

Research Article



Formulation, Evaluation and Comparison of the Herbal Shampoo with Commercial Shampoos

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ABSTRACT

The study aimed to formulate a pure herbal shampoo and to evaluate and compare its physicochemical properties with the marketed synthetic and herbal shampoos. The herbal shampoo was formulated by adding the extracts of *Sapinus indica*, Bhringraj, Shikakai, Amla etc to a Flaxseed solution. Small amount of methyl paraben was added as a preservative and pH was adjusted with citric acid. Several tests such as visual inspection, pH, wetting time, % of solid contents, foam volume and stability, surface tension, detergency, dirt dispersion etc, were performed to determine the physicochemical properties of both prepared and marketed shampoos. The formulated herbal shampoo was clear, light green in color, transparent, good odor and appealing. The PH of the Formulated Shampoo was found in the range of 7.02 ± 0.02 . Formulated herbal shampoo comprises % solid content, Surface tension, wetting time and Viscosity were found to be 22.72 ± 0.02 , 22.63 ± 0.06 , 187 ± 0.02 sec and 15.223 cps. Dirt dispersion of the Formulated Herbal Shampoo was found to be Moderate. Foam ability and stability of the Formulated Herbal Shampoo was found to be good foaming with 12.5ml. Formulated herbal shampoo shows physicochemical properties comparable to the commercial shampoo. However, further research and development is required to improve its quality and safety. The main objective of this study was to eliminate harmful synthetic ingredient from herbal shampoo formulation and substitute them with a safe natural ingredient.

Keywords: Herbal shampoo, Herb Extract, Physicochemical properties, Evaluation.

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INTRODUCTION

Now a day's peoples are conscious about hairs due to increase in pollution hairs get damaged. Pollutants badly effects on hair resulted into split ends, roughness, retarded growth of hairs, loss of shine of hair and hair falls. These all problems of hair are covered by shampoo but in case of synthetic shampoos they are made from chemical constituents shows side effects on hairs.

In case of polyherbal shampoos natural ingredients are involved in it, which having natural tendency as a cleanser. They show a good effect on hairs without showing any side effects on hairs. Natural ingredients useful because of their pure qualities.^{1,2}

Shampoos are most probably used as cosmetics. It is a hair care product that is used for cleaning scalp and hair in our daily life. Shampoos are most likely utilized as beautifying agents and are a viscous solution of detergents containing suitable additives preservatives and active ingredients. It is usually applied on wet hair, massaging into the hair, and cleansed by rinsing with water. The purpose of using shampoo is to remove dirt

that is build up on the hair without stripping out much of the sebum. Many synthetic shampoos are present in the current market both medicated and nonmedicated; however, herbal shampoo popularized due to natural origin which is safer, increases consumer demand and free from side effects.^{3,4,5}

In synthetic shampoos, surfactants (synthetic) are added mainly for their cleansing and foaming property, but the continuous use of these surfactants leads to serious effects such as eye irritation, scalp irritation, loss of hair, and dryness of hairs⁶.

Herbal formulations are considered as alternative to synthetic shampoo but formulating cosmetics using completely natural raw material is a difficult task.⁷

There are large numbers of medicinal plants which are reported to have beneficial effects on hair and are commonly used in formulation of shampoo⁸.

These plant products may be used in their powdered form, crude form, purified extracts, or derivative form.⁹

Objectives

- 1) To formulate the herbal shampoo.
- 2) To evaluate the herbal shampoo.
- 3) The part used for formulation is leaves, fruits and root.
- 4) To reduce side effects of chemical formulation.
- 5) To improve hairs texture.
- 6) To darkening the hair color.



7) To imparting gloss to hair and to maintain their manageability and oiliness for hairs ¹⁰

Herbal shampoos are the cosmetic preparations that with the use of traditional Ayurvedic herbs are meant for cleansing the hair and scalp just like the regular shampoo. They are used for removal of oils, dandruff, dirt, environmental pollutions etc^{11, 12}.

This study was designed to formulate a herbal shampoo and to evaluate and compare its physicochemical properties with the marketed synthetic and herbal shampoo in search of a safe and effective cosmetic product.

MATERIALS AND METHODS

All plant materials were obtained from local market, Guntur. A.P., and were identified. Two commercially available shampoos namely Dove Shampoo and Himalaya shampoo were purchased from the local super market.

Preparation of plant extracts

Required quantities of *Sapinus indica*, Bhringraj, Shikakai, Amla etc., were washed under running water to remove foreign substances, homogenized and boiled in hot water for 4h. The aqueous extract was filtered and concentrated to obtain semi solid mass. Aqueous extracts of remaining ingredients were also prepared by the similar method ¹³.

Preparation of Flaxseed solution

Add the flaxseeds to the water.

Boil this water for around 10 minutes and keep stirring to avoid the flaxseeds from sticking to the base of the utensil.

Turn the stove off when you achieve a gel-like texture, not too dense but not too thin. Let the gel cool down for about an hour while it thickens.

Put the sock in a glass measuring cup, and then empty the gel into it.

Now, squeeze the gel from the stock into the measuring cup in order to strain it.

Formulation of herbal shampoo

The plant extracts were mixed in different proportions to obtain a shampoo whose formula is shown in Table-1. Herbal extracts were added to 10% flaxseed and were mixed by shaking for 20 min. Lemon juice (1 ml) and Methyl paraben were also added with stirring. Finally, the pH of the solution was adjusted by adding sufficient quantity of 1% citric acid solution. Few drops of rosemary oil were also added to impart aroma to the prepared shampoo and the final volume was made to 100 ml with flaxseed solution.

Table 1: Formulation of Herbal Shampoos

S.No	Ingredients	Formulations (100 gms)	Uses
1	<i>Sapindus indica</i>	5 gm	Cleanser, removing head lice
2	Bhringraj	0.5 gm	Promotes hair growth
3	Amla extract	25 gm	Strengthening of hair
4	Shikakai	25 gm	To treat scalp disorder
5	Lemon juice	1 ml	Refreshens the hair
6	Methyl paraben	1 ml of 0.05% solution	preservative
7	Citric acid	Q.S	Balance the pH level
8	Essential oil (rosemary)	0.1 ml	Prevent dandruff
9	Fenugreek seeds	1 gm	Nutrient for hair growth
10	Tulasi	10 gm	Treat skin disorders
11	Flaxseed solution	Q.S to 100 ml	Provides nourishment

Evaluation of Herbal Shampoo

The prepared formulation was evaluated for product performance which includes organoleptic characters, pH, physicochemical characterization, and for solid content. To guarantee the nature of the items, particular tests were performed for surface tension, foam volume, foam stability, and wetting time using standard protocol

Visual assessment

The prepared formulation was assessed for color, clarity, odor, and froth content.

pH determination

The pH of the prepared herbal shampoo in distilled water (10% v/v) was evaluated by means of pH analyzer at room temperature ¹⁴

Determination of solid content:

About 4g of shampoo solution was placed in an evaporating dish. The liquid portion of the shampoo was evaporated by placing the dish on hotplate. Remaining solid content in the dish was calculated after complete drying.



It was determined by using the formula:

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

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.¹⁵

Dirt dispersion:

The test tube containing 10ml of distilled water is added to it. Later two drops of shampoo formulation is introduced to the test tube. Afterwards one drop of India ink is added to the test tube. The test tube is then stopper with the cork and shaken for 10 times. The results had been written from amount of ink dispersed such as None, Light, Moderate, or Heavy^{16,17,18,19}

Surface tension measurement

The prepared shampoo in distilled water (10% w/v) was evaluated for surface tension using stalagmometer in room temperature²⁰

Foaming ability and foam stability:

The foaming capability and foam stability test is carried out by using cylinder shake method. In this technique 50 ml of the 1% shampoo solution was taken in a 250 ml graduated cylinder and covered the cylinder with hand. The cylinder is then shaken for 10 times. The volume of the foam appeared due to shaking is measured after every one minute consecutively for four minutes.^{15,17,18, 21}

Wetting time

To test the efficacy of the shampoo, wetting ability of a surfactant needs to be calculated which depends on the concentration of surfactant¹⁹. For the evaluation of wetting ability of the shampoo, canvas disc method is used which is an efficient, quick, easy, and reliable method. The prepared shampoo shows the wetting time of the about 120 s. The maximum of wetting time shows that the shampoo contains lower amount of detergents.²²

Rheological evaluation

The viscosity of the shampoos was determined by using Ostwald Viscometer. The viscosity of the ten times. The amount of ink in the foam was estimated as None, Light, Moderate, or Heavy.^{23,24,25,26}

RESULTS AND DISCUSSION

Medicinal plants used in the Formulation of Herbal shampoo were found as rich source of novel drugs. These plants were Amla, *Sapindus indica*, Shikakai, Bhringraj, and other ingredients had been reported for hair growth and conditioning. The various quality control parameters like Physical appearance/visual inspection, pH, % Solid contents, Foam ability and Stability, Dirt dispersion, Viscosity were checked. All parameter gives favorable

result. The result obtained on present study shows that the active ingredients of these drugs when incorporated in shampoo gives more stable products with good aesthetic appeal.

Physical appearance/visual inspection

The formulated and marketed shampoos were evaluated for physical characteristics such as color, odor and transparency (Table 2). Our prepared shampoo was transparent, light green and had good odor. No significant difference was observed in terms of odor, transparency and foaming characteristics between commercial and formulated shampoo except for color.

Determination of pH

The pH balance of the product is important as it affects skin and surface on which there are used. The pH of our formulated shampoo falls with the ideal pH range of the shampoo i.e., (between 7 and 5) and are presented in Table 2.

The pH of the shampoo also helps in minimizing irritation to the eyes enhances the qualities of hair and maintains ecological balance of scalp. The pH of the tested commercial shampoos was found within the preferred range.

Percentage solid contents

Good shampoos usually have 20%–30% solid content as it is easy to be applied and rinse out from the hair. If it doesn't have enough solid it will be too watery and wash away quickly, similarly too many solids will be hard to work into the hair or too hard to wash out. The percent solid contents of all the tested shampoo was found within the range of 22–25% and are expected to wash out easily (Table 2).

Dirt dispersion

Dirt dispersion is an important criterion for evaluation of cleansing action of shampoo. Shampoos that cause the ink to concentrate in the foam are considered of poor quality because ink or dirt that stays in foam is difficult to rinse away and gets re-deposited on the hair cleansing action. All shampoo concentrated the ink in the water portion, ensuring their satisfactory cleaning ability and actual effectiveness. The results were shown in (Table 2).

Surface tension

The term indicates the amount of surfactant present in Shampoo to reduce the surface tension. Lesser the surface tension stronger is the cleaning ability of the shampoo. A shampoo is considered of good quality if it decreases the surface tension of pure water from 72.28 dyn/cm to about 40 dyn/cm. All the tested shampoo showed similar reduction in surface tension ranging from 21.63 to 32.33 dyn/cm (Table-2). The reduction in surface tension is an indication of their good detergent action. The formulated shampoo reduced the surface tension to 22.63 dyn/cm which is comparable to marketed Himalaya shampoos



(28.45dyn/cm), , Dove (32.33 dyn/cm) . The results were shown in (Table 2).

Foaming ability and foam stability

One of the essential parameters in evaluating a shampoo is lathering or mostly described as foaming. The formulated herbal shampoo resulted in the formation of small-medium, dense and uniform type of foam. The foam volume remained unchanged during a 5-minute period which suggests that the produced foams have good stability. The results were shown in (Table 2).

Wetting time

The wetting ability of a surfactant is dependent on its concentration and is commonly used to test its efficacy. The canvas disc method is quick, efficient and reliable test to evaluate the wetting ability of a shampoo. The wetting time of three shampoos was found in the order 141 < 157 < 187 sec for Dove, Himalaya and formulated shampoo respectively. It

can be concluded that Dove contains the maximum concentration of detergents because it had the least wetting time by contrast our formulated shampoo exhibited maximum wetting time so, it contains minimum concentration of detergents. The results were shown in (Table 2).

Viscosity

Viscosity has an important role in explaining and controlling many attributes like shelf-life stability and product aesthetics such as clarity, ease of flow, on removal from packing and spreading when applied to hair. The viscosity of the prepared formulations was measured at room temperature using a Brookfield viscometer (R/S plus rheometer model, LV, USA). 100 ml of the tested shampoo was poured in a beaker and an appropriate spindle was immersed into it. Readings were recorded after 5 min. of rotation at a speed of 10 rpm. The results were shown in (Table 2).

Table 2: Physicochemical Evaluation of Formulated and Marketed Shampoo

Parameters	Formulated Shampoo	Dove	Himalaya Shampoo
Color	Light green	White	White
Transparency	Clear	Milky opaque	Clear
Odour	Good	Good	Good
pH	7.02± 0.02	7.25± 0.02	5.72 ± 0.02
%Solid Contents	22.72 ± 0.02	25.72 ± 0.07	25.72 ± 0.01
Dirt Dispersion	Moderate	Heavy	Moderate
Surface Tension (dyne/cm)	22.63 ± 0.06	32.33 ± 0.04	28.45 ± 0.03
Foam producing ability	Yes	Yes	Yes
Foam stability and uniform	Good	Good	Good
Viscosity (mPa.s at RT)	30,000	30,000	50,000
Wetting time(s)	121	131	135

CONCLUSION

The present study was carried out with the aim of preparing the herbal shampoo that reduces hair loss during combing, safer than the chemical conditioning agents as well as to strengthen the hair growth. Herbal shampoo was formulated with the aqueous extract of medicinal plants that are commonly used for cleansing hair traditionally. To provide the effective conditioning effects, the present study involves the use of Shikakai, Amla, and other plant extracts instead of synthetic.

The main challenge lies in selection of natural material which can be rationally justified and comparable to that of synthetic material. In present study our aim is to develop an herbal shampoo which would be completely natural.

We formulated an herbal shampoo by using plant extracts which are commonly used traditionally and lauded for their hair cleansing actions.

All the ingredients used to formulate shampoo are safer than silicones and poly quaterniums synthetic conditioning agents and vis a vis can greatly reduce the hair or protein loss during combing. Instead of using cationic conditioners we have used Shikakai, Amla, and other plant extracts to provide the conditioning effects.

Several tests were performed to evaluate and compare the physicochemical properties of both prepared and marketed shampoos. Our prepared shampoo showed comparable result with that of marketed shampoo for quality control tests but further research and development is required to improve its overall quality.

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