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Formulation and Evaluation of Herbal Shampoo from Fermented Rice Water and its Anti-Fungal Activity

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Abstract: *The most common problem these days is hair loss, so the primary goal of the study is to reduce hair loss and promote hair growth. The essential element of this study is fermented rice water (Oryza sativa), which includes significantly extra antioxidants than pure rice water. Inositol is the main component that helps reduce hair loss. The herbal shampoo was made from traditional herbs inclusive of Hibiscus rosasinensis, Sapindus mukorossi, Aloe Vera, Senegalia rugata and fermented rice water in different concentrations and examined on various parameters. The effects show that the herbal shampoo has the following properties, such as desirable foaming ability, good cleansing, low surface tension, viscosity and soothing properties. The effects of the evaluation of the herbal shampoo showed higher effects, which is good to use, secure and powerful in treating hair loss.*

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

I. INTRODUCTION

Shampoo is a liquid or cream soap or detergent that is used to wash the hair. Shampoo is a hair washing product that comes in the form of a thick liquid. Shampoo's purpose is to remove the undesired build-up between the hairs without removing so much sebum that the hair becomes unmanageable. The most popular type of hair treatment is shampooing. Shampoos are made up of a range of herbs and their extracts, although the majority of shampoos on the market today are surfactant-based. Surfactants are included for their cleansing properties, but their continued usage can cause eye irritation, hair loss, and hair dryness. [1]

Herbal shampoo made with Hibiscus-rosasinensis, Embalica officinalis, Trigonella foenum graceum, Aloe barbadensis, and fermented rice water was used in this study to make hair silky and lustrous, as well as increase the strength, texture, and growth of hair. Fermented rice water is abundant in anti-oxidants, which are good for your hair's health. The element in rice water, inositol, has the capacity to penetrate damaged hair and restore it from the inside out. The ideal pH of fermented rice water maintains hair lustrous, enhances skin elasticity, decreases surface friction, and keeps hair from greying. [2]

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 exceedingly difficult to make an herbal shampoo with only one natural ingredient that's milder and safer than synthetics while yet competing favorably in terms of foaming, detergency, and solid content. As a result, we decided to create a pure herbal shampoo using plant elements that have been used for hair cleaning in India for centuries.

The quality control tests for shampoos include visual inspection and physiochemical controls such as pH, density, and viscosity. The most common detergents contain sodium lauryl sulphate; however, the concentration varies greatly between brands and even within a manufacturer's product range. Shampoos with a high detergent content may be found in cheap shampoos, while shampoos with a low detergent concentration may be found in premium shampoos. Shampoos for oily hair might contain the same detergent as shampoos for dry hair at the same concentration. It's more likely that the difference is due to a reduction in the amount of oil or conditioning substance in the shampoo for oily hair, or it could just be the packaging

Ideal Properties of shampoo. [3]

1. To make the hair easy and shiny.
2. Produce specific quantity of foam.
3. Should now no longer motive irritant to scalp, pores and skin and eye.
4. Should absolutely, successfully take away dust.

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5. Impart exceptional perfume to hair.

Functions of Shampoo

1. It is responsible to successfully and absolutely take away dust or soil.
2. It is responsible to successfully wash the hair.
3. It is responsible to produce an excellent quantity of froth to fulfill the user.
4. It is responsible to be effortlessly eliminated via way of means of rinsing with water.
5. It is responsible to impart a pleasing perfume to the hair.
6. It is responsible to now no longer have any aspect consequences or reasons of infection to the pores and skin and eye.

II. MATERIALS AND METHODS

Table 1: Formulation Table of Fermented Rice Water Shampoo

Sr. No	Name of 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	Reetha powder (gm)	0.5	1	1.5	2	2.5	3
4	Shikakai 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	Vit E (gm)	0.5	1	1.5	2	2.5	3
7	Shampoo base (Q.S)	0.5	1	1.5	2	2.5	3

Preparation of Herbal Shampoo

1. • Take a cup of rice in clean bowl & rinse with water for once to remove dirt & impurities .
   • Drained the water & again added some amount of water to rice & cover the bowl with heavy lid . Kept the bowl aside at room temp for 1 day .
2. • Later collected rice water & transfer into clean glass jar & allow it to ferment for 2 to 3 days
3. • Collected fermented Rice water added Hibiscus powder , Reetha powder , Shikakai powder, Aloe vera gel , Vitamin E & stirred well until they are dispersed
4. • Now solution was filtered
5. • The filtered solution was added to the shampoo base until it attains the desired viscosity

Table 2: Description of Ingredient Used

Sr. No	Common Name	Picture	Botanical Name	Part Used	Category
1	Fermented Rice Water		Oryza sativa	Seed	Used for hair growth

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2	Hibiscus		Hibiscus rosa – sinesis	Flower	Conditioning agent
3	Reetha		Sapindus mukorossi	Fruits	Controlling hair fall & removing dandruff
4	Shikakai		Senegalia rugata	Seed	Controlling hair fall & removing Dandruff
5	Aloe Vera		Aloe vera	Leaf	Conditioning agent

III. Evaluation of Herbal Shampoo

A. Physical Appearance: [4]
Formulated shampoo become evaluated for Physical characteristics inclusive of transparency, color, smell with the aid of using watching with bare eye.

B. pH Determination: [5]
The pH of the fermented rice water shampoo became evaluated through taking (10% v/v) Solution through the use of pH analyzer.

C. Wetting Test: [6]
A paper canvas weighing 0.44 g is reduce right into a 1-inch diameter disc. Put it at the floor of the shampoo solution. Record the time it takes for the paper to sink into the formula and mark the time with a stopwatch

D. Test for Dirt Dispersion: [7]
Two drops of the formulated shampoo have been delivered to ten mL of distilled water placed in a wide-mouth test tube. A drop of Indian ink is placed withinside the test tube and the test tube is shaken for 10 mins through sealing it. The quantity of ink in the test tube becomes measured. The final rating became categorized as hard, medium, none.

E. Foaming Ability: [8]
Add 50 ml of formulated shampoo to a 250 ml test tube volume, shake the test tube 10 times with a period of 1 min and 4 min respectively. The total foam was measured after stirring for 1 minute. The process is called the cylinder Shake method

F. Surface Tension Test: [9]
The surface tension of the shampoo formulated in clean water (10% w/v) was evaluated using a stalagmometer at room temperature. It was determined using the formula
R2/R1 = w3-w1(n1)/w2-w1(n2)
Where,

W_1= weight of empty beaker
W_2= weight of beaker with distilled water
W_3= weight of beaker with herbal shampoo solution
n_1= number of drops of distilled water
n_2=number of drops of shampoo solution
R_1= surface tension of distilled water at room temperature
R_2= surface tension of shampoo solution

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G. Determination of Solid Content: [10]

About 4g of shampoo solution become placed in an evaporating dish. The liquid part of the shampoo become after evaporated by using placing the dish on warm plate. Remaining solid content material withinside the dish become calculated 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'

H. Phytochemical Analysis of Fermented Rice Water: [11,12]

Qualitative phytochemical studies were conducted to identify the presence of bioactive chemical components such as alkaloids, flavonoids, glycosides, steroids, phenols, tannins and proteins.

I. Anti-Fungal Assay:

Discs impregnated with known concentration of antifungal discs are placed on agar plate that has been inoculated (or) seeded uniformly over the entire plate with a culture of the micro-organism to be tested. The plate is incubated for 18-24 hrs. at 370C. During this period, the antifungal agent diffuses through the agar and may prevent the growth of fungi. Effectiveness of susceptibility is proportional to the diameter of inhibition of zone around the disc. Organisms which grow up to the edge of the disc are resistant.

- Organisms used: *Candida albican*.
- Media used: Nutrient Agar.
- Test used: Fermented Rice Water Shampoo
- Standard: Fluconazole

IV. Results and Discussion

Table 3: Physicochemical evaluation of formulated herbal shampoo

Sr. 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	Apperance	VISCOUS					
4	Texture	SMOOTH					
5	pH	8.3	8.1	7.9	6.4	6.2	5.3
6	Dirt Dispersion	Medium	Medium	Medium	None	None	None
7	Foaming Index (ml)	32	36	42	48	55	65
8	Wetting Test (sec)	94	114	116	125	140	155
9	% Of solid content	13	18	20	23	28	32
10	Surface Tension	20.25	26.30	30.33	36.30	42.32	44.25
11	Anti-Fungal Assay	20 mm	18 mm	21 mm	24 mm	22 mm	18 m

A. Physical Appearance:

The formulated shampoo became evaluated for visible inspection. The formulated shampoo became determine to be clear, dark brown in color, and had a moderate odor.

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B. pH:
pH of the shampoo plays important function in improving hair quality & decreasing infection to eye. The shampoo is formulated both with neutral or slightly acidic ph. The pH. of formulated herbal shampoo was found to be in the range 1.2 to 8.5.

C. Determination of Solid Content:
In general, a quality shampoo should have a solids content in the 20% to 30% range. The solids content of the formulated herbal shampoo ranged from 15% to 34%.

D. Foaming Ability and Foaming Stability:
Foaming ability is one of the important parameters to consider when evaluating shampoos. The foam volume of the Formulated herbal shampoo ranged from 30 ml to 68 ml. This volume had remained constant even after 4 minutes of observation.

E. Dirt Dispersion:
The dirt dispersion test plays a very important role in assessing the cleaning effect of the shampoo. Shampoos are considered poor quality, if the ink is concentrated in the foam. Depending on the concentration of ink in the foam, the results were declared as heavy, moderate, light and none.

F. Wetting Time:
The effectiveness of the shampoo wetting time check is accomplished. It relies upon the concentration of surfactant. The canvas disc approach is preferred for calculating the wetting time. The wetting time of the formulated shampoo had been determined to be with in the variety of 96 to 158sec.

G. Surface Tension
The detergency of the shampoo can be decided primarily on the basis of the surface tension values. The lower the Surface tension value, the greater the cleaning effect of the shampoo. The surface tension of the formulated herbal Shampoo was found to be range from 22.63 to 43.52 dynes/cm.
‘

H. Phytochemical Analysis

Phytochemicals	Test	Result
Alkaloids	Mayer’s test	++
Flavonoids	Alkaline reagent test	++
Phenols	Phenols test	-
Tannins	Ferric chloride test	-
Glycosides	Keller kiliani test	++
Proteins	Biuret test	++
Steroids	Salkowski test	-

The Phytochemical studies had been performed based on qualitative evaluation to identify the presence of bioactive chemical constituent. From the observation table, we will say that alkaloids, flavonoids, glycosides and protein had been present where phenols, tannins and steroids had been absent.

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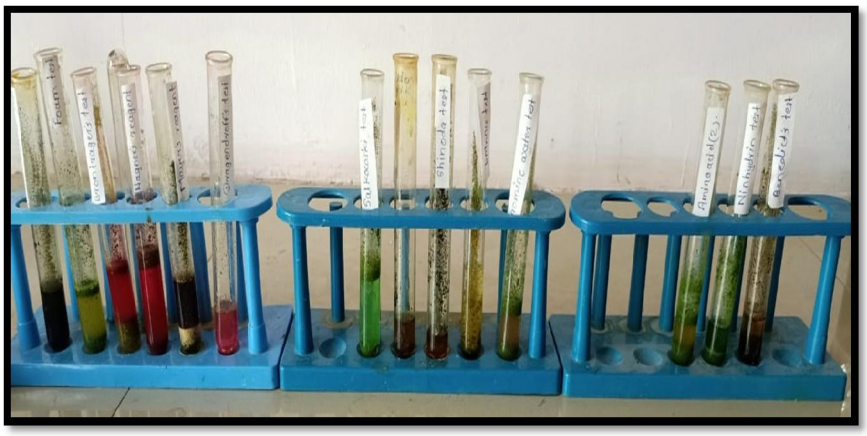

Figure 1: Phytochemical Analysis of Fermented Rice Water

A. Anti-Fungal Assay

Zone of inhibition is a testing and observing the microbial activity growth of microorganisms or antimicrobial agent. The fig 2 results shown zone of inhibition this is an area of agar diffusion method where the bacteria are unable to grow, due to presence of drug that inhibits the growth of microorganisms and this shows that the product or formulations having good anti-dandruff activity. And the above Formulations is good to inhibit the dandruff from scalp and protect the skin from other fungi or microbials.

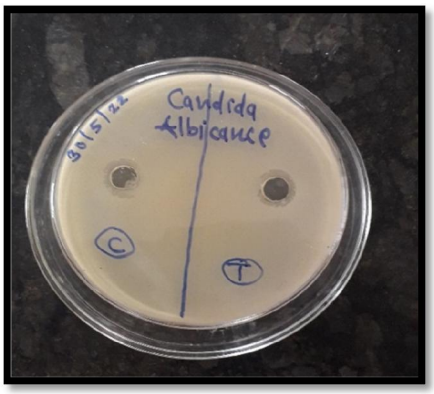

Figure 2: Anti-Fungal Assay

V. CONCLUSION

The main motive of formulating herbal shampoo was to reduce hair fall and promote hair growth. Herbal shampoo was formulated using conventional herbs that are very secure and effective to be used. Inositol, a chemical constituent present in the rice water, performs a key function in stopping hair damage, and useful for the hair growth. The utilization of herbal conditioning markers enables in stopping hair loss in comparison to the usage of artificial conditioning markers. Later, the formulated herbal shampoo was evaluated for various parameters which includes visible inspection, pH, dirt dispersion, % of solid content, wetting time and surface tension. Based on the evaluation effects of various formulations, it was concluded that formulation F4 has shown better effects while in comparison to different formulations. Hence, the formulated herbal shampoo was secure and powerful to be used and helps in reducing the hair fall.

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