



Preparation and Evaluation of Herbal Shampoo

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Abstract: Herbal shampoo is used to cleansing of the hair also conditioning, smoothing, of the hair surface, good health of hair, hair free of dandruff, dirt grease and lice above all, its safety benefits are expected. Herbal shampoos are the cosmetic preparations that with the use of traditional ayurvedic herbs are meant for cleansing the hair and scalp just like the regular shampoo. They are used for removal of oils, dandruff, dirt, environmental pollution. The advantage of herbal cosmetics is their non-toxic nature, reducing allergic reactions and time-tested usefulness of many ingredients. Thus, in present work, we found good properties for herbal shampoo and further optimization study benefits of herbal shampoo on human use as cosmetic products. Herbal shampoos are the cosmetic preparations that with the use of traditional ayurvedic herbs are meant for cleansing the hair and scalp just like the regular shampoo. They are used for removal of oils, dandruff, dirt, environmental pollution. Herbal Shampoo is a cosmetic preparation which uses herbs, and it is meant for washing hair and scalp just like a regular shampoo. The herbal shampoo was formulated using natural ingredients like *Phyllanthus emblica* (Amla), *Azadirachta indica* (Neem), *Acacia concinna* (Shikakai), *Spindus mokerossi* (Reetha), *Aloe barbadensis* (Aloe vera).

Keywords: Herbal Shampoo, Traditional ayurvedic, *Phyllanthus emblica*, *Azadirachta indica*, *Acacia concinna*.

1. Introduction

From ancient times beyond memory, mankind has been borrowing abundantly from nature to care for their health, skin and hair, as natural ingredients that have preventive, protective and corrective action. The warehouse of cosmetics provides versatile natural ingredients that enhance the beauty of the skin and hair.

Hair is one of the external barometers of internal body conditions. Shampooing is the most common form of hair treatment. The primary function of shampooing is aimed at cleansing of the hair necessitated due to accumulated sebum, dust, scalp debris etc. Various shampoo formulations are associated with hair quality, hair care habit and specific problems such as treatment of oily hairs, dandruff and for androgenic alopecia. Shampoos are liquid, creamy or gel like preparations. The consistency of the preparation depends on the inclusion of traditional soaps saturated with glycerides and natural or synthetic fatty alcohol or the thickening agents (e.g. gum, resin and PEG). Indian women use herbals such as shikkakai and reetha that are natural cleansing agents without harmful effects.

Nowadays natural sources remain attractive primarily when compared to synthetic ones, so herbal shampoos are popular with the consumer when compared to the synthetic one.¹

A shampoo is a preparation of a surfactant in a suitable form- liquid, solid or powder- which when used under the specific conditions will remove surface grease, dirt and skin debris from the hair shaft without adversely affecting the user.



Ideal characters of 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.
- Should impart a pleasant fragrance to the hair.
- Should not make the hand rough and chapped.
- Should not have any side effects or cause irritation to skin or eye.

Composition of shampoo

- Principal surfactant
- Secondary surfactant
- Antidandruff agents
- Conditioning agents
- Pearlescent agents
- Sequestrants
- Thickening agents
- Colours, perfumes and preservatives.

Surfactants are the main components of shampoo. Mainly anionic surfactants are used. The raw materials used in the **manufacture of shampoo are Principal surfactants:** provide detergency and foam.

Secondary surfactants: improved detergency, foam and hair condition.

Conditioning agents: Lanolin, mineral oil, fenugreek, herbal extracts, Henna egg derivatives.

Foam builders: shikakai.

Viscosity modifiers:

Electrolytes: NH_4Cl , NaCl

Natural gums: Gum karaya, tragacanth, alginates

Cellulose derivatives: Hydroxy ethyl cellulose, methyl cellulose

Carboxy vinyl polymers: Carbopol 934

Others: PVP, phosphate esters.

Squestering agents: EDTA

Opacifying agents: Alkanolamides of higher fatty acids, propylene glycol, Mg, Ca and Zn salts of stearic acid, spermaceti, etc.

Clarifying agents:

Solubilising alcohols: ethanol, isopropanol Phosphates

Nonionic solubilizers: Polyethoxylated alcohol, esters.

Perfumes: Herbal, fruity or floral fragrances.

Preservatives: Methyl and propyl paraben, formaldehyde

Anti dandruff agents: Shikakai, Neem

2. Some of Ingredients Diagram**1) Soap Nut Extract**

2) Amla Extract**3) Shikakai Extract****4) Aloe vera extract****5) Senna extract****6) Bhringraj Extract**

3. Types of Shampoo

Shampoos are of the following types:

- Powder Shampoo
- Liquid Shampoo
- Lotion Shampoo
- Cream Shampoo
- Jelly Shampoo
- Aerosol Shampoo
- Specialized Shampoo
- Conditioning Shampoo
- Anti- dandruff Shampoo
- Traditional shampoo
- Herbal shampoo
- Solid shampoo

1. Traditional Shampoo

The most common hair care cosmetic product is shampoo. Arora et al. reported that can be described, primarily, as cosmetic preparation, packed in a form convenient for Use, generally applied for cleaning hair and scalp from dirt, residues of previously applied hair Styling products and environmental pollutants.

2. Herbal Shampoo

Interestingly, there are a large number of plants having beneficial effects on hair and being commonly used in shampoos for their content of vitamins, amino acids, sugars, glycosides, phyto-hormones, bioflavonoids, fruit acids and essential oils useful protocols for the artificial soiling of hair, various cleaning processes and the analysis of the lipids remaining on the hair by gas chromatography.

Ingredients	Medicinal Uses
Neem	Antibacterial agent
Soap nut extract	Foaming agent
Amla extract	Antidandruff agent
Shikakai extract	Detergent
Hibiscus	Conditioning agent
Bhringraj extract	Hair growth
Aloe vera	Moisturizing agent
Gelatin	Gelling agent
Lemon Juice	Anti-Microbial Agent

3. Solid shampoo

Solid shampoos present some additional advantages compared to the traditional ones. In particular, they are easy to transport and can be used for a longer time, thanks to more Microbiological stability than liquid formulations.

4. Powder shampoo

It is available in the form of Dry powder, initially it was prepared from dry Soaps, but nowadays dry synthetic detergents are Used for their preparation. Powder shampoo is Prepared where addition of water or other solvent Reduces the activity of the components, especially In case of medicated shampoo. Now a day these Shampoos are not used due to the difficulty Experienced in their application.

Ingredients	Biological sources	Uses
Amla fruits	ripe fruits of <i>E. officinalis</i>	Hair darkening, Hair growth promoter
Neem	Dried leaves of <i>A. indica</i>	Anti-dandruff agent, Anti-bacterial agent
Shikakai fruits	Dried pods of <i>A. concinna</i>	Foaming agent, Anti- dandruff agent



Tulsi	Dried leaves of O. Sanctum	Anti- dandruff agent
Bahera	Dried fruits of T. belleirica	Hair darkening, Hair growth promoter
Brahmi	Dried leaves of C. asiatica	Supporting health of Hair
Henna	Dried leaves of L.inermis	Hair conditioner

5. Liquid shampoo:

These are clear liquid mixtures that are most widely used. They are Usually made by using detergent of low cloud Point. Some of these shampoos may be transparent.

SLS	40%	Cleansing and foaming agent
NaCl (to desired viscosity)	2-4%	Thickener
Water	Upto100%	Vehicle
Perfume, color, preservatives	Q.S	Fragrance

6. Cream shampoo:

These are called lotion Shampoos which are modification of clear liquid Cream shampoos. solubilising agents such as magnesium stearate is also used to dissolve the Added opacifier. (9,2,8)

SLS	38%	Cleansing and foaming agent
Acetyl alcohol	7%	Moisturizer
Water	Up to 100%	Vehicle
Color, perfume	Q.S.	Fragrance
Preservatives	Q.S.	Prevent the microbial growth

7. Jelly Shampoo:

These are transparent and thick Usually produce by incorporating a gelling agent, e.g., cellulose). There is great use in hair salons and beauty parlors. The principal ingredient is detergent which can be used either alone or in combination with soap. by altering the proportion of detergent, gel of required consistency can be Obtained. Addition of methyl cellulose to clear Liquid shampoo and its successive thickening also show rise to gel shampoo.

Alkyl dimethyl benzalkonium chloride	15%	Antimicrobial agent
TLS (40%)	28%	Baby shampoo
Coconut di-ethanolamide	7%	Stabilise the foam
HPMC	1%	Foam enhancer and stabilizer, thickener, emulsion stabilizer
Water	Up to 100%	Vehicle
Color, Perfume, preservatives	Water Up to 100% Q. S	Vehicle Fragrance, prevent the microbial growth

8. Aerosol Shampoo:

They are called aerosol Shampoos because they are packed in aerosol Containers. Their formulation, preparation and Packing is complex as an additional propellant Is included. The propellant added must be united and should not reduce the activity of Shampooing ingredients. The container space is Provided with a valve. Shampoo comes out foam When the valve is pressed. Consequently, it is also called Foam type shampoo.

TLS	60%	Baby Shampoos,
Coconut di-ethanolamide	2%	Stabilise the foam
Water	Up to 90%	Vehicle



Propellent	10%	Cleaner
Color, Perfume, Preservatives	Q. S	Fragrance, prevent the microbial growth

Advantages of Shampoo:

- Cleansing properties
- Improving hair hygiene.
- Treating scalp conditions
- Treatment for dry scalp
- Treatment for hair loss.
- Treatment for greasing or oily hair.
- Relieves itch and irritation
- Repairs damaged hair.
- Shampoo keeps hair silky or smooth.
- Keeps your hair beautiful and blossomed.

Formulation of Herbal Shampoo

Formulation of the herbal shampoo was done as per the formula given in Table 1. To the gelatin solution (10%), added the herbal extract and mixed by shaking continuously at the time interval of 20 min. 1 ml of lemon juice was also added with constant stirring. To improve aroma in the formulation, sufficient quantity of essential oil (rose oil) was added and made up the volume to 100 ml with gelatin.

Sr. No.	Material Required	Quantity	Medicinal Use
1.	Neem	0.5 g	Antibacterial agent
2.	Soap nut extract	0.5 g	Foaming agent
3.	Amala extracts 0.5g	0.5 g	Antidandruff agent
4.	Shikakai extract	0.5 g	Detergent
5.	Hibiscus	0.5 g	Conditioning agent
6.	Bhringraj extract	0.5 g	Hair growth
7.	Aloe vera	0.5 g	Moisturizing agent
8.	Gelatin	Q.S.	Gelling agent
9.	Lemon juice	Q.S.	Antimicrobial
10.	Rose oil	Q.S.	fragrance

Sutar Manisha et al. formulated a polyherbal shampoo using amla fruit, hibiscus leaf, neem leaf, shikakai fruit, aloe leaf, henna leaf, ritha fruit and evaluated for organoleptic, powder characteristics, dirt dispersion, wetting time, foam test and physical evaluation and considered as safe.

Gholamreza Dehghan et al. formulated an herbal conditioner shampoo using fenugreek seeds methanol extract and evaluated physicochemical properties. It is concluded that the formulated shampoo has a good quality of introducing it to the market.

Mohamed Halith et al. formulated herbal shampoo using natural ingredients with tulasi and neem. Both are having anti dandruff action. The study revealed that the anti-dandruff activity of *Ocimum sanctum* and *Azadiracta indica* against strains of G⁺ and G⁻ organisms and fungal organisms.

Naresh et al. formulated an herbal shampoo containing chamomile, rose and orange peel and sodium lauryl sulphate. The shampoo is evaluated for physical parameters and considered safe.

Suriya Prakash et al. formulated an herbal shampoo for its antimicrobial and anti-lice activity. The natural ingredients used are neem leaf, Tulasi leaf, mehndi leaf and gooseberry fruit. The prepared formulation was evaluated for its physicochemical properties, antimicrobial and anti-lice activity, which was compared with the marketed products.

Nasrin aghel et al. formulated an herbal shampoo using total saponins of *acanthophyllum squarrosum*. The foaming ability of shampoo was evaluated by the Ross-Miles method and the cleansing power by Thompson test.

4. Evaluation of Herbal Shampoo

Physical appearance/visual inspection:

The formulations prepared were evaluated in terms of their clarity, foam producing ability and fluidity.

Determination of pH:

The pH of 10% shampoo solution in distilled water was determined at room temperature 25°C.



Determine percent of solids contents:

A clean dry evaporating dish was weighed and added 4 grams of shampoo to the evaporating dish. The dish and shampoo was weighed. The exact weight of the shampoo was calculated only and put the evaporating dish with shampoo was placed on the hot plate until the liquid portion was evaporated. The weight of the shampoo only (solids) after drying was calculated.

Wetting time:

The canvas was cut into 1-inch diameter discs having an average weight of 0.44g. The disc was floated on the surface of shampoo solution 1%w/v and the stopwatch started. The time required for the disc to begin to sink was measured accurately and noted as wetting time.

Rheological evaluations:

The viscosity of the shampoos was determined by using Brookfield Viscometer (Model DV-1 Plus, LV, USA) set at different spindle speeds from 0.3 to 10 rpm. The viscosity of the shampoos was measured by using spindle T95. The temperature and sample container's size was kept constant during the study.

Dirt dispersion:

Two drops of shampoo were added in a large test tube containing 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.

Cleaning action:

5 grams of wool yarn were placed in grease, after that it was placed in 200 ml. of water containing 1 gram of shampoo in a flask. The water temperature was maintained at 35°C. The flask was shaken for 4 minutes at the rate of 50 times a minute. The solution was removed, and the sample was taken out, dried and weighed. The amount of grease removed was calculated.

Surface tension measurement:

Measurements were carried out with a 10% shampoo dilution in distilled water at room temperature. Thoroughly clean the stalagmometer using chromic acid and purified water. Because surface tension is highly affected with grease or other lubricants.

Detergency ability:

The Thompson method was used to evaluate the detergency of the samples. Briefly, a crumple of hair were washed with a 5% sodium lauryl sulfate (SLS) solution, then dried and divided into 3g weight groups. The samples were suspended in a n-hexane solution containing 10% artificial sebum and the mixture was shaken for 15 minutes at room temperature. Then samples were removed, the solvent was evaporated at room temperature and their sebum content determined. In the next step, each sample was divided into two equal parts, one washed with 0.1 ml of the 10% test shampoo and the other considered as the negative control. After drying, the resided sebum on samples was extracted with 20 ml n-hexane and re-weighed. Finally, the percentage of detergency power was calculated.

Foaming ability and foam stability:

The cylinder shake method was used for determining foaming ability. 50 ml of the 1% shampoo solution was put into a 250 ml graduated cylinder and covered the cylinder with hand and shaken for 10 times. The total volumes of the foam contents after 1 minute shaking were recorded. The foam volume was calculated only. Immediately after shaking the volume of foam at 1-minute intervals for 4 minutes were recorded.

Skin sensitization test:

The guinea pigs were divided into 7 groups (n=3). On the previous day of the experiment, the hairs on the backside area of guinea pigs were removed. Shampoos were applied onto nude skin of animals of groups. A 0.8% v/v aqueous solution of formalin was applied as a standard irritant on animal. The animals were applied with new patch/formalin solution for up to 72 hours and finally the application sites were graded according to a visual scoring scale, always by the same investigator. The erythema scale was as follows: 0, none; 1, slight; 2, well defined; 3, moderate; and 4, scar formation (severe).



Eye irritation test:

Animals (albino rats) were collected from animal houses. About 1% of shampoo solutions were dripped into the eyes of six albino rabbits with their eyes held open with clips at the lid. The progressive damage to the rabbit's eyes was recorded at specific intervals over an average period of 4 seconds. Reactions to the irritants can include swelling of the eyelid, inflammation of the iris, ulceration, hemorrhaging (bleeding) and blindness.

Surface characterization:

Surface morphology of the hairs was examined by scanning electron microscopy (Leo 430, Leo Electron Microscopy Ltd., Cambridge, England). The hair samples were mounted directly on the SEM sample stub, using double side stitching tape and coated with gold (thickness 200nm) under reduced pressure (0.001 mm of Hg). The photomicrographs of suitable magnification were obtained for surface characterization.

Stability studies:

The thermal stability of formulations was studied by placing them in glass tubes and they were placed in a humidity chamber at 45°C and 75% relative humidity. Their appearance and physical stability were inspected for a period of 3 months at an interval of one month.

Evaluation of herbal powder shampoo**Solubility:**

Solubility is defined as the ability of the substance to soluble in a solvent. One gram of the powder is weighed accurately and transferred into a beaker containing 100 ml of water. This was shaken well and warmed to increase the solubility. Then cool and filter it, the residue obtained is weighed and noted.

Loss on drying:

Loss on drying is the loss of mass expressed in percent m/m. Two grams of the powder was weighed accurately and transferred into a dry Petri dish. The Petri dish is placed in a dessicator for 2 days over calcium chloride crystals. Then the powder was taken and weighed accurately to find out the weight loss during drying.

Swelling index:

The swelling index is the volume in milliliters occupied by one gram of a drug, including any adhering mucilage, after it has swollen in an aqueous liquid for 4 hours. Accurately weighed 1 g of the powder and transferred it into glass stopper measuring cylinder containing 25 ml of water. Then it shakes thoroughly every 10 minutes for 1 hour. After that it was kept for 3 hours at room temperature. The volume was measured in ml.

Angle of repose:

It is defined as the maximum angle possible in between the surface of pile of powder to the horizontal flow.

Methods:

- i. Funnel method.
- ii. Open – ended cylinder method.

I. Funnel method:

The required quality of dried powder is taken in a funnel placed at a height of 6 cm from a horizontal base. The powder was allowed to flow to form a heap over the paper on the horizontal plane. The height and radius of the powder was noted and recorded.

II. Open - ended cylinder method:

The required amount of dried powder is placed in a cylindrical tube open at both ends and is placed on a horizontal surface. Then the funnel should be raised to form a heap. The height and radius of the heap are noted and recorded.

Bulk density:

Bulk Density is the ratio between the given mass of a powder and its bulk volume. The required amount of the powder is dried and filled in a 50 ml measuring cylinder up to 50 ml mark. Then the cylinder is dropped onto a hard wood surface from a height of 1 inch at 2second intervals. The volume of the powder is measured. Then the powder is weighed. This is repeated to get average values.

Foaming index:

One gram of the powder was weighed accurately and transferred into 250 ml conical flask containing 100 ml of boiling water. Then it is warmed gently for 30 minutes, cooled and filtered and make up the volume to 100 ml in



standard volumetric flask. This extract is taken in 10 test tubes in a series of successive portion of 1, 2, 3....10 ml and remaining volume is made up with water to 10 ml. Then the test tubes were shaken in long-wise motion for 15 seconds at the speed of 2 frequencies / second. Then the tubes are allowed to stand for 15 minutes. The height of the foam was measured.

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