IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

"DEVELOPMENT, FORMULATION & EVALUATION OF ANTI-DANDRUFF HERBAL SHAMPOO POWDER"

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ABSTRACT

This project focuses on formulating a natural herbal anti-dandruff shampoo powder using Neem, Tulsi, Reetha, Amla, and Mint. These ingredients were chosen for their antimicrobial, cleansing, and nourishing properties. Neem and Tulsi combat dandruff-causing fungi, Reetha provides gentle cleansing, Amla strengthens hair with antioxidants, and Mint soothes scalp irritation. The powder was evaluated for pH, foaming capacity, and dandruff reduction, showing effective results — including reduced flakes, less itchiness, and healthier hair. This study demonstrates the potential of herbal formulations as sustainable, chemical-free alternatives for scalp and hair care.

Keywords- scalp healthy, natural cleansing, eco-friendly cosmetic, antimicrobial properties.

INTRODUCTION

Hair care has been an essential part of human self-care practices for centuries. From ancient civilizations to modern times, people have relied on natural remedies to maintain healthy, vibrant hair. In recent years, the demand for herbal and chemical-free products has grown, as more people seek gentle, sustainable solutions for common hair and scalp issues. One of the most prevalent concerns is dandruff — a condition that affects millions worldwide, causing flaky skin, itchiness, and discomfort.

Conventional shampoos often contain harsh chemicals that strip the scalp of its natural oils, leading to dryness and even more irritation over time. In contrast, herbal powders offer a holistic approach, harnessing the healing power of plants to cleanse the scalp, nourish hair follicles, and combat dandruff without unwanted side effects. This project aims to create a 40g anti-dandruff herbal shampoo powder using a blend of time-tested ingredients, each carefully selected for its unique benefits to scalp and hair health.

The formulation combines five potent herbal powders: Neem, Tulsi, Reetha, Amla, and Mint. These ingredients work synergistically to address the root causes of dandruff — such as fungal infections, excess oil production, and poor scalp circulation — while promoting overall hair strength and shine. The powder form extends the product's shelf life, eliminates the need for synthetic preservatives, and allows for versatile application methods, such as hair masks or cleansing pastes.
This project not only explores the formulation and preparation of the herbal shampoo powder but also delves into the science behind each ingredient's therapeutic properties. The goal is to develop an effective, eco-friendly, and easy-to-use product that supports scalp health and encourages people to embrace natural hair care solutions.

Through this project, we aim to showcase the potential of herbal remedies in modern hair care, bridging ancient traditions with contemporary needs. By understanding and harnessing the power of nature, we can create products that are gentle on our bodies and the planet, fostering a more sustainable future for personal care.

MECHANISM

1. The herbal shampoo powder works through the combined action of its natural ingredients, each targeting specific scalp issues:
2. Cleansing (Reetha): Reetha contains natural saponins, which create a mild lather to gently cleanse the scalp, removing dirt, oil, and product buildup.
3. Antimicrobial Action (Neem & Tulsi): Neem and Tulsi exhibit antifungal and antibacterial properties that combat Malassezia, the fungus commonly linked to dandruff.
4. Exfoliation & Scalp Renewal (Amla): Amla is rich in vitamin C and antioxidants, helping to remove dead skin cells, promote circulation, and nourish the scalp.
5. Cooling & Soothing (Mint): Mint provides a refreshing cooling effect, reducing itchiness and inflammation, while stimulating blood flow to the hair follicles.
6. Together, these ingredients cleanse, heal, and balance the scalp, preventing dandruff recurrence and promoting healthy hair growth.

INGREDIENTS

Ingredient Introduction for Anti dandruff Herbal Shampoo Powder

1. Neem (Azadirachta indica)

Neem is a powerhouse herb known for its potent antifungal, antibacterial, and anti-inflammatory properties. It effectively combats dandruff by targeting the Malassezia fungus, a common cause of flaky scalps. Neem also soothes itchiness, reduces scalp redness, and promotes a healthy environment for hair growth. Its rich antioxidant content helps protect hair follicles from oxidative stress, preventing premature graying and hair loss.

Key Benefits: Dandruff control, scalp purification, itch relief
Active Compounds: Nimbidin, Nimbin, Azadirachtin.

2. Tulsi (ocimum sanctum)

Tulsi, or Holy Basil, is a revered herb in Ayurveda, valued for its detoxifying and antimicrobial effects. It purifies the scalp, removing excess oil, buildup, and pollutants that contribute to dandruff and scalp infections. Tulsi's cooling properties help calm inflammation, while its antioxidants support hair strength and vitality.

Key Benefits: Scalp detoxification, antifungal action, cooling effect.
Active Compounds: Eugenol, Ursolic acid, Rosmarinic acid.

3. Reetha (Sapindus mukorossi)

Also known as soapnut, Reetha is a natural cleanser packed with saponins ─ compounds that create a gentle, foamy lather when mixed with water. It cleanses the scalp without stripping natural oils, removing dirt, excess sebum, and flakes. Reetha's antimicrobial properties further assist in controlling dandruff and scalp infections, making it a gentle yet powerful cleanser.

Key Benefits: Natural cleansing, gentle foaming, scalp purification
Active Compounds: Saponins, Sapindic acid

4. Amla (Emblica officinalis)

Amla, or Indian Gooseberry, is rich in vitamin C and antioxidants, which nourish the scalp, boost collagen production, and strengthen hair follicles. It helps balance scalp oil production, preventing excessive dryness or greasiness that can contribute to dandruff. Amla also promotes hair growth, adds shine, and helps prevent premature graying.

Key Benefits: Scalp nourishment, antioxidant protection, hair strengthening
Active Compounds: Ascorbic acid (Vitamin C), Gallic acid, Tannins

5. Mint (Mentha)

Mint provides a refreshing, cooling effect that soothes scalp irritation and relieves itchiness. Its antimicrobial properties help keep scalp infections at bay, while its natural menthol content stimulates blood circulation to the hair follicles, encouraging healthy hair growth. Mint's cooling sensation also makes the shampooing experience more invigorating and refreshing

Key Benefits: Itch relief, scalp stimulation, cooling effect.
Active Compounds: Menthol, Flavonoids, Phenolic acids.

METHOD

1. Ingredient Preparation: Ensure all herbal powders are finely ground and moisture-free.
2. Weighing & Proportioning: Accurately weigh each ingredient according to the formula.
3. Blending: Mix all powders thoroughly in a large bowl to ensure even distribution.
4. Sifting (Optional): Sift the blended powder to remove any large particles.
5. Storage: Store the final product in an airtight container, away from light and moisture.

PROCEDURE

PROCEDURE FOR HERBAL SHAMPOO POWDER

1. Mixing the Powder: Combine all the measured ingredients in a bowl.
2. Creating the Shampoo Paste: Take 1–2 tablespoons of the powder and mix with warm water to form a smooth paste.
3. Application: Apply the paste to wet hair, massaging into the scalp for 5–7 minutes.
4. Resting Time: Let the paste sit on the scalp for 5–10 minutes for better absorption.
5. Rinsing: Rinse thoroughly with lukewarm water until all residue is washed out.
6. Drying & Observing Results: Air-dry the hair and observe the scalp for reduced flakes and improved texture.

TABLE

INGREDIENTS	**Quantity**
NEEM	24%
AMLA	20%
REETHA	20%
TULSI	16%
MINT	20%

PREPARATION METHOD

The following steps are followed sequentially for the formulation of polyherbal shampoo powder.

—Drying:- All the powder are in dry form and grinded.

—Weighing: - All the required herbal powders for shampoo preparation were weighed individually.

—Size reduction: - The crude ingredients were collected and these ingredients were size reduced using a hand-driven mixer individually.

—Mixing: - All these fine ingredients were mixed thoroughly by the mixer to form a homogenous fine powder.

—Sieving: - Then this fine powder was passed through sieve no. 80, to get a sufficient quantity of fine powder.

—Packing and labelling: - Then it was packed and labeled suitably.

EVALUATION

Evaluation of Multipurpose Herbal Powder Shampoo Prepared formulations of shampoos were subjected to following evaluation parameters.

A. Visual appearance/organoleptic assessment Organoleptic analysis was done for characteristics like color, taste, texture, and odor. Color and texture were assessed using the senses of sight and touch, respectively. A group of five people who are sensitive to taste and odor were chosen to evaluate the two.

B. Characteristics of powder in general Evaluation of the parameters that may impact the preparation's external qualities (such as flow characteristics, appearance, packaging requirements, etc.) is part of general powder characteristics. Particle size, angle of repose, 21 bulk density, and tapped density are among the characteristics assessed in this section. For the evaluation, all three of the shampoo powders were taken from the top, middle, and bottom levels.

1. Size of particles A sieving procedure using I.P. Standard sieves and mechanical shaking for 10 minutes was used to estimate the particle size, which is a parameter that affects many qualities including spreadability, grittiness, etc.
2. Repose angle It is the greatest angle that can exist between the powder pile's surface and the horizontal flow.
   - Funnel method Required quality of dried powder is taken in a funnel placed at a height of 6 cm from a horizontal base. The powder was allowed to flow to form a heap over the paper on the horizontal plane. The height and radius of the powder was noted and recorded the angle of repose (θ) can be calculated by using the formula.
   - The open-ended cylinder technique A cylindrical tube that is open at both ends and set on a horizontal surface contains the necessary quantity of dried powder. After that, lift the funnel until it forms a heap. The heap's height and radius are measured and documented. The formula can be used to determine the angle of repose (θ) for the two ways mentioned above. $\Theta = \tan^{-1}(h / r)$ where r is the radius of the heap's base, h is its height, and θ is its angle of repose.
3. Density in bulk The ratio of a powder's specified mass to its bulk volume is known as its bulk density. After drying, the necessary quantity of powder is added to a 50 ml measuring cylinder until it reaches the 50 ml mark. The cylinder is then dropped at two-second intervals from a height of one inch onto a hard wood surface. The powder's volume is measured. The powder is then weighed. To obtain average results, this process is repeated. The following formula is used to determine the bulk density.

$$\text{Bulk density} = \frac{\text{Mass of the herbal powder shampoo}}{\text{Volume of the herbal powder shampoo}}$$

4. The density that is taped The increased bulk density that results from mechanically tapping a container holding the powder sample is known as the "tapped density." The measuring cylinder or vessel is mechanically tapped for one minute after the initial powder volume or mass has been observed, and readings of the volume or mass are taken until there is little more change in either. Grams per cubic centimeter (g/cm3) was the unit of measurement.

PHYSICOCHEMICAL EVALUATION

PH

The pH of 10% shampoo solution in distilled water was determined At room temperature 25°C. The pH was measured by using digital

PH METER.

1. Washability:- Formulations were applied on the skin and then ease and extent of Washing with water were checked manually.
2. Solubility:- Solubility is defined as the ability of the substance to soluble in a Solvent. One gram of the powder is weighed accurately and Transferred into a beaker containing 100 ml of water. This was Shaken well and warmed to increase the solubility. Then cooled and Filter it, the residue obtained is weighed and noted.
3. Loss on drying:- Loss on drying is the loss of mass expressed in percent m/m. Two Gram of the powder was weighed accurately and transferred into a Dry Petri dish. The Petri dish is placed in a dessicator for 2 days over Calcium chloride crystals. Then the powder was taken and weighed Accurately to find out the weight loss during drying
4. Skin /eye 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

5. Skin irritation test:- Skin irritation test is carried out by using open patch method.With many cosmetic products, whether commercial or homemade, It is recommended that you do a patch test on your skin prior to use. This is to ensure that you do not have an allergic reaction to the Product and if you do, it will only be confined to a small area of skin And thus treatable with ease.

Step 1- Pour or squeeze out a little of the cosmetic preparation to Your wrist.
Step 2- Dab a small amount of the preparation on the pulse of your wrist or the crook of your elbow.
Step 3- Leave the preparation unwashed for a period of 15-20 min.
Step 4- Watch for signs of an allergic reaction. Typical signs will Include redness, a rash, any form of breakouts on the skin, itchiness, Pain, flaking etc. Some people may also experience nausea or Respiratory reactions. If any of these signs present themselves, cease Use immediately.
Step 5- Continue to use the product if you do not have a reaction. If You do not have any allergic reaction Symptoms, it is likely that the preparation is all right for your skin type.

6. Extractive values:- Determination of alcohol soluble extractive 5 g of the each air dried herbal shampoo powder was eighed and Macerated with 100 ml of Alcohol of the specified strength in a Closed flask for twenty-four hours, shaked frequently during six Hours and allowed to stand for eighteen hours. Filtered, by taking Precautions against loss of solvent, 25 ml of the filtrate was Evaporated to dryness in a tare flat bottomed shallow dish, and dryAt 105 0C, to constant weight and weighed. The percentage of Alcohol-soluble extractive with reference to the air-dried drug was Calculated. Determination of water soluble extractive Proceeded as Directed for the determination of alcohol-soluble extractive, using Chloroform water instead of ethanol. The percentage of watersoluble extractive was calculated for each sample.
7. Dirt dispersion:- Two drops of 1% each shampoo powders 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 for 10 times. The amount of Ink in the foam of was estimated as None, Light, Moderate, or Heavy.
8. Moisture content determination10 g of each herbal shampoo powder was weighed in a tare Evaporating dish and kept in hot air oven at 1050c. Repeated the Drying until the constant weight loss was observed after the interval Of 30 minutes. The moisture content was calculated for each sample.
9. Wetting time:- The canvas was cut into 1 inch diameter discs having an average Weight of 0.44 g. The disc was floated on the surface of shampoo Solution of 1% w/v and the stopwatch started. The time required for The disc to begin to sink was measured acutely and noted as the Wetting Time.
10. Nature of hair after washes:- Nature of hair after wash can be done by collecting the responses of Volunteers.
11. Foaming index:- One gram of the powder was weighed accurately and transferred Into 250 ml conical flask containing 100 ml of boiling water. Then It is warmed gently for 30 minutes, cooled and filtered and make up The volume to 100 ml in standard volumetric flask. This extract is Taken in 10 test tubes in a series of successive portion of 1, 2, 3….10 Ml and remaining volume is made up with water to 10 ml. Then the Test tubes were shaken in longwise motion for 15 seconds at speed Of 2 frequencies / second. Then the tubes are allowed to stand for 15 Minutes. The height of the foam was measured. Foaming index =1000/a

RESULT

The formulated anti-dandruff herbal shampoo powder effectively reduced dandruff, soothed scalp irritation, and improved hair texture without the use of synthetic chemicals. It maintained a scalp-friendly pH, provided a gentle cleansing action, and promoted overall hair health.

DISCUSSION

The results confirmed that herbal ingredients, when carefully selected and combined, can provide an effective natural alternative to commercial anti-dandruff shampoos. Neem and Tulsi's antimicrobial properties targeted the root cause of dandruff, while Reetha ensured a thorough cleanse. Amla nourished the hair from root to tip, and Mint delivered a soothing effect, relieving scalp discomfort. The powder formulation not only eliminated the need for preservatives but also allowed for flexible use — as a shampoo, scalp mask, or pre-wash treatment. While the product may lack the high foaming action of commercial shampoos, its cleansing efficacy and scalp-balancing effects make it a superior long-term solution.Potential improvements include experimenting with ingredients like Fenugreek (for added moisture) or Hibiscus (for enhanced conditioning).

CONCLUSION

The 40g herbal anti-dandruff shampoo powder proved to be a safe, effective, and sustainable hair care solution. It successfully addressed common dandruff concerns, improved scalp health, and strengthened hair strands, all while being eco-friendly and free from synthetic additives.

This project highlights the immense potential of herbal hair care formulations and encourages a return to nature for lasting hair health. The results reinforce the belief that simple, plant-based ingredients can provide powerful therapeutic benefits ─ offering a blueprint for future natural product development.

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