

Formulation and Evaluation of Herbal Shampoo from Hibiscus Plant Leaves

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Abstract

The aim of this present study is to prepare and formulate an herbal shampoo and to assess its physiochemical function that emphasis on safety, efficacy, eliminating harmful synthetic ingredient, and substitute with safe natural ingredients. *Emblica officinalis*, *Hibiscus rosa-sinensis*, *Acacia concinna*, *Sapindus indica*, *Eclipta prostrata*, *Aloe barbadensis*, and *Cassia auriculata* extracts were used in varying amounts to formulate the shampoo. Organoleptic, physicochemical, and performance tests were evaluated in terms of visual evaluation, wetting time test, pH, solid content assurance, surface tension, detergency, dirt dispersion, conditioning performance, foam volume, and stability. The cleaner that was produced was transparent and visually pleasing. It showed good cleaning, detergency, froth stability, tiny bubble size, minimal surface strain, and effective conditioning.

Keywords: Herbal shampoo, Hibiscus Plant Leaves, *Eclipta prostrata*, *Sapindus indica*, Evaluation of shampoo.

Introduction

Most likely, shampoos are utilised as cosmetics. It is a hair care product that we use on a regular basis to clean our hair and scalp. Shampoos, which are a viscous solution of detergents with appropriate additions, preservatives, and active substances, are probably used as beautifying agents. Typically, it is applied to damp hair, massaged into the hair, and then rinsed with water to clean. Shampoo is used to get rid of accumulated dirt from hair without removing much sebum. There are several medicated and non-medicated synthetic shampoos on the market today, but herbal shampoo gained popularity owing to its natural nature, which is safer, promotes customer demand, and has no negative side effects {Mainkar and Jolly, 2001; Aghel et al., 2007 and Potluri et al., 2013}.

Synthetic surfactants are included to synthetic shampoos primarily for their cleaning and foaming properties, however prolonged usage of these surfactants can have detrimental consequences such dry hair, scalp irritation, eye irritation, and hair loss {Shinde et al., 2013}. We can use shampoos with natural herbals as an alternative to synthetic ones. However, it is extremely challenging to formulate cosmetics using entirely natural ingredients {Firthouse, 2009}. Many medicinal herbs with possible effects on hair have been utilised for centuries all over the world and are used in the formulation of shampoos {Pooja et al., 2011}. These therapeutic herbs can be utilised as crude, powdered, extracts, or derivatives {Kapoor, 2005}. It is challenging to create a shampoo with just one natural ingredient that would be safer and have a gentler impact than a synthetic shampoo. Additionally, the synthetic shampoo must have

high foaming, detergency, and solid content. As a result, we thought of creating an unadulterated natural cleanser employing a traditional method using frequently used plant material for hair cleaning.

In the present study, herbal shampoo was formulated containing suitable ingredient such as *Hibiscus rosa-sinensis*, *Embllica officinalis*, *Acacia concinna*, *Sapindus indica*, *Eclipta prostrata*, *Aloe barbadensis*, and *Cassia auriculata* in different proportions to formulate and evaluate its physicochemical properties. The pericarp of *S. indica* Poir. (Soapnut), products of *Phyllanthus emblica* (Amla), and units of dried *A. concinna* (Shikakai) have been utilized customarily as old stories framework for purging hair {Khushboo et al., 2010}. Because of its high saponin content, cleanser nut and shikakai produce abundant foam when shaken with water {Srivasuki, 2012}, indicating a foaming effect. *C. auriculata* blooms and amla fruit are used to strengthen hair, stop hair loss, encourage hair growth, and act as an anti-dandruff agent {Roy et al., 2008}. *E. prostrata* leaves (Bhringraj), sometimes referred to as fake daisy in English and Bhringraj in India, are used to encourage hair development and stop hair from becoming grey {Tarun et al., 2014}. *A. barbadensis* and *H. rosa-sinensis* flowers are utilised as conditioning agents.

Material and Methods

Plants

The plant materials required for the present study were obtained from Campus of Oriental College of Pharmacy Bhopal.

Making the extract

Each of the following powdered plant materials *Hibiscus rosa-sinensis*, *Embllica officinalis*, *Acacia concinna*, *Sapindus indica*, *Eclipta prostrata*, *Aloe barbadensis*, and *Cassia auriculata* weighed around 100 g. Distilled water was used to remove the powdered material by boiling it for 4 hours. Each plant material's extract was separated and allowed to evaporate.

Herbal shampoo formulation

The herbal shampoo was made using the recipe listed in Table 1. The herbal extract was added to the 10% gelatin solution and shaken constantly for 20 minutes. Additionally, 1 ml of lemon juice was added while stirring continuously. A appropriate amount of essential oil (rose oil) was added to the formulation to enhance its scent and gelatin was used to get the volume up to 100 ml.

Table 1: Shows Ingredients of the herbal shampoo		
S. No	Materials required	Quantity to be weighed
1	Soap nut extract	0.5 g
2	Amla extract	0.5 g
3	Shikakai extract	0.5 g
4	Hibiscus	0.5 g
5	Bhringraj extract	0.5 g

6	Senna extract	0.5 g
7	Aloe vera	1 g
8	Gelatin	q.s
9	Lemon Juice	q.s
10	Rose Oil	q.s

An assessment of herbal shampoo

The produced formulation was assessed for solid content, pH, physicochemical characterisation, and organoleptic characteristics. Using established methodology, specific tests for surface tension, foam volume, foam stability, and wetting time were conducted to ensure the nature of the goods.

Visual evaluation

The colour, clarity, odour, and foam content of the produced mixture were evaluated.

Determination of pH

A pH analyser was used to measure the produced herbal shampoo's pH in 10% v/v distilled water at room temperature {Badi and Khan, 2014}.

Calculating the proportion of solid content

Weighing around 4 g of shampoo in a dry, clean, evaporating dish allowed us to calculate the proportion of solid content. The process was carried out once more to verify the outcome. The shampoo's liquid component was evaporated in a dish by setting it on a hot plate. After the shampoo had completely dried, the weight and percentage of its solid components were determined {Gaud and Gupta, 2001}.

Measuring surface tension

A stalagmometer was used to measure the surface tension of the produced shampoo in 10% w/v distilled water at room temperature {Mainkar and Jolly, 2000}.

Wetting test

The amount of time needed for the canvas paper to completely sink was used to compute the wetting time {Potluri et al., 2013}. A 0.44 g piece of canvas paper was cut into a 1-inch-diameter disc. The canvas paper disc was placed over the shampoo (1% v/v) surface, and the timer was used to record how long it took the paper to sink.

Test for foam stability

The cylinder shaking method was used to assess the foam's stability. A graduated cylinder with a 250 ml capacity was filled with around 50 ml of the prepared shampoo (1%) solution, and it was forcefully shaken ten times. By measuring the foam volume

of the shake test after one and four minutes, respectively, foam stability was determined {Klein, 2004}. The volume of all the foam was measured.

Test for dirt dispersion

In a test tube with a wide mouth, two drops of cleaner were added to 10 ml of purified water. After sealing the test tube with a stopper, add one drop of Indian ink to the prepared shampoo and mix for ten minutes. After measuring the amount of ink in the foam, the outcome was classified as none, minor, medium, or heavy {Ali and Khandim, 2011}.

Evaluation of conditioning performance

An artificial Indian woman's hair was purchased from a salon and split into two swatches, each weighing five grams and measuring around ten centimetres in length. The test swatch was cleaned using the prepared shampoo, while the control swatch was left unclean. Each tree was introduced for two minutes to a 10:15 shampoo to water mixture in a conical flask, and the mixture was then cleaned with 50 ml of distilled water. The process was repeated a maximum of ten times, with each tree being air dried at room temperature. A blind touch test with 20 randomly chosen student volunteers was used to assess the conditioning effect of the produced shampoo in terms of smoothness and softness {Boonme et al., 2011}. All of the chosen students were asked to touch the hair that had been cleaned with the prepared shampoo in order to score the conditioning effectiveness of the shampoo on a scale of 1–4 (4 - excellent, 3 - good, 2 – satisfactory and 1 - poor).

Results

Herbal shampoo formulation

Equal amounts of the aqueous extracts of each ingredient were combined with soapnut to create the shampoo (Table 1). Phytoconstituents like saponins, a naturally occurring surfactant with detergent and foaming properties, are present in the plant extract mentioned above. Many natural ingredients have good viscosity, which is necessary for an optimal shampoo. The 10% gelatin solution forms transparent solutions by acting as a pseudoplastic. 1 ml of lemon juice is added to the shampoo to act as a chelating agent, natural antioxidant and anti-dandruff agent while preserving the formulation's acidic pH.

Evaluation of formulated shampoo

Physical appearance

Upon visual assessment of the formulation, the manufactured shampoo demonstrated good qualities in terms of appearance and foaming effect. Table 2 shows the outcomes.

Table 2: Shows Description of the ingredients of the herbal shampoo				
S. No.	Common Name	Botanical Name	Parts Used	Category
1	Hibiscus	<i>Hibiscus rosa-sinensis</i>	Leaves	Conditioning agent
2	Amla	<i>Emblica officinalis</i>	Fruit	Anti-dandruff agent
3	Shikakai	<i>Acacia concinna</i>	Powder	Detergent
4	Soapnut	<i>Sapindus indica</i>	Fruit	Detergent

5	Cassia	<i>Cassia auriculata</i>	Leaves	Anti-dandruff agent
6	Bhringraj	<i>Eclipta prostrata</i>	Leaves, Flower	Hair growth
7	<i>Aloe vera</i>	<i>Aloe barbadensis</i>	Leaf	Coolant

pH

At 25°C, the pH of the shampoo solution made with 10% distilled water was measured. The pH of the shampoo is crucial for stabilising the scalp, reducing eye irritation, and boosting and improving the quality of the hair {Baran and Maibah, 1998}. Developing shampoos with a lower pH value is one of the current trends for reducing the harm that shampoo does to hair. Sheen is produced by lowering pH (moderate acidity), which encourages scale tightness and inhibits swelling. Table 2 displays the findings.

Solid Content

High solid content shampoos are quite challenging to rinse and work with the hair. There is 23.25% solid content in the produced shampoo. As a result, while making shampoos with reduced solid material, they were thought to be simple to wash off (Table 2).

Surface Tension

It was discovered that the produced shampoo reduced surface tension by around 32.18 dynes/cm (Table 3). Lowering the surface tension of water from 72.8 dynes/cm to 32–37 dynes/cm is one of the processes in the detergency property, and this will be the marker for a good detergency impact of the shampoo.

Table 3: Shows Physicochemical study of the herbal shampoo		
S. No.	Evaluation Test	Formulated Shampoo
1	Color	Brown
2	Transparency	Clear
3	Odor	Good
4	pH of 10% solution	7
5	Solid Contents(%)	23.25
6	Foam Volume (ml)	25
7	Foam Type	Dense, small
8	Surface Tension (dyne/cm)	32.18
9	Wetting Time (s)	120 s

Wetting Time

The wetting ability of a surfactant, which is dependent on the surfactant concentration, must be determined in order to evaluate the shampoo's effectiveness {Ireland et al., 2007}. The canvas disc method, which is effective, quick, simple, and dependable, is used to assess the shampoo's wetting capacity. The prepared shampoo has a wetting time of around 120 seconds. The greatest wetting time indicates that there are less detergents in the shampoo.

Foaming stability and foaming ability

Foam stability is one of a shampoo's most crucial requirements from the consumer's perspective. Determining foaming stability was a crucial factor taken into account while evaluating the shampoo. The shampoo's formulation produces more than 50 millilitres of foam. The prepared shampoo produces consistent, compact, thick, and stable foam. The foam volume doesn't change over the course of around five minutes, indicating that the shampoo's created foam has strong stability and that the prepared shampoo has higher foam properties, which might be because it contains both shikakai and soapnut {Sarath et al., 2013}.

Test for dirt dispersion

The amount of ink in the foam was assessed in the Indian ink dirt dispersion test, and the outcome was categorised as none, light, moderate, or heavy.

Net content

Before the experiment began, the outside of the bottle was marked at the liquid's surface level. At the conclusion of the experiment, the amount of water needed to fill the bottle to the mark was recorded. The ingredients were put in an open can with the frozen material taking up the container's weight if the formed materials were paste or solid forms, and the net content was recorded.

Performance of conditioning

Table 4 displays the average value that the student reported based on the conditioning performance of the produced shampoo. The control tree, which was not cleaned, had a conditioning performance score of 1.1, while the tree that was cleaned with prepared shampoo received a score of 3.0 out of 4. The shampoo's conditioning effect is good, according to the findings.

Table 4: Shows Conditioning performance of formulated shampoo		
Score	Formulated Shampoo	Control
1	1	16
2	4	4
3	12	0
4	3	0
Average	3	1.1

Conclusion

The goal of the current study was to create a herbal shampoo that would increase hair development, lessen hair loss while combing, and be safer than chemical conditioning agents. The aqueous extract of medicinal herbs that are traditionally used for hair cleaning was utilised to create the herbal shampoo. Protein or hair loss is decreased by using synthetic conditioning agents. In the current study, Shikakai, Amla, and other plant extracts are used in place of

artificial cationic conditioners to produce the desired conditioning results. The primary goal of this study was to create a shampoo that is both stable and useful by eliminating all synthetic ingredients that are often used in these kinds of formulations. Numerous tests were conducted to assess the manufactured shampoo's superior product performance. Further scientific validation is required for the overall quality of the created shampoo, even if the findings of the assessment research showed a comparable result for the quality control test.

ACKNOWLEDGMENT

The authors express their sincere gratitude to **Triveni Digarse**, Assistant Professor, Oriental College of Pharmacy, Bhopal, for her valuable guidance, continuous encouragement, and constant support throughout the completion of this research work. Her insightful suggestions, academic expertise, and motivation greatly contributed to the successful accomplishment of the study. The authors are also thankful to the management and faculty members of Oriental College of Pharmacy Bhopal, for providing the necessary facilities, resources and academic environment required for carrying out this work successfully. Special thanks are extended to family members, friends, colleagues for their encouragement, cooperation, and moral support during the entire research process.

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