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## Review on herbal shampoo

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### Abstract

Herbal Shampoo are probably the most widely used cosmetic products for cleansing Hairs and scalp in our daily life 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 pollutions etc.

Shampoo is a type of cosmetic mixture that uses herbs from plants as an alternative to the synthetic Shampoo available in the market. The herbal shampoo is important, as people today prefer herbal products than chemical ones for they proved to enhance. Shampoos are most probably used as cosmetics. Shampoos are most likely utilized as beautifying agents and are a viscous solution of detergents containing suitable additives preservatives and active ingredients. It is a harmless, chronic condition that occurs when scalp becomes dry or greasy and produces white flakes of dead skin that appear in hair or on shoulders. People most often think of it as anything that produces a flaky scalp. A good shampoo should almost form abundant foam irrespective of the type of water used or the nature of soil or fat to be removed from hair. Concept foam formation is not released to the Cleansing effect, but people psychologically always prefer a high foam product. Some good shampoos are found to have side effects like drying effect on the hair. This leaves the hair too dry to handle or Comb. Hence proper conditioning of the hair is also an important consideration.

**Keywords:** Cosmetic, herbal shampoo, dandruff, advantages, disadvantages, herbs examples

### Introduction

#### Definition of herbal shampoo

- Shampoos are most probably used as beautifying It is a hair care product that is used for cleanse scalp and hair in our daily life.
- Shampoos are most likely utilized as beautifying agents and are sticky 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 herbal shampoo is used to remove dirt that is make up on the hair without stripping out much of the sebum.
- Many artificial shampoos are present in the current market both medicated and non-medicated, however, shampoo popularized due to natural origin which is safe, increases consumers demand and free from side effects.
- HS is defined as a preparation with surfactant (surface active material) in-suitable form liquid solid or power which when used under the conditions specified will remove surface grease, dirt an skin debris from the hair shaft and scalp without affecting adversely the hair, scalp or health of the user.
- HS has so many types are powder, liquid, lotion, cream, jelly, aerosol, specialized HS (Conditioning, Anti-dandruff,). But the future of HS is going to be herbal Shampoo.
- It contains the natural ingredients with herb extract.
- It helps hairs to improvise their standard of moisture, shine, growth, thickening, strength of hair roots.
- Shampoos are may be the most widely used the cosmetic product for cleansing hairs and scalp in your daily life.
- A shampoo is Shampoos are may be the most widely used the cosmetic product for cleansing hairs and scalp in your daily life.

- A shampoo is basically a solution of a detergent containing suitable additives for other benefits such as hair conditioning, lubrication, medication etc.
- Nowadays many synthetic, herbal, medicated and non-medicated shampoos are available in the market.
- But popularity of the herbal shampoos among consumers is on rise because of their belief.
- The herbal shampoos are safe and free from side effect.
- Herbal shampoos is widely unstable product all over the world it has been used form many years.
- Chemical herbal shampoos are prepared with several chemicals which can care hairs problems bur also responsible for damage of hairs.
- Some international researchers said that the chemicals of herbal shampoos also responsible for cancer herbal shampoos are defined as preparation of a surfactant in suitable form liquid, solid or powder which when used under the condition specified will remove surface grease, dirt & skin debris from the hair shaft & scalp.
- Herbal shampoos have so many types are powder, liquid, lotion, cream, jelly, aerosol and specialized herbal shampoos (Conditioning, antidandruff).
- Herbal shampoos contain all the natural ingredients with herb extract.
- It helps hair to improve their quality of moisture, growth, thickening, strength of hair roots. The most important thing is that herbal shampoos has no any side effect.
- By using herbal shampoos we can stop the hair loss.
- Hairs are the basic part of human beauty.
- People are using herbs for cleansing, beautifying &managing hair since ancient era.



### History- Indian subcontinent

In the Indian subcontinent, a variation of herbs and their extracts have been used as shampoos since ancient times. A very effective early Shampoo was made by boiling Sapindus with dried Indian gooseberry (Amla) and a selection of other herbs, using the strained extract. Sapindus, also known as soapberries or soapnuts, a tropical tree Widespread in India, is called ksuna. In ancient Indian texts and its fruit Pulp contains saponins which are a natural surfactant. The extract of Soapberries creates a lather which Indian texts called phenaka, it leaves the hair soft, shiny and manageable. Other products used for hair Cleansing were shikakai (*Acacia concinna*), hibiscus flowers, ritha (*Sapindus mukorossi*) and arappu (*Albizia amara*).Guru

Nanak the Founder and the first Guru of Sikhism, made references to soapberry tree and soap in the 16th century.

### Anatomy of hair

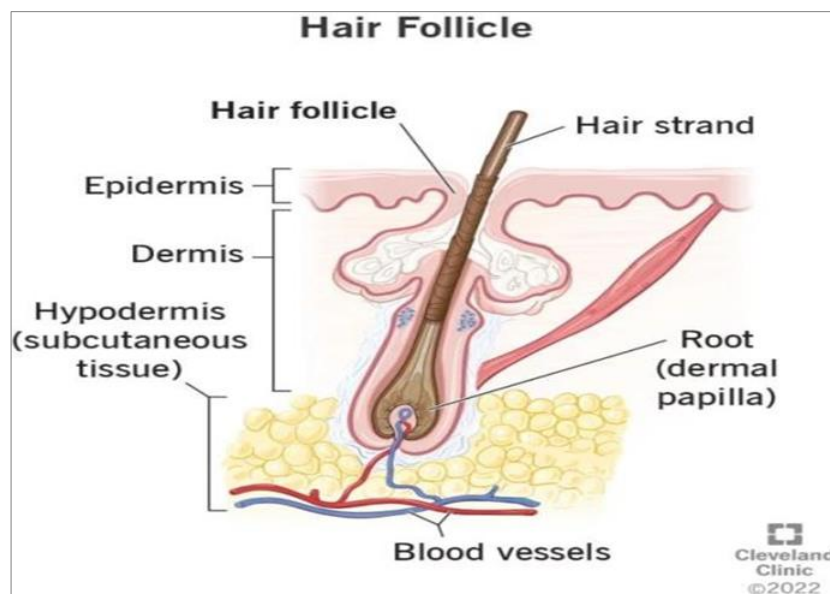
At the base of the hair, the hair root widens to a spherical hair bulb.

The hair papilla, which elements the hair root with blood, is discovered interior the backside of the hair bulb. New hair cells are continuously being in the hair bulb, shut to the papilla. New cells are continuously forming in the hair bulb. These cells stick collectively and harden. The full strand of hair develops from this team of hardened hair cells.

Because new hardened cells hold on attaching to the hair from below, it is progressively pushed up out of the skin. In

this way, a single hair on your head grows at a fee of about 1 cm per month. The shade of the hair is decided by means of the quantity of melanin in the hardened cells. This can fluctuate a lot from character to person, and it adjustments over the direction of a lifetime. The quantity of melanin

typically decreases as human beings get older, and greater air receives trapped inner the hair – it then loses its colour and turns white. Depending on someone’s authentic hair shade and the variety of white hairs that develop, the hair on their on their head then turns grey or white.



#### Parts of hair

- The hair is made up of 95% keratin a fibrous, hellicoidal 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.

**Dermal papillae:** The dermal papilla is responsible regulating the hair cycle and hair growth, and is also comprised of androgen receptors that are Sensitive to the presence of DHT.

**Matrix:** The matrix surrounds the dermal papillae and contains all the active ceneeded for hair growth and for the development of the different Parts of the hair, particularly the outer root sheath. The inner root sheath and the hair shaft combined. The matrix and the dermal papillae make up the hair.

**Bulb or Outer root sheath:** The outer root sheath, or, is the outermost part of the hair and is Keratinized.

**Inner root sheath:** internal root sheath is comprised of three parts: the Henley layer, Huxley layer, and Cuticle.

#### Growth cycle of hair

Hair growth cycle consists of four phases:

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

#### Hair problems

- **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.
- **Spilt 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 spilt ends.

**Ideal Properties of Shampoo**

- It should effectively and completely remove dust or soil, excessive sebum or other fatty Substances and loose corneal cells from the hair.
- It should produce a good amount of foam to satisfy the psychological requirements of the user.
- It should be easily removed on rinsing with water.
- It should leave the hair non -dry, soft, shiny with good manageability minimum fly away.
- It should impart a pleasant perfume to the hair.
- It should not cause any reaction/ irritation to skin or eye.
- It should not make the hand rough and chapped.

**Types of shampoo**

**Powder shampoo:** It is available in the form of dry powder, initially it was prepared from dry soaps, but nowadays dry synthetic detergents are used for their preparation.

- Powder shampoo is prepared where addition of water or other solvent reduces the activity of the components, especially in case of medicated shampoo.
- Nowadays, these shampoos are not used due to the difficulty experienced in their application.

**Liquid shampoo:** These are clear liquid preparations that are most widely used.

They are usually made by using detergent of low cloud point. Some of these shampoos may be transparent.

**Cream shampoo:** These are called as lotion shampoos which are modification of clear liquid cream shampoos. Solubilising agents such as magnesium stearate is also used to dissolve the added opacifier.

**Jelly shampoo:** These are transparent and thick usually made by incorporating a gelling agent, (e.g., cellulose).

- There is great use in hair salons and beauty parlours.
- The principle ingredient is detergent which can be used either alone or in combination with soap.
- By altering the proportion of detergent, gel of required consistency can be obtained.
- Addition of methyl cellulose to clear liquid shampoo and its subsequent thickening also gives rise to gel shampoo.

**Aerosol shampoo:** They are called aerosol shampoos because they are packed in aerosol containers.

- Their formulation, preparation and packing is complicated as an additional propellant is included.
- The propellant added must be compatible and should not reduce the activity of shampooing ingredients.
- The container opening is provided with a valve.
- Shampoo comes out as foam when the valve is pressed. Hence also called as foam type shampoo.

**Keratin shampoo:** When your shampoo (or any hair care product) is infused with keratin oil, you reap benefits that nourish and condition the hair.

This helps it look shiny and smooth. It also helps to fight frizz, tame fly always, and protect against damage caused by styling tools like a straightening iron or blow dryer.

**Volumizing shampoo:** Volumizing or volume shampoos make hair appear fuller, bouncier and more full of body.

- It's more about the texture of the hair than the thickness of the hair strands.
- Instead, volumizing shampoos should be lightweight enough to not weigh down your hair, thus creating more body in the end.


**Specialised shampoo:** Speciality shampoos are marketed to people with dandruff, color-treated hair, gluten or wheat allergies, an interest in using an organic product, infants and young children ("baby shampoo" is less irritating).



- Conditioner
- Anti- dandruff
- Baby
- Two layer
- Anti hairfull






**Advantages of shampoo**





- Cleansing properties
- Improving hair hygiene.
- Treating scalp conditions
- Treatment for dry scalp
- Treatment for hair loss.
- Treatment for greasing or oily hair.
- Relieves itch and irritation
- Repairs damaged hair.
- Shampoo keeps hair silky or smooth.
- Keeps your hair beautiful and blossomed.
- Pure and Organic Ingredient Free from Side Effects
- No Surfactants eg:- SLS
- No Synthetic Additive

**Table 1:** Herbs used in herbal shampoo

Botanical name	Common name	Uses	Figure
<i>Lawsonia inermis</i>	Henna	Promotes growth of hair conditioner	

<i>Azadirachta indica</i>	Neem	Antimicrobial agent Prevent the dryness of hair Prevents flaking of hairs	
<i>Ocinum sanctum</i>	Tulsi	Antimicrobial Anti-lice property	
<i>Emblica officinalis</i>	Amla	Promotes hair growth Prevents premature greying of hairs Controls dandruff	
<i>Acacia concinna</i>	Shikakai	Retains natural oil of hair Keeps hairs lustrous and healthy Add more shine to the Hairs. Cleanses Hair. Crubs Hair Loss. Prevents Lice, Psoriasis, Eczema & Scabies. Prevents Splits ends	
<i>Aloe barbadensis</i>	Aleo vera	Conditioning and moisturizing agent Calms an itchy scalp. Deeps Cleans Oily hairs. Promote hair growth. Smooth natural curls. Reduce frizzing	
<i>Citrus lemon</i>	Lemon	Maintains the PH Imparts fragrance to the preparation Add More shine. Get rid of dandruff Split ends Reduces hair fall	

<i>Hibiscus rosa sinensis</i>	China rose or rose oil	Prevents hair loss Promotes hair growth It repairs hair damage shampoo	
<i>Sapindus mukorossi</i>	Soap nut/ Reetha	Detergent Anti-dandruff Fight against scalp Infection	
<i>Trigonella foenum graecum</i>	Fenugreek	Cleaning Softening Anti-microbial Prevent dandruff Moisturize the skin Reduce hair loss Make hair strong and add shines to the hair	
<i>Chrysopogon zizanioides</i>	Vetiver grass	Anti-fungal Anti-microbial	
<i>Zingiber officinalis</i>	Ginger	Promotes hair growth Reduces dandruff Antibacterial Reduce split hairs	

<i>Eclipta prostrata</i>	Bhringraj	<p>Hair tonic Grows hair longer Makes hairs stronger Moisturizing the hair Dandruff reduction</p>	
<i>Withania somnifera</i>	Ashwagand ha	<p>Controls hair fall Promotes hair growth Improves circulation of the scalp</p>	
<i>Camellia sinensis</i>	Green tea leaves	<p>Hair growth and enrichment Disinfect and nourish your scalp to promote healthy hair growth</p>	
<i>Bacopa monneri</i>	Brahmi	<p>Support the growth of the hair Coats your hair naturally, and protects it from drying</p>	

**MATERIAL:**

Material	Quantity
Reetha extract	2.5 g
Amla extract	2.5 g
Sheekakai extract	2.5 g
Sidr extract	2 g
Lemon juice	1 mL
Methyl paraben	1 mL of 0.05% solution
Gelatin solution	q.s
Citric acid	q.s
Essential oil	0.1 mL

**Formulation of herbal 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, then allow it to cool and filter.
- Filter it by using muslin cloth, and collect the filtrate.
- Then add incorporate preservative (eg: Methyl paraben) to prevent microbial growth.

**Functions of herbal shampoo**

1. Lubrication
2. Conditioning
3. Hair Growth
4. Maintenance of Hair Colour
5. Medication

**Benefits of herbal shampoo**

1. More Shine
2. Less Hair Loss
3. Long Lasting Colour
4. Stronger and More Fortified Hairs
5. All Natural, No Chemicals
6. Won't Irritate Skin or Scalp
7. Keep Healthy Natural Oils

**Composition of shampoo**

- Principal surfactant
- Secondary surfactant
- Antidandruff agents
- Conditioning agents
- Pearlescent agent
- Sequestrants agent
- Thickening agents
- Colours, perfumes and preservatives

**Principal surfactant:** Surfactant are cleaning agents that substituted soap.

- They act through the weakening of the physicochemical adherence forces that bind impurities and residues to the hair.
- Surfactant dissolve these impurities preventing them from binding to the shaft or the scalp.
- The cleansing ability of a shampoo depends on how well it remove grease as well as the type and amount of surfactants used.

**Conditioner agent:** Conditioner are used to decrease friction, detangle the hair, minimize frizz and improve combability.

Conditioner act by neutralizing the electrical negative charge of the hair fiber by adding positive charges and by lubricating the cuticle that reduces fiber hydrophilicity.

**Functions of the conditioners**

- Improve combability
- Minimize the hair natural lipid outer layer
- Restore hydrophobicity
- Seal the cuticle
- Avoid or minimize frizz, friction: Neutralize the negative charged net

- Enhance shine, smoothness and manageability

**Colour perfumes and preservatives:** As most of the surfactants typically used in shampoos have a straw/yellow color, the variety of colors that can be achieved are limited. Green, yellow and orange are easier to obtain than pastels.

- The other cover when adding color to a shampoo is the stability of the color.
- Blue tend to turn green, reds tend to turn orange and greens tend to turn yellow.
- These color changes can occur whether the shampoo is exposed to UV light or can occur just from heat and aging.

**Secondary surfactants:** improved detergency, foam and hair condition.

**Conditioning agents:** Lanolin, mineral oil, fenugreek, herbal extracts, Henna egg derivatives.

- Foam builders: shikakai
- Electrolytes: NH<sub>4</sub>Cl, NaCl
- Natural gums: Gum acacia, tragacanth, alginates
- Cellulose derivatives: Hydroxy ethyl cellulose, methyl cellulose
- Carboxy vinyl polymers: Carbopol 934
- Others: PVP, phosphate esters.
- Sequestering agents: EDTA
- Opacifying agents: Alkanolamides of higher fatty acids, propylene glycol, Mg, Ca and Zn salts of stearic acid, spermaceti, etc.
- Solubilising alcohols: ethanol, isopropanol Phosphates
- Non- ionic solubilizers: Polyethoxylated alcohols, esters.
- Perfumes: Herbal, fruity or floral fragrances.
- Preservatives: Methyl and propyl paraben, formaldehyde
- Anti- dandruff agents: Shikakai, neem, tulsi

**Evaluation of shampoo**

1. **Physical appearance/visual inspection:** The formulation prepared was evaluated for the 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. **Percent of Solid:** Weighed a clean dry evaporating dish and recorded the initial weight of evaporating dish. 4Gm of shampoo Formulation (not the 1% solution) was taken in the evaporating dish.
  - Weigh the dish and shampoo and record Initial weight of shampoo and dish.
  - Calculated the exact weight of the shampoo only and recorded the initial Weight of shampoo only.
  - Place the evaporating dish with shampoo on the hot plate until the liquid portion has Evaporated.
  - After drying, weighed the dish and shampoo solid and results were noted.

**Foam formation: (Shake Test):** Took 50 ml of the 1% shampoo solution in 250 ml graduated cylinder and recorded the volume.

- Then cover the Cylinder with hand and shaken 10 times.
- The total volume of the contents was recorded after shaking. Calculate.



- The volume of the foam and recorded the size of the bubbles.

**Foam quality and retention:** Immediately behind the shake test, time was recorded. Recorded the volume of foam at 1 minute intervals for 5 Minutes.

**Surface tension:** Shampoo was taken in the beaker and then slowly added distilled water.

After thorough mixing of shampoo and Water the surface tension was uniform by using stalagmometer.

**Skin irritation test:** The solution of prepared shampoo on skin and kept for 5 minutes and observed for redness of skin and Irritation there, were no any red colouration and the irritation to the skin.

**Visual stability:** To prepared shampoo was tested for the visual stability for 21 days at room temperature with relative humidity 65+\_5, and observed for color change and PH.

- There were no changed in color and PH of shampoo within 21 Day and no any phase separation between oil and water.

**Viscosity:** Viscosity was determined by using the Ostwald viscometer.

**Dirt dispersion test:** To 10 ml of purified water two drops of cleanser were included and taken in a wide mouthed test tube.

- To the Formulated shampoo, added one drop of Indian ink and shaken for 10 min after closing the test tube with a Stopper.
- The volume of seal in the froth was measured and the result was graded in terms of none, slight, medium, or heavy Testing of wetting-Wetting time was calculated by noting the time required by the canvas paper to sink completely.
- A duck paper weighing 0.44 g was cut into a disc of diameter measuring 1-inch.

**Wetting time:** Wetting time was calculated by noting the time required by the canvas paper to sink completely.

- A canvas paper weighing 0.44 g was cut into a disc of diameter measuring 1-inch.
- Over the shampoo (1% v/v) surface, the canvas paper disc was kept and the time taken for the paper to sink was measured using the stopwatch.

**Cleansing action:** The cleansing property of the herbal shampoo was evaluated by the application of the shampoo on hair that has not been washed for seven days.

- The shampoo was used to wash the hair of human subject that had applied oil 4-5 hours before washing.
- The performance of the shampoo was assessed on its ability to remove oily dirt from scalp.

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

**Microbial examination:** 100 microlitre of shampoo was mixed with melted Mueller Hinton agar and poured to sterile petridishes under aseptic conditions.

- The plates were rotated to mix thoroughly and then allowed to set.
- The plates were incubated at 37 °C for 24 hours and observed for microbial growth.
- This test was carried out to determine the susceptibility or resistance of organisms to formulation ingredients according to the method described by Cheesbrough.
- The Gram positive (Bacillus) and Gram negative (E.coli) test organisms were subcultured on nutrient broth and incubated at 37 °C till desired turbidity.
- The developed culture was streaked on the surface of Mueller Hinton agar on which four wells were punched with sterile cork borer. 25, 50, 100 and 150 ul shampoo were filled in these wells in increasing order.
- The plates were incubated at 37 °C for 24 hrs. and zone of inhibition around the wells were measured using a ruler.

#### **Advantages of herbal shampoo**

- Easy to manufacture and cheap in cost.
- Easily available and found in large variety and quantity.
- They did not provoke allergic reaction and do not have negative side effects.
- Easily incorporate in skin and hair.
- Pure and organic ingredients are used.

#### **Disadvantages of herbal shampoo**

- Difficult to hide odour and taste sometimes.
- Herbal drugs having slower effect than allopathic drug hence require long term therapy.
- Manufacturing process is time consuming and complicated.
- The residue left behind by dry shampoo can obstruct the pores on the scalp, which can lead to inflammation or breakouts.
- Natural product affect product uniformity and quality control
- No pharmacopeia defines any specific procedure or ingredients to be used in any of the herbal products.

## Examples of herbal shampoo



## 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. The present 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 extracts of medicinal plants that are commonly used for cleansing hair traditionally, Use of conditioning agents (synthetic) reduces the protein or hair loss. To provide the effective conditioning effects, the present study involves the use of shikakai, amla, and other plant extracts instead of synthetic cationic conditioners. 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. To evaluate for good product performance of the prepared shampoo, many tests were performed. The results of the evaluation study of the developed shampoo revealed a comparable results for quality control test, but further scientific validation is needed for its overall quality.

## References

1. <https://www.ijcrt.org/papers/IJCRT2210046.pdf>
2. [https://ijprajournal.com/issue\\_dcp/A%20Review%20on%20Formulation%20and%20Evaluation%20of%20Herbal%20AntiDandruff%20Shampoo.pdf](https://ijprajournal.com/issue_dcp/A%20Review%20on%20Formulation%20and%20Evaluation%20of%20Herbal%20AntiDandruff%20Shampoo.pdf)
3. <https://ajpaonline.com/HTMLPaper.aspx?Journal=Asian%20Journal%20of%20Pharmaceutical%20Analysis;PID=2013-3-4-10>
4. <https://www.jetir.org/papers/JETIR2105847.pdf>
5. <https://www.sciencedirect.com/science/article/pii/S2314853514000663>
6. <https://ijrpr.com/uploads/V3ISSUE7/IJRPR5614.pdf>
7. <https://www.xisdjxsu.asia/V1719-52.pdf>