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FORMULATION AND EVALUATION OF HERBAL HAIR SERUM

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ABSTRACT
Hair Serum was formulated by using Aloevera, fenugreek seed water, rice water, coconut oil, Almond oil, rose water. The cosmetics are very helpful and it is less sensitive to any side Effects. All ingredients are easily available in market this serum not only controls frizz, Enhance smoothness, reduces tangles, promotes shine, enhances straightness and protects Against damage. Healthy looking hair is a sign of good health, beauty and hair care practices Which moulds one's personality. Human hair follicle cycle consists of 4 main phases anagen,Catagen, telogen and exogen. Hair gets its pigment from Melanin stored in hair follicle cells. Follicle can lose their ability to produce melanin as age which result in growth of grey or white Hair damage follicle can also stop producing hair which can lead to certain condition such as Alopecia which can cause follicle to stop producing hair altogether.Coconut oil may have several benefits for our hair and scalp, it may help to moisturise and seal Hair. This can help to prevent dry, flaky scalp and dandruff. Almond oil moisturises your scalp And strengthens hair follicles. To know the different parameter regarding this prepared hair Serum I have performed some evaluation parameters i.e. physical appearance, homogeneity Test, pH test, viscosity, spread ability etc.Stability testing for prepared formulation was performed by storing it at different temperature Condition for time period of one week to know the parameter like colour, odour, pH and Smoothness of hair serum.

KEYWORDS: *Human hair , Hair strength , Hair nutrition , Alovera*

1.Introduction

Hair serum is a liquid treatment formula. A smooth layer of serum reflects the sunshine, Which is how serum gives your hair a shiny, not greasy, finish. It's a common Misconception that hair serum will be set naturally fine hair. Instead, it all depends on Which serum you utilize and in what quantity. Hair serum a squadron of fans Who claim that it has revolutionized the look of their hair, while some people aren't quite Sure where and the way it fits into their hair care routines. We take a better look at what Exactly hair serum is, how it works, whether it's right for you and, if so, a way to get the. Most out of it. Hair serum plays a significant role in the protection and nourishment of the Hair. Hair serums do have volatile oil extracts in them. That's why it helps to keep the hair Smooth and healthy. Not only does it nourish the hair but it also provides strength and Shine. Using the shampoo and conditioner isn't enough to ensure maximum protection. Hair Serum plays a significant role because it can keep the hair secure from environmental Pollution. This is the reason why applying hair serum is very important to guard the hair Completely and supply them with strength. Scroll below to understand the advantages of Hair serum. There are a variety of advantages to using hair serums. These not only provide An outstanding look to the but also make the hair healthy and glossy.

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Sr no	**Ingredients**
1	Alovera Gel
2	Rice Water
3	Rose Water
4	Vitamin E
5	Coconut Oil
6	Almond Oil
7	Carbopole 934
8	Methyl Parabean

2.MATERIALS (INGREDIENTS) USED LN FORMULATION

2.1 Alovera Gel



Fig. Alovera gel

Scientific Name – Aloebarbadensismilleer
Synonym – Aloe vera , aloe , burn plant, lily of oil
Family – Liliaceae
Biological source – Aloe is the dried juice collected by incision .
Chemical const – Emodin , Aloesin

2 .2 Rice Water



Fig. Rice Water

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Botanical Name – Oryza Sativa
Biological Source – Embryo and Endosperm
Family: Gramineae / Poaceae

2.3 Coconut Oil



Fig. Coconut Oil

Kingdom: Plantae
Order: Arecales
Family: Arecaceae
Genus: Cucos
Species: C. Nucifera
Synonims: Coconut oil, coconut butter, copra oil.

3. MATERIAL AND METHOD

3.1 Materials

All fresh herbs aloevera, fenugreek seeds, oils were collected from Maharashtra, India, and
Authenticated by gmcp, methyl paraben, Carbopol 934 and Carbopol 940 available was gmcp Laboratories.

Ingredients

- Aloevera gel
- Fenugreek seeds extract
- Rice water extract
- Rose water
- Oils
- Vitamin-E

Chemicals

- Methyl paraben
- Carbopol 934

Carbopol 934

934 polymer is a white powder, crosslinked polyacrylic acid polymer. It is an extremely
Efficient rheology modifier capable of providing high viscosity and forms sparkling clear gels
Or hydro-alcoholic gels and creams. Its short flow, non-drip properties are ideal for applications

Such as clear gels, hydroalcoholic gels, serum and creams

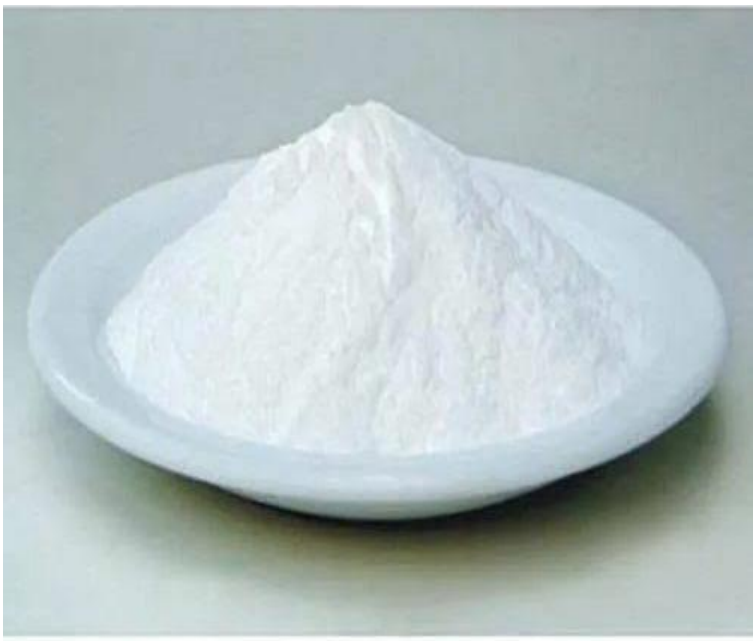
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Fig. Carbopol

Methyl Paraben



Methylparaben is an anti-fungal agent often used in a variety of cosmetics and personal-care Products. It is also used as a food preservative.

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3.2Formulation of Herbal Hair Serum

• Formula

Sr.No	Ingredients	Quantity Taken(60ml)
1.	Aloevera Gel	30gm
2.	Rice WATER	5ml
3.	Coconut OIL	3ml
4.	Almond OIL	4ml
5.	Rose WATER	5ml
6.	Vitamin-E	1ml
7.	Carbopole 934	5ml
8.	Methyl PARABEN	2ml

METHOD OF PREPARATION

- Cleaned all the glassware and dried them properly as per SOP.
- Measured the accurate quantity of Aloevera gel, rice water, fenugreek seeds water and mix Well transfer it in beaker.
- In another beaker take some amount of and water Carbopol 934 (1 % w/w) and purified Water were taken in a beaker and Stirred by mechanical stirrer at 400 to 650 rpm.
- Now mix accurate amount of almond oil and coconut oil in above carbopole mixture.
- Given quantity distilled water was taken and add required quantity of methyl paraben were Dissolved by heating on water bath, Cool the solution.
- Mixed the above both solution properly and stirred continuosly by mechanical stirrer at 400 to 650 rpm. As well as mixed required quantity of rose water and vitamin-E .
- After properly mixed solution and transferred solution in container and added Preservatives as methyl parabens .
- Then formed a Herbal Hair Serum



3.3 Here are 8 Common hair problems and the best ways to overcome them:

• Dandruff
• Hair loss
• Dry Hair
• Spit Ends
• Oily / Greasy Hair

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• Frizzy Hair
• Dull Hair
• Heat Damaged



3.4 Hair Serums For Different Hair Types

- For Dry Hair
- For Curly Hair
- For Coloured, Chemically Treated Hair
- For Split-End Hair

Excessively dry hair needs extra care and nutrition. The good news is that now there are Serums available that can be applied overnight and kept that can revitalize your hair while You get your beauty sleep. Make sure though that these serums are cream-based and not Oil-based so that that they don't weigh down your hair instead of moisturizing it.

Uses of Hair Serum

1. Adds shines
2. Helps Nourish Dry Hair
3. Softens Yours Strands
4. 4.Protects Against Humidity
5. 5.Helps with Damages.

Causes of Damage Hair

- Deficiencies
- Heat Damage
- Lack Of Deep Conditioning
- Nutritional Excessive Shampooing
- Swimming Without a Cap
- Sun Damage
- Excessive Using Hot Water

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4. STRUCTURE OF HAIR

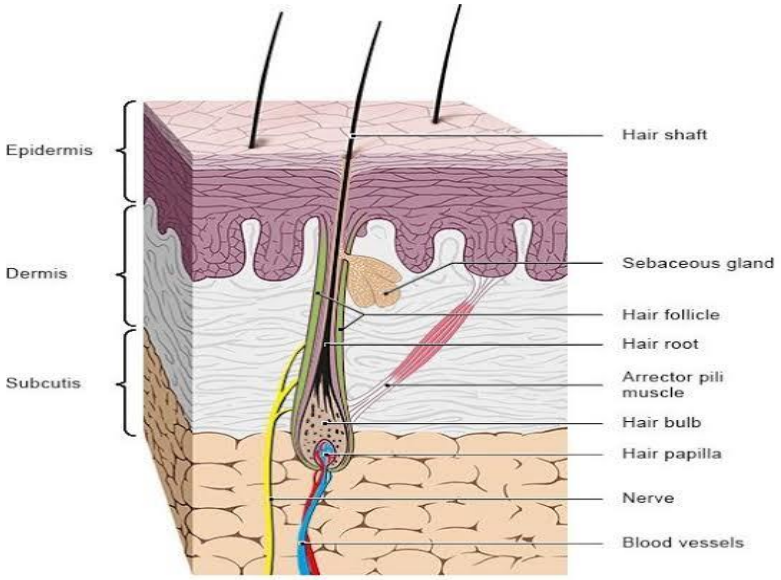


Fig. Hair Folicle

1. Each hair has a hair shaft and a hair root. The shaft is the visible part of hair that sticks Out of the skin. The hair roots are in the skin and extend down to the deeper layers of skin. It is surrounded by the hair follicle (a sheath of skin and connective tissue), which is also Connected to a sebaceous gland
2. Each hair follicle is attached to a tiny muscle (arrector pili) that can make the hair stand up. Many nerves sense hair movement and are sensitive to even the slightest draft.
3. At the base of the hair, the hair root widens to a round hair bulb. The hair papilla, which Supplies the hair root with blood, is found inside the bottom of the hair bulb. New hair cells Are constantly being in the hair bulb, close to the papilla.
4. New cells are constantly forming in the hair bulb. These cells stick together and harden. The full strand of hair develops from this group of hardened hair cells. Because new Hardened cells keep on attaching to the hair from below, it is gradually pushed up out of the Skin. In this way, a single hair on your head grows at a rate of about 1 cm per month.
5. The colour of the hair is determined by the amount of melanin in the hardened cells. This Can vary a lot from person to person, and it changes over the course of a lifetime. The Amount of melanin typically decreases as people get older, and more air gets trapped inside The hair – it then loses its colour and turns white. Depending on someone's original haircolour and the number of white hairs that grow, the hair on their head then turns gray or White

Nutrients Important For Hair Health

Betacarotene	Biotin	VitaminB1	Vitamin B2
VitaminB5 (pantothenic acid)	Vitamin B6	Vitamin B12	Vitamin D
Vitamin E	inositol	Folic acid	Calcium
Zinc	Iron	L-Methionine	L – Cysteine
L Lysine	L-Taurine	Selenium	Polyunsaturated fattyacids

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5.HAIR FOLLICLE CYCLE



Ingredients & Roles

1.Aloe Vera: Moisturizes and soothes the scalp, promotes hair growth, and provides hydration.
2.Rice Water: Strengthens hair, improves shine, and helps in hair growth due to the presence of inositol.
3.Coconut Oil: Nourishes hair, penetrates the hair shaft, and reduces protein loss, promoting softness.
4.Rose Water: Balances the scalp's pH, reduces inflammation, and adds a pleasant fragrance.
5.Vitamin E: Acts as an antioxidant, protects hair from environmental damage, and nourishes the scalp.
6.Carbopol 934: A gelling agent used to increase the viscosity and create a smooth gel texture.
7.Methyl Paraben: A preservative used to prevent microbial growth and increase shelf life.

Uses : The herbal hair syrup formulated with aloe vera, rice water, coconut oil, rose water, vitamin E, carbopol 934, and methyl paraben has several beneficial uses for hair and scalp health. Here are the key uses:

1.Hair Growth Stimulation

• Aloe vera and rice water are known for promoting hair growth by improving scalp circulation and providing essential nutrients to the hair follicles.

2.Deep Conditioning and Hydration

• Coconut oil and aloe vera moisturize and deeply condition the hair, leaving it soft and manageable. They also help to reduce hair dryness and prevent split ends.

3.Strengthening Hair

• Rice water is rich in amino acids, vitamins, and minerals that help strengthen the hair shaft, reducing breakage and improving overall hair strength.

4.Scalp Soothing and Nourishment

• Rose water and aloe vera help soothe the scalp, reducing irritation, inflammation, and itchiness. This is particularly helpful for those with sensitive scalps or conditions like dandruff.

5.Protection from Damage

• Vitamin E provides antioxidant protection, which shields the hair and scalp from damage caused by free radicals, environmental pollutants, and UV exposure.

6.Improving Hair Texture

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• The combined hydrating and conditioning properties of coconut oil and aloe vera enhance the smoothness of the hair, making it easier to detangle and style. This leads to softer, shinier, and more manageable hair.
7.Reducing Frizz
• Aloe vera and coconut oil help control frizz by sealing moisture into the hair strands and smoothing the cuticle layer, preventing flyaways.
8.Scalp pH Balance
• Rose water helps maintain the scalp's natural pH balance, which is important for preventing excessive oiliness or dryness and for keeping the scalp healthy.
9.Preservation and Long-Lasting Effect
• The inclusion of methyl paraben ensures that the syrup remains safe and effective for a longer period without the risk of microbial contamination.
10.Pre-Wash Treatment
11.It can be used as a pre-wash treatment to provide deep nourishment. Apply to the scalp and hair, leave it on for 20-30 minutes, and then wash it off. This helps in repairing and protecting hair before shampooing.
• This formulation serves as a multipurpose product that can be used as a hair mask, conditioner, or leave-in treatment, depending on the user's needs.

6. APPLICATION OF HERBAL SYRUM

The application of a herbal hair serum is simple and can greatly benefit hair and scalp health. Here's how to use it effectively:
1. For Dry or Frizzy Hair (Leave-In Serum)
Step 1: Take a small amount of serum (1-2 pumps or a few drops) on your palms.
Step 2: Rub your hands together and apply it evenly to your hair, focusing on the mid-lengths and ends where frizz and dryness are more common.
Step 3: Gently comb through your hair with your fingers or a wide-tooth comb to distribute the serum evenly.
Step 4: Style as desired. You can apply the serum to either damp or dry hair.
Benefits: It smooths frizz, adds shine, and moisturizes dry ends without making the hair greasy.
2. As a Scalp Treatment
Step 1: Take a few drops of the serum and apply it directly to your scalp using your fingertips.
Step 2: Gently massage the serum into your scalp using circular motions for 2-3 minutes. This improves blood circulation and helps absorb the nutrients from the serum.
Step 3: Leave it on overnight or for at least 30 minutes before washing it out with a mild shampoo.
Benefits: This nourishes the scalp, prevents dandruff, and promotes healthy hair growth.
3. Pre-Wash Treatment
Step 1: Apply the serum generously to your hair and scalp, covering it from roots to ends.
Step 2: Leave it on for 30 minutes to an hour before washing it off with shampoo.
Step 3: Rinse thoroughly with water.
Benefits: Works as a deep conditioning treatment, repairing dry and damaged hair, and protecting it from harsh shampoos.
4. Heat Protection Before Styling
Step 1: Before blow-drying or using heat tools (like flat irons or curling wands), apply a small amount of the serum to damp hair.
Step 2: Distribute the serum evenly through the hair, focusing on the ends.
Step 3: Style as usual with heat tools.
Benefits: It forms a protective barrier against heat damage while keeping the hair smooth and shiny.
5. Post-Styling Shine
Step 1: After styling, apply a small amount of serum to your hands.
Step 2: Lightly smooth the serum over the surface of your hair, focusing on flyaways or frizzy areas.
Benefits: Adds shine and smoothness to styled hair without weighing it down.
General Tips:
Use sparingly: Herbal serums are often concentrated, so start with a small amount and add more if needed.
Avoid the roots for daily use: When applying as a leave-in serum, avoid using it too close to the scalp to prevent greasiness unless treating specific scalp concerns.
Suitable for all hair types: Adapt the quantity used based on your hair type—use less for fine hair and more for thick or curly hair.
The serum can be used daily or as needed based on your hair's condition and styling requirements.

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7. MECHANISMS OF ACTION

The mechanisms of action of a herbal hair serum are based on the bioactive properties of its ingredients. Here's how the components typically work to enhance hair health:

• Aloe Vera

Moisturization and Scalp Healing: Aloe vera contains proteolytic enzymes that repair dead skin cells on the scalp. It deeply hydrates the hair shaft and scalp, improving elasticity and reducing dryness. Its anti-inflammatory and antifungal properties help soothe and heal the scalp, reducing dandruff and irritation.

Hair Growth Stimulation: Aloe vera contains vitamins A, C, and E, which support cell turnover, promoting healthier, stronger hair growth.

• Rice Water

• Strengthening Hair: Rice water is rich in inositol, a carbohydrate that helps repair and protect damaged hair by coating the hair shaft. Inositol penetrates the hair, making it stronger and more resilient to damage.

Improved Hair Elasticity: The amino acids in rice water improve hair elasticity and reduce breakage, leading to longer, healthier hair.

Scalp Health: Rice water has anti-inflammatory properties, which help in soothing the scalp and reducing irritation.

• Coconut Oil

Penetration and Nourishment: Coconut oil has a unique ability to penetrate the hair shaft deeply due to its low molecular weight and straight chain structure, nourishing the hair from within. It prevents protein loss, which is crucial for maintaining the strength of the hair.

Moisture Retention: It creates a protective layer over the hair, sealing in moisture and preventing water loss. This reduces frizz and improves hair texture.

Antimicrobial Action: Coconut oil has antifungal and antibacterial properties that help protect the scalp from infections, reducing dandruff and scalp issues.

• Rose Water

pH Balancing: Rose water helps balance the scalp's pH, which is crucial for maintaining a healthy scalp environment. A balanced pH reduces excessive oil production or dryness, both of which can lead to hair problems.

Anti-inflammatory Properties: Rose water's anti-inflammatory action soothes irritated or inflamed scalps, helping with conditions like dandruff and itchiness.

Hair Strengthening: The natural flavonoids and antioxidants in rose water help strengthen hair follicles, reducing hair fall.

• Vitamin E

Antioxidant Protection: Vitamin E is a powerful antioxidant that protects hair cells from oxidative stress caused by UV rays, pollution, and free radicals. This reduces damage to the hair shaft and scalp.

Improved Circulation: Vitamin E helps improve blood circulation to the scalp, which enhances nutrient and oxygen delivery to hair follicles, promoting healthy hair growth.

Moisturizing: It acts as a natural conditioner, preventing moisture loss and leaving the hair softer and shinier.

• Carbopol 934 (Gelling Agent)

Consistency and Stability: Carbopol helps maintain the serum's gel-like consistency, making it easy to apply and ensuring even distribution of the active ingredients. It doesn't interact with the herbal components, allowing them to retain their efficacy.

Controlled Release: As a thickener, it may help in slow release of the active ingredients, allowing for prolonged contact with the hair and scalp.

• Methyl Paraben (Preservative)

Antimicrobial Action: Methyl paraben prevents the growth of bacteria, yeast, and molds in the serum, ensuring the product remains safe and effective over time. While it doesn't directly affect the hair, it ensures the serum remains uncontaminated, preventing scalp infections from microbial growth.

Combined Mechanisms of Action:

Hydration and Moisture Retention: Aloe vera, coconut oil, and vitamin E deeply hydrate the scalp and hair while locking in moisture, preventing dryness, frizz, and split ends.

Strengthening and Repair: Rice water, aloe vera, and vitamin E work together to strengthen hair strands by promoting protein retention, repairing damage, and improving elasticity, which helps reduce breakage.

Scalp Health: The anti-inflammatory and antimicrobial properties of aloe vera

Almond oil is widely used in hair care due to its rich content of vitamins, fatty acids, and antioxidants. Here's a detailed explanation of the mechanisms of action of almond oil for hair health

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• Deep Moisturization

Rich in Oleic Acid (Omega-9 Fatty Acid): Almond oil contains a high concentration of oleic acid, which is an emollient that penetrates deeply into the hair shaft, providing intense moisturization. It helps seal the cuticle, preventing moisture loss and keeping hair hydrated, soft, and shiny.

Sealing Effect: As a carrier oil, almond oil creates a protective layer on the hair surface, locking in moisture and preventing dehydration, which is especially beneficial for dry, frizzy, or damaged hair.

• Nourishing and Strengthening

Vitamin E: Almond oil is rich in vitamin E, a potent antioxidant that protects hair cells from oxidative stress caused by free radicals, UV rays, and environmental pollutants. This protection helps reduce damage and maintains the strength and elasticity of the hair.

Biotin (Vitamin B7): Almond oil contains small amounts of biotin, which helps strengthen the keratin structure in the hair, reducing breakage and split ends, and promoting thicker, healthier hair growth.

• Promoting Hair Growth

Magnesium and Zinc Content: Almond oil contains essential minerals like magnesium and zinc, which play a key role in supporting hair growth. Magnesium helps regulate blood circulation to the scalp, promoting better nutrient delivery to the hair follicles. Zinc deficiency is often linked to hair thinning and loss, and the presence of zinc in almond oil helps maintain healthy hair follicles.

Scalp Nourishment: Regular scalp massage with almond oil stimulates blood flow, enhancing the delivery of oxygen and nutrients to hair follicles, which can lead to increased hair growth.

• Repairing and Preventing Hair Damage

Linoleic Acid (Omega-6 Fatty Acid): Almond oil contains linoleic acid, which is important for maintaining the integrity of the hair's lipid barrier. This helps repair damaged cuticles and improves the overall structure of the hair, making it smoother and less prone to breakage.

Protein Preservation: Almond oil helps prevent protein loss from the hair shaft, particularly when the hair is exposed to damaging factors such as heat styling, sun exposure, or harsh chemicals. By preserving the protein content of the hair, almond oil maintains hair strength and elasticity.

• Reducing Scalp Inflammation and Irritation

Anti-Inflammatory Action: Almond oil has mild anti-inflammatory properties, which help soothe irritated, itchy, or inflamed scalps. This is particularly beneficial for people suffering from scalp conditions like seborrheic dermatitis, psoriasis, or dandruff.

Fatty Acids: The oleic and linoleic acids in almond oil help moisturize and nourish the scalp, preventing dryness, flakiness, and the formation of dandruff.

• Detangling and Frizz Control

Smoothing the Hair Cuticle: The emollient properties of almond oil smooth the hair cuticle, reducing tangling and preventing knots. This makes it easier to comb and style the hair, while also controlling frizz and flyaways.

Softening Effect: Almond oil coats the hair and reduces roughness, making it softer, shinier, and more manageable. It helps reduce the static that often causes frizzy hair, especially in humid environments.

• UV Protection

Natural Sun Protection: Almond oil contains small amounts of squalene and fatty acids, which offer a natural barrier against UV damage. Although it doesn't replace sunscreen, almond oil helps shield the hair and scalp from sun-induced damage, which can cause dryness, color fading, and loss of elasticity.

• Split End Prevention

Cuticle Sealing: By smoothing and sealing the hair cuticle, almond oil prevents the hair from splitting at the ends. It forms a protective layer around each strand, reducing the likelihood of breakage or split ends caused by environmental factors or styling damage.

Combined Benefits:

Almond oil works by nourishing the hair and scalp with essential vitamins, fatty acids, and antioxidants.

It strengthens hair, improves elasticity, and prevents damage by protecting against environmental stressors, moisture loss, and breakage.

The moisturizing and emollient properties of almond oil result in smoother, softer hair with reduced frizz and tangles, while promoting overall scalp health.

In summary, almond oil acts as a moisturizer, strengthener, repair agent, and scalp nourisher, making it an effective remedy for dry, damaged, or frizzy hair.

8. MARKETED PREPARATION OF HERBAL SYRUM

There are several marketed preparations of herbal hair syrups that combine natural ingredients to nourish the scalp and promote hair health. These formulations typically include herbal extracts, oils, and vitamins to address common hair problems such as hair fall, dandruff, dryness, and lack of shine. Below are a few examples of well-known herbal hair syrup products that are widely available in the market:

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• Sesa Ayurvedic Hair Vitalizer
Key Ingredients: Bhringraj, Amla, Brahmi, Hibiscus, Neem, and Milk Proteins.
Benefits: Strengthens hair roots, promotes hair growth, reduces dandruff, and prevents premature greying.
Application: Spray or apply directly to the scalp and gently massage for absorption.
• Khadi Natural Herbal Hair Growth Serum
Key Ingredients: Aloe Vera, Basil, Green Tea, Rosemary, and Ginseng.
Benefits: Stimulates hair growth, controls dandruff, and improves hair thickness and texture.
Application: Applied directly to the scalp, usually as a leave-in treatment after washing.
• Livon Hair Gain Tonic
Key Ingredients: Aloe Vera, Ginseng, and Biotin.
Benefits: Reduces hair fall, stimulates hair growth, and strengthens hair follicles.
Application: Applied to the scalp and massaged daily to prevent hair fall and improve density.
• Indulekha Bringha Hair Oil
Key Ingredients: Bringharaj, Aloe Vera, Coconut Oil, Amla, and Rosemary.
Benefits: Promotes new hair growth, strengthens the roots, prevents hair thinning and hair fall.
Application: Applied directly to the scalp through a special comb applicator and massaged in for better penetration.
• Trichup Herbal Hair Serum
Key Ingredients: Aloe Vera, Vitamin E, Amla, and Bhringraj.
Benefits: Smoothens hair, controls frizz, adds shine, and reduces hair fall.
Application: Applied to damp hair, focusing on the lengths and ends, to control frizz and add shine.
• Biotique Bio Mountain Ebony Vitalizing Hair Serum
Key Ingredients: Mountain Ebony, Neem, Bhringraj, Amla, and Peppermint Oil.
Benefits: Promotes hair growth, reduces dandruff, prevents hair thinning, and stimulates scalp circulation.
Application: Applied to the scalp and massaged gently. No need to rinse out.
• Himalaya Herbals Anti-Hair Fall Hair Oil
Key Ingredients: Bhringraj, Amla, Fenugreek, and Aloe Vera.
Benefits: Strengthens hair roots, promotes hair growth, and reduces hair fall.
Application: Massaged into the scalp before or after washing hair.
• Kesh King Ayurvedic Hair Oil
Key Ingredients: Bhringraj, Amla, Brahmi, and Aloe Vera.
Benefits: Reduces hair fall, stimulates hair growth, and prevents dandruff.
Application: Applied to the scalp and left overnight or for a few hours before washing.
Common Features in Marketed Herbal Hair Syrups:
Natural Ingredients: Most products are formulated with herbal extracts like Bhringraj, Aloe Vera, Amla, Neem, and other well-known Ayurvedic or herbal components that are beneficial for hair health.
Moisturization and Conditioning: Many products include ingredients like coconut oil, aloe vera, and vitamin E for hydration and softness.
Hair Fall and Growth Support: Products focus on reducing hair fall and stimulating new hair growth by strengthening hair roots and nourishing hair follicles.
Easy Application: Most are designed as leave-in treatments or oils to be massaged into the scalp for better absorption and results.
These preparations are designed for individuals looking for natural or herbal alternatives to commercial hair care products that often contain synthetic chemicals.

9.DIFFERENCE BETWEEN NATURAL AND SYNTHETIC

The primary difference between natural hair serums and synthetic hair serums lies in their ingredients, mechanisms of action, and long-term effects on hair health. Here's a detailed comparison:
• Ingredients
Natural Hair Serums:
Composed of natural ingredients such as plant extracts, essential oils, and herbal components like aloe vera, coconut oil, argan oil, and vitamin E.
Free from artificial chemicals, preservatives, and synthetic fragrances. They may include naturally derived preservatives like vitamin E or rosemary extract.
Examples of key ingredients: jojoba oil, almond oil, bhringraj, amla, green tea extract, rose water.
Synthetic Hair Serums:

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Formulated with silicones, synthetic polymers, and various chemicals that help coat the hair to make it appear smooth and shiny.
Often contain artificial preservatives like parabens, sulfates, and fragrance for a longer shelf life and scent enhancement.
Examples of synthetic ingredients: dimethicone, cyclopentasiloxane, polyquaternium, mineral oils.

10.MECHANISM OF ACTION

10.1 Natural Hair Serums:

Work by nourishing and moisturizing the hair from within. They penetrate the hair shaft and scalp to provide essential vitamins, fatty acids, and antioxidants.
Encourage long-term hair health by strengthening hair strands, improving scalp circulation, and repairing damaged cuticles.
They typically focus on enhancing hair texture naturally, promoting growth, and improving overall hair health without relying on artificial coatings.

10.2 Synthetic Hair Serums:

Function primarily by coating the hair shaft with a thin layer of silicone or other synthetic compounds, which creates a temporary smoothness and shine.
They mask hair damage by smoothing the cuticle layer and reducing frizz but don't provide deep nourishment. Instead, they offer instant cosmetic improvements.
Their effect wears off after washing, and they may lead to product buildup over time, potentially causing hair to feel greasy or weighed down.

10.3 Benefits

Natural Hair Serums:
Promote long-term hair health by delivering nutrients, antioxidants, and natural oils that strengthen hair and protect it from damage.
Free from harsh chemicals, making them suitable for individuals with sensitive scalps or those prone to allergic reactions.
Support hair growth, reduce breakage, and improve scalp health over time.
Less likely to cause product buildup or clog hair follicles.
Synthetic Hair Serums:
Provide instant results like smoothness, shine, and frizz control due to the silicone coating.
Effective for creating a polished look and protecting the hair from heat styling damage in the short term.
Often designed for specific hair types, such as smoothing serums for straight hair or curl-defining serums for curly hair.

• Long-Term Effects

Natural Hair Serums: • Improve the health of both the hair and scalp over time by delivering real nourishment.
• Can stimulate healthy hair growth, repair damaged hair, and enhance the overall strength and resilience of hair.
• Gentle on the scalp, unlikely to cause irritation, and safe for prolonged use without adverse effects like buildup.
Synthetic Hair Serums:
•Prolonged use can lead to product buildup, as silicones and polymers may not fully wash out of the hair with regular shampoos. This can make hair feel heavy, dull, and greasy over time.
Can block moisture from entering the hair shaft, potentially leading.

11. EVALUATION OF HERBAL HAIR SERUM

11.1 Physical Evaluation:

• **Color:** Pale green color.
• **Odor:** Pleasant.
• **Texture:**Smooth.
• **State:**Semi-solid.
Irritancy: Mark the area (1cm) on left hand dorsal surface. Applied on that area
And time was noted. Then checked irritancy.
Wash Ability:A small amount of serum was applied on hand and wash withTapped water.
pH Test : The pH meter was calibrated using pH 4 and pH 7 buffer solutions. Then, the electrode was soaked in the hair serum and left until the pH normalized after a few minutes.
Viscosity: viscosity of serum was measured by Brooke field viscometer at a Temperature of 25˚C
Homogeneity Test:A clean and dry object glass was smeared with the hair Serum, and a cover glass was sealed. The appearance under the light of some coarse Particle/homogeneity was investigated. Herbal hair serum was tested by visual Examination for homogeneity and tested for some lumps, flocculates, or aggregates.

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Spread ability: Spread ability was measured by a parallel plate process typically Used to assess and measure the spread ability of semi-solid preparations. One gram Hair serum was pressed between two horizontal plates of dimension 20× 20 cm, the Upper of which weighed 125 g. The spread diameter was measured after 1 min.

Spread ability was calculated using the following formula:

$$S = M \times L / T$$

Where:
S= Spread ability,
M= Weight in the pan (tied to the upper slide),
L= Length moved by the glass slide, and
T = Time (in sec) taken to separate the slides completely.

Stability
The herbal hair serum was kept for three months at two separate temperatures of 4 ± 2 °C and 30 ± 2 °C, with 65 RH. Compared with the original pH and density, the pH And density of the herbal hair serum were determined after three months

11.2 PHYSIOCHEMICAL EVALUATION OF FORMULATION

Sr.no.	PhysiochemicalParameters	Observations
1.	Colour	Pale green colour
2.	Odour	Pleasent
3.	Consistency	Smooth
4.	State	Semi-solid
5.	PH	6.7
6.	Spreadibility	6g.cm/s(good and uniform)
7.	Solubililty	Soluble in many(polar) oils; Also soluble in alcohol
8.	Washibility	Good
9.	No-irritancy	Non-irritant

12. RESULT AND DISCUSSION

Hair serum was prepared and evaluated by above mentioned methods

12.1 **Physical Appearance :-**It was observed that the colour of all the herbal hair serum was pale green with a translucent look, which on the operation was founded to be smooth

12.2 **Homogeneity :-**By visual examination of the looks and presence of any lumps, flocculates, or summations, the produced herbal hair serum was checked for unity. The unity of set serum has been shown to be fine.

12.3 **pH Determination:-**The pH of the entire herbal hair serum was 6.8, which was sufficient for **Stability Studies:-**The herbal hair serum was stable during the exploration time, as these the hair, suggesting that the herbal hair serum was suitable for the hair. serums showed no physical insecurity, and there was no conspicuous difference within the pH ahead and after the study

12.4 **Skin irritation test :-**after we apply on skin no any variety of redness occur .

12.5 **Sensitivity test :-** apply on skin and observed after 10 min no any rashes or itching Occurred.

Conclusion
This research provides guideline on the employment of herbal ingredients on the preparation of Herbal toilet article having minimal or no side effects. All the parameters showed that they'ret Within the boundaries and since all the ingredients added have many advantages, this oil will help In maintaining good growth of hair, turning grey hair to black, protects from dandruff and leads to Lustrous looking hair.

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