



Formulation and Evaluation of Anti-Dandruff Herbal Shampoo

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KEYWORDS

Herbal shampoo;
Annona squamosa
extract;
Phyllanthus niruri
extract;
Sapindus mukorossi
extract;
Evaluation of shampoo.

ABSTRACT

Hair can be taken care of with various cosmetic products such as hair oil, hair shampoo, hair gel, hair serum, hair cream, etc. Shampooing is the most common hair care method. Herbal shampoo was prepared by adding extracts of *Annona squamosa*, *Phyllanthus niruri* to soap nut solution. A small amount of neem oil was added as a preservative and the pH was adjusted with lemon juice. A more radical approach to popularizing herbal shampoos would be to change consumer expectations of shampoo by emphasizing safety and efficacy. You can come across this herbal shampoo which is less damaging to the hair giving good results as it contains natural ingredients. The composition of a shampoo containing one or more herbs can be characterized by various methods. The main goal of this shampoo was to remove the harmful synthetic ingredients from the anti-dandruff formula and replace them with a safe natural ingredient.

INTRODUCTION

Hair is a protein fibre that grows from follicles present in the dermis. Interest in hair primarily focuses on hair growth, hair type, and hair care, but hair is also an important biological material composed primarily of proteins, including alpha keratin. Various forms of hair, such as hairstyles and hair removal methods, vary widely across cultures and historical periods, but they are often used to indicate personal beliefs, social status, such as their age, gender or religion. Human hair is often classified into three common human ethnic groups, which are African, Asian, and European. Based on different aspects and perspectives, several studies on human hair have been carried out in many scientific fields, including biology, dermatology, cosmetics, forensics, and medicine.^[4]

Dandruff is the biggest problem in the world today. It is apparently caused by fungi called *Malassezia stricta* and *M. globosa*. This is a common disease caused by the *pityrosporum* yeast that affects the condition of the scalp. Dandruff cannot be completely removed; it can only be effectively controlled. The scalp sheds dead cells almost invisible, but in some cases, they slough off as visible flakes called dandruff. Anti-dandruff agents are intended to reduce dandruff. Although the causes of dandruff are not completely understood, treatment involves the use of several active ingredients that act as antibacterial agents or antimetabolic agents.^[16]

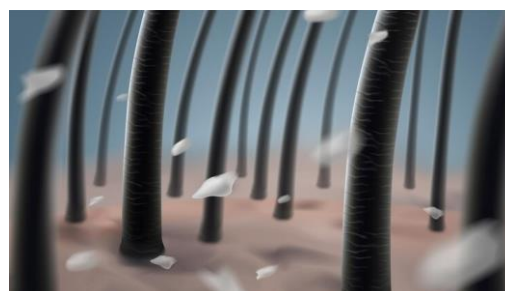


Figure.1 Dandruff affects 5% of the population, and by 2030 dandruff will mainly occur after puberty, with men more susceptible to dandruff than women. It is a common scalp condition that affects almost half of the post-pubescent population, regardless of gender or race.^[16]

Shampoo is the most important hair care product and represents the largest segment of hair cosmetics. Shampoo is a viscous detergent solution with appropriate additives, preservatives and active ingredients commonly used as a beauty agent. The shampoo is designed as a soap alternative that cleans the scalp and hair by removing unwanted oils, dandruff, environmental dust, and hair care product residue. It is applied to wet hair by massaging and cleaned by rinsing with water. Shampoo is used to remove accumulated dirt from the hair without removing much sebum. Currently on the market there are many synthetic shampoos that contain both medicated and non-medicated shampoos; However,



herbal shampoos are popular because they are of natural origin, are safer, increase demand and do not cause side effects. Shampoo plays an important role in our daily hair care regimen. It forms the basis for maintaining scalp hygiene and overall hair health.^[7]

Herbal shampoos are cosmetic preparations that involve the use of traditional Ayurvedic herbs to cleanse the scalp and hair. Ayurvedic herbal shampoo is very effective for people who have many daily hair problems like hair fall, dandruff, grey hair, dry hair, etc. due to environmental pollution. Historically, people on the Indian continent began using Ayurvedic extracts of various types very early on. Herbal hair loss shampoo is manufactured using natural Ayurvedic ingredients, natural oils, minerals and plant-extracted compounds. These ingredients work to improve hair hydration by moisturizing the follicles and roots. This in turn reduces the risk of hair loss, dry, frizzy and damaged hair.^[14]

Recently, natural and environmentally friendly products have become increasingly popular among health and environmentally conscious consumers. This trend extends to hair care as well. People are increasingly realizing that the difficulty in maintaining healthy hair is due to the hair's constant exposure to harmful chemicals found in synthetic shampoos and conditioners. Increasing awareness of how natural products can positively impact our lives has led people to choose safer and healthier options. Natural shampoos consist of beneficial natural plant and herbal extracts, either raw or powdered, that provide a variety of positive results for your hair and scalp. Shampoo can be defined as a cosmetic product for washing the hair and scalp. Its main role is to cleanse the hair of accumulated sebum, scalp residue and hair care product residue. In addition to these functions, the shampoo moisturizes and nourishes the hair and prevents static electricity in the hair. Care must be taken to ensure that the entire shampoo formulation is medically safe for long-term use.^[21]

OBJECTIVES

- The herbal formulation of anti-dandruff shampoo is to reduce dandruff and to promote hair growth.
- Bacterial infections be reduced by this herbal combination.
- The herbal shampoo prevents hair fall and hair loss.
- The greying of hair will be delayed, and it maintains the natural colour of hair.
- The anti-inflammatory property helps in reducing inflammation of scalp.
- It may also support nutrient absorption of scalp, which nourishes the hair.
- Custard apple is rich in iron that helps to improve blood circulation to scalp.

- It stimulates the follicles and ultimately promote hair growth.
- *Phyllanthus niruri* act as hair growth promoting agent in androgenetic alopecia.

MATERIALS:

The plant materials required for the present study were obtained from in and around Coimbatore, Tamil Nadu.

Annona squamosa:

Common name: Sugar apple, Custard apple, sweet sops

Biological name: *Annona squamosa*

Family: Annonaceae

Part used: Seeds

Uses: It is used to treat breast cancer, treatment of depression, Treat various digestive disorders, as an insecticidal agent and it also used for Anti dandruff agent, Anti lice agent.



Figure.2

Phyllanthus niruri:

Common name: *Gale of the wind*

Biological source: *Phyllanthus niruri*

Family: Phyllanthaceae

Part used: Leaves

Uses: It is used to treat hepatic disease, Oedema and help to treat high blood pressure, Urinary troubles and it also used as a Anti dandruff agent, Hair growth promotor.



Figure.3



Soapnut:

Common name: Indian soapberry

Biological source: *Sapindus mukorossi*

Family: Sapindaceae

Part used: Fruit

Uses: Treat skin disorders like acne, eczema, Psoriasis and prevents dandruff.



Figure.4

Neem oil:

- It is used to treat conditions ranging from ulcer to fungal infections.
- It stimulates hair follicles thereby encouraging hair growth.
- It prevents the dryness of hairs and flaking of hairs.



Figure.5

Almond oil:

- It is used to smoothen the skin and treat minor wounds and cuts and blood flow to the roots, encouraging hair growth and strengthening it.
- It is used to treat hair loss and split ends.
- It is used to check scalp infection and inflammation.



Figure.6

Lemon juice:

- It is used to fight the most dreaded enemies of hair growth dandruff and hair fall.
- It is a natural cleaner, removing excess oil and product buildup from your hair.



Figure.7

METHODS

EXTRACTION OF ANNONA SQUAMOSA:

- ✓ Collect fresh apple seeds and dry them for 7 days.
- ✓ Dry seeds are ground with a motor and pestle.
- ✓ Sift the powdered seeds, weigh 30 g and macerate with 300 ml of diluted solution in an Erlenmeyer flask.
- ✓ Add petroleum ether and stir constantly.
- ✓ The prepared mixture is macerated for 3 days with stirring and then filtered through filter paper.
- ✓ Excess solvent is evaporated using an evaporator.
- ✓ Weigh the prepared extract.



Figure.8

**EXTRACTION OF PHYLLANTHUS NIRURI:**

- ✓ Collect fresh leaves of *Phyllanthus niruri* and dry them for 7 days.
- ✓ Grind the dried leaves with a motor and pestle.
- ✓ Sift the powdered leaves, weigh 30 g and macerate with 300 ml of ethanol in an Erlenmeyer flask with constant stirring.
- ✓ The prepared mixture is macerated for 3 days with stirring and then filtered through filter paper.
- ✓ Excess solvent is evaporated using an evaporator.
- ✓ Weigh the prepared extract.

**Figure.9****EXTRACTION OF SAPINDUS MUKOROSI:**

- ✓ Fresh reetha fruit was collected; seed is removed and chopped finely using a clean knife.
- ✓ Rinse with water to remove dirt and debris.
- ✓ The chopped fruit was boiled with water for about 20 minutes.
- ✓ The fruit was smashed while boiling.
- ✓ The solution was allowed to cool at room temperature.
- ✓ Resultant solution was filtered with sieve.
- ✓ Then the extract was added to the formulation.

FORMULATION OF HERBAL SHAMPOO:**PROCEDURE:**

- i. The herbal shampoo was formulated according to the formulation shown in Table 1.
- ii. The herbal extract was added to the soapnut solution and mixed by shaking for 20 minutes.
- iii. Neem oil was also added with stirring.
- iv. Finally, enough lemon juice was added to adjust the pH of the solution. In addition, a few ml of almond oil was added to the prepared shampoo to flavour it, and a gelatin solution was added to bring the final volume.

INGREDIENTS	F1	F2	F3	F4	F5
<i>Annona squamosa</i>	2.5ml	2.5ml	2.5ml	2.5ml	2.5ml
<i>Phyllanthus niruri</i>	2.5ml	2.5ml	2.5ml	2.5ml	2.5ml
Soapnut solution	15ml	18ml	20ml	25ml	30ml
Neem oil	5ml	5ml	5ml	5ml	5ml
Lemon juice	1ml	1ml	1ml	1ml	1ml
Almond oil	4ml	4ml	4ml	4ml	4ml
Gelatin	Q. S	Q. S	Q. S	Q. S	Q. S

Table.1**EVALUATION OF HERBAL SHAMPOO:**

To evaluate the prepared herbal shampoo; Quality control tests including visual assessment and physicochemical controls such as pH, density, etc. were conducted to evaluate the formulation. Special tests such as solids content, surface tension and wetting time measurements were also carried out on the shampoo formulations to ensure product quality.

1. VISUAL ASSESSMENT:

The prepared formulation was assessed for colour, clarity, odour, and froth content.

2. pH DETERMINATION:

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

3. DIRT DISPERSION TEST:

The test tube containing 10ml of distilled water is added to it. Later two drops of shampoo formulation are 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.

4. 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 100 ml measuring 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 oneminute consecutively for fourminutes.

5. 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. The remaining solid content in the dish was calculated after complete drying.

It was determined by using the formula: % 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.

6. SURFACE TENSION MEASUREMENT:

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

7. WETTING TIME:

To test the efficacy of shampoo, wetting ability of a surfactant needs to be calculated which depends on the concentration of surfactant. The formulated shampoo is evaluated for wetting time using filter paper. The maximum wetting time shows that the shampoo contains a less amount of detergents.

8. DETERMINATION OF DENSITY:

First take empty weight of pycnometer, then fill it till neck with shampoo and then weigh it along with shampoo. Again, fill pycnometer with water and weigh it.

$$\text{Density} = \frac{\text{Weight of pycnometer with shampoo} - \text{weight of empty pycnometer}}{\text{Weight of pycnometer with water} - \text{weight of empty pycnometer}}$$

9. SKIN IRRITATION TEST:

Prepared herbal shampoo was applied on skin for 5 minutes after that was washed and tested for irritation or inflammation to the skin.

RESULT AND DISCUSSION:

The shampoo was formulated by mixing extracts and all ingredients in proper ratio. The above plant extracts contain botanical components such as saponins, which are natural surfactants with cleaning and foaming properties. Gelatin solutions exhibit pseudoplasticity and form transparent solutions. Lemon juice added to the shampoo acts as an anti-dandruff agent, natural antioxidant, clarifying agent, and maintains the acidic pH in the formula. Good results are obtained for all parameters.

VISUAL ASSESSMENT:

The formulated herbal shampoo was assessed for colour, clarity, odour, and froth content.



Figure.10

S.NO	PARAMETERS	F1	F2	F3	F4	F5
1.	COLOUR	Light green	Light green	Light green	Light green	Light green
2.	ODOUR	Good	Good	Good	Good	Good
3.	TRANSPARENCY	Opaque	Opaque	Opaque	Opaque	Opaque

Table. 2

pH DETERMINATION:

A product's pH balance is important because it helps minimize eye irritation, improve hair quality, and

maintain the ecological balance of the scalp. The pH of our formulated shampoos is in the ideal pH range for shampoos (between 5 and 7).

S.NO	PARAMETERS	F1	F2	F3	F4	F5
1.	pH	6.7	6.7	6.9	6.9	6.8

Table.3



Figure.11

DETERMINATION OF SOLID CONTENT:

A good shampoo will have a solids content of 20-30% to make it easier to apply to your hair and rinse off. If the solids content is low, it will become watery and

will be washed away quickly. Similarly, too many solids will have a hard time penetrating the hair and will be difficult to wash out.

S.NO	PARAMETERS	F1	F2	F3	F4	F5
1.	Determination of solid content	27%	24%	26%	27%	25%

Table.4

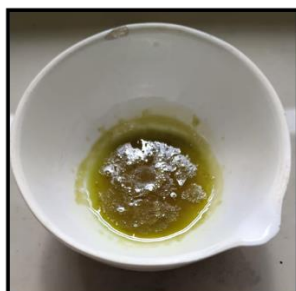


Figure.12

DIRT DISPERSION TEST:

Dirt distribution is important to evaluate the cleaning effect of shampoo. Shampoos with concentrated ink in the foam are considered to be of poor quality because

the ink and dirt left in the foam is difficult to wash out and re-deposit when washing the hair.

S.NO	PARAMETERS	F1	F2	F3	F4	F5
1.	Dirt Dispersion	Moderate	Moderate	Moderate	Moderate	Moderate

Table.5



Figure.13

**SURFACE TENSION MEASUREMENT:**

The amount of surfactants included in shampoos to reduce surface tension. The lower the surface tension, the stronger the shampoo's cleaning effect. A shampoo

is considered to be of high quality if the surface tension of pure water drops from 72.28 dyn/cm to approximately 40 dyn/cm.

PARAMETERS	F1	F2	F3	F4	F5
Surface Tension Measurement	21.66dyn/cm	22.3dyn/cm	21.66dyn/cm	23.2dyn/cm	22.4dyn/cm

Table.6

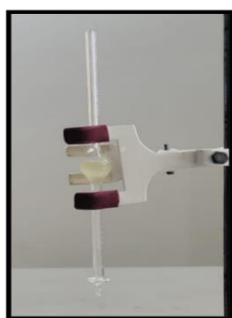


Figure.14

FOAMING ABILITY AND FOAM STABILITY:

Foaming has little to do with the cleansing effectiveness of a shampoo, but it is important to consumers. The final formulation produced a stable foam and the foam volume changed slightly. The table shows the foam stability of herbal shampoos. Note that there appears to be no direct relationship between

cleaning effectiveness and foaming. This only confirms the fact that a shampoo that lathers well does not necessarily have a high cleaning effect. The final formulation resulted in a stable foam with little change in foam volume.

TIME (minutes)	FOAM STABILITY (VOLUME)				
	F1	F2	F3	F4	F5
1	86	97	89	97	90
2	84	95	86	95	89
3	83	94	85	95	87
4	82	93	84	94	85
5	81	92	82	92	83

Table.7

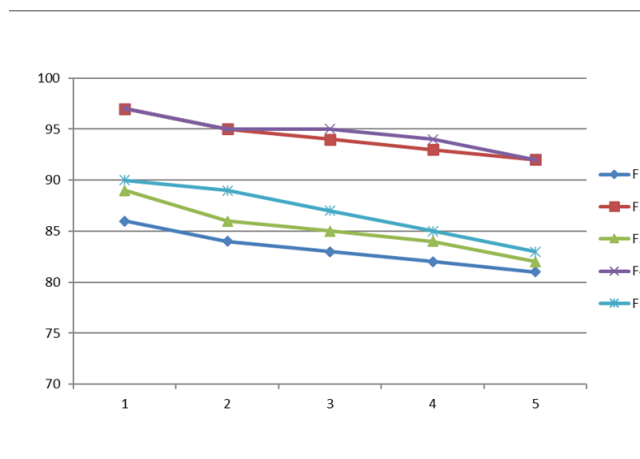


Figure.14



Figure.15

WETTING TIME:

The wetting ability of a surfactant depends on its concentration and is commonly used to test its effectiveness. The canvas disc method is a quick,

efficient and reliable test for evaluating the wetting ability of shampoos. The exposure time of the prepared shampoo is approximately 120 seconds.

S.NO	PARAMETERS	F1	F2	F3	F4	F5
1.	Wetting time	107s	119s	113s	107s	120s

Table.8

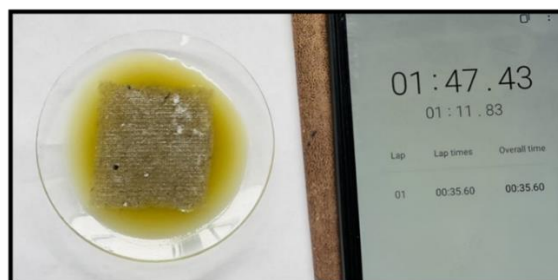


Figure.16

DENSITY:

The density of the anti-dandruff herbal shampoo was good enough for its compactness.



Figure.17

S.NO.	PARAMETERS	F1	F2	F3	F4	F5
1.	Density	0.901g/ml	1.01g/ml	1.01g/ml	0.9g/ml	0.902g/ml

Table.9

SKIN IRRITATION TEST:



The prepared shampoo does not contain harmful synthetic ingredients and therefore does not have any negative effects on the skin. In most cases, synthetic chemicals cause irritation and irritation to the skin, but

in this formula, almost all ingredients are naturally derived.

PARAMETERS	F1	F2	F3	F4	F5
Irritancy	NoIrritancy	NoIrritancy	Noirritancy	NoIrritancy	Noirritancy

Table.10

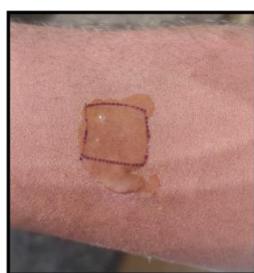


Figure.18

SUMMARY

- ❖ We have planned to prepare herbal shampoo.
- ❖ Herbal ingredients were selected according to their benefits and specification.
- ❖ Anti dandruff activity of *Annona squamosa* was known from the literature published.
- ❖ Anti-fungal, Anti-bacterial activity of *Phyllanthus niruri* was known from the literature published.
- ❖ Extraction of *Annona squamosa* was done with petroleum ether in maceration process.
- ❖ Extraction of *Phyllanthus niruri* was done with ethanol in maceration process.
- ❖ Phytochemicals presence was tested and confirmed.
- ❖ The Anti dandruff Herbal Shampoo was formulated and evaluated.
- ❖ The prepared shampoo was filled in a container and packed with labelling.



Figure.19

CONCLUSION

We conclude from evaluations that the Herbal shampoo was prepared wisely, and the reports were within the range.

Bring it all together, we concluded that every drop of shampoo loaded with benefits of *Phyllanthus niruri* and

Annona squamosa will offer anti dandruff activity and prevent hair damage it may proven in clinical studies. We have prepared our anti-dandruff herbal shampoo without synthetic ingredients and evaluated for its action of cleansing, which may give good result as other marketed synthetic commercial shampoos.

AUTHOR'S CONTRIBUTION:

We all have worked together to formulate our natural herbal anti-dandruff shampoo, without synthetic ingredients. Gayathri. S, Kanchanadevi. A, Kumara Perumal. P, Mohamed Ajmal. A, Mohamed Sabideen. M have contributed to formulate herbal shampoo in the combination of *Annona squamosa* & *Phyllanthus niruri*. Extraction and formulation were carried out by Mohammed Sabideen. M and Kumara Perumal. P, Evaluation test was done by Gayathri. S and Kanchanadevi. A, reports of evaluation test was gathered & photographed by Mohammed Ajmal. A which was attached with report. Mohamed Sabideen. M, Gayathri. S, Kanchanadevi. A took the lead writing and manuscript.

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