



FORMULATION AND EVALUTION OF ANTI-DANDRUFF SHAMPOO USING EXTRACT OF LEAVES OF DATURA METEL LINN.

Ms. Ayushi Tanwar*, Mr. Goutam Tanwar, Mr. Shashwat Rathore, Mr. Maksud Pathan, Mrs. Anjula Patidar

Charak Institute of Pharmacy, Mandleshwar

Abstract: Hair is a fascinating and complex part of the human body. Hair has three distinct layers: the cuticle, cortex, and medulla. Hair-related problems can vary widely and may include issues such as hair loss, dandruff, scalp infections, damaged hair, greasy hair, and more all due to environmental factors and using chemical ingredients. Herbal care products have gained popularity due to their natural ingredients and potential effectiveness in treating the condition. These products often utilize plant-based ingredients known for their anti-inflammatory, antifungal, and soothing properties. Anti-dandruff shampoos are specifically formulated to help alleviate the symptoms of dandruff, such as flaking, itching, and scalp irritation. These shampoos often contain active ingredients that target the underlying causes of dandruff, such as fungal infections or excessive oil production. The extraction was performed through soxhlet method using solvent acetone on which after phytochemical screening we get carbohydrate, alkaloids, steroid. In this the chemical constituents present are Scopolamine, Adenosine, Thymidine, Dioscoroside and the Scopolamine provided the Anti-Fungal activity. *Datura metel* is a well-known medicinal plant due to its herbicidal, anti-dandruff, insecticidal, anti-fungal, anti-bacteria. One study evaluated the ethanolic extract of *Datura metel* leaves for its anti-lice and anti-dandruff activity. The anti-dandruff shampoos were prepared and evaluated for various parameters like pH, Skin irritation, Viscosity, Durt dispersion, Physical Appearance etc. Hence in the present work, we found excellent results of the shampoo.

Keyword: Anti Dandruff Shampoo, Dandruff, *Datura Metel*.Linn, Hair, phytochemical.

1. Introduction

1.1 Hair

Hair is a unique character found on all mammals but not on other animals. In humans it is a special and cherished feature, especially in females, but its main functions are in protection of the skin from mechanical insults and to facilitate homeothermy. For example, eyebrows and eyelashes stop things entering the eyes, while scalp hair prevents sunlight, cold, and physical damage to the head and neck. ^[1]



Fig. no.2. Hair Growth cycle

1.2 Dandruff

- Dandruff is a chronic scalp condition characterized by scaling, itching, and redness of the scalp. It occurs when the scalp sheds epidermal cells in large clumps. The skin of the scalp renews itself about once a month. Usually, the scalp sheds dead cells in a nearly invisible way, but sometimes cell turnover becomes unusually rapid and dead cells are shed as visible flakes called dandruff.
- **Causes:** The cause of dandruff varies among individuals, depending on their susceptibility.

Causes can be classified into-

a) Microbial

(a) Microbial Factors:

(1) **Fungal:** *Malassezia furfur* is considered as the leading cause of dandruff. The fungi *Malassezia* can lead to dandruff.

(2) **Bacterial:** Disequilibrium in the proportion of the two main bacterial populations found on the scalp, *Propionibacterium acnes* and *Staphylococcus epidermidis*, may also be a cause of dandruff.

(b) Non-microbial Factors:

- Damage to the scalp Stratum corneum.
- Dry scalp.
- Oily or irritated skin.
- Dirt accumulation due to less frequent shampooing.
- Sensitivity to hair cosmetics.

1.3 Shampoo

Shampoos are most probably used as cosmetics. It is a hair care product that is used for cleaning the scalp and hair in our daily life. Shampoos are most likely utilized as beautifying agents and are a viscous solution of detergents containing suitable additives, preservatives, and active ingredients. It is usually applied on wet hair, massaged into the hair, and cleansed by rinsing with water. The purpose of using shampoo is to remove dirt that has built up on the hair without stripping out much of the sebum. Many synthetic shampoos are present in the current market, both medicated and non-medicated; however, herbal shampoo has become popularized due to its natural origin, which is safer, increases consumer demand, and is free from side effects.^[4]

Need of Shampoo :

Our skin and scalp are kept hydrated by sebum, an oily material. Sebum can quickly accumulate if you don't shampoo, making your hair oilier than you'd like. Sebum also draws microfauna, which can lead to dandruff and other problems with the hair. Shampooing is necessary to remove sebum from your scalp as well as any traces of other hair products. The market uses it extensively. A frequently washed scalp can also get dry. Shampoos containing abrasive chemicals can strip the oil from your scalp, causing flaking. Additionally, washing in extremely hot water might result in dry hair, broken ends, and flaky skin. Redness, swelling, and itching are signs of a dry scalp issue.

Ideal Characteristics of Shampoo:

- Should effectively wash hair.
- Should produce a good amount of foam.
- The shampoo should be easily removed by rinsing with water.
- Should leave the hair non-dry, soft, and lustrous with good, manageability.
- Should impart a pleasant fragrance to the hair.
- Should not make the hand rough and chapped.
- Should not have any side effects or irritate skin obeyed.

Functions of Shampoo:

1. To make the hair smooth and shiny.
2. Produce good amount of foam.
3. Should not cause irritant to scalp, skin and eye.
4. Should completely, effectively remove dirt.
5. Impart pleasant fragrance to hair.
6. It should effectively and completely remove dirt or soil.
7. It should effectively wash the hair.
8. It should produce a good amount of foam to satisfy the user.
9. It should be readily removed by rinsing with water.
10. It should impart a pleasant fragrance to the hair.
11. It should not have any side effects or causes irritation to the skin and eye.^[5]

2. Plant Profile

2.1 Datura Metel



Fig.no.3. Plant of *Datura Metel* Linn.

- **Plant name:** *Datura metel* Linn.
- **Family:** Solanaceae.
- **Biological Source:** It consists of dried leaves and flowering tops of *Datura metel* Linn.
- **Chemical constituents:** Disciferitriol, copolamine, adenosine, thymidine, ilekudinoside, dioscoroside.
- **Pharmacological activity:**
 - ✓ Arthritis Treatment
 - ✓ Insecticidal activity
 - ✓ Herbicidal activity
 - ✓ Antifungal activity
 - ✓ Antibacterial activity
 - ✓ Hypoglycemic activity
 - ✓ Antioxidant

3. Material and Method:

3.1 Collection of Plant Material- The fresh leaves of *Datura Metel* Linn. were collected from agriculture. The fresh leaves were washed with distilled water and shade dried.

3.2 Extraction of Plant Material- Plant powder 50g was extracted with 800ml of acetone in a soxhlet apparatus at 60 °C for 42 hrs.

1. Set up the Soxhlet apparatus: Assemble the round-bottom flask, condenser, and thimble. Place the dry *Datura metel* leaves in the thimble.

2. Add acetone: Pour the 800 ml of acetone into the round-bottom flask. Make sure the leaves in the thimble are not in direct contact with the acetone.

3. Start the extraction: Heat the round-bottom flask, causing the acetone to boil and vaporize. The vapor will rise and condense in the condenser, dripping back into the thimble.

4. Continuous extraction: As the condensed acetone drips back into the thimble, it will dissolve more compounds from the dried *Datura metel* leaves. This continuous cycle of extraction and condensation will allow for efficient extraction of the desired compounds.

5. Collection: The extracted compounds will gradually accumulate in the round-bottom flask as the extraction process continues.

6. Completion: The extraction process is typically carried out for several hours or until the desired compounds have been sufficiently extracted. The collected solution in the round-bottom flask can then be evaporated to obtain the desired extract.⁽⁶⁾

3.3 Phytochemical screening of *Datura Metel* Linn leaves extract

S.no	Product	Test	Result
1.	Carbohydrate	<i>Fehling's test</i>	Positive
2.	Glycosides	<i>Liebermann's test</i>	Positive
3.	Anthraquinone	<i>Borntrager's test</i>	Negative
4.	Alkaloids	<i>Dragendorff's test</i>	Positive
5	Steroid	<i>Liebermann Burchard's test</i>	Positive
6	Saponin	<i>Foam test</i>	Negative

3.4 Preparation of herbal shampoo-

Formulation of the herbal shampoo was done as per the formula given in Table 2. To increase the thickness of formulation, SLS (7.5%) solution was prepared using 0.1 M NaCl. 14g of the herbal extract was added to 20 ml SLS solution with 20 ml NaCl solution and mixed by shaking gently. The final volume was made to 100 ml by adding 10 ml guar gum extract, 2 ml of glycerine and 25 ml of water. To improve aroma in the formulation, sufficient quantity of rose water was added. The shampoo also included one capsule of Vitamin E for conditioning and 2 ml of lemon juice as preservative.⁽⁷⁾

S.no	Name of ingredient	Role of ingredient
1	Glycerine	Moisturing
2	Sodium chloride	thickener
3	SLS	surfactant
4	Lemon juice	Preservative
5	Guar gum	viscosity
6	Rose water	fragrance
7	<i>Datura Metel</i> Linn leaves extract	Anti- Dandruff

Table no.01. Material used in the preparation of Shampoo

S.no	Name of ingredient	Quantity
1	Herbal extract	14gm
2	SLS	20ml
3	0.1M Nacl	20ml
4	Guar gum	10ml
5	Glycerine	3ml
6	Lemon juice	3ml
7	Rose Water	5ml
8	Water	25ml

Table no.2. Formula for preparation of Shampoo

4. Evaluation of 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.

4.1 Physical appearance/visual inspection: The formulation prepared was evaluated for the clarity, color, odor and foam producing ability and fluidity.⁽⁸⁾

4.2 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.⁽⁹⁾

4.3 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.

4.4 Viscosity: The viscosity of herbal shampoo was determined by using Ostwald's viscometer.

4.5 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.⁽¹⁰⁾

4.6 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.

4.7 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.

5. Result and Discussion:

S.no	Parameter	Observation
1.	Physical appearance	Light green
2.	pH	6
3.	Odour	good
4.	Foam type	Dense , small
5.	Viscosity	50 millipoise
6.	Dirt dispersion	light
7.	Cleansing action	good
8.	Skin irritation	nil

Table no.3.Result of evaluation parameter.

6. Conclusion:

The anti-dandruff Shampoo was formulated by admixing the equal amount of *Datura Metel* Linn leaves extract. The above extract contain Phyto-constituents like alkaloids, glycosides, carbohydrate and steroid etc. We are using excipients like Glycerine provides Moisturising property, Nacl provides Thickening, SLS used as a surfactant, Lemon juice is used as a preservative, Guar gum provide Viscosity and Rose water is also used as a Fragrance. But the main ingredient is *Datura Metel* Linn leaves extract to fight against Dandruff. The evaluation parameter of shampoo was determined and the formulation was found to be good, exceptable which is desirable as a cosmetic formulation.

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