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A Review on Polyherbal Shampoo Powder



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ABSTRACT

The shampoo sector is probably the largest unit among the hair care products. Shampoos are one of the cosmetic products used daily as the hair is a special and cherished feature of human being which beautifies the look of every individual. Day by day dependency of people is raising on herbal formulations not only for a chronic ailment but also for several acute problems. The assurance therapy with minimal side effects has been proven with ayurvedic formulations. In the scenario of changing food habits, stress, and dependent environment conditions, several hairs and skin disorders are encountered. In case of hair disorders like dandruff, hair fall, dull hair, split ends, etc, a proper selection of ayurvedic ingredients with the required amount, the dosage form can be formulated to fight against hair problems. This polyherbal shampoo was formulated by using natural ingredients like Aloe vera (*Barbadensis miller*), Neem leaves (*Azadirachta indica*), Reetha fruit (*Sapindus mukurossi*), Shikakai (*Acacia concinna*), Amla fruit (*Emblica officinalis*), Hibiscus leaves (*Hibiscus rosa-sinensis*) with proven efficacy. The combination of such ingredients has made it possible to secure highly effective dry powder shampoo. The formulation at laboratory scale was evaluated for several organoleptic properties, general powder characteristics and physicochemical evaluation to ensure the safety and efficacy of the formulation.



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INTRODUCTION:

Hairs are an integral part of human beauty. Herbal shampoos are cosmetic preparations that with the use of traditional ayurvedic herbs are meant for cleansing the hair, and scalp, beautifying and managing the hair since the ancient era. Herbal shampoos are used not only for cleansing purposes but also for imparting gloss to hair and maintain their manageability and oiliness for hair.

Ideal characteristics of shampoo:^[9, 11, 15]

- i) Should effectively and completely remove the dirt and excessive build-up between hair and sebum.
- ii) Should impart a good amount of foam.
- iii) Should improve the softness, lusters with good manageability.
- iv) Should be easily removed by rinsing with water.
- v) Should impart pleasant fragrance to the hair.
- vi) Should not make the hand rough and chapped.
- vii) Should not have any side effects.
- viii) Should not irritate the skin and eye.
- ix) Should provide safety and efficacy.
- x) Should improve the look and feel of hair and scalp.

Types of herbal shampoos:

-Powder shampoo

-Liquid shampoo

-Aerosol shampoo

-Cream shampoo

-Jelly shampoo

-Lotion shampoo

Importance of polyherbal shampoo:

→It clears sebum, dirt, dandruff.

→It promotes growth and strengthens the hair.

→It darkens the hair.

→It also acts as a conditioning agent.

→It provides all the above actions without affecting or damaging hair.

ANATOMY AND PHYSIOLOGY OF THE HAIR ^[6]

Structure of Hair [Fig 1 A]

A hair is composed of columns of dead, keratinized cells welded together. The shaft is a superficial portion of the hair, which projects from the surface of the skin. The shaft of straight hair is rounded in a cross-section, that of wavy hair is oval and that of wooly hair is elliptical or kidney-shaped. The root is the portion of the hair deep into the surface that penetrates the dermis and sometimes into the subcutaneous layer. The shaft and root both consist of three concentric layers- [Fig 1 B].

—Medulla

It is the central part of the shaft and is generally noticeable in thick hair. It is composed of two or three rows of polyhedral cells containing pigment granules and air spaces.

—Cortex

It is located peripheral to the medulla and forms the major part of the shaft. It consists of elongated cells, containing pigment granules in dark hair while the air in white hair.

—Cuticle

It is the outermost layer of the hair and consists of a single layer of thin, flat cells, which are heavily keratinized.

Physiology of the hair

A hair arises from the integrated activities of several keratinocyte layers in the hair follicle. The development of hair is a dynamic, cyclic process in which the duration of growth cycles is coordinated by many hormones and cytokines and depends not only on where the hair is growing but also on some other factors, such as the individual's age and stage of development, nutritional habits, or environmental alterations like day-length. Important players of this cycle are mainly cytokines (hormones), which can instruct the follicle to undergo appropriate changes so that each hair can be in a different stage of the growth cycle compared to the adjacent hairs. Hair follicles grow in repeated cycles, in which stages of rapid growth and hair shaft formation alternate with stages of apoptosis-driven hair follicle regression and relative hair follicle quiescence. In particular, the hair growth cycle can be divided into three distinct phases [Figure No. 2].

- 1) Anagen or growth phase;
- 2) Catagen or transitional phase; and
- 3) Telogen or resting phase.

The anagen phase is an active growth phase, during which the hair follicle enlarges reaching its characteristic onion shape and a hair fiber is produced. It can be divided into six stages (I–VI). During anagen I–V (proanagen), hair progenitor cells proliferate, envelope the growing dermal papilla, grow downwards into the skin, and begin to differentiate into the hair shaft and IRS; then, the newly formed hair shaft begins to develop and the melanocytes located in the hair matrix show pigment-producing activity; in anagen VI (metanagen), full restoration of the hair fiber-producing unit is realized, which is characterized by the formation of the epithelial hair bulb surrounding the dermal papilla, located deep in the subcutaneous tissue, and the new hair shaft appears from the skin surface. This phase can last for several years in hair follicles.

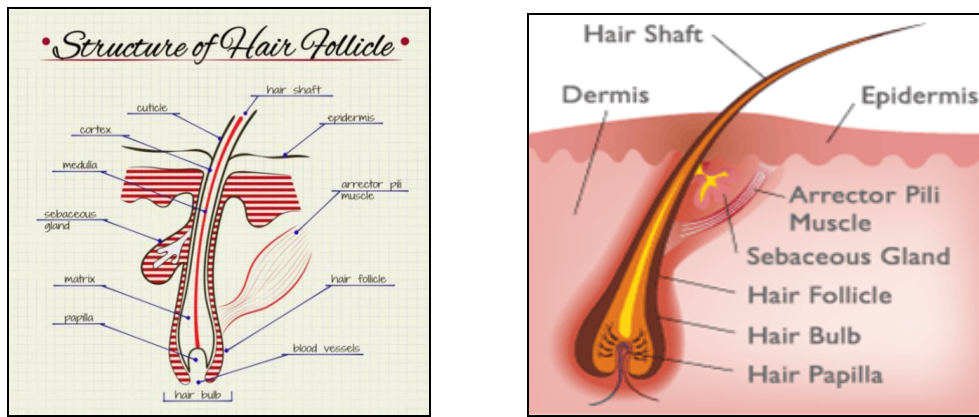


Figure No. 1: [A] Structure of Hair [B] Structure of Hair follicle

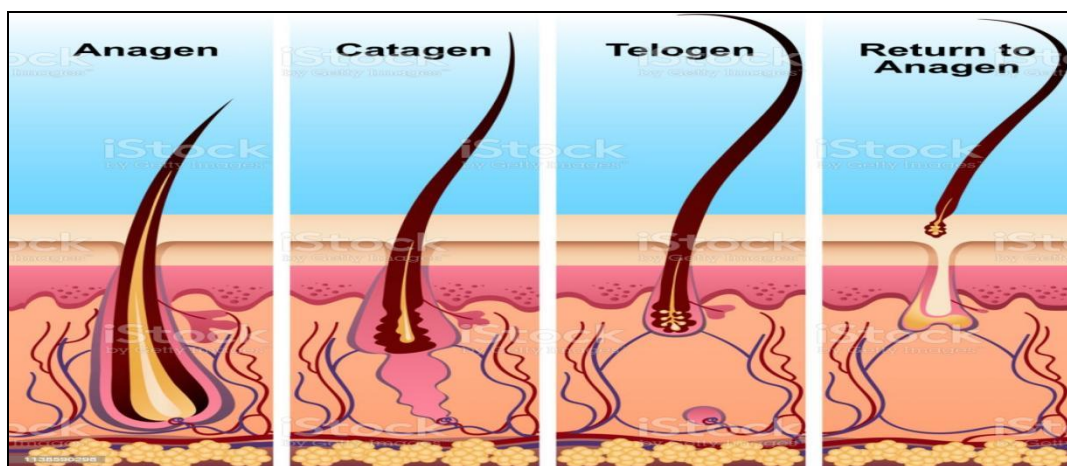


Figure No. 2: Stages of hair growth or hair growth cycle.

HAIR PROBLEMS: [7]

1. Dandruff [Figure No. 3 A]: - The scaly particles that cling to the root of the hair is dandruff which is caused by poor diet, dry scalp, infection, excess sebum, and sensitivity to certain products. It is a harmless, non-inflammatory skin condition that affects the scalp and can lead to hair loss. Naturally, apple cider vinegar is a quick fix to help to relieve dandruff as it contains anti-inflammatory and anti-bacterial properties. Coconut oil, tea tree oil, adding omega 3- fatty acids also help large extend to relieve dandruff.

2. Hair loss: - Hair loss occurs due to several factors such as stress, hormonal imbalance, and using the wrong products. Prevention is possible by using protein-rich food, switching to mild shampoos, massage with hot oil, staying hydrated, and exercise regularly.

3. Dry hair [Figure No. 3 B]: - It is due to deficiency of protein, sometimes other underlying issues such as menopause, birth control pill, pregnancy, hormonal imbalance, anemia, and hyperthyroidism can also cause dry hair. Omega 3 and 6 fatty acid-rich food can replenish the hair luster.

4. Oily scalp: - Of the many reasons like poor diet, genetics, or hormonal changes, the biggest culprit of an oily scalp is overwashing. Ingredients like lactic acid help to regulate the production of oil.

5. Hair colour damage: - Regular coloring sessions can damage the hair in the long run. The chemicals in the dye can also cause dryness, dandruff, breakage, and split ends. Medicated shampoos, extra care, conditioning, and nourishing can treat the hair.

6. Split ends: - When the oil from the scalp doesn't reach the ends of the hair, it tends to dry and split over time and another reason is heat worse the ends. Applying a dash of oil on the ends can avoid split ends.



Figure No. 3: [A] Dandruff [B] Dry hair

7. Dull hair / Heat damaged hair: - It's tempting to turn the temperature of the straightener to high temperatures i.e, 450 degrees Celcius to get perfectly straight hair.

The temperature can burn hair, cuticle and cause breakage.

I HERBS USED IN TREATING HAIR PROBLEMS:

***Shikakai** - Remember those days when our mother gives us shikakai to wash hair Thanks to our mother because shikakai is a fantastic herb for healthy hair. Shikakai or *Acacia concinna* is a natural cleanser and scalp soothing ayurvedic herb. It is rich in vitamin c and

phytochemicals that help to reduce dandruff, itching, and scalp dryness. Shikakai is rich in antioxidants that help and promote hair growth naturally.



Figure No. 4: [A] Shikakai [B] Brahmi

Brahmi - Brahmi is a wonderful herb for hair growth and the thickening of hair. Brahmi oil contains an alkaloid that activates a protein in the body that toughens and strengthens the hair naturally. Brahmi reduces cortisol - a stress hormone in the body. A high level of cortisol is one of the reasons for hair fall. Brahmi helps to improve blood circulation to the scalp.

Amla—*Phyllanthus emblica*, also known as Indian gooseberry is an excellent hair conditioning herb. Vitamin-c loaded amla is an essential part of hair care and skincare routine. It contains essential fatty acids and antioxidants which strengthen the hair follicles and make hair strong and luster. Amla is overall good for hair and scalp health as it helps to remove dandruff and dissolve grease, dirt from follicles. It promotes essential nutrients to hair follicles to promote hair growth.



Figure No. 5: [A] Amla [B] Methi

Fenugreek or Methi seeds - It is a common spice in every Indian kitchen. It is considered the best ayurvedic medicine since its seeds are rich in vitamin A, C, K, proteins, and folic acid. Fenugreek seeds contain the protein nicotinic acid which is known to be very effective against hair fall, dandruff, and various scalp problems.

Aloe vera - Aloe vera has scalp soothing and anti-inflammatory properties. It has been used for ages to reduce hair loss. It is also an excellent home remedy for hair damage and dandruff. The gel of aloe vera can restore the pH balance of the scalp and increases hair growth.



Figure No. 6: [A] Aloe vera

[B] Reetha

Reetha - *Aritha*, *Sapindus mukorossi* is also known as Soapnuts, is an excellent hair tonic, long known for its benefits for healthy hair and scalp. Used for centuries as an anti-hair loss shampoo, the natural antifungal, and antibacterial properties may help with dandruff. The natural saponins not only cleanse hair but also add body and sheen and make hair feel thicker, silky, and smooth.

Hibiscus - It is used to lessen grey hair and promote hair growth. The flowers and leaves contain mucilage and plant proteins that help in the treatment of dandruff and hair loss. Hibiscus infusions are great as a final rinse, add warm red hues, provide excellent slip and help detangle naturally curly hair.



Figure No. 7: [A] Hibiscus [B] Heena [C] Lavender

Henna - The powdered leaves of this plant have been used since ancient times as a natural dye. Henna gives hair a reddish tint and when mixed with other botanicals such as indigo and

cassia, can create a variety of beautiful colors. Henna a deep conditioner, coats the hair shaft, seals moisture and increases luster. And makes hair silky soft.

Lavender - Stress is a known cause of hair loss. Lavender oil has a calming aroma and is used as a natural remedy to reduce stress and stress-induced hair loss. Scottish scientists have found that massaging the scalp with lavender essential oil along with a carrier oil (grapeseed or jjoba oils), is a safe and effective treatment for alopecia areata.

II. PREPARATION METHODS: [11,15]

The following steps are followed sequentially for the formulation of polyherbal shampoo powder.

—**Drying**:- All the powder are in dry form and grinded.

—**Weighing**: - All the required herbal powders for shampoo preparation were weighed individually.

—**Size reduction**: - The crude ingredients were collected and these ingredients were size reduced using a hand-driven mixer individually.

—**Mixing**: - All these fine ingredients were mixed thoroughly by the mixer to form a homogenous fine powder.

—**Sieving**: - Then this fine powder was passed through sieve no. 80, to get a sufficient quantity of fine powder.

—**Packing and labeling**: - Then it was packed and labeled suitably.

Table No 1: Biological name and their uses of herbal ingredients

Ingredients	Biological name	Use of ingredient
Aloe vera	<i>Aloe Barbadensis</i>	Conditioner and moisturizing effect
Shikakai	<i>Acacia concinna</i>	Detergent
Amla	<i>Phyllanthus emblica</i>	Anti-dandruff, strengthen and increase hair growth
Hibiscus	<i>Hibiscus rosa - sinensis</i>	Conditioning agent
Reetha	<i>Sapindus mukorossi</i>	Cleanser, insecticide (lice)
Neem	<i>Azadirachta indica</i>	Prevents dryness of hair

Table No 2: Formula for Polyherbal powder shampoo (50 grams)

Ingredients	Formula 1	Formula 2	Formula 3
Aloevera	5	10	15
Shikakai	10	10	10
Amla	10	10	5
Hibiscus	10	5	5
Reetha	10	10	10
Neem	5	5	5

EVALUATION OF POLYHERBAL POWDER SHAMPOO:[3, 13]

Prepared formulations of shampoos should be subjected for the following evaluation parameters;

A) Organoleptic evaluation

Organoleptic evaluation on the parameters like colour, odour taste, and texture should be carried out. Colour and texture are evaluated by vision and touch sensation respectively. For taste and odour evaluation a team of five taste and odour sensitive persons are formed and random sampling is performed.

B) General powder characteristic

General powder characteristics include evaluation of those parameters which are going to affect the external properties (like flow properties, appearance, packaging criteria, etc.) of the preparation. Characteristics evaluated under this section are powder form, particle size angle of repose, and bulk density. Sample for all these evaluations are taken at three different levels i.e. from the top, middle and lower levels.

1. Particle size

Particle size is a parameter, which could affect various properties like spreadability, grittiness, etc., Particle size is determined by the sieving method by using I.P. Standard sieves by mechanical shaking for 10 Min.

2. Angle of repose

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

Funnel method

Take required quantity of the dried powder in a funnel placed at a height of 6 cm from a horizontal base. Allow the powder to flow to form a heap over the paper on the horizontal plane. Note the height and radius of the powder and record the angle of repose (θ) by using the formula. Place required amount of dried powder in a cylindrical tube open at both ends on a horizontal surface. Then raise the funnel to form a heap. Record the height and radius of the heap. For the above two methods, the angle of repose (θ) can be calculated by using the formula.

$$\theta = \tan^{-1}(h / r)$$

Where, θ – Angle of repose,

h – height of the heap,

r – Radius of the base

3. Bulk density

Bulk density is the ratio between the given mass of a powder and its bulk volume. Take the required amount of dried powder and fill it in a 50 ml measuring cylinder up to 50 ml mark. Then drop the cylinder onto a hardwood surface from a height of 1 inch at a 2-second interval. Measure the volume of the powder. Then weigh the powder. This is repeated to get average values. The bulk density is calculated by using the below-given formula.

$$\text{Bulk density} = \frac{\text{mass of the polyherbal powder shampoo}}{\text{Volume of the polyherbal powder shampoo}}$$

4. Tapped density

The tapped density is an increased bulk density attained after mechanical tapping a container containing the powder sample. Observe the initial powder volume or mass, tap the measuring cylinder or vessel mechanically for 1 min and take volume or mass readings until little further volume or mass change was observed. It was expressed in gram per cubic centimeter (g/cm^3).

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

C) Physicochemical evaluation

- 1. pH:-** Measure the pH of 10 % shampoo solution in distilled water at room temperature 25° .
C. the pH is measured by using a digital pH meter.
- 2. Washability:-** Apply the formulation on the skin then check the ease and extend of washing with water manually.
- 3. Solubility:-** Solubility is defined as the ability of the substance to soluble in a solvent. Weigh 1 gram of the powder accurately and transfer into a beaker containing 100 ml of water. Shake well and warm to increase the solubility. Then cool and filter, and weigh the residue obtained.

4. Loss of drying: -

Loss of drying is the loss of mass expressed in percent m/m. Weigh Two gram of powder and transfer into a dry Petri dish. Place the Petri dish in a desiccator for 2 days over calcium chloride crystals. Then take the powder and weigh accurately to find out the weight loss during drying.

5. Skin /eye irritation test

The eye and skin irritation tests reveals that the herbal shampoo powder shows no harmful effect on the skin and eye. This is due to the absence of synthetic surfactants. Most of the synthetic surfactants produce inflammation of the eyelid and corneal irritation. But in formulation of herbal shampoo powder, all the ingredients used are obtained naturally. So, it does not produce any harmful effect on the skin and eye.

*** Skin irritation test**

Perform skin irritation test by using the open patch method.

With many cosmetic products, whether commercial or homemade, it is recommended to do a patch test on skin before use. This is to ensure that no allergic reaction is seen for the product and if so, it will only be confined to a small area of skin and thus treatable with ease.

Step 1 - Pour or squeeze out a little of the cosmetic preparation to your wrist.

Step 2 - Dab a small amount of the preparation on the pulse of your wrist or the crook of your elbow.

Step 3 - Leave the preparation unwashed for 15-20 min.

Step 4 - Watch for signs of an allergic reaction. Typical signs will include redness, a rash, any form of breakouts on the skin, itchiness, pain, flaking, etc. Some people may also experience nausea or respiratory reactions. If any of these signs present themselves, cease use immediately.

Step 5 - Continue to use the product if you do not react. If you do not have any allergic reaction symptoms, the preparation is likely all right for your skin type.

Eye irritation test

Collect animals (albino rats) from the animal house. Dip about 1 % of shampoo solutions into the eyes of albino rats with their eyes held open with clips at the lid. Record the progressive damage to the rat's eyes 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.

6. Extractive values

Determination of alcohol-soluble extractive

Weigh 5 g of each air-dried herbal shampoo powder was and macerate with 100 ml of Alcohol of the specified strength in a closed flask for twenty-four hours, shake frequently for six hours, and allow to stand for eighteen hours. Filter, by taking precautions against loss of solvent, 25 ml of the filtrate is evaporated to dryness in a tare flat bottomed shallow dish, and dry at 105 °C, to constant weight and weigh. The percentage of alcohol-soluble extractive concerning the air-dried drug is calculated.

Determination of water-soluble extractive

Proceeded as directed for the determination of alcohol-soluble extractive, using chloroform water instead of ethanol. The percentage of water-soluble extractive was calculated for each sample.

7. Ash value

Total ash content

Ash value is calculated to determine the inorganic contents which are characteristic of an herb. Take about 2 Gm of powder drug in silicon dish previously ignited and weighed. The temperature is increased gradually by increasing the heat not exceeding to red colour. After complete burning, cool and weigh the ash.

Acid insoluble ash

Acid insoluble ash is calculated by boiling obtained ash with 25 ml diluted HCl for 5 min, insoluble matter is collected in gooch crucible, wash with hot water, ignite, and weigh.

8. Dirt dispersion

Two drops of 1% of each shampoo powders are added to a large test tube containing 10 ml of distilled water. Add 1 drop of India ink; stopper the test tube and shake for 10 times. The amount of ink in the foam is estimated as None, Light, Moderate, or Heavy.

9. Moisture content determination

Weigh 10 g of each herbal shampoo powder in a tare evaporating dish and kept it in a hot air oven at 105⁰C. Repeat the drying until the constant weight loss is observed after 30 minutes. The moisture content is calculated for each sample.

10. Wetting time

Cut the canvas into 1-inch diameter discs having an average weight of 0.44 g. Let the disc float on the surface of a shampoo solution of 1 % w/v and then start stopwatch. The time required for the disc to begin to sink is measured accurately and noted as the wetting time.

11. Stability Study

The stability and acceptability of organoleptic properties (odor and color) of formulations during the storage period indicate that they are chemically and physically stable.

12. Nature of hair after washes

Nature of hair after wash should be done by collecting the responses of volunteers.

13. Foaming index

Weigh one gram of the powder and transfer into a 250 ml conical flask containing 100 ml of boiling water. Then warm gently for 30 minutes, cool and filter, and make up the volume to 100 ml in a standard volumetric flask. Take this extract in 10 test tubes in a series of successive portions of 1, 2, 3....10 ml, and make up the remaining volume with water to 10 ml. Then shake the test tubes in longwise motion for 15 seconds at speed of 2 frequencies/second. Then allow to stand for 15 minutes. The height of the foam is measured.

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

$$a = \text{height of the foam}$$

Advantages of Herbal shampoos over synthetic chemical shampoos:^[9]

1. The cleansing action of the synthetic cleansers/ shampoo aims basically to remove oil content from the hair leaving the hair dry and damaged, whereas herbal shampoos aim at delivering essential nutrients to the hair and at the same time have a mild cleansing effect to remove the unwanted oily content.
2. The conditioning effect that is provided by herbs is more beneficial to the hair whereas the synthetic conditioners play with different types of charge inducers which may damage hair permanently.
3. In general, synthetic anti-dandruff shampoo make use of climbazole that helps in getting rid of dandruff temporarily but herbal shampoo uses the goodness of ginger, neem which removes dandruff-causing organisms.
4. Modern shampoos use silicones for silky hair which is not good for human use and also for the environment. However, the same silkiness can be obtained by using herbs like hibiscus.
5. The herbal/ herb extracts have the same efficacy and results when used in modern dosage forms like that of those when used alone.
6. Herbal shampoos are bio-degradable, earth-friendly, and are free from side effects.
7. Apart from this, the use of herbal shampoo help in revenue to many of the farmers at least to earn their livelihood through whom the herbs are sourced.

Table No. 3: Differences between Herbal liquid shampoo and Herbal powder shampoo

HERBAL LIQUID SHAMPOO	HERBAL POWDER SHAMPOO
1.Liquid form, more prone to contamination.	1. Powder form and less prone to contamination.
2. Shelf life is less.	2.Shelf life is more.
3.Moisture content is high so preservatives need to be added.	3. Moisture content is less. No use of preservatives.
4. May cause irritation and uneasiness.	4.Easy to use
5. The chances of incompatibility are more.	5.Chances of incompatibility are less.
6. Less stable	6.More stable
7. Transportation is difficult as it may leak.	7.Transportation is easy.

Presently available marketed products:

- * Organic hair cleanser- by tribe concepts- ingredients include fenugreek, shikakai, reetha.
- * Root strengthening and conditioner- by tribe concepts- ingredients include fenugreek, amla, liquorice.
- * Natural hair shampoo- by Havintha- ingredients include amla, reetha, shikakai, methi.
- * Herbal organic hair wash- by MahaGro - ingredients include shikakai, reetha, methi, brahmi, amla, hibiscus, bhringraj, kapoorkali.
- * Kesh Jyothi herbal hair wash- by Isha life - ingredients include amla, shikakai, reetha, henna, hibiscus.

CONCLUSION:

Many people suffer from hair disorders such as dandruff, alopecia, and dermatitis. Shampooing is the best treatment for these types of disorders. The awareness and need for cosmetics with the herb is on the rise, as it is strongly believed that these products are safe and free from side effect. It is seen that many products natural claims are still based extensively on synthetic functional ingredients. The present review focus on the use of the herbal ingredient in place of synthetic ingredient instead of using cationic conditioners we can use shikakai, hibiscus, and other plant extracts to provide a conditioning effect. Herbal-based powder shampoos are more effective in terms of safety and ease of manufacturing and from an economic point of view.

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