



FORMULATION AND EVALUATION OF HERBAL SHAMPOO

¹Pawan R. Dhakate, ²Pavitra D. Kodwate, ³Tushar P. Papankar, ⁴Pratham Barewar, ⁵Manju Kothari

B.Pharmacy (Student),
Gondia College of Pharmacy, Gondia, Maharashtra, India

Abstract: The main objective of these study is to evaluate and formulate herbal shampoo. Shampoo are one of the cosmetic products used in daily life. Synthetic preservatives and detergents have sometimes been the cause of adverse effects among consumers. A more radical approach in reducing the synthetic ingredients is by incorporating natural extract whose functionality is comparable with their synthetic ingredients. The ingredients used in formulation are rice water (prepared by homemade method), extract of *Murraya koenigii* leaves and *Aegle marmelos* fruit *Sapindus mukorossi* is used as foaming agent, then prepared decoction of these ingredients and mixing with each other and evaluated for its organoleptic and physio-chemical characteristics. Additional benefits are expected, e.g., conditioning, smoothing of the hair surface, good health of hair, i.e., hair free of dandruff, dirt, grease and cleansing of hair and scalp. The combination of several such ingredient of herbal origin has made it possible to secure highly effective dry powder shampoo. The formulation at laboratory scale was done and evaluated for number of parameters to ensure its safety and efficacy.

Index Terms - Herbal shampoo, Curry leaves, Bael fruit, Reetha, Rice water.

I. INTRODUCTION

Herbal shampoos are a type of hair care product that utilize natural ingredients derived from plants to cleanse and nourish the hair. These shampoos are formulated to provide a gentler and more nourishing alternative to traditional chemical-based shampoos. The ingredients used in herbal shampoos can include a variety of herbs, flowers, and botanicals, such as rice water, *murraya koenigii* leaves extract and *butea monosperma* flower extract.

Herbal shampoos are often marketed as being better for the hair and scalp than traditional shampoos, as they can help to soothe dry, itchy, or flaky scalps and provide essential vitamins and minerals to the hair to promote growth and health. Additionally, herbal shampoos often contain fewer harsh chemicals and synthetic fragrances, making them a popular choice for people with sensitive scalps or for those who are looking for a more natural hair care routine.

Overall, herbal shampoos offer a natural alternative to traditional chemical-based shampoos, utilizing the benefits of plants to cleanse and nourish the hair. They can provide a gentler and more nourishing experience for the hair and scalp, making them a popular choice for those seeking a more natural approach to hair care.

CLASSIFICATION OF SHAMPOO:**A. Based on use or Function**

- Conditioning shampoo
- Antidandruff shampoo
- Baby shampoo
- Clarifying shampoo

B. Based on Appearance

- Powder shampoo
- Liquid shampoo
- Gel shampoo
- Oil shampoo

FUNCTIONS OF HERBAL SHAMPOO:

- The selection of active ingredients for hair care shampoo is often based on the ability of the ingredient to prevent damage to skin as well as to improve the quality of the skin by way of cleansing, nourishing, and protecting the skin.
- It have not make the hand rough and chapped.
- It's not give any side effects or causes irritation to the eye.
- It produces a good amount of foam to satisfy the psychological requirements.

IDEAL CHARACTERISTIC OF HERBAL SHAMPOO:

- Should effectively and completely remove the dust, excessive sebum.
- Should effectively wash hair.
- Should produce a good amount of foam
- The shampoo should be easily removed by rinsing with water.
- Should leave the hair non dry, soft, lustrous with good, manageability.
- It should impart a pleasant fragrance to the hair.
- It should not have any side effects or causes irritation to the skin and eye.

PLANT PROFILE:**1.CURRY LEAVES:**

Fig No.1: Murraya koenigii

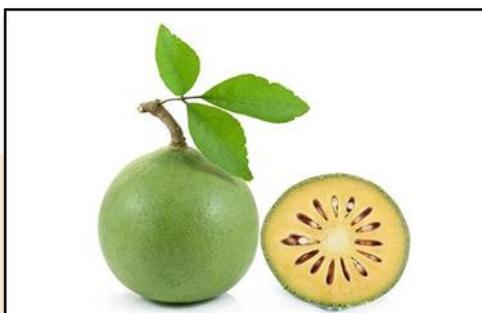
Curry leaves, also known as sweet neem leaves, are an important herb in Indian cuisine. It belonging to family Rutaceae. South Asia is home to this plant and it is found in countries like Sri Lanka, Bangladesh, China and India. Curry leaves have been used for centuries in traditional Indian hair care for their beneficial properties. curry leaves are known to have darkening agents, antioxidants and vitamin B complex which can turns hair back to natural color.

Chemical constituents:

- **Vitamins:** Curry leaves are a good source of vitamins like vitamin C, vitamin B, and vitamin E. These vitamins play a crucial role in promoting hair growth, preventing hair loss, and nourishing the hair follicles.
- **Antioxidants:** Curry leaves possess antioxidant properties due to the presence of compounds like kaempferol and quercetin. These antioxidants help in protecting the hair follicles from oxidative stress and damage caused by free radicals

Uses:

- Straighten the roots of hair
- Promote hair growth
- Treat dandruff
- Prevents hair graying

2.BAEL FRUIT:**Fig no.2: *Aegle marmelos***

Bael also known as golden apple, Japanese bitter orange, stone apple, wood apple. It belonging to family Rutaceae found in Himalayan tract and throughout India. The uses of bael for hair is it reduces hair loss, fights against dandruff, prevent premature greying of hair and strengthens hair. Bael contains marmelosin A, B and C as well as protein, volatile oil and vitamin C.

Chemical constitute:

- **Vitamins:** Certain vitamins, such as biotin (vitamin B7), are often included in hair care products. Biotin is believed to promote hair growth and improve hair health.
- **Protein:** Proteins, such as keratin and hydrolyzed wheat protein, are commonly found in hair care products. These proteins can help strengthen the hair strands and improve their overall appearance.

Uses:

- Improve scalp health
- Nourishment of scalp
- Promotes hair growth

3.REETHA:**Fig no.3: *Sapindus mukorossi***

Reetha is a large deciduous tree of sapindaceae family. The major constituents present in Reetha are saponins, sugars and mucilage which is used for natural hair cleansers. it is commonly known by many names like soapberry, soapnut, washnut, aritha, dodan. It commonly found in India, Japan and China. Reetha is found in the hilly regions of the Himalayas in India.

Chemical constituents:

- Saponins: Reetha is rich in natural saponins, particularly a class of saponins called triterpenoids. These saponins have natural cleansing properties and produce a lathering effect when mixed with water, making reetha an effective natural alternative to conventional shampoos.
- Flavonoids: Reetha also contains flavonoids, which are plant compounds known for their antioxidant and anti-inflammatory properties. These flavonoids may help protect the scalp and hair follicles from oxidative stress and promote overall hair health.

Uses:

- Promotes healthy hair
- Add shine to the hair
- Conditioning properties
- Improve scalp health

When using herbal shampoo for hair care, there are a few tips to keep in mind to maximum its benefits:

- Wet your hair thoroughly: Before applying herbal shampoo, wet your hair thoroughly with lukewarm water. This will help the shampoo lather well and distribute evenly.
- Use an appropriate amount: follow the instruction on the shampoo bottle to determine the right amount to use. Generally, a small amount is sufficient, but it may vary depending on your hair length and thickness. Avoid using excessive amounts as it may lead to product buildup.
- Massage gently: once you have applied the shampoo to your hair, use your fingertips to massage your scalp gently in circular motion. This helps stimulates blood circulation and ensure that the herbal ingredients are effectively distributes.
- Rinse thoroughly: after massaging, rinse your hair thoroughly with lukewarm water until all traces of the shampoo are removed. Its important to rinse properly to prevent any residue from remaining on the scalp or hair.
- Avoid hot water: while washing your hair with herbal shampoo, avoid using hot water as it can trip the natural oils from your hair and scalp.
- Use regularly: consistency is key when it comes to seeing results with herbal shampoo. Use it regularly as part of your hair care routine to experience the long-term benefits.
- Consider herbal hair treatment: supplementing your herbal shampoo with occasional herbal hair treatments, can further enhance the nourishing and rejuvenating effects on your hair and scalp.

Hair Hygiene:

- Regular washing: It is essential to wash your hair regularly to remove dirt, sweat, oil and product buildup. The frequency of washing depends on your hair type and personal preference. Generally, washing your hair 2-3 times a week is sufficient for most peoples.
- Scalp care: Pay attention to the health of your scalp, as it plays a crucial role in hair hygiene. Gently massage your scalp while washing to stimulate blood circulation and promote a healthy environment for hair growth. Avoid using excessive heat and styling products that may irritate or dry out your scalp.
- Proper Drying: After washing your hair, gently pat it dry with a soft towel. Avoid rubbing vigorously, as it can cause friction and damage your hair strands. Allow your hair to air dry whenever possible, as excessive heat from blow dryers can lead to dryness and breakage. If you use heat styling tools, apply a heat protectant spray before using them.
- Brushing and Detangling: Regular brushing helps distribute natural oils from the scalp to the hair strands, promoting shine and keeping your hair healthy. Use a wide-toothed comb or a brush with soft bristles to gently detangle your hair, starting from the ends and working your way up. Be cautious to avoid excessive pulling or tugging, as it can cause breakage.
- Avoid Over styling: Excessive use of heat styling tools, such as flat irons, curling irons, or excessive backcombing, can damage your hair and weaken the strands. Limit the use of such tools and opt for heat-free styling techniques whenever possible. Use hair accessories that are gentle on your hair, and avoid hairstyles that pull tightly on the scalp, as they can cause hair breakage or traction alopecia.

- **Protection from Environmental Factors:** Shield your hair from harsh environmental conditions, such as extreme sun exposure, strong winds, or chlorinated water. Wear a hat or use a scarf to protect your hair from UV rays and environmental pollutants. After swimming in chlorinated pools or saltwater, rinse your hair thoroughly to remove any residue and follow up with a moisturizing conditioner.
- **Healthy Lifestyle:** Your overall health and well-being also impact the health of your hair. Maintain a balanced diet, rich in nutrients like vitamins, minerals, and proteins, as they contribute to healthy hair growth. Stay hydrated, manage stress levels, and get enough sleep, as these factors can also affect the condition of your hair.

MATERIAL AND METHODS:

1.Collection and authentication of the selected medicinal plant:

The plant curry leaves and bael fruit collected from the Gondia district, Maharashtra, India. Herbarium sheet of plant specimen is certified by Department of Botany, D.B. science Gondia.

2.Preparation of Plant Extract:

Curry leaves (*Murraya koenigii*) Extract:

The collected leaves allow the sun dry 2-3 days, and grind into a coarse powder using a mortar and pestle. weighed 30g crude powder and allowed for successive extraction with a 9:1 ratio of organic solvents such methanol and water using the Soxhlet Apparatus. The mixture was heated on heating mantle at 60°C for 7-8 successive cycles. The extract was collected and evaporate on a water bath. Lastly, the extracted materials are subjected to phytochemical analysis.

Bael fruit (*Aegle marmelos*) Extract:

The collected fruits are cut into little pieces and allow to totally dried, and grind into a coarse powder using a mortar and pestle. After homogenization, weighed 30g crude powder and allowed for successive extraction with a 9:1 ratio of organic solvents such methanol and water using the Soxhlet Apparatus. The mixture was heated on heating mantle at 60°C for 7-8 successive cycles. The extract was collected and evaporate on a water bath. Lastly, the extracted materials are subjected to phytochemical analysis.

Reetha (*Sapindus mukorossi*) Extract:

The extract of *Sapindus mukorossi* was prepared as reported by Chen et al. 2021, but with few modifications. The dried shells of *Sapindus mukorossi* (soap nuts) was washed and weighed 50 g soaked in 100 ml distilled water for overnight. The resultant mixture was agitated on a rotary shaker for 6 hours and boiled on the heating mantle at 60°C for 20 minutes. The extract was allowed to cool and later on centrifuged at 3200 rpm for 10 minutes. The extract was then filtered and stored till the next procedure.

3. Preliminary phytochemical screening of the extracts:

By using established techniques, a preliminary analysis of extracts was conducted to determine the presence of several phytoconstituents. The findings of the subsequent chemical tests were compiled in Table 1.

Table1: Preliminary phytochemical screening of extract

Sr.no.	Plant chemical constituents	Test\Reagent	Result		
			Curry leaves	Bael fruit	Reetha
1.	Alkaloid	• Dragendorff's Test	+	+	-
		• Hager's test	-	+	+
		• Wagner test	+	-	-
2.	Flavonoid	• Shinoda test	-	+	+
3.	Protein	• Millon's reaction	-	+	-
		• Xanthoproteic reaction	-	+	-
4.	Amino acids	• Ninhydrin test	+	+	-
5.	Saponins	• Foam test	-	-	+
6.	Tannins	• FeCl ₃ test	+	+	+
		• Lead acetate test	+	+	+

(+ indicates Present; - indicates Absent)

4. Formulation of Herbal Shampoo:

- Herbal shampoo was prepared by using 10% gelatin solution. To prepare the 10% gelatin solution boil 100ml of water and add 10gm gelatin powder and again boil for 5 min and keep the aside for cooling.
- The preparation of fermented rice water is done by the homemade method take the rice and soaked into the water for 2-3 days.
- Add curry leaves extract, bael fruit extract and reetha extract and fermented rice water with constant stirring.
- Add 1ml citric acid and methyl paraben as a preservative with constant stirring.
- Add few drops of orange oil for the good aroma.
- Stirring well with mechanical stirrer for obtained homogeneous formulation.

- Stored in air tight container with appropriate label.



Fig no:4



Fig no:5

Formulated herbal shampoo

Table 2: formulation of herbal shampoo

Sr.no.	Ingredients	Quantity	Uses
1.	10% Gelatin solution	Q. S	Vehicle
2.	Curry leaves extract	5gm	Antioxidant agent, Antimicrobial agent
3.	Bael fruit extract	5gm	Protein, Vitamins
4.	Reetha extract	20ml	Foaming agent
5.	Fermented rice water	10ml	Conditioning, Nourishment
6.	Citric acid	1 ml	For adjust the pH
7.	Methyl Paraben	Q. S	Preservative
8.	Orange oil	Q. S	Perfume

5.Evaluation of herbal shampoo:

To evaluate the prepared formulations, quality control tests including visual assessment and physicochemical controls such as pH, density and viscosity were performed.

a. Physical Appearance\ Visual inspection:

The formulation prepared was evaluated for the clarity, color, odor and foam producing ability.

b. Determination of pH:

Take 1gm of shampoo solution dissolved in 10ml distilled water was measured by using PH meter at room temperature.

(Neutral pH=7, Acidic pH <7, Basic pH >7).

c. Rheological or Viscosity Evaluations:

The viscosity of the shampoos was determined by using Brookfield viscometer. 10ml of shampoo is taken in a beaker and spindle is dipped in it for about 5min. and then reading is taken.

d. Dirt Dispersion:

Two drops of shampoo were added in a large test tube contain 10 ml of distilled water. 1 drop of India ink was added; the test tube was stoppered and shakes it ten times. The amount of ink in the foam was estimated as None, Light, Moderate, or Heavy.

e. Test to evaluate foaming ability and foam stability:

Foaming ability was determined by using cylinder shake method. Take 50 ml of the 1% formulated shampoo solution was placed into a 250 ml graduated cylinder and covered with one hand and shaken 10 times. The total volume of the foam content after one min of shaking was recorded. Foam stability was evaluated by recording foam volume after 1 minute and 4 minutes of shaken test.

f. Wetting time test:

A canvas paper was cut into 1 inch diameter discs having an average weight of 0.44g. The smooth surface of disc was placed on the surface of 1% v/v shampoo solution and the stopwatch started. The time required for the disc to begin to sink was noted down as the wetting time.

g. Patch Test:

Patch Test was evaluated by applying formulated herbal shampoo on skin and scalp and left for 30 min, after 30 minutes of washing observe any itching, rashes or redness on skin by sensory and visual inspection.

h. Stability Studies:

The thermal stability of formulations was studied by placing in glass tubes and they were placed in a different temperature conditions like at 25°C, 37°C and 45°C. Their appearance and physical stability were inspected for 1 week were observed in the formulated herbal shampoo.

RESULT AND DISSCUSION:

Sr. no	Evaluation Parameter	Result
1.	Color	Brown
2.	Transparency	Opaque
3.	Odor	Good
4.	Texture	Smooth
5.	pH	Acidic
6.	Dirt dispersion test	Moderate
7.	Foam type	Small, Dense
8.	Wetting time	120s
9.	Patch test	No irritation
10.	Stability test	Stable

Table no.3: Observation Table

The effectiveness of a herbal shampoo containing curry leaves, bael fruit extract, rice water, and reetha (soapnut) can vary depending on several factors, including individual hair type and condition. While these ingredients are commonly used in Ayurvedic and herbal hair care remedies, there is limited scientific research specifically on the combination of these ingredients in shampoo form.

CONCLUSION:

The present study, we formulated an herbal shampoo containing curry leaves and bael fruit extract and fermented rice water which is traditionally used for hair cleansing. The combination of curry leaves extract, bael fruit extract, and fermented rice water in herbal shampoo offers potential benefits for hair care. Inositol, a chemical constituent present in the rice water plays a key role in preventing hair damage, provides support to the hair strands and helpful for the hair growth. These natural ingredients are known for their nourishing and conditioning properties, which can promote hair growth, reduce dandruff, and enhance overall hair health. All the ingredients used to formulate the shampoo are safer than generic commercial shampoos and the physicochemical evaluation showed ideal results, but further research is required to improve its quality especially on the conditioning performance and to identify the constituents which are responsible for the performance.

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