

HERBAL SHAMPOO: BENEFITS, PREPARATION AND EVALUATION.

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Abstract:

Shampoos are the cosmetics preparations meant for cleansing the hair by removal of the dirt grease from the hair shaft and scalp. There are wide range of synthetic shampoos available in the market with different functions. But these synthetic shampoo shows harmful effect on the hair and scalp like dryness of hair and keratin loss. Due to these reasons herbal shampoos has evolved as an alternative to synthetic shampoo because of the safe and traditionally used ingredients. Herbal shampoo is a cosmetic preparation which uses herbs and meant for cleansing the hair and scalp just like regular shampoo. Many of the herbs are reported to have beneficial affect on hair and are used in herbal shampoos.

Keywords: Synthetic shampoo, Herbal shampoo, cosmetics, Traditional ingredients.

Introduction:

Hair is an integral part of human beauty. In humans' hair serves lot of purposes like protection against external factors, sebum, apocrine sweat and pheromonas production and thermoregulations [1]. Hair care products are primarily meant for cleansing the hair. It also modifies the hair texture, provides nourishment to the hair and gives healthy look to the hair [2].

Shampoo is the most common hair care cosmetic. It is available either in viscous liquid or powder form, applied for cleaning hair and scalp from dirt, residues of previously applied hair styling products and environmental pollutants [3]. In the early days shampoos were meant only for cleansing hair and scalp, but the shampoos available today do much more than that. Along with cleansing it leaves the hair easy to comb, lustrous and controllable while being convenient to use [4]. Nowadays a wide range of shampoos are available in the market like synthetic,

herbal, medicated and non-medicated shampoos with different functions. Among these herbal shampoos are most popular ones as they bear the impression of having better purity, safety and efficacy.

Herbal shampoos are prepared from natural ingredients and are meant for cleansing hair and scalp just like regular shampoo. These shampoos are free from side effects since no surfactants are involved, has good stability and are less harmful compared to synthetic shampoo [5]. Synthetic shampoo contains surfactants. Long term use of these surfactants can lead to serious effects like scalp irritation, loss of hair, drying of hair, greying of hair, split ends and eye irritation. Due to these reasons the public is getting attracted towards herbal cosmetics due to its insignificant side effects and inexpensive nature [6].

REQUIREMENTS OF SHAMPOO [4]:

- It should remove sebum and atmospheric pollutants from scalp and hair.
- It should remove the residues of previously applied hair styling lotions and sprays.
- It should deliver an optimal level of foam to satisfy the expectations of the user
- It should be nontoxic and non-irritating to the hair and scalp.

TYPES OF SHAMPOOS [1,4] :

Shampoos are of following types

- Powder shampoo
- Clear liquid shampoo
- Lotion shampoo
- Solid gel shampoo
- Medicated shampoo
- Liquid herbal shampoo

Specialized shampoo

- Baby shampoo
- Anti-dandruff shampoo
- Conditioning shampoo
- Two-layer shampoo

ANTAMONY OF HAIR [7]:

The hair is made up of 95% keratin a fibrous, helicoidal protein (shaped like a helix) that forms part of the skin and all its attachments (body hair, nails etc.).

The hair structure consists of 3 different parts:

- **Medulla:** It is the innermost layer of the hair shaft, made up of an amorphous, soft, oily substances.
- **Cuticle:** Thin protective outer layer that contains nutrients beneficial for hair growth. It is highly keratinized with cells shaped like scales that are layered one over the other, measuring about 60 micrometers long and about 6 micrometers wide.
- **Cortex:** It is the main constituent of the hair, containing long keratin chains which gives elasticity, suppleness and resistance to the hair. The cells of the cortex are joined together by an intercellular cement rich in lipids and proteins.

GROWTH CYCLE OF HAIR [8]:

Hair growth cycle consists of four phases:

- **Anagen (growth phase):** It is the growing phase. This phase lasts for several years.
- **Catagen (transitional phase):** during this phase the hair follicle shrinks and hair growth slows.
- **Telogen (resting phase):** It is the resting phase where hair growth stops and new hair begins the growth phase, pushing the old hair out.
- **Exogen phase:** last phase of hair growth cycle where hair strand completely detaches from the scalp and sheds off.

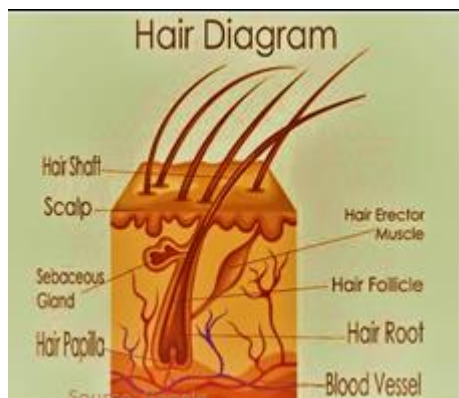


Fig 1: Hair structure

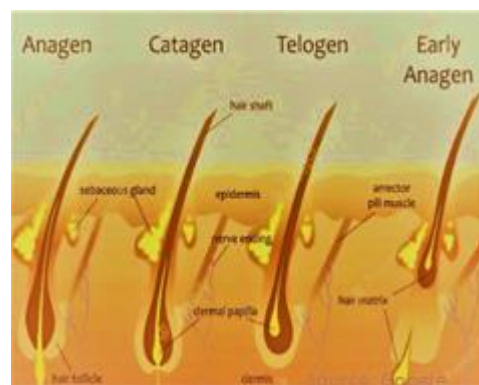







Fig 2: Growth Cycle of hair




HAIR PROBLEMS [9]:

- **HAIR LOSS:** The main reason behind the hair loss is Stress, medication, changes in hormone and many hair styling products can contribute to hair loss.
- **OILY HAIR/GREASY HAIR:** Oily hair is caused by excessive production of natural oil (sebum) by the scalp. Sebum is produced by sebaceous glands which sometimes “work overtime” leading to excessive amount of oil.
- **DANDRUFF:** Dandruff is a non-inflammatory harmless skin condition that affects scalp and might result in hair loss. It is scaly and adheres to the root of the hair.
- **DRY HAIR:** Dry hair occurs due to deficiency of proteins in the diet. Menopause, anemia, hormonal imbalance, birth control pill can also lead to dry hair.
- **SPLIT ENDS:** Splits ends occur when the hair ends dry and other reasons are exposure to extreme weather conditions. Hair care techniques such as straightening and curling and chemical hair products may cause split ends.





HERBS COMMONLY USED IN HERBAL SHAMPOO [1, 10]:

Botanical name	Common name.	Functions/uses	Figure
Lawsonia Inermis	Henna	Promotes growth of hair, conditioner.	

Azadirachta indica	Neem	Antimicrobial agent, Prevents the dryness of hairs and flaking of hairs.	
Ocimum sanctum	Tulsi	Antimicrobial and anti-lice property	 <p>Source: Google</p>
Embelica officinalis	Indian gooseberry/ amla	Promotes hair growth, prevents premature greying and controls dandruff.	 <p>Source: Google</p>
Acacia concinna	Soap pod/ Shikakai	Retains natural oil of hair, keeps hair lustrous & healthy.	 <p>Source: Google</p>

Aloe barbadensis	Aloe vera	Conditioning & moisturizing effect.	 <p>Source: Google</p>
Citrus lemon	Lemon	Maintains the pH & imparts fragrance to preparation	 <p>Source: Google</p>
Hibiscus rosa sinensis	China rose	Prevents hair loss and hair growth promoter	 <p>Source: Google</p>

Sapindus mukorossi	Soap nut/ Reetha	Detergent and antidandruff.	 <p>Source: Google</p>
Trigonella foenum graceum	Fenugreek	Cleansing and softening.	 <p>Source: Google</p>
chrysopogon zizanioides	Vetiver grass	Antifungal, Antimicrobial	 <p>Source: Google</p>
Zingiber officinalis	Ginger	Promotes hair growth.	 <p>Source: Google</p>

Eclipta prostrata	Bhringraj	Hair tonic	 <p>Source: Google</p>
Withania somnifera	Ashwagandha	Controls hair fall, promotes hair growth, improves circulation of the scalp.	 <p>Source: Google</p>
Camellia sinensis	Green tea leaves	Hair growth and enrichment	 <p>Source: Google</p>
Bacopa monneri	Brahmi	Supports the hair growth	 <p>Source: Google</p>

PREPARATION METHODS [11,12]:**METHOD 1:**

The following steps are employed for the formulation of polyherbal shampoo powder:

- **Drying:** All the ingredients required for the shampoo preparation are dried and grinded.
- **Weighing:** All herbal powders required for the preparation are weighed separately.
- **Size reduction:** The weighed materials are subjected to size reduction using hand driven mixer individually.
- **Mixing:** The fine powders are mixed methodically using mixer to form a homogenous mixture.
- **Sieving:** The mixture is passed through sieve no 80, to get uniform size particles and reduce the lumps.
- **Packing and Labelling:** Finally, the powder was packed and labelled suitably.

METHOD 2:

The following steps are involved in the preparation polyherbal liquid shampoo:

- **Collection of materials:** Ingredients required for the preparation are collected and washed thoroughly and dried.
- **Weighing:** Ingredients are weighed individually and soaked overnight.
- **Decoction preparation:** Ingredients are boiled in the same water used for soaking on medium flame, allow to cool and filter
- **Incorporate preservative (eg: Methyl paraben) to prevent microbial growth**

EVALUATION OF POLYHERBAL SHAMPOO POWDER [11,13]:**Organoleptic evaluation:**

- Organoleptic evaluation includes the assessment of parameters such as color, odor, texture taste etc.

General powder Characteristics:

- General powder characteristics includes the evaluation of parameters such bulk density, particle size and angle of repose.

i. **Particle size:** Particle size affects grittiness and spreading properties of powder. Particle size is determined by using microscopy techniques.

ii. **Angle of repose:**

Funnel method:

Required quantity of powder is allowed to flow through a funnel which is placed at a height of 6 cm from horizontal base. The powder is allowed to flow to form a heap over the paper on the horizontal plane. The radius and the height of the powder heap is noted down.

iii. **Bulk density:**

Bulk Density is the ratio between the given mass of a powder and its bulk volume. Dried powder is filled into a 50 ml measuring cylinder upto 50 ml mark. Then the cylinder is tapped onto soft surface from a height of 1 inch at 2 second intervals. The volume of the powder is measured. The Bulk Density is calculated by using the below given formula.

$$\text{Bulk density} = \frac{\text{Mass of the herbal shampoo}}{\text{Volume of the herbal shampoo}}$$

iv. **Tapped density:**

The tapped density is obtained after mechanically tapping container containing the powder. Dried powder is filled into 50 ml measuring cylinder upto 50 ml mark. Then the cylinder is tapped 100 times onto soft surface. The volume of powder is measured.

$$\text{Tapped density} = \frac{\text{Weight of powder}}{\text{Tapped volume of powder}}$$

Physicochemical evaluation:

- i. **pH:** The pH of the shampoo is measured by using pH meter.
- ii. **Washability:** The ease and extent of washing can be checked manually by applying on skin.
- iii. **Solubility:** Solubility is ability of the substance to dissolve in solvent. Solubility test is done by dissolving the sample in solvent followed by slight warming, cooling and filtering. Then the residue obtained is weighed and noted down.
- iv. **Loss on drying:** Loss on drying is the loss of mass expressed in percent m/m.
About 2 g of powder is taken in a Petridish and placed in a desiccator for 2 days over calcium chloride crystals. Then the powder was taken and the weight is checked to determine the loss during drying.

- **Dirt dispersion:** Dirt dispersion ability of the shampoo can be determined by using Indian ink. About 1% of shampoo solution taken in a test tube and 1 drop of India ink is added. The test tube is stoppered and shaken for about 10 mins. The amount of ink present in the foam is indicated as None, Light, Moderate, or Heavy.
- **Wetting time:** Canvas paper is used to determine the wetting time of shampoo. The canvas was cut into disc shape with 1 inch diameter with an average weight of 0.44 g. the disc was allowed to float on the surface of 1% shampoo solution and the time taken by the disc to start sinking in the shampoo solution is noted as wetting time.
- **Foaming index:** 1% w/v solution of the shampoo powder is prepared. Solution is warmed slightly for 30 mins, cooled, filtered and volume is made upto 100 ml. 1, 2,...10ml of extract is taken separately in 10 test tubes and volume is made upto 10ml using water. Shake the test tubes at a speed of 2 frequency per second for about 15 sec. then the test tubes are kept aside for 15 mins without shaking. Foam height(a) is measured.

$$\text{Foaming index} = \frac{1000}{a}$$

- **Swelling index:** About 1g of shampoo powder is taken into a glass stopper cylinder containing 25ml of water. Then the measuring cylinder is shaken for 1 hour with an interval of 10 mins. The solution is kept aside for 3 hrs without shaking. Volume is measured in ml.
- **Nature of hair:** By gathering the responses from volunteers' nature of hair after washing can be evaluated.

EVALUATION OF POLYHERBAL LIQUID SHAMPOO [14, 15]:

- **Organoleptic evaluation/visual assessment:**

The prepared formulations are evaluated in terms of color, clarity, odor etc.

- **pH determination:**

The pH of the shampoo is measured by using pH meter.

- **Percentage of solid content determination:**

4g of shampoo is taken in a previously weighed evaporating dish and evaporated by placing the evaporating dish on the hot plate. The final weight is noted down. Percentage of solid contents of shampoo left after complete evaporation is calculated.

- **Rheological Evaluation:**

The viscosity of the shampoo is determined by using Brookfield viscometer.

- **Surface tension measurement:**

Stalagmometer is used for determining surface tension of shampoo using chromic acid and purified water. The data was calculated by equation given below:

$$R_3 = (W_3 - W_1) n_1 \times R_1 / (W_2 - W_1) n_2 \times R_2$$

Where,

W_1 is the weight of empty beaker.

W_2 is the weight of beaker with distilled water.

W_3 is the weight of beaker with shampoo solution.

N_1 is the no. of drops of distilled water.

N_2 is the no. of drops of shampoo solution.

R_1 is the surface tension of distilled water at room temperature.

R_2 is the surface tension of shampoo solution.

- **Foaming ability and Foaming stability:**

The cylinder shake method is employed in the foaming ability and stability test. In this method 50ml of the 1% shampoo solution is taken in a 250ml graduated cylinder and covered the cylinder with hand. The cylinder is then shaken for 10 times. The volume of the foam appeared due to shaking is measured after every one minute consecutively for 5 minutes.

- **Wetting time test:**

Canvas paper is used to determine the wetting time of shampoo. The canvas was cut into disc shape with 1 inch diameter with an average weight of 0.44 g. the disc was allowed to float on the surface of 1% shampoo solution and the time taken by the disc to start sinking in the shampoo solution is noted as wetting time.

- **Dirt dispersion test**

About 1% of shampoo solution taken in a test tube and 1 drop of India ink is added. The test tube is stoppered and shaken for about 10 mins. The amount of ink present in the foam is indicated as None, Light, Moderate, or Heavy.

- **Cleaning action:**

About 1 g of grease is spread on non-adsorbent cotton and kept in conical flask containing 1% shampoo solution. The conical flask is shaken for 1 hr in mechanical shaker. Cotton is collected, dried and weighed. The amount of grease removed is determined by using the equation given below:

$$DP = 100 \left(1 - \frac{T}{C}\right)$$

Where,

C - Weight of grease in control sample

T - Weight of grease in test sample

DP-Percentage of detergency power

- **Skin sensitization test:**

Guinea pigs are used for skin sensitization test. They are divided into 7 groups (n=3). Hairs on the back of the guinea pigs are shaved previously. Shampoos are applied on the onto nude skin of animals. Formalin solution (0.8 %v/v) is applied as a standard irritant on animal. The application site is graded according to the erythema produced as: 0-none, 1-slight, 2-well defined, 3-moderate, 4-scar formation(severe).

- **Conditioning performance evaluation:**

Artificial hair strands are collected from salon and are divided into two batch (control and test) length 10 cm approximately. The test hair sample is washed with formulated shampoo and control is the one without washing. The test sample has to be washed with shampoo atleast for 10 times and sir dried. Blind touch test method is used for determining the conditioning effect of shampoo. About 20 student volunteers are selected and are made to touch the hair samples. The conditioning performance of the shampoo is rated in terms of score1-4 (4-excellent, 3-good, 2-satisfactory and 1-poor)

Eye irritation test:

Albino rabbits can be used for performing eye irritation test. The prepared shampoo solution is allowed to fall into eyes of six albino rabbits. The damage that is caused to rabbit's eye at different time intervals is recorded. Eye Irritation can be caused due to ulceration, swelling of eyelid, blindness and hemorrhage.

CONCLUSION:

The present review focuses on the uses and importance of herbal shampoo. It includes the awareness and need for the cosmetics with herbal ingredients, as it is strongly believed that the herbal products are safe and free from side effects. It emphasizes on types, methods of preparation and evaluation of polyherbal shampoos.

CONFLICT OF INTEREST:

The authors declare no conflict of interest.

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