

A Review on Formulation and Evaluation of Herbal Anti-Dandruff Shampoo

**Ms. Navale Dnyaneshwari¹, Ms. Jadhav Trupt², Ms. Khaire Akshada³,
Ms. Khose Sonali⁴, Ms. Gaikwad Rutuja⁵**

Students, Samarth Institute of pharmacy, Belhe, Maharashtra, India^{1,2,3,4}
Department of Pharmaceutics, Samarth Institute of Pharmacy, Belhe, Maharashtra, India⁵

Abstract: *The aim of the present study is to formulate and evaluate herbal Anti dandruff shampoo containing natural ingredients with an emphasis on safety and efficacy. It clears dirt, dandruff, promotes hair growth, luster, strengthens and darkens the hair. The shampoo sector is probably the largest unit of among the hair care products. Since the shampoos are one of the cosmetic product used in daily as the hair is special and cherished feature of humans. Majority of ingredients in the shampoos are chemicals and hence have been under severe attack due to its potential risk of side effects with its usage. The main objective is to study how to eliminate harmful synthetic ingredients from anti-dandruff shampoo formulation and substitute them with safe natural ingredients. An attempt has been made to combine modern formulation technology into a formula based on natural ingredients.*

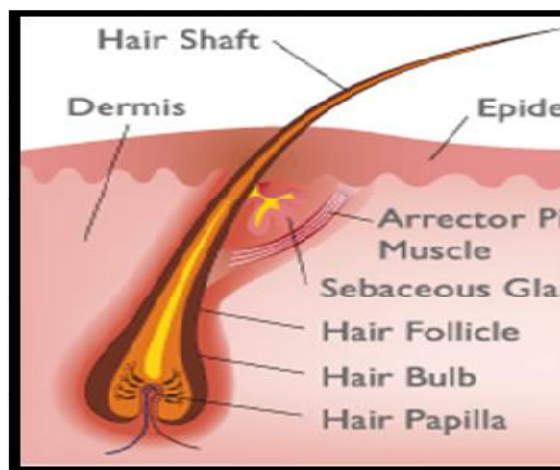
Keywords: pH, Herbal shampoo, Natural ingredients, Hair, Dandruff, Cleansing action, Dirt removal

I. INTRODUCTION

- Hairs are the integral part of human beauty.
- Hair is a protein filament that grows from follicles on the dermis or skin.
- Scientific name of hair is pili or pilus.
- Hair is a component of the integumentary system and extends downward into the dermal layer where it sits in the hair follicle.
- The presence of hair is a primary differentiator of mammals as a unique class of organisms. In humans, it is a cherished and highly visible indicator of health, youth, and even class.
- It has a sensory function, protects from cold and UV radiation, and can have a significant psychological impact when its growth or structure is deranged.
- At a microscopic level, the variety in length, color, diameter, and cross-sectional shape of each hair creates the characteristic profiles seen across ethnic groups and among individuals. Hair Anatomy:
- Hair grows from hair follicles situated within that

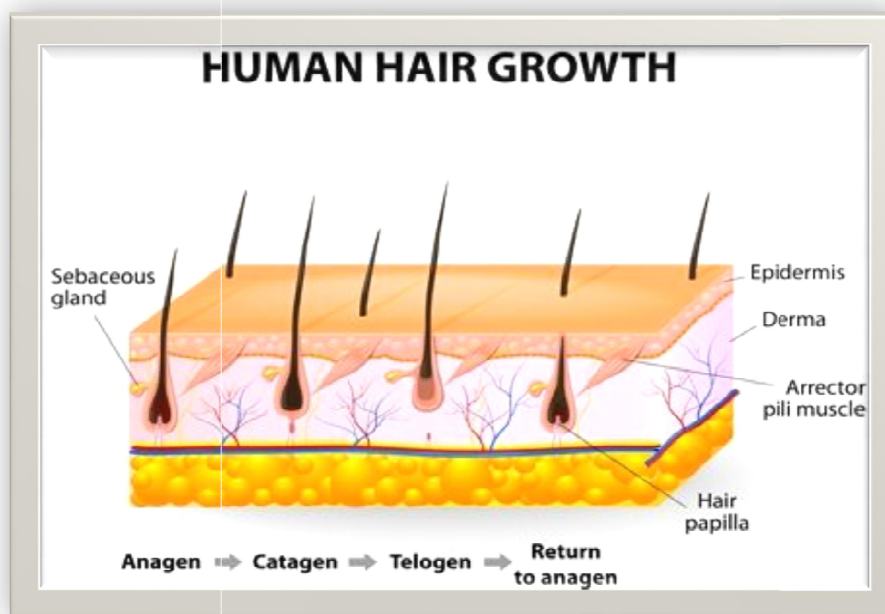
II. HAIR ANATOMY

- Hair grows from hair follicles situated within the .Hair grows from hair follicles situated within the fatty layer of the scalp. Contrary to the popular belief that hair grows as single strands, hair follicles actually grow in groups of 1-4 hairs called "follicular units".
- At the base of each hair follicle is a hair bulb where the growth mechanism for producing hair occurs. Hair follicles get their nourishment from the blood vessels within the dermis. The cells divide and develop to produce the hair shaft.
- While the hair is still developing underneath the epidermis, it maintains a soft form. Once the pushes past the epidermis, its outside layer hardens into keratin



2.1 Parts of the Hair

- **Dermal papillae:** The dermal papilla is responsible for 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 cells needed 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.
- **Outer root sheath:** The outer root sheath, or tricholemma, is the outermost part of the hair and is keratinized. It covers the entire hair follicle inside the dermis and then transitions through to the epidermis, providing the hair follicle with an opening from which to surface from.
- **Inner root sheath:** inner root sheath is comprised of three parts: the Henley layer, Huxley layer, and cuticle. The Henley's and Huxley's layers are capsular layers that anchor onto each other with the purpose of stabilizing the hair. The cuticle, which is the innermost part that is closest to the hair shaft, is made from dead hardened cells and give the hair shaft added protection. This, together with the capsular layers that make up the Henley's and Huxley's layers, secures the hair and allows it to grow in length.
- **Hair shaft:** The hair shaft is the solitary part of the hair follicle that fully exits the surface of the skin. The hair shaft is made up of three layers: the medulla, cortex, and the cuticle.
- The medulla is described as an unsystematic and unstructured area located in the innermost region of the hair shaft and is not always present.
- The cortex, in contrast to the medulla, is highly structured and organized. The cortex is made up of keratin and is responsible for giving hair its strength and durability, as well as its water uptake. The cortex also contains melanin and determines the color of hair based on the number, distribution and types of melanin granules present.
- The cuticle is the hair's outer protective layer and is connected to the internal root sheath. It is a complex structure with a single



2.2 Problems Related to Hair

- Dandruff
- Dry hair
- Split ends
- Oily hair
- Frizzy hair
- Limp hair
- Hair loss
- Heat damage
- Color damage
- Grey hair

A. Dandruff

- 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.
- Although it is harmless, dandruff can be embarrassing for those who have it
- Skin cells are formed continuously on the scalp, so the shedding of the dead skin cells is a normal process. With dandruff, however, skin cells are shed at a faster rate than normal. Oil from the scalp causes the skin cells to clump together and appear as white flakes



B. Causes of Dandruff

- Dry skin.
- Irritated, oily skin.
- Not shampooing often enough
- Other skin conditions
- Malassezia-yeast like fungus
- Sensitivity to hair products (contact dermatitis)

C. Treatment

- Follow a healthy diet.
- Avoid stress.
- Shampoo use a combination of special ingredients to control dandruff.

D. Shampoo

A Shampoo is a preparation of a surfactant in a suitable form -liquids, solid or powder-which when used under the specified conditions will

- Remove surface grease
- Dirt and
- Skin debris

From the hair shaft and scalp without adversely affecting the user.

E. 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.

F. Ideal Properties of Shampoo

- To make the hair smooth and shiny.
- Produce good amount of foam
- Should not cause irritation to scalp ,skin and eye.
- Should completely, effectively remove dirt.
- Impart pleasant fragrance to hair.
- Good biodegradability
- Low toxicity
- Slightly acidic (ph less than 7) since a basic

G. Herbal Shampoo

They 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, dirt, environmental pollution, etc.

H. Advantages of Herbal Shampoo

- Herbal shampoo are made out of pure and organic ingredients and there are no synthetic additives or surfactants are free of any side effects.
- Are bio-degradable and earth friendly.
- It doesn't cause irritation to the eyes.
- It is cost friendly, not much expensive
- Regular usage of herbal shampoo can do wonders for your hair.
- By using herbal shampoo, you can get the perfect oil balance.

III. FUNCTIONS OF INGREDIENTS

1) Reetha: Sapindus Mukorossi-Sapindaceae, Reetha or Soapnuts is also called as Arishtak in Ayurveda and “Soap nut tree” in India. It is well known for its traditional medicinal uses and is commonly used as a hair cleanser. It is an anti hair loss shampoo, the natural antifungal and anti bacterial which may helps in anti dandruff. It can be used on a daily basis to provide nourishment to the hair scalp and promote hair regrowth. Reetha helps to control dandruff and promotes hair growth due to its Tridosha balancing property.



Figure: Reetha

DOI: 10.48175/568



2) Hibiscus : Hibiscus rosa-sinensis, malvaceae, The Hibiscus nourishes the hair follicles, soften the hair and make it more manageable. To reap the nourishing benefits of Hibiscus for your hair, you can use conditioners that have Hibiscus as the key ingredient. flowers and leaves contain mucilage and plant proteins that helps in treatment of anti dandruff and hair loss.



Figure: Hibiscus

3) Ginger : Zingiber Officinale-Zingiberaceae, the anti septic properties of ginger helps in treating dandruff effectively by getting rid of infections and fungus on the scalp. One of the main reason for dandruff is imbalance in PH. Ginger balances the PH of the scalp that ultimately helps in hair growth



Figure: Ginger

4) Amla : Indian gooseberry- Euphorbiaceae. Amla has always been a part of hair care rituals in the olden days. An elixir of hair, this wonder fruit is loaded with Vitamin C and tannins. The nourishing properties in amla make it a natural conditioner for hair, giving it an extra smooth texture.



Figure: Amla



5) **Neem:** *Azadirachta indica*-Neem has antifungal properties that may help within the treatment of dandruff. The effective use of neem to your hair can relieve the itchiness, inflammation, and irritation associated with dandruff.



Figure: Neem

6) **Tulsi:** *Ocimum tenuiflorum* – Lamiaceae Tulsi benefits hair by rejuvenating the hair follicles and strengthening the roots, which in turn curbs hair loss. And that's not all! This herbal treatment also promotes circulation in your scalp and keeps it cool.



Figure: Tulsi

7) **Green Tea:** Herb tea It is beneficial for healthy hair due to the presence of vitamin B (panthenol), epigallocatechin gallate (EGCG), vitamin C, theanine and anti-oxidants-



Figure: Green Tea



8) **Shikekai:** Ban ritha-Leguminosae Natural surfactant soap pods have been used for cleansing the scalp, strengthening the hair from the roots, offering relief from scaling, and reducing irritation, dryness, greasiness, and scaling of the scalp since ancient times. Shikakai means “fruit for hair”.



Figure: Shikekai

Formulation:

- The parts of herbs were collected and dried in the sunlight.
- The dried herbs were powdered and weighed accurately.
- All the materials, as shown in Table are mixed homogenously in the mortar Pestle

Composition of Anti – dandruff hair pack

S. No	Name	Biological Name	Quantity
1.	Amla	Phyllanthus Emblica	35 gm
2.	Shikekai	Acacia concinna	30 gm
3.	Neem	Azadirachta indica	10 gm
4.	reetha	Sapindus mukorossi	35 gm
5.	Hibiscus	Hibiscus rosa Sinensis	30 gm
6.	Tulsi	Ocimum sanctum	20 gm
7.	Ginger	Zingiber Officinale	10 gm
8.	Green tea	Camellia sinensis	10 gm

IV. EVALUATION OF HERBAL SHAMPOO

To evaluate the prepared formulations, quality control tests including visual assessment and physicochemical controls such as pH, density, viscosity, surface tension, foam volume, foam stability and wetting time were performed using standard protocols.

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. **Determination of solid content percentage:** A clean dry evaporating dish was weighed and 4 grams of shampoo was added to the evaporating dish. The evaporating dish with shampoo was placed on the hot plate until the liquid portion was evaporated. The weight of the solid contents present in the shampoo was calculated after drying.



4. **Wetting time:** Wetting time was calculated by noting the time required by the canvas paper to sink completely [16]. 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.
5. **Rheological evaluation:** The viscosity of herbal shampoo was determined by using Ostwald's viscometer. The viscosity of the herbal shampoo was measured by counting drops of herbal shampoo from the mark to bottom.
6. **Dirt dispersion:** Two drops of herbal shampoo were added in a wide mouthed falcon tube containing 10ml of distilled water. 1 drop of India ink was added, the falcon tube was covered and shaken for ten times. The amount of ink in the foam was estimated as None, Light, Moderate, or Heavy.
7. **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.
8. **Surface tension measurement:** Measurement was carried out with herbal shampoo through stalagmometer. The principle is to measure the weight of the drops of herbal shampoo falling from a capillary glass tube, and there by calculate the surface tension of the fluid. We can determine the weight of the falling drops by counting them.
9. **Foaming ability & foam stability:** Cylinder shake method was used for determining foaming ability. 50ml of the 1% herbal shampoo solution was put into a 250ml graduated cylinder & the cylinder was covered with hands and shaken for 10 minutes. The total volume of the foam content after 1 minute shaking was recorded. Immediately after shaking the volume of foam at *1 minute intervals for 10 minutes were recorded. The foam volume remains same throughout* the period of about 5 min showing that the generated foam by the shampoo has good stability and the prepared shampoo exhibits higher foam property which may be due to the presence of soapnut.
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 skin for 5 minutes after that was washed and tested for irritation or inflammation to the skin.
12. **Conditioning attributes:** The conditioning effect of the shampoo on the hair was evaluated after the hair had been washed with it. Conditioning properties include all desirable benefits imparted to the hair such as increased mass to the hair.
13. **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.

V. CONCLUSION

The objective of the study was to develop a stable and functionally effective herbal shampoo by excluding synthetic chemicals, which are normally incorporated in such formulations to larger extent. Synthetic hair shampoo is known to damage the hair cuticle leaving it brittle, dull and dry. Although the formulated shampoo contains synthetic chemical as SLS (7.5%) but its percentage is too small as compared to synthetic shampoo (10-40%) available in the market. The



evaluation study on our shampoo showed good cleaning action, better foaming capacity, and quick wetting time. We have used Aloe-vera gel to provide the conditioning effects.

VI. ACKNOWLEDMENT

We thanks and gratitude to Trustee of Samarth Rural Education Institute's and team of Samarth Institute of Pharmacy, Belhe, Pune with their valuable guidance and support.

REFERENCES

- [1]. Revansiddappa M, Sharadha R, Abbulu K. Formulation and evaluation of herbal antidandruff shampoo. *J Pharmacogn Phytochem*. 2018; 7(4):764-767
- [2]. Maniker AR, Jolly CI. Formulation of natural shampoo. *Int J Cosm Sci*. 2001; 23(1):59-62.
- [3]. Aghel N, Moghimipour B, Dana RA. Formulation of a herbal shampoo using total saponins of *Acanthophyllum squarrosum*. *Iran J Pharm Res*. 2007; 6:167-72.
- [4]. Potluri A, Asma SS, Rallapally N, Durrivel S, Harish GA. Review on herbs used in antidandruff shampoo and its evaluation parameters. *Indo Am J Pharm Res*. 2013; 3:3266-3278.
- [5]. Chandrani D, Lubaina SZ, Soosamma M. A review of antifungal effect of plant extract vs. Chemical substances against *Malassezia* spp. *Int J Pharm Bio Sci* 2012;3(3):773-80.
- [6]. Naveen S, Karthika S, Sentila R, Mahenthiran R, Michael A. In-vitro evaluation of herbal and chemical agents in the management of Dandruff. *J Microbial Biotech Res* 2012;2:916-
- [7]. Aghel N, Mohimpour B, Dana RA. *Iran J Pharm Res* 2007;6:167-72
- [8]. Sharma RM, Shah K, Janki patel. Evaluation of prepared herbal shampoo formulations and to compare formulated shampoo with marketed shampoos. *International journal of pharmacy and pharmaceutical sciences*. 2011; 3(4):402-405.
- [9]. Chandran S, Vipin KV, Augusthy AR, Lindumol KV, Shirwaikar A. Development and evaluation of antidandruff shampoo based on natural sources. *J Pharm Phototherapeutics*. 2013; 1(4):10-4.
- [10]. Shinde PR, Tatiya AU, Surana SJ. Formulation and Evaluation of Herbal Antidandruff Shampoo. *International Jnl of research in Cosmetic Science*. 2013; 3(2):25-33.
- [11]. Potluri A, Harish GB, Pragathikumar, Durraivel. A review article on Formulation and evaluation of Herbal Anti-Dandruff Shampoo. *Indian jnl of Research in Pharmacy and Biotechnology*. 2013; 1(6):835-839
- [12]. B.M.Mithal, R.N.Saha, A hand book of cosmetics, first edition, 2000.
- [13]. Jaya preeti P. Padmini K., Srikanth J, Lohita M, Swetha K Vengal rao p., A review on H Herbal Shampoo and its Evaluation, *Asian J. Pharm. Ana*. 3(4): 2013; 153-156
- [14]. Ronni wolf, MD, Danny wolf, MD, Soaps, Shampoos and Detergents, *Clinics in Dermatology*, 2001; 19:393-397.
- [15]. A R Manikar and C I Jolly, (2001) Formulation of natural shampoo, *Int J cosm sci*, vol. 23, pp no:59- 62.
- [16]. Pandey Shivanand, Meshya Nilam, D. Viral, (2010), Herbs play an important role in the field of cosmetics, *Int J PharmTech Research*, Vol.2 (1), pp no: 632-639
- [17]. Sharma, PP. *Cosmetics-Formulation, Manufacturing and Quality control*, 3rd ed. Lucknow: Vandana Publications; 1998. p. 644-776.
- [18]. Deshmukh. S, Kaushal. B, and Ghode. S, Formulation and evaluation of herbal shampoo and comparative studies with herbal marketed shampoo. *International Journal of Pharma and Biosciences*, 2012, 638-645.
- [19]. Pooja A, Arun N, Maninder K. Shampoos based on synthetic ingredients vis-à-vis shampoos based on herbal ingredients. A review. *Int J Pharm Sci Rev Res*. 2011; 7:41-46.
- [20]. Kumar A, Mali RR. Evaluation of prepared shampoo formulations and to compare formulated shampoo with marketed shampoos. *Int J Pharm Sci. Review and Research*. 2010; 3(1):120-126