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Natural Solutions for Dandruff And Hair Fall: Formulation and Evaluation of Herbal Hair Oil

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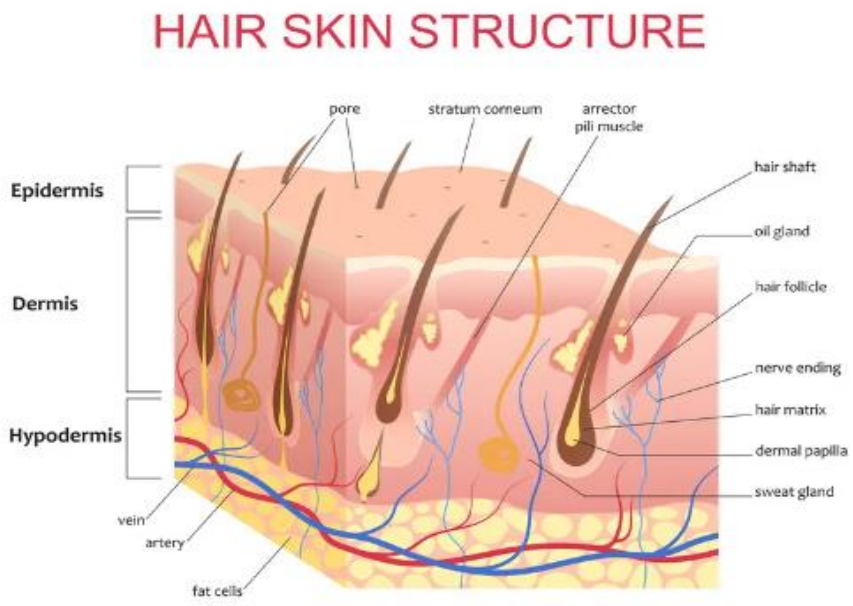
ABSTRACT
Herbal hair oils have been widely used for nourishment and protection of hair and also to treat a variety of hair-related problems to promote healthy hair. The use of chemical medicine may not always bring the desired results as it has negative side effects. Using herbal products, the photochemical and bioactive ingredients work together to achieve the desired results. An unique herbal hair oil formulation is presented in this study that is enhanced with natural extracts such coconut oil, sesame seeds, black seeds, hibiscus flowers, fenugreek seeds, curry leaves, and onion. The objective of this research is to maximize the combined benefits of these botanical elements in order to hydrate the scalp, stimulate hair follicles, and enhance the general appearance of hair. Since the coconut oil serves as a carrier base, the active ingredients are more easily absorbed into the scalp. Extracts from black and sesame seeds are used because they are rich in important fatty acids, vitamins, and minerals, which are believed to promote hair growth and lessen hair loss. Hibiscus helps to revitalize the hair, add luster, and delay the onset of premature greying thanks to its natural antioxidants and aminoacids.The present work was aimed to formulate herbal hair oil that seeks to address a variety of hair problems such as thinning hair, dryness, dandruff, and dullness. The formulated herbal hair oil was evaluated at various parameters such as organoleptic properties,viscosity,saponificationvalue,pHwere determined. For people looking to improve their hair health and maintain shiny, strong, and lovely hair, this research may offer a natural and secure response.

Keywords: Hair**,** Herbal Hair Oil, Dandruff, Hair Loss.

1. Introduction

A noteworthy biological characteristic of human skin is hair. It fulfils a number of goals, including those related to defence, temperature regulation, sensory perception, and aesthetics.Here is more information regarding human hair in detail:
Structure:
Hair Shaft: The portion of the hair that is visible and protrudes above the skin's surface.
Hair Root: The part of the hair embedded in the hair follicle underneath the skin's surface.
Each hair root emerges from a tiny, tube-like structure in the skin called a hair follicle.

Sebaceous Glands: These are glands that are connected to hair follicles and secrete sebum, an oily material that moisturises and lubricates both the skin and hair.



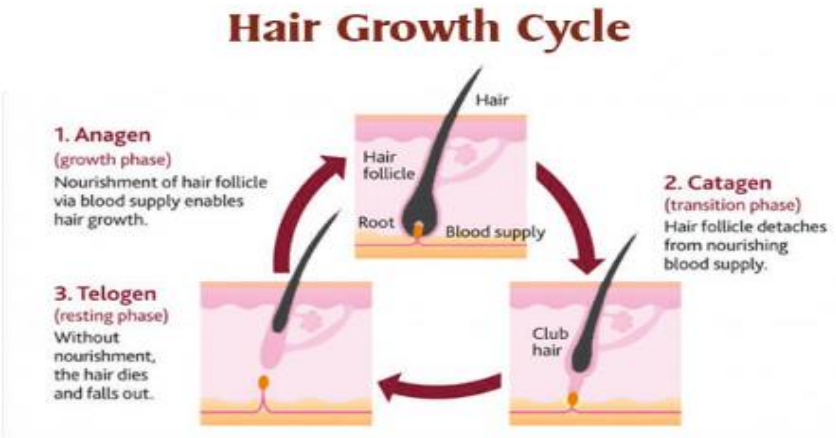
"Figure 1" Human Hair Skin Structure

Keratin,a protein also present in nails and the epidermis of the skin, makes up the majority of the protein that makes up hair.

Melanin, a pigment that determines hair colour, is created by specialised cells at the base of the hair follicle called melanocytes.

Cycle of Hair Growth:

The hair is actively developing during the anagen phase, which is the stage of active growth. Normally, this phase lasts between two and six years. The transitional stage known as the catagen phase is when the hair follicle starts to contract and hair growth slows down. About two to three weeks pass during this time. The hair follicle is quiescent during the telogen phase, which lasts for several months. The cycle then restarts when the old hair is shed after this stage.



"Figure 2" Hair Growth Cycle

Growth of Hair:
Human hair typically grows 1.25 centimetres (about half an inch) per month. Individual growth rates can, however, differ depending on a number of variables, including age, genetics, health, and hormonal effects.

Hair Loss:
Alopecia, another name for hair loss, is a current complaint that impacts both men and women. It happens when hair loses and doesn't regrow typically, performing in thinning or baldness. Treatment results can differ grounded on the underpinning cause of hair loss because there are multitudinous types and reasons of hair loss. There are several different types of hair loss, including a. Androgenetic alopecia and womanish pattern hair loss, the most common type of androgenetic alopecia, is constantly inherited. Men frequently endure a retreating hairline and head thinning, but women frequently witness overall hair thinning. Telogen scrap A lot of hairs enter their resting phase(telogen), fall out in clumps, and also grow back after many months. This condition is known as telogen scrap. Its reasons generally include severe stress, complaint, hormonal changes, or salutary scarcities. Alopecia areata, an autoimmune complaint that causes bald patches to appear on the crown or other corridor of the body. Traction alopecia. Alopecia universalis is a rare kind of alopecia areata that causes complete hair loss, including eyelashes and eyebrows.

Dandruff:
The skin condition seborrheic dermatitis (SD), which only affects the crown and develops short, itchy skin, is related to dandruff. Over half of all grown-ups worldwide are affected by it because it is so wide. Utmost individualities concentrate on the flakes. still, the most uncomfortable adverse goods could be itching.Scratching may worsen vexation and produce a vicious cycle. For some people, stress can complicate or indeed worsen dandruff.

Hair Care:
Hair care is concerned with the cleanliness and cosmetology of hair, which includes scalp hair, facial hair (beard and moustache), pubic hair, and other body hair. Hair care practices vary depending on one's culture and the physical qualities of one's hair. In traditional systems of medicines many plants and herbs are used for hair care. To prevent alopecia, hair loss, dandruff there are treatments with synthetic drugs which are available in markets but for long term use of these drugs may lead to various side effects resulting in the gradual decrease in hair growth and nourishment.A few herbs like fenugreek seeds,hibiscus flower, black seeds, amla, shikakai ,neem etc have natural nutritional values that provides nourishment to hair and also prevent certain types of hair loss,dandruff and other hair related problems like curry leaves are rich in antioxidant,high in protein and beta carotene content which helps for preventing hair loss and thinning of hair similarly hibiscus petals contains amino acids,proteins,carbohydrates which helps to prevent dandruff. Hair oils are the most common process mentioned in many old literatures which include hair oil preparations to treat various dandruff and hair fall process.

Herbal Hair Oil:
Herbal hair oils have been used for generations to treat dandruff and other hair-related problems as well

as to promote healthy hair. The natural plant extracts, herbs, and essential oils used to create these oils are often known for their therapeutic benefits. While herbal hair oils can be beneficial, it's crucial to keep in mind that individual outcomes may vary and that severe hair loss or recurrent dandruff should be discussed with a healthcare provider.

Using herbal hair oils may assist with hair loss and dandruff in the following ways:
Nutrition: The necessary vitamins, minerals, and nutrients found in herbal hair oils frequently nourish the scalp and hair follicles. This nourishing treatment can enhance the condition of the hair as a whole, possibly preventing hair loss and encouraging hair growth.
Blood circulation is increased while applying herbal hair oil to the scalp and massaging it in. Improved blood flow can support the delivery of vital nutrients and oxygen to the hair follicles, encouraging the creation of healthier hair.
Moisturization: Dandruff, itching, and flakiness are all caused by a dry scalp. Natural hair oils for the scalp can help hydrate the skin, reducing dryness and perhaps even dandruff.
Natural antifungal and antibacterial properties: Some herbal oils, including tea tree, neem, and coconut oils, have these qualities. These qualities can aid in the fight against dandruff brought on by bacterial or fungal illnesses.
Tension relief: Massaging the scalp with herbal hair oil may be calming and a great way to relieve tension. Stress reduction may indirectly improve the health of the scalp and hair.
Natural conditioners, such as herbal hair oils, can assist to improve the texture and sheen of hair.
List of ingredients used in the formulation of herbal hair oil are presented in Table 1 .
along with their chemical constituents and uses:

Table No.1: Ingredients Used

Name Of Ingredients	Chemical Constituents	Uses	Figure
Onion: Biological Source:*Alliumpa*Family:Alliaceae	Prtein,carbohydrates,cellulose, minerals, a fixed oil,an essential oil,andmorethan80%waterare all present in onions.	Extra sulphur from onion juice can encourage strong, thickhair,reducing hair loss and encouraging hair development.	
Fenugreek Seeds: Biological Source: *Trigonllafoenum* Family: Leguminosae	Coumarin derivatives (Trigo-coumarin,Trigoforin)and saponin glycoside (Diosgenin, Trigogen-in, Yamogenin, Gitogenin) Pro-lamine, Choline, Protein, Flavo-noids (Quercetin, Luteolin), and Alkaloids (Trigonelline).	Fenugreek hair oil in-creases blood flow and lessens dandruff. Fenu-greek seeds are recog-nized for their abilityto-preventhair loss and dan-druff because of their high protein and nicotinic	

		acid content. Additionally, it regulatesbaldingand hair thinning and addresses hair dryness.	
CurryLeaves: Biological Source:*Murrayakoenigii* Family: Rutaceae	Sterol, alkaloids, flavonoids, and carbs.	Curry leaves are rich inantioxidants,which hydrate the scalp and destroy damaged hair follicles.Curryleaves arealsoadvantageous for hair because of their high protein and betacarotenecontent, both of which are important in preventing hair loss and thinning.	
4.)**Black Seeds:** Biologicalsource: *Nigella sativa Linn* Family: Ranunculaceae	Pyrazoline alkaloid that contains nigellidine and nigellicine, as wellastheisoquinolinealkaloids nigellicimine, nigellicimine n-oxide, and nigellicimine	Enhancing the health ofthehair,decreasing hair loss, minimizing acne, minimizing inflammation, and lowering blood sugar levels	
5.)**Sesame Seeds:** BiologicalSource: *Sesamumindicum Linn.* Famly:Pedaliaceae	Sesame seeds are rich inprotein, vitamin B1, dietary fiber, all eight of the important elements, and are a wonderful source of phosphorus, iron, magnesium, calcium, manganese, copper,and zinc. Along with these essential elements, sesame seeds also contain two unique chemicals called sesamin and sesamolin.	Its high omega fatty acid concentration stimulateshairgrowth and feeds the roots. Additionally,itaidsin hydrating the scalp and enhances blood flow, regenerating the hair follicles. Additionally,sesame seeds possess anti- aging qualities that mightstrengthenhair and possibly prevent or delay greying.	

6.) **Hibiscus Petals:** Biological Source- *Hibiscus rosasinensis* Family - Malceae	Tannins, anthraquinones, quinines, phenols, flavonoids, alkaloids, terpenoids, saponins, cardiac glycosides, protein, free amino acids, carbohydrates, reducing sugars, mucilage, essential oil, and steroids are amongthechemicalcompounds present.	Root your hair strands firmly. The active ingredients that nourishyourscalpand hair roots include flavonoids and amino acids that may be found in hibiscus flowers and leaves. encourages hair growth. deeply hydrates the hair strands. Prevents Dandruff & Scalp Itching. prevents hair from aging. Stops one from going bald.	
7.)**CoconutOil [Carrier Oil]:** Biological Source: *CocosnuciferaLinn.* Family:Palmae	The fatty acids that make up coconut oil are caprylic acid (8%),capricacid(7%),lauric acid (49%), myristic acid (8%), palmitic acid (8%), stearic acid (2%),oleicacid(6%),and2%of linoleic acid.	Preventing breaking and hydrating your hair. Protecting your hair from damage and protein loss when wet. Maintaining your hair from environmental hazards including smoke, wind, and sunlight.	

Materials and Methods:

Materials:

We brought the onion,sesame seeds,black seeds,fenugreek seeds and coconut oil from a local trader and for fresh leaves of hibiscus petals and curry leaves were gathered from the premises of St. Wilfreds Institute of Pharmacy and the surrounding localities.

Materials used:

Figure.3: Onion

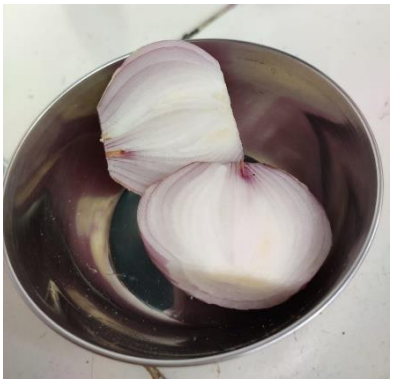


Figure.4:FenugreekSeeds

Figure.5:Curry leaves

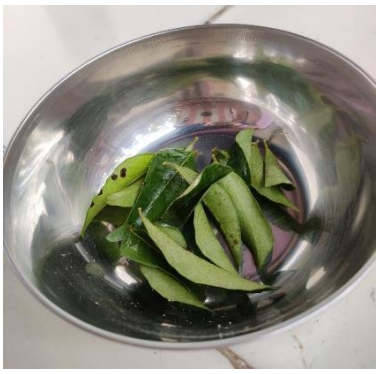


Figure.6:BlackSeeds

Figure.7:Sesame Seeds

Figure.8:Hibiscus Petals

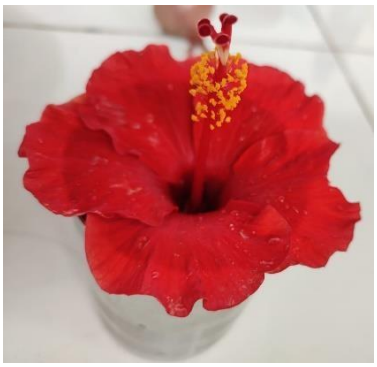
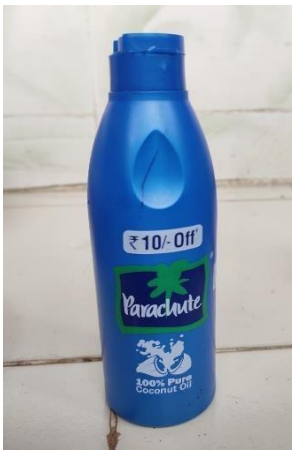


Figure.9:Coconut Oil



FORMULATION OF HAIR OIL:

Table 2: FORMULATION TABLE:-

Sl No	Ingredients:	Quantity [%]
1	Onion	15%
2	FenugreekSeeds	10%
3	Curry Leaves	5%
4	BlackSeeds	10%
5	SesameSeeds	10%
6	HibiscusPetals	5%
7	CoconutOil[CarrierOil]	45%

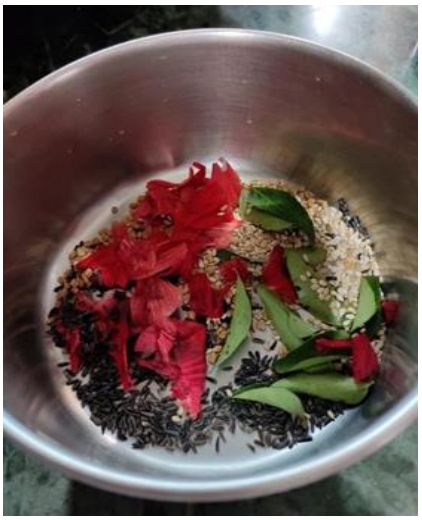
By using the direct boiling method in which the crude drugs were powdered,weighed and directly boiled in coconut oil with continuous stirring and heating until the drug had completely extracted in the oil base.

Procedure followed for the preparation of hair oil:

1. The onion should be peeled and cut into small pieces to get rid of any dirt or impurities, rinse the fenugreek seeds, curry leaves, black seeds, sesame seeds, and hibiscus petals.
2. Roughly chop the seeds and petals:
3. Add the fenugreek seeds, black seeds, sesame seeds, and hibiscus petals to a blender or food processor.

4. Pulverize the mixture to a coarse powder. You can add a little water to help with blending if necessary.

Figure.10



Juice from an onion:

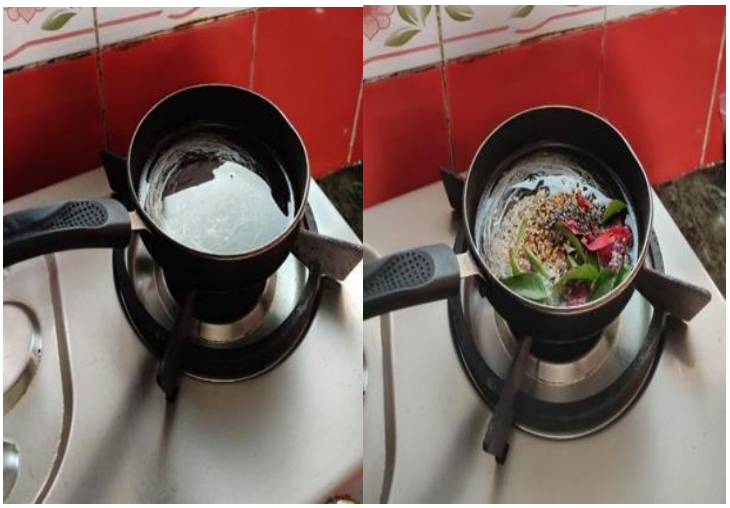
1. In the food processor or blender, add the diced onion. Blend the onion until it becomes a silky, juicy paste.
2. Squeeze the juice from the onion paste using a cheesecloth or strainer. Discard the pulp after collecting the juice in a different container.

Figure.11

Blend coconut oil: Coconut oil should be added to a pan along with fresh curry leaves.

1. For around five minutes, heat the oil on low flame. Curry leaves will be able to release their flavour into the oil due to the heat.
2. Stir carefully before adding the hibiscus and pulverized seed combination to the pot. Incorporate everything in the pot after adding the onion juice.
3. Cook the mixture:

Figure : 11



1. In order to prevent the oil from boiling, keep heating it on low flame for an additional 5–10 minutes.
2. To keep it from sticking to the pan's bottom, stir the mixture every so often.

Figure.13

Cool and strain:

1. When the oil has finished infusing, remove the pan from the heat and allow it to cool to room temperature.

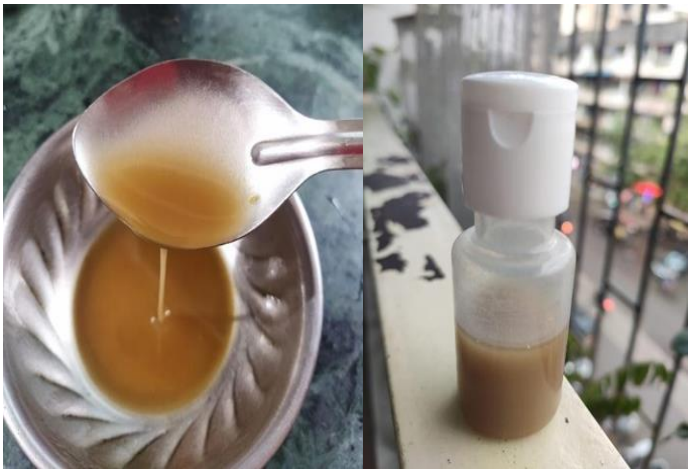
Figure:14

1. Once the oil has cooled, pour it through cheesecloth or a sieve into a clean, dry glass bottle or container. Extract as much oil as you can from the herbs by pressing them.

Storage:

The herbal hair oil should be kept in a tightly-sealed container and kept out of direct sunlight in a cool, dry location. Before usage, let the oil remain for a day or two to maximize the benefits of the herbal infusion.

Figure.15



EVALUATION TESTS:

Organoleptic Properties:

- Colour: Visible to the naked eye
- Odour: Was observed.
- Grittiness: Gently rub over the skin and observe it.
- Sedimentation: The prepared preparation is kept aside for over night to check sedimentation.

Acid value:

Preparing the 0.1 molar solution KOH pellets weighing 0.56 g were dissolved in 100 mL of distilled water while being constantly agitated. The burette was filled with the prepared 0.1 molar KOH solution. Preparation of the sample:10ml of oil was measured ,and diluted with 25ml of ethanol and 25 ml of ether mixture and was shackled. 0.1 molar KOH solution was used to titrate after adding 1 ml of phenolphthalein solution.

Saponification value:

A conical flask with a volume of 250 mL was filled with 1 mL of oil that had been precisely weighed, followed by 10ml of a mixture consisting of a 2:1 ratio of ethanol and ether.25ml of 0.5 N alcoholic KOH was added to this flask, which was then kept at room temperature for 30 minutes and allowed to cool. Using phenolphthalein indicator, the solution was titrated against 0.5 N HCl after cooling. Similar to the sample titration, no oil was utilized for the blank test. Calculated KOH use was measured in mg.

Specific gravity:

Take the bottle with the specific gravity, rinse it with distilled water, dry it in the oven for about 15 minutes, let it cool, and place a cap on it, and weigh it. Now add the sample to the same specific gravity bottle, close it with a cap, and weigh it again. Subtract the weight to get the sample weight per ml.

Phytochemicalscreeningofherbalhairoil:
The prepared herbal oil underwent qualitative chemical analysis to identify numerous plant main constituents like sulphur, ascorbic acid, and saponins using various techniques.

Test for Sulphur:
Hydrogenperoxideshouldbesprayedordroppedontothetestpaperforthesulphurtest.When exposed to fumes, the paper turns brown in colour.

Saponin test:
Oil and water are mixed in a test tube and is shaken to create stable froth.

pH:
Measure the pH of herbal hair oil using a digital pH meter. The ideal pH range for hair oils is around 4.5 to 6.5.

Sensitivity:
Apply the product to the skin and expose it to sunlight for about five minutes.

Viscosity:
A fluid's resistance to deformation carried on by tensional or compressive stress is measured by its viscosity. Completely clean the viscometer. Install the viscometer upright on a suitable stand. Dry viscometer that has reached the g mark. Measure the time it takes a sample of hair oil to travel from point A to point B. Measure three times. Find out the densities of the liquids. The viscosity was determined using Ostwald's viscometer.

Refractive Index:
Before obtaining readings, the temperature of the refractometer was modified and the oil sample was applied to the polished prism. After the measurements were complete, the prism was cleaned with hot water. The readings were corrected.

StabilityTest:
Store the hair oil samples at different temperatures [room temperature, refrigeration, and elevated temperature] and assess their stability over time.

Microbial Load Analysis:
Perform microbial load analysis to ensure the hair oil is free from harmful bacteria, fungi, and other microorganism.

Table 3: OBSERVATIONS AND RESULT

Sr.No.	Evaluation Tests	Result
1.	Organoleptic Properties:	
1.1	Colour	Dark Yellow to Brown
1.2	Odour	Characteristic
1.3	Grittiness	Smooth
1.4	Sedimentation	No Sedimentation
2.	Acid value	4.5

3.	Saponification value	25.33
4.	Specific gravity	0.85
5.	pH	6.5
6.	Sensitivity	No irritation
7.	Viscosity	0.93
8.	Refractive Index	1.32
9.	Microbial Load Analysis	Not Found

Table: 4: PHYTOCHEMICAL SCREENING OF HERBAL HAIR OIL:

Sr. No.	Tests	Observations	Result
1.	Ascorbicacid	Yellow colour turns blue	Present
2.	Sulphur	Brown colour appeared	Present
3.	Saponin	Appearance of foam	Present

CONCLUSION:

The formulation of herbal hair oil using onion, fenugreek seeds, curry leaves, black seeds, sesame seeds, hibiscus petals, and coconut oil shows promising potential for addressing dandruff and hair fall problems. The evaluation tests will provide valuable in sights into its efficacy and safety, making it a viable natural solution for hair care. Further research and clinical trials may be conducted to establish its commercial viability and widespread option

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