



Research Article

Formulation and Evaluation of Herbal Anti-Dandruff Shampoo Using *Delonix Regia*

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Shampoo is a cosmetic formulation designed to cleanse the scalp and hair by removing dirt, excess oil, and environmental pollutants while maintaining hair health with growing awareness about the harmful effects of synthetic chemicals, herbal shampoos have gained popularity due to their natural origin, safety, and minimal side effects. Shampoos are broadly classified into several types based on their function and formulation. The anatomy of hair consists of three main parts: the cuticle, cortex, and medulla. Healthy hair structure is essential for maintaining shine, elasticity, and strength. Common hair problems include dandruff, hair fall, dryness, premature greying, and scalp infections. These issues may arise due to poor hygiene, hormonal imbalance, environmental factors, chemical treatments, and nutritional deficiencies. The formulation of herbal Preparation of herbal shampoo involves drying and powdering plant materials, preparing aqueous extracts, filtering, mixing with surfactants, adjusting pH, adding preservatives and fragrance, and finally packaging in suitable containers. Evaluation tests of herbal shampoo include physical appearance, pH determination, viscosity measurement, foam height and stability test, solid content determination. These tests ensure the safety, quality, effectiveness, and consumer acceptability of the final product.

Keywords: Herbal shampoo, *Delonix regia*, Anatomy of hair, Evaluation test.

INTRODUCTION

Shampoos are most probably used as cosmetics. It is a hair care product that is used for cleaning scalp and hair in our daily life. Shampoos are most likely utilized as beautifying agents and a viscous 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 shampoo is to remove dirt that is build up on the hair. A shampoo is basically a solution of a detergent containing suitable additives for other benefits such as hair conditioning enhancement, lubrication, medication etc. Now-a-days many synthetic, herbal, medicated and non-medicated shampoos are available in the market but popularity of herbal shampoo among consumers is on rise because of their belief that these products being of natural origin are safe and free from side effects. It is a harmless, chronic condition that occurs when the scalp becomes dry or greasy and

produces white flakes of dead skin that appear in the hair or on the shoulders. Herbal anti-dandruff shampoos are the cosmetic formulations which contain herbal ingredients such as plant extracts and essential oil. These herbal shampoos are generally used to remove the dandruff, to add natural colour to the hair, to remove the extra oil content of the hair, for the healthy growth of the hair, to remove the dust, dirt, and scales of the scalp, to prevent hair falling, to impart softness and smoothness to the hair shaft, etc. It is assumed that they can penetrate to the root shafts, stimulate the sebaceous glands, enhance the blood circulation and impart greater strength to the hair root and the shaft. They are also used against alopecia, thinning, clubbing, and graying of hair and hair shaft roughness and breaking. There are large numbers of plants which have beneficial effects on hair and are commonly used in shampoos.

Types of Shampoo:

Shampoos are of following types given below:

- Baby shampoo
- Lotion shampoo
- Powder shampoo
- Solid gel shampoo
- Medicated shampoo
- Clear liquid shampoo
- Conditioning shampoo
- Liquid herbal shampoo
- Anti-dandruff shampoo

Advantages of Herbal Shampoo:

1. Pure and Organic Ingredient.
2. Free from Side Effects.
3. No Synthetic Additives.
4. No Animal Testing.
5. No Petroleum based Ingredients.
6. Less hair loss.
7. Won't Irritate Skin or Scalp.

➤ Antamony Of Hair:

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 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 micro-meters long and about 6 micro-meters 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.

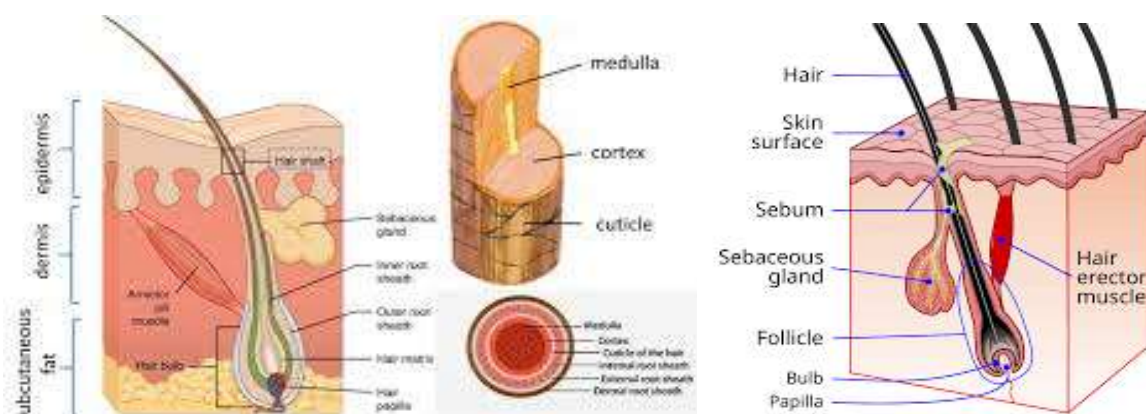


Figure 1. Anatomy of Hair

➤ Hair Problem:

Dandruff-: 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.



Figure 2. Dandruff Problems in Hair

Oily scalp-: Many reasons like poor diet, genetics, or hormonal changes, the biggest culprit of an oily scalp

is excessive washing. Ingredients like lactic acid help to regulate the production of oil.



Figure 3. Oily Scalp

MATERIALS AND METHOD:

Ingredients that are used in the preparation of herbal shampoo are:-

- **Active Pharmaceutical Ingredients (API)-:**
(*Delonix regia*)

Name of the plant: *Delonix regia* (Gulmohar).

Biological Source: It is made up of dried *D. regia* roots, stems, and leaves as well as flowering plant species from the Family Fabaceae. Flavanoids, tannins, alkaloids, saponins, steroids, carotenoids [lycopene, phytoene, beta-carotene, prolycopene, neolycopene], phenolic acid [gallic acid, protocatechuic acid, salicylic acid, transcinammic acid and chlorogenic acid], anthocyanins [cyanidin-3-glucoside and cyanidin-3-gentiobioside and beta sitosterol.



Other Ingredients:

1. Shikakai:

Biological source: Dried fruits of *Acacia concinna* belonging to family Fabaceae. Shikakai is a spiny climbing shrub native to China and tropical Asia, common in the warm plains of central and south India.

It is renowned as a raw material for shampoo, and the leaves and young shoots are often eaten. Shikakai has been used traditionally for hair care in the Indian Subcontinent since ancient times. It is traditionally used as a shampoo and it is also added in synthetic Ayurvedic shampoos. It is an herb especially used for controlling hair fall and dandruff.



2. Reetha:

Biological source: It consists of dried fruits of *Sapindus trifoliatus*. Family: Sapindaceae. Reetha is a species of tree in the family Sapindaceae. It is a deciduous tree that grows in the lower foothills and mid hills of the Himalayas at altitudes of up to 1,200

metres; the value of the tree mostly comes from its fruit. With regular use of it, any scalp infection, such as dandruff, is treated. It is also useful in getting rid of head lice, which frequently occur when dirt and soap residue is left to fester. It ensures that the hair and scalp are thoroughly cleansed and that head lice are not present.



3. Sodium Lauryl Sulphate:

Sodium lauryl sulphate (SLS), is an anionic detergent and surfactant found in many personal care products (soaps, shampoos, toothpaste, etc.) and for industrial

uses. It is derived from palm kernel oil or coconut oil. In herbicides, it is used as a surfactant to improve absorption of the herbicidal chemicals and reduces time the product takes to be rain fast.



4. Aloe Vera:

Biological source: Aloe Vera consists of the fresh or dried leaves and gel obtained from the plant *Aloe barbadensis miller* belonging to the family Liliaceae.

Aloe Vera is a succulent plant species of the genus Aloe. It is widely distributed, and is considered an invasive species in many world regions. Aloe Vera has many active ingredients and minerals that can help strengthen your hair. It has fatty acids and amino acids

and is rich in vitamins A, B12, C, and E. These play a part in healthy hair follicles and controls greasy hair.

Aloe Vera contains proteolytic enzymes which repairs dead skin cells on scalp.



5. Fenugreek:

Biological source: *Trigonella foenum-graecum* (L), commonly known as fenugreek is an annual herb belonging to the family Fabaceae. It consists of seeds

and leaves of *Trigonella foenum-graecum*, belonging to the family Fabaceae. Rich in protein mucilaginous fibre, which encourage the moisturizer barrier in hair strand, also act as the simonising agent, and use to remove dandruff.



6. Almond oil:

Biological source: Almond is a product of *Prunus amygdalus* L. which belongs to Family Rosaceae. It used to smoothen the skin and treat minor wounds and

cuts and blood flow to the roots, encouraging hair growth and strengthening it. It used to treat hair loss and split ends. It used to check scalp infection and inflammation.



➤ Formulation Table:

Ingredients	Quantity
<i>Delonix regia</i>	5gm
Sodium lauryl sulphate	3gm

Fenugreek powder	2.5gm
Shikakai	2.5gm
Reetha	2.5gm
Aloe Vera gel	3 ml
Almond oil	1 ml
Water	q.s

➤ Preparation of Herbal Shampoo:

Take a beaker and add Delonix regia powder and Aloe Vera gel



Take a bowl and add Shikakai, Reetha, Fenugreek powder into water.



Mix them well to get in equal composition



Add sodium lauryl sulphate



Heat the total mixture on water bath



Cool the mixture and finally add almond oil



Figure no 4: Formulated Herbal Shampoo

➤ Evaluation of Herbal Shampoo:

To evaluate the prepared formulations, quality control tests including visual assessment and physicochemical controls such as pH, density and foaming were performed.

Organoleptic properties-: We have done the visual inspection of product and observed that it was of-

- Colour – Brown
- Odour – Aromatic
- State – Liquid
- Consistency – Viscous

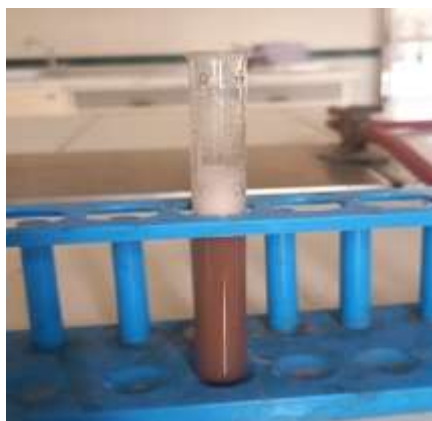


Determination of pH:- The pH of formulated shampoo was 5.2. A formulated shampoo is acid balanced which is near to the skin pH. The pH of shampoo is important for improving and enhancing the qualities of hair, minimizing irritation to the skin and stabilizing the pH balance of the scalp. Mild

acidity prevents swelling and promotes tightening of the scales, thereby inducing shine.

Foaming ability and foaming stability:

10 ml and stable for more than 5 minutes.



Solid contents (%): A Clean dry china dish was weighed and 4 grams of shampoo was added to it. The weight of dish and shampoo was noted. The exact weight of shampoo was calculated. Place the china

dish with herbal shampoo on hot plate until the liquid portion was evaporated. The weight of shampoo (solids) after drying was calculated.

Solid content = 1.53gm



RESULT AND DISCUSSION:

S. No	Parameters	Result
1	Colour	Dark Brownish
2	Odour	Aromatic
3	PH	Mild acidic (5.2)
4	Foam type	Small
5	Solid content	1.53gm
6	Texture	Smooth

The Formulated shampoo was clear and good appealing. It demonstrated good stability, detergency, cleansing, small bubble size, and execute good conditioning property. The herbal shampoos are the preparations which are used for the washing and cleaning of hairs and to provide nourishment. The herbal shampoos are widely used due to their no or less side effects as compared to conventional shampoos, because it contains pure natural or herbal ingredients rather than synthetic chemicals. Herbal shampoo does not require animal testing and it is skin friendly. Herbal shampoo was formulated by mixing different ingredients in specific proportions. Selected plant materials are rich in polyphenol compounds such as alkaloid, and saponin. They have found to exhibit Anti-hair fall, Anti- dandruff, cleansing, moisturising and surfactant properties. Physicochemical properties of the herbal shampoo were statistically evaluated. The effectiveness of herbal shampoo containing Delonix regia, Fenugreek, Aloe Vera, Shikakai, Reetha and Almond oil can vary depending on several factors, including individual hair type and condition. While these ingredients are commonly used in ayurvedic and herbal hair care remedies, there is limited scientific research specifically on the combination of these ingredients in shampoo form.

CONCLUSION

In conclusion, the study of shampoo formulation highlights the importance of selecting appropriate ingredients to ensure effective cleansing while maintaining hair and scalp health. Understanding the different types of shampoos helps in choosing suitable formulations based on individual hair and scalp needs. Knowledge of hair anatomy, including the cuticle, cortex, and medulla, provides insight into how shampoos interact with hair structure and influence its

strength, texture, and appearance. Addressing common hair problems like dandruff, hair fall, dryness, and scalp infections requires formulations that not only cleanse but also nourish and protect. The materials and methods used in herbal shampoo preparation demonstrate the role of natural ingredients, surfactants, thickeners, and preservatives in achieving a balanced and effective product. Finally, evaluation tests such as pH determination, viscosity measurement, foam stability, confirm the quality, safety, and performance of the herbal shampoo. Overall, herbal shampoo formulations offer a promising, eco-friendly, and consumer-acceptable approaches to hair care, combining traditional knowledge with scientific validation.

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