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Research Article

Formulation and Evaluation of Fermented Rice Water Herbal Shampoo

Meduri Teja Sri*, Munnangi Lakshmi Divya, Potharaju Sreevani, Suravarapu Sri Tejaswi, Swami Vasavi Rama Deepthi, Uppala Vandana, Yepuri Divya, Vadlamudi Pallavi, Nadendla Rama Rao

Chalapathi Institute of Pharmaceutical Sciences, Chalapathi Nagar, Lam, Guntur, 522034, India

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*Address for Correspondence:

Meduri Teja Sri, Chalapathi Institute of Pharmaceutical Sciences, Chalapathi Nagar, Lam, Guntur, 522034, India

ORCID ID: https://orcid.org/0000-0001-8674-7866

Abstract

Now-a-days, the most occurring problem is hair fall, so the main aim of the study is to reduce hair fall and promote hair growth. The main ingredient in this study is fermented rice water (*Oryza sativa*) which contains many antioxidants when compared to the plain rice water. Inositol is the major constituent which helps in decreasing hair fall. The herbal shampoo was formulated using some of the traditional herbs like *Hibiscus-rosa-sinensis, Phyllanthus emblica, Aloe vera, Trigonella foenum graceum* along with fermented rice water in different concentrations and evaluated for various parameters. The prepared herbal shampoo was evaluated with physico-chemical parameters like pH, foam formation, dirt dispersion, surface tension, viscosity and wetting test. The results states that the herbal shampoo possess the following characteristics such as good foam ability, good cleansing, low surface tension, viscosity and soothing property. The evaluation results of the herbal shampoo had shown better results, which is ideal to use, safe and effective in the treatment of hair fall.

Keywords: Herbal shampoo, *Oryza sativa*, Hair fall.

1. INTRODUCTION:

Shampoos are likely the most broadly utilized restorative items for cleaning hairs and scalp in our everyday life. In ancient times, shampoos are made up of variety of herbs and their extracts, but at present, most of the shampoos in the current market are formulated using surfactants [1]. The surfactants are added for their cleansing property, but it's continuous use leads to effects such as eye irritation, loss of hair and dryness of hair [2]. The alternative solution is to substitute the use of synthetic shampoos with the herbal shampoos.

In the present study, herbal shampoo was formulated by using the ingredients such as Hibiscus-rosasinensis, Embalica officinalis, Trigonella foenum graceum, Aloe barbadensis and fermented rice water makes hair smooth and shiny and as well as it improves the strength, texture and growth of hair. Fermented rice water contains high amount of anti-oxidants that are beneficial for hair health. Inositol, an ingredient present in the rice water has ability to penetrate into damaged hair and repairs it from the inside out. The optimal pH of the fermented rice water keeps hair shiny, improves skin elasticity, reduces surface friction and prevents greying of hair [3].

Amla enhances the hair natural colour by preventing premature greying of hair. It has antifungal and anti-viral properties, which prevents dandruff and other fungal infections [4]. The seeds of Trigonella foenum graceum are rich source of iron and protein, which are two essential nutrients for hair growth. The chemical compounds such as flavonoids and saponins are responsible to induce the hair growth [5].

The petals of Hibiscus rosasinensis flowers are used to stimulate thicker hair growth and to prevent hair loss and scalp disorders. Presence of amino acids and vitamin C improve the blood circulation under the scalp and boosts hair growth [6]. The proteolytic enzymes present in the aloe vera repairs the dead skin cells on the scalp. It acts as a great conditioner. Hibiscus rosa sinensis and Aloe barbadense help in soothing of hair and gives the hair bouncy, smooth and shiny appearance [7].

2. MATERIALS AND METHODS:

Table 1: Formulation table of fermented rice water shampoo

S.NO	Name of the ingredient	F1	F2	F3	F4	F5	F6
1	Rice water(ml)	15	20	25	30	35	40
2	Hibiscus powder(gm)	0.5	1	1.5	2	2.5	3
3	Amla powder(gm)	0.5	1	1.6	2	2.5	3
4	Fenugreek powder(gm)	0.5	1	1.5	2	2.5	3
5	Aloe vera gel(gm)	0.5	1	1.5	2	2.5	3
6	Shampoo base	q. s	q. s	q. s	q. s	q. s	q. s

2.1 Preparation of herbal shampoo:

Taken a cup of rice in a clean bowl and rinsed with water for once to remove the dirt and impurities. Drained the water and again added some amount of water to rice and covered the bowl with heavy lid. Kept the bowl aside at room temperature for a day. Later, collected the rice water and transferred into a clean glass jar and allowed it to ferment for 2 to 3 days. To the collected fermented rice water added hibiscus powder, amla powder, aloe vera gel, fenugreek powder and stirred well until they are dispersed. Now, the solution was filtered. The filtered solution was added to the shampoo base until it attains the desired viscosity.

Table 2: Description of ingredients used

S. No	Common Name	Pictures	Botanical Name	Parts used	Category
1.	Fermented rice water		Oryza sativa	Seeds	Used for hair growth
2.	Hibiscus		Hibiscus rosa-sinensis	Flowers	Conditioning agent
3.	Amla		Phyllanthus emblica	Fruit	Prevents pre-mature greying of hair
4.	Fenugreek		Trigonella foenum graceum	Seeds	Anti-dandruff agent
5.	Aloe vera		Aloe vera	Leaf	Conditioning agent

2.2 Evaluation parameters:

To assess the quality of formulated shampoo, several quality control tests were performed.

- **Physical Appearance:** [11]

The formulated shampoo was evaluated for physical characteristics such as transparency, color, odor by observing with naked eye.

- **pH determination:**

The pH of the fermented rice water shampoo was evaluated by taking (10% v/v) solution by using pH analyzer.

- **Test for dirt dispersion:**

Two drops of formulated shampoo were added to 10 ml of distilled water which is taken in a wide mouthed test tube. To the test tube one drop of Indian ink was added and the test tube was shaken for 10 min by closing the test tube

mouth. Volume of ink in the test tube was measured result was graded in terms of heavy, medium, none.

- **Foaming ability:** [12]

50 ml of formulated shampoo taken in a test tube volume of 250 ml, shake the test tube for 10 times with time period of 1min, 4min respectively. Total foam was measured after 1min of shaking. The method called as cylinder shake method.

- **Wetting test:**

A canvas paper weighing 0.44 g was cut into a disc diameter measuring 1 inch. Place it in the surface of the shampoo solution. Record the time taken by the paper to sink in the formulation and record the time by using stop watch.

- **Surface tension test:** [13]

Formulated shampoo in clean water (10% w/v) was evaluated for surface tension using stalagmometer at room temperature.

It was determined by using formula:

R2/R1 = w3-w1(n1)/w2-w1(n2)

W1= weight of empty beaker

W2= weight of beaker with distilled water

W3= weight of beaker with herbal shampoo solution

n1=number of drops of distilled water

n2 =number of drops of shampoo solution

R1= surface tension of distilled water at room temperature

R2= surface tension of shampoo solution.

- **Determination of solid content:** [14]

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. 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 x100

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.

3. RESULTS AND DISCUSSION:

Table 3: Physicochemical evaluation of formulated herbal shampoo

S.NO	EVALUATION PARAMETER	OBSERVATION					
		F1	F2	F3	F4	F5	F6
1	COLOUR	Brown	Brown	Brown	Dark Brown	Dark Brown	Dark Brown
2	ODOUR	CHARACTERISTIC					
3	APPEARANCE	VISCOUS					
4	TEXTURE	SMOOTH					
5	pH	8.5	8.2	7.5	6.8	6.3	5.2
6	DIRT DISPERSION	MEDIUM	MEDIUM	MEDIUM	NONE	NONE	NONE
7	FOAMING INDEX (ml)	30	36	40	48	56	68
8	WETTING TEST (sec)	96	115	118	128	142	158
9	% OF SOLID CONTENT	15	18	21	24	28	34
10	SURFACE TENSION (dynes/cm)	22.63	28.45	32.33	36.42	41.23	43.52

- **Physical appearance:**

The formulated shampoo was assessed for visual inspection. It was observed that the formulated shampoo was clear, dark brown and possess mild odor.

- **pH**

The pH of the shampoo plays a key role in stabilizing the scalp, improving hair quality and reducing irritation to eyes. To minimize the damage to hair, most of the shampoos are formulated either with neutral or slightly acidic pH. The pH of the formulated herbal shampoo was found to be in the range of 5.2 to 8.5.

- **Determination of solid content**:

In general, the good quality shampoo must possess the solid content in the range of 20% to 30%, so that, it will be very easy to apply and wash out. If the solid content is more, then it is very difficult to wash out. The solid content of the formulated herbal shampoo was found to be in the range of 15% to 34%.

- **Foaming ability and foaming stability:**

Foaming ability is one of the important parameters to be considered in the evaluation of shampoos. The foam volume of the formulated herbal shampoo was found to be in the range of 30ml to 68ml. This volume had remained constant even after the observation for 4 minutes.

- **Dirt dispersion:**

For the evaluation of the cleansing action of shampoo, dirt dispersion test plays an immense role. Shampoos are considered of poor quality, if the ink concentrates in the foam. Based on the concentration of the ink in the foam, the results were declared as heavy, moderate, light and none.

- **Wetting time:**

In order to test the efficacy of the shampoo, wetting time test is carried out. It depends upon the concentration of surfactant. The canvas disc method is preferred for calculating the wetting time. The wetting time of the formulated shampoo were found to be in the range of 96 to 158sec.

- **Surface tension:**

The detergency of the shampoo can be determined based on the surface tension values. Lower the value of the surface tension, more will be the cleansing action of the shampoo. The surface tension of the formulated herbal shampoo was found to be in the range of 22.63to 43.52 dynes/cm.

4. CONCLUSION:

The main aim of formulating herbal shampoo was to reduce hair fall and promote hair growth. Herbal shampoo was formulated using traditional herbs which are very safe and effective for use. 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. In addition to this, some herbs are used, which acts as good conditioning agents. The usage of natural conditioning agents helps in preventing hair loss compared to the use of synthetic conditioning agents. Later, the formulated herbal shampoo was evaluated for various parameters such as visual inspection, pH, dirt dispersion, % of solid content, wetting time and surface tension. Based on the evaluation results of various formulations, it was concluded that formulation F4 has shown better results when compared to other formulations. Hence the formulated herbal shampoo was safe and effective for use and helps in reducing the hair fall.

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