

Formulation and Evaluation of Fermented Rice Water Herbal Shampoo For Antihairfall Activity

Asst.prof.Nida Mulla , Prin.Dr.S.K.bais, Kaveri .S.Navale*

*Fabtech college of pharmacy,Sangola
Dist-Solapur -413307*

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ABSTRACT:

The study's primary objective is to lessen hair loss and encourage hair growth because it is now the most prevalent and serious condition. Fermented rice water (*Oryza Sativa*), which contains substantially more antioxidants than pure rice water, is the key component of this study. Antioxidant in rice water called inositol helps stop hair loss. Traditional herbs such as *Hibiscus rosasinensis*, *Sapindus mukorossi*, *Aloe Vera*, *Senegalia rugata*, *Phyllanthus emblica*, and fermented rice water were used to make the herbal shampoo, which was tested on a number of parameters. According to research, herbal shampoo has a variety of qualities, including excellent foaming ability, effective washing, low surface tension, viscosity, and soothing effects, as well as being biodegradable and environmentally friendly. The assessment of the effects of the herbal shampoo were more pronounced and it is safe, effective, and efficient at treating hair loss.

Keywords: Herbal Shampoo, *Oryza Sativa*, *Hibiscus Powder*, Hair Fall, Detergency Power, Biodegradable, etc.

I. INTRODUCTION :

Herbal shampoo is a cosmetic product made from age-old ayurvedic herbs that is used to clean the hair and scalp. Shampoo is a product used to wash hair, and it comes in a thick liquid form. The goal of shampoo is to eliminate dirt, stop hair loss, and remove unwanted buildup between the hairs without removing too much sebum that makes the hair difficult to manage. The most common hair treatment is shampooing. Although the majority of shampoos on the market today are surfactant-based, shampoos can be made using herbs and their extracts. Surfactants are included for their cleansing abilities, but prolonged use of them can harm hair, cause eye irritation, and result in hair loss and dryness. [1]

In order to make hair silky, lustrous, strong, and conditioning as well as to boost the

strength, texture, and growth of hair, this study employed a herbal shampoo formulated with *Hibiscus-rosasinensis*, *Embalica officinalis*, *Trigonella foenum graecum*, *Aloe barbadensis*, and fermented rice water. Fermented rice water is rich in inositol, an antioxidant that is helpful for the health of your hair. Inositol, a component of rice water, has the power to penetrate damaged hair and rebuild it from the inside out while also preventing thinning. The perfect pH of fermented rice water keeps hair healthy and shiny, improves skin elasticity, lessens surface friction, and prevents greying of the hair. Vitamins B6 and B12 are abundant in it. There are numerous medicinal herbs that have been found to have positive effects on hair and are widely utilized in Shampoo composition. These plant products can be powdered, crude, pure extracts, or derivatives. It's Very Difficult to make an herbal shampoo by using only one natural ingredient that's milder and safer than synthetics while yet Competing favorably in terms of foaming, detergency, and solid content. As per result, we decided to prepare a pure herbal Shampoo using plant parts and material that have been used for hair cleaning in shampoo. for shampoo quality control testing, visual inspection and physiochemical controls like the wetting test, surface tension, pH, density, and viscosity are used. While shampoos with a low detergent concentration can be found in finest and premium shampoos, shampoos with a high detergent content can be found in lesser quality shampoos. Shampoos for oily hair may contain the same detergent at the same concentration as shampoos for dry hair. [2]

Need Of Shampoo

- 1.The skin on our head produce a greasy fluid called sebum. It is produced to protect the hair from sebum.
- 2.This give the hair a healthy shine
3. Eliminate extra oil[3]

Ideal properties of herbal shampoo:

1. The corneal cells from the hair should be removed, along with any excess sebum or other fatty substances and dust or soil.
2. It should generate enough foam to meet the psychological needs of the user.
3. It should be simple to remove after water rinsing.
4. It ought to leave the hair manageable, soft, lustrous, and non-dry.
5. It gives the hair a lovely fragrance.
6. It shouldn't cause any skin or eye irritation or side effects.
7. It shouldn't dry out and roughen up the hand. [4]

Objectives

1. Calculate the quantity of fermented rice water required to smooth the scalp and hair of people.
2. Find out how well the nutrients in fermented rice water can penetrate the harm done to human hair and scalp.
3. Evaluate the possibility of making shampoo for human hair from fermented rice water.
4. To create a herbal shampoo to prevent hair loss.
5. To evaluate the natural shampoo.
6. To lessen the damaging effects of chemical formulations on hair and to prevent hair loss.
7. To strengthen and promote hair growth.

Functions of Shampoo

1. It must effectively and thoroughly remove dirt.
2. The hair must be thoroughly cleaned.
3. It ought to produce enough foam to make the user feel comfortable.
4. The dirt should be easily removed by rinsing with water.
5. It ought to leave the hair with a lovely fragrance or scent.

6. It shouldn't have any unfavourable effects or hurt your skin or eyes. [5]

Advantages of Herbal Shampoo

1. Cheaper and easier to produce.
2. Easily accessible, plentiful, and found in a wide variety.
3. They had no unfavourable side effects and neither promoted nor caused allergic reactions.
4. Simple to integrate into the skin and hair.
5. Used herbal resources are pure and organic.
6. No API or ingredients derived from petroleum.

Disadvantages of Herbal Shampoo

1. Sometimes it's challenging to cover up taste and odour.
2. Because herbal medicines work more slowly than allopathic ones, prolonged treatment is necessary.
3. The manufacturing process is laborious and complex.
4. Vary from batch to batch in consistency [6]

TYPES OF SHAMPOOS

Shampoos are of following types

Based on function

- Clear liquid shampoo
- Powder shampoo
- Lotion shampoo
- Medicated shampoo
- Solid gel shampoo
- Liquid herbal shampoo

Specialized shampoo

- Anti-dandruff shampoo
- Baby shampoo
- Two-layer shampoo
- Conditioning shampoo [7]

✓BRIEF INFORMATION ABOUT FERMENTED RICE WATER RICE WATER

Figure 1: Fermented Rice water



DESCRIPTION:

Take one cup of rice (any variety would do), rinse it, and then drain the water. Now let the rice soak for 20 minutes in two cups of distilled water, stirring every five minutes. Transfer the water to a clean bottle, strain it, and leave it overnight. It should have started to ferment and go sour in the morning. It is said to help the hair grow more quickly and make it lustrous and silky. Starch makes around 75-80% of rice grains. The essential proteins and keratin in our hair can be replaced with the aid of fermented rice water. Fermented rice water is rich in minerals and vitamins B, C, and E. It has a PH of about 6, which is somewhat acidic.

Benefits of Fermented Rice water:**1. Fermented Rice water for hair Strength:**

Use Fermented rice water for hair if you want strong, healthy hair. The rice water's amino acids fortify the hair roots. Additionally, it contains inositol, an antioxidant that gives the hair strength. It is simple to detangle hair using fermented rice water, which reduces hair breakage and nourishes hair.

2. Hair-care with fermented rice water sparkle, smoothness, and shine

Fermented rice water can be used to give hair a shiny, full-of-lustrous appearance. The added layer of defence provided by fermented rice water is particularly effective against air pollution and dirt, heat-producing electronic hair appliances, chemicals in hair care products, etc. These cause the hair to lose its sheen, while the fermented rice water makes sure that it stays silky, smooth, and shining. A natural conditioner that provides the hair fantastic bounce is fermented rice water.

3. Rice water fermented for hair growth

The fact that fermented rice water promotes hair growth and prevents hair loss—and that you can notice the rise in just a short period of

time—is another crucial factor. The hair remains healthy as the fermented rice water helps shield it from harm. The fermented rice water's protein, vitamin, and antioxidant boost to the hair promotes rapid hair growth.

4. Fermented Rice water for to eliminate dandruff and flakes

The growth of *Malassezia*, a fungus that can cause dandruff, is inhibited by fermented rice water, particularly that made from red rice. Therefore, treating hair with fermented rice water will solve the dandruff issue. It manifests the antifungal properties. Additionally, it moisturises the hair and scalp, preventing dry skin, which leads to skin flaking, from developing. Weekly application of fermented rice water to the hair will prevent flakes and dandruff.

5. It is a chemical free hair cleanser

Using it as a shampoo to wash out your hair may not be as convenient as a store bought shampoo, but it comes without chemicals and preservatives, and you don't even need to follow it up with a conditioner.

6. It maintains a pH equilibrium on the scalp.

The pH values of rice water are identical to those of the scalp, preserving the natural oils in your hair! A few drops of your favourite essential oils can be added to rice water for additional benefits, and this mixture can take the place of your typical shampoo.

7. For frizzy hair protection

According to a 2010 study published in the International Journal of Cosmetic Science, utilising fermented rice water as a hair treatment has various advantages, including enhanced elasticity, the prevention of hair loss, a smoother texture, less friction, and less frizz. This is largely because inositol, an antioxidant, is present[8].

PLANT:

Fig 2: Rice plant

Name of the plant: *Oryza sativa*
 Biological source: made up of the endosperm and embryo of *Oryza sativa* seeds.
 Family: Poaceae/Graminae

Poaceae/Graminae, which includes grasses and graminées
 Rice species: *Oryza L.*
 Species: rice, *Oryza sativa L.*

CLASSIFICATION IN SCIENCE:

Kingdom: Plantae – plants, plants, planta, and vegetation
 Viridiplantae, a subkingdom of green plants
 Embryophyta is a super division.
 Tracheophyta, which includes tracheophytes and vascular plants
 Spermatophytina, or spermatophytes, are the division.
 Magnoliopsida, a class

Chemical composition: A full complement of amino acids, 12% water, 75%–80% starch (carbohydrate), 7% protein, 3% fat, and 3% fibre make up a rice grain’s chemical make-up.

Drug-Related Activity:

Antihairfall Antioxidant, antifungal, anti-colitis, cancer-preventive, anti-tumor, anti-mutagenic, antidiabetic, ocular impairment, anti-aging, and anti-inflammatory. Vitamin B, C, E, and minerals included in fermented rice water support skin cell growth. [9]

II. MATERIALS AND METHEOD

Table1: Formulation table of fermented rise water herbal shampoo

Sr.No	Name of ingredients	F1	F2	F3	F4	F5	F6
1.	Rice water (ml)	15	20	25	30	35	40
2.	Hibiscus powder (gm)	0.4	1	1.4	2	2.4	3
3.	Amla powder (gm)	0.4	1	1.5	2	2.4	3
4.	Aloevera gel (gm)	0.4	1	1.4	2	2.4	3
5.	Reetha powder (gm)	0.4	1	1.4	2	2.4	3
6.	Shikakai powder (gm)	0.4	1	1.4	2	2.4	3

7.	Vit.E (gm)	0.4	1	1.4	2	2.4	3
8.	Shampoo base (Q.S)	0.4	1	1.4	2	2.4	3

Preparation of herbal shampoo:

1.Place cup of rice in a clean bowl and give it a quick rinse under the faucet to get rid of any dirt or impurities.

added more water to the rice once more after draining the water, and I covered the bowl with a sturdy lid. About a day, set the bowl aside at room temperature.



2.After collecting the rice water, put it in a clean glass jar and let it ferment for two to three days.

3. To the collected fermented rice water, add the vitamin E, aloe vera gel, hibiscus powder, amla powder, reetha powder, shikakai powder, and stir until they are evenly distributed.

4. Formulation was now filtered.

5. The filtered formulation was infused into the shampoo base until the desired viscosity was reached.

Table 2: Information of Ingrdients

Sr.no	Common name	Image	Botanical name	Part of plant	Category
1.	Fermented rice water		Oryza sativa	seed	Stimulating the hair growth
2.	Amla		Phyllanthus emblica	fruit	Prevent premature graing

3.	hibiscus		Hibiscus rosa-sinesis	flower	Conditioning agent
4.	Aloe vera		Aloe vera	leaf	Conditioning agent
5.	Reetha		Sapindus mukorossi	fruit	Controlling hairfall And removing dandruff
6.	Shikakai		Senegalia rugata	seed	Controlling hairfall And removing dandruff

Evaluation criteria:

A number of quality control tests were carried out to evaluate the formulation of shampoo.

1. Physical Appearance

By looking at the shampoo with the unaided eye, physical qualities like colour, clarity, and odour were assessed.

2. Calculation of pH:

Using a pH analyzer, the pH of the herbal shampoo made from fermented rice water was determined.

3. To test for dirt dispersion:

10 ml of distilled water was added to two drops of specially formulated herbal shampoo in a wide-mouthed test tube. One drop of Indian ink was put to the test tube, and the test tube's mouth was sealed while it was shook for ten minutes. Test tube

ink volume was measured, and the outcome was assessed in terms of heavy[10]

4. Foaming ability:

50 ml of the prepared herbal shampoo is added to a test tube with a capacity of 250 ml, and the test tube is shaken ten times in increments of one and four minutes. After the 1 minute of shaking, total foam was measured. The so-called "cylinder shake approach."

5. Wetting test:

A disc with a 1 inch diameter was cut from a 0.45 g canvas paper. Put it on the shampoo solution's surface. With the aid of a stop watch, note how long it takes the paper to absorb the formulation. [11]

6. Surface tension test:

The surface tension of the prepared herbal shampoo in pure water (10% w/v) was measured using a stalagmometer at room temperature.

Formula was used to arrive at the result:

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

W1= weight of empty beaker

W2= weight of beaker with distilled water

W3= weight of beaker with herbal shampoo

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.[12]

7.Determination of solid content:

Place approximately 4g of shampoo solution in an evaporating dish. By setting the dish on a hotplate, the prepared shampoo's liquid component evaporated. After the dish had dried completely, the amount of solid material left in it was calculated.

It was determined by using the formula;

$$\% \text{ of solid content} = C-A / B-A \times 100$$

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[13]

8.Rheological or Viscosity evaluations:

Using a Brookfield viscometer, the viscosity of the herbal shampoos was assessed. Spindle was submerged in 10ml of shampoo for

roughly five minutes before readings were obtained.

9.Detergency ability:

The effectiveness of the herbal shampoo samples was assessed using the Thompson method. In a nutshell, a clump of hair washed in a 5% sodium lauryl sulphate (SLS) solution, dried, and split into 3g weight of groups. The samples were shaken for 15 minutes at room temperature while being suspended in a 10% fake sebum solution in hexane. Following sample removal, the solvent was at room temperature evaporated, and the sebum content was calculated. The following procedure involved splitting each sample into two equal halves, one of which rinsed with 0.1 ml of the 10% test shampoo and was used as the negative control. After drying, samples' remaining sebum was removed using 20 ml of n-hexane, and the samples were then reweighed.

Finally, the percentage of detergency power was calculated using the following equation:

$$DP=100(1-T/C)$$

In which, DP is the percentage of detergency power, C is the weight of sebum in the control sample and T is the weight of sebum in the test sample .[14]

10.Phytochemical Analysis of Fermented Rice Water

To determine the existence of bioactive chemical elements such alkaloids, flavonoids, glycosides, steroids, phenols, tannins, and proteins, qualitative phytochemical tests were carried out. [15,16]

III. RESULT AND DICUSSION:

Table 3: physicochemical evaluation of herbal shampoo

Sr. no	Evaluation parameter	Observation					
		F1	F2	F3	F4	F5	F6
1.	COLOUR	Brown	Brown	Brown	Dark brown	DarkBrown	DarkBrown
2.	ODOUR	Characteristic Viscous Smooth					
3.	APPEARANCE						
4.	TEXTURE						
5.	PH	8.4	8.2	7.4	6.9	6.3	5.4

6.	DIRT DISPERSION	Medium	Medium	Medium	None	None	None
7.	FOAMING INDEX(ml)	30	36	40	49	55	70
8.	WETTING TEST(sec)	95	115	118	128	142	158
9.	%OF SOLID CONTENT	15	18	21	24	28	35
10.	SURFACE TENSION(dyne/cm)	22.60	28.44	32.33	36.40	41.24	43.52

Physical appearance:

The shampoo formulation was evaluated for visual examination. The shampoo formulation was found to be clear, dark brown, and odourless.

pH:

The shampoo's pH is crucial for stabilising the scalp, enhancing hair quality, and minimising eye discomfort. Most shampoos are made with either a neutral or slightly acidic pH to reduce damage to hair. The pH of the herbal shampoo formulation was determined to be between 5.4 and 8.4.

Determination of solid content:

Generally speaking, a high-quality shampoo needs to have a solid content of 20% to 30% in order to be simple to apply and remove. It is quite challenging to wash off if the solid concentration is higher. The solid percentage of the herbal shampoo formulation was discovered to be between 15% and 35%.

Foaming ability and foaming stability:

One of the crucial factors to take into account while evaluating shampoos is foaming power. The designed herbal shampoo's foam volume was discovered to be between 30 and 70 millilitres. Even after observing for 4 minutes, this volume had not changed.

Dirt dispersion:

The dirt dispersion test is quite important for assessing the cleansing effect of shampoo. If the ink concentrates in the froth of the shampoo, it is deemed to be of low quality. The outcomes were

classified as heavy, moderate, light, or none based on the ink concentration in the foam.

Wetting time:

Wetting time tests are performed to evaluate the shampoo's effectiveness. It depends on the surfactant concentration. The preferred approach for determining the wetting time is the canvas disc method. The designed shampoo's wetting time was discovered to be between 95 and 158 seconds.

Surface tension:

Based on the surface tension readings, the detergency of the shampoo can be calculated. The surface tension value must be lower for the shampoo's cleaning power to increase. The surface tension of the herbal shampoo formulation was discovered to be between 22.60 and 43.52 dynes/cm. [17]

IV. CONCLUSION:

In order to lessen hair loss and encourage hair growth, fermented rice water herbal shampoo was created. Traditional herbs, herb extract, and fermented rice water were used to create a herbal shampoo that is very safe and effective to use. Inositol, a significant chemical component found in rice water, is important for minimising hair damage when receiving the keratin treatment since it supports the hair root and encourages hair growth. Additionally, several plants that work well as conditioning agents and antifungal agents are employed. Contrary to the use of synthetic

conditioning agents, the use of natural conditioning agents aids in reducing moisture on the skin's surface and hair loss. Various metrics, including wetting time, visual inspection, foaming index, pH, filth dispersion, percentage of solid content, and surface tension, were used to evaluate later-formulated herbal shampoo. It was determined that formulation F4 has produced superior outcomes than other formulations based on the evaluation results of different formulations. In comparison to other formulations, the herbal shampoo made from fermented rice water helps to prevent hair loss, encourage hair growth, and keep hair strong. Consequently, the herbal shampoo made from fermented rice water proved safe to use and aids in preventing hair loss. The aqueous extract of medicinal herbs that are frequently used for hair washing traditionally was employed in the formulation of fermented rice water herbal shampoo. Instead of synthetic materials, the current study uses fermented rice water, hibiscus flower, aloe vera leaf, fruit of reetha, and shikakai and amla seeds to deliver the positive results.

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