



**INTERNATIONAL JOURNAL OF
PHARMACEUTICAL SCIENCES**
[ISSN: 0975-4725; CODEN(USA): IJPS00]
Journal Homepage: <https://www.ijpsjournal.com>



Review Article

Nature's Touch: a Herbal Hair Serum

Aayush Shirbhate*, Aditya Kakad, Dr. Swati Deshmukh

Shraddha Institute of Pharmacy, Washim.

ARTICLE INFO

Published: 4 Nov 2025

Keywords:

Anatomy of Hair, Growth cycle of Hair, Hair Serum, Benefits, Types of Hair, Material, Evaluation

DOI:

10.5281/zenodo.17519228

ABSTRACT

The formulated herbal hair serum containing Nigella Savita (black seed), Zingiber officinale (ginger), flaxseed, citrus peel, almond oil, coconut oil, vitamin E, and fenugreek (Trigonella foenum-graecum) demonstrate significant potential as a natural and effective hair care formulation. Each ingredient contributes distinct pharmacological and cosmetic benefits that act synergistically to promote overall scalp and hair health. Ginger extract enhances scalp microcirculation, stimulating hair follicles and promoting new hair growth. Flaxseed offers a rich source of omega-3 fatty acids and natural mucilage, which help to condition and smooth the hair shaft, reducing frizz and breakage. Almond oil and coconut oil act as excellent emollients and carriers, improving serum Spreadability, nourishing the hair roots, and protecting against dryness and environmental damage. The addition of vitamin E further enhances the serum's antioxidant capacity, reducing oxidative stress on the scalp and preventing premature graying or follicular damage this herbal hair serum provides a scientifically justified and aesthetically acceptable formulation that supports hair growth, reduces hair fall, enhances shine, and improves manageability. With further standardization and clinical evaluation, this product has the potential to be developed into a commercially viable natural hair care formulation.

INTRODUCTION

The demand for cosmetic items has increased as a result of the cost growth in living standards worldwide. Since many individuals wish to remain young and appealing, cosmetics have become more important.(1) A crucial part of the human body is hair. Since a person's hair is thought to be

one of the key components that enhance their appearance, it's crucial to Take good care of your hair.(2) The definition of hair is "improved epithelial structure formed as a result of keratinization of germinative cells." Hairs are the protuberances of the skin's follicles. Hair is present on the face, scalp, and skin, among other places A key component of hair growth is the

*Corresponding Author: Viraj Naravane

Address: College of Pharmacy (Poly), Sawarde.

Email : pratikshabpatil28@gmail.com

Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.



scalp, and human hair is regarded as one of the symbols of beauty in people.(3)

It is a cyclical process that includes the synthesis, elongation, and eventual shedding of hair shafts. Antigen, catagen, and telogen phase follicles are typically found in human hair. During the anagen phase, the hair follicles readily produce the hair shaft and aggressively collect cytochrome.

Hair loss is a common and upsetting condition that is influenced by environmental, medical, dietary, and genetic factors.(4) The most prevalent cause of hair loss in men is androgenic alopecia, often known as male-pattern baldness, but in women, medical problems such as hypothyroidism, oral contraceptives, and nutritional deficiencies are responsible for hair loss. Its prevalence in the general population ranges from 1.7% to 2.1%, with young patients (ages 21 to 40) having a higher prevalence. There is no discernible difference in incidence between males and females.(5) Citrus peel contains a wealth of nutrients, including vitamin C, carotene, and protein. Hair growth can be infused with essential nutrients from orange peel, while it can also refine damaged hair and strengthen hair toughness. Moreover, it can enhance blood circulation in the skin, stimulate metabolism, nourish the scalp, and promote hair growth in a favorable environment.(6) The medicinal properties associated with Citrus sinensis are attributed to its abundant secondary metabolites. The antimicrobial properties of plants are thought to stem from tannins, saponins, phenolic compounds, essential oils, and flavonoids.

Fenugreek seed extract serves as a nutritional supplement and comprises micronutrients such as B-vitamins, antioxidants, and trace elements present in hair. Trigonella foenum-graceum L. (fenugreek) belongs to the family of leguminous herbs. Fenugreek originates from the

Mediterranean, Western Asia, and Southern Europe.(7) Fenugreek seeds contain various active components, including saponins (such as diosgenin, yamogenin, and gitogenin derivatives),

One of the greatest natural hair nutrients is coconut oil. It helps hair develop in a shiny, healthy manner. It is also quite effective at stopping protein loss, which can lead to your hair growing in a number of unhealthy or ugly ways. Coconut oil is frequently used to cure hair on the Indian subcontinent. In such countries, most people use coconut oil on their hair daily after bathing or showering.(8)

Almond oil strengthens the hair follicles and provides deep hydration to the scalp, resulting in thick, glossy, and gorgeous hair. You might be able to get rid of dandruff with almond oil. It contains antimicrobial properties that help dry skin heal and remove dead skin cells from the scalp.(9,10) This vitamin B derivative is suggested for people with problems like hair thinning. Almond oil applied topically has been shown to slow down the aging process and help prevent sun-induced skin damage.(11) By minimizing DNA damage from UV radiation and averting the chemical and structural alterations they may cause, almond oil can help safeguard cells

Anatomy of hair :-

95 % of hair is made up of keratin, a helical, fibrous protein found in skin and its derivatives.(12)(including body hair and nails). Three different layers create the structure of hair:

- **The medulla :** This is the interior part of the hair shaft and is made of an amorphous, soft, and oily substance.
- **The cuticle :** forms a thin, protective outer layer with scale-shaped cells that is highly



keratinized and contains nutrients necessary for hair growth.

- **Cortex** : It is the primary component of hair and contains long keratin chains that give the hair its suppleness, elasticity, and resilience.

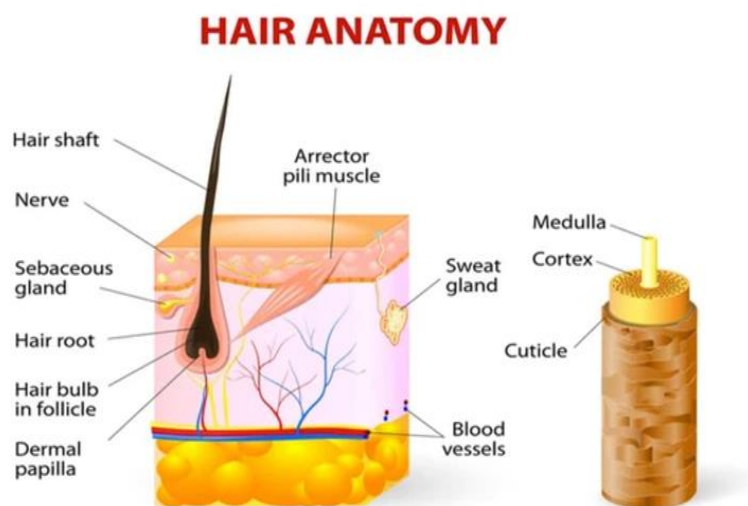


Fig 1. Hair anatomy

Growth Cycle of Hair: -

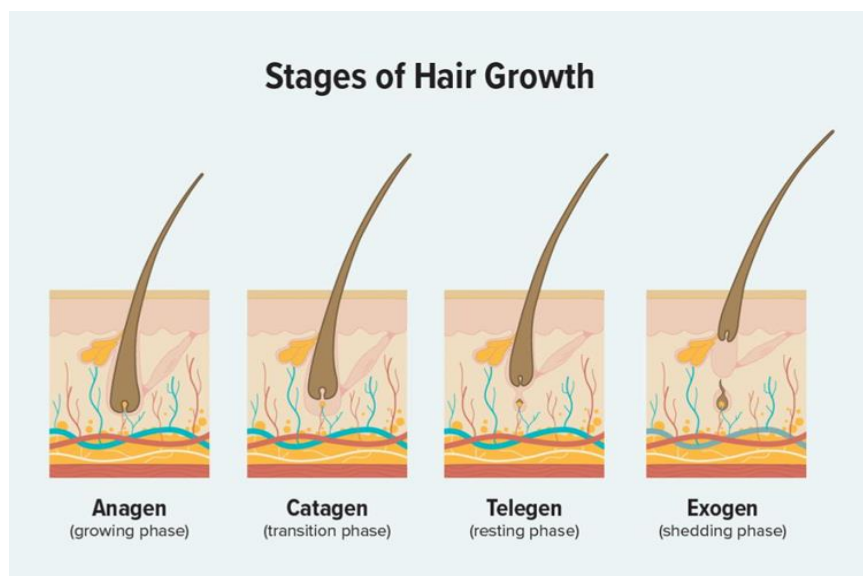


Fig 2. Growth Cycle of Hair

The Hair growth Cycle Is Consists Of 4 Stages :-

- **Anagen** (growth stage): This period, which can continue for several years, is known as active growing.(13, 14)

- **Catagen** (transitional stage): The hair follicle contracts during this phase, and the rate of hair growth slows.

- **Telogen** (resting stage): During this time of rest, hair development stops and new hair grows in, pushing out the old hair.
- **Exogen** stage: The hair strand completely separates from the scalp and falls away at the last stage of the hair development cycle.

Hair Serum :-

Hair serum originated from the ancient cultures' use of plant extracts and natural oils to nourish and improve hair. (15)

In the 1980s and 1990s, hair serums became a popular new category of hair care products.

Highlight Of Hair Serum :-

- One hair styling product that creates a protective layer on the hair's surface is hair serum.(16,17)
- Basically, it is a liquid hair care solution that has a viscosity that is more akin to water.
- Silicone is used in the formulation of this style product to improve hydration, gloss, and smoothness by forming a protective coating on the hair's surface.
- Made to be used with wet hair.

Types of hair used for hair serum(18)

- Straight
- Wavy
- Curly
- Coily

Benefits of hair serum:

- **Protect hair :**

- **Gives shine to the hair:-**

- **Multipurpose:-**

- **Nourished hairs:-**

- **Best for hair dry:-**

- **Prevent hair fall from breakage:-.**

Objectives :-

- Hair can be efficiently softened, smoothed, and made silky using herbal hair serum.(19)
- Serums are a great way to protect hair from pollutants, dust, heat, and sun damage.
- They make hair shiny, keep it from breaking, are ideal for dry hair, nourish it, and make it easier to handle.(20)

Advantage of hair serum :-

- Your hair can be silky, soft, and smoothed using hair serum(21)
- It shields the hair from damaging elements.
- The final output and the pre-style treatment.

Disadvantage of hair serum :-

- Too much use can harm your hair.
- Hair accumulates and becomes lifeless and flat after a few days of regular use.(22)
- Serum application to the scalp may result in irritation

Side effects of using hair serum :-

- Excessive and frequent application can cause the hair to become unhealthy and dry.(23)



- The serum may cause inflammation when applied to the scalp.
- The silicones found in hair serum may be bad for long hair.
- Avoid applying anything to the scalp because it may cause inflammation or make it greasy(24)
- Hair loss:-
- Split ends:-
- Dry hair:-
- Oily hair:-
- Frizzy hair:-
- Dull or damaged hair:-

Hair problems and their causes :-

- Dandruff:-



Fig. 3 Hair problems

Do's and don'ts using hair serum ?

Getting the most out of hair serums requires knowing how to apply them correctly. Here are some guidelines for utilizing hair serums.(25)

- **Do: Prior to application, wash hair.**

Hair serum is typically a leave-in product that is applied to hair that has just been shampooed.(26) The main purpose of the serum is to protect the hair from impurities. Using it on wicked hair goes against the purpose. Moreover, using it on hair of low quality can result in an unctuous and heavy appearance.(27)

- **Do: Pre-heat it prior to application on the hair.**

The majority of hair serums have a thick texture, which makes them difficult to apply.(28,29,30)By putting a small amount of the product on your palm and rubbing it for several seconds, you can warm it up and make it smoother, which helps with a more uniform application.

- **Don't: Use on roots.**

To prevent weighing down the hair, making the roots look greasy, and causing product buildup, it is crucial to keep hair serum away from the roots.(31)

Do: Consider a person's hair type and hair goals.

Hair serums come in various formulations, which means that some hair types may benefit more than others based on the specific serum(32)

Materials and methods:-

➤ Collection of plant part:-(33)

From the Pranveer Singh Institute of Technology's Medicinal Plant Garden in Kanpur, Uttar Pradesh, India, several plant materials—including *Citrus sinensis*, *Linum usitatissimum*, *Nigella sativa*, *Zingiber officinale*, and *Trigonella foenum-graecum*—were gathered and duly verified in the Department of Pharmacognosy in order to make herbal hair oil.

1) *Zingiber officinale*



Fig . 4 *Zingiber officinale*

Botanical name: *Zingiber officinale* Roscoe

Family – Zingiberaceae

Synonym – Ginger, canton ginger, stem ginger.

Biological source – Ginger consists of the dried rhizomes of the *Zingiber officinale* Roscoe

Chemical constituents: bisabolene, zingerone, shogaol, gingerol, etc.

Uses: Surfactant, anti-inflammatory, asthma, neurological disease, rheumatoid arthritis.

2) Citrus peel



Fig. 5 Citrus peel

Botanical name: *Citrus sinensis*

Family – Rutaceae

Synonym – Orange or sweet orange

Biological source – It is obtained from the orange peel Which is dried or fresh outer part of the pericarp of ripe Or nearly ripe fruits of *Citrus sinensis*.

Chemical constituents – limonene, (S)-linalool, pectin, Octanal, decanal, essential alcohols, etc.

Uses – Anti-oxidant, anti-inflammatory, Orange oil as Perfuming agent

Orange peel, or *Citrus sinensis*, has demonstrated extremely beneficial effects on hair. With regular usage, these peels can make hair shinier and smoother.(34) Rich in antioxidants, they also aid in healing the damage caused by pollution. Using orange peels on a daily basis, which are high in vitamin C, makes hair lustrous and bouncy and less dry and lifeless. Furthermore, orange peels, which are a great source of vitamins B12 and E, aid in the growth of hair. Additionally, they slow down the rate at which gray hair appears.

3) Flaxseed



Fig. 5 Flaxseed

Botanical name: *Linum usitatissimum*

Family – Linaceae

Synonym- Linseed, flaxseed

Biological source – It consists of the dried fully ripe Seeds of *Linum usitatissimum* Linn.

Chemical constituents – alpha-linoleic acid (ALA), Omega-3 fatty acid, lignans, etc

Uses – Anti-inflammatory, anti-oxidants, hair growth Stimulator [44].

Flaxseed, also called linseed, is a crucial component of functional foods because of its high levels of lignans, fiber, and -linolic acid (ALA, an omega-3 fatty acid(35)One possible health benefit of flaxseed oil, fibers, and lignans is a decrease in cardiovascular disease, atherosclerosis, diabetes, cancer, osteoporosis, arthritis, autoimmune, and neurological disorders. Flaxseed is also a great source of fatty acids and antioxidants, which help rid the scalp of dead skin cells and pollutants.

4) Fenugreek:



Fig. 7 Fenugreek

Botanical name: *Trigonella foenum-graceum*

Family – Leguminosae

Synonym – Methi, Methika, Alholva, Chandrika.

Biological Source – It is obtained from the dried seeds To *Trigonella foenum-graecum*.

Chemical constituents- Vitamin B, alkaloids, Flavonoids, saponins, etc.

Uses – Hair growth stimulant, antibacterial.

A dietary supplement made from fenugreek seed extract also includes micronutrients like antioxidants, B vitamins, and trace minerals found in hair. It is a leguminous herb, fenugreek (*Trigonella foenum-graceum* L.). Fenugreek is indigenous to the Mediterranean region, Western Asia, and Southern Europe.(36) Among the many active components found in fenugreek seeds are trigonelline alkaloids, flavonoids, galactomannan vitamins, fiber, and saponins, including diosgenin, yamogenin, and gitogenin derivatives. The sour taste and pleasant scent of the seeds are also present. It has a lengthy history as a plant used in ancient medicine and cuisine.(37)Recent years have seen a substantial increase in interest in the health benefits of fenugreek seeds due to their potential as antihypertensive, antiulcerogenic, hypoglycemic, and hypocholesterolemic medicines. (dihydrotestosterone).

Nigella sativa L:



Fig.8 Nigella sativa L.

Botanical name: Nigella Sativa Linn

Family – Ranunculaceae

Synonym – Black cumin, Black caraway, Kalonji.

Biological Source – It is obtained from the dried ripe seeds .of Nigella Sativa Linn .

Chemical constituents- Volatile oil, Fixed oil, alkaloids, tannins, saponins, proteins, etc.

Uses – Antibacterial, antifungal, anti-inflammatory, and antioxidant.

Commonly referred to as black cumin, Nigella sativa (NS) is an annual flowering plant indigenous to Pakistan, India, and the Mediterranean region. Thymoquinone (TQ), dithymoquinone (DTQ), thymohydroquinone (THQ), and thymol (THY) are the main pharmacologically active ingredients of NS. TQ, which makes up the majority (30%–48%) of NS, has been shown to reduce inflammatory cell infiltration in the brain by inhibiting NF-kB activation.(38)TQ exhibits anti-inflammatory properties via blocking the expression of cyclooxygenase 2 (COX-2) and the creation of prostaglandin D2 (PGD2), which is why NS has been used as a natural remedy for a variety of diseases and inflammatory conditions. Recent research has also demonstrated that PGD2 significantly inhibits the hair follicle.

5) Almond oil:



Fig.9 Almond oil

Your hair can be softened and strengthened by the nutritional oil. Due to its high content of vitamin B-7 (biotin), almond oil helps maintain the health and strength of hair and nails. It can also safeguard your hair from sun damage, as it has a natural SPF of 5. Almond oil can be used to treat the scalp. As a nutritional oil, almond oil can soften and strengthen your hair. The almond oil contributes to the health and strength of hair and nails. Additionally, it can protect your hair from damage caused by the sun. Almond oil application results in a deeply hydrated scalp and strengthened hair follicles, leading to thick, shiny, and beautiful hair. Dandruff can be eliminated with the help of almond oil. It features antibacterial properties. It also possesses certain anti-inflammatory conditioning. It enhances the hair's glossiness.

6) Coconut oil:



Fig.10 Coconut oil

One of the best natural hair nutrients is coconut oil. It helps hair grow shiny and healthily. It also works very well to stop protein loss, which can lead to your hair growing in a number of unhealthy or ugly ways. Coconut oil is frequently used for hair care on the Indian subcontinent. Most people in those countries put coconut oil on their hair every day after taking a bath or shower. It

Vitamin E:



Fig.11 Vitamin E.

Oil with a lot of vitamin E can help restore luster and replenish that protective layer. In general, oil helps protect the hair from damage, minimize breakage, and seal out moisture. Shine can be restored and the protective layer replaced using vitamin E-rich oil.(39) Additionally, oil helps lock out moisture, minimize breakage, and shield the hair from harm for the health and appearance of hair vitamin E capsules to hair vitamin E's moisturizing capabilities, which can help hydrate and brittle hair, making it easier to maintain.(40) Rebuilding the protective layer with a vitamin-rich oil will help restore shine. In general, oil keeps the hair hydrated, reduces breakage, and shields it from harm.(41) Because vitamin E includes natural antioxidants that may encourage hair growth, it may help support a healthy crown and hair. The

amount of oxidative stress and free radicals that cause the hair follicle cells in one's crown to deteriorate can be decreased by vitamins and antioxidants.

Formulation of herbal hair serum:

Step 1: Clean all the glassware and dry them properly as per bribe.

Step 2: Every fresh herb, including the peel of *Citrus sinensis*, the roots of *Zingiber officinale*, the seeds of *Linum usitatissimum*, *Nigella sativa*, and *Trigonella foenum-graecum*, was precisely weighed and added to 500 milliliters of water.(42)

Step 3: For fifteen minutes, the contents mentioned above were boiled.

Step 4: They were boiled for 15 minutes, let to cool, and then filtered.

Step 5: Vitamin E, almond oil and coconut oil were introduced to the filtrate.

Step 6: A spray container was then used to store the prepared serum .

Formulation table of herbal hair serum:

Sr. No	Name of ingredients	Quantity (%)	Uses
1	Citrus peel	70	Acts as antioxidant, controls scalp oil, improves shine
2	<i>Nigella sativa</i> L	7	Promotes hair growth, reduces dandruff, strengthens follicles
3	Fenugreek	10	Prevents dandruff, strengthens hair roots, reduces hair fall
4	Flaxseed	5	Provides omega-3 fatty acids and mucilage; adds shine and reduces frizz
5	<i>Zingiber officinale</i>	5	Stimulates blood circulation to scalp, enhances hair growth
6	Almond oil	0.5	Nourishes and moisturizes hair; improves texture
7	Coconut oil	1	Serves as base oil; provides deep conditioning and prevents protein loss
8	Vitamin E	1.5	Antioxidant; prevents oxidative damage, enhances shelf life

Evaluation of herbal hair serum:

- a) Physical look :
- b) Test for homogeneity :
- c) pH test:
- d) Viscosity:
- e) Spreadability:
- f) Test for sensitivity:

DISCUSSION

➤ Physical appearance:

The herbal hair serums were all found to be transparent and pale brown in color, with a smooth texture upon application

➤ Homogeneity:

The generated herbal hair serum's homogeneity was assessed visually by looking for lumps, flocculates, or clumps.(43) It has been demonstrated that the produced serum is homogeneous

➤ pH determination:

The manufactured herbal serum was found to have a pH of 7.50, which is appropriate for formulation

➤ Stability:

The created formulation did not exhibit physical instability over the research period, nor did there appear to be any discernible pH changes before and after the study

Microbial contamination:

After seven days, the herbal hair serum's microbiological contamination level was 1.89 CFU for fungal after 24 hours

CONCLUSION:

The formulated herbal hair serum containing *Nigella sativa* (black seed), *Zingiber officinale* (ginger), flaxseed, citrus peel, almond oil, coconut oil, vitamin E, and fenugreek (*Trigonella foenum-graecum*) demonstrates significant potential as a natural and effective hair care formulation. Each ingredient contributes distinct pharmacological and cosmetic benefits that act synergistically to promote overall scalp and hair health.

The combination of *Nigella sativa* and fenugreek provides strong antimicrobial, anti-inflammatory, and hair-strengthening effects, helping to reduce dandruff and prevent hair loss. Ginger extract enhances scalp microcirculation, stimulating hair follicles and promoting new hair growth. Flaxseed offers a rich source of omega-3 fatty acids and natural mucilage, which help to condition and smooth the hair shaft, reducing frizz and breakage.

The inclusion of citrus peel extract provides natural antioxidants and vitamin C that help purify the scalp, control excess oil, and impart shine to the hair. Almond oil and coconut oil act as excellent emollients and carriers, improving serum spreadability, nourishing the hair roots, and protecting against dryness and environmental damage. The addition of vitamin E further enhances the serum's antioxidant capacity, reducing oxidative stress on the scalp and preventing premature graying or follicular damage.

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Evaluation of herbal hair serum-a review. *Int J Basic Clin Pharmacol* 2023;12:759-65.

HOW TO CITE: Aayush Shirbhate*, Aditya Kakad, Dr. Swati Deshmukh, Nature's Touch: a Herbal Hair Serum, *Int. J. of Pharm. Sci.*, 2025, Vol 3, Issue 11, 369-381 <https://doi.org/10.5281/zenodo.17519228>