

A Review on Formulation and Evaluation of Herbal Shampoo

T. Mathesvaran¹, S.K.Senthil kumar^{1*}, E. Pavendhan², E. Pavithra², N. Pavithra², S. Pavithra², K. Praveen².

¹Assistant Professor, Department of Pharmaceutics, Arunai college of pharmacy, Tiruvannamalai, Tamil Nadu – 606 603.

^{1*}Principal, Department of Pharmaceutics, Arunai college of pharmacy, Tiruvannamalai, Tamil Nadu – 606 603.

²Final year B.Pharm students, Arunai college of pharmacy, Tiruvannamalai, Tamil Nadu – 606 603.

Submitted: 20-08-2023

Accepted: 31-08-2023

ABSTRACT:

Shampooing is the most common form of hair treatment. Shampoos are primarily been products aimed at cleansing the hair and scalp. 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. A more radical approach in popularizing herbal shampoo would be to change the consumers' expectations from a shampoo, with emphasis on safety and efficacy. The present paper emphasizes on composition, types, methods of evaluation, also a brief review on herbal shampoo formulations.^[1]

KEYWORDS: Herbal Shampoo, Types, Anti-Dandruff, Anti hair fall, Evaluation methods.

I. INTRODUCTION:

From ancient time 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 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 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 alcohols 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 the synthetic one, so herbal shampoos are popular with the consumer when compared to the synthetic one.

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.^[1]

Shampoos are most probably used as cosmetics. It is a hair care product that is used for cleaning scalp and hair in our daily life. Shampoos are most likely utilized as beautifying agents and are a viscous solution of detergents containing suitable additives preservatives and active ingredients. It is usually applied on wet hair, massaging into the hair, and cleansed by rinsing with water. The purpose of using shampoo is to remove dirt that is build up on the hair without stripping out much of the sebum. Many synthetic shampoos are present in the current market both medicated and non-medicated; however,herbal shampoo popularized due to natural origin which is safer, increases consumer demand and free from side effects. In synthetic shampoos, surfactants (synthetic) are added mainly for their cleansing and foaming property, but the continuous use of these surfactants leads to serious effects such as eye irritation, scalp irritation, loss of hair, and dryness of hairs. Alternative to synthetic shampoo we can use shampoos containing natural herbals. However, formulating cosmetic products containing only natural substances are very difficult. There are a number of medicinal plants with potential effects on hair used traditionally over years around the world and are incorporated in shampoo

formulation. These medicinal plants may be used in extracts form, their powdered form, crude form, or their derivatives. To develop a shampoo containing an only one natural substance which would be safer with milder effect, then the synthetic shampoo is difficult and also it should possess good foaming, detergency, and solid content as such synthetic shampoo. Hence, we considered in detailing an unadulterated natural cleanser utilizing conventional technique using regularly utilized plant material for hair washing.^[2]

Hair is one of the external barometers of internal body conditions. It is an important part of human body derived from ectoderm and is protective appendages on the body associated with sebaceous glands, sweat glands. Haircare products are the preparation which are meant for cleansing, modifying the texture, changing of the colour, providing nourishment to the hair and giving the healthy look to the hair. Shampoo is described as a cosmetic preparation meant for washing hair of accumulated sebum, scalp debris and residue of hair grooming preparations. Herbal shampoo is a cosmetic preparation which uses herbs from plants and it is meant for washing of hair and scalp just like a regular shampoo. It is an alternative to the synthetic shampoo available in market. Synthetic shampoo causes harmful effects on hairs, skin and eyes so community got attracted towards the herbal products, due to negligible side effects and less cost. The objective of the present research work is to formulate and evaluate an herbal shampoo with various herbs for multipurpose use by eliminating all traditionally incorporated synthetic ingredients. This shampoo clears sebum, dirt, dandruff, promotes hair growth, strengthens, and darkens hair. Moreover, it also acts as a conditioning agent. This herbal shampoo powder performs all these actions without affecting or damaging hair^[3].

Hairs are the integral part of human beauty. People are using herbs for cleaning, beautifying and managing hair since the ancient era. As the time has passed synthetic agents have taken a large share but today people are getting aware of their harmful effects on hairs, skin and eyes. These regions attracted to community towards the herbal products, which are less expensive and have negligible side effects. Hair cleansers or shampoos are used not only for cleansing purpose but also for imparting gloss to hair and to maintain their manageability and oiliness for hairs. Shampoos are of various types, like powder shampoo, clear liquid shampoo liquid shampoo,

lotion shampoo, solid gel shampoo, medicated shampoo, liquid herbal shampoo etc. As far as herbal shampoos are concerned in stability criteria. Depending upon the nature of the ingredients they may be simple or plain shampoo, antiseptic or antidandruff shampoo and nutritional shampoo containing vitamin, amino-acids proteins hydrolysate.^[4]

A liquid or cream preparation of soap or detergent to wash the hair is called as shampoo. Shampoo is a hair care product, typically in the form of a viscous liquid that is used for cleansing hair. The goal of using shampoo is to remove the unwanted build-up in between the hair without stripping out so much sebum as to make hair unmanageable. Shampooing is the most common form of hair treatment. Shampoos are primarily being products aimed at cleansing the hair and scalp. 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. A more radical approach in popularizing herbal shampoo would be to change the consumer expectations from a shampoo, with emphasis on safety and efficacy.^[5]

The hair of the head has historically been associated with beauty and social distinction. The hair has been trimmed, shaped, and even coloured since the most ancient times; relatively little emphasis has been placed on the process of cleaning it. Real technology in the cleaning of hair and scalp has developed only in this century. First came the mass distribution of cake soap and sanitary facilities to make bodily cleanliness and personal hygiene practical. Next came the specialization of branded shampoo products for the hair and scalp, offered in a multiplicity of types and forms. Hair care by itself can induce a state of self-confidence and may reflect social status. This may explain significant differences in shampooing regimens, which range from once or twice a week to once a day. Hair is a mid-way between nature and culture. Hair care attitudes are different from one society to another regardless of economic differences, and from one person to another within societies. Harry defined shampoo as “a preparation of a surfactant i.e. surface active material in a suitable form – liquid, solid, powder. But the usage of surface-active material becomes very harmful from long time for the youth as well as our environment. Various synthetic compounds, chemicals, dye and their derivative has been proved to cause various skin diseases having numerous side effects. The word herbal is a symbol of safety

in contrast to the synthetic one which has adverse effects on human health. Thus, there is increasing attractiveness of herbal cosmetics and the tremendous range of herbal products now generally available to the public. Now-a-days the usefulness of herbs in the cosmetic production has been extensively increased in personal care system and there is a great demand for the herbal cosmetics. The basic idea of hair growth enhancing & conditioning shampoo lies deep in the Rigveda, Yajurveda, Ayurveda, Unani and Homeopathic system of medicine. These are the products in which herbs are used in crude or extract form. These herbs should have varieties of properties like nervine tonic, cleansing and softening activity, antiseptic properties, promote the growth of hair, and antibacterial etc. Today's busy life schedule has created the negligence of an individual to protect their hair from various problems. People don't have time for different treatment for getting good results.^[6]

Hair is an important part of human body to provide beauty. Innumerable instances from all the art forms can be cited supporting the special prominence accorded to hair by people of virtually all times and cultures. Little emphasis has been given in the cleaning of hairs. Now, washing hairs with shampoos has become common and practiced all around the world. Shampoos widely used today based on synthetic ingredients or herbal ingredients. A shampoo is a preparation of surfactant in liquid, solid or powder, whichever is suitable. It removes grease, dirt and skin debris from the hair shaft and scalp without adversely affecting the user. "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, environmental pollution, etc

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 hair rough and chapped.
- Should not have any side effects or cause irritation to skin or eye.^[1]

- To make the hair smooth and shiny.
- Produce good amount of foam.
- Should not cause irritant to scalp, skin and eye.
- Should completely, effectively remove dirt.
- Impart pleasant fragrance to hair.^[5]

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.^[1]

Types of shampoo

- 1) Liquid shampoo
- 2) Solid cream shampoo
- 3) Jelly shampoo
- 4) Powder shampoo
- 5) Lotion shampoo
- 6) Aerosol foam shampoo
- 7) Specialized shampoo
- 8) Conditioning shampoo
- 9) Antidandruff shampoo
- 10) Baby shampoo
- 11) Two-layer shampoo

1) Liquid shampoo

It is a hair care product, typically in the form of a various liquid that is used cleaning hair that is most widely used. Alkanolamides can also be used in this preparation. Some of this shampoo may be transparent.

Examples: Loreal liquid shampoo, TRESemme liquid shampoo.^[8]



2) Solid cream shampoo

These shampoos have a paste like consistency and are packed in a collapsible tube. They find great use in hair salons. They are also available in jars with wide mouth. The paste consistency is developed by the addition of alkyl sulfates, also Cetyl alcohol is added, which is serves as a builder.

Example: Redken cream shampoo^[8]



3) Jelly shampoo

It is a protein-rich substance produced by honey bees and used in shampoo these are great use in hair salons and beauty Parlors.

Examples: Garnier shampoo, honey and royal jelly shampoo^[8]



4) Powder shampoo

It is in powder form. It is type of shampoo that reduces hair greasiness without the need of water. Powder shampoo is a prepared when addition of water or other solvent reduces the activity of components, especially in case of medicated shampoo.

Example: Neem powder shampoo.^[8]



5) Lotion shampoo

A lotion shampoo calm of anionic surfactant projected for management to the hair or scalp. Are the modification of apparent liquid

shampoo solubilizing agent such as magnesium stearate is also used to liquefy the added opacifier.

Example: Redken cream shampoo^[8]



6) Aerosol foam shampoo

Aerosol shampoo contains tiny particles of liquid or solid suspended within the gas they are usually preferred when the hair is greasy. decrease the activity of shampooing ingredients. the bottle opening is provided with a regulator. Shampoo come out as foam when the valve is pushed. Hence also called as foam-type shampoo.

Example: Kerasys aerosol shampoo.^[8]



Formulation of shampoo

The herbal shampoo was prepared by using primary emulsion method. The plant extracts

were mixed in different proportions to obtain an extract^[3]

Ali Heyam Saad and Rasool Bazigha Ka dhim reported formulation of self-preserving shampoo having a low concentration of the detergent using *Ziziphus spina cristi* leaves with emphasis on safety and efficacy. Evaluation of organoleptic, physicochemical and performance tests were performed and compared with herbal marketed product and considered as 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, 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 an herbal conditioner shampoo using fenugreek seeds methanol extract and evaluated for physicochemical properties. It is concluded that the formulated shampoo has a good quality of 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 indica* against strains of G+ and G- organisms and fungal organisms.⁷

Swati Deshmukh et al. formulated an herbal shampoo using aloe vera, neem, shikakai, ritha, amla, brahmi and evaluated and concluded as safe.⁸

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 as safe.⁹

Suriya Prakash et al. formulated an herbal shampoo for its antimicrobial and anti-lice activity. The natural ingredients used are neem leaf, thulasi leaf, mehendi 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.¹

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.^[1]

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°C³.

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 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 0.44g. 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 rpm³. The viscosity of the shampoos was measured by using spindle T95. The temperature and sample container's size were kept constants during the study.

Dirt dispersion:

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

Temperature of water was maintained at 35°C. The flask was Shaked for 4 minutes at the rate of 50 times a minute. The solution was removed and 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 ability of the samples. Briefly, a crumple of hair was 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:

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 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 house. About 1% shampoo solutions 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:

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 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 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 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 cooled 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 gram of the powder was weighed accurately and transferred into a dry Petri dish. The Petri dish 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 hours. Accurately weighed 1 g of the powder and transferred it into glass stopper measuring cylinder containing 25 ml of water. Then it is shaken thoroughly at every 10 minutes for 1 hour. After that it was kept for 3 hours at room temperature. The volume was measured in ml.

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 longwise motion for 15 seconds at speed of 2 frequencies / second. Then the tubes are allowed to stand for 15 minutes. The height of the foam was measured.³⁻¹¹

II. CONCLUSION:

The present review study was carried out with the aim of preparing the herbal shampoo that reduces hair loss during combing, safer than the chemical conditioning agents as well as to strengthen 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. 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. The replacement of synthetic ingredients by herbal natural extracts having the same activity to overcome side effects is the need of study. Synthetic hair shampoo is known to damage the hair cuticle and leave brittle, dull and dry hair. The factors like UV radiations, use of harsh chemical products have direct and indirect impact on to the hair.

REFERENCE:

- [1]. A Review on Herbal Shampoo and Its Evaluation. Jaya Preethi P.*, Padmini K., Srikanth J., Lohita M., Swetha K., Vengal Rao P.

- [2]. Vijayalakshmi, A., Sangeetha, S., & Ranjith, N. (2018). Formulation and evaluation of herbal shampoo. *Asian J Pharm Clin Res*, 11(4), 121-4.
- [3]. Arora, R., Singh, R. K., & Meenakshi, B. (2019). Formulation and evaluation of herbal shampoo by extract of some plants. *Pharm Chem J*, 6(4), 74-80.
- [4]. Dubey, S., Nema, N., & Nayak, S. (2004). Preparation and evaluation of herbal shampoo powder. *Ancient science of life*, 24(1), 38.
- [5]. Pundkar, A. S., & SUJATA, P. (2020). Formulation and evaluation of herbal liquid shampoo. *World Journal of Pharmaceutical Research*, 9(5), 901-911.
- [6]. Namita, N. (2013). Formulation and evaluation of herbal shampoo having antimicrobial potential. *Int J Pharm Pharm Sci*, 5, 708-12.
- [7]. Gholve, S., Nadarge, S., Hindole, S., Bhusnure, O., Bhosale, P., & Thonte, S. (2015). Formulation and evaluation of polyherbal antidandruff powder shampoo. *World journal of pharmaceutical research*, 4(10), 1714-1731.
- [8]. Formulation and evaluation of herbal cream shampoo of curry leaves Jadhav Shweta Rajendra*, Ubale Amol Tanaji, Ziya Khalil Khan, Aoughade Jyoti Vikas, Pawar Neha Vijay
- [9]. Gubitosa, J., Rizzi, V., Fini, P., & Cosma, P. (2019). Hair care cosmetics: From traditional shampoo to solid clay and herbal shampoo, a review. *Cosmetics*, 6(1), 13.
- [10]. Preethi, P. J., Padmini, K., Srikanth, J., Lohita, M., Swetha, K. P. V. R., & Rao, P. V. (2013). A review on herbal shampoo and its evaluation. *Asian journal of pharmaceutical analysis*, 3(4), 153-156.
- [11]. Arora, P., Nanda, A., & Karan, M. (2011). Shampoos based on synthetic ingredients vis-a-vis shampoos based on herbal ingredients: a review. *International Journal of Pharmaceutical Sciences Review and Research*, 7(1), 42-46.
- [12]. Thakur, A., Pandit, V., & Ashawat, M. S. (2020). A review on herbal shampoo. *World J Pharm Res*, 9(8), 1132-7.
- [13]. Kengar, M. D., Vambhurkar, G. B., Gavade, A. S., Jagtap, A. M., & Raut, I. D. (2018). Formulation and evaluation of polyherbal shampoo. *Research Journal of Topical and Cosmetic Sciences*, 9(1), 1-3.
- [14]. Gyawali, R., & Paudel, P. N. (2022). Herbal remedies in cosmeceuticals formulation: A review on Nepalese perspectives. *Annapurna Journal of Health Sciences*, 2(1), 59-65.
- [15]. Potluri, A., Shaheda, S. K., Rallapally, N., Durrivel, S., & Harish, G. (2013). A review on herbs used in anti-dandruff shampoo and its evaluation parameters. *Research Journal of Topical and Cosmetic Sciences*, 4(1), 5-13.
- [16]. Mokle, B. A., Machave, S. P., Pophale, S. P., Nikam, V. V., Borude, R. S., Jadhav, S. D., & Sanap, G. (2023). HERBAL ANTI-DANDRUFF SHAMPOO.