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Formulation and Evaluation of Herbal Anti-Microbial Shampoo by Using Goat Milk and Garlic

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ABSTRACT

The present research work aimed to formulate antimicrobial herbal shampoo by using Garlic and Goat milk and evaluate the prepared natural herbal shampoo. The compositions of herbal shampoo are Reetha extract (*Sapindus mukorossi*), Amla extract (*Emblica officinalis*), Galic extract (*Allium sativum*), Goat's milk, Star anise oil (*Illicium verum*), and Sandalwood oil (*Santalum album*) added as fragrance, Methylparaben was added as a preservative. For extraction, the decoction method was used. The shampoo was prepared having antimicrobial activity from garlic, conditioning activity from goat milk, and anti-lice activity from star anise oil. The shampoo was evaluated for some parameters like physical appearance, pH, Conditioning Performance, Viscosity, Dirt dispersion, % of Solid content, visual stability, and surface tension. The results of the above test are as follows. The Shampoo's physical character was brown and had a good odor. PH (4) was observed and neutralized by the buffer solution. Foam volume was found to be 100 ml and showed good stability. The viscosity was found to be (30cp), and Dirt dispersion was found to be moderate. Total solid content is (22). Surface tension was reduced to 42 dyn/cm. The formulation was clear had good foam formation, foam quality, and no skin irritation and result showed the production of stable herbal shampoo with no sign of phase separation and no change in the color Herbal shampoo showed protection from lice but also give a conditioning effect, shine to hair and show good antimicrobial activity. Further research and development are required to improve its quality and safety.

1. INTRODUCTION

Herbal Shampoo is defined as a preparation of a surfactant, surface-active material in suitable form liquid, emulsion, and pastes which when used under the conditions specified will remove surface grease, dirt on skin debris from the hair shaft and scalp without affecting adversely the hair, scalp or health of the user. Herbal Shampoo is a widely daily product all over the world. It has been used for many years. Today's market is filled with a chemical Herbal Shampoo. Chemical Herbal Shampoo is prepared with several chemicals which can cure hair problems but are also responsible for damage to hair. Some international research said that the chemicals of Herbal Shampoo are also responsible for cancer.

Fig no 1: Herbal Medicinal Plant

The selection of active ingredients for hair care powders is based on the ability of the ingredient to prevent skin damage as well as to improve the quality of the skin by cleansing, nourishing, and protecting the skin. The most advantage-able thing about Herbal Shampoo is that it has no side effects. Our Herbal Shampoo contains Amla, Reetha, Sandalwood oil, Star Anise oil, Goat milk[14].

Dandruff is actually caused by microbes and it is a 100% natural and called namely as a **Malassezia.** Malassezia is a monophyletic genus of fungi and found all warm-blooded mammals and humans and it contributed dandruff, atopic eczema dermatitis, pityriasis, Versicolor, and folliculitis etc. Around 50% of people's bodies have a negative reaction to the presence of this fungus, causing dandruff. Natural oils are presented in our scalp and it called as a sebum and it is a fuel/food for the dandruff-causing microbe. Malassezia feeds off these oils, breaking it down into by-products, including oleic acid formation of oleic acid is a starting kick point of dandruff [2, 12].

2. MATERIAL AND METHOD

2.1 The extraction method of decoction

A decoction is a method of extraction by boiling plant material to dissolve the chemicals of the material, which may include stems, roots, bark, and rhizomes. The concentration extract prepared from the medicinal plant after it has been boiled. A decoction is a method of extraction by boiling herbal or plant material (which may include stems, roots, bark and rhizomes) to dissolve the chemicals of the material.

Pharmaceutical: Drugs a **decoction** is an essence or liquor that you decoct from a substance. I took out some of the decoction just after the liquid started to boil and strained it. Boil the leaves in water and drink the resulting decoction. A decoction is the essence or liquor that you decoct from a substance.[11]

2.2 MATERIALS

Table No. 01 List of Material

INGREDIENTS	ROLE OF INGREDIENTS
Reetha extract	Foaming agent
Amla extract	To provide nourishment to hair
Garlic	Anti-Microbial
Goat Milk	Conditioning
Star anise	Anti-lice
Methyl Paraben	Preservative
Guar gum	Thickening agent
Citric acid	To adjust pH
Sandalwood oil	Perfume

2.3 IDENTIFICATION TEST: [13,5,6]

- **Detection of Alkaloids**

Mayer s test

To a few ml of filtrate, a drop or two of Mayer s reagent is added by the side of the test tube. A white or creamy precipitate indicates the test as positive.

Wagner s test

To a few ml of filtrate, a few drops of Wagner s reagent are added by the side of the test tube. A reddish-brown precipitate confirms the test as positive.

Dragendorf s test

To a few ml of filtrate, 1 or 2 ml of Dragendorff s reagent are added. A prominent yellow precipitate indicates the test as positive.

- **Detection of carbohydrates**

Molish Test

To 2 ml of filtrate, two drops of alcoholic solution of alpha naphthol are added, the mixture is shaken well and 1ml of concentrated sulphuric acid is added slowly along the sides of the tube and allowed to stand. A violet ring indicates the presence of carbohydrates.

Detection of saponins

The extract (50 mg) is diluted with distilled water and made up of 20 ml. the suspension is shaken in a graduated cylinder for 15 min. A 2 cm layer of foam indicates the presence of saponins.

- **Detection of Amino acids**

Millon s test

To 2 ml of filtrate, a few drops of Millon s reagent are added. A white precipitate indicates the presence of proteins.

Biuret test

An aliquot of 2ml filtrate is treated with one drop of 2% copper sulfate solution. To this, 1ml ethanol (95%) is added, followed by an excess of potassium hydroxide pellets. The pink colour in the ethanolic layer indicates the presence of proteins.

- **Test for sterol**

Liebermann Burchard s test - The extract (50 mg) is dissolved in 2 ml acetic anhydride. To this, one or two drops of concentrated sulphuric acid are added slowly along the sides of the test tube. An array of colour changes shows the presence of Phytosterols.

- **Detection of phenolic compounds and Tannins**

Ferric chloride test

The extract (50 mg) is dissolved 5 ml of distilled water. To this, few drops of neutral 5% ferric chloride Solutions is added. Dark green colour indicates the presence of phenolic compounds.

Lead Acetate test

The extract (50 mg) is dissolved in distilled water and to this; 3 ml of 10% lead, and acetate solution is added. A bulky white precipitate indicates the presence of Phenol compound.[4]

2.4 EVALUATION TEST – [4,5,7]

➢ **Physical appearance**:

As with any other herbal cosmetic products, the attractiveness of shampoos for consumers tends to be judged visually, thus having a good physical appearance is important. The formulated shampoo is opaque and brown in colour. It has a good odour given by the fragrance in the ingredients and also a good foam-producing ability. The formulated shampoo was observed to be significantly different with synthetic shampoo in terms of colour and transparency.

➢ **Determination of pH:**

The pH of shampoo solution (10% w/v) in distilled water was determined at room Temperature Detergency and cleaning action 5gm sample of solid human hair is placed at 35ºc in 200cc of water containing of 1gm of shampoo. The flask is shaken 50 times a minute

for 4 minute. Then washed once again with a sufficient amount of water, then after the filter the hair dried and weighed. The amount of soil removed under this condition is calculated. Neutral pH was obtained.

➢ **Conditioning action**:

Conditioning action the degree of conditioning given to hair is ultimately judged by the shampoo user who is making the evaluation based on past experience.

➢ **Foam ability and foam stability:**

200 ml of surfactant solution is dropped into a glass column containing 50 ml of the sane solution the height of foam generated is measured immediately and again after a specified time interval and is considered proportional to the volume.

➢ **Skin irritation test:**

Applied the solution of prepared shampoo on the skin and kept for 5 min and observed for redness of skin and irritation there, was no any red coloration and the irritation to the skin.

➢ **Foam index:**

Test tube A = 1ml shampoo -- 0.9 cm foam

Test tube B = 2ml shampoo – 1 cm foam

Test tube C = 3ml shampoo – 1.5 cm foam

Test tube D = 4ml shampoo – 2 cm foam

Test tube E = 5ml shampoo – 2.7 cm foam

Foaming index= 1000\A

Where A = Volume of decoction having exact 1cm height

Therefore, foaming index = 1000\2 = 500

➢ **Viscosity**

The viscosity of liquid shampoo is determined using “Brookfield Viscometer" Product viscosity plays an important role in defining and controlling many attributes such as shelf-life stability and product aesthetics such as clarity ease of flow on removal from packing and

spreading on application to hair and product consistency in the package. The flow characteristics of non-Newtonian materials are usually not measured with a single data point, because their viscosity is dependent on the shear rate.

➢ **Dirt dispersion:**

Two drops of shampoo were added to a large test tube containing 10 ml of distilled water. 1 drop of India ink was added; the test tube was a stopper and shakes it ten times. The amount of ink in the foam was estimated as None, Light, Moderate, or Heavy. Ossify drops, which would allow ease of spreading on the hair.

➢ **% solid content:**

A clean dry evaporating dish was weighed and added 4 gm of shampoo to the evaporating dish. Then dish was allowed to evaporate the shampoo on hot plate. The weight of evaporating of shampoo was noted and calculated.

2.5 FORMULATION OF SHAMPOO –

Table no.02 List of Ingredient

Sr. No.	Ingredient	Quantity
1	Amla	15 ml
2	Reetha	30 ml
3	Garlic	10 ml
4	Goat milk	10 ml
5	Star anice oil	3 to 4 drop
6	Sandalwood oil	3 to 4 drop
7	Preservative	5 ml
8	Water	Makeup 100 ml

Preparation Method –

We prepare herbal shampoo by the extraction method of decoction.

1. Add 15 ml of Amla extract.
2. Then, add 30 ml of Reetha extract to it. Triturate both properly.

3. Further adding, 10 ml Garlic extract and 10 ml Goat milk Mix all the ingredients properly.

4. To this, add 3 to 4 drops Star anise oil for anti-lice activity.

5. Now, add 3 to 4 drops of Sandalwood oil as a perfumery in herbal shampoo.

6. Then, add 5 ml of preservative (methylparaben) and make volume up to 100 ml by adding Distilled water to it.

3. RESULTS -

3.1 IDENTIFICATION TEST –

Table No. 3.1 Identification test result

Plant constituent	**Phytochemical test**	**Aqueous extract Of Reetha**	**Aqueous extract Of Amla**	**Aqueous extract Of Allium Sativum**
Alkaloid test				
	Mayer s test	+	+	+
	Wegner's test	-	-	+
	Dragendorff s	-	+	-
Carbohydrate				
	Molisch's test	+	+	+
	Saponin test	+	+	-
Amino acids				
	Millon s test	+	+	
	Phytosterols	-	-	
Test for Sterols				
	Libermann and Buchards test	+		
Phenolic compounds				
	Ferric chloride	+	+	
	Lead acetate	+	+	
	Alkaline reagent test	+	+	
Flavonoids		+	+	+
Tannis		+	+	+
Saponins		+	+	-
Steroids				-

3.2 EVALUATION TEST RESULT –

Table No. 3.2 Evaluation of prepared shampoo

Sr. No.	Test	Result
1	Physical appearance	Brownish white
2	Determination of PH	7
3	Conditioning action	Good
4	Foam stability	Stable
5	Foam index	500
6	Viscosity	30 cp
7	Dirt dispersion	Moderate
8	Solid content	22
9	Skin irritation	No
10	Cleaning action	Good

3.3 ANTI-MICROBIAL TEST [2, 10, 11, 13,]

The antimicrobial activity of all the extracts was carried out by **Disc Diffusion Method** using the following organism.

Bacterial pathogens:

(i) E.coli

(ii) Staphylococcus aureus

Fungal pathogens:

(i) Aspergillus niger

(ii) Aspergillus fumigate

(iii) Malassezia species

3.4 Anti-Bacterial Test-

Antibacterial activity of plant extracts was carried out against bacterial pathogens, such as *E. coli* and *Staphylococcus aureus* using agar well diffusion method. Initially, the stock cultures of bacteria were revived by inoculating in broth media and growth at 37ºC for 18hrs. The

Nutrient agar plates were prepared and wells were made in the plate. Each plate was inoculated with cultures and spread evenly on the plate. After 20 min, the wells were filled with aqueous plant extract (25%, 50%, 75%, and 100%). The control wells with water prepared. All the plates were incubated at 37ºC for 24 h and the diameter of the inhibition zone in mm was noted. A mixture of plant extract (75%) in the proportion (50%, 70%, 90%, 100%) was also filled in another two plates spread with bacteria *Staphylococcus aureus* and *E.coli*.[13]

3.5 Antifungal Test -

The bulb extract of Allium sativum was tested by well diffusion method for the detection of its antifungal activity. 1ml of culture is placed in petri plate and sabouraud agar was poured, mix thoroughly and plates were allowed to solidify. Prepare well in plates by using cork borer. Plant extract of different solvent i.e. aqueous, methanol and chloroform added in labelled well and incubated at 30ºC for 24 hours. The test material having antifungal activity inhibit the growth of microorganism and clear distinct zone of inhibition was seen around the well [10].

4. DISCUSSION -

The present study was carried out to prepare the herbal shampoo that reduces hair loss during combing, safer than the chemical conditioning agents as well as strengthens the hair growth. Herbal shampoo was formulated with the aqueous extract of medicinal plants that are commonly used for cleansing hair traditionally. Use of conditioning agents (synthetic) reduces protein or hair loss. To provide the effective conditioning effects, the present study involves the use of amla, and other plant extracts instead of synthetic cationic conditioners. The main purpose behind this investigation was to develop a stable and functionally effective shampoo by excluding all types of synthetic additives, which are normally incorporated in such formulations. To evaluate for good product performance of the prepared shampoo, many tests were performed. The results of the evaluation study of the developed shampoo revealed a comparable result for quality control test, but further scientific validation is needed for its overall quality.

5. CONCLUSION -

The formulated shampoos were not only safer than the synthetic shampoo, but also greatly reduce the hair loss during combing as well as strengthened the hair growth. The present

study was carried out to prepare herbal shampoo that reduces hair loss during combing, is safer than the chemical conditioning agents as well as strengthens the hair growth. Herbal shampoo was formulated with the aqueous extract of medicinal plants that are commonly used for cleansing hair traditionally Use of conditioning agents (synthetic) reduces the protein or hair loss. To provide the effective conditioning effects, the present study involves the use of goat milk, Amla, and other plant extracts instead of synthetic In the present scenario, it seems improbable that herbal shampoo, although better in performance and safer than the synthetic ones, will be popular with the consumers. The awareness and need for cosmetics with herbs is on the rise, as it is strongly believed that these products are safe and free from side effects. But when compared to the chemical-based shampoos, herbal shampoos are more effective in terms of safety and ease of manufacturing and in an economic point of view they are cheap. From the result, in the present study, the prepared herbal shampoo formulation was comparable to the market shampoos in many parameters. Our data suggest that, prepared herbal shampoo is recommended as a choice product in cost-effective hair care cosmetics.

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