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## A review on herbal hair gel mask using natural ingredients

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### Abstract

Herbal cosmetics are the substances used for improving the appearance of a person. Herbs, fruits, flowers, seeds, and essential oils are the natural elements that are used in the preparation of herbal cosmetics. As herbal cosmetics contain vitamins, antioxidants, natural bioactive components, and other nutrients, they nourish the skin and hair and provide therapeutic benefits rather than just improving their appearance. These are the semi-solid formulations. Herbal hair gels emphasize the increasing popularity of such natural, chemical-free hair gels by providing various advantages like hair growth, reduced falling of hair, dandruff control along with styling. Hair loss, hair thinning, dandruff has become the most common problems faced by both men and women today, this occurs mainly due to the increasing exposure to pollution and the widespread use of chemical-based products such as shampoos, hair gels, and other hair care formulations. Herbal hair gels are effective in minimizing and repairing the damage caused by these chemical agents found in various commercial hair care products.

This review gives an overview of the preparation, importance, and advantages of a botanical hair mask gel made from flaxseed (*Linum usitatissimum*), fenugreek (*Trigonella foenum-graecum*), and rice water (*Oryza sativa*). Each ingredient contributes some unique properties that are beneficial for scalp health and hair regeneration. The flaxseed is one of the oldest crops and is rich in omega-3 fatty acids, lignans, proteins, and vitamin E; it fortifies hair follicles, reduces inflammation, and increases elasticity and luster. Fenugreek seeds are mainly composed of oleic and linoleic acids, vitamins A, B, and C, iron, and lecithin, which all together nourish hair, prevent dandruff, minimize damage to follicles, and retard graying of hair. Rice water is a classic Asian beauty ingredient and comprises amino acids, inositol, vitamins B, C, and E, and various minerals that improve hair texture, elasticity, and smoothness and maintain scalp pH and hydration.

These natural ingredients interact with a synergistic effect on the constitution of a semi-solid, nutritional gel, which exerts cosmetic and therapeutic benefits. It helps clean the scalp, strengthens the roots, repairs broken strands, and enhances the cosmetic look and volume of the hair. The various parameters evaluated herein, like pH, viscosity, spreadability, and skin irritation tests, establish the safety and efficacy of the gel for topical applications. The herbal hair gel mask provides an environmentally friendly and sustainable approach to hair care by eschewing synthetic additives and harsh chemicals that have detrimental long-term effects.

**Keywords:** Herbal cosmetics, hair gel mask, flaxseed (*Linum usitatissimum*), fenugreek (*Trigonella foenum-graecum*), rice water (*Oryza sativa*), natural ingredients, hair nourishment, hair growth, dandruff control, antioxidants

### Introduction

Hair is a very critical and sensitive part of the human body <sup>[1]</sup>. It includes both the visible hair shaft and the underlying hair follicle, which is the structure that produces the hair. The hair shaft, made of keratinized cells, consists of 3 layers:

- The Medulla (core not always present)
- Cortex (main body)
- Cuticle (outer protective layer) <sup>[2]</sup>.

Proper hair care is important to ensure that the hair remains healthy, strong, and naturally beautiful. A good hair care routine reduces hair breakage, protects the hair from environmental assault, and makes it easier to style. Hair damage is related to interaction with various factors like high heat styling, chemical processing, exposure to the environment, the use of harsh hair products, and insufficient moisture.

In addition, bad nutrition, improper handling, and some health disorders weaken the hair, causing it to break easily, become brittle, dull, and lose its shine [3].

Herbal cosmetics are the formulation that enhance the human appearance. Herbal hair gels are the formulations that replace synthetic gelling agents with natural plant derived ingredients that offers both styling and therapeutic benefits. Hair care is a significant aspect of personal grooming and hygiene. The application of hair masks may improve scalp health and promote stronger, healthier hair [4]. Hair cosmetics are formulations designed to cleanse, modify texture, alter color, rejuvenate stressed hair, provide nourishment, and enhance the overall health and appearance of the hair. Nowadays, maintaining a clean scalp and healthy hair has become an essential aspect of personal grooming and overall well-being. The propitious properties of the ingredients used in herbal hair masks are well known. The primary purpose of applying this hair mask is to clean the hair and scalp, removing built up debris while providing nourishment [5]. Hair cosmetics are formulations designed to cleanse, modify texture, alter color, rejuvenate stressed hair, provide nourishment, and enhance the overall health and appearance of the hair. Nowadays, maintaining a clean scalp and healthy hair has become an essential aspect of personal grooming and overall well-being. The propitious properties of the ingredients used in herbal hair masks are well known. The primary purpose of applying this hair mask is to clean the hair and scalp, removing built up debris while providing nourishment [6]. Natural ingredients such as fenugreek seeds, flaxseeds, and rice water are rich sources of essential

nutrients that nourish the scalp and promote the overall hair health.

Flaxseed, often called flax (*Linum usitatissimum*), has been regarded as a nutritional powerhouse because of its rich composition of essential macro and micronutrients; it contains a balanced combination of proteins, omega-3 fatty acids, dietary fiber, and antioxidants. These constituents are highly important for maintaining scalp health, thereby making the strands of hair strong and developing overall hair growth and shine. Fenugreek (*Trigonella foenum-graecum*) belongs to the family Leguminosae and is an annual herb. It is a famous spice in human food. Traditionally, both its seeds and green leaves were utilized for culinary purposes and also in medicine since ancient times [7]. Fenugreek seeds are rich in oleic acid, linoleic acid, niacin, linolenic acid, fiber, glycolipids, phospholipids, choline, and Vitamins A, B1, B2, and C. A number of studies demonstrated that fenugreek possesses anti-diabetic, antioxidant, antibacterial, anti-anorexic, and anti-inflammatory activities [1]. Rice Water is the milky liquid that results from washing or soaking rice. It is traditionally used for treating skin and hair. It is rich in vitamins B, C, and E, along with essential minerals that help to tighten skin, shrink open pores, and regenerate skin cells. It improves blood circulation and helps delay the aging process [8].

## Ingredients

### Flaxseed [9]



- **Synonym:** Linseed, *Linum*, Alsi, Jawas.
- **Biological Source:** *Linum usitatissimum* Linn.
- **Family:** Linaceae.
- **Kingdom:** Plantae (Plants).
- **Subkingdom:** Trophobiont (Vascular Plant).
- **Subdivision:** Spermatophyta (Seed Plant).
- **Division:** Magnoliophyta.
- **Class:** Magnoliopsida (Dicotyledons).
- **Subclass:** Rosidae.
- **Order:** Linales.
- **Genus:** *Linum* L.
- **Species:** *Usitatissimum* L.

- **Geographical source:** The exact origin of linseed is not definitely known, although it is regarded as indigenous to India. Today, it is grown extensively both as a fibre plant in Egypt, Algeria, Spain, Italy and Greece, and as an oil plant in Turkey, Afghanistan and India [10].

Flaxseed (*Linum usitatissimum*) is one of the oldest crops in the world, with an almost as long record of use. Traditionally, it was used in ancient Egypt and Greece for medicinal purposes, especially for indigestion and various abdominal complaints [11]. Flaxseed is among the very first plants that were domesticated by humans [1]. It is a blue-flowering rabi crop belonging to the family Linaceae [12]. It

has a nutty flavor and is crunchy in texture. Due to its outstanding nutritional profile and therapeutic potential, flaxseed is consumed since time immemorial. In India, it is considered a priority crop and finds its applications both as a food ingredient and in traditional medicine <sup>[13]</sup>. The average annual global production of Flax is around 3.09 million tons. Canada is the largest producer accounting for about 38% of the total production. Other major producers of flaxseed are India, China, and the United States <sup>[10]</sup>. Flaxseed is considered a nutritionally excellent product, as it contains much dietary fiber, protein, and lipids. The biochemical composition depends on the genotype, conditions of cultivation, and treatment of seeds. It is also known as linseed and has recently become popular as a functional food ingredient due to its rich contents of  $\alpha$ -linolenic acid (ALA, a form of omega-3 fatty acid), lignans, and dietary fiber <sup>[14]</sup>. Flaxseed contains approximately 30% lipids, with the main component being  $\alpha$ -linolenic acid (ALA) (about 53%), while linoleic acid makes up about 17%, oleic acid about 19%, stearic acid about 3%, and palmitic acid about 5%. This specific ratio of fatty acids allows it to have a very good n-6: n-3 ratio of about 0.3:1, contributing to its nutritional and functional value <sup>[15]</sup>. Flaxseeds are rich in Omega-3 fatty acids, which make them a highly valued functional food ingredient and a favored inclusion in the diets of health-conscious individuals <sup>[16]</sup>.

The main bioactive ingredients of flaxseed are  $\alpha$ -linolenic acid (ALA), lignans, and dietary fiber. Generally, flaxseed is available in four forms for human consumption: Whole seeds, ground seeds, flaxseed oil and partially defatted flaxseed meal <sup>[17]</sup>. Flaxseed is a nutritious functional food ingredient because of its high  $\alpha$ -linolenic acid (ALA) content, an omega-3 fatty acid that delivers all the necessary vitamins, proteins, and nutrients to both hair and scalp. Omega-3 fatty acids reduce hair loss by minimizing follicle inflammation and enhancing blood flow in the scalp, which enhances hair growth. The anti-inflammatory action of ALA further promotes scalp nutrition and overall hair health.

Flaxseed is also a good source of lignans, potent anti-oxidants that may inhibit bacterial growth, promote hair regeneration, and aid in preventing hair loss. It also contains vitamin E, another anti-oxidant promoting the prevention of damage to the hair and its nourishment. In addition, flaxseed is a natural source of B-complex vitamins, which play a great role in strengthening hair and developing faster, healthier growth <sup>[9]</sup>.

#### Benefits of flaxseeds for hairs

- **Omega-3 fatty acids:** It contains the necessary vitamins, proteins, and nutrients that nourish the scalp and hair. They help prevent hair follicle inflammation, which reduces hair loss. In addition, omega-3s enhance blood flow in the scalp to promote the growth of healthier, stronger hair <sup>[18]</sup>.
- **Vitamin E:** Vitamin E helps maintain scalp health by neutralizing free radicals and lowering oxidative stress. It improves blood flow in the scalp, which further fortifies hair follicles and prevents hair loss due to the aging process <sup>[1]</sup>.
- **Anti-oxidants:** Flaxseed is rich in lignans—a class of antioxidants with very strong antimicrobial properties, inhibiting the growth of injurious microorganisms. These lignans protect not only the scalp from infections

but also help in hair regeneration and reduce hair loss <sup>[18]</sup>.

Flaxseed is packed full of essential vitamins, nutrients, and healthy fats that offer a wealth of advantages to the health of one's hair and scalp. It nourishes the scalp, treats hair loss, and aids in hair growth. Rich in bioactive compounds and omega-3 fatty acids, flaxseed delivers numerous benefits associated with hair and overall health <sup>[19]</sup>.

#### Fenugreek



- **Synonym:** Methi, Bird's foot, Greek hay seeds.
- **Scientific name:** *Trigonella foenum-graecum*.
- **Family:** Fabaceae.
- **Kingdom:** Plantae.
- **Subfamily:** Faboideae.
- **Genus:** *Trigonella*
- **Species:** *T. foenum graecum*.

Fenugreek (*Trigonella foenum-graecum*) is an annual herb of the family Fabaceae. Commonly known as Methi in Hindi, fenugreek is a plant used in many food and medicine applications. The seeds and green leaves of fenugreek have been used for nutritional and therapeutic purposes for many years. Fenugreek not only adds flavor, texture, and color to food but also possesses various pharmacological activities, such as hypocholesterolemic, antidiabetic, lactogenic, antibacterial, stomach stimulant, anorexia-reducing, hepatoprotective, and anticancer effects <sup>[1]</sup>. Fenugreek is widely grown throughout the Mediterranean region and Asia. The seeds of fenugreek are conventionally used in a dried form in various countries like India, China, Egypt, and parts of Europe for their galactagogue, anti-inflammatory, insulinotropic, and rejuvenating properties <sup>[20]</sup>.

*Trigonella foenum-graecum* gets its name from its yellowish-white triangular-shaped flowers with '*Trigonella*' meaning "triangle" in Latin. It is believed to be one of the oldest cultivated herbs known for its unique nutritional and therapeutic properties. Fenugreek is a highly adaptable plant, which is resistant to salinity, drought and heavy metal stress, and can therefore grow under a wide array of climatic conditions and marginal soils. Its seeds have a high content of oleic acid, linolenic acid, linoleic acid, niacin, fibre, glycolipids, phospholipids, choline, and vitamin A, B1, B2, C, which makes it an excellent source of vital nutrients <sup>[1]</sup>.

Fenugreek is rich in nutrients and bioactive compounds that play an important role in maintaining overall health and



supporting various biological functions. The seeds contain about 22- 26% protein, 58% carbohydrates, 25% dietary fiber, and 0.9% lipids, thus being a highly nutritious component of herbal formulations. In contrast, fenugreek leaves contain 6% carbohydrates, 4.4% protein, 1.1% fiber, reflecting their balanced nutrient composition. These constituents account for the therapeutic efficacy of fenugreek, adding value as a functional food and natural ingredient in health-promoting preparations [21].

Fenugreek, or Methi in its native tongue, has conventionally been used as a herbal medicine with enormous benefits regarding hair health. It effectively helps stop hair fall, promotes hair growth, and removes dandruff, while soothing scalp conditions that are either dry or itchy. Fenugreek seeds are packed with protein, vitamin C, iron, potassium, and lecithin-nourishing elements responsible for strengthening hair follicles, boosting hair growth, and giving the hair its natural sheen and texture [22].

### Benefits of fenugreek seeds for hairs health [1]

#### 1. Strengthens hair from root

The saponins in fenugreek seeds, which exhibit antifungal and antibacterial action, help decrease scalp infections, dandruff, and itching. The presence of lecithin, a natural emollient, helps moisturize the scalp, conditioning it and improving hair strength from the root while reducing dryness and breakage.

#### 2. Treats Follicular Issues

The bioactive compounds in fenugreek could interact with dihydrotestosterone, a hormone that is known to miniaturize hair follicles and provoke balding. Indeed, fenugreek has been thought to block the binding of DHT to hair follicles, thus supporting follicular health and preventing thinning of the hair.

#### 3. Enhances Hair Shine

The nutritional and conditioning elements in fenugreek repair the heat-styling and environmentally stressed hair shafts to improve the overall sheen, smoothness, and appearance of hair strands.

#### 4. Prevents Premature Greying

Fenugreek is rich in potassium and iron, both essential minerals that support natural hair pigmentation and may help delay premature greying.

#### 5. Fights Scalp Problems

Its anti-inflammatory and antioxidant properties help in soothing scalp irritation and inflammation, hence creating a better environment on the scalp for hair to grow.

#### 6. Improves Hair Strength

The high protein and iron levels found in fenugreek provide the building blocks necessary to construct strong, resilient hair strands and reduce breakage while enhancing overall hair integrity.

#### 7. Nourishes Hair and Promotes Growth

This herb is a source of vitamins A, C, and K, folic acid, calcium, potassium, and protein combined, which jointly nourish the scalp, stimulate hair follicles, and support healthy hair growth.

### Rice Water [23]



- **Botanical name:** *Oryza sativa* Linn.
- **Biological source:** Rice grains, which consist of the embryo and endosperm of the seeds of *Oryza sativa*.
- **Family:** Poaceae (also known as Graminae)
- **Kingdom:** Plantae.
- **Subkingdom:** Viridiplantae
- **Superdivision:** Embryophyta.
- **Division:** Tracheophyta (Vascular plants)
- **Subdivision:** Spermatophytina (seed plants)
- **Class:** Magnoliopsida
- **Family:** Poaceae (grasses)
- **Genus:** *Oryza* L. (rice)
- **Species:** *Oryza sativa* L. (rice)

Rice is a major cereal crop that thrives best under warm, waterlogged conditions. It is one of the most consumed staple foods all over the world and is considered a staple food in Asia, where rice serves as an integral part of agriculture, daily diet, and traditional medicinal practices.

Rice has long been employed in a variety of forms in traditional Asian medicine to help control cardiovascular diseases, diabetes, and inflammation, and in the care of skin and hair. Traditionally, rice water, which is obtained from washing rice, has been used as a hair treatment in several Asian countries such as Thailand due to its ability to reduce the surface friction of hair, increase its elasticity, and help to grow the hair [24].

Rice water has been highly important in beauty and personal care since the earliest times in Asian history. This practice actually originated in ancient China, where its hydrating and rejuvenative properties made it a popular treatment among royal families for healthy skin and hair. Historical documents and traditional practices bear testimony to its role in enhancing skin smoothness and hair shine. In Japan, too, during its Heian period, rice water was used by women for radiant skin and lustrous hair [25].

Rice water is the starchy liquid resulting from soaking or boiling rice, and it has been used traditionally for its beneficial properties in improving hair health. This liquid is full of vital vitamins like B, C, and E, as well as other essential minerals and amino acids. Strengthening, revitalizing, and nourishing hair, rice water indeed improves hair texture, luster, and life. Hence, it has become worldwide famous as a good ingredient for traditional and modern hair care [23].

## Nutritional Composition of Rice Water for Hair <sup>[23]</sup>

Rice water contains several key nutrients that make it beneficial for hair health. Some of the main components include:

1. **Proteins (16%):** These play an important role in strengthening and repairing hair fibers, improving elasticity, and reducing breakage.
2. **Lipids and Triglycerides (10%):** All of these components together contribute to retaining moisture, smoothening hair texture, and protecting the cuticle-all leading to shinier and more manageable hair.
3. **Starch (9%):** One of the major carbohydrates in rice water that helps thicken hair and, hence, gives volume for fine or weak hair.
4. **Carbohydrates:** Besides starch, the other carbohydrates within rice water help nourish the scalp and support overall hair texture and growth.
5. **Inositol:** Inositol is a type of sugar that strengthens the hair from its roots, rejuvenates damaged strands, and reduces split ends.
6. **Phytic Acid:** An antioxidant compound that protects hair from oxidative stress and environmental insults, while nutrient absorption in the hair follicles is enhanced.

## Benefits of Rice Water for Hairs

### 1. Rice Water for Hair Strength

Rice water is excellent for improving hair elasticity. It contains amino acids, which strengthen the roots of the hair and build up the overall strength of the strand. Also, inositol-a carbohydrate-lends to strengthening and repairing your weak or broken hair. Regular application of rice water also helps in easy detangling, reducing hair breakage accordingly <sup>[8]</sup>.

### 2. Enhanced Shine and Luster <sup>[23]</sup>

The nutrient-rich composition in rice water smoothes and seals the hair cuticle, allowing for better light reflection along the strands. The outcome thereof is increased shine and a generally healthier, more lustrous look of the hair.

### 3. Improved Texture and Volume

Rice water helps improve hair texture and volume, giving body to thin or limp hair. Its nutrient composition makes hair look thicker and fuller, hence more resilient.

### 4. Scalp Health

Nutritional amino acids and vitamins within rice water help nourish the scalp and create a very favorable environment for hair growth. In addition, it will keep the scalp at the right hydration level and pH balance to avoid dryness and irritation.

### 5. Reduced Hair Graying

Rice water can prevent premature graying of the hair by strengthening hair follicles and improving the nutrient supply to the roots. Regular application helps in stronger, more vibrant, and youthful-looking hair.

## Evaluation Parameters <sup>[19]</sup>

### 1. Physical Properties

The gel formulations are examined for appearance, colour, and odour by visual examination to ensure uniformity and aesthetic acceptability.

## 2. pH Measurement

The pH of the formulation was measured by using a pH meter to ensure that it is within a suitable range for scalp and hair compatibility.

## 3. Viscosity

Viscosity was measured to determine the gel's consistency, thickness, and spreadability since these features influence application and consumer acceptability.

## 4. Spreadability

To determine the ease with which the gel spreads over the hair and scalp surface, spreadability tests were performed.

## 5. Skin Irritation (Patch) Test

Skin compatibility and the absence of irritation were checked by a patch test performed on volunteers.

## Conclusion

This review on "Herbal Hair Gel Mask Using Natural Ingredients" accentuates the potential of natural, chemical-free formulations to promote hair health and sustainability. Herbal ingredients like flaxseeds, fenugreek, and rice water are rich in essential nutrients, vitamins, antioxidants, and bioactive compounds that nourish the scalp, strengthen hair follicles, and improve hair texture and shine. Flaxseed seeds provide omega-3 fatty acids that reduce scalp inflammation and promote hair growth, while fenugreek seeds have proteins, lecithin, and minerals that prevent dandruff, control hair fall, and reduce scalp problems. Rice water offers amino acids and vitamins that help repair damaged hair, thereby enhancing elasticity and smoothness.

These natural ingredients confer therapeutic and cosmetic benefits together, without any harmful aspects of synthetic chemicals. The herbal gel mask helps moisturize the scalp and promotes blood circulation, thereby maintaining natural hair color and strength. Evaluation parameters such as pH, viscosity, spreadability, and patch tests guarantee product quality, safety, and user satisfaction.

Herbal hair gel masks are a variety of non-toxic, effective, and eco-friendly methods that can replace commercial hair products. Not only do they support the health, strength, and shine of your hair, but they also express the modern trend of sustainability and holism within cosmetic formulation.

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