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Research Article

A Research on Formulation and Evaluation of Polyherbal Powdered Shampoo

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ABSTRACT

A person's hair is an essential component of their beauty. People have utilized medicinal plants for management, hygiene, and cosmetics since ancient times. The use of synthetic agents has increased over time, but people are now conscious of the negative effects they have on the skin and eyes. Her herbal products, which are less expensive and have few adverse effects, have drawn customers from these areas. Shampoos and hair cleansers are used not only to keep hair clean but also to maintain its coordination and management and to make it shine. With a focus on safety and effectiveness, the current study aims to formulate and evaluate herbal shampoo powder made with natural ingredients. Given that shampoos are among the cosmetics used on a daily basis, the shampoo industry likely has the highest unit sales of any hair care product. Consumers have occasionally experienced negative side effects from synthetic preservatives and detergents. Products called shampoos are typically used to clean the scalp and hair. The art of shampooing involves rinsing sebum, or oil secreted by sebaceous glands, from hair to leave it free of dirt and oil. The purpose of this study is to create and evaluate herbal shampoo powder using natural ingredients, with an emphasis on safety and effectiveness. Of all the hair care products, shampoo is probably the most widely used because it eliminates debris and dandruff, promotes hair growth and shine, and fortifies and darkens hair. People are becoming more and more reliant on herbal or ayurvedic remedies for both acute and chronic conditions. Ayurvedic formulation has shown promise for cosmetic use due to its promise of therapy with minimal side effects. Numerous skin and hair disorders are found in situations where dietary habits, stress levels, and environmental factors change. Maintaining other factors won't satisfy the need, so extraneous treatment is necessary to ensure safety. With the right choice of ayurvedic ingredients and dosage forms, dandruff-fighting powder shampoo can be created for hair disorders like dandruff.

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INTRODUCTION



Fig no 1: Shampoo

Definition of Shampoo: -

Most likely, shampoos are used as cosmetics. It is a hair care product that we use on a daily basis to clean our hair and scalp. Shampoos are a viscous mixture of detergents with appropriate additives, preservatives, and active ingredients that are most likely used as beautifying agents. Typically, it is rubbed into wet hair and rinsed out with water. The purpose of using shampoo is to remove dirt that is build up on the hair without stripping out much of the sebum ^[.7] Most likely, shampoos are used as cosmetics. It is a hair care product that we use on a daily basis to clean our hair and scalp. Shampoos are a viscous mixture of detergents with appropriate additives, preservatives, and active ingredients that are most likely used as beautifying agents. Typically, it is rubbed into wet hair and rinsed out with water. Shampoo is meant to remove accumulated dirt from hair without removing a significant amount of sebum.9. Simple shampoo, anti-dandruff shampoo—which contains vitamins, amino acids, and protein hydrolyzes—all depend on the kind and composition of the ingredients. ^{11.}

Definition of Powder Shampoo:-



Fig no: 2: Example of Dry Shampoo



Similar to a standard shampoo, the herbal shampoo is a cosmetic preparation made from plant-based herbs and is intended to be used for hair and scalp washing. It acts as a substitute for synthetic shampoo that is sold commercially. Today's herbal lists support the idea that using natural sources can help people develop good health (2). In the past, a shampoo could be described as an efficient hair and scalp cleanser, but today's shampoos need to perform a lot more tasks. In addition to being practical and simple to use, it should leave the hair manageable, shiny, radiant, and easy to comb.

1] The ideal characteristic of herbal shampoo

- Hair should be washed efficiently.
- ought to generate a sizable amount of foam.
- Rinsing with water should remove the shampoo with ease.
- Should leave hair manageable, soft, shiny, and non-dry.
- Should give the hair a pleasing scent.
- The hand shouldn't become rough or chapped.
- Must not cause irritation to the skin or eyes or cause any negative side effects.^[12]

3) Composition of Shampoo:

- 1 Surfactant
- 2 Antidandruff agents
- 3 Conditioning agent
- 4 Pearlescent agents
- 5 Sequestrants
- 6 Thickening agent
- 7 Colures, perfumes and preservative [6]

4) Shampoos are of the following types:

- Powder Shampoo
- Liquid Shampoo
- Lotion Shampoo
- Cream Shampoo
- Jelly Shampoo

- Aerosol Shampoo
- Specialized Shampoo
- Conditioning Shampoo
- Anti-dandruff Shampoo^[6]

5) Advantages of Shampoo -

- Enhancing hair care practices.
- Address the condition of the scalp
- Properties for cleaning.
- A remedy for dry scalp.
- Hair loss treatment.
- Greasing or oily hair treatment
- Reduce irritation and itching.
- Shampoo maintains smooth, silky hair.
- Preserves the beauty and bloom of your hair. [2]

6] Need of Shampoo

Sebum is a greasy substance produced by the skin on our heads. It is created to cover the entire head and protect the hair. This gives hair a healthy sheen, but excessive secretion makes the hair appear unclean. Since people have been using natural ingredients for ages, herbal shampoos are thought to be the best hair care products. Herbal shampoos are shampoos enhanced with extracts of natural ingredients. The best thing about these shampoos is that they produce the best and longest-lasting results. These shampoos don't contain harsh chemicals or damage hair..[5,12]

7] How shampoo works:

Shampoo cleans by stripping sebum from the hair. Sebum is an oil secreted by hair follicles that is readily absorbed by the strands of hair, and forms a protective layer. Sebum protects the protein structure of hair from damage, but this protection comes at a cost. It tends to collect dirt, styling products and scalp flakes. Surfactants strip the sebum from the hair shafts and thereby remove the dirt attached to it. While both soaps and shampoos



contain surfactants, soap bonds to oils with such affinity that it removes too much if used on hair. Shampoo uses a different class of surfactants balanced to avoid removing too much oil from the hair.[1]

Before	Shampooing	Mode of Action	Rinse	
Oil Hair	Surfactant	Micelle	STR.	
Skin	Skin	Skin	Skin	
Oil and dirt are attached to the skin and hair	The surfactant lowers the surface tension of the water	The surfactant creates micelles around the dirt and oil that are removed from the skin and hair	The micelles with the oil, dirt and surfactant are eliminated with the water during rinse	

Fig no: 3: How Shampoo Works

The chemical processes involved in hair washing are comparable to those of conventional soap. Water is initially repelled from the hydrophobic surface of undamaged hair, but skin lipids like sebum adhere to it. Rinsing the hair with plain water makes the lipid donor easily removable. The removal of sebum from the hair shaft is made possible by the anionic surfactants, which significantly lower the interfacial surface tension. The shampoo's surfactant micelle structures dissolve the non-polar greasy substances on the hair shaft, which are then washed away. Additionally, there is significant removal due to the "roll up" effect of oil and surfactants. ^[1].

1] Hair Anatomy:

The part of the hair that penetrates deeply into the dermis and occasionally into the subcutaneous

layer is called the root. Three concentric layers are present in both the root and the shaft.

• Medulla: Usually visible in thick hairs, this is the central portion of the shaft. It is made up of two or three rows of polyhedral cells with air spaces and pigment granules.

• Core: This crucial component of the shaft is situated on the periphery of the medulla. It consists of long cells that contain pigment granules in dark hair and air in white hair.

• Cuticle: The hair's outermost layer is made up of a single layer of thin, flat, highly keratinized cells^{.[1]}

Structure of hair:

The cortex of the hair fiber is composed of elongated keratinized cells that are connected to



form the majority of the shaft. The cuticle that surrounds the cortex is made from a single cell strand found in the foundation bulb and forms a surface structure of the hair fiber that is five to ten cell layers thick.^[2]



HAIR ANATOMY



Parts of the Hair:

Dermal papillae: The dermal papilla controls the hair cycle and hair growth. It also has androgen receptors that respond to DHT.

Matrix: The matrix surrounds the dermal papillae and has all the active cells that hair needs to grow and for the different parts of the hair to grow, like the outer root sheath, the inner root sheath, and the hair shaft. The hair bulb is made up of the matrix

and the dermal papillae. The outer root sheath, also called the trichelemma, is the outermost part of the hair and is made of keratin. It covers the whole hair follicle inside the dermis and then goes through to the epidermis, giving the hair follicle a way to come to the surface. The inner root sheath has three parts: the Henley layer, the Huxley layer, and the cuticle. The Henley's and Huxley's layers are capsular layers that hold each other in place to keep the hair stable. The cuticle, which is the part that is closest to the hair shaft, is made of dead^[2]





Fig no :5: Parts of the Hair

Hair Shaft:

The hair shaft is the only part of the hair follicle that sticks out of the skin. The hair shaft has three layers: the medulla, the cortex, and the cuticle. The medulla is an area in the innermost part of the hair shaft that is not always there and is not organized or systematic. The cortex is very structured and organized, unlike the medulla. Keratin makes up the cortex, which gives hair its strength and durability as well as its ability to take in water. The cortex contains granules of melanin and is responsible for hair color, whichever out of three parameters---the number, the distribution, or the type of melanin granules within the cortex. The cuticle is the hard outer layer protecting the hair shaft attached to the inner root sheath. It is an extremely complicated structure with a single molecular layer of lipids allowing the hair to repel water.[2]

Growth Of Hairs:

Hair normally grows at the rate of 0.3-0.5 millimeters (mm) per day. It has 1000000 hair follicles supporting on a healthy scalp, which extends a little upward from one inch above the ear: trouble-makers have considered this number as high as 2000000. Most of the hair is composed of the Cortex, a cell type in which Indians have the toughest. The straight hair of the Chinese and Japanese has practically no orthocortex, while the crimped hair of Negroes carries a nicely distinguishable band of orthocortex. The hair products are thus defined as those which are meant for cleansing, altering the texture, changing colour, revitalizing stressed hair, nourishing the tresses, and giving good look to the hair. Specialty shampoos are sold for dandruff, color-treated hair, gluten or wheat allergies, or anyone who is mostly concerned with being organic. Baby shampoos may be a bit less irritating. They also make animals that may contain shampoos for insecticides or other medicinal ingredients for treating skin problems or for treating infestations like fleas. Shampoo is made of a surfactant, usually sodium lauryl sulfate, with a co-surfactant, usually cocamidopropyl betaine, in water to give a

thick, viscous liquid. Hair care products is additionally define because the preparation which are meant for cleansing, modifying the feel, changing of the colour, giving life to the stressed

Problems Related to Hair:

- Dandruff
- Dry hair
- Split ends
- Oily hair
- Frizzy hair
- Limp hair
- Hair loss
- Heat damage
- Color damage
- Grey hair ^[1]

9] Ingredient Information A] Amla Fruit:

Synonym: - Indian gooseberry, Amlang,

• **Biological Source:** - This consist of dried as well as fresh fruit pericarp of Emblica officinalis Gaerth Phyllanthus emblica Linn which belongs to family Euphorbiaceae.

• Chemical Constituents: - The main chemical constituent of Amla is citric acid, ascorbic acid, aspartic acid, glutamic acid

• Uses: - 1. Amla is rich in vitamin c, and promote hair growth. 2. It act as natural conditioner, leaving hair soft, smooth and shiny. 3. It strengthens hair follicles, reducing hair breakage and split ends.[13]



Fig no: 6: Amla

B] Hibiscus:

- Synonym-Hibiscus rosa-sinensis, Hibiscus cooperi auct.
- Biological Source: Hibiscus is a genus of flowering plant in the mallow belonging to family Malvaceae.
- Organoleptic Properties- Color-white to pink, red, orange or yellow.
- Odour-Aromatic.
- Chemical Constituents-The constituents of hibiscus are, Citric acid, Mallic acid, Tartaric acid, Galactose. ^[5]





Fig no: 7: Hibiscus

C] Neem Leaf:

- Synonym: Neem, Margosa, Azadirachta.
- Biological Source: Neem consists of almost all parts of the plants which are used as drug.



Some important morphological parts are the dried stem bark, root bark, leaves and fruits of Azadirachta indica also, known as Meliaazadirachta.

- Family: Meliaceous
- Uses: Antiseptic, antibacterial^[7]



Fig no: 8: Neem

D] Shikakai:

- Synonym- Satala, Virala, Tatphala.
- Biological Source-Dried fruits of Acacia Concinna belonging to family Fabiacae.



- Organoleptic Properties- Color-Dark brown. Odour-Characteristics.
- Chemical Constituents-The chemical constituents of Shikakai are, Spinosterol, Acacia acid, Lactone, Glucose, Arabinose^{.[14]}



Fig No: 9: Shikakai

D] Ritha:

- Synonym- Reetha, Soapnut, Washnut, Aritha.
- Biological Source-It is dried fruits of species of Sapindus Mukorossi belong to family Sapindaceae.
- Organoleptic Properties- Color-Dark brown to Black Odour-Characteristics Taste-Bitter



• Chemical Constituents-The main constituent of reetha is Saponins. Other constituent are,

Sopindic acid, Oleanolic acid, Sapindoside A&B, Mukuroziosides, Trifoliosid^{.[5]}



Fig no: 10: Ritha

E] Tulsi:

- Synonym: Holy Basil, Tulasi, Tulsi
- **Biological Source:** The leaves, roots and almost all parts of Tulsi plant
- Family: Lamiaceae
- Uses: Promotes scalp health and growth, antibacterial, antifungal and anti-inflammatory [13]



Fig no: 11: Tulsi

Review Literature:

1. Ankita Bhujbal, 2Amol Jadhav 2014: The herbal shampoo powder was formulated using above natural ingredients, selected herbal drugs in dried form were purchased. Herbs along with their part used in shampoo and quantity taken . Herbal shampoo was prepared by uniformly powdering and mixing in ascending order by weight with continuoustrituration. Formulation of herbal shampoo powder . All the powder are in dry form and grinded. All the required herbal powders for shampoo preparation were weighed individually. The crude ingredients were collected and these ingredients were sizereduced using hand driven mixer individually. All these fine ingredients were mixed thoroughly by mixer to



form ahomogenous fine powder. Then this fine powder was passed through sieve no: 80, to get the sufficient quantity of fine powder.

- 2. Sapna*, 2Shivam Kumar Bhardwaj, and et al 2023: Different plant extracts were combined to make a shampoo. Once the herbal extracts were then added to a 10% gelatin solution, the process took 20 minutes. The entire contents from stage 1 (1mL lemon juice, Methylparaben) were added and stirred. Finally, we adjusted the pH of the solution using an adequate amount of 1% citric acid solution. We also added a few drops of rose essential oil to the prepared shampoo for flavour, then brought the final volume to 100 mL using gelatin solution.
- 3. Monalisa Nayak*, Simanchal Panda 2018, : Different plant parts were selected and obtained for the hair care product. The selected plants are amla, neem, shikakai, tulsi, behera, brahmi, and henna. The necessary powders of amla fruit, behera fruit, shikakai fruit, and neem leaves, brahmi leaves, tulsi leaves, henna was accurately measured, put through sieve no. 100 and then mixed in their ascending order of quantity with continuous trituration and stored in airtight containers until it was used for further studies...
- 4. **T. Satyanarayana*, D. Nirmala kumari, 2022**: All the size-reduced plant materials were sieved using sieve number 100 so that the fine powder was produced. Then all the required ingredients were formulated as per the formulation

Aim & Objective:

Aim: - Formulation and evaluation of Herbal Shampoo Powder.

Objectives: -

- 1. To formulate the herbal shampoo.
- 2. To evaluate the herbal shampoo
- 3. To reduce side effects of chemical formulation.
- 4. To improve hair texture.
- 5. To darkening the hair colour.

6. To imparting gloss to hair and to maintain their manageability and oiliness for hairs.

7. To reduce dandruff by using herbs.

Plan Of Work

The present work planned and implemented as follows-

- 1. Extension of Literature survey
- 2. Selection of drugs
- 3. Procurement of chemicals.
- 4. Formulation of powdered shampoo
- 5. Evaluation of shampoo
- 6. Conclusion
- 7. Reference

MATERIALS:

Sr.no	Ingredients	Quantity
1	Amla	30g
2	Hibiscus	10g
3	Neem	20g
4	Shikakai	15g
5	Ritha	15g
6	Tulsi	10g

2] METHODOLOGY

Collection of Plant Material:

- Hibiscus Rosasinensis,
- Osmium Tenifloram (Tulsi)
- Azadirachta Indica (Neem)
- Acacia Concinna (Shikakai)
- Sapindus Mukorossi (Ritha)

• Phyllanthus Emblica (Amla)



Fig no: 12: Sample

Drying and Grinding: All the dried leaf grinded into fine powder.



Fig no: 13: Grinding

Weighing : All the powder herbs were weighted on digital weight machine according to formulation.



Fig no: 14: Weighing

Sieving: All the powder herbs were passed through sieve no. 120 to obtain very fine powder particles.





Fig no: 15: Sieving

> **Mixing**: Mix all the powder herbs together.



Fig no: 16: Mixing

Packaging and Labelling: The formulation of dry shampoo was well stored into an air tight container and labeled.

Evaluation of herbal shampoo

1. Organoleptic evaluation:

The parameters like colour, odour taste, and texture were subjected to organoleptic analysis. Vision and touch sensation assessed color and texture respectively. Five taste and odour sensitive individuals were assembled to conduct random sampling for taste and odour assessment^{.[4]}

2. General powder characteristics:

Characteristics assessed under this section are powder form, particle size, angle of repose, and bulk density. General powder qualities include assessment of those factors that will influence the external features (like flow characteristics, appearance, packing requirements, etc.) of the formulation. At three distinct levels—top, middle, and lower— samples for all these assessments were collected^{. [7]}

Particle size:

Particle size is a variable that influences several characteristics including grittiness, spread capability, among others. I. P. sieving technique helped to establish particle size. Mechanical shaking of standard sieves for ten minutes.

Particle size F1 F6 ranges 20–25^[7]

Angle of repose:

It is the largest degree one may achieve between the horizontal flow and the surface of a pile of powder.

Funnel method:

A funnel positioned 6 cm over a horizontal base collects the required quality of dried powder. On the horizontal level, the powder was let flow to create a hill above the paper. The powder's height and radius were noted and recorded; employing the formula, the angle of repose () can be determined. Therefore, the following equation estimated the angle of repose.

g/cm3 expresses it. = tan^-1(h/r)

Where h= Height of Pile Formed r = the radius of the base of pile. (5)

Bulk density



The ratio of a powder's bulk volume and its given mass is known as its bulk density. Up to the 50 ml mark, the prescribed volume of the powder is dried and measured in a 50 ml measuring cylinder. The cylinder is next lowered from a height of 1 inch at two-second intervals onto a hardwood floor. Measurements are made of the powder's volume. Then the powder is weighed. This process is repeated to generate mean values.^[6]

III. Tapped density:

The tapped density is an enhanced bulk density achieved after physically tapping a container holding the powder sample. Following observation of the first powder volume or mass, the measuring cylinder or vessel is mechanistically tapped for one minute and readings are taken until very minimal additional change in volume or mass was noted. It was written in grams per cubic centimetre (g/cm3). ^[6]

3. 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 pH paper^[11]

Washability:

Formulations were applied on the skin and then ease and extent of washing with water were checked manually ^[13]

Solubility:

Solubility is the capacity of a compound to soluble in a solvent. Ten milliliters of water are placed into a beaker with one gram of the powder exactly weighted. This was vigorously agitated and heated to improve solubility; then cooled and filtered, the residue collected is weighed and marked.^{3]}

Dirt dispersion:

In a big test tube holding 10 ml of distilled water, two drops of 1% each shampoo powders were added. One drop of India ink was dropped; the test tube was stoppered and shaken for 10 times. 10 g of each herbal shampoo powder was weighed in a tare evaporating dish and kept in a hot air oven at 105C. The amount of ink in the foam of was determined as None, Light, Moderate, or Heavy V. Moisture content: For every sample, the moisture content was determined.^[15]

Loss on drying:

Expressed in percentage m/m, loss on drying is the loss of mass. Two grams of the powder were carefully measured and poured onto a dry Petri dish. For two days over calcium chloride crystals, the Petri dish is put in a desiccator. The powder was then carefully weighted to ascertain the weight reduction during drying.^[12]

VII. Foaming index:

One gram of the powder was meticulously weighed and put into a 250 ml conical flask holding 100 ml of boiling water. It is then softly warmed for 30 minutes, filtered and cooled, and the volume is brought to 100 ml in the conventional volumetric flask. Ten test tubes in a series of the successive portion of 1, 2, 3. 10 ml are taken, with the residual volume made up with water to 10 ml. Then the test tubes were shaken for 15 seconds at a speed of 2 frequencies per second in long wise motion. After that, the tubes were left to rest for 15 minutes.¹⁰

VIII. Skin/eye irritation test:

The skin and eye irritation tests indicated that no harmful effects were exhibited towards the skin and eye with the herbal shampoo powder due to the absence of synthetic surfactants. There tends to



be a level of inflammation of the eyelid and corneal irritation associated with most synthetic surfactants. In this formulation, with the herbal shampoo powder, was produced by the use of all the ingredients naturally so thereby does not produce harmful effect to the skin and eye.^[9]

Extractive values:

Determination of alcohol soluble extractive:

5 grams of each air-dried herbal shampoo powder was measured out and macerated with 100 ml of Alcohol of the appropriate strength in a closed flask for twenty-four hours, shake frequently for six hours then allowed to stand for eighteen hours. Filtered, taking care to prevent loss of solvent, 25 ml of the filtrate was evaporated to dryness in a tare flat bottomed shallow dish, and dried at 105°C, to constant weight and weighed. The percentage of alcohol soluble extractive in the airdried drug was determined. Determination of water-soluble extractive: We proceeded as being instructed for the determination of alcohol soluble extractive but with the use of chloroform water instead of ethanol. The percentage of watersoluble extractive was determined for each of [8]

RESULT & DECELERATION

Sr No	Evolution Test	Result
1	Organalantia	Drown Characteristics Ditter Smooth and
1	Organolepuc	Brown Characteristics Bitter Smooth and
	Evaluation	fine powder
	A] Color	
	B] Odour	
	C]Taste	
	D] Texture	
2.	General Powder	0.177
	Characteristics	31*
	A] Partical size	1.2g/cm
	B] Angle of Repose	2.5g/cm
	C] Bulk Density	
	D] Tap Density	
3.	Physiochemical	6
	Characteristics	Soluble in water
	a] PH	Easily washable
	b] Solubility	Moderate
	c]Washability	9.01g remain out of 10
	d]Dirt Dispersion	60sec
	e] Moisture Content	Good foaming
	f] Wetting Time	No harmful effect on skin
	g] Foaming index	Stable at room temperature
	h] Skin/Eye Irritation Test	
	i] Stability	

CONCLUSION:

This study aimed to develop a completely herbal shampoo and make it broadly equivalent to existing synthetic shampoos. We developed an herbal shampoo using plant extract as is common in traditional Asian medicine and valued for their capacity of hair cleansing. All the components used in preparing shampoo are safer than the synthetic conditioning agents such as silicones and polyquaterniums, in addition; they can greatly reduce the loss of hair or lose of protein during mixing. We have replaced the cationic conditioners with plant extracts such as Shikakai



and Amla to achieve similar conditioning. We have carried out some studies to evaluate and compare the physicochemical properties of the two shampoos we prepared and the commercial ones we accessed. Our prepared shampoo is equivalent to the commercial shampoo and the results are encouraging. This will require further research and development to increase the quality.

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