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A review on Herbal Shampoo and its evaluation

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ABSTRACT:

Shampooing is the most common form of hair treatment. Shampoos are primarily products aimed at cleansing the hair and scalp. In the present scenario, it seems improbable that herbal shampoo will be popular with consumers, although better in performance and safer than synthetic ones. A more radical approach to popularizing herbal shampoo would be to change the consumers' expectations of shampoo, with an emphasis on safety and efficacy. The present paper emphasizes composition, types, evaluation methods, and a brief review of herbal shampoo formulations.

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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, nature provides such 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 shampoo is aimed at cleansing the hair necessitated due to accumulated sebum, dust, scalp debris, etc. Various shampoo formulations are associated with hair quality, hair care habits, and specific problems such as the treatment of oily hair, dandruff, and 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 alcohols or thickening agents (e.g. gum, resin, and PEG). Indian women use herbals such as *shikakai* and *reetha* which 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 synthetic ones.

A shampoo is a preparation of a surfactant in a suitable form- liquid, solid, or powder- which when used under specific conditions will remove surface grease, dirt, and skin debris from the hair shaft without adversely affecting the user [1,2].

Ideal characteristics of shampoo [1,2]:

- Should effectively and completely remove the dust and 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, and 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 the skin or eye.

Composition of shampoo [1,2]:

- Principal surfactant.
- Secondary surfactant.
- Anti-dandruff agents.
- Conditioning agents.
- Pearlescent agents.
- Sequestrates.
- 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 which provide detergency and foam. The secondary surfactants improved detergency, foam, and hair condition.

- Conditioning agents: Lanolin, mineral oil, fenugreek, herbal extracts, and Henna egg derivatives.
- Foam builders: shikakai.
- Electrolytes: NH_4Cl, NaCl.
- Viscosity modifiers:
  - Natural gums: Gum karaya, tragacanth, and alginates.
  - Cellulose derivatives: Hydroxy ethyl cellulose, methylcellulose
  - Carboxy vinyl polymers: Carbopol 934
  - Others: PVP, phosphate esters.
- Sequestering agents: EDTA
- Opacifying agents: Alkanolamides of higher fatty acids, propylene glycol, Mg, Ca, and Zn salts of stearic acid, spermaceti, etc.
- Clarifying agents:
  - Solubilizing alcohols: ethanol, isopropanol, and Phosphates.
  - Nonionic solubilizers: Polyethoxylated alcohols, esters.
- Perfumes: Herbal, fruity, or floral fragrances.
- Preservatives: Methyl and propylparaben, formaldehyde.
- Anti-dandruff agents: Shikakai, neem, and thulasi.

Types of shampoo [1,2]:

- Liquid shampoo.
- Solid cream shampoo.
- Jelly shampoo.
- Powder shampoo.
- Lotion shampoo.
- Aerosol foam shampoo.

Specialized shampoo:

- Conditioning shampoo.
- Antidandruff shampoo.
- Baby shampoo.
- Two-layer shampoo.

Scientific work on the Formulation of shampoo:

Ali Heyam Saad and Rasool Bazigha Kadhim reported a formulation of self-preserving shampoo having a low concentration of the detergent using *Ziziphus spinacristi* leaves with an emphasis on safety and efficacy. Evaluation of organoleptic, physicochemical, and performance tests was performed and compared with an herbal-marketed product and considered safe [3].

Sachin Dubey, *et al.* formulated two preparations of herbal shampoo using some common traditional drugs such as bahera, amla, neem Tulasi, shikakai henna, and Brahmi and evaluated for organoleptic, powder characteristics, foam test, and physical evaluation and considered as safe [4].

Sutar Manisha, *et al*. formulated a polyherbal shampoo using amla fruit, hibiscus leaf, neem leaf, shikakai fruit, aloe leaf, henna leaf, and ritha fruit, and evaluated for organoleptic, powder characteristics, dirt dispersion, wetting time, foam test and physical evaluation and considered as safe [5].

Gholamreza Dehghan, *et al*. formulated a herbal conditioner shampoo using fenugreek seeds methanol extract and evaluated it for physicochemical properties. It is concluded that the formulated shampoo has a good quality in introducing it to the market [6].

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 indicia* against strains of G+ and G- organisms and fungal organisms [7].

Swati Deshmukh, *et al*. formulated a herbal shampoo using Aloe vera, neem, shikakai, reetha, amla brahmi and evaluated it, and concluded it as safe [8].

Naresh, *et al*. formulated a herbal shampoo containing chamomile, rose and orange peel, and sodium lauryl sulfate. The shampoo is evaluated for physical parameters and is considered safe [9].

Suriya Prakash, *et al*. formulated a herbal shampoo for its antimicrobial and anti-lice activity. The natural ingredients used are neem leaf, thulasi leaf, Mehandi leaf, and gooseberry fruit. The prepared formulations were evaluated for their physicochemical properties, and antimicrobial and anti-lice activity, which were compared with the marketed products [10].

Nasrin aghel, *et al*. formulated a herbal shampoo using total saponins of *acanthophyllum squarrose.* The foaming ability of shampoo was evaluated by the Ross-Miles method and the cleansing power by Thompson test [10].

EVALUATION OF HERBAL SHAMPOO [1-3]:

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

Determine the percent of solids contents:

A clean dry evaporating dish was weighed and added 4 g of shampoo was to the evaporating dish. The dish and shampoo were 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 0.44 g. The disc was floated on the surface of the shampoo solution at 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-l 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 size was kept constant during the study.

Dirt dispersion:

Two drops of shampoo were added to a large test tube containing 10 ml of distilled water. 1 drop of Indian ink was added; the test tube was stoppered and shaken it ten times. The amount of ink in the foam was estimated as None, Light, Moderate, or Heavy.

Cleaning action:

About 5 g of wool yarn was placed in grease, and after that, it was placed in 200 ml of water containing 1 g of shampoo in a flask. The temperature of the water was maintained at 350 °C. The flask was shaken for 4 min at the rate of 50 times a min. The solution was removed and a 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 chronic acid and purified water because surface tension is highly affected by grease or other lubricants.

Detergency ability:

The Thompson method was used to evaluate the detergency ability of the samples. Briefly, a crumple of hair was washed with a 5 % sodium lauryl sulfate (SLS) solution, then dried and divided into 3 g weight groups. The samples were suspended in an n-hexane solution containing 10 % artificial sebum and the mixture was

shaken for 15 min at room temperature. Then samples were removed, the solvent was evaporated at room temperature and their sebum content was 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 residing 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. About 50 ml of the 1 % shampoo solution was put into a 250 ml graduated cylinder and covered the cylinder with a hand and shaken 10 times. The total volumes of the foam contents after 1 minute of shaking were recorded. The foam volume was calculated only. Immediately after shaking the volume of foam at 1 min intervals for 4 min was 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 the guinea pigs were removed. Shampoos were applied onto the nude skin of animals of groups. A 0.8 % v/v aqueous solution of formalin was applied as a standard irritant on an animal. The animals were applied with a new patch/formalin solution for up to 72 h 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 % shampoo solution was 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:

The 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 film (thickness 200 nm) 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 intervals of one month.

Evaluation of herbal powder shampoo:

***Solubility*:**

Solubility is defined as the ability of the substance to be 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 cooled and filtered, the residue obtained is weighed and noted.

***Loss on drying*:**

Loss on drying is the loss of mass expressed in percent m/m. About 2 g of the powder was weighed accurately and transferred into a dry petridish. The petridish is placed in a desiccator 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 h. Accurately weighed 1 g of the powder and transferred into a glass stopper measuring cylinder containing 25 ml of water. Then it is shaken thoroughly every 10 min for 1 h. After that, it was kept for 3 h at room temperature. The volume was measured in ml.

***Angle of repose*:**

It is defined as the maximum angle possible between the surface of the pile of powder to the horizontal flow. The methods are the Funnel method, Open-ended cylinder method, and Funnel method:

The required quality of the 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 were noted and recorded.

Open-ended cylinder method: The required amount of dried powder is placed in a cylindrical tube open at both ends 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 the 50 ml mark. Then the cylinder is dropped onto a hardwood surface from a height of 1 inch at 2-second 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 a 250 ml conical flask containing 100 ml of boiling water. Then it is warmed gently for 30 min, cooled, and filtered and make up the volume to 100 ml in a standard volumetric flask. This extract is taken in 10 test tubes in a series of successive portions of 1 to 10 ml and the remaining volume is made up of water to 10 ml. Then the test tubes were shaken in longwise motion for 15 s at speed of 2 frequencies/s. Then the tubes are allowed to stand for 15 min. The height of the foam was measured.

CONCLUSION:

Globalization is the need of today and the world market will open for all by 2005. The world is also moving towards herbal medicines for health care, healthy foods, and for cosmetic purposes including hair preparations. India is a rich heritage for the cultivation and production of herbal medicines due to its diversified climatic conditions. The present paper emphasizes composition, types, evaluation methods, and a brief review of herbal shampoo formulations.

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