



Development And Assessment Of A Polyherbal Shampoo For Treating Dandruff

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ABSTRACT

The study aimed to develop and evaluate a polyherbal shampoo preparation, comparing its physicochemical properties with both herbal and synthetic commercial counterparts. The objective was to create an Ayurvedic shampoo utilizing natural herbs and compounds, aiming for improved efficacy and safety compared to synthetic alternatives. Key components of the formulation included Shikakai, Reetha, and Amla, comprising 10% of the active ingredients. Citric acid was utilized for pH adjustment, while a minimal quantity of methyl paraben served as a preservative.

Various tests were conducted to assess the physicochemical properties of the formulated and commercial shampoos, including visual inspection, pH determination, solid content percentage, foam volume and stability, surface tension measurement, detergency, and dirt dispersion analysis.

The polyherbal shampoo exhibited clarity and visual appeal, along with satisfactory cleansing and detergency performance within five minutes of application. Additionally, it demonstrated low surface tension, small bubble size, and stable foam formation. Comparative analysis indicated that the formulated shampoo provided conditioning effects comparable to those of commercial counterparts, suggesting promising performance in conditioning aspects.

Keywords - rice water, marketing shampoo, anti-dandruff shampoo, evaluation test

INTRODUCTION

Shampoo is a popular hair care product utilized for cleansing the hair and scalp, commonly found in liquid form, though solid bar formats are also available, albeit less commonly used. Following shampooing, some individuals may opt to apply hair conditioner for additional hair care benefits. The formulation of shampoo typically involves a combination of two surfactants, sodium lauryl sulfate or sodium laurate sulfate, along with a co-surfactant such as cocamidopropyl betaine, mixed with water. While synthetic surfactants are incorporated into shampoos primarily for their cleansing and foaming properties, prolonged use of these synthetic ingredients can lead to adverse effects such as dryness of the hair, scalp irritation, eye irritation, and even hair loss. As an alternative, shampoos containing natural herbal ingredients have gained popularity due to their perceived health benefits.





Many medicinal plants with historically recognized effects on hair health are commonly included in shampoo formulations. Shampoos are essentially detergent solutions that have been formulated to provide additional functions such as lubrication, nourishment, or medication delivery. They are available in various types, including synthetic, herbal, medicated, and non-medicated options.






Herbal shampoos, in particular, have seen increased consumer preference over chemical-based alternatives due to their perceived health-enhancing properties. Common natural ingredients used in herbal shampoo formulations include soap nut (Ritha), lemon, fermented rice, hibiscus leaves, amla, Shikakai, neem, and curry leaves.

Hair care products encompass a wide range of functionalities aimed at restoring and replenishing hair health. These products may facilitate cleaning, texturizing, colouring, nourishing, providing a healthy appearance to stressed hair, and revitalizing it. Hair types vary among individuals, including regular, dry, and greasy hair. Issues such as hair loss, greying, dandruff, and split ends can be exacerbated by the use of chemical or synthetic shampoos.

Material and Methods

Table no1: Ingredients of polyherbal shampoo listed

| Sr no | Name | Picture | Botanical name | Parts used for Shampoo | Advantages |
|-------|----------|---|-----------------------|------------------------|--|
| 1 | Soap Nut |  | Sapindus Trifoliatus | Powder Extract | Prevents Hair Loss. Prevents hair thinning. Combat Infection of the Scalp. |
| 2 | Amla |  | Emblica officinalis | Amla Extract | Make the hair and scalp stronger. Lessen greying, or premature hair pigment loss. Encourage the Growth of Hair. Diminish Hair Loss. Treat or avoid dry scalp and dandruff. Treat or avoid bacterial and fungal scalp and hair Enhance Hairs' overall look. |
| 3 | Shikakai |  | Acacia concinna | Shikakai Extract | Shampoos Hair. Give the hairs more luster. Prevents split ends and grey hair. Stops Hair Loss Prevents scabies, lice, psoriasis, and dermatitis. Nourishes the hair and encourages strong, quick hair growth. |
| 4 | Hibiscus |  | Hibiscus rosa-sinesis | Flowers | Promote hair growth and replenished hair volume. Prevents baldness and conditions hair (finasteride & minoxidil). Address itchy and dandruff scalps. Stops premature aging of the skin. |
| 5 | Neem |  | Azadirachta indica | Leaves | Dusting off stubble. washing the scalp and hair & conditioning the hair. In addition to giving the hair more volume and gloss. strengthens the hair follicle. |

| | | | | | |
|----|----------------|--|------------------|--------|--|
| 6 | Curry |  | Murraya koenigii | Leaves | Enriched with antioxidants that aid in scalp hydration. Eliminate inactive hair follicles. stopping the loss and thinning of hair iv. fixing frizzy, damaged hair. |
| 7 | Gelatine |  | Gelidium amansii | Powder | Gelatine can increase the growth and thickness of hair. A gelatine supplement or a placebo for 24 alopecia sufferers for 50 weeks. It makes hairs thicker & To strengthen the hairs. |
| 8 | Lemon |  | Citrus lemon | Juice | Give hair more luster and its natural color. Remove any dandruff. Decreases hair loss. |
| 9 | Fermented rice |  | Oryza sativa | Water | More antioxidants found in fermented rice water aid damaged and dead hair cells. Diminishes hair loss. Rich in vitamins. |
| 10 | Rose |  | Rosa damascena | Oil | It restores damage to hair. Encourages hair growth. Dandruff is lessened. Endows the wash with aroma. |

Method for Extraction

Extraction of Sapindus mukorossi

If the fruit was moist, a 100 g weight of soap nut fruit was dried in an oven at room temperature for one day. After being taken out of the fruit, the seeds were ground into a powder with a 14-mesh size. 30g of the powder was measured out and brought to a boil in 100 ml of methanol. Stir it for fifteen minutes, then let it macerate for three days, stirring occasionally. After filtering the mixture, let it evaporate in a water bath. Filter the solution and allow it to dry completely in a hot water bath. To cool the extract, store it in a desiccator.

Extraction of Phyllanthus emblica

Using a mortar and pestle, the dried amla fruit was gathered and ground into powder. There are 20g of powerful amla in every 60ml of methanol. Stir it for fifteen minutes, then let it macerate for three days, stirring occasionally. After filtering the mixture, let it evaporate in a water bath. Filter the solution and allow it to dry completely in a hot water bath. To cool the extract, store it in a desiccator.

Extraction of Acacia Concinna

Using a mortar and pestle, the dried Shikakai fruit were gathered and ground into powder. 60 millilitres of methanol weigh 20 grams of supercharged Shikakai. Stir it for fifteen minutes, then let it macerate for three days, stirring occasionally. After filtering the mixture, let it evaporate in a water bath. Filter the solution and allow it to dry completely in a hot water bath. To cool the extract, store it in a desiccator.

Formulation table

Table no 2: Composition of formulated herbal shampoo

| Material | Category | Quantity |
|-------------------|-------------------------------------|----------|
| Reetha extract | Foaming agent {Anti-dandruff} | 2.5g |
| Amla extract | Prevents pre-mature greying of hair | 2.5g |
| Shikakai extract | Hair cleanser, Detergent | 2.5g |
| Hibiscus flower | Conditioning agent | 10gm |
| Neem leaves | Antioxidant. Antiseptic | 10gm |
| Curry leaves | Moisturiser, Conditioner | 10gm |
| Lemon juice | Antioxidants {vitamin C} | 1ml |
| Methyl paraben | Preservative | 1ml |
| Fermented rice | Used for hair growth | q. s |
| Gelatine solution | Conditioner | q. s |
| Citric acid | pH balance | q. s |
| Essential oil | Fragrance | 0.1ml |

Herbal shampoo formulation

The shampoo was formulated by blending various plant extracts in different proportions, as outlined in the accompanying table. A solution of 10% gelatine was prepared and mixed with the herbal extracts, followed by agitation for 20 minutes. During stirring, methyl paraben and one millilitre of lemon juice were incorporated. Subsequently, to adjust the pH of the solution, an appropriate volume of 1% citric acid solution was introduced. A few drops of rose essential oil were also included to impart fragrance to the shampoo. Finally, the gelatine solution was utilized to adjust the final volume of the shampoo to 100 ml.



Antidandruff Shampoo

Evaluation parameter of herbal shampoo

- Organoleptic evaluation/visual appearance:** The shampoo composition was evaluated for its foam production, color, clarity, and fragrance.
- Determination of pH:** The pH of a 10% v/v shampoo solution in distilled water was tested at room temperature. The pH was measured using a digital pH metre.
- Determination of % of solid contents:** An evaporating dish, previously washed, dried, and weighed, was filled with 4 grammes of shampoo. To confirm the exact weight of the shampoo, the dish and shampoo were weighed again. The liquid part of the shampoo was evaporated by placing the evaporating dish on the hot plate. The weight and percentage of solid components in the shampoo were calculated after it was completely dried.
- Dirt dispersion test:** Two drops of cleanser were added to 10 ml of distilled water and transferred to a wide-mouthed test tube. One drop of Indian ink was added to the prepared shampoo mixture, which was then vigorously agitated for 10 minutes with the test tube sealed using a stopper. The ink volume in the foam was quantified and categorised as none, minor, medium, or heavy.
- Surface tension measurement:** The surface tension of a 10% w/v shampoo solution in distilled water was measured using a stalagmometer at room temperature
- Wetting time:** The amount of time needed for the canvas paper to fully sink was noted in order to compute the wetting time. One inch in diameter was cut from a 0.44-gram piece of canvas paper. The canvas paper disc was placed over the shampoo (1% v/v) surface, and the timer was used to time how long it took for the paper to sink.

7. **Viscosity test:** Using an LV-62 spindle, the viscosity was measured with a Brookfield viscometer. The spindle was submerged in the shampoo immediately after the rotation rate was set to 10 rpm, and the viscometer reading in cps was recorded.
8. **Test to evaluate foaming ability and foam stability:** The cylinder shake method was utilized to ascertain the foaming potential. In a nutshell, a 250 mL graduated cylinder was filled with 50 mL of the 1% commercial or designed shampoo solution, covered with one hand, and shaken ten times. Following a minute of shaking, the total amount of the foam content was noted. By measuring the foam volume after the shake test for one minute and four minutes, foam stability was assessed.
9. **Skin Irritation Test:** The skin was prepped with a polyherbal shampoo, applied for five minutes, then washed and examined for signs of skin irritation or inflammation.
10. **Test for microbial growth:** To perform the test for microbial growth 1.73gm of nutrient agar was taken in 75ml of water and autoclaved for 15 min at 15 lb pressure after that the prepared agar media was poured in Petri plates and after solidification of agar media. The formulated scrub was inoculated on plates of agar media by streak plate method. one plate was kept as a slandered or control. The plates were incubated 37°C for 24hr. After the incubation period plates were taken out and checked for the microbial growth by using colony counter



Antimicrobial activity

Results and discussion

Preparation of Herbal Shampoo:

Equal proportions of aqueous extracts of the mentioned components were combined with soapnut to formulate the shampoo. The plant extract contains phytoconstituents such as saponins, which act as natural surfactants renowned for their foaming and detergent properties. Achieving optimal viscosity is crucial for ensuring high-quality shampoo, and various natural ingredients meet this requirement effectively. The 10% gelatine solution exhibits pseudoplastic behaviour, resulting in the formation of clear solutions. Incorporating one millilitre of lemon juice into the shampoo formulation serves as a chelating agent, natural antioxidant, and anti-dandruff agent, while also helping to maintain the formulation's acidic pH level.

Shampoo Evaluation:

To assess the efficacy of both commercial and herbal shampoo formulations, several basic physicochemical tests were conducted. The results of these tests are detailed in the following section.

Table no 3:Physicochemical Assessment of Formulated and Marketed Shampoo

| Sr no | Test name | Results | |
|-------|---------------------------|--------------------|--------------|
| | | Formulated shampoo | Clinic plus |
| 1 | Physical appearance | Brown colour | White |
| 2 | Transparency | Clear | Milky Opaque |
| 3 | Odour | Good | Good |
| 4 | pH | 7 | 5 |
| 5 | % Solid contents | 23.45 | 25 |
| 6 | Dirt dispersion | Light | Light |
| 7 | Surface tension[dynes/cm] | 35.19 | 31.15 |

| | | | |
|----|-----------------------------|-----------------------|-----------------------|
| 8 | Wetting time[sec] | 180 | 140 |
| 9 | Viscosity[cps] | 65.34 | 66.12 |
| 10 | Foam ability | Small, dense, uniform | Small, dense, uniform |
| 11 | Skin Irritation | Non-irritant | Non-irritant |
| 12 | Anti-microbial activity[mm] | 10 | 11 |

CONCLUSION

The objective of this study was to formulate an herbal shampoo aimed at enhancing hair growth and reducing hair loss during combing, while also ensuring safety compared to chemical-based conditioning agents. In this regard, ingredients such as Shikakai, Amla, Reetha, and other plant extracts were utilized instead of synthetic cationic conditioners to provide the desired conditioning effects. Various physicochemical tests were conducted to evaluate and compare the characteristics of the prepared shampoo with commercially available ones.

The results of quality control tests demonstrated that our formulated shampoo performed comparably to marketed shampoos. However, further investigation and development are necessary to enhance the overall quality of the product.

ACKNOWLEDGEMENT

The authors extend their gratitude to D.S.T.S. Mandal's College of Pharmacy, Solapur, for providing the necessary facilities to conduct this study

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