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# FORMULATION AND EVALUATION OF REJUVENATING HAIR AND SCALP MASK

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***Abstract :*** This research encompasses a comprehensive overview of hair, its types, structure, growth cycle, scalp, and modern-day hair problems, along with trending products to address them. It begins by elucidating the biological and cultural significance of hair, followed by detailed descriptions of hair types, structure, and scalp conditions. Modern-day hair issues such as hair loss, dandruff, hair damage, premature graying, and hair thinning are discussed, highlighting their prevalence and impact. Additionally, popular natural remedies like jatamansi root, flax seed, castor oil, and coconut oil, along with their benefits for hair care, are elaborated upon. The abstract further delves into the formulation process of a rejuvenating hair and scalp mask using natural ingredients, followed by an evaluation of its properties. Results indicate satisfactory outcomes highlighting the formulation's potential for effective hair care. This research bridges traditional knowledge with contemporary hair care practices, offering insights into holistic approaches to hair health.. Overall, the abstract provides a comprehensive understanding of hair care, modern-day hair problems, and natural remedies, offering valuable insights for hair care enthusiasts and researchers alike.

***Keyword :*** Rejuvenating, hair, scalp, mask

## 1. INTRODUCTION:

### 1.1 Hair:

Hair is a filamentous structure that grows from follicles embedded in the skin. Composed mainly of protein, particularly keratin, hair serves various biological functions. It provides protection against external elements such as UV radiation, dust, and pollutants, while also helping to regulate body temperature through insulation. [26] Additionally, hair follicles contain sensory receptors connected to nerve endings, enhancing sensory perception. Beyond its biological significance, hair holds immense social and cultural importance. It plays a pivotal role in individual identity and self-expression, conveying social messages and cultural affiliations through hairstyles, colors, and grooming practices. Hair-related rituals and traditions mark significant life events and transitions, while trends in hair fashion reflect societal norms and influences. Overall, hair is not only a fundamental aspect of human biology but also a symbol of cultural diversity and personal identity. [1,2,26]

### 1.2 Hair Structure:

Hair has a complex structure the cuticle, cortex, and medulla are three distinct layers of the hair shaft, each contributing to the hair's overall structure, strength, and appearance. Understanding the characteristics and functions of these layers is essential for effective hair care and maintenance. [1]

a. Cuticle: The cuticle is the outermost layer of the hair shaft, consisting of overlapping scales that resemble roof shingles. These scales are made up of flattened, transparent cells composed mainly of keratin protein. The primary function of the cuticle is to protect the inner layers of the hair shaft from damage and external stressors. [1,2,3]

b. Cortex: The cortex is the middle layer of the hair shaft, located beneath the cuticle. It makes up the bulk of the hair and provides strength, elasticity, and color to the hair strand. The cortex consists of elongated cells packed with keratin fibers, which give hair its structural integrity and flexibility.

c. Medulla: The medulla is the innermost layer of the hair shaft, situated at the core. It is composed of loosely packed cells and air spaces, giving it a spongy or honeycomb-like appearance. Unlike the cuticle and cortex, the presence and structure of the medulla can vary significantly among individuals and even among different hair types. [2,3]

### 1.4 Scalp

The scalp is the skin covering the top of the head, housing the hair follicles and serving as the foundation for hair growth. It is a highly vascularized area, meaning it has a rich blood supply, which is essential for nourishing the hair follicles and promoting healthy hair growth. The scalp also contains sebaceous glands, which produce sebum, a natural oil that helps lubricate and protect the hair and scalp. In addition to supporting hair growth, the scalp plays a crucial role in regulating body temperature. The hair on the scalp acts as insulation, helping to retain heat in cold environments and dissipate excess heat in warmer conditions. [6,7] This thermoregulatory function is important for maintaining overall comfort and well-being. The scalp can vary in condition from person to person, with factors such as oil production, sensitivity, and overall health influencing its state. Common scalp conditions include dryness, oiliness, sensitivity, and dandruff. Proper scalp care, including regular cleansing, moisturizing, and protection from environmental stressors, is essential for maintaining scalp health and promoting optimal hair growth. [4,6,7]

### 1.5 Plant Profile:

#### 1.5.1 Jatamansi Root:

**Taxonomical classification**

- **Biological source:** *Nardostachys jatamansi*
- **Synonyms:** Jatamansi, spikrnard
- **Kingdom:** Plantae
- **Order:** Dipsacales
- **Family:** Valerianaceae
- **Genus:** Nardostachys

Jatamansi, also known as Spikenard in English, is a flowering plant native to the Himalayan region, particularly found in Nepal, China, and India. Its scientific name is *Nardostachys jatamansi* . In traditional Ayurvedic medicine, Jatamansi root has been used for various purposes, including for its benefits in hair care, including as an oil, powder, or as an ingredient in hair care products like shampoos, hair masks and conditioners. Here are some potential uses and benefits of Jatamansi for hair: promotes hair growth, prevents premature graying, improves hair texture, treats scalp conditions, natural conditioner & reduces split ends: [8,9,10,11]

*Fig. no. 1 Jatamansi root*

### 1.5.2 Flax seed:

**Taxonomical classification**

- **Biological source:** *Linum usitatissimum*
- **Synonyms: Teesi, alsi, linseed**
- **Kingdom:** Plantae
- **Order: Malpighiales**
- **Family: Linaceae**
- **Genus: Linum**

Flax seeds, also known as linseed, are small brown or golden seeds that are packed with nutrients and are beneficial for overall health. Its botanical name is *Linum usitatissimum*. When it comes to hair care, flax seeds offer several advantages: moisturizes the scalp, strengthens hair, adds shine, improves hair elasticity& reduces inflammation, [12,13,14,15]

*Fig. no. 2 Flax seed*

### 1.5.3 Castor oil:

**Taxonomical classification**

- **Biological source:** *Ricinus communis*
- **Synonyms:** Castor bean plant, Erand
- **Kingdom**: Plantae
- **Order**: Malpighiales
- **Family**: Euphorbiaceae
- **Genus**: Ricinus

Castor oil, derived from the seeds of the castor oil plant *Ricinus communis*, is a popular natural remedy for various hair care purposes. Here are some of the benefits of castor oil for hair: promotes hair growth, moisturizes the scalp, strengthens hair, conditions hair, treats scalp conditions:, adds lustre& prevents hair loss. [17,18,19,20]

*Fig. no. 3 Castor oil*

### 1.5.4 Coconut oil:

**Taxonomical classification**

- **Biological source:** *Cocos nucifera*
- **Synonyms:** Coconut palm, Coco palm, Coconut tree, Nariyal

- **Kingdom:** Plantae
- **Order:** Arecales
- **Family:** Arecaceae
- **Genus:** Cocos

Coconut oil is widely known for its various benefits for hair care. Coconut oil is also commonly used as a carrier oil for diluting essential or heavier oils in hair care. Carrier oils are used to dilute heavier oils before applying them to the skin or hair, as they help in spreading the heavier oils evenly and prevent skin irritation. Coconut oil is an excellent choice as a carrier oil due to its moisturizing properties and ability to penetrate the hair shaft effectively.

When using coconut oil for hair care, it's essential to choose high-quality, cold-pressed virgin coconut oil for maximum benefits. Coconut oil can be applied to hair and scalp as a pre-shampoo treatment, leave-in conditioner, or as a styling product. [19,20,21]

*Fig. no. 4 Coconut oil*

### 1.5.5 Shea butter:

**Taxonomical classification**

- **Biological source:** *Vitellaria paradoxa*
- **Synonyms:** Karité tree, Bambara nut tree, Galam butter tree, Bambuk butter tree
- **Kingdom**: Plantae
- **Order**: Sapindales
- **Family**: Sapotaceae
- **Genus**: Vitellaria

Shea butter, extracted from the nuts of the African shea tree, is a renowned natural ingredient celebrated for its multifaceted benefits in hair care. Rich in vitamins A, E, and F, as well as essential fatty acids, shea butter offers a plethora of advantages for maintaining healthy hair. First and foremost, shea butter serves as an excellent moisturizer, deeply nourishing the scalp and hair strands. Its emollient properties help seal in

moisture, preventing dryness and minimizing breakage. This quality makes it especially advantageous for people with dry, fragile, or harmed hair. Furthermore, shea butter possesses anti-inflammatory properties, which can soothe irritated scalp conditions such as dandruff or eczema. Its natural antioxidants contribute to scalp health by protecting against environmental damage and oxidative stress. Shea butter also aids in enhancing hair elasticity, promoting softness, and improving manageability. Its lightweight texture ensures that it doesn't weigh down the hair or leave it feeling greasy, making it suitable for various hair types, including curly and textured hair. Overall, Shea butter plays a pivotal role in hair care by moisturizing, nourishing, and protecting the hair and scalp, ultimately contributing to healthier, more lustrous locks. [21,38]

*Fig. no. 5 Shea butter*

## 2. MATERIALS AND METHOD:

*Table no. 1 List of Ingredients and their properties*

| S no. | Ingredients | Properties |
|---|---|---|
| 1. | Jatamansi Root | Promots hair growth, prevent prematutre greying |
| 2. | Flaxseed | Provides moisture and lusture |
| 3. | Castor oil | Improves hair texture, hair and scalp strengthening |
| 4. | Coconut Oil | Moisturizer, carrior oil |
| 5. | Shea Butter | Improves elasticity, and soothes irritated scalp |
| 6. | Lanolin | Emollient and occlusive |
| 7. | Cetyl alcohol | Emulsifier, thickener, and stabilizer |

| | | |
|---|---|---|
| 8. | Light liquid paraffin | Emollient and occlusive |
| 9. | Glycerol | Humectant |
| 10 | Water | Vehicle or solvent |
| 11. | Lavender oil | Fragrance |

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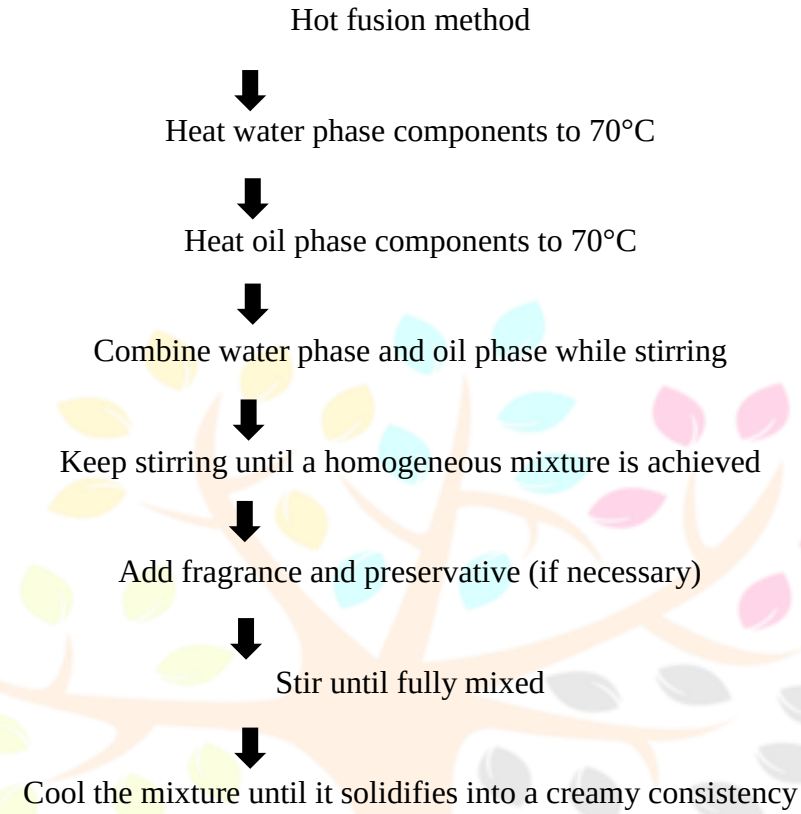
### 2.1 Method:

The rejuvenating hair and scalp mask is formulated by opting hot fusion method. This method is a common technique used in the pharmaceutical and cosmetics industries to prepare semi-solid dosage forms such as ointments, creams, and gels.




## 3. EXPERIMENTAL WORK:

All the API such as jatamansi root powder, flax seed, castor oil, coconut oil and shea butter was collected from amazon online store and local pharmacy.

The excipients: glycerine, lanolin, cetyl alcohol and light liquid paraffin were obtained from SoPR, DBUU.

### 3.1 Preparations:

- Preparation of flax seed aqueous extract: Flax seed aqueous extract was prepared by adding 15g of flax seed into 100ml boiling water at $100^{o}$ Celsius (which will be 15%) with continuous stirring until mucilaginous texture is achieved. The extract was then filtered immediately while hot, using muslin cloth. Permitted to cool naturally to room temperature.

- Preparation of jatamansi root extract: The technique used here for extraction is Maceration. Jatamansi root extract was prepared by adding 20ml castor oil, 30ml coconut oil and 2.5g jatamansi root powder for 5% extract and then allowed the mixture to stand 3 days in full sunlight. Same for 10% jatamansi

root extract 20ml of castor oil, 30 ml of coconut oil and 5g of jatamansi root powder were mixed together and was allowed to stand in full sunlight for 3 days. After 3 days both the 5% and 10% extracts were filtered and stored at room temperature.

- Formulation of hair and scalp mask: Formulation of the rejuvenating mask was done by using fusion method.

➢ *Water phase:* In a beaker, measured amount water, glycerine and flax seed aqueous extract (given in the table below) was heated upto 70$^{o}$ Celsius.

➢ *Oil phase*: In another beaker, cetyl alcohol, lanolin, light liquid paraffin, jatamansi root extract and shea butter was measured (according to the table below) and heated until all the ingredients melted at around 70$^{o}$ Celsius..

When temperature of both phase is about same, the water phase was poured slowly into the oil phase with continuous stirring. After 5-10 minutes of stirring cream like texture was formed. At last to adjust ph 0.1 N NaOh was added along lavender oil for fragrance.

*Table no. 2 Formulation table*

| S no. | Ingredients | F1(5%) | F2(10%) | F3(5%) | F4(10%) |
|---|---|---|---|---|---|
| 1. | Flax seed extract | 2ml | 2ml | 2ml | 2ml |
| 2. | Jatamansi root oil extract | 8ml | 8ml | 2ml | 2ml |
| 3. | Shea butter | 8g | 8g | 2g | 2g |
| 4. | Lanolin | 8g | 8g | 2g | 2g |
| 5. | Light liquid paraffin | 8ml | 8ml | 2ml | 2ml |
| 6. | Cetyl alcohol | 16g | 16g | 2g | 2g |
| 7. | Glycerol | 12ml | 12ml | 3ml | 3ml |
| 8. | Purified water | 36ml | 36ml | 5ml | 5ml |
| 9. | Lavender oil | 2 drops | 2 drops | 1 drops | 2 drops |
| 10. | 0.1N NaOH | q.s. | q.s. | q.s. | q.s. |

**3.2 Evaluation test:**

**a. Organoleptic properties:** The organoleptic properties of rejuvenation mask was observed for the color, odor and texture.

**b. pH:** For testing pH of the rejuvenating mask weighed 0.5 g of cream dissolved it in 50.0ml of distilled water and its pH was measured with the help of digital pH meter.

**c. Viscosity:** To test viscosity of the rejuvenating mask Brookfield viscometer was used at 1 rpm with the spindle no. 62.

**d. Spreadability test:** The rejuvenating mask was tested for spreadability by placing sufficient amount of mask between two glass slides under 100g of weight to form thin layer.

Spreadability= m*l/t

m =weight tight to upper slide

l =length moved on the glass slide

t =time take

**e. Washability:** Washability of the rejuvenating mask was tested by applying it on dorsal surface of left hand and held under running water to observe.

**f. Irritancy test:** The rejuvenating mask was applied to the marked area (1sq.cm) on dorsal surface of left hand to test for irritancy. Observed at regular interval upto 24 hours for irritancy, erythema& edema

**g. Homogeneity:** Homogeneity was tested by observing the rejuvenating hair and scalp mask visually and its appearance.

## 4. RESULT AND DISCUSSION:

**a. Organoleptic properties:** The organoleptic properties of the hair and scalp rejuvenating mask are mentioned in table below.

*Table no. 3 Organoleptic Properties*

| S no. | Parameter | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|
| 1. | Color | Pale white | Earthy brown | Pale white | Earthy brown |
| 2 | Odor | Pleasant | Pleasant | Pleasant | Pleasant |
| 3. | Texture | Creamy | Creamy | Runny, lotion-like | Runny, lotion-like |

**b. pH:** The pH of rejuvenating mask was found to be satisfactory, observations are mentioned in the table below.

**c. Viscosity:** The viscosity of hair and scalp rejuvenating mask was good and the results are mentioned in the table below.

**d. Spreadability:** The spreadability of the rejuvenating is shown in the table below and found to be.

*Table no. 4 Evaluation results*

| S no. | Parameter | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|
| 1. | pH | 6.7 | 6.3 | 6.4 | 6.3 |
| 2. | Viscosity | 44990cp | 44892cp | 26630cp | 26648cp |
| 3. | Spreadability | 50 g-cm/sec | 50 g-cm/sec | 65 g-cm/sec | 65 g-cm/sec |

**e. Washability:** Washability of the rejuvenating mask is found to be good and satisfactory.

**f. Homogeneity:** The homogeneity of the formulated hair and scalp rejuvenating mask (F1, F2, F3& F4) was good enough.

**g. Irritancy test:** The result of irritancy tests are found to be satisfactory and mentioned in the table below.

*Table no. 5 Observation results*

| S no. | Parameter | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|
| 1. | Irritation | None | Mild | None | Mild |
| 2 | Edema | None | None | None | None |
| 3. | Redness | None | None | Mild | Mild |
| 4. | Swelling | None | None | None | None |

## 5. CONCLUSION:

In conclusion, the formulation of the hair and scalp rejuvenating mask involved the careful selection of ingredients, including flax seed aqueous extract and jatamansi root oil extract, among others. The fusion method was employed for formulation, resulting in products designated as F1, F2, F3, and F4, each with varying concentrations of active ingredients. Organoleptic properties, pH, viscosity, spreadability, washability, homogeneity, and irritancy were evaluated as part of the assessment process. Results indicate that F1 exhibited desirable organoleptic properties, satisfactory pH levels, good viscosity, and adequate spreadability. Washability was found to be effective, and the mask demonstrated homogeneity without visible variability. Importantly, irritancy tests revealed no adverse reactions, indicating the safety of the formulated masks for use on the hair and scalp. Overall, the formulated hair and scalp rejuvenating mask F1 show promise as potential product for promoting hair health and providing nourishment to the scalp, supported by its favourable characteristics and safety profile observed in the evaluation tests.

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