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A Review on Preparation and Evaluation of Herbal Shampoo



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ABSTRACT

Since shampoos are the most widely used cosmetic product in daily life, the shampoo industry has the highest sales volume of all hair care products. Given that it helps clean the hair, shampoo is among the most essential cosmetics. Modern shampoo compositions no longer aim for the clearest hair-cleaning experience. A natural hair care product called herbal shampoo is intended to promote hair growth, strength, and blackness while also getting rid of oil, dirt, and dandruff. When the hair becomes oily or dry, the disease, which is benign and persistent, can cause white, flaky dead skin to appear on the shoulders as well as in the hair. 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 (*Emblca officinalis*), Hibiscus leaves (*Hibiscus rosa-sinensis*) with proven efficacy. The purpose of the current study is to develop. The formulation at the laboratory scale was evaluated for several organoleptic properties, general powder characteristics and physicochemical evaluation to ensure the safety and efficacy.

HISTORY:

Since ancient times, several plants and their extracts have been utilized as shampoos throughout the Indian subcontinent. Boiling *Sapindus* with dried Indian gooseberry (Amla) and a few other herbs and using the filtered fluid made for a very efficient early shampoo. *Sapindus*, commonly referred to as soapberries or soap nuts, is a tropical tree that is widely found in India and is referred to as ksuna. Saponins, a naturally occurring surfactant, are mentioned in ancient Indian scriptures together with fruit pulp. The lather produced by soapberry extract is referred to as phenaka in Indian scriptures. It leaves hair manageable, lustrous, and silky. Additional hair cleaning products included hibiscus blossoms, ritha (*Sapindus mukorossi*), arappu (*Albizia amara*), and Shikakai (*Acacia concinna*). Sikhism's founder and first Guru, Guru Nanak, made references to the soapberry tree and soap in the 16th century.^[1]

INTRODUCTION:^[2]

A person's hair is a crucial aspect of their beauty. Since ancient times, people have employed plants for administration, hygiene, and aesthetics. Although synthetic chemicals have made major contributions throughout the years, their negative effects on the skin and eyes are now widely recognized. People have been driven to these locations by herbal items since they are reasonably priced and have few adverse effects. Not just for washing the hair, but also for making it lighter and maintaining its coherence. To achieve Quality by Design, you must design your product and processes to ensure predetermined levels of efficacy, safety, and quality. This requires knowing how your product's ingredients and manufacturing processes impact its efficacy, safety, and quality.

TYPES OF SHAMPOOS:^[3]

1. Powder Shampoo
2. Liquid Shampoo
3. Lotion Shampoo
4. Cream Shampoo
5. Jelly Shampoo
6. Aerosol Shampoo
7. Specialized Shampoo
8. Conditioning Shampoo

9. Anti-dandruff Shampoo
10. Baby Shampoo
11. Two Layer Shampoo

Ideal Characteristics of Shampoo:

1. Should effectively and completely remove the dust, and excessive sebum.
2. Should effectively wash hair.
3. The shampoo should be easily removed by rinsing with water.
4. Should impart a pleasant fragrance to the hair.
5. Should not have any side effects or irritate the skin or eye.

COMPOSITION OF SHAMPOO:

1. Surfactant
2. Antidandruff agent
3. Conditioning agent
4. Pearlescent agent
5. Sequestrants
6. Thickening agent
7. Colours, perfumes and preservatives

Ideal properties of Herbal Shampoo-^[4]

1. It should effectively and completely remove dust or soil, excessive sebum or other fatty substances and loose corneal cells from the hair.
2. It should produce a good amount of foam to satisfy the psychological requirements of user.
3. It should be easily removed on rinsing with water.
4. It should leave the hair non-dry; soft, and lustrous with good manageability and minimum fly away.
5. It should impart a pleasant fragrance to the hair.
6. It should not cause any side-effects / irritation to skin or eye.

It should not make the hand rough and chapped.

ANATOMY OF HAIR:

Ninety-five percent of hair is composed of keratin, a fibrous, helicoidal protein with a helix structure that is present in the skin and all of its attachments (nails, body hair, etc.).

Three distinct components make up the structure of hair: ^[5]

Medulla: It is the deepest layer of the hair shaft, consisting of soft, greasy, amorphous materials.

Cuticle: A thin, protective covering on the outside that holds nutrients that help hair grow. It is highly keratinized, with around 60 micrometers in length and 6 micrometers in width, with cells piled one on top of the other like scales.

Cortex: The primary component of hair, it is made up of lengthy keratin chains that give hair its suppleness, resilience, and elasticity. The cortical cells are connected via an intercellular cement rich in lipids and proteins.

GROWTH CYCLE OF HAIR: ^[6]

The hair growth cycle consists of four phases:

Anagen (growth phase): This is the stage of development. This stage takes several years to complete.

Catagen (transitional phase): The transitional phase causes the hair follicle to shrink and the rate of hair growth to decrease.

Telogen (resting phase): It is the time when hair stops growing and new hair starts to grow, pushing out the older hair.

Exogen phase: It is the final stage of the hair growth cycle, during which the hair strand fully sheds off the scalp.

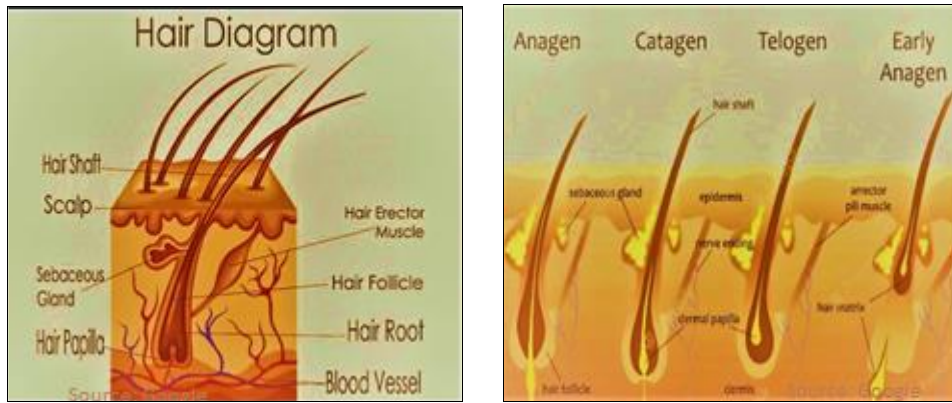


Fig-1-Anatomy of hair

HAIR PROBLEMS:

Hair loss: The primary cause of hair loss is Hair loss can be exacerbated by stress, medication, hormone fluctuations, and a variety of hair styling products.

Oily hair/greasy hair: Excessive sebum production on the scalp is the cause of oily hair. Sebaceous glands produce sebum, and occasionally they "work overtime," producing an excessive amount of oil.

Dandruff: Dandruff is a benign, non-inflammatory skin ailment that affects the scalp and may cause hair loss. It sticks to the hair root and is scaly.

Dry hair: A diet lacking in proteins is the cause of dry hair. Dry hair can also result from menopause, anemia, hormonal imbalances, and birth control pills.

Spilled ends: Aside from other factors, split ends happen when the hair ends become dry. Herbs used in treating hair problems. [7]

HERBS USED IN TREATING HAIR PROBLEMS: [8, 9, 10]

Shikakai: Recall the times when our mom used Shikakai to wash our hair. Shikakai is a great herb for healthy hair, thanks to our mother. The ayurvedic herb Shikakai, also known as *Acacia concinna*, is a natural cleanser and scalp tonic. Its abundance of vitamin C and phytochemicals helps lessen scalp dryness, itching, and dandruff. Antioxidants found in Shikakai are abundant and aid in the natural growth of hair.

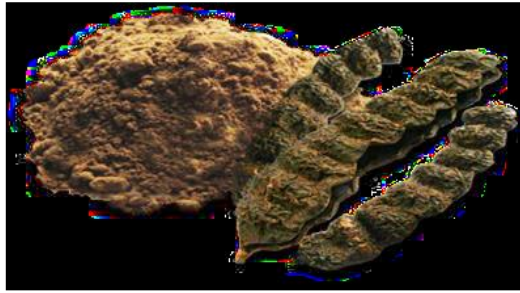


Fig-2-Shikakai

Brahmi: It is an excellent herb for thickening and promoting hair growth. An alkaloid found in Brahmi oil causes the body to release a protein that naturally fortifies and toughens hair. The stress hormone cortisol is lowered in the body by Brahmi. One of the causes of hair loss is an elevated cortisol level. Brahmi aids in enhancing scalp blood circulation.



Fig-3-Brahmi

Amla: *Phyllanthus emblica*, also known as Indian gooseberry, is excellent for hair conditioning. Amla, which is high in vitamin C, is an essential part of any hair care and skincare regimen. It contains essential fatty acids and antioxidants that help to strengthen hair follicles and make hair strong and shiny. Amla is generally beneficial to hair and scalp health because it aids in the removal of dandruff and the dissolution of grease and dirt from follicles.



Fig-4-Amla

Fenugreek or Methi: These seeds are a staple in every Indian kitchen. Its seeds are high in vitamin A, C, K, proteins, and folic acid, making it the best ayurvedic medicine. Fenugreek seeds contain the protein nicotinic acid, which is effective against hair loss, dandruff, and other scalp issues.



Fig-5-Methi

Aloe vera: It has anti-inflammatory and calming effects on the scalp. It has long been used to stop hair loss. It is also a great at-home treatment for dandruff and hair damage. *Aloe vera* gel promotes hair growth and helps the scalp's pH balance to be restored.



Fig-6-Aloe vera

Ritha: *Sapindus mukorossi*, also known as Soapnuts, is an excellent hair tonic that has long been known for its benefits for healthy hair and scalp. Natural antifungal and antibacterial properties, which have been used for centuries as an anti-hair loss shampoo, may help with dandruff. Natural saponins not only cleanse but also add body and sheen to hair, making it feel thicker, silkier, and smoother.



Fig-7-Ritha

Hibiscus: It is used to encourage hair growth and reduce grey hair. Mucilage and plant proteins found in the flowers and leaves aid in the treatment of dandruff and hair loss. Infusions of hibiscus are wonderful as a last rinse; they add a hint of warmth to red, offer superior slip, and aid in detangling naturally curly hair.



Fig-8-Hibiscus

Henna: This plant's powdered leaves have been used as a natural dye since ancient times. In addition to giving hair a reddish hue, henna can produce a multitude of lovely colors when combined with other botanicals like cassia and indigo. Applying henna as a deep conditioner helps to seal moisture, coat the hair shaft, and boost luster.



Fig-9-Henna

Lavender: Hair loss is known to be caused by stress. Lavender oil is a natural remedy that reduces stress and hair loss caused by stress. It has a calming aroma. Researchers from Scotland have discovered a safe and efficient way to treat alopecia areata: massaging the scalp with lavender essential oil combined with a carrier oil (jajoba or grapeseed oil).



Fig-10-Lavender

PREPARATION METHODS: ^[11]

METHOD:-1

Drying: Every component needed to make the shampoo is ground up and dried.

Weighing: Each powdered herb needed for the recipe is weighed individually.

Size reduction: Each weighed material is put through a hand-driven mixer to reduce its size.

Mixing: To create a homogenous mixture, the fine powders are carefully combined with a mixer.

Sieving: To obtain uniform-sized particles and minimize lumps, the mixture is run through sieve number 80.

Packaging and Labeling: Lastly, the powder was appropriately packaged and labeled.

METHOD: - 2

The preparation of polyhedral liquid shampoo entails the following steps:

Gathering of materials: The ingredients needed for the recipe are gathered, carefully cleaned, and dried.

Weighing: Each ingredient is measured out and allowed to soak for the entire night.

Preparing the decoction: Ingredients are boiled in the same water used for soaking on medium flame, allowing cooling and filtering.

Incorporate preservative (eg: Methyl paraben) to prevent microbial growth.

Table-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, strengthens 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-2-Formula for Polyherbal powder shampoo (50 grams)

Ingredients	Formula 1	Formula 2	Formula 3
Aloe vera	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 HERBAL SHAMPOO: ^[12]

The formulations were subjected to quality control tests, including visual assessment and physicochemical controls like pH, density, viscosity, surface tension, foam volume, foam stability, and wetting time.

1. Physical appearance/visual inspection:

The formulation prepared was evaluated for clarity, color, odor and foam producing ability and fluidity.

2. Determination of pH:

A 10% v/v shampoo solution was constituted in distilled water and the pH of the solution was measured by using a calibrated pH meter.

3. Determination of solid content percentage:

A dry evaporating dish was weighed, and 4 grams of shampoo was added. The dish was placed on a hot plate until the liquid evaporated, and the solid contents were calculated.

4. Wetting time:

The wetting time was determined by measuring the time it took for a canvas paper to sink completely. A 1-inch diameter disc of 0.44 g canvas paper was placed on a shampoo surface, and the time taken for the paper to sink was recorded using a stopwatch.

5. Rheological evaluation:

The viscosity of herbal shampoo was measured using Ostwald's viscometer and counting drops from the mark to the bottom.

- nw: viscosity of water
- ny: viscosity of tested liquid
- dw: density of water
- dy: density of tested liquid
- tw: timing of runoff of water
- ty: timing of runoff of tested liquid

6. Dirt dispersion:

A falcon tube was filled with two drops of herbal shampoo and 10 ml of distilled water. India ink was added, and the tube was shaken ten times to determine the ink content in the foam.

7. Cleansing action:

The herbal shampoo's cleansing properties were tested on hair that had not been washed for seven days and on human subjects who had applied oil 4-5 hours before washing. The shampoo's performance was evaluated for its ability to remove oily dirt from the scalp.

8. Surface tension measurement:

The study used a stalagmometer to measure the weight of herbal shampoo drops falling from a capillary glass tube, allowing for the calculation of the fluid's surface tension. The weight was determined by counting the drops, providing a visual representation of the experiment.

- nl: no. of drops of liquid
- nw: no. of drops of water
- dl: density of liquid
- dw: density of water
- tw: 71.2 dyne/cm

9. Foaming ability & foam stability:

The foaming ability of a shampoo was determined using the cylinder shake method. A 250ml graduated cylinder was filled with 50ml of 1% herbal shampoo solution and shaken for 10 minutes. The foam volume remained constant for about 5 minutes, indicating good stability and higher foam properties. The shampoo's foam content was recorded at 1-minute intervals, possibly due to the presence of a soap nut.

10. Stability Study:

The stability of the formulation was studied for a period of four weeks by keeping at temperature of 25-30°C.

11. Skin Irritation Test:

Prepared herbal shampoo was applied on the skin for 5 minutes after that was washed and tested for irritation or inflammation of the skin.

12. Conditioning attributes:

The shampoo's conditioning effect on hair was assessed post-wash, focusing on its desirable benefits like increased hair mass, improved luster, softness, and silkiness, which are all beneficial for hair.

13. Microbial examination:

A study was conducted to determine the susceptibility or resistance of organisms to formulation ingredients. Shampoo was mixed with Mueller Hinton agar and poured into sterile Petri dishes. The plates were rotated, set, and incubated at 37°C for 24 hours. Gram positive and Gram-negative test organisms were subcultured on nutrient broth and incubated at 37°C. The developed culture was streaked on Mueller Hinton agar surfaces, and four wells were punched with a cork borer. Shampoo was filled in these wells in increasing order.

CONCLUSION:

The formulation aims to create a stable and effective shampoo using herbal natural extracts to reduce side effects and maintain a healthy scalp. The pH of the shampoo is adjusted to 5, retaining the acidic mantle of the scalp. The study suggests using Shikakai, Amla, and other plant extracts instead of synthetic agents to provide effective conditioning effects. The responsibility lies with formulators to change consumer perception of a good shampoo and improve the overall quality of hair.

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