DEVELOPMENT AND EVALUATION OF
POLY-HERBAL HAIR SERUM

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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>
<thead>
<tr>
<th>Ingredients</th>
<th>Quantity taken (50ml)</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grapeseed oil</td>
<td>29.11ml</td>
<td>Hydrating agent, base, vehicle</td>
</tr>
<tr>
<td>Sweet almond oil</td>
<td>9.65ml</td>
<td>Nourishing &amp; softening</td>
</tr>
<tr>
<td>Argon oil</td>
<td>9.65ml</td>
<td>Frizz control</td>
</tr>
<tr>
<td>Peppermint oil</td>
<td>0.32ml</td>
<td>Stimulate the scalp and promote hair growth</td>
</tr>
<tr>
<td>Ylang Ylang oil</td>
<td>0.65ml</td>
<td>Promote hair thickness</td>
</tr>
<tr>
<td>Vitamin-E</td>
<td>0.32ml</td>
<td>Antioxidant</td>
</tr>
<tr>
<td>Guar Gum</td>
<td>0.30gm</td>
<td>Thickening and Conditioning Agent</td>
</tr>
</tbody>
</table>
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 (RVDV-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:

\[ S = \frac{M \times L}{T} \]

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± 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 [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>
<thead>
<tr>
<th>Parameters</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical appearance</td>
<td>Greenish</td>
</tr>
<tr>
<td>Homogeneity</td>
<td>Good</td>
</tr>
<tr>
<td>pH*</td>
<td>7.3±0.012</td>
</tr>
<tr>
<td>Spreadability</td>
<td>Good</td>
</tr>
</tbody>
</table>

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>
<thead>
<tr>
<th>Viscosity (cps) *</th>
<th>10 RPM</th>
<th>20 RPM</th>
<th>50 RPM</th>
<th>100 RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5300 ± 0.011</td>
<td>3950 ± 0.023</td>
<td>1860 ± 0.009</td>
<td>1136 ± 0.142</td>
</tr>
</tbody>
</table>
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.

![Image of microbial contamination]

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>
<thead>
<tr>
<th>Table 4: Stability study of polyherbal hair serum</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>pH</strong></td>
</tr>
<tr>
<td>6.8 ± 0.027</td>
</tr>
</tbody>
</table>

*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-


