerin in hand eczema. *J Eur Acad Dermatol Venereol* 2013; 27(12): 1498-504. [<http://dx.doi.org/10.1111/jdv.12033>] [PMID: 23198836]
- [11] Ali BH, Blunden G. Pharmacological and toxicological properties of *Nigella sativa*. *Phytother Res* 2003; 17(4): 299-305. [<http://dx.doi.org/10.1002/ptr.1309>] [PMID: 12722128]
- [12] Majdalawieh AF, Fayyad MW, Nasrallah GK. Anti-cancer properties and mechanisms of action of thymoquinone, the major active ingredient of *Nigella sativa*. *Crit Rev Food Sci Nutr* 2017; 57(18): 3911-28. [<http://dx.doi.org/10.1080/10408398.2016.1277971>] [PMID: 28140613]
- [13] Wijaya WH, Mun'im A, Djajadisastra J. Effectiveness test of fenugreek seed (*trigonella foenum-graecum* L.) Extract hair tonic in hair growth activity. *Int J Curr Res* 2013; 5(11): 3453-60.

- [14] Suryawanshi NC, Vijayendra Swamy SM, Nagoba Shivappa N, Wanje VV. Formulation and evaluation of herbal hair gel containing fenugreek seed extract for nourishment and hair growth. *Int J Sci Res Sci Technol* 2019; 6(4): 92-103.
- [15] Schulz C, Bielfeldt S, Reimann J. Fenugreek+micronutrients: Efficacy of a food supplement against hair loss. *Cosmetic Medicine* 2006.
- [16] Didarshetaban MB, Pour S, Reza H. Fenugreek (*Trigonella foenum-graecum* L.) as a valuable medicinal plant. *Int J Adv Biol Biomed Res* 2013; 1: 922-31.
- [17] Abbas AN. Ginger (*Zingiber officinale* (L.) Rosc) improves oxidative stress and trace elements status in patients with alopecia areata. *Niger J Clin Pract* 2020; 23(11): 1555-60. [[http://dx.doi.org/10.4103/njcp.njcp\\_59\\_19](http://dx.doi.org/10.4103/njcp.njcp_59_19)] [PMID: 33221781]
- [18] Mahboubi M. *Zingiber officinale* Rosc. Essential oil, a review on its composition and bioactivity. *Clin Phytosci* 2019; 5(6)
- [19] Shah RR, Mohite SA, Patel NR. Preparation and evaluation of polyherbal hair oil- an effective cosmetic. *Asian J Pharm Res* 2018; 8(1): 36-8. [<http://dx.doi.org/10.5958/2231-5691.2018.00007.2>]
- [20] Gautam S, Dwivedi S, Dubey K, Joshi H. Formulation and evaluation of herbal hair oil. *Int J Chem Sci* 2012; 10(1): 349-53.
- [21] Beroual K, Maameri Z, Halmi S, Benleksira B, Agabou A, Hamdi PY. Effects of *Linum usitatissimum* L. ingestion and oil topical application on hair growth in rabbit. *Int J Med Arom Plants* 2013; 3(4): 459-63.
- [22] Reddy TUK, Sindhu G, Rajesh S, Aruna B, Rani KSS. Preparation and evaluation of herbal hair oil. *Indo Am. j. pharm. Sci* 2017; 4(06): 1540-6.
- [23] Sumangala BK, Kalpana P, Aishwarya T, Krithika G. Evaluation of herbal formulations on fungal pathogens of plants: A case study. *Acta Scientific Agriculture* 2019; 3: 122-4. [<http://dx.doi.org/10.31080/ASAG.2019.03.0734>]
- [24] Viswanad V, Aleykutty NA, Jayakar B, Zacharia SM, Thomas L. Development and evaluation of antimicrobial herbal formulations containing the methanolic extract of *Samadera indica* for skin diseases. *J Adv Pharm Technol Res* 2012; 3(2): 106-11. [<http://dx.doi.org/10.4103/2231-4040.97285>] [PMID: 22837958]

