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Research Article

Formulation and Evaluation of Herbal Hair Serum for Improving Hair Nourishment, Smoothness and Overall, Hair Health

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ABSTRACT

Hair plays a vital role in enhancing physical appearance and maintaining self-confidence. Various environmental factors, chemical treatments, nutritional deficiencies, and lifestyle changes adversely affect hair quality, resulting in dryness, frizz, breakage, and loss of natural shine. Herbal hair serums have emerged as promising cosmetic formulations due to their ability to provide nourishment and protection through naturally derived ingredients. The present study was undertaken to formulate and evaluate a herbal hair serum containing Aloe vera gel, rose water, sunflower oil, vitamin E, glycerine, Tween 80, methyl paraben, and propyl paraben. Three formulations designated as H1, H2, and H3 were prepared using varying concentrations of Aloe vera gel and rose water. The prepared formulations were evaluated for physical appearance, pH, homogeneity, viscosity, spreadability, and stability. All formulations exhibited acceptable physicochemical properties with smooth texture, pleasant odor, and satisfactory homogeneity. The pH values were found within the acceptable range for scalp application. Viscosity and spreadability studies indicated suitability for topical use. Stability studies revealed no significant changes in the formulation during storage. Among the three formulations, batch H3 demonstrated superior performance in terms of viscosity, homogeneity, and stability. The findings suggest that the developed herbal hair serum may be considered a safe and effective natural alternative for improving hair nourishment, smoothness, and overall hair health

INTRODUCTION

Hair is one of the most important aesthetic features of the human body and significantly contributes to

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personality and self-esteem. Healthy hair is generally associated with youthfulness, beauty, and good health. However, increasing exposure to environmental pollution, ultraviolet radiation, stress, poor dietary habits, and excessive use of chemical-based cosmetic products has resulted in a rise in hair-related problems worldwide. Common issues such as hair fall, dryness, dandruff, split ends, and rough texture adversely affect hair quality and appearance.

Hair serums are cosmetic preparations designed to improve the texture, appearance, and manageability of hair. Unlike conventional oils, hair serums form a protective coating on the hair shaft, helping reduce frizz, enhance shine, and protect against environmental damage. Modern consumers increasingly prefer herbal cosmetic products because they are perceived as safer and more environmentally friendly than synthetic alternatives.

Herbal hair serums incorporate plant-derived ingredients possessing moisturizing, antioxidant, conditioning, and nourishing properties. Aloe vera is known for its hydrating and soothing effects, while sunflower oil provides essential fatty acids that improve hair softness and reduce dryness. Vitamin E functions as a powerful antioxidant that protects hair from oxidative damage and enhances scalp health. Rose water acts as a natural conditioner and contributes to maintaining scalp pH balance.

The growing demand for herbal cosmetic formulations has encouraged researchers to develop effective natural alternatives for hair care. Therefore, the present study was conducted to formulate and evaluate a herbal hair serum capable of improving hair nourishment, smoothness, and overall hair health.

2. MATERIALS AND METHODS:

2.1 Materials

The herbal hair serum was formulated using Aloe vera gel, rose water, sunflower oil, vitamin E, glycerine, Tween 80, methyl paraben, propyl paraben, and distilled water. All ingredients were obtained from reliable sources and used without further purification. Aloe vera gel was selected for its moisturizing and conditioning properties, while sunflower oil and vitamin E were incorporated as nourishing and antioxidant agents. Rose water was used as a natural fragrance and soothing agent. Tween 80 served as an emulsifying agent, whereas methyl paraben and propyl paraben were employed as preservatives to enhance the stability of the formulation.

2.2 Method of Preparation

The herbal hair serum was prepared by an emulsion technique. Initially, the aqueous phase was prepared by mixing distilled water and rose water in a clean beaker. Methyl paraben and propyl paraben were dissolved in the aqueous phase with continuous stirring. Aloe vera gel was then added gradually and mixed thoroughly to obtain a uniform mixture.

In a separate beaker, sunflower oil, vitamin E, and Tween 80 were mixed to prepare the oil phase. The oil phase was slowly incorporated into the aqueous phase under continuous stirring to form a stable emulsion. Glycerine was subsequently added and mixed uniformly. The final volume was adjusted with distilled water and the prepared serum was transferred into airtight containers for further evaluation.

2.3 Formulation of Herbal Hair Serum

Three formulations (H1, H2, and H3) were prepared by varying the concentration of Aloe vera

gel and rose water while keeping the remaining ingredients constant.

Table 1: Composition of Herbal Hair Serum Formulations

Ingredients	H1 (30 ml)	H2 (30 ml)	H3 (30 ml)
Aloe vera gel	4 ml	5 ml	6 ml
Rose water	6 ml	7 ml	8 ml
Distilled water	15.5 ml	13.5 ml	11.5 ml
Sunflower oil	0.5 ml	0.5 ml	0.5 ml
Glycerine	1.5 ml	1.5 ml	1.5 ml
Vitamin E	0.5 ml	0.5 ml	0.5 ml
Tween 80	0.5 ml	0.5 ml	0.5 ml
Methyl paraben	0.05 ml	0.0 ml	0.05 ml
Propyl paraben	0.01 ml	0.01 ml	0.01 ml

2.4 Evaluation of Herbal Hair Serum

The prepared formulations were evaluated for various physicochemical parameters including physical appearance, pH, homogeneity, viscosity, spreadability, and stability. Physical appearance was assessed by visual inspection for color, odor, and texture. The pH was determined using a digital pH meter. Homogeneity was evaluated by observing the formulation for lumps and phase separation. Viscosity was measured using a Brookfield viscometer. Spreadability was determined by the glass slide method. Stability studies were carried out by storing the formulations under suitable conditions and monitoring any changes in appearance, pH, and viscosity.

3. RESULTS AND DISCUSSION

3.1 Physical Appearance

The prepared herbal hair serum formulations were evaluated visually for colour, odour, texture, and overall appearance. All formulations exhibited a milky white colour with a pleasant rose fragrance and smooth texture. No phase separation or visible instability was observed during the study period.

Table 2: Physical Appearance of Herbal Hair Serum Formulations

Parameter	H1	H2	H3
Colour	Milky White	Milky White	Milky White
Odour	Rose Type	Rose Type	Rose Type
Texture	Smooth	Smooth	Smooth
Appearance	Uniform	Uniform	Uniform

3.2 pH Determination

The pH of the formulations was determined using a digital pH meter. The observed pH values ranged between 5.1 and 5.6, indicating compatibility with the natural pH of the scalp and minimizing the possibility of irritation.

Table 3: pH of Herbal Hair Serum Formulations

Batch	pH
H1	5.1
H2	5.4
H3	5.6

3.3 Homogeneity Test

All formulations were examined visually for homogeneity. The formulations were free from lumps, coarse particles, and phase separation. Batch H3 exhibited superior homogeneity compared to the other formulations.

Table 4: Homogeneity of Herbal Hair Serum Formulations

Batch	Observation
H1	Good
H2	Good
H3	Very Good

3.4 Viscosity Determination

Viscosity is an important parameter affecting the ease of application of hair serum. The viscosity values increased slightly with increasing concentration of Aloe vera gel. Batch H3 showed the highest viscosity, which contributed to better consistency and application characteristics.

Table 5: Viscosity of Herbal Hair Serum Formulations

Batch	Viscosity (cP)
H1	215
H2	223
H3	230

3.5 Spreadability Test

All formulations demonstrated satisfactory spreadability and could be easily distributed over the hair surface. Good spreadability ensures uniform application and improved user acceptability.

Table 6: Spreadability of Herbal Hair Serum Formulations

Batch	Observation
H1	Easily Spreadable
H2	Easily Spreadable
H3	Easily Spreadable

3.6 Stability Study

The formulations were stored under suitable storage conditions and monitored for changes in pH, appearance, and viscosity. No significant changes were observed during the study period, indicating good stability of the prepared formulations.

Table 7: Stability Study of Optimized Formulation

Parameter	Initial	Final
pH	5.5	5.6
Appearance	Stable	Stable
Viscosity (cP)	230	232

3.7 DISCUSSION

The herbal hair serum was successfully formulated using Aloe vera gel, rose water, sunflower oil, vitamin E, glycerine, and suitable excipients. The prepared formulations showed acceptable physicochemical characteristics including smooth texture, pleasant fragrance, appropriate pH, good homogeneity, and satisfactory stability. Aloe vera contributed significantly to hydration and conditioning effects, while sunflower oil and vitamin E enhanced nourishment and protection against environmental damage. Rose water improved scalp compatibility and imparted a pleasant fragrance to the formulation.

Among all the formulations, batch H3 demonstrated superior performance with respect to viscosity, homogeneity, and stability. The higher concentration of Aloe vera gel in H3 may have contributed to its improved consistency and conditioning properties. The stability study confirmed that the optimized formulation remained physically stable without any signs of phase separation or deterioration. The results suggest that the developed herbal hair serum possesses desirable cosmetic properties and may serve as a natural alternative to synthetic hair care products.

4. CONCLUSION

The present study successfully formulated and evaluated a herbal hair serum using Aloe vera gel, rose water, sunflower oil, vitamin E, glycerine, Tween 80, and suitable preservatives. Three formulations (H1, H2, and H3) were prepared and assessed for various physicochemical parameters including appearance, pH, homogeneity, viscosity, spreadability, and stability.

The evaluation results demonstrated that all formulations possessed acceptable cosmetic and physicochemical characteristics. The pH values were found to be within the suitable range for scalp application, indicating good compatibility and minimal risk of irritation. The formulations exhibited smooth texture, pleasant fragrance, good homogeneity, and satisfactory spreadability. Stability studies revealed that the prepared serum remained stable without significant changes in appearance, pH, or viscosity during the storage period.

Among the three formulations, batch H3 showed superior performance with respect to viscosity, homogeneity, and stability. The improved characteristics of H3 may be attributed to the higher concentration of Aloe vera gel, which enhanced the moisturizing and conditioning properties of the formulation. Sunflower oil and vitamin E contributed to hair nourishment and

antioxidant protection, while rose water improved scalp compatibility and product acceptability.

Based on the obtained results, it can be concluded that the developed herbal hair serum is a stable, effective, and aesthetically acceptable formulation that may be used as a natural alternative to conventional synthetic hair care products for improving hair nourishment, smoothness, and overall hair health.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this research work.

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