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Research Article

Formulation and Evaluation of Herbal Shampoo

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ABSTRACT

Using natural ingredients, such as fenugreek (*Trigonella foenum-graecum*), hibiscus (*Hibiscus rosa-sinensis*), aloe vera, reetha (*Sapindus mukorossi*), and neem (*Azadirachta indica*), the current study attempts to create and assess a herbal shampoo. The product was created to offer a safe, efficient, and environmentally responsible substitute for store-bought synthetic shampoos. Every component was chosen for its shown advantages in hair care: fenugreek for dandruff prevention and nourishing, hibiscus for hair growth stimulation, aloe vera for conditioning and moisturizing, reetha for natural cleansing, and neem for potent antibacterial properties. Standard cosmetic formulation techniques were used to make the shampoo, while maceration and decoction processes were used to acquire the extracts of the chosen herbs. Important factors such as appearance, pH, surface tension, foaming ability, wetting time, cleansing action, viscosity, and stability were assessed for the final product. According to the findings, the shampoo had a pH between 6.0 and 6.5, exceptional foaming qualities, a decent cleansing effect, outstanding stability, and a nice scent. According to the study's findings, the polyherbal shampoo has a lot of potential as a natural, cost-effective, and efficient hair care solution that is devoid of artificial additives and dangerous surfactants. Overall results point to the created herbal shampoo as a possible alternative to synthetic formulations because it is stable, safe, and eco-friendly, and it offers great cleansing and conditioning qualities without any negative side effects.

INTRODUCTION

Nowadays, many are worried about their hair because of the rise in pollution, which damages it. Pollutants had detrimental effects on hair, including split ends, roughness, slowed hair development, a loss of sheen, and hair loss.

Shampoo can solve all of these hair issues, however synthetic shampoos, which are composed of chemicals, have negative effects on hair. Natural substances with a natural predisposition to act as cleaners are used in polyherbal shampoos. They have a positive effect on hairs and don't

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cause any negative side effects. Natural substances are beneficial due to their inherent purity¹⁻²

Most likely, shampoos are utilized as cosmetics. It is a hair care product that we use on a daily basis to clean our hair and scalp. Shampoos are a viscous solution of detergents with appropriate additions, preservatives, and active chemicals that are most commonly used as beautifying agents. It is typically massaged into wet hair after application, and then rinsed out with water. Shampoo is meant to remove accumulated dirt from hair without removing a significant amount of sebum. There are several synthetic shampoos on the market today, both medicated and nonmedicated; however, herbal shampoo has gained popularity because it is safer, has less adverse effects, and is of natural origin³⁻⁵.

Synthetic surfactants are added to synthetic shampoos primarily for their cleansing and foaming properties, but prolonged use of these surfactants can cause serious side effects like eye and scalp irritation, hair loss, and dryness of the hairs⁶; herbal formulations are seen as an alternative to synthetic shampoo, but it can be challenging to formulate cosmetics using only natural raw materials⁷. There are many medicinal plants that are said to have positive effects on hair and are frequently used in shampoo formulations⁸; these plant products can be used in their powdered form, crude form, purified extracts, or derivative form⁹.

Goals

1. To create the shampoo using herbs.
2. To assess the shampoo made of herbs.
3. The leaves, fruits, and roots are the components employed in formulation.
4. To lessen the negative impacts of the chemical composition.
5. To enhance the texture of hair.

6. To make the hair color darker.
7. To keep hair manageable and oily while adding gloss to hairs¹⁰

Similar to conventional shampoo, herbal shampoos are cosmetic preparations that use traditional Ayurvedic herbs to cleanse the scalp and hair. They are employed to remove pollutants from the environment, dandruff, oils, and grime, among other things¹¹⁻¹².

The purpose of this study was to create a herbal shampoo and assess and contrast its physicochemical characteristics with those of commercially available synthetic and herbal shampoos in an effort to find a cosmetic product that is both safe and efficient.

MATERIALS AND METHODS

Every plant material was discovered and acquired from the neighborhood market. We bought commercially available shampoos from the neighborhood hyper market.

Plant extract preparation

The necessary amounts of fenugreek, hibiscus, reetha, neem etc., were homogenized and cooked in hot water for four hours after being cleaned under running water to get rid of any extraneous materials. To get semi-solid bulk, the aqueous extract was filtered and concentrated. The same procedure was also used to make aqueous extracts of the remaining components.

The Extraction of Aloe Vera

Aloe vera leaves were used for the gel extraction process, which involved scraping out the mucilage with a blunt-edged knife and eliminating any exudates. To ensure uniformity, this mucilage was aggressively mixed in a blender. A muslin towel was used to strain and filter this solution¹³⁻¹⁴.



Formulation of an herbal shampoo

To create the shampoo whose formula is displayed in Table 1, the plant extracts were combined in various ratios. 10% Aloe vera gel was combined with herbal extracts, and the mixture was shaken for 20 minutes. Additionally, 1 milliliter of methyl

paraben were added while stirring. Ultimately, a sufficient amount of 1% citric acid solution was added to the solution to correct its pH. The produced shampoo was scented with a few drops of rosemary oil, and Aloe vera solution was added to bring the final amount to 100 milliliters.

Table 1 Formulation ingredients used in herbal shampoo

Sr. No.	Ingredients	Biological Source	Quantity (% w/v)	Function
1	Fenugreek seed extract	Trigonella foenum-graecum	10%	Acts as a natural conditioner; reduces dandruff and promotes hair growth
2	Hibiscus flower extract	Hibiscus rosa-sinensis	10%	Stimulates hair growth and adds shine
3	Aloe vera gel	Aloe barbadensis miller	10%	Moisturizer and hair softener; reduces scalp irritation
4	Reetha fruit extract	Sapindus mukorossi	20%	Natural surfactant and cleanser due to saponin content
5	Neem leaf extract	Azadirachta indica	10%	Antimicrobial and antifungal; prevents dandruff
6	Glycerin	—	5%	Moisturizing and conditioning agent
7	Rose essence	—	q.s.	Provides pleasant fragrance
8	Citric acid	-	1%	pH adjuster
9	Distilled water	—	up to 100 mL	Solvent / vehicle

Evaluation of Herbal Shampoo

The produced formulation was assessed for solid content, physicochemical characterisation, pH, and organoleptic characteristics for product performance. Specific tests were carried out using standard protocol for surface tension, foam volume, foam stability, and wetting time to ensure the nature of the goods.

Visual evaluation:

The prepared formulation's color, clarity, odor, and foam content were evaluated.

Determination of pH:

The herbal shampoo's pH after being made with distilled water (10% v/v) was measured at room temperature using a pH tester ¹⁵.

Determination of the solid content:

An evaporating dish was filled with roughly 4g of shampoo solution. By setting the dish on a hotplate, the shampoo's liquid component evaporated. After the dish was completely dried, the amount of solid material left in it was calculated. It was determined by using the formula:

$$\% \text{ of solid content} = \frac{C-A}{B-A} \times 100$$

Where;

A= weight of empty evaporating dish

B= weight of evaporating dish with shampoo solution

C= weight of evaporating dish after evaporation of shampoo solution ¹⁶.

Dirt dispersion:



10 milliliters of pure water are added to the test tube. Later, the test tube is filled with two drops of the shampoo formulation. After that, the test tube is filled with one drop of India ink. After that, the test tube is sealed with a cork and shook ten times. The findings were written using the following ink dispersion levels: None, Light, Moderate, or Heavy¹⁷⁻²¹.

Measurement of surface tension:

Using a stalagmometer at room temperature, the surface tension of the shampoo made with 10% w/v pure water was measured²¹.

Foam ability and stability of foam:

The cylinder shake method is used to examine the foaming capability and foam stability. This method uses 50 ml of 1% shampoo solution was filled in a 250 ml graduated cylinder, and the cylinder was manually covered. After then, the

cylinder is shook ten times. For four minutes, the volume of the foam that formed as a result of shaking is measured every minute¹⁸⁻²².

Wetting time:

Wetting ability of a surfactant, which is dependent on surfactant concentration, must be computed in order to test the shampoo's effectiveness. The canvas disc method, which is effective, quick, simple, and dependable, is used to assess the shampoo's wetting capacity. The prepared shampoo displays a wetting time of roughly 120 seconds. The maximal wetting time indicates that there are less detergents in the shampoo²³.

Rheological evaluation:

The Ostwald Viscometer was used to measure the shampoos' viscosity. The ten times' viscosity. The foam's estimated ink content was None, Light, Heavy or moderate²⁴⁻²⁷.

Table 2 Evaluation of herbal shampoo

Parameter	Formulated Herbal Shampoo	Commercial Synthetic Shampoo	Inference
Color	Light brown (natural hue)	Artificially colored (blue/green)	Herbal shampoo maintains natural appearance
Odor	Pleasant herbal fragrance	Perfumed chemical scent	Herbal fragrance more acceptable and milder
Consistency	Smooth and homogeneous	Thick and gel-like	Both acceptable; herbal has natural viscosity
pH (10% solution)	6.3 ± 0.1	7.1 ± 0.2	Herbal shampoo is more scalp-friendly (near natural pH)
% solid content	22.72	25.7	Herbal shampoo is washed out easily
Foaming ability and stability	155	175	Slightly lower foam but adequate cleansing
Surface tension	31.8 dynes/cm	30.5 dynes/cm	Both effective cleansers
Wetting time	27 sec	24	Comparable wetting ability
Dirt dispersion	No dirt in foam	Slight dirt in foam	Herbal shampoo disperses dirt efficiently
Rheological evaluation	2450 cps	2600 cps	Ideal viscosity for good flow and spreadability

RESULTS AND DISCUSSION:

The manufactured polyherbal shampoo, which contained Fenugreek, Hibiscus, Aloe vera, Reetha,

and Neem, was tested for several physicochemical and performance criteria. The results are shown in Table 2.



The prepared herbal shampoo demonstrated excellent cosmetic and functional properties. The pH (6.3) is comparable to the natural pH of hair and scalp, reducing irritation. The foam height and stability validated the cleansing power of Reetha's natural saponins. Aloe vera and Fenugreek provided good conditioning and moisturizing properties, while Neem protected against dandruff and scalp infections.

The reduction in surface tension (31.8 dynes/cm) demonstrated excellent cleansing and emulsifying action. The viscosity (2450 cps) provided good spreadability and consumer acceptance.

Overall, the findings indicate that this polyherbal shampoo has efficient cleansing, conditioning, and antibacterial qualities, making it an appealing natural alternative to commercial shampoos.

CONCLUSIONS

The current study effectively developed and tested a polyherbal shampoo containing Fenugreek, Hibiscus, Aloe vera, Reetha, and Neem extracts. The composition was created as an effective, natural, and safe alternative to synthetic shampoos, which can cause scalp irritation and hair damage. The shampoo has desired physicochemical features, including a pH of 6.3 ± 0.1 , steady viscosity, good foaming capacity, and great washing efficacy.

Every herbal component worked in concert to enhance the overall result: Neem provided antimicrobial and dandruff-preventing properties, Fenugreek and Aloe vera provided conditioning and moisturizing effects, Hibiscus encouraged hair growth and added shine, and Reetha served as a natural surfactant. Over a 30-day period, the formulation remained physically stable with no signs of discoloration or phase separation.

As a result, the created polyherbal shampoo has outstanding cleansing, conditioning, and protecting qualities and is a promising, economical, and environmentally friendly hair care product. To make it a standard herbal cosmetic preparation, more research can be done on its long-term shelf life and microbiological stability.

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