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Formulation of Natural Hair Oil by Propagation of Fenugreek Seed in Aloe Vera Leaf

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Abstract

Hair plays a vital role in human life. Hair is an epidermal derivative, which is an essential part of increasing the body's overall elegance. Hair fall, dandruff, split ends, and grey hair are a few problems involved with hair faced by humans. To overcome these, human takes many measures by applying cosmetics for each. Hair oil is used to solve almost all of these problems. The present research has been undertaken to formulate and evaluate the pure herbal oil formulation by propagation of dried fenugreek seed (Trigonella foenum-graecum) in Aloe vera leaf ((Aloe barbadensis). In the process of formulating specialized hair oil, fenugreek seeds are subjected to a unique propagation method within the confines of an aloe vera leaf. Then dry sprouted fenugreek seed for 24 hr. After that, it is boiled with coconut oil in a water bath. The developed hair oil evaluated, encompassing key parameters such as pH, specific gravity, viscosity, irritation and sensitivity tests, as well as assessments of acid value, saponification value, and anti-dandruff and anti-fungal properties. Good results of hair growth were seen in the formulation. Herbal hair oil has minimal or no side effects. All the evaluation values showed that they were within the acceptable limit. As well as this hair oil shows satisfactory anti-microbial and anti-fungal activity. the formulated hair oil demonstrates superior efficacy, promoting robust hair growth, offering effective dandruff protection, and imparting a glossy and lustrous appearance, surpassing the effects of the marketed formulation.

Keywords: Sprouted Fenugreek Seed in Aloe Vera gel, herbal Hair oil, anti-fungal

Introduction

Traditional health care system relies on herbal medicines, and the World Health Organization has already recognized its contribution to tribal communities. Medicinal herbs can be procured easily from nature, and these natural products are assumed to have minimum side effects. Herbal drugs obtained from plants are considered much safer in treating various diseases[1].

Hair plays an essential role in human life. Hair is an epidermal derivative, one of the vital parts increasing the overall elegance of the body. Hair is a protein filament that grows from follicles found in the dermis. Apart from areas of glabrous skin, the

human body is covered in follicles that produce thick terminal and fine vellus hair. Hair follows a specific growth cycle with three distinct and concurrent phases: anagen, catagen, and telogen phases; all three co-occur throughout the body. Hair has various functions in humans, such as protection against external factors, sebum, apocrine sweat, pheromones production, and thermoregulation[1, 2, 3, 4,5,6,7].

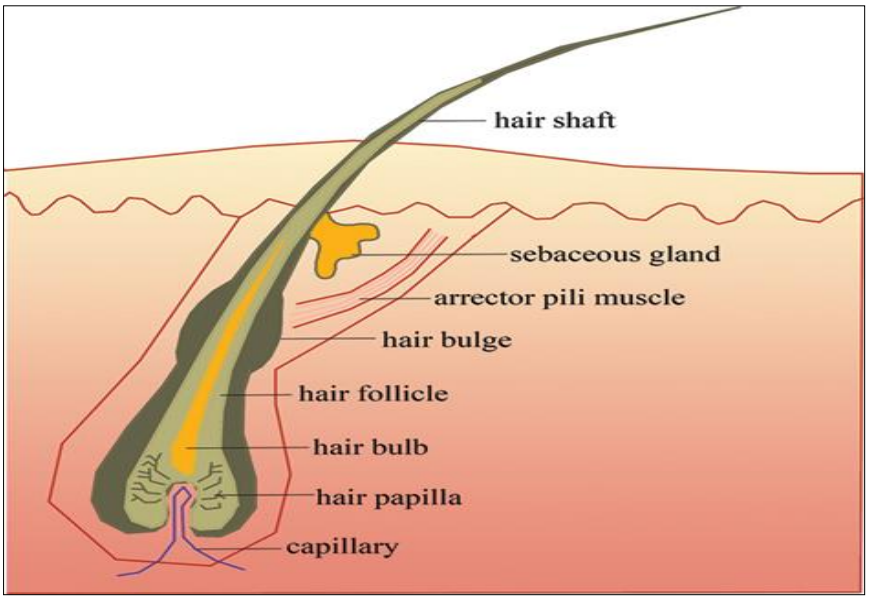

Figure No.:1 Hair filament

There are some significant problems with hairs, like [4].

- ✓ Hair Loss (Alopecia)
- ✓ Dry Hair
- ✓ Dull Hair
- ✓ Spit Ends
- ✓ Hair Damaged
- ✓ scalp infections

Nowadays, many people face significant problems related to hair. To overcome these, humans take many measures by applying cosmetics to hair. Hair oil is used to solve almost all of these problems. Hair oil moisturizes the scalp and reverses dry scalp and dry hair condition. It provides numerous essential nutrients required to maintain normal functions of the sebaceous gland and promote natural hair growth. Keeping this point in consideration, the present work was undertaken. Herbal hair oil is preferred and is used in many ailments. They promote hair growth, improve hair's elegance, and prevent hair fall. Hair oil encourages hair growth and provides moisture to the scalp, rendering beautiful hair. The present work aimed to prepare and evaluate natural hair oil by propagating fenugreek seed in aloe vera leaf and containing herbs, like curry leaves, in coconut oil. All these herbs have well-known traditional potential in the treatment of hair care. Propagation refers to the process by which an organism grows from a seed or a spore.

The most common forms of germination include a seed sprouting to form a seedling and the formation of a sporeling from a spore. Propagation is an effective processing method for improving nutritional quality, boosting the level and digestibility of free amino acids and available carbohydrates, increasing mineral bio-availability, and improving the functional properties of cereal and pulses [5, 6,7,8,9.]

Table no – 1 Introduction of Herbal drug

Sr no.	Herbal drug	Images	Biological Source	family	Chemical Constituents	Hair related uses
1	Sprouted Fenugreek seed [11,12,13, 14, 15]		It consists of dried ripe seeds of Trigonella foenum-graecum	Legumino sae	Highest saponin (4.63 g/100 g) and protein (43.8 g/100 g), polyphenols, anti-oxidant, fenugreek seed itself contain carbohydrates (45–60%) as in mucilaginous fiber (galactomannans), proteins (20–30%) enriched in tryptophan and lysine, lipids (5–10%) or fixed oil, flavonoids and saponins.	anti-inflammatory, anti-fungal, anti-hair fall, and anti-dandruff, treating a variety of scalp issues like dryness of hair, baldness, and hair thinning, moisturizing the hair
2	Alovera[11, 17,23,23,24,25, 27,28]		Aloes are obtained from the dried juice of the leaves of Aloe barbadensis	Asphodel aceae	Aloe vera contains 75 potentially active constituents, vitamins, enzymes, minerals, sugars, lignin, saponins, salicylic acids and amino acids, vitamins A (beta-carotene), C and E, and anti-oxidants. It also contains vitamin B12, folic acid, and choline.	Aloe vera has long been used for treating Alopecia. It also soothes the scalp and conditions hair, is an Anti-dandruff agent,
3	curry leaves[11,17,26 ,30]		Dried leaves of Murraya koenigii	Rutaceae	βpinene, α-pinene, linalool, α-eudesmol, p-cymene, γ-terpinene, α-amorphene, allo-ocimene, sabinene, γterpinene, linalyl acetate, myrcene, β-eudesmol, carvone, limonene, β-elemene, α-terpineol	Curry leaves are rich in anti-oxidants. These anti-oxidants moisturize the scalp and also remove dead hair follicles. Apart from that, curry leaves are beneficial for the hair since they are high in beta-carotene and protein content, which are instrumental in preventing hair loss and thinning of hair
4	Coconut oil[1,6,10,20,12,1 3,18,24,28]		Coconut oil is expressed from the dried solid part of the endosperm of coconut Cocos nucifera	Arecaceae	fatty acids, caprylic acid C -8:0 (8%), capric acid, C-10:0,(7%), lauric acid C-12:0, (49%), myristic acid C-14:0(8%), palmitic acid C-16:0 (8%), stearic acid C-18:0 (2%), oleic acid C-18:1 (6%) and 2% of C-18:2 linoleic acid.	Help to prevent a dry, flaky scalp and dandruff, as well as split ends and hair breakage. Moisturize and seal hair, Protect your hair from protein loss and damage when wet and protect your hair from environmental damage like wind, sun, and smoke.

Materials and Methods

Collection of Plant Materials

Raw materials were collected from the Medicinal Plant Garden of SVERI'S College of Pharmacy Pandharpur Maharashtra, India, to prepare herbal hair oil. They were properly authenticated in the Department of Pharmacognosy.

Formulation of hair oil

First step

Sprouting of fenugreek seed

First, Cut a fresh leaf of aloe vera into two parts and sprinkle 10 gm of fenugreek seeds between the leaves. After that, Tie the aloe leaf with a thread loosely, as it ensures the fenugreek seeds are in content with aloe vera gel. Keep it for about 48 hours to make the seeds become sprouted. Then, take the seeds into a plate and dry them under the sun until they dry.

Second step

Make a fine powder of Sprouted dry fenugreek seed by using the grinder. Then add it to 50 ml of coconut oil with small pieces of 3 gm fresh curry leaves and directly boil it in the water bath with continuous stirring and heating until the active constituents have entirely extracted from the oil base. Then, it was kept as it was for 24 hr and placed in a glass bottle.

Evaluation Parameters

The formulated herbal hair oil was subjected to physical evaluation.

Sensitivity test: The prepared hair oil was applied on the 1cm skin of the hand and exposed to sunlight for 4-5 minutes.

Biological evaluation Primary skin irritation test

The prepared formulations were assessed for primary skin irritation tests. Healthy human volunteers were selected for the study. The hair of each volunteer 1cm2 was shaved which could accommodate three test sites. It was cleaned with surgical spirit. The formulations were applied over the respective test sites and observed for erythema and edema for 48 hours after application.

Specific Gravity: Take the specific gravity bottle and rinse it with distilled water. Dry it in the oven for 15 minutes, cool it, close it with a cap, and weigh it (a). Now, fill the same specific gravity bottle with the sample & seal it with a lid, and again weigh it (b). Determine the sample weight per milliliter by subtracting the weight (b-a).

Viscosity: It is an index of the resistance of a liquid to flow. The higher the viscosity of a liquid, the greater the resistance to flow. The viscosity was determined by using Ostwald's viscometer.

pH: A pH meter determined herbal hair oil's pH. Acid value: Preparation of 0.1M KOH solution: Weigh 0.56 g KOH pellets, dissolve in 100 ml of distilled water, and stir continuously. Prepared 0.1M KOH solution was filled in the burette.

Preparation of sample: Measure 10 g of oil sample, dissolve in 25 ml ethanol & 25 ml ether mixture, and shake. Add 1 ml of phenolphthalein as an indicator. And titrate with 0.1M KOH solution. Acid value = 5.61V*N/ W Where V = Volume of potassium hydroxide used (ml). N =

Normality of potassium hydroxide. W= Weight of sample (g)

Saponification value

Accurately weigh 1g of oil sample into a 250ml conical flask and 10ml of ethanol: ether mixture (2:1) was added. To this flask, 25ml of 0.5N alcoholic KOH was added. Keep the flask for 30 min for reflux, then cool the flask. The cooled solution was titrated against 0.5N HCL solution using phenolphthalein as an indicator (a). Similarly, blank titration was performed without taking an oil sample (b). The amount of KOH in mg used was calculated. Saponification value = 28.05 *(b-a) /W Where, b= ml of KOH required for blank a= ml of KOH needed to neutralize the substance. W weight of the sample (g).

Anti-oxidant activity

DPPH radical scavenging test: One ml of oil solutions (20, 30, 40, 50, and 60 µg/ml. in acetone) was added to one ml of DPPH solution (0.2mM in acetone). After a 30-minute reaction at room temperature, the absorbance of the solution was measured at 517nm. The Anti-oxidant activity of the oil is measured against ascorbic acid as standard [7]

Anti-dandruff activity

The anti-dandruff activity of herbal hair oil was studied by well diffusion and broth dilution assay.

Well diffusion assay

Isolates from the dandruff were inoculated by swabbing on the surface of gelled media plates. Wells of 6 mm in diameter were performed in the PDA media, and each well was filled with 50 µl of various concentrations of polyherbal hair oil. The plates were kept in laminar air flow for 30 minutes for proper extract diffusion and then incubated at 37º C for 3 - 5 days. The radius for the zone of inhibition was measured in millimeters and recorded against the corresponding concentration.

Broth dilution assay

Broth dilution assays are the standard method used to compare the inhibition efficiency of the anti-dandruff agents. 5 ml of the potato dextrose broth, 0.1 ml of the culture (grown for 24 hrs), and the polyherbal hair oil was added in the culture tubes. The tubes were incubated at 37º C for 24 h. The optical densities were measured spectrometically at 600 nm 9. The percentage of inhibition was calculated by using the following formula.

% of inhibition= Control OD – Test OD / Control OD*100

OD= Optical Density

Results and Discussions

Table No. 2: Result

Sr. No.	Evaluation Parameter Inference	Inference
1	Sensitivity test	Nonsensitive
2	Biological evaluation Primary skin irritation test	Non-irritant
3	Specific Gravity	0.944
4	Viscosity	0.92 cp
5	pH	7.8
6	Acid value	4.68
7	Saponification value	192.25
9	Color	Yellowish
10	Odor	Characteristic
11	Grittiness	smooth

Herbal hair oil is one of the most recognized hair treatments. Herbal hair oil moisturizes the scalp and reverses dry scalp and dry hair condition. It provides numerous essential nutrients required to maintain the normal function of sebaceous glands and promotes natural hair growth. The present study on the propagation of fenugreek seed in aloe vera leaf resulted in significant changes in bioactive components and anti-oxidant activity. The various parameters like Colour, Odour, Specific gravity (density), pH, Viscosity, Saponification value, Acid value, and irritation test herbal hair oils were evaluated (Table 2).

The formulated herbal hair oil was subjected to evaluate the anti-dandruff activity against M. furfur by agar well diffusion and broth dilution assay, which are given in Tables No. 3 and 4. The anti-dandruff activity by agar diffusion method was measured as the diameter of the zone of inhibition. It exhibited good anti-dandruff activity against M. furfur. The zone of inhibition was observed as 20 mm, and the lowest anti-dandruff activity was observed for commercially available anti-dandruff hair oil (13 mm). It is also confirmed by broth dilution assay that the maximum inhibition percentage (75 %) was observed in formulated hair oil, and commercial anti-dandruff percentage of inhibition was (52 %).

Table No.3: Anti-dandruff activity of herbal hair oil against M. furfur by agar well diffusion

Sr. No.	Test solution	Zone of inhibition
1	Formulated herbal hair oil	20 mm
2	Commercial anti-dandruff oil	13 mm

Table No.4: Anti-dandruff activity of herbal hair oil against M. furfur by broth dilution Assay

Sr. No.	Test solution	% of inhibition
1	Formulated herbal hair oil	75
2	Commercial anti-dandruff oil	52

The prepared formulated hair oil showed good anti-oxidant activity compared to standard (ascorbic acid). Our results revealed that the anti-oxidant capacity of the herbal hair oil is comparable to the anti-oxidant activity of Ascorbic acid. Although various methods are available for measuring anti-oxidant activity, we used the DPPH method as the standard. Our study showed that herbal hair oil shows good anti-oxidant activity, as shown in Table No. 5

Table No.5: Anti-oxidant test

Drug With Acetone Concentrations(µl/ml)	Absorbance	% Radical scavenging activity
20	0.235	32.25
30	0.340	45.68
40	0.360	59.49
50	0.412	57.78
60	0.446	62.55
Standard (Ascorbic acid)	0.07	89.67

Conclusion

All the values in the evaluation of finished hair oil showed that they were within acceptable limits. Due to the propagation of fenugreek seed in Aloe Vera Leaf, the present study resulted in significant changes in bioactive components and showed good anti-oxidant and anti-dandruff activity. Hence, it is concluded that the oil is beneficial in maintaining good growth of hair, treatment of alopecia, moisturizing the hair, treating splitting of hair, providing protection from dandruff, and resulting in lustrous-looking hair.

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