

## FORMULATION AND EVALUATION OF HERBAL ANTIDANDRUFF SHAMPOO POWDER

Dr. Sundhararajan R <sup>1</sup>, Mrs.Jothilakshmi R<sup>\*2</sup>, N.Beevi Fathima Jannath<sup>3</sup>, H.Hasir Javith<sup>3</sup>,

S.S.Mohamed Subair<sup>3</sup>, A.Pagalavan<sup>3</sup>

1. Principal and Professor, Mohamed Sathak AJ College of Pharmacy

2. Associate Professor, Mohamed Sathak AJ College of Pharmacy

3.B.Pharm, Final Year Students, Mohamed Sathak AJ College of Pharmacy

### Abstract :

Dandruff is a widespread scalp condition often resulting from fungal infections, excess sebum production, or poor hygiene, leading to flaking, itching, and irritation. Synthetic anti-dandruff shampoos, though effective, can cause side effects like dryness, hair damage, and allergic reactions. This study focuses on the formulation and evaluation of a herbal anti-dandruff shampoo powder using a synergistic blend of natural ingredients known for their antifungal, anti-inflammatory, cleansing, and soothing properties. The herbal ingredients selected for the formulation include *Acacia concinna* (Shikakai), *Aloe vera*, *Ocimum sanctum* (Tulsi), *Trigonella foenum-graecum* (Fenugreek), *Indigofera tinctoria* (Indigo), *Cinnamomum camphora* (Camphor), *Melissa officinalis* (Lemon balm), *Urtica dioica* (Nettle), *Sapindus indica* (Reetha), and *Rosa centifolia* (Rose petals). These ingredients were dried, finely powdered, and mixed in optimized proportions to prepare a dry shampoo powder devoid of synthetic surfactants or preservatives. The formulation was evaluated for various parameters including organoleptic properties, pH, foaming ability, cleansing power, microbial load, and anti-dandruff efficacy against *Malassezia* species. Results indicated that the shampoo powder had a pH compatible with the scalp (5.5–6.5), good cleansing and foaming action, and notable antifungal activity. The presence of *Aloe vera*, camphor, and nettle also contributed to soothing and conditioning effects, making it suitable for sensitive scalps.

The study concludes that this polyherbal shampoo powder offers a safe, effective, and eco-friendly alternative to commercial anti-dandruff shampoos, combining traditional herbal knowledge with modern cosmetic science.

---

### Keywords

Herbal shampoo powder, Anti-dandruff, *Acacia concinna*, *Aloe vera*, *Ocimum sanctum*, Camphor, *Sapindus indica*, *Indigofera tinctoria*, *Malassezia*, Natural hair care, Polyherbal formulation.

## INTRODUCTION:

Dandruff is a common scalp disorder characterized by the excessive shedding of dead skin cells, often accompanied by itching, irritation, and scalp inflammation. It is frequently associated with fungal infections, particularly *Malassezia furfur*. Conventional shampoos used for dandruff control contain synthetic chemicals such as ketoconazole, zinc pyrithione, or selenium sulfide, which may lead to side effects like dryness, scalp irritation, and allergic reactions upon prolonged use.

With growing awareness about the harmful effects of synthetic ingredients and a rising preference for natural remedies, herbal formulations are gaining attention for their safety, efficacy, and eco-friendliness. This study focuses on developing a **herbal anti-dandruff shampoo powder** using a combination of medicinal plants known for their antifungal, cleansing, anti-inflammatory, and soothing properties.

## INTRODUCTION ABOUT SHAMPOOS

Shampoo is one of the cosmetic preparation containing surface active agent which is used to remove grease, dirt and debris from the hair and scalp without seriously affecting the hair scalp and other part of the body. Apart from cleansing action it must leave the hair fragrant, lustrous, soft and manageable. The complete shampoo formulation must be medically safe for long term usage. The shampoo process involves kneading the hair and scrubbing the scalp with a cleansing agent to achieve level of cleanliness. Although shampooing is basically a wet cleaning process, it moved into the category of a cosmetic treatment. Thus present day shampoo after colour, transparency, fragrance, desirable tactile properties, fine raw materials, rich foam, and so on. A shampoo's primary function via cleaning should be selective and should preserve a quantity of the natural oil that coats the hair and scalp. But cleaning of hair and scalp presents different problems. Hair presents a reasonably hard surface which does not pick up particles of dirt without the intervention of a remover, dirt can be removed easily. The scalp presents a soft area having sebum on its surface. The sebum coating of the hair fibres is supposed to provide protection for the hair against at least mechanical damage. The natural soil of the hair includes oily waxy material from sebum and perspiration, flaky skin and inorganic components. The captured soil can consist of air-borne oily type materials, such as dirt and residues of cosmetic products of prior use. The presence of the soil coating which may amount to more than 5% of the hair weight can deleteriously influence the sensory perception of the hair and its mass physical behavior resulting in stinging, loss of lustre and diminished shine. The soil can be removed relatively easily by surfactant solutions with proper agitation. The detergency efficacy of a number of currently popular shampoos has been determined to range from 25% to 80%. Further, approximately 65-89% of the soil of the scalp was found to have remained on the hair after shampooing which makes it amply clear that

most of the shampoos don't archive a total soil removal but they do provide a satisfactory balance of adequate soil removal together with the other desired attributes.

### IDEAL REQUIREMENT

- It should be easily removable on rinsing of hair
- It should effectively remove dust, dirt, soil, sebum, and residues of hair setting lotions or oil from the scalp.
- It should have a pleasant fragrance.
- It should be toxic and non-irritant to skin and eyes
- It should produce a good amount of foam to satisfy the psychological needs of the customer
- It should provide a good finish after washing hair and make hair manageable, lustrous, silky, and soft.
- It should perform its function in a small amount
- It should be able to form foam in hard and soft water
- It should have a pH 5.0 to 9.0 or slightly acidic PH. since a basic environment weakens the hair by breaking the disulfide bonds in hair keratin
- It should have good biodegradability and cause no damage to hair. Feels thick and creamy
- It should be clear and transparent if liquid and free of any agglomerated particles; if in paste form, it should have a flowing property if in powder form
- Many shampoos are pearlescent. This effect is achieved by the addition of tiny flakes of suitable materials, e.g., glycol distearate (a wax)

### 1. COLLECTION AND AUTHENTICATION OF PLANT MATERIALS:

The ten plant materials (or) specimens for the proposed study were collected during June 2025 from Tambaram, Chennai, Tamil Nadu.

### DETAILS OF PLANT MATERIALS USED IN THE PRESENT STUDY (TABLE NO : !)

S.No	Name of the Plant Materials	For 5gm
1	Acacia concina	0.6g
2	Aloevera	0.5g
3	Ocimum sanctum	0.5g
4	Trigonella foenum graecum	0.4g
5	Indigofera tinctoria	0.5g

6	<i>Cinnamomum camphora</i>	0.5g
7	<i>Melissa officinalis</i>	0.4g
8	<i>Urtica dioica</i>	0.6g
9	<i>Sapindus indica</i>	0.4g
10	<i>Rosa centifolia</i>	0.3g

## PREPARATION OF POWDER SHAMPOOS

Preparation of an anti-dandruff herbal shampoo powder was formulated as shown in Table No:1 The following steps are involved in preparing an anti-dandruff herbal shampoo powder.

- ❖ The crude ingredients were collected & freed from filth & debris
- ❖ The herbs are separately dried in sun shades for about 15 days.
- ❖ Then the dried herbs are size-reduced using a driven mixer individually and made into powders.
- ❖ All these fine ingredients were mixed thoroughly by a mixer to form a homogenous fine powder
- ❖ Then, this fine powder was passed through a sieve no. to get a sufficient quantity of fine powder.
- ❖ Finally, the dry herbal powder was sieved once again to collect a fine mixture of powders
- ❖ The flavouring agent is added to the herbal powder shampoo by geometric dilution & until it is used for further studies.

## EVALUATION OF ANTIDANDRUFF HERBAL SHAMPOO POWDER:

To evaluate the prepared formulations, quality control tests including visual assessment and physicochemical controls such as pH, density & viscosity were performed. Also, to assure the quality of products, specific tests for shampoo formulations include the determination of solubility, loss on drying, swelling index, angle of repose, bulk density, foaming index, and surface tension.

**Antimicrobial activity and eye and skin irritation test.**

1. Solubility
2. Loss on drying
3. Swelling index
4. Angle of repose
  - a. 4.1) Funnel method
  - b. 4.2) An open-ended cylinder must
5. Bulk density
6. Foaming index
7. Surface tension
8. Antimicrobial activity

**8.1) Antifungal activity****8.1.1) Cup-plate method****8.1.2) Antibacterial activity****9. Eye & skin irritation test****ANTI-MICROBIAL STUDIES:**

In the present work attempt has been made to find the effect of the antidandruff herbal shampoo powder extract on inhibiting the growth of some bacteria and fungi. Antimicrobial drugs are the greatest contributions of the present century to therapeutics. Drugs in this class differ from all others in that they are designed to inhibit /kill infecting organisms and to have no/minimal effect on the recipient.

**EVALUATION OF VARIOUS METHODS:**

Various methods are available for the evaluation of antimicrobial activity

- Agar streak dilution method
- Serial dilution method
- Agar diffusion method
  - Cup plate method
  - Cylinder method
  - Paper disc method
- Turbidity method

As every method has its own advantage & limitation, for the present study cup plate method was used to antidandruff herbal shampoo powder extract. These tests present the usefulness of the different antimicrobial agents at the usual therapeutic doses. It gave a very approximate measure of the

degree of sensitivity. The ap-plate method is of the methods that may are used for determining the relative effectiveness of the test compounds with that of the std.

Screening of antibacterial activity (cup-plate method) (Sundararaj,2001)

The zone of inhibition of microbial growth under standardized conditions may be utilized for demonstrating the antibacterial activity. There are many methods for performing bacterial susceptibility tests. The agar, “cup-plate method” was carried out, owing to its easy, inexpensive performance & standardized, the results can also be directly correlated to concentration values

### **Principle:**

The antimicrobial agents and std antibiotics to be tested were placed on the agar plate (Mueller-Hinton) that had been uniformly inoculated over the entire plate with the culture (bacteria) to be tested. The plate was incubated overnight at 37°c. during this period, the antibacterial agents prevent the growth of the organisms that grow upon the edge of the disc are resistant.

Std drugs used:

Streptomycin 30µg/ml disc

Extracts 1mg per m

### **Organisms used for antibacterial study:**

Bacillus cerus MTCC 430(gram(+ve), Staphylococcus qureus MTCC 737(gram(+ve), Escherichia coli MTCC 443(gram(-)ve), Pseudomonas aeruginosa MTCC 618(gram(-)ve),

### **Antifungal activity:**

In antifungal activity, the cup-plate method was used. The antidandruff herbal shampoo powder extract was used.

### **Principle:**

The antidandruff herbal shampoo powder extract and std antibiotics to be tested were placed on agar plate (Sabouraud dextrose agar) that has been inoculated uniformly over the entire plate with a culture(fungi) to be tested. The plates were incubated for 7days at 28°c. during this period, the antidandruff herbal shampoo extract, the prevent the growth of organisms which grow up to the edge of the disc are resistant.

### **Std drugs used**

Ketoconazole 50µg/ml

**Table:5** Antibacterial activity of an antidandruff herbal shampoo extract

**Diameter of zone of inhibition in mm**

S.No	Organism std	Std (20µg/ml)	A.H.S.PE(20µg/ml)
1	Bacillus cereus	20	17
2	Escherichia coli	18	16

Table:6

Antifungal activity of antidandruff herbal shampoo powder extract

Diameter of zone of inhibition in mm

Organism	Std keticonazole(20µg/ml)	H.H.S.E(20µg/ml)
Candida albicans	19	16

Fig 1: Anti microbial activity against G(-) organism



Fig 2: Antimicrobial activity against G (+) organism



Fig 3: Anti fungal activity

against Candida albicans



RESULT AND DISCUSSION:

- ❖ The plant materials were suitably dried and made into powder. The antidandruff herbal powder shampoo was obtained by mixing of powdered materials in appropriate quantity.
- ❖ The antidandruff herbal powder shampoo was evaluated by measuring its solubility, angle of repose, bulk density, swelling index, foaming index, anti-microbial test & eye-skin irritation test.

**Solubility test:**

The solubility test revealed that the herbal powder shampoo powder comprises of mostly soluble ingredients which may be helpful in producing comfortable feeling while being mixed with water.

**Angle of response:**

Good flow property is essential in formulation of any powder. The angle of response of antidandruff herbal shampoo powder was  $32^{\circ}8'$ .

The result has been are table 1. This confirms that the powder has good flow property. Hence expected to be easy to fill the powders in the packets during packaging.

**Bulk density:**

The bulk density of the herbal shampoo powder was 0.395. The result was reported in table 2. This measurement indicates that the loose powder packing may be to the presence of large interparticle spaces.

The measurement of these parameter helps to find out the package size  
(i.e) quantity of powders that can be filled in a particular packets.

**Swelling index:**

These results showed that there was an increase in percentage of water absorption. This study confirms that the herbal shampoo powder was found to have good water retaining capacity. This is due to the presence of glycosides, glucose and saponins etc.

**Foaming index:**

This results showed that the powder which is capable to produce high foaming property. This is due to the presence of soap nut is used as foaming agent which mainly consists of saponin A and B. Surface tension of formulated antidandruff herbal shampoo powder was found to be 43.33 dynes/cm the result has been showed in the table 3. It is high & hence our formulation is expected to produce good cleansing effect.

**Antimicrobial activity was studied:**

The result were shown in table 4&5. This test revealed the fact that the herbal shampoo powder produces zone of inhibition against G(+ve), G(-ve), & fungal organisms. This confirms the herbal shampoo extract have good antimicrobial activity due to the presence of ocimum sanctum (flavonoids), cinnamomum camphora and little extent by acacia concina (saponnins), amla & (tannins).

**Eye irritation and skin irritation test:**

The eye and skin irritation tests revealed that the herbal shampoo powder shows no harmful effect on skin and eye. This is due to the absence of synthetic surfactants. Most of the synthetic surfactants produce inflammation of the eyelid and corneal irritation. But in this formulation of herbal shampoo powder, the uses of all ingredients are obtained naturally. So it does not produce any harmful effect on skin and eye.

S.No.	Method	Height of the cone (h in cm)	Radius of the cone (r in cm)	$\tan\theta=(b/r)$	Average	$\tan\theta$ ( $\theta=\tan^{-1}(b/r)$ )
1	Fennel Method	2.5	3.8	0.6578	0.6727	33°9'
		2.4	3.6	0.7017		
		2.5	3.8	0.6578		
2	Open-ended Cylinder method	2.4	4.1	0.6706		33°8'
		2.6	3.5			
		2.6	3.8			

**Table:1** Determination of angle of repose of antidandruff herbal shampoo powder**Table:2**

Determination of the bulk density of the antidandruff herbal shampoo powder

S.No:	Bulk volume (ml)	Mass of the powder (gm)	Bulk density (gm/ml)	Average bulk density (gm/ml)
1	46	17.4	0.378	0.3926
2	45	16.5	0.4	
3	46	16.5	0.4	

**Table 3:** surface tension 43.33 dynes/cm

T1	T2	T3	T4	T5	T6	T7	T8	T9	T10
0	0	0	0.1	0.2	0.2	0.3	0.4	0.5	0.8

**Table:4:** determination of foaming index of antidandruff herbal shampoo powder (in mm)

Note: T1-T10 test tube numbers 1 to 10

**Table:5 Antimicrobial activity** Antibacterial activity-cups plate method

S.No	Organism	Diameter of inhibition
1	Gram positive	18
2	Gram negative	11

**Table:6 Antifungal activity**

S.No	Organism	Diameter of inhibition in mm
1	Candida albicans	11

### RESULT:

The antimicrobial screening for the herbal shampoo extracts were carried out by cup-plate method. It includes antibacterial and antifungal activity. The results were shown in the table 5 & 6, figure..... Further, the herbal shampoo extract was screened for antibacterial & antifungal studies at 25µg/ml concentration. The organisms used for bacillus cerus, S.quirens, E.coli & candida albicans. The concentration 25µg/ml of antidandruff herbal shampoo extract, was considered to be significant effect when compared std drug. In antibacterial activity. The zone of inhibition was found to be 17mm against Bacillus cerus & 16mm against E.coli.

In antifungal activity the zone of inhibition was found to be 16mm for candida albicans. The antidandruff herbal shampoo extract showed significant effect of antibacterial and antifungal activity against all the organisms. The result shows the antimicrobial activity is dose dependant.

### DISCUSSION:

The antidandruff herbal shampoo powder prepared by mixing of suitable dried powdered materials in appropriate quantity and evaluated. The evaluation of antidandruff herbal shampoo powder were done by measured its solubility, angle of repose, bulk density, swelling index, antimicrobial test, foaming index and eye-skin irritation test. Solubility of the herbal shampoo powder was studied and this test produced comfortable feeling while mixed with water. The angle of repose was determined. This confirms that the herbal shampoo powder has been good flow property. Bulk density also done. The measurement of these parameter helps to the package size.

The swelling index of the antidandruff determination herbal shampoo powder was determined. This determination showed the presence of glycosides, glucose & saponins. Foaming index also carried

out. This estimation showed the presence of sapoindoside A and B. The surface tension of formulated antidandruff herbal shampoo powder was carried out & to produce good cleansing effect. The eye and skin irritation tests were carried out. This test showed no harmful effect on skin and eye. Antimicrobial activity of the formulated.

## CONCLUSION:

Most of the people all over the world takes a great care to improve their beauty of face, skin, hair etc by using many herbal and synthetic cosmetic products. Some people especially women take a great care to improve their hair growth, prevent the dandruff and for better looking of hair. Hence we assigned our project work to formulate & evaluate the antidandruff herbal shampoo powder with better, to prevent dandruff and improved functions of hair.

Formulated antidandruff herbal shampoo powder have MULTIPLE FUNCTIONS (i.e.) used to prevent hair falling, premature grey hair and dandruff, to promote hair growth, blackening of hair, conditioning of hair, nourishment of hair and to provide cleansing action, cooling effect etc. The results of present investigation have indicated the presence of antidandruff activity of the *Ocimum sanctum* and *cinnamomum camphora* mainly effective against strains of gram negative organism such as *E. coli* and gram positive organism such as *staphylococcus* and fungal organism such as *candida albicans*. The developed product has enhanced detergency, foaming action and particularly effective against dandruff also. From this investigation it can be concluded that the formulation of antidandruff herbal shampoo powder contains all good characters of an ideal shampoo and it was found to be harmless, more effective and economic.

## References :

1. Kumar, P. V., Venkateswara Rao, P., Prince, R., Terejamma, K., Chaitanya, T., & Desu, P. K. (2018). Formulation and Evaluation of Herbal Anti-Dandruff Shampoo from *Bhringraj* Leaves. *ARC Journal of Pharmaceutical Sciences*, 4(2), 29–33. [Arc Journals](#)
2. More, A. G., Pote, P. D., Kore, P. S., & Garhwani, Y. D. (2022). Formulation and Evaluation of Polyherbal Anti-Dandruff Shampoo. *International Journal of Ayurvedic Medicine*, 13(2), 365–369. <https://doi.org/10.47552/ijam.v13i2.2696> [Ijam](#)
3. Patel, S., Gupta, A., & Gupta, M. (2022). Formulation and Evaluation of Polyherbal Anti-Dandruff Shampoo and its Marketed Comparison. *Journal for Research in Applied Sciences and Biotechnology*, 1(2), 1–9. <https://doi.org/10.55544/jrasb.1.2.1> [Jrasb](#)

4. IJPCA (n.d.). Formulation and Evaluation of Dry Herbal Powder Shampoo. *International Journal of Pharmacognosy and Clinical Analysis*. Includes herbs like Aloe vera, Reetha, Tulsi, Neem, Shikakai, etc. [IJPC Analysis](#)
5. Madhavan, A., Unnati, M., Rachana, K., Jain, P., Bhashasaraswathi, K., & Joshi, A. K. (2024). Powder shampoo formulation with antioxidant activity: in vitro perspectives. *Arab Gulf Journal of Scientific Research*, 42(3), 1171–1180. <https://doi.org/10.1108/AGJSR-03-2023-0112> [Emerald+1](#)
6. Sagar, R., & Dixit, V. K. (2006). Formulation and evaluation of herbal anti-dandruff shampoo. *Nigerian Journal of Natural Products and Medicine*, 9(1). DOI:10.4314/njnp.v9i1.11837 [ResearchGate](#)
7. Handa, U., Sharma, D., Dubey, A., Nagpal, K., Sharma, P., Rani, N., & Mittal, V. (2025). Formulation and Evaluation of Polyherbal Anti-Dandruff Shampoo. *Anti-Infective Agents*, 23(1): e180724232004. <https://dx.doi.org/10.2174/0122113525319397240711053227> [Eureka Select](#)
8. Rashmi, C., Sariful Islam, A., Asraful, A., Mohammad Rafid, & Shiyas, M. P. (2023). Formulation and Evaluation of Herbal Anti-Dandruff Shampoo. *International Journal in Pharmaceutical Sciences*, 1(11), 473–483. <https://doi.org/10.5281/zenodo.10205392> [Int'l J of Pharma Sciences](#)
9. Experimental dataset on Aloe vera, Ocimum sanctum, and Withania somnifera anti-dandruff shampoo. *PMC (Ethiopia study)*. [PMC](#)
10. Licorice shampoo formulation vs commercial shampoo. *PMC study*. Discusses multi-herb shampoo formulations including Acacia concinna and Sapindus mukorossi. [PMC](#)
11. Wikipedia entry on *Senegalia rugata* (Shikakai) describing its traditional use as mild anti-dandruff hair cleanser. [Wikipedia](#)
12. Potluri, A., Shaheda, S. K., Rallapally, N., Durrivel, S., & Harish, G. (2013). A Review on Herbs Used in Anti-Dandruff Shampoo and Evaluation Parameters. *Indo-American Journal of Pharmaceutical Research*, 3, 3266–3278. Cited in Bentham Science article. [Eureka Select](#)
13. Aghel, N., Moghimipour, B., & Dana, R. A. (2007). Formulation of an herbal shampoo using total saponins of *Acanthophyllum squarrosum*. *Iranian Journal of Pharmaceutical Research*, 6, 167–172. [Eureka Select](#)

14. Sarath, C., Vipin, K. V., Ann, R. A., Lindumol, K. V., & Arun, S. (2013). Development and evaluation of anti-dandruff shampoo based on natural sources. *Journal of Pharmacognosy and Phytotherapy*, 1(4), 10–14. [Eureka Select](#)
15. Snehal, W., & Nitin, K. (2014). Preparation & Evaluation of Anti-Dandruff Polyherbal Powder Shampoo. *Pharmacophore*, 5(1), 77–84. Cited in Rashmi et al. [Int'l J of Pharma Sciences](#)