

Formulation and Evaluation of Herbal Shampoo prepared using *Chrysanthemum indicum* for the treatment of scalp psoriasis

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Abstract: Shampoos are utilised not just to clean hair, but also to add gloss, keep hair manageable, and retain its oiliness. Shampoos come in many different varieties, including powder, transparent liquid, lotion, solid gel, medicinal, and liquid herbal. Regarding the stability criteria for herbal shampoos, they could be simple or plain shampoo, antibacterial, or antidandruff, depending on the makeup of the components. The objective of the current study was to create a pure herbal shampoo, assess its physicochemical qualities, and compare it to existing shampoos in the market. Varied plant extracts from varied proportions were added to a 10% aqueous gelatin solution to create the herbal shampoo. A small amount of methyl paraben was added as a preservative, and lemon juice was used to correct pH. To ascertain the physicochemical qualities, a number of tests including visual inspection, pH, wetting time, %solid content, foam volume, surface tension, detergency, and dirt dispersion were carried out. The designed herbal shampoo had a liquid consistency that was brown in colour, had a surface tension score of 34.29N/m, wetted out in 2 sec, and contained 1.2g of solids. The outcomes showed that the herbal shampoo formulation has good detergency. However, additional study and development are necessary to enhance its quality and safety

Index Terms- Herbal shampoo, Extraction of Herbal plants, Formulation, Evaluation.

INTRODUCTION

Most likely, shampoos are applied as cosmetics. It is a hair care item that is used on a daily basis to clean the scalp and hair. Shampoos, which are a thick mixture of detergents with the proper additions, preservatives, and active substances, are likely used as beautifying agents. Shampoo is used to wash away dirt that has accumulated on the hair without significantly removing sebum. While there are many synthetic shampoos on the market today, medicated and unmedicated, herbal shampoo has gained popularity

since it is safer, has higher consumer demand, and has no negative side effects. Numerous medicinal plants that have been used for centuries and are included in the composition of shampoos have potential effects on hair. These therapeutic herbs can be used as extracts, powders, crude forms, or derivatives. It is challenging to create a shampoo with only one natural ingredient that is safer and has a milder effect than synthetic shampoo. It also needs to have strong foaming, detergency, and solid content like synthetic shampoo. As a result, we gave careful thought to developing a pure natural cleanser employing a time-tested method and commonly used plant material for washing hair. Making a herbal shampoo with just one natural ingredient that is milder and safer than synthetics while also competing favourably with their foaming, detergency, and solid content is incredibly challenging. As a result, we thought about creating a pure herbal shampoo using plants that are traditionally and frequently used for washing hair in India and the Gulf region in Oman.

Scalp psoriasis: Psoriasis of the scalp is a common skin condition. Depending on your skin tone, it could appear differently. It frequently appears as elevated, reddish or salmon-colour patches with white scales on people with light to medium complexion. The patches may be purple and the scales may be grey on darker skin. It may affect your entire scalp or just a few patches here and there. It may also spread to the back of your neck, the forehead, or the area behind and inside of your ears.

Chrysanthemum indicum in treatment of psoriasis:

In Southeast Asian traditional medicine, *Chrysanthemum indicum* L. is frequently used as an anti-inflammatory medication. Additionally, it was discovered to have anti-inflammatory, antioxidant,

and anti-microbial properties. Through the inhibition of MAPKs and NF-B-dependent pathways, *Chrysanthemum indicum* L. blocks the production of inflammatory mediators like NO, PGE2, TNF-, and IL-1. Additionally, our preliminary research showed that when the extracts of different herbs, including *Chrysanthemum indicum* L., were compared, the 1,3-butylene glycol extract of dried flowers of *Chrysanthemum indicum* L. decreased the expression of IL-4 and IL-13 the most in DNCB-treated HaCaT cells, human keratinocytes. Therefore, *Chrysanthemum indicum* L. may alleviate symptoms similar to psoriasis.

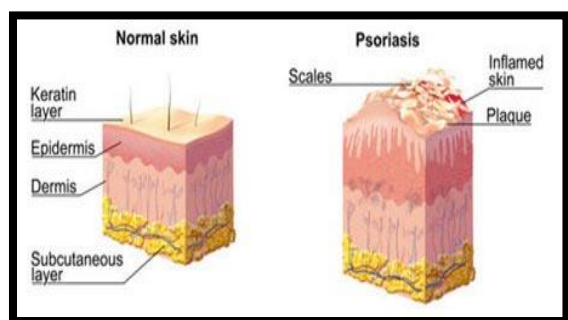


Fig no.1 - Normal skin vs. Psoriasis skin

- Benefits of Shampoo
 1. Add More Shine
 2. Reduced Hair Loss
 3. Long-Lasting Colour
 4. Hairs That Are Stronger and More Fortified
 5. Chemical-free, all-natural products
- Ideal Properties of herbal shampoo
 1. Pleasant odour.
 2. The amount of irritation is low.
 3. Excellent preservation.
 4. Excellent stability.
 5. Ease of Application.
- Advantages of Herbal Shampoo over Synthetic Shampoo:
 1. The components are all natural and organic.
 2. These shampoos have no negative side effects.
 3. There are no synthetic additions such as sodium lauryl sulphate.
 4. There will be no animal testing.
 5. It is gentle on the skin.
 6. These shampoos aid in the strengthening of the root, which in turn aids in hair development.

7. Herbal shampoos also help to increase the shine of hair; therefore if you have dry or dull hair, these herbal shampoos are excellent.
8. It strengthens the roots and aids in the growth of new, soft roots; herbal shampoos aid in the reduction of dandruff generation on the scalp.

MATERIALS

In order to prepare the herbal shampoo, the selected plant materials were shade dried and made into coarse particles and this powder material was used for the extraction.

Sr.No	Name of ingredients	Manufactured/ Company
1	Chrysanthemum indicum	Local Market Kolhapur
2	Soap nut	Loba chemie Pvt.Ltd
3	Amla	Botanical garden
4	Hibiscus	Botanical garden
5	Bhringraj	Loba chemie Pvt.Ltd
6	Senna	Loba chemie Pvt.Ltd
7	Aloe Vera	Botanical garden
8	Gelatin	Molychem Pvt.Ltd.
9	Lemon	Botanical garden
10	Rose oil	Research lab fine chem. Industries
11	Methyl paraben	Molychem Pvt.Ltd.

Table no.1 – Materials for Herbal Shampoo.

METHODS OF EXTRACTION

EXTRACTION OF *Chrysanthemum indicum*

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25g of dry CIF combined in a 1:8 ratio with distilled water.



3 periods of 1 hour each of heating and simmering is performed.



The stirring is done continuously during this time.



After 1 hr filtration process is performed.



And the filtrate containing the main components was extracted.

Flow chart of Extraction

EXTRACTION OF HERBAL PLANTS

Each powdered plant, Hibiscus Rosa sinensis, Phyllanthus embilica, Eclipta prostrate, Cassia angustifolia, and Aloe Vera, was extracted with distilled water by boiling for 4 hours. Alcohol was used to extract sapindusmukoross. Each plant's extract was isolated and evaporated.

FORMULATION OF HERBAL SHAMPOO:

To prepare herbal shampoo, different plant extracts were combined in varying ratios.

Components required for making herbal shampoo:

Sr.No	Ingredients	F1	F2
1	Soap nut extract	0.5 ml	0.5 ml
2	Amla extract	0.5 ml	0.5 ml
3	Chrysanthemum extract	0.5ml	1 ml
4	Hibiscus extract	0.5ml	0.5 ml
5	Bhringraj extract	0.5ml	1.5 ml
6	Senna extract	0.5 ml	-
7	Aloe Vera	1 ml	0.5 ml
8	Gelatin	q.s	q.s
9	Lemon juice	q.s	q.s
10	Rose oil	q.s	q.s
11	Methyl paraben	q.s	q.s

Table no.2- Formula for Herbal Shampoo

METHOD:

The herbal shampoo was made in accordance with the formulation table's formula.

At intervals of 20 minutes, continuously shake the herbal extract into the 10% gelatin solution. A steady stirring motion was used to add 1 cc of lemon juice. Enough essential oil (rose oil) was added to the recipe to enhance the aroma. Using gelatin solution, the final volume was increased to 100ml.



Fig no.2 - Herbal Shampoo

EVALUATION OF HERBAL SHAMPOO:

Several quality-controlled tests, such as visual assessment, physicochemical controls, and condition in performance testing, were conducted to check the generated formulations' quality.

1. Visual Assessment-The prepared shampoo was assessed for its ability to produce foam as well as for its clarity, colour, and fragrance.

2. Determination of pH-At room temperature, a pH metre was used to measure the pH of 10% v/v shampoo solution in distilled water.

Acidic pH <7, neutral pH = 7, and basic pH > 7.

3. Surface tension Measurement-Choosing a clean stalagnometer, securing it firmly in the vertical position, and sucking water through the rubber tube to a level higher than the upper mark can help you determine how many drops there were. Leave the rubber tube in place and let the water fall. Start counting drops when the water meniscus just over the higher mark; when the water crosses the lower mark, stop counting and note that the desired number of drops has been reached.

Repeat the procedure with the liquid whose surface tension has to be calculated, and record the number of drops as (n₂).

Calculate the surface tension of an unidentified liquid using the formula below.

$$v = \rho_2 n_1 \div \rho_1 n_2 \times \gamma$$

Where, γ = surface tension.

n₁ = Number of drops of water.

n₂ = Number of drops of liquid shampoo.

ρ_2 = Density of liquid shampoo.

ρ_1 = Density of water.

4. Test of Wetting: The amount of time needed for the canvas paper to completely sink was used to compute the wetting time. A disc with a 1-inch diameter was made out of a 0.44g piece of canvas paper. A canvas paper disc was placed over a surface of shampoo (1% v/v), and the time it took for the paper to sink was calculated using a stopwatch.

5. Dirt Dispersion Test - In a test tube with a large mouth, 10 ml of water and two drops of cleaner were added. When the test tube was sealed with a stopper, one drop of Indian ink was added to the prepared shampoo and shaken for 10 minutes. Measurements were made of the amount of ink on the froth, and the outcome was categorised as none, slight, medium, or heavy.

6. Foaming Index Test - The ability to produce foam was assessed using the Cylinder Shake technique. A measuring cylinder was filled with 5mL of shampoo, the volume was increased to 25mL, and the cylinder was thoroughly shaken for 10 minutes. The stock solution was then measured in five test tubes using a 1 ml, 2 ml, 3 ml, 4 ml, and 5 ml volume. Additionally, water was added to each test tube to increase its volume by up to 10 ml. Each test produced foam that was measured in centimetres, and the forming index was determined using the following formula:

$$\text{Foaming index} = 1000/A$$

Where, A is the volume of stock solution with a precise height of 1 cm.

7. Determination of % solid content: In a previously clean, dry, and weighed evaporating dish, 4 grams of shampoo were added. To ensure the weight of the shampoo was accurate, the dish and shampoo were weighed once more. By setting an evaporating dish on the hot plate, the liquid portion of the shampoo was evaporated. After the shampoo had dried completely, the weight and percentage of the solid constituents were calculated.

RESULT AND DISCUSSION

Parameters	Observations
Colour	Brown
Odour	Pleasant
pH	6.7
Surface tension(N/m)	34.29N/m
Wetting time (s)	2 sec
Dirt dispersion test	light
Foaming index	500
Solid content (%)	1.2g

Visual Assessment - The colour, odour, texture, and state of the shampoo compositions were all assessed. The formulation was found to have a better physical look, per the results.

Sr.No	Parameters	Formulation
1	Colour	Brown
2	Odour	Aromatic
3	Texture	Viscous
4	state	liquid

Determination of pH - The shampoo's pH is a crucial factor in boosting and improving the characteristics of hair, reducing eye discomfort, and stabilising the ecological balance of the scalp. Since the pH range of

all the shampoos was between 5.0 and 7.0, which is closer to skin pH, they were all acid balanced. The composition contains 6.7 pH.

Surface tension Measurement - Using a stalagmeter, it was discovered that the herbal shampoo formulation had a surface tension of 34.29 N/m.

$$\text{Number of water drips } (n_1) = 42.33$$

$$\text{Number of liquid shampoo droplets } (n_2) = 91.66$$

$$\text{Density of water } (\rho_1) = 0.99$$

$$\text{Shampoo's density } (\rho_2) = 1.01$$

$$= (1.01 \times 42.33 \setminus 0.99 \times 91.66) \times 72.8 = 34.29 \text{ N/m}$$

Test of Wetting - Using a stopwatch, the time it took for the canvas paper to sink was determined to be 2 seconds.

Dirt dispersion test - A dirt dispersion test is used to gauge how well a shampoo cleans. Shampoos that keep the concentrated water soluble dye in the hair. Foam is regarded as being of low quality since dye or dirt that remains in the foam is challenging to remove and ends up getting redeposited on the hair. Therefore, for greater washing activity, the dirt should remain in the aqueous liquid layer. The shampoo's formulation proved effective washing and quick elimination of the water-soluble pigment within 3 minutes

Foaming index test - Each test produced foam that was measured in centimetres, and the forming index was determined using the following formula:

$$\text{Foaming index} = 1000/A$$

Where, A is the volume of stock solution with a precise height of 1 cm

Sr. No	No. of test tubes (ml of stock solution)	Height of Foam (cm)
1	1ml	0.9cm
2	2ml	1.7cm
3	3ml	2cm
4	4ml	2cm
5	5ml	2.7cm

$$\text{Foaming index} = 1000/ A$$

$$= 1000/2$$

$$= 500$$

The developed formulation of herbal shampoo was found to have a 500 foaming index.

Determination of% solid content: The tested shampoo's solid content, which was determined to be 1.2g, was predicted to wash out.

CONCLUSION

The goal of the current study was to develop a herbal shampoo that would lessen psoriasis-related scalp irritation, in comparison to chemical conditioning agents because they are safer and have no unfavourable side effects. The goal of this experiment was to create a stable, functional shampoo without any of the synthetic ingredients that are typically used in such formulations. We used a variety of evaluation criteria to assess the performance of herbal shampoo. The assessment study of the shampoo formulation produced equivalent results for the quality control test. However, we still require additional validation procedures for this herbal shampoo.

REFERENCE

- [1] Vijayalakshmi A, Sangeetha S, Ranjith N. Formulation and evaluation of herbal shampoo. *Asian Journal of Pharmaceutical and Clinical Research*. 2018; 11(4):121-4.
- [2] Sawant PS, Sankpal PB, Jagtap AM, Gavade AS, Vambhurkar GB. Formulation and evaluation of herbal shampoo. *Research Journal of Topical and Cosmetic Sciences*. 2020; 11(1):01-4.
- [3] Arora R, Singh RK, Meenakshi B. Formulation and evaluation of herbal shampoo by extract of some plants. *The Pharmaceutical and Chemical Journal*. 2019; 6(4):74-80.
- [4] Yadav AR, Mohite SK. Formulation and evaluation of antidandruff shampoo. *Research Journal of Topical and Cosmetic Sciences*. 2020; 11(2):55-8.
- [5] Azadbakht M, Monadi T, Esmaili Z, Chabra A, Tavakoli N. Formulation and evaluation of licorice shampoo in comparison with commercial shampoo. *Journal of Pharmacy & Bio allied Sciences*. 2018 Oct; 10(4):208
- [6] Chavan VM, ASB KJ. Formulation and evaluation of herbal shampoo. *Asian J Pharm Clin Res*. 2019; 9(5):88-96
- [7] Pundkar AS, Ingale SP. Formulation and evaluation of herbal liquid shampoo. *World Journal of Pharmaceutical Research*. 2020 Feb 25; 9(5)
- [8] Malpani T, Jeithliya M, Pal N, Puri P. Formulation and evaluation of Pomegranate based herbal shampoo. *Journal of Pharmacognosy and Phytochemistry*. 2020; 9(4):1439-44.
- [9] Kumari I, Sarkar I, Sanyashi I, Das S, Das R. Formulation and Evaluation of herbal shampoo using neem, amla and reetha extract. *Journal of Pharmacognosy and Phytochemistry*. 2022; 11(4):179-84.
- [10] Lodha G. Formulation and evaluation of polyherbal shampoo to promote hair growth and provide antidandruff action. *Journal of Drug Delivery and Therapeutics*. 2019 Aug 30;9(4-A):296-300.
- [11] Gholve S, Nadarge S, Hindole S, Bhusnure O, Bhosale P, Thonte S. Formulation and evaluation of polyherbal antidandruff powder shampoo. *World journal of pharmaceutical research*. 2015 Jul 25; 4(10):1714-31.
- [12] Reddy KV, Yachawad AV, Zambare KK, Landge S. Formulation and evaluation of herbal shampoo: *Bryophyllum pinnatum*. *Asian Journal of Pharmaceutical Research*. 2020; 10(2):86-8.
- [13] Nikam NR, Patil PR, Jadhav RP, Vakhariya RR, Magdum CS. Formulation and evaluation of herbal shampoo: A comparative study. *Research Journal of Topical and Cosmetic Sciences*. 2019; 10(2):61-4.
- [14] Yateem H, Hanania M, Mosleh N. Formulation and evaluation of herbal shampoo containing olive leaves extract.
- [15] Patel IM, Talathi AD. Use of traditional Indian herbs for the formulation of shampoo and their comparative analysis. *International Journal of Pharmacy and Pharmaceutical Sciences*. 2016; 8(3):28-32.
- [16] Meduri TS, Munnangi LD, Potharaju S, Suravarapu ST, Swami VR, Uppala V, Yepuri D, Vadlamudi P, Nadendla RR. Formulation and Evaluation of Fermented Rice Water Herbal Shampoo. *Journal of Drug Delivery and Therapeutics*. 2021 Aug 15; 11(4-S):127-30.
- [17] Nair MM, Bhargava G, Kavitha PN, Saraswati C. Preparation and Evaluation of Herbal Anti-dandruff Shampoo. *Natl. J. Pharm. Sci*. 2022; 2(1):179-84.
- [18] Prashanthi P, Elumalai A, Eswaraiyah MC, Rao YN, Ahamed J. Assessment on general parameters for formulation and evaluation of herbal shampoo. *Research Journal of Topical and Cosmetic Sciences*. 2012; 3(2):31-3.

- [19] Kaur G, Kriplani P, Dhingra A, Chopra B, Deswal G. Formulation and evaluation of anti-dandruff polyherbal powder shampoo. *Journal of Quality Assurance and Pharma Analysis*. 2016; 2(1):115-21.
- [20] Soundarya M, Ravichandran S. FORMULATION AND EVALUATION OF POLY HERBAL SHAMPOO.
- [21] Gothwa NM, Gupta RA. Formulation and evaluation of herbal soil shampoo. *International Journal of Pharmacy & Life Sciences*. 2017 May 1; 8(5).
- [22] PAVAN AR, Hima BK, Kumari MP, Maddileti R, Lakshmi GA. Formulation, evaluation & comparison of traditional poly herbal shampoo powders with marketed formulation. *Journal of Drug Delivery and Therapeutics*. 2019 Apr 19; 9(2-s):500-3.