
FORMULATION AND EVALUATION OF HERBAL ANTI DANDRUFF SHAMPOO

***¹Rohit Raj, ²Dr. Abhishek Banke, ³Dr. R. B. Goswami**

Student, Sagar Institute of Research Technology & Science-Pharmacy, Bhopal.¹

Assistant professor, Sagar Institute of Research Technology & Science-Pharmacy, Bhopal.²

Director, Sagar Institute of Research Technology & Science-Pharmacy, Bhopal.³

Article Received: 17 May 2026

***Corresponding Author: Rohit Raj**

Article Revised: 05 June 2026

Student, Sagar Institute of Research Technology & Science-Pharmacy, Bhopal.

Published on: 25 June 2026

DOI: <https://doi-doi.org/101555/ijrpa.1705>

ABSTRACT

Dandruff is a common scalp disorder characterized by excessive shedding of corneocytes, itchiness, and irritation, largely associated with fungal colonization—primarily *Malassezia* species. Increasing concern over the side effects of synthetic anti-dandruff agents such as zinc pyrithione, selenium sulfide, and ketoconazole have encouraged the development of herbal formulations that are safer, biodegradable, and compatible with long-term use. The present study focuses on the preparation and evaluation of a polyherbal anti-dandruff shampoo using natural ingredients selected for their antifungal, antibacterial, cleansing, and conditioning properties. The herbal ingredients incorporated in the formulation include neem (*Azadirachta indica*) for its potent antimicrobial and anti-inflammatory effects, shikakai (*Acacia concinna*) and reetha (*Sapindus mukorossi*) as natural surfactants and cleansing agents, fenugreek (*Trigonella foenum-graecum*) seeds for their conditioning and anti-flaking properties, and aloe vera (*Aloe barbadensis*) for soothing and moisturizing the scalp. These raw materials were prepared through drying, powdering, and extraction using aqueous or hydroalcoholic solvents depending on their phytochemical solubility. The herbal extracts were combined with a mild base, natural thickening agents, and preservatives to obtain a stable shampoo formulation. Evaluation of the herbal shampoo involved a range of physicochemical and performance-based tests. Parameters such as pH, viscosity, foam height, foam retention, surface tension, wetting time, dirt dispersion, and solid content were measured to assess quality and compatibility with scalp physiology. The pH of the formulation was maintained between 5.0 and 6.5, making it suitable for maintaining scalp health and preventing cuticle damage. The shampoo demonstrated satisfactory foaming ability, good cleansing action, and acceptable viscosity for

consumer use. Antidandruff activity was assessed using microbiological tests against *Malassezia furfur*, which showed noticeable inhibitory effects, indicating the synergistic action of the herbal ingredients. Additionally, a small-scale user evaluation indicated improvements in scalp cleanliness, reduction in flakes, and enhanced hair softness without signs of irritation. The results suggest that the prepared herbal anti-dandruff shampoo possesses effective cleansing, conditioning, and antifungal properties, making it a promising natural alternative to synthetic formulations. The study highlights the potential of plant-based ingredients in producing safe, economical, and environmentally friendly hair-care products. Further research on stability enhancement and large-scale clinical evaluation would support commercialization and wider therapeutic use.

INTRODUCTION

Herbal is a book containing the names and descriptions of plants, usually with information on their medicinal, tonic, culinary, toxic, hallucinatory, aromatic, or magical powers, and the legends associated with them. A herbal may also classify the plants it describes, may give recipes for herbal extracts, tinctures, or potions, and sometimes include mineral and animal medicaments in addition to those obtained from plants. Herbals were often illustrated to assist plant identification. Herbals were among the first literature produced in Ancient Egypt, China, India, and Europe as the medical wisdom of the day accumulated by herbalists, apothecaries, and physicians. Herbals were also among the first books to be printed in both China and Europe.

In Western Europe, herbals flourished for two centuries following the introduction of moveable type (c. 1470–1670). In the late 17th century, the rise of modern chemistry, toxicology, and pharmacology reduced the medicinal value of the classical herbal. As reference manuals for botanical study and plant identification, herbals were supplanted by Floras – systematic accounts of the plants found growing in a particular region, with scientifically accurate botanical descriptions, classification, and illustrations. Herbals have seen a modest revival in the Western world since the last decades of the 20th century, as verbalism and related disciplines (such as homeopathy and aromatherapy) became popular forms of alternative medicine. The word herbal is derived from the mediaeval Latin *liber herbaris* ("book of herbs"): it is sometimes used in contrast to the word *florilegium*, which is a treatise on flowers with emphasis on their beauty and enjoyment rather than the herbal emphasis on their utility. Much of the information found in printed herbals arose out of traditional medicine and herbal knowledge that predated the invention of writing. Before the advent of printing, herbals were produced as manuscripts, which could be kept as scrolls or loose sheets, or bound into codices. Early

handwritten herbals were often illustrated with paintings and drawings. Like other manuscript books, herbals were "published" through repeated copying by hand, either by professional scribes or by the readers themselves. In the process of making a copy, the copyist would often translate.

SHAMPOO

Is a hair care product, typically in the form of a viscous liquid, which is used for cleaning hair? Less commonly, shampoo is available in solid bar format. Shampoo is used by applying it to wet hair, massaging the product into the scalp, and then rinsing it out. Some users may follow a shampooing with the use of hair conditioner. Shampoo is typically used to remove the unwanted build-up of sebum in the hair without stripping out so much as to make hair unmanageable. Shampoo is generally made by combining a surfactant, most often sodium laurel sulfate or sodium laureate sulfate, with a co-surfactant, most often cocamidopropyl betaine in water.

PREPARATION OF SHAMPOO

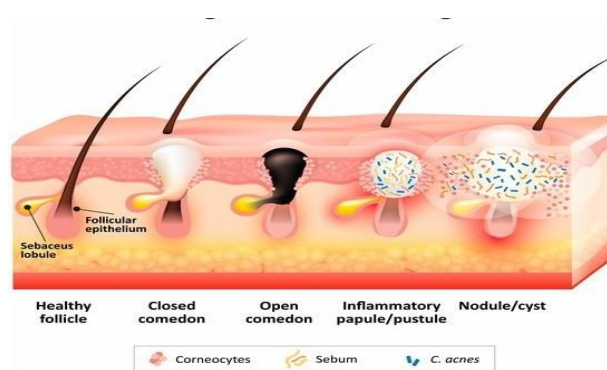
Preparation of anti-dandruff shampoo, Shampoo was formulated using simple mixing process. Herbal anti-dandruff shampoo was formulated by adding the required amounts of herbal ingredients

EVALUATION PARAMETERS

Determination of pH: The pH of 10% shampoo solution in distilled water is determined at room temperature found to be neutral. Dirt Dispersion: two drops of shampoo were added in a large test tube contain 10 ml of distilled water. 1 drop of India ink was added; the test tube was stoppered and shaken ten times. The amount of ink in the foam was estimated as Moderate. Foaming Ability and Foam Stability Cylinder: 1 ml of shampoo solution in test tube volume made up to 10 ml with distilled water then shaken and left for 1 min then after measure the foam. Evaporating test: A clean dry evaporating dish was weighed and added 4 grams of shampoo to the evaporating dish. The dish and shampoo was weighed. The exact weight of the shampoo. DANDRUFF (scalp problem): Dandruff is a skin condition that mainly affects the scalp. Symptoms include flaking and sometimes mild itchiness. It can result in social or self-esteem problems. A more severe form of the condition, which includes inflammation of the skin, is known as seborrheic. The cause is unclear but believed to involve several genetic and environmental factors; the condition may worsen in the winter. It is not due to poor hygiene, and the underlying mechanism involves the excessive growth of skin cells. Diagnosis is based on

symptoms. There is no known cure for dandruff. Antifungal cream, such as ketoconazole, or salicylic acid may be used to try to improve the condition. Dandruff affects about half of adults, with males more often affected than females. In addition, people in all areas of the world are affected. Dandruff is a common scalp disorder affecting almost half of the post pubertal population of any ethnicity and both genders. It may, however, represent a stubbornesthethical disturbance often source of pruritus. Skin biogenesis, in particular the *Malassezia* spp. flora, plays a key etiologic role, in combination with the unusual capacity of some coenocytes to be coated by these yeasts. Substantial evidence indicates that keratinocytes play an active role in the generation and expression of immunopathological reactions. This is probably the case in dandruff. Upon stimulation of a critical colonization of coenocytes by *Malassezia* yeasts, the release of pro-inflammatory mediators is increased. This could lead to the subclinical micro inflammation present in dandruff. In seborrhea dermatitis, local deposits of immunoglobulins and the release. Lymphocytes are responsible for the recruitment and local activation of leukocytes leading to the eventual amplification of the inflammatory reaction.

Some ancillary non-microbial causes of dandruff may operate through physical or chemical irritants. Many methods have been described for rating dandruff. Our favorite tools are clinical examination and squamometry. Dandruff can precipitate telogen effluvium and exacerbate androgenic alopecia. Figure 1 - Scaling formation at the follicular area with moderate inflammation.



Dandruff History - The history of dandruff and dandruff in history. A homage to Raymond. Annales de dermatology et de véneréologie, 1990

In one of his books, written at the beginning of this century, Raymond Sabouraud devoted some 280 pages to the history of dandruff. Their reading illustrates how, from the Greeks to Sabouraud's era, this desquamated disease has been subjected to endless doctrinal and scientific conflicts, long before the so-called "present" controversies. One of the early conflicts, between

Celsus and Galen, lies in the nature of the squames, i.e. dry or educating, leading to the inclusion (or non-inclusion) or pityriasis in the group of desquamative diseases, such as psoriasis or ichthyosis. Translated into Latin (*furfur*, *porrigo*) and into Arabic, the word pityriasis was replaced in the Middle Age by *tinea* which then referred to any disease of the human scalp. With Plenck, Lorry, Willan and others, the 18th century brought.

Causes

The cause is unclear but believed to involve several genetic and environmental factors.

As the skin layers continually replace themselves, cells are pushed outward where they die and flake off. For most individuals, these flakes of skin are too small to be visible. However, certain conditions cause cell turnover to be unusually rapid, especially in the scalp. It is hypothesized that for people with dandruff, skin cells may mature and be shed in 2–7 days, as opposed to around a month in people without dandruff. The result is that dead skin cells are shed in large, oily clumps, which appear as white or grayish flakes on the scalp, skin and clothes.

According to one study, dandruff has been shown to be possibly the result of three factors:

1. Skin oil, commonly referred to as sebum or sebaceous secretions
2. The metabolic by-product of skin micro-organisms (most specifically *Malassezia* yeasts)
3. Individual susceptibility and allergy sensitivity.
4. Irritated, oily skins.
5. Dry skins
6. A yeast-like fungus that feeds on oil on the scalp of most adults.

ANTI-DANDRUFF AGENTS

Are intended to reduce the formation of dandruff flakes. The cause for dandruff is not fully understood but the treatment involves the use of several “actives” that function either as antimicrobial agents or as anti-mitotic agents. The choice of “active” depends on the regulatory requirements in the markets that are being served. In the United States, there are five ingredients that are currently approved for use in over the counter (OTC) anti-dandruff products. The two most popular ingredients are zinc pyrithione and selenium sulfide. The other approved “actives” are salicylic acid, sulfur, and coal-tar solution. Except for coal tar and salicylic acid, the other three ingredients are used as suspensions in shampoo formulations.

1. Zinc pyrithione
2. Selenium sulfide
3. Ciclopirox

4. Salicylic acid sulfur

Treatment of dandruff

For mild dandruff, first try regular cleansing with a gentle shampoo to reduce oil and skin cell buildup. If that doesn't help, try a medicated dandruff shampoo. Some people can tolerate using a medicated shampoo two to three times a week, with regular shampooing on other days if needed.

Uses of Shampoo

The main purpose of shampoo is to remove dirt and oil from the surface of the hair fibres and the scalp, while the main purpose of conditioner is to ensure that the hair is smooth for combing. Some commercial shampoos may also have additional components to control dandruff and condition hair. Anti-dandruff shampoo Agents-Salicylic acid is a beta hydroxyl acid keratinocytes agent that is useful in removing scaly hyperkeratosis skin. The two most popular ingredients are zinc pyrithione and selenium sulfide.

The other approved "actives" are salicylic acid, sulfur, and coal-tar solution. With the exception of coal tar and salicylic acid, the other three ingredients are used as suspensions in shampoo formulations. Commonly used conditioning substances include hydrolyzed silk and animal protein, glycerin, dimethicone, simethicone, polyvinylpyrrolidone, propylene glycol, and stearyl-konium chloride. Zinc pyrithione (ZPT) has been used as a sanitizing ingredient in anti-dandruff treatments.

Anti-dandruff Herbal Shampoo Agents-Herbal ingredients like lemongrass oil, rosemary oil, coleus oil, clove oil, pepper extract, neem extract, and basil extract also recorded anti-pityrosporum activity, but their MIC values are much higher than the synthetic ingredients.

Uses of Constituents

1. **Neem oil**-Neem Shampoo treats scalp issues and prevents hair loss. The antibacterial and the antiseptic properties of the shampoo help in healing and soothing itchy scalps, as well as preventing dandruff. It also removes debris, excess oil and dead cells from the hair and scalp.



Neem oil

2. Hibiscus - It acts as a natural ultra-emollient that traps moisture in your hair and prevents your hair from becoming dry and frizzy. Hibiscus leaves and flowers contain a high amount of mucilage that acts as a natural conditioner and restores elasticity in your hair. It makes your hair silky and smooth and prevents split.



Hibiscus

3. Tulsi - A natural coolant, it is an anti-fungal herb, helping fight dandruff and other scalp issues. Tulsi (*Ocimum sanctum* L) is one of the most common herbs used in Indian traditional system and also named as "Holy Basil", "Queen of Herbs". The name Tulsi comes from Sanskrit word that means "the incomparable one". In Indian culture, it is worshiped very religiously and known as "Vishnupriya".



Tulsi

4. Bhringraj Powder - Bhringraj powder can also be found in capsule or powder form. In Ayurveda, an Indian tradition that aims to balance and heal the body through nutrition, Bhringraj is said to promote hair growth, strengthen hair, and prevent graying and dandruff.



Bhringraj Powder

5. Ethanol- These alcohols play different roles for care and styling products. Short-chain alcohols are often used in styling products such as hairsprays and hair gels. These type of products contain Alcohol Denat. (i.e. ethanol) to achieve their fast drying properties on hair.



Ethanol

6. Sodium Lauryl Sulfate – SLS functions in cleaning product as a surfactant, wetting surfaces, emulsifying or solubilizing oils, and suspending soil so that they can be rinsed away.

This ingredient contributes foaming properties to cleaning products.



Sodium Lauryl Sulfate

7. Lemon Grass Oil-Lemongrass is a popular ingredient in shampoo and other hair products to help combat excessively oily hair and scalp and aid in reducing the production of excess oil on the hair and scalp while also adding a healthy lustre and shine.



Lemon Grass Oil

8. EDTA-EDTA or ethylenediaminetetra-acetic acid is an ingredient that helps to improve the stability and enhance the appearance of cosmetic products.



EDTA

9. Glycerin -Glycerin is a humectant, meaning it pulls in moisture from the air to deeply hydrate the hair. It's colorless, odorless, and relatively inexpensive, so it's in many store-bought products.

MATERIAL AND METHODS

- Weighing method: The purpose of weighing, then, is to compare the quantity of matter in a specific object with the quantity of matter in a given standard - a gram or kilogram weight.
- Drying method: Drying is a mass transfer process consisting of the removal of water or another solvent by evaporation from a solid, semi-solid or liquid. By using Hot Air Oven.
- Mixing method: In mixing, two or more ingredients are evenly dispersed in one another until they become one product.
- Soxhlet method

A Soxhlet extractor is a piece of laboratory apparatus invented in 1879 by Franz von Soxhlet. It was originally designed for the extraction of a lipid from a solid material. Typically, Soxhlet extraction is used when the desired compound has a limited solubility in a solvent, and the impurity is insoluble in that solvent. It allows for an unmonitored and unmanaged operation while efficiently recycling a small amount of solvent to dissolve a larger amount of material. A Soxhlet apparatus consists of a ROUND BOTTOM FLASK, Syphon tube, crude drug, vapour outlet chamber, inlet water tube.

Soxhlet method use for–

- Determination of the fat content of meat meal.
- Soxhlet method is often the method of choice as a routine test.
- Extraction and separation for solid sample.
- It can be analyzed for lipids or pesticides in food and soil material and others.
- The crude fat content was determined by Soxhlet extraction.

Table no-1

S. No	CONSTITUENT	Formulation 1
1	Neem oil	5ml
2	Lemon grass oil	2ml
3	Bhringraj powder	1gm
4	Hibiscus powder	1gm
5	Sodium lauryl sulfate	4gm
6	Glycerin	10ml
7	EDTA	5gm
8	Sodium Hydroxide	To adjust pH
9	Water	10ml
10	Perfume	4ml
11	Tulsi powder	1gm
12	Ethanol	10ml

RESULT & DISCUSSION

In the present Research work formulations were made and evaluated for different parameters. Physical Appearance/Visual Inspection, the results formulations had the good characteristics with respect to foaming. The pH of shampoos has been shown to be important for improving and enhancing the qualities of hair, minimizing irritation to the eyes and stabilizing the ecological balance of the scalp. The current trend to promote shampoos of lower pH is one of the ways to minimize damage to the hair. Mild acidity prevents swelling and promotes tightening of the scales, thereby inducing shine. As seen from Table 1, all the shampoos were acid balanced and were ranged is neutral which is safe skin. Percent of Solids contents if the shampoo has too many solids it will be hard to work into the hair or too hard to wash out. The result of percent of solids contents is tabulated in table 1, and was found between 22–29%. As a result, they were easy to wash out. Dirt Dispersion Shampoo that causes the ink to concentrate in the foam is considered poor quality, the dirt should stay in water. Dirt that stays in the foam will be difficult to rinse away. It will redeposit on the hair. All five shampoos showed similar results. These results indicate that no dirt would stay in the foam; so prepared and marketed formulations are satisfactory. Surface tension measurement has been mentioned that a proper shampoo.

CONCLUSION

The latest research has shown that Bhringraj Powder exhibits excellent antifungal behavior. The antidandruff shampoo was formulated by adding Bhringraj Powder the principal ingredients of the antidandruff. As additives play an important role determining any formulation's efficiency, stability and aesthetic appeal, this point was held in mind when selecting the additives for shampoo formulation. Eventually they invented and tested the antidandruff shampoo. As seen from the tests, a herbal antidandruff shampoo can be formulated which is not only equal to the conventional shampoo.

REFERENCE

1. Prashant Tiwari, Bimlesh Kumar, Mandeep Kaur, Gurpreet Kaur and Harleen Kaur. Phytochemical screening and extraction: A review. *Internationale Pharmaceutica Scientia*, 2011; 1(1): 98-106.
2. Rajesh J, Mohana Lakshmi S, Tamizhvanan K and Viswasanthi. Formulation, characterization and evaluation of methanolic extract of *Abutilon indicum* loaded solid lipid nanoparticles against microorganisms causing diabetic foot and urinary tract infection.

- Journal of Global Trends in Pharmaceutical Sciences, 2014; 5(4): 2093-2102.
3. KhotUttamkumarVitthal,PillaiM.MandPallaviKininge.Studyofsolidlipidnanoparticles asacarrier forbacoside. InternationalJournal of PharmacyandBiological Sciences,2013; 3(3): 414-426.
 4. SunilPrakashChaturvediandVimalKumar.ProductionTechniquesofLipidNanoparticles: A Review. Research Journal of Pharmaceutical, Biological and Chemical Sciences, 2012; 3(3): 525-541
 5. Sanjay S. Jain, Dr. Neha M. Dand, Dr. Kisan R. Jadhav and Dr. Vilasrao J. Kadam. Comparativestudyofsolidlipidnanoparticleandnanostructuredlipidcarrierofcarvedilol. World Journal of Pharmacy and Pharmaceutical Sciences, 2016; 5(3):1375-1383.
 6. NeetaRai,AbhishekKumarJainandJobinAbraham.Formulationandevaluationofherbal anti-dandruff shampoo containing garlic loaded solid lipid nanoparticles. International Journal of Pharma Research & Review, 2013; 2(10): 12-24
 7. Asok Kumar and Rakesh Roshan Mali. Evaluation of prepared shampoo formulations and to compare formulated shampoo with marketed shampoos. International Journal of Pharmaceutical Sciences Review and Research, 2010; 1(1): 120-126