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Formulation and Evaluation of A Herbal Hair Serum Incorporating Hibiscus, Black seed, Avocado and Vitamin E.

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ABSTRACT

Herbal hair serum is a naturally prepared cosmetic product designed to improve the overall condition of hair by providing nourishment, moisture, and protection through the use of herbal and oil-based ingredients. The formulation includes Hibiscus powder, Avocado Oil, Black Seed Oil, Vitamin E capsule, glycerine, and other natural substances that are beneficial for maintaining healthy hair and scalp. Hibiscus is known for supporting hair growth, strengthening hair follicles, and minimizing hair fall because of its rich antioxidant and nutrient content. Avocado oil deeply conditions and hydrates the hair due to the presence of essential fatty acids and vitamins, while black seed oil helps maintain scalp health and reduce dandruff. Vitamin E protects hair from environmental damage and improves softness and texture, whereas glycerine acts as a moisturizing agent that helps retain hydration and smoothness in the hair.

The prepared herbal hair serum was assessed for different evaluation parameters such as physical appearance, texture, consistency, spreadability, pH, and stability. The formulation showed good homogeneity, smooth texture, easy application, and a non-greasy nature, which makes it suitable for regular hair care use. The serum was effective in reducing dryness, controlling frizz, improving manageability, and enhancing the natural shine of hair. The study indicates that the herbal hair serum prepared with natural ingredients is safe, economical, and effective for improving hair health without producing the adverse effects commonly associated with synthetic chemical-based hair products.

Hair is considered an important part of personal appearance and contributes significantly to an individual's confidence and personality. In recent years, common hair problems such as

dandruff, hair fall, dryness, split ends, and premature greying have increased due to environmental pollution, stress, poor dietary habits, and excessive use of chemical cosmetics. As a result, there has been growing interest in herbal cosmetic preparations because they are considered safer and more skin-friendly. Herbal hair serum is one of the commonly used natural hair care products that helps nourish, protect, and improve the quality and appearance of hair naturally.

1. INTRODUCTION

In modern lifestyles, hair-related problems such as hair fall, dandruff, dryness, split ends, and hair thinning have become increasingly common due to factors like environmental pollution, stress, unhealthy eating habits, hormonal changes, and the frequent use of chemical-based hair products. Regular exposure to harsh shampoos, hair dyes, heating devices, and environmental contaminants can weaken hair roots and negatively affect scalp health. Because of these issues, many people are now shifting toward herbal and natural hair care products that are considered safer and less harmful for long-term use.

Herbal cosmetic products have become popular because they are prepared using naturally available plant-based ingredients and are generally associated with fewer side effects when compared to synthetic cosmetic formulations. These herbal preparations help nourish the hair and scalp naturally while reducing the chances of irritation and allergic reactions. Among different herbal hair care products, herbal hair serum is commonly used to improve hair texture, control frizz, provide shine, and protect hair from external damage. Hair serum creates a protective coating over the hair strands, helping to maintain moisture and smoothness. In comparison to conventional hair oils, serums are light in texture, non-sticky, and convenient for everyday application.

The present study, "Formulation and Evaluation of Herbal Hair Serum," focuses on the preparation of a natural hair serum using ingredients such as Hibiscus powder, Vitamin E capsules, Avocado Oil, Black Seed Oil, and other beneficial herbal components. These ingredients were selected because of their nourishing, conditioning, and protective properties, which support scalp health, strengthen hair follicles, and encourage healthy hair growth naturally.

2. MATERIALS AND METHODS

A clean and dry beaker was taken for the preparation of the herbal hair serum. Measured quantities of avocado oil and black seed oil were added into the beaker and mixed thoroughly. Hibiscus powder was then added slowly with continuous stirring to obtain a smooth and uniform mixture. After proper mixing, the contents of the Vitamin E capsule were added to the formulation. Glycerine was then incorporated to improve the moisturizing property of the serum. The mixture was stirred continuously until a homogenous and smooth serum was formed. Finally, the prepared herbal hair serum was transferred into a clean airtight container and stored properly for further use.

3. METHOD OF FORMULATION:

The herbal hair serum was formulated by taking a clean and dry beaker and adding avocado oil and black seed oil in suitable quantities, followed by continuous stirring to obtain a uniform mixture. Hibiscus powder was then added slowly and mixed properly to avoid lump formation. The contents of the Vitamin E capsule were added to the mixture for antioxidant and nourishing effects. After that, glycerine was incorporated to provide moisture and smoothness to the hair. The entire mixture was stirred continuously until a smooth and homogenous serum was obtained. Finally, the prepared serum was filtered if necessary and stored in a clean airtight container for further use.

STEPS USED IN FORMULATION OF SERUM:

1. Collect all the required ingredients such as Hibiscus powder, black seed oil, avocado oil, Vitamin E capsule, and glycerine.
2. Take a clean and dry beaker for the preparation of the serum.
3. Add avocado oil and black seed oil into the beaker and mix thoroughly.
4. Slowly add Hibiscus powder into the oil mixture with continuous stirring to obtain a smooth blend.
5. Pierce the Vitamin E capsule and add the contents into the mixture.
6. Add glycerine to the formulation to provide moisturization and smoothness.
7. Stir the mixture continuously until a uniform and homogenous serum is formed.

8. Filter the serum if necessary to remove coarse particles.
9. Transfer the prepared herbal hair serum into a clean airtight container and store properly for further use.

Formulation of Serum

All the ingredients were taken in suitable quantities. Avocado oil and black seed oil were mixed thoroughly in a clean beaker. Hibiscus powder was added slowly with continuous stirring to form a smooth mixture. The contents of the Vitamin E capsule were then added, followed by glycerine. The mixture was stirred continuously until a uniform and homogenous serum was obtained. Finally, the prepared herbal hair serum was stored in a clean airtight container for further use. Fig 1. represents formulation of Hair Serum. Fig 2. represents Physical appearance. Table 1. represents Formulation of Serum

Fig 1. Formulation of Hair Serum

Table 1. Formulation of Serum

Ingredient	Part of plant	Activity	F1	F2	F3
Hibiscus	Flower	Stop hair loss & Thicken Hairs	5g	4g	2g
Avocado	Fruit	Moisturizes hairs.	10ml	8ml	5ml
Black seed	Seed	Stimulation & Strengthens	5ml	4ml	2ml
Glycerin	-	Humectant	3ml	2ml	1ml
e		& Softness			
Vitamin E	-	Nourishing	1ml	1ml	1ml
Distilled water	-	QS	50ml	40ml	25ml

Fig 2: Physical appearance.

Evaluation of Hair Serum

The prepared herbal hair serum containing Hibiscus, Black Seed Oil, Avocado Oil, Vitamin E capsule, and glycerine was evaluated for various physical, chemical, and cosmetic parameters to determine its quality, stability, safety, and effectiveness for hair care application. The evaluation of herbal hair serum is important to ensure that the formulation is suitable for regular use and provides the desired benefits without causing irritation or damage to the hair and scalp.

1. Appearance

The prepared serum was visually examined for its appearance and texture. The formulation showed a smooth, attractive, and uniform appearance without the presence of any visible impurities or coarse particles. The serum exhibited a glossy and elegant look, which made it suitable for cosmetic application.

2. Color

The color of the serum was observed visually. The formulation showed a dark brown color due to the presence of hibiscus powder and natural oils. The color remained stable during storage and did not show any discoloration.

3. Odor

The odor of the serum was evaluated by smelling the preparation. The formulation possessed a pleasant and characteristic herbal odor due to the natural ingredients present in it. No unpleasant or rancid smell was observed during the study period.

4. Consistency

Consistency of the serum was checked by applying a small quantity between the fingers. The prepared serum showed smooth and slightly viscous consistency, which was suitable for easy application on hair and scalp. The serum was neither too thick nor too watery.

5. Homogeneity

The formulation was examined for homogeneity by visual inspection and touch. The prepared serum was found to be homogenous and free from lumps, aggregates, and phase separation. All the ingredients were uniformly distributed throughout the formulation.

6. P^H Determination

The pH of the herbal hair serum was determined using a digital pH meter. The pH was found to be within the suitable range for scalp and hair application. A proper pH helps in maintaining scalp health and prevents irritation or dryness.

7. Spreadability

Spreadability of the serum was evaluated by applying a small quantity on the skin and hair surface. The serum spread easily without excessive rubbing and formed a smooth layer on the hair strands. Good spreadability ensures uniform application and better performance of the serum.

8. Texture

The texture of the formulation was evaluated manually. The serum showed a soft, smooth, and non-sticky texture, which enhanced user acceptability. The serum did not leave excessive greasiness after application.

9. Stability Study

The stability study was carried out by storing the serum at room temperature for a specific period and observing changes in color, odor, consistency, and phase separation. The formulation remained stable throughout the storage period and showed no significant changes in physical properties.

10. Irritation Test

The irritation test was performed by applying a small amount of serum on the skin surface. The formulation did not produce redness, itching, irritation, or any allergic reaction, indicating that the serum was safe for topical application.

11. Washability.

Washability was checked by rinsing the applied serum with water. The formulation was easily washable and did not leave heavy residue on the hair and scalp after cleaning.

12. Conditioning Property.

The prepared serum showed excellent conditioning properties due to the presence of avocado oil, black seed oil, glycerine, and Vitamin E. The serum helped in making the hair soft, shiny, smooth, and manageable after application.

4. RESULT AND DISCUSSION

The evaluation results indicated that the prepared herbal hair serum possessed good cosmetic and physical properties. The serum showed satisfactory appearance, consistency, homogeneity, spreadability, and stability. The natural ingredients present in the formulation provided nourishment, moisturization, and protection to the hair. Hibiscus promoted healthy hair growth and reduced hair fall, while black seed oil improved scalp health and reduced dryness. Avocado oil deeply conditioned the hair, and Vitamin E protected hair from environmental damage. Glycerine maintained moisture and improved softness.

The prepared formulation was found to be safe, stable, non-irritant, and suitable for regular hair care use. Therefore, the herbal hair serum can be considered an effective natural alternative to synthetic chemical-based hair serums.

EVALUATION TEST

1. Organoleptic Test

The organoleptic evaluation of the herbal hair serum prepared using Hibiscus, Black Seed Oil, Avocado Oil, Vitamin E capsule, and glycerine showed satisfactory results. The serum exhibited a dark brown color with a smooth and uniform appearance. It possessed a pleasant

characteristic herbal odor and a soft, slightly viscous consistency suitable for easy application on hair and scalp. The texture of the formulation was smooth, non-sticky, and free from coarse particles or phase separation, indicating good homogeneity and acceptability of the prepared herbal hair serum. Results are listed in Table2.

Table 2. Organoleptic test results for serum preparations

PARAMETER	BATCH F1	BATCH F2	BATCH F3
Colure	Brownish-red	Brownish-red	Brownish-red
Odour	Sweet type	Sweet type	Sweet type
Texure.	Smooth	Smooth	Smooth

2. Determination of pH, Viscosity, Homogenicity 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. Fig 3. represents PH test of Hair serum. Fig 4. represents viscosity Test

Fig 3. PH test of Hair serum.

Table 3. Homogenicity, Viscosity And Spreadability Test.

PARAMETER	BATCH F1	BATCH F2	BATCH F3
PH	5	5.2	5.5
Homogenicity test	Good	Good	Very good
Viscosity (cps)	216	221	229
Spreadability test	Easily spreadable	Easily Spreadable	Easily Spreadable.

Fig 4. Viscosity Test (Viscometer).

Skin sensitivity test :The results of the Draize test for sensitivity demonstrated that the three formulations were safe and skin irritation and allergic sensitization were absent. All formulations showed no redness, edema, inflammation and irritation during application as reported in table 4. Fig 5 represents skin sensitivity test.

Table 4. Skin sensitivity test

Formulas code	Skin irritation	Redness	Inflammation
A	No	No	No
B	No	No	No
C	No	No	No

Fig 5: Skin sensitivity test.

Stability Study: After 3 week stability study at room temperature all the lotion formulations were stable upto 2 week. Afterwards slight change in viscosity and feel was found with formulation A and B respectively. In 3rd week only formula C was found to be stable with white color, smooth feel and a very specific pH and viscosity. Hence, for the preparation of our herbal antioxidant Serum we considered formula C as optimized batch. The results of stability study are presented in detail in table 5.

Table 5. Stability Study of Base Formulation.

Formula Code	Color	Sudden Viscosity Change	Feel	pH	Solution stability.
		After 1 Week			
A	Brownish-red	No change	Smooth	5.01	Stable
B	Brownish-red	No change	Smooth	5.05	Stable
C	Brownish-red	No change	Smooth	5	Stable
		After 2 Weeks			
A	Brownish-red	Slight change	Smooth	5.50	Stable
B	Brownish-red	Slight change	Smooth	5.40	Stable
C	Brownish-red	No change	Smooth	5	Stable
		After 3 Weeks			
A	Brown	Change	Watery	6.30	Unstable
B	Brownish-red	Change	Watery	6.00	Unstable
C	Brown	No change	Smooth	5.06	Stable

After the evaluation test study and stability study it was concluded that formula C was considered to be best for preparation of Serum.

5. CONCLUSION

The herbal hair serum prepared using natural ingredients such as *Hibiscusrosa-sinensis* powder, avocado oil, black seed oil, glycerine, and Vitamin E demonstrated excellent hair care and scalp nourishing properties. The formulation was developed with the aim of providing a natural, safe, and effective alternative to synthetic hair care products commonly available in the market. Modern hair problems such as hair fall, dandruff, dryness, frizz, split ends, roughness, dullness, and scalp irritation are increasing because of pollution, unhealthy lifestyle, stress, poor nutrition, excessive use of heat styling tools, and chemical treatments. Herbal hair serum prepared from natural ingredients helps manage these problems effectively while reducing the harmful effects associated with chemical-based cosmetic products.

The combination of herbal ingredients used in the serum provided multiple beneficial effects for hair and scalp health. Hibiscus powder is well known for its ability to strengthen hair roots, promote hair growth, reduce hair fall, and improve hair texture. It also helps nourish the scalp and adds natural softness and shine to the hair. Avocado oil contains essential fatty acids, vitamins, antioxidants, and moisturizing properties that help repair dry and damaged hair, reduce split ends, and improve hair elasticity. Black seed oil is rich in thymoquinone, antioxidants, and nutrients that help nourish the scalp, reduce dandruff, strengthen hair follicles, and protect hair from environmental damage. Glycerine acts as a humectant that attracts moisture and helps maintain hydration in the hair strands, reducing dryness, roughness, and frizz. Vitamin E provides antioxidant protection, improves blood circulation in the scalp, and helps repair damaged hair follicles while improving overall hair health and appearance.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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