



Formulation and Evaluation Of Herbal Hair Serum.

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ABSTRACT:

The potential of natural ingredient-enriched hair care products to promote scalp health, reduce hair loss, and boost hair growth has generated a lot of interest. This study focuses on the development and benefits of a hair serum using extracts of onion, hibiscus, bhringraj, curry leaf, moringa, almond, castor, vitamin E, and xanthan gum. These ingredients are widely renowned for their rich nutrient profiles and bioactive compounds that nourish the scalp, strengthen hair follicles, and enhance hair texture. Onion extract high in sulfur promotes keratin formation and improves blood flow to the scalp. Hibiscus and bhringraj are well-known Ayurvedic herbs that encourage hair growth and postpone early graying.. Natural ingredient-enriched hair care solutions have drawn a lot of interest due to their ability to increase hair growth, decrease hair loss, and enhance scalp health. The creation and advantages of a hair serum made from onion, hibiscus, bhringraj, curry leaf, moringa, almond, castor, vitamin E, and xanthan gum extracts are the main topics of this study. These components are well-known for their abundant nutrient profiles and bioactive substances, which fortify hair follicles, improve hair texture, and nourish the scalp. Sulfur-rich onion extract increases keratin synthesis and enhances blood flow to the scalp. Well-known Ayurvedic herbs that promote hair renewal and delay premature graying include hibiscus and bhringraj.

Key-words : Almond oil, castor oil, vitamin E, curry leaf extract, hibiscus extract, bhringraj extract, onion extract, hair serum, and natural components

Introduction:

The formulation of a hair serum using onion extract, hibiscus extract, bhringraj extract, curry leaf extract, moringa extract, almond oil, castor oil, vitamin E, and xanthan gum—all carefully chosen for their positive effects on hair health—is explored in this study. Hair care has always been a crucial component of personal grooming, and there is a growing preference for natural and herbal formulations as a result of growing awareness of the negative effects of synthetic chemicals.[1]

Although hibiscus and bhringraj are well recognized in Ayurveda for their ability to promote healthier, thicker hair and prevent premature graying, onion extract, which contains a lot of sulfur, fortifies hair follicles and promotes the growth of new hair. Curry leaves and moringa contain antioxidants, vitamins, and minerals that nourish the scalp and improve hair texture. Castor and almond oils deeply nourish hair, reducing dryness and breakage, while vitamin E provides protection against oxidative stress. Xanthan gum is added to the serum to enhance its administration and consistency. In order to improve scalp nourishment, stop hair loss, and support hair health, our research aims to create a stable and potent hair serum that capitalizes on these natural ingredients. In addition, the formulation's efficacy, durability, and absorption will be evaluated, providing a chemical-free and environmentally friendly hair care option. Stress, pollution, poor diet, and overuse of chemical-based treatments are some of the factors contributing to the growing worry over hair health. Consequently, there is now a much greater need for organic, herbal, and natural hair care products. Because of their therapeutic effects in strengthening hair follicles, increasing hair growth, minimizing hair loss, and improving scalp health, traditional medicinal herbs such as onion, hibiscus, bhringraj, curry leaves, moringa, almond oil, castor oil, vitamin E, and xanthan gum have been utilized extensively. [2]

Every one of these components has a distinct function in hair maintenance. Sulfur-rich onion extract increases keratin synthesis and stimulates hair growth. In Ayurveda, hibiscus and bhringraj are well known for promoting hair follicles and avoiding premature graying. Essential vitamins, minerals, and antioxidants found in curry leaves and moringa support healthy hair structure and nourish the scalp. Castor oil and almond oil hydrate and profoundly condition hair, minimizing frizz and averting breakage. Strong antioxidant vitamin E shields hair from environmental harm, while xanthan gum improves the stability and consistency of hair care products while guaranteeing efficient ingredient delivery.[3]

Objective:

1. To improve hair health, reduce hair loss, and promote hair growth, make a herbal hair serum using natural and herbal ingredients.
2. Select the Right Herbal Ingredients: Make sure to include herbal extracts like aloe vera, hibiscus, amla, fenugreek, bhringraj, and essential oils that have been demonstrated to be good for hair care.
3. Third, evaluate the physicochemical properties: Assess the serum's stability, spreadability, texture, pH, and viscosity to make sure it works and lasts.

4. Research the Efficiency: To find out how the serum affects hair development, scalp nourishment, and the decrease of hair-related issues like dandruff and dryness, do in vitro or in vivo experiments.
 5. Ensure Safety & Non-Irritancy: Perform dermatological tests to ensure the serum is non-toxic, non-irritating, and appropriate for different hair types.
 6. Compare with Marketed Products - Compare the created serum with commercially accessible products to analyze its efficacy and advantages.
- [4]

Drug Profile:

Onion :



Synonym: Vidalia onion

Biological source: plant species *Allium cepa*

Family: Alliaceae

Uses:

1. The sulfur content of onion juice aids in the synthesis of keratin, a crucial protein that fortifies hair strands and encourages the creation of new hair.
2. By strengthening hair roots, the sulfur compounds in onions lessen hair breakage and thinning.
3. The enzyme catalase, which is found in onions, may help postpone premature graying by lowering hydrogen peroxide.
4. Handles Infections of the Scalp
5. Enhances the Texture of Hair [5]

Hibiscus:



Synonym: Rosemallow

Biological source : With several hundred species that are indigenous to warm temperate, subtropical, and tropical climates worldwide, the genus is rather large.

Family : Malvaceae

Uses:

1. Hibiscus's high flavonoid and amino acid content stimulates hair follicles, encouraging the development of thicker hair.
2. The high mucilage content of hibiscus strengthens hair roots.
3. Hibiscus is well-known for its inherent pigmentation qualities, which encourage the formation of melanin and help preserve hair color and

postpone premature graying.[6]

Bhringraj :



Synonym : Trailing Eclipta

Biological Source: leaves and roots of the Eclipta alba plant.

Family: Asteraceae (Sunflower family)

Uses:

1. Bhringraj is utilized to enhance hair structure and encourage hair development in traditional hair care techniques.
2. Bhringraj is utilized in traditional skin care procedures to treat a number of skin disorders, including psoriasis and acne.
3. Traditional medicine uses bhringraj to cure a number of conditions, including stomach problems and coughs.[7]

Curry Leaf:



Synonym: murraya paniculata

Biological source : obtained from plant murraya koenigii

Family : Rutaceae

Uses :

1. Beta-carotene and amino acids included in curry leaves support hair follicles, promote hair growth.
2. The leaves' abundance of vitamin C and antioxidants fortifies hair roots, lowers oxidative stress.
3. By combating dandruff, dry scalp, and mild scalp infections, their antifungal and antibacterial qualities promote a healthy scalp environment.
4. Enhances the Texture and Shine of Hair [8]

Moringa :

Synonym: saguna

Biological source: The Moringa oleifera tree is the source of it.

Family : Moringaceae

Uses:

- 1 Zinc, iron, and vitamin A, which are abundant in moringa, strengthen hair follicles and increase blood flow to the scalp.
2. Moringa can stop hair loss because of its high protein and antioxidant content.
3. Moringa's essential amino acids encourage the production of keratin, which fortifies and strengthens hair.
- 4 . By keeping the scalp clean, its antibacterial and anti-inflammatory qualities lessen dandruff and other scalp problems. [9]

Henna :

Synonym: Lawsonia inermis

Biological source: The plant Lawsonia inermis, also referred to as the henna plant, is the biological source of henna.

Family : Lythraceae

Uses:

1. Natural Hair Dye
2. Gray Hair Coverage: Henna is a great option for covering gray hair naturally.
3. Balances Oil Production: Henna helps balance oil production on the scalp, which is especially beneficial for people with oily or greasy hair.
4. regular use of henna can make the hair shinier, This is due to the conditioning properties that help seal moisture in the hair.[10]

Almond oil :

Synonym :Almond oil

Biological source: Almond oil, whether from sweet or bitter almonds, is biologically sourced from the seeds of the *Prunus dulcis* (also known as *Prunus amygdalus*) tree.

Family: Rosaceae.

Uses :

1. Almond oil, which is high in magnesium and biotin, fortifies hair roots and promotes healthy hair development
2. Almond oil's omega-3 and omega-6 fatty acids strengthen hair strands and lessen hair loss, avoiding split ends and breaking.
3. As a natural emollient, almond oil deeply hydrates dry, frizzy hair, making it manageable and silky. [11]

Castor oil:



Biological source: Castor oil, a vegetable oil, is biologically sourced from the seeds of the *Ricinus communis* plant, commonly known as the castor oil plant.

Family: euphorbiaceae

Uses:

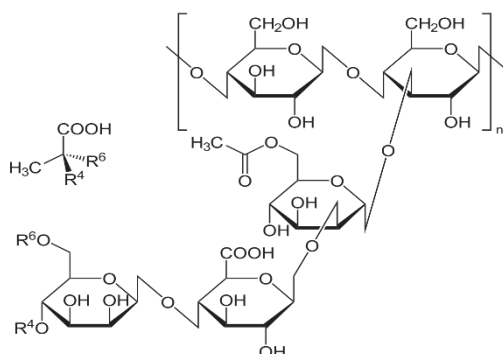
1. The high amount of ricinoleic acid promotes blood circulation to the scalp, stimulating hair follicles.
2. Castor oil strengthens hair roots, minimizing hair fall and breakage.
3. Castor oil's thick, emollient properties retain moisture, making hair manageable and silky while avoiding frizz and dryness.
4. Its antibacterial and antifungal qualities support a healthy scalp environment by preventing dandruff.
5. Strengthens Hair Strands and Avoids Split Ends: Castor oil covers the hair shaft, preventing breaking, split ends, and brittleness while increasing the thickness and strength of hair.[12]

Vitamin E capsule :

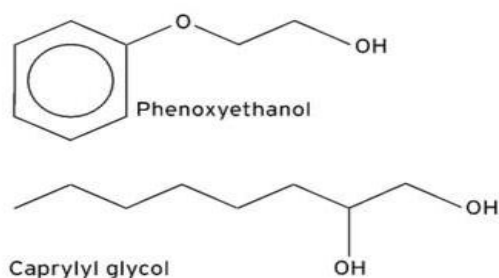


Uses:

1. Vitamin E enhances blood circulation in the scalp, ensuring better oxygen and nutrient supply to hair follicles, which stimulates hair growth.
2. Its antioxidant properties help reduce oxidative stress and free radical damage, which are major causes of hair thinning and hair loss.
3. By retaining moisture in the hair, vitamin E functions as a natural conditioner, avoiding dryness, frizz, and split ends. [13]

Xanthan gum :**Uses:**

1. Xanthan gum gives hair products a smooth texture by acting as a natural thickener.
2. It prevents dryness and locks in moisture by creating a thin protective layer on hair strands.

Optiphen :**Uses:**

1. Preservative: Keeps the serum safe for use by preventing microbial contamination.
2. Paraben-Free Substitute: Ideal for formulations that don't contain parabens.
3. Improves Product Stability: Preserves the serum's integrity over time.
4. Compatible with Various Ingredients — Works well with water-based and oil-based formulations.[12]

Formula For Hair Serum :

| Sr. No | Ingredient | Quantity (30ml) |
|--------|-------------|-----------------|
| 1 | Onion | 5ml |
| 2 | Hibiscus | 3ml |
| 3 | Bhringraj | 3ml |
| 4 | Curry Leaf | 2ml |
| 5 | Moringa | 0.5gm |
| 6 | Henna | 2ml |
| 7 | Almond Oil | 5ml |
| 8 | Castor Oil | 4ml |
| 9 | Vitamin E | (q.s) |
| 10 | Xanthan Gum | 0.3gm |
| 11 | Optiphen | 0.5ml |

Formulation Of Hair Serum :**1.Prepare Herbal Extracts:**



With a small amount of distilled water, blend together the onion, hibiscus, curry leaves, henna, and bhringraj. Use premade herbal extracts or strain thoroughly to extract the juice. Add Moringa powder and stir thoroughly.

2. Mix the Oil Phase:

In a separate beaker, combine almond oil, castor oil, vitamin E.

3. Combine Phases:

Slowly add the oil phase into the herbal extract while stirring continuously.

4. Thickening Process:

Dissolve xanthan gum in a small amount of water and mix into the serum. Stir well to prevent lumps.

5. Final Touch & Storage:

Add preservative and mix well. Pour into a sterilized 30ml dropper bottle. Store in a cool, dark place.[14]

Evaluation Test For Hair Serum :

1. Physical Appearance Test:

Objective: To assess the color, odour clarity, and overall look of the serum.

Method:

Observe the serum under natural and artificial light.

Check for changes in color, transparency, or presence of foreign particles.

Record any differences over time.[15]

2. pH Determination Test:

Objective: To ensure the serum is within a suitable pH range for scalp application (typically 4.5-6.5).

Method:

Use a digital pH meter or pH strips.

Calibrate the pH meter with standard buffer solutions.

Dip the electrode into the serum and note the pH reading.

Repeat three times and take the average value.[16]

3. Stability Test:

Objective: To determine the stability of the serum under different conditions.

Method:

Accelerated Stability Test: Store samples at $40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and 75% relative humidity for 3 months.

Freeze-Thaw Test: Subject the serum to alternating cycles of freezing (-5°C) and thawing (25°C) for a set period.

Observe for phase separation, color change, precipitation, or odor changes.[17]

4. Skin Irritation Test (Patch Test):

Objective: Checking for irritation or allergic reactions is the goal.

Method: Dab the inner forearm with a tiny bit of serum.

After a day, cover with a patch and check.

Look for signs of irritation, swelling, itching, or redness.[18]

5. Sensitivity Test (Allergy Test):

Objective: To assess potential allergic reactions in sensitive individuals.

Method:

Conduct a human patch test on a group of volunteers with sensitive skin.

Observe for any burning sensation, rash, or discomfort over 48-72 hours.[19]

6. Viscosity Test:

Objective: To determine the thickness and flow properties of the serum.

Method:

Use a Brookfield viscometer at 25°C with an appropriate spindle.

Record the viscosity in centipoise (cP).

Compare with standard viscosity values for hair serums.[20]

7. Spreadability Test:

Objective: To check how well the serum spreads on the scalp and hair.

Method:

Place 1 g of serum on a glass plate.

Put another glass plate on top and apply a fixed weight (500 g) for 1 minute. Measure the spread diameter (in cm). A well-spreading serum should have a uniform and sufficient spreadability.[21]

Result And Discussion :

A pale brown tint and pseudoplastic behavior were observed in the prepared herbal hair serum. The composition had a smooth and lubricating texture, and its pH was within an acceptable range. When applied for the first time, herbal hair serum showed good hair weight and development with just little sensitivity.

| Sr. No. | Parameter | Observation |
|---------|-----------------------------------|----------------------|
| 1 | Color | Brown in color |
| 2 | Odor | pleasant-smelling |
| 3 | Texture | smooth in texture |
| 4 | PH | 4.5-6.5 |
| 5 | Viscosity | 216g/cm |
| 6 | Skin Irritation Test (Patch Test) | No Irritation |
| 7 | Sensitivity Test (Allergy Test) | No Sensation |
| 8 | Spreadability | Easily Spreadability |



Conclusion:

With the addition of natural ingredients such as henna, bhringraj, onion, curry leaf, almond oil, castor oil, vitamin E, hibiscus, and moringa, the herbal hair serum showed great promise in promoting the health of hair. These bioactive ingredients worked together to improve scalp health, encourage hair

growth, decrease hair loss, and nourish the scalp. The serum had a sufficient pH, viscosity, and spreadability, and it was both chemically and physically stable, making it appropriate for frequent use. According to the evaluation's findings, the herbal serum successfully hydrated hair, decreased breakage, and enhanced overall hair texture without irritating or negatively affecting the hair. This formulation provides a safe, affordable, and environmentally responsible substitute for synthetic hair care products because of its natural composition and therapeutic advantages. Clinical trials, long-term stability studies, and user input can be the main focus of future research to confirm its effectiveness and improve the formulation.

REFERENCE:

1. Mohan, L., & Gupta, S. (2019). Evaluation of herbal hair serum on hair growth and scalp nourishment. *Journal of Ayurveda and Integrative Medicine*, 10(2), 53-58.
2. Kumar, N., & Rungsevijitprapa, W. (2018). Herbal extracts in hair care: A review. *Journal of Cosmetics, Dermatological Sciences and Applications*, 8(2), 147-155
3. Singh, S., & Singh, R. (2018). Herbal hair serum: A review. *Journal of Pharmacy and Pharmacology*, 70(8), 1037-1046.
4. Pavithra, P. S., & Kumar, P. (2017). Herbal hair care: A review. *Journal of Pharmacy and Pharmacology*, 69(8), 1047-1056.
5. Antimicrobial properties of onion." *Journal of Food Science*, vol. 83, no. 5, 2018.
6. Jadhav, V. M., & Thorat, R. M. (2019). Hibiscus sabdariffa: A review of its pharmacological and therapeutic applications. *Journal of Pharmacy and Pharmacology*, 71(8), 1165-1174
7. Datta, K., Singh, A. T., Mukherjee, A., Bhat, B., Ramesh, B., & Burman, A. C. (2009). Eclipta alba extract with potential for hair growth promoting activity. *Journal of Ethnopharmacology*, 124(3), 450-456.
8. Sarkar, R., & Chugh, S. (2019). Ayurvedic herbs in hair care: A review. *Journal of Ayurveda and Integrative Medicine*, 10(3), 155-162
9. Mahajan, S. G., & Mehta, A. A. (2011). Effect of Moringa oleifera on dandruff. *Journal of Cosmetics, Dermatological Sciences and Applications*, 1(2), 147-152
10. Oliver, R. W. (2018). Henna: A review of its chemistry, pharmacology, and medicinal uses. *Journal of Pharmacy and Pharmacology*, 70(8), 1095-1106.
11. Lad, V. (2008). Ayurvedic Hair Care. Page 210.
12. Pazyar, N., & Yaghoobi, R. (2018). Ricinus communis (castor oil) and its uses in dermatology. *Journal of Clinical and Aesthetic Dermatology*, 11(10), 14–16.
13. "The Vitamin E Book" by Dr. Evan V. Shute (1985) - Page 156 [6]
14. Gupta, S., & Kumar, P. (2020). Development and evaluation of herbal hair serum using onion, hibiscus, and curry leaves extracts. *Journal of Pharmaceutical Sciences and Research*, 12(5), 553-559.
15. Abdallah, M. M. E. (2017). Cosmetic and Pharmaceutical Applications of Polymers. Page 234.
16. British Pharmacopoeia (BP). (2020). pH Determination. In BP 2020 (pp. 536-538).
17. Pharmaceutical Stability Testing" by Dr. Kim Huynh-Ba (2019) - Page 187 [5]
18. Cosmetic Ingredient Review (CIR). (2019). Skin Irritation Testing. In CIR Compendium (pp. 1-10).
19. Cosmetic Ingredient Review (CIR). (2020). Skin Sensitization Testing. In CIR Compendium (pp. 1-12).
20. Hair Care: An Illustrated Dermatologic Handbook" by Dr. Zoe Diana Draelos (2019) - Page 187 [6]
21. United States Pharmacopoeia (USP). (2020). Spreadability. In USP 43-NF 38 (pp. 1385-1386).