

Formulation and Evaluation of Poly-Herbal Shampoo for the treatment of hair loss and dandruff

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Abstract:Background: The purpose of the current study was to develop a pure herbal shampoo and assess and contrast its physicochemical features with those of shampoos that had already been commercialised. varied plant extracts from varied proportions were added to a 10% aqueous gelatin solution to create the herbal shampoo. Citric acid was used to change the pH, and a small amount of methyl paraben was added as a preservative. To ascertain the physicochemical qualities, a number of tests including visual inspection, pH, wetting time, percentage of solid content, foam volume, surface tension, detergency, and dirt dispersion were carried out. The intended herbal shampoo had a liquid consistency, was brown in colour, wetted out in two seconds, had 1.2g of solids, and had a surface tension score of 34.29N/m. The outcomes showed that the herbal shampoo formulation has good detergency. However, additional study and improvement are needed to enhance its quality and efficacy.

Index Terms- Poly-Herbal shampoo, Extraction of Herbal plants, Formulation, Evaluation.

INTRODUCTION

- Poly-Herbal Shampoo:

Shampoo is a liquid or semi-liquid product used to wash the hair and scalp. In the same way that conventional shampoos are used to clean the hair and scalp, herbal shampoos are cosmetic preparations made from traditional and ayurvedic herbs. Shampoos are probably utilised as beautifying products since they are a thick mixture of detergents with the right additives, preservatives, and active ingredients. Without considerably eliminating sebum, shampoo is used to wash away filth that has accumulated on the hair. Herbal shampoo has become more popular since it is safer, has higher customer demand, and has no unfavourable side effects, despite the fact that there are numerous synthetic shampoos available on the market today, both medicated and unmedicated. There are

several medicinal herbs that have been utilised for ages.

- Benefits of Shampoo:
 1. Increase the shine
 2. Decrease in Hair Loss
 3. Colour That Lasts
 4. Hairs That Are More Fortified and Stronger
 5. Natural, chemical-free products
- Ideal Properties of Shampoo:
 1. A nice smell.
 2. There is not much irritation.
 3. Outstanding preservation.
 4. Very strong stability.
 5. Application Simplicity.
 6. Debris removal.
- Advantages of polyherbal shampoo over synthetic shampoo:
 1. All of the ingredients are natural and organic.
 2. There are no side effects to using these shampoos.
 3. No artificial additives, such as sodium lauryl sulphate, are present.
 4. No animal experimentation will be conducted.
- PLANT PROFILE
 1. Curry Leaves:



Fig no.1

The curry tree, also known as *Murrayakoenigii* or *Bergerakoenigii*, is a tropical and subtropical tree that is indigenous to Asia. It belongs to the Rutaceae family, which also contains rue, citrus, and satinwood. Although *M. koenigii* belongs to a different family than neem, *Azadirachta indica*, which is in the allied family Meliaceae, the plant is also occasionally referred to

As sweet neem. Antioxidants included in curry leaves help moisturise the scalp and eliminate damaged hair follicles. Additionally, curry leaves are good for the hair because of their high protein and beta-carotene content, both of which play a key role in preventing hair loss and thinning. Antioxidants included in curry leaves help moisturise the scalp and eliminate damaged hair follicles

2. Hibiscus Flower:



Fig no.2

In Kannada, it is known as Dasavala, while in Sanskrit, it is known as Rudrapushpa.

Hindi. The Malvaceae family of flowering plants includes the genus *Hibiscus*. Several species, including *Hibiscus syriacus* and *Hibiscus rosasinensis*, are frequently grown as attractive plants. It can be found in Egypt, North America, Malaysia, Japan, China, and India. A small tree or bushy evergreen shrub that can reach heights of 2.5–5 metres (8–16 feet) and 1.5–2. Glossy leaves and solitary, vivid red summer flowers on a 39m (5–10ft) broad plant. It has conspicuous orange-tipped crimson anthers on its five petaled, 10 cm in diameter flowers.

The leaf is simple with alternate phyllotaxy, petiolate, oval, sharp at the apex, and serrated along the margin. It is made up of pigments such as -tocopherol, -, -carotene, -europinidin, -petunidine, -rosainidin. The herb is employed in ayurveda and medical practises for

its antioxidant, antipyretic. It exhibits proliferative effect, menorrhagia, piles, diarrhoea, and allergies. It is also an anthelmintic, antibacterial, and antifungal. In the cosmetics industry, it is used to treat dandruff, thicken hair, stop hair loss, make hair look healthy and shiny, prevent premature greying, condition against frizz, dryness, and breakage, and avoid split ends.

3. Neem leaves:



Fig no.3

Also known as Bevu in Kannada, Nimba in Sanskrit, and Neem in English. It is made out of the leaves of the Meliaceae family tree *Azadirachta indica*.

Medical uses include antimicrobial, anti-ulcer, and anti-diabetic. It is used to treat hair loss, split ends, frizzy hair, and early greying of the hair. It is also used to treat dandruff and fungal infections of the scalp. It is also used to condition the hair, strengthen the hair follicles, and add volume and gloss to the hair. It also cleans the scalp of the hair. It is also utilised in Ayurveda to cure vatta issues and balance kaphadosha and pitta.

4. Reetha fruit:



Fig no.4

The fruit is frequently referred to as an Indian soapberry. Also known as Washnut in English, Rishtak in Sanskrit, and Antuvalakayi in Kannada. The tree species Sapindusmukorossi, sometimes referred to as Reetha, is a member of the Sapindaceae family.

It is a deciduous tree that grows up to 4000 feet above sea level in the lower foothills and mid-hills of the Himalaya. It is a dried fruit with a soapy feel that is used to make premium shampoos, detergents, and a washing alternative. Sugar (10%), mucilage (10%), and saponins (10% to 11.5%) make up the fruit. Mukorozisaponin, Sapindoside

A, B, and C, and Sapinmuloside. To remove oil, debris, and dust from the hair, saponin aids in the production of foam. The vitamin content in saponin increases hair lustre and decreases.

5. Amla fruit:



Fig no.5

The 'Indian gooseberry' is another name for *Emblica officinalis*. It is a member of the Euphorbiaceae family and is referred to as amla in Hindi and amalaki in Sanskrit

It is a small to medium-sized tree with spreading branches and a crooked trunk, and its grayish-green bark comes off in pieces. The leaves are simple, subsessile, and tightly spaced along the branchlets, which are glabrous or faintly pubescent, 10–20 cm long, and typically deciduous.

MATERIALS

In order to prepare the herbal shampoo, the selected plant material were shade dried and made into coarse

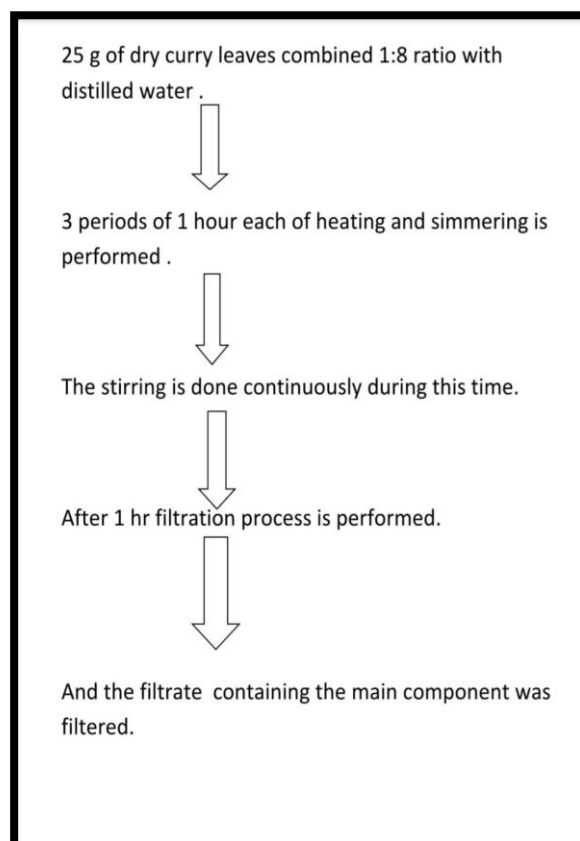
particles and this powder material was used for the extraction.

Table no.1 – Materials for PolyHerbal Shampoo.

Sr.No	Name of ingredients	Manufactured/ Company
1	Curry leaves	Local Market Kolhapur
2	Soap nut	Loba chemie Pvt Ltd
3	Amla	Botanical garden
4	Hibiscus	Botanical garden
5	Neem	Botanical garden
6	Gelatin	Molychem Pvt Ltd
7	Lemon	Botanical garden
8	Rose oil	Research lab fine chem industries.
9	Methyl paraben	Molychem Pvt Ltd

METHODS OF EXTRACTION

EXTRACTION OF *Murraya koenigii*



Flow chart of Extraction



Fig no. 6

EXTRACTION OF HERBAL PLANTS

Hibiscus rosa sinensis, Phyllanthus embilica, and Murraya koenigii powdered plants were each extracted using distilled water by boiling for four hours. Sapindus mukorossi was extracted with alcohol. The extract from each plant was separated and evaporated.

FORMULATION OF HERBAL SHAMPOO:

To prepare herbal shampoo, different plant extracts were combined in varying ratios.

Components required for making herbal shampoo:

Sr.No	Ingredients	Qty taken
1	Soapnut extract	5g
2	Amla extract	5g
3	Curry leaves extract	5g
4	Hibiscus extract	5g
5	Neem	5g
6	Gelatin	q.s
7	Lemon juice	q.s
8	Rose oil	q.s
9	Methyl paraben	q.s

Table no.2- Formula for Poly-Herbal Shampoo

METHOD:

The herbal shampoo was made in accordance with the formulation table's formula. To a 10% gelatin solution, herbal extracts were added, and the mixture was shaken for 20 minutes. One millilitre of lemon juice was stirred in. The created shampoo also received a few drops of essential oil for aroma and methyl paraben for

preservative, and the final volume was increased to 100ml using gelatin solution.



Fig no. 7 –Poly Herbal Shampoo

EVALUATION OF HERBAL SHAMPOO:

To verify the quality of the developed formulations, several quality-controlled tests were carried out, including visual evaluation, physicochemical controls, and condition in performance testing.

1. Visual Assessment-The prepared shampoo was evaluated for clarity, colour, and scent as well as for its capacity to form foam.

2. Determination of pH-A 10% v/v shampoo solution in distilled water was measured for pH at room temp. Basic pH > 7, neutral pH = 7, and acidic pH < 7. erature using a pH metre.

3. Surface tension Measurement-You may figure out how many drops there were by selecting a clean stalagnometer, placing it firmly in the vertical position, and sucking water through the rubber tube to a level higher than the upper mark. Allow the water to fall while leaving the rubber tube in place. When the water meniscus is just above the higher mark, start counting drops; when the water passes the lower mark, stop counting and note that the desired number of droplets has been reached.

Repetition of the process with the liquid whose surface tension needs to be determined is recorded as (n2).

Calculate the surface tension of an unidentified liquid using the formula below.

$$v = \rho_2 n_1 \div \rho_1 n_2 \times \gamma$$

Where, v = surface tension.

n_1 = Number of drops of water.

n_2 = Number of drops of liquid shampoo.

ρ_2 = Density of liquid shampoo.

ρ_1 = Density of water.

4. Test of Wetting: The wetting time was calculated as the time required for the canvas paper to sink entirely. A 0.44g piece of canvas paper was used to create a disc with a diameter of 1 inch. Using a stopwatch, the amount of time it took for a canvas paper disc to sink was measured over a 1% v/v shampoo surface.

5. Dirt Dispersion Test: Two drops of cleaner and 10 ml of water were introduced to a test tube with a big mouth. One drop of Indian ink was added to the prepared shampoo after the test tube had been closed with a stopper, and the mixture was agitated for 10 minutes. The amount of ink on the froth was measured, and the results were classed as none, slight, medium, or heavy.

6. Foaming Index Test –The Cylinder Shake technique was used to evaluate the capacity to create foam. Shampoo was added to a measuring cylinder in a quantity of 5mL, increased to 25mL, and thoroughly shaken for 10 minutes. After that, the stock solution was divided into five test tubes with a volume of 1 ml, 2 ml, 3 ml, 4 ml, and 5 ml. Each test tube also received an additional addition of water to boost its volume by up to 10 ml. The foam formed during each test was measured in centimetres, and the forming index was calculated using the formula below:

$$\text{Foaming index} = 1000/A$$

Where, A is the volume of stock solution with a precise height of 1 cm.

7. Determination of % solid content: 4 grams of shampoo were introduced to an evaporating dish that had been previously cleaned, dried, and weighed. The dish and shampoo were weighed again to make sure the weight was right. The liquid part of the shampoo was evaporated by placing an evaporating dish on a hot plate. The weight and percentage of the solid components were calculated after the shampoo had fully dried.

8. Anti-Microbial Activity: FOR 15 minutes at 120°C (250°F), all glassware required for the antimicrobial test was sterilised in an autoclave.

Preparation of Nutrient Agar:

A variety of low-demanding organisms can develop on Nutrient Agar, an all-purpose media. It typically contains (mass/volume).

- 1) Peptone serves as organic nitrogen at 0.5%.
- 2) 0.3% beef extract: These have water-soluble salts, vitamins, carbohydrates, and nitrogen.
- 3). The mixture is made firmer by 1.5% of agar.

4) Distilled water - Water serves as a vehicle for the components agar and other.

5) The pH is adjusted to neutral (6.8) at 25 °C (77 °F)

Approximately one minute is spent boiling the component mixture. An autoclave will be used for the subsequent sterilising process, set at 120 °C for 15 minutes. They are then further frozen to around 50°C (120°F) and placed into Petri plates that are immediately covered to prevent contamination. 48 hours were spent incubating the petriplates at 37°C after the agar in the dishes had set. The subsequent inoculation procedure is performed on warm dishes rather than chilled ones. The incubated dishes were warmed to room temperature before being inoculated.

RESULT AND DISCUSSION

Parameters	Observations
Color	Brown
Odor	Pleasant
pH	6.8
Surface tension(N/m)	34.29N/m
Wetting time (s)	3 sec
Dirt dispersion test	light
Foaming index	500
Solid content (%)	1.2g

Visual Assessment -The shampoo formulations' colour, scent, texture, and condition were all evaluated. The results showed that the formulation had a better physical appearance.

Sr.No	Parameters	Formulation
1	Color	Brown
2	Odour	Aromatic
3	Texture	Viscous

Determination of pH - The pH of the shampoo is an important consideration for enhancing and improving hair features, easing eye irritation, and stabilising the ecological balance of the scalp. All of the shampoos were acid balanced since their pH range was between 5.0 and 7.0, which is closer to skin pH. The composition has a pH of 6.5.

Surface tension Measurement - Using a stalagmometer, it was discovered that the herbal shampoo formulation had a surface tension of 34.29 N/m.

$$\text{Surface tension} = (1.01 \times 42.33 / 0.99 \times 91.66) \times 72.8$$

$$=34.29N/m$$

Test of Wetting - The time taken for the canvas paper to sink was measured with a stopwatch and was found to be 3 seconds.

Dirt dispersion test - A shampoo's cleaning performance is evaluated using a dirt dispersion test. Foam is thought to be of bad quality because leftover dye or dirt is difficult to remove and ends up getting redeposited on the hair. Therefore, the dirt should stay in the aqueous liquid layer for increased cleaning activity. Within three minutes, the shampoo's recipe demonstrated efficient washing and prompt eradication of the water-soluble pigment.

Foaming index test - Each test produced foam that was measured in centimetres, and the forming index was determined using the following formula:

$$\text{Foaming index} = 1000/A$$

Where, A is the volume of stock solution with a precise height of 1 cm

Sr. No	No. of test tubes (ml of stock solution)	Height of Foam (cm)
1	1ml	0.9cm
2	2ml	1.7cm
3	3ml	2cm
4	4ml	2cm
5	5ml	2.7cm

$$\begin{aligned} \text{Foaming index} &= 1000/ A \\ &= 1000/2 \\ &= 500 \end{aligned}$$

The developed formulation of polyherbal shampoo was found to have a 500 foaming index.

Determination of % solid content: -The solid content of the tested shampoo, which was found to be 1.2g, was expected to wash out.

Anti-microbial Activity - We might assume that Staphylococcus aureus was present because we found a Gram-positive, spherically shaped bacterium.

Upon further inspection, a brown ring that formed a zone of inhibition and denoted anti-microbial activity was visible.

CONCLUSION

In the current investigation, plant extracts from the hibiscus, curry leaves, amla, neem and reetha are used in place of artificial cationic conditioners. The goal of this experiment was to create a stable, functional shampoo without any of the synthetic ingredients that are typically used in such formulations. We used a variety of evaluation criteria to assess the performance of herbal shampoo. The assessment study of the

shampoo formulation produced equivalent results for the quality control test. However, we still require additional validation procedures for this herbal shampoo.

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