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### HERBAL SHAMPOO: BASIC CONCEPT, FORMULATION AND MARKET POTENTIAL

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#### **ABSTRACT:**

Shampooing is the most common form of hair treatment. Hair tonic and conditioner formulation containing herbal extract, such as fenugreek, can prevent hair loss and retain hair conditioning. Hair is an important part of our body. Human hair begins with the identification of four parts: the follicle, the cuticle, the cortex and the medulla. A healthy head of hair is described as hair that has luster, smooth, long and silky, bouncy, with good volume, and with no evidence of balding. At present time peoples are suffering from hair disorder like dandruff, alopecia, poliosis etc. herbal shampoo is best treatment for hair disorder. This article provides basic information towards hair morphology, hair diseases associated, formulation considerations and market potential emphasis on herbal formulations with their importance.

**Keywords:** Shampoo, Hair disorder, Ingredients, Hair morphology, Formulation.

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#### **INTRODUCTION**

From ancient time beyond memory, mankind have 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 glycosides and natural or synthetic fatty alcohols or the thickening agents (e.g. gum, resin and PEG). Indian women use

herbals such as *shikakai* and *reetha* that are natural cleansing agents without harmful effects. Now-a day's 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<sup>1</sup>. 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<sup>2</sup>. Now-a-days, many herbal shampoos are available in the market which contains herbal ingredients such as plant extracts and essential oil. There are large numbers of plants which are reported to have beneficial effects on hair and are commonly used in shampoos<sup>3</sup>. Shampoos are kind of formulation that are used for hair and body washing or therapeutic purposes. Shampoos are expected to be much more than mere cleansing agents. Shampoos have many properties in addition of their detergency, such as conditioning and hair shining<sup>4</sup>. Ayurveda has numerous natural medications wherein the most common herbs include *Neem*, *Kapoor* (naphthalene), and *Henna*, *Hirida*, *Behada*, and *Amalaki*, *Magic nut*, *Bringaraj*, *Rosary Pea*, *Sweet Flag*, *Cashmere tree* and *Mandor* found to have anti dandruff activities<sup>5</sup>. There are also wide range of herbal ingredients like pepper extract, basil extract, *neem extract*, *rosemary oil*, *basil oil*, *clove oil*, *coleus oil*, *teatree* oil which have been documented to have good anti pityrosporum or antidandruff activity<sup>6</sup>.

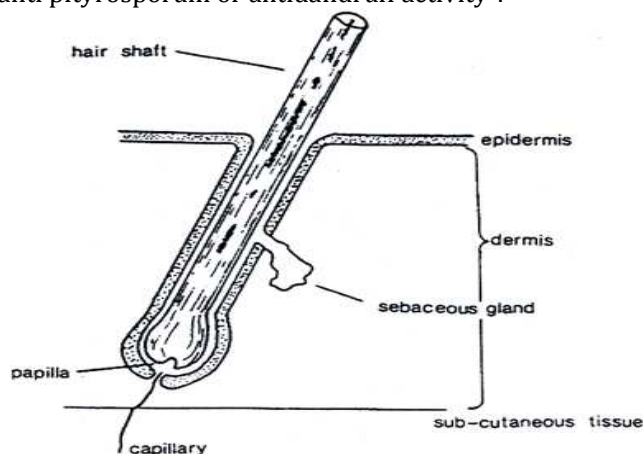


Fig 1: Structure of human hair<sup>7</sup>

A basic understanding of the structure of human hair begins with the identification of four parts: the follicle, the cuticle, the cortex and the medulla. This is somewhat misleading, though, because the follicle is comprised of several other parts. Hair follicles are one of only two places in the body where stem cells continue to exist into adulthood. On average, each hair strand grows about six inches per year and then dies, usually before four years<sup>7</sup>.

#### Hair disorders

Hair disorders may occur when excessive amounts of hair grow or fall out. They may also occur if the hair lacks pigment in certain areas or if the hair becomes gray prematurely. These conditions can be temporary or permanent, depending on the cause. There are many

potential causes of hair disorders, ranging from immune disorders and genetics to illnesses and medications.

#### Synonyms of Hair disorder

Abnormal hair loss, alopecia, alopecia areata, androgenetica alopecia, bald, balding, baldness, bleaching, body hair, coarse hair, depilatory, electrolysis, facial hair, hair, hair growth, hair loss, hair restoration, hair transplant, hyperandrogenism, hypertrichosis, ingrown hair, laser therapy, plucking, shaving, threading, telogen effluvium, waxing, white hair, wig<sup>8</sup>.

#### HAIR COSMETICS

The term cosmetics have been derived from the term "cosmetikos" which means the skill to decorate. Thus cosmetics are the art of decorating yourself to look beautiful. According to D & C Act Cosmetics mean any articles meant to be rubbed, poured, sprinkled or sprayed on or introduced into or otherwise applied to any part of the human body for cleansing, beautifying, promoting attractiveness or altering appearance and include any article intended for use as a component of cosmetic<sup>9</sup>. A 'healthy' head of hair is described as hair that has luster, is smooth, long and silky, bouncy, with good volume, and with no evidence of balding. To achieve this, the hair-care industry has provided us with a plethora of products to beautify, enhance, strengthen, and 'nourish' our tresses. Most of the products work at the cuticle level of the exposed hair shaft. A few can enter the cortex. Some hair procedures like coloring, perming, straightening, and the like, result in structural damage. Specialized products then have to be used to repair and restore (if possible) the natural hair integrity. Hair dressing has evolved from just cutting, to altering the color, texture, and 'health' of the hair. Frizzy hair can be straightened and straight hair can be curled. Understanding the structural components is essential to understanding 'hair care'<sup>10</sup>.

#### Ingredients of cosmetics

- . Water
- . Oils, Fats, Waxes
- . Humectants
- . Surfactants
- . Preservatives
- . Perfumes And Colors
- . Herbal or Plant Material
- . Functional Raw Materials

#### Water

It is the main ingredient of cosmetics formulation. Thus stability and quality of final product is dependent on the purity of water used so pure water should be used in manufacturing of cosmetics. Pure water on large scale

can be manufactured by any of the methods mentioned below.

- Ion exchange system
- Distillations

#### Oil, fats and waxes

These are used in preparation of creams, lotions, brilliantine, hair oil, lipsticks etc. The source of oil, fat & wax can be mineral source & animal source. The source and example is given below.

Source:-1) Mineral source -mineral oil -paraffin and petroleum jelly Oils

#### Waxes

The commonly used waxes in preparation of cosmetics Include bees wax, spermaceti, ceresin, ozokerite wax.

#### Humectants

**Table 1: Type of Humectants**

Type of Humectants	Examples
Inorganic	Calcium chloride (not used now due to compatibility problems)
Metal organic	Sodium lactate (used in sunscreen lotions)
Organic	Polyethylene glycol, Propylene glycol, glycerol, sorbitol, mannitol.

#### Surfactants

Surfactants lower one or more boundary tensions at interface in the system. One common feature of surfactant is that they all are amphipathic molecules containing a hydrophobic part & a hydrophilic part. It is used in cosmetics to impart following functions- Detergency, Wetting, Foaming, Emulsification, and Solubilization.

**Table 2: Types of surfactant**

Type of surfactant	Examples
Anionic	Fatty acid soaps, alkyl sulphates, alkyl sulphonates, polyethylene glycol ester, alkyl ether sulphates taurines, sarcosinates etc.
Cationic	Alkyl tri methyl ammonium salts, Dialkyl dimethyl ammonium salts, alkyl pyridinium salts, and quaternised diamine salts.
Non ionic	Alkanolamides, alkyl polyglycol ether, thioethers, and alkyl polyethylene mine amides.
Ampholytic	Betains, alkylimidazolines, acyl peptides, etc.

#### Preservatives

Used to prevent spoilage which occurs due to Oxidation of oils, Microbial growth

- Unused cosmetics are usually contaminated with *pseudomonas* but used cosmetics are contaminated with *staphylococci*, fungi, yeast

#### Types of preservative

1 Anti microbial agents e.g. Benzoic acid, formaldehyde, cresol, phenol, thiomersol, phenyl mercuric salts. etc.

2 Antioxidants e.g. Gallic acid, methyl gallate, BHA, BHT, Tocopherol, citric acid, Ethanolamine, lecithin, ascorbic acid, sodium sulphite, Sodium metabisulphite.

3 Antioxidant synergists:- Enhance the efficacy of antioxidants. Examples include:- ascorbic acid, citric acid, phosphoric acid

4 UV absorbers:-These are mainly used in products which are vulnerable to visible or UV light. By incorporating UV absorbers colorless containers can be used if deterioration is due to UV light only.

#### Perfumes

The word perfume has been derived from “per” means through and “fumum” means smoke. It suggests that early perfumes were pleasant smells obtained by burning wood and grass etc.

**Table 3: Source of perfume**

Source of perfume	Example
Natural(Animal source)	Musk, civet, Ambergris, Castoreum etc.
Aroma chemical	Eugenol, Farnesal, Rose oxide, Citral, Limonene
Floral base	Rose base, Jasmine base

#### Colors

It is defined as visual sensation caused by a definite wavelength by an object by one/more phenomenon of emission, reflection, refraction, transmission. Colors can be classified into three classes:- a) Natural colors:- Plant source:- e.g. Saffron, turmeric Animal source:-e.g. Cochineal (red) b) Inorganic colors:- e.g. Iron oxides, chromium oxides, carbon black, titanium dioxide, zinc oxide etc. c) Coal tar colors:-Tartrazine, Amaranth, Erythrosine, Indigo carmine etc.

**Table 4: Herbal or plant materials are used in different cosmetics preparations.**

Name	Use in cosmetics
Almond	Facial and body scrubs
Azadiracta	Tooth paste and skin care.
Comfrey	Creams and lotions.
Tulsi	Skin cream and lotions
Cucumber	Masks, toner, cleanser
Heena	Dyeing of hair
Amla	Shampoo
Jasmine	Hair oil
Lemon	Skin tonic, cleansers
Apricot	Facial and body scrubs

**Functional raw materials**

**Table 5: Agents contribute towards some functional property<sup>11</sup>.**

Type	Example & use
Vitamins	Vit. C (antioxidant in emulsion), Vit. A, Vit. E (skin beautification)
Amino acids	AV HILL MP TT (all essential amino acids)
Anti-inflammatory agents	Allantoin (hand cream & lotion) Cade oil (eczema & psoriasis), Calamine
Sunscreen agents	PABA, Vitamin C, Quinine salts Coumarin derivatives

**Classification of hair cosmetics<sup>12</sup>**

**Table 6: Classification of hair cosmetics**

Class	Action	Examples
Class 1	Those that work on the exocuticle	Shampoos, conditioners, serums, hair sprays, waxes, gels, mousses
Class 2	Those that work on the cortex or alter the structural integrity of the Hair shaft.	Hair colors, bleaching agents, straightening, and perming agents.

**IDEAL CHARACTERS OF SHAMPOO**

- should effectively and completely remove the dust, excessive sebum.
- should effectively wash hair.
- should produce a good amount of foam.
- 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<sup>13</sup>.

**FORMULATIONS OF SHAMPOO**

**Detergents**

These are surfactants that combine and emulsify and wash off the grease and dirt (soil). Various types of surfactants are formulated to cleanse different types of hair laurel/laureth sulfates, triethanol amine lauryl sulfate, diethanol lauryl sulfate, and sodium olefin sulfate. Also, detergent, to be very effective in cleansing the hair, would also strip the hair of sebum, leaving them dry.

**Foaming agents**

These are very popular in shampoos, as historically people equate efficacy with foaming of the shampoo. Greasy hair will require repeated washing with shampoo, until the shampoo foams properly.

**Conditioners**

An effective cleanser will strip the hair of all grease, thus leaving it dry and dull. Hence, shampoos incorporate various ingredients that can coat the cuticle to improve shine, slip, and easy comb ability.

**Thickeners and opacifiers**

These appeal to the aesthetic sensibilities of the user, but do not add to the cleansing effect. They have to be compatible with the surfactants. Although alkanol amides were the early agents used they have been replaced with various aqueous and non-aqueous agents.

**Sequestering agents**

A detergent, when used with hard water, leaves a sticky residue on the surface. This scum renders the hair dull and unmanageable. This is often seen when soap is used to cleanse the hair. Sequestering agents prevent the formation of this scum by chelating the calcium and magnesium ions from hard water.

**PH adjusters**

Damaged hair can swell with alkaline detergents hence, when formulating suitable shampoos for such hair, an acidic pH adjustment is done. The substances used include citric and lactic acid.

**Additives**

Various additional agents are added to shampoos to either give better conditioning or to term them as a natural or an herbal shampoo depending upon the nature of the detergent use, shampoos are targeted for various hair types. Proper shampooing involves wetting the hair completely taking a good amount of shampoo in the palm and then applying it along the head and length of hair. Hair should not be piled up on top of the head before applying the shampoo as this can lead to matting of hair.

**MARKET POTENTIAL OF SHAMPOO**

With the raise in the standard of living & health consciousness of people the demand for Cosmetics are growing very fast. Shampoo is one of such cosmetic products which find application in every household (both urban & rural household). Demand is still growing very fast as smaller sizes (sachet type) are vigorously promoted by the leading manufacturers and selling it even in the smaller roadside pawnshops. Thus for cleaning & conditioning of hairs shampoos have largely replaced normal bath soap with the different requirement for different types of hairs viz. Dry, Oil, and normal wide varieties of shampoos are in demand. Besides this shampoos fortified with protein sources like egg and almond etc show exclusive demand.

**Table 7: Some marketed formulations of Shampoo**

Name	Pack	Company name
Clinic plus	6 ml, 80ml, 150ml, 300ml.	Hindustan unilever ltd.
Lux	6ml, 80ml, 150ml, 300ml.	Hindustan unilever ltd.
Pantene	6ml, 80ml, 150ml, 300ml.	P and G ltd.
Head and shoulder	6ml, 80ml, 150ml, 300ml	P and G ltd.
Ayur	6ml, 80ml, 150ml, 300ml	Ayur herbal pvt ltd.
Sesa	6ml, 80ml, 150ml, 300ml.	Ban labs ltd.
Dabur vatika	6ml, 80ml, 150ml, 300ml	Dabur india ltd.
Dove	6ml, 80ml, 150ml, 300ml.	Hindustan unilever ltd.
Kesh king	80ml, 115ml.	SBS Biotech Ltd.
Sunsilk	6ml, 80ml, 150ml, 300ml.	Hindustan unilever ltd.
Mediker	5.5gm, 10gm.	Marico ltd.

#### **EVALUATIONS OF HERBAL SHAMPOOS**

To evaluate the prepared formulations, quality control tests including visual assessment and physicochemical controls such as pH, density and viscosity were performed. Also, to assure the quality of products, specific tests for shampoo formulations including the determination of dry residue and moisture content, total surfactant activity, salt content, surface tension, thermal and mechanical stability and detergency tests.

#### **Physical appearance/visual inspection**

It includes their clarity, foam producing ability and fluidity.

#### **Determination of pH**

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

#### **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.

#### **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 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 shaken 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 by using the following equation:

$$DP=100(1-T/c)$$

In which, DP is the percentage of detergency power, C is the weight of sebum in the control sample and T is the weight of sebum in the test sample.

#### **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 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 were washed with a 5% sodium lauryl sulfate (SLS) solution, then dried and divided into 3g weight groups. The samples were suspended in 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 using the following equation:

$$DP=100(1-T/c)$$

#### **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. The animals of group I was served as normal, without any treatment. Animal Group II, III, IV, V and VI were applied with shampoo. Shampoos were applied onto nude skin of animals of groups. A 0.8% v/v aqueous solution of formalin was applied. 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 erythematic scale was as follows: 0, none; 1, slight; 2, well defined; 3, moderate; and 4, scar formation.

#### 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

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period of 4 seconds. Reactions to the irritants can include swelling of the eyelid, inflammation of the iris, ulceration, hemorrhaging (bleeding) and blindness<sup>4-7</sup>.

#### CONCLUSION

At present time peoples only pay attention on his skin not on hair. Hairs are important part of our body. Many people's suffering from hair disorders like dandruff, alopecia, poliosis, and hirutism etc. Shampooing is the best treatment for this type of disorders. Shampoo is best as compare to soap. Herbal shampoos are better than marketed shampoo. Natural plant extract are used in herbal shampoo which have no side effect. The formulated shampoos were not only safer then the chemical conditioning agents but also greatly reduce the hair loss during combing as well as strengthen the hair growth. Many natural products are used in cosmetics also.