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FORMULATION AND EVALUATION OF HERBAL SHAMPOO POWDER

Isha R. Suryawanshi, Awinash S. Chavan, Shivam P. Zanvar

ABSTRACT

The present study focuses on the formulation and evaluation of a herbal powder shampoo using five medicinal herbs: Neem (Azadirachta indica), Tulsi (Ocimum tenuiflorum), Shikakai (Acacia concinna), Hibiscus (Rosa sinensis), and Brahmi (Bacopa monnieri). These herbs were selected for their scientifically validated hair care benefits, including antifungal, anti-inflammatory, and hair growth-promoting properties. The plant materials were collected, shade dried, powdered, sieved, and blended in appropriate proportions to form a fine dry shampoo. The formulation was evaluated through organoleptic properties, powder characteristics (particle size, angle of repose, bulk and tapped density), and physicochemical properties like pH, solubility, washability, dirt dispersion, and foaming ability. The final product exhibited a smooth and fine moss green powder with a pleasant herbal odor and favorable physicochemical characteristics. The shampoo showed good washability, high foaming index, no skin irritation, and remained stable at room temperature. The use of natural ingredients makes this herbal dry shampoo a safer alternative to chemicalbased shampoos. It offers a promising, eco-friendly, and effective hair care solution without harmful additives. This formulation can be further explored for commercial application, especially for consumers seeking natural, sustainable personal care options.

KEYWORDS: *Herbal shampoo, Neem, Tulsi, Shikakai, Hibiscus, Brahmi, hair care, antifungal, powder formulation, natural cosmetics.*

INTRODUCTION

HUMAN HAIR

Despite its seemingly simple appearance, a hair strand is one of the body's most intricate structures. Hair consists of two distinct structural components. The area beneath your skin is called the hair follicle, and the area visible above it is called the hair shaft. 95% of hair is made of keratin. Ectoderm from the skin gives rise to vital body parts like hair, nails, and the sebaceous and sweat glands. Hair also serves as a protective covering for the body. Because they are derived from the epidermis during embryological development, they are also known as epidermal derivatives.(6) Your hair grows and is held in place in the hair follicle. At the bottom of the follicle, a piece of tissue called the papilla contains tiny blood vessels(1).

HAIR STRUCTURE

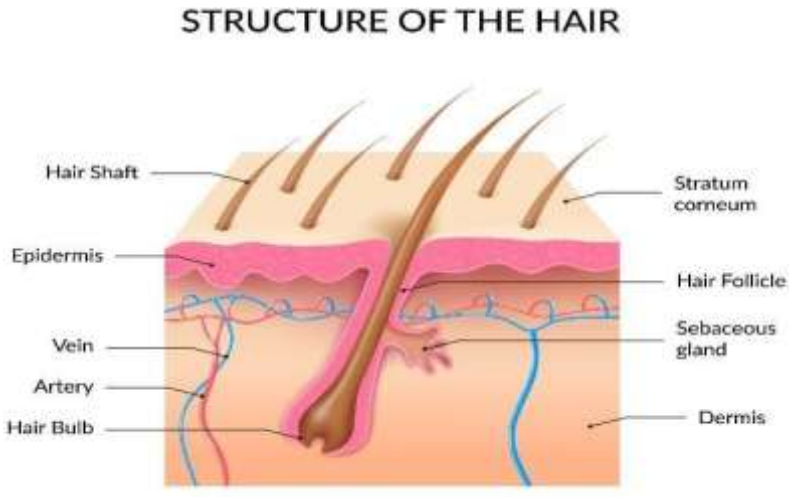


Fig No 01: Structure of Human Hair(2)

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➢ Hair Shaft: The hair shaft is the part of the hair that we can see. The shaft is the visible part of the hair that sticks out of the skin. The hair root is in the skin and extends down to the deeper layers of the skin. Each hair shaft is made up of two or three layers: the cuticle, the cortex, and sometimes the medulla. the layer of hair shaft:

- The Inner Layer: This is called the medulla. Depending on the type of hair, the medulla isn't always present.
- The Middle Layer: This is called the cortex, which makes up most of the hair shaft. The medulla and the cortex contain pigmenting cells responsible for giving hair color.
- The Outer Layer: This is called the cuticle, which is formed by tightly packed scales in an overlapping structure that resembles roof shingles. Many hair conditioning products are formulated to clean the cuticle by smoothing its structure. (3)

GROWTH CYCLE OF HAIR

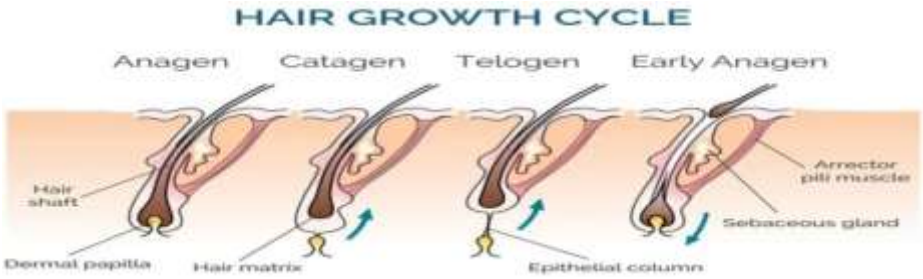


Fig No 02: Hair Growth Cycle(7)

Hair growth cycle consists of four phases:

1. Anagen (growth phase): It is the growing phase. The anagen phase is when your hair grows your hair follicle forms a new hair shaft.
2. Catagen (transitional phase): During this phase the hair follicle shrinks and hair growth slows. ·
3. Telogen (resting phase): It is the resting phase where hair growth stops and new hair begins the growth phase, pushing the old hair out. ·
4. Exogen phase (last phase): It is hair growth cycle where hair strand completely detaches from the scalp and sheds off. (4)

HAIR PROBLEMS

i **Dandruff:** is a non-inflammatory harmless skin condition that affects scalp and might result in hair loss. It is scaly and adheres to the root of the hair.

ii **Hair loss:** The main reason behind the hair loss is stress, medication, changes in hormone and many hair styling products can contribute to hair loss.

iii **Oily hair/Greasy hair:** Oily hair is caused by excessive production of natural oil by the scalp sebum is produced by sebaceous glands which sometimes
"work overtime" leading to excessive amount of oil.

iv Dry hair: Dry hair occurs due to deficiency of proteins in the diet, menopause, anaemia, hormonal imbalance, birth control pill can also lead to dry hair.

v. Split Ends: Splits ends occurs when the hair ends dry and other reasons are exposure to extreme weather conditions. Hair care techniques such as straightening and curling and chemical hair products may cause spilt ends. (9)

DANDRUFF

Dandruff is the major cosmetic problem and great public concern both in developed and developing countries. The word dandruff is combination of 'ten 'meaning letter' and 'drof' meaning 'dirty' Dandruff is a chromic scalp condition leading to scaling itching redness of scalp by shedding epidermal cell. Scalp shed dead cells in nearly invisible way but sometimes sheds as visible flakes called fake dandruff. In physiological spectrum of sealing about 487,000 cell/sq cm get released after detergent treatment. Many herbal shampoos available in market contain herbal ingredients such as plant extracts and essential oils. Tulsi, Henna, Neem, Lemon, Shikakai are commonly used plants in shampoo formulation of which somehow antidandruff activity. The goal of using shampoo is to remove the unwanted build-up in between the hair without stripping out so much sebum as to make hair unmanageable shampoo is generally made by combining surfactant, most often sodium lauryl sulphate with a co-surfactant, most often propyl in water. (10) Synthetic shampoo made cause side effects so keeping this in view an herbal anti-dandruff shampoo has been formulated and evaluated significantly. In Indian system of medicine, various plants its parts have been used for treatment of dandruff such as Tulsi, Henna, Neem, Lemon, Shikakai. Traditionally, single plants have been used and there was no scientific report available regarding totally all ingredients are natural regarding usage of such combination that we have conceived.

SHAMPOO

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Shampoos are the cosmetics preparation meant for cleaning the hair by removal of the dirt grease from the hair shaft and scalp. The purpose of using shampoo is to remove dirt that is build up on the hair without out much of the sebum. (1)

Benefits Of Herbal Shampoo

1. More shine.
2. Less hair loss.
3. Long lasting colour.
4. All natural, no chemicals.
5. Stronger and more fortified hairs.
6. Won't irritate skin or scalp.
7. Keep healthy natural oils. (5)

TYPES OF SHAMPOOS

1. Powder shampoo
2. Lotion shampoo
3. Clear liquid shampoo
4. Solid gel shampoo
5. Medicated shampoo
6. Liquid herbal shampoo

FUNCTION OF HERBAL SHAMPOO:

1. Lubrication
2. Conditioning
3. Hair growth
4. Maintenance of hair colour
5. Medication.

NEED

Herbal shampoos are regarded as the greatest hair care products because natural ingredients have been utilized by humans for eons. Shampoos enriched with natural ingredient extracts are known as herbal shampoos. The best and most durable results are produced by these shampoos, which is their greatest quality. These shampoos don't harm hair and don't contain any harsh chemicals.(23)

The goal of mixing two or more different herbs is to provide the hair with a variety of benefits. The addition of various hair product ingredients allows this shampoo to serve multiple purposes. Shampoo clear dirt, nourish the hair remove the lice give cooling effect after shampooing, remove the dandruff, increase the hair volume and hair strength and it is natural conditioner for hair.

ADVANTAGES OF HERBAL SHAMPOO

1. Pure and organic ingredients
2. Free from side effects
3. No surfactants eg. SLS
4. No synthetic additives
5. No animal testing
6. Earth and skin friendly
7. Promote hair growth
8. Remove dandruff (8)

Formulation of Herbal Shampoo

1. **Foam stabilizers:** Softeners, or both Customers value foam. It is psychologically associated with the detergent effect, but it is also an indication that the cleaning job has been completed. The upstart of foam its volume, softness, texture, stability and removal by rinsing are all components of foaming qualities. These properties are primarily enhanced by addition of fatty acid alkanol amides, which impart a creamy feel as well as softer and more stable foam.
2. **Thickeners:** Consistency and richness are provide by natural gums (Karaya, tragacanth), cellulose hydrocolloids, acrylic polymers (carbomer) or salt such sodium.
3. **Conditioners:** They are intended to bring softness and gloss to reduce flyaway and to enhance detangling.There role in a shampoo is not effective as conditioner because of multiple function. They are useful in shampoo for dry and damage hair. A great number of compoundare added according to type of formulation, the purpose, care and beautifying aims they are mostly fatty ingredients, protein and cationic polymers.
4. **Preservatives:** Help in increasing shelf life of herbal product.
5. **Fragrances and Colorants:** Fragrance and colorants are intended to individualize shampoo perception.(13)

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LITERATURE REVIEW

1. **Preethi P. Jaya, Padmini K., Srikanth J., Lohita M., Swetha K., Rao P. Vengal (2013),** Shampooing is the most common form of hair treatment. Shampoos are primarily beenproducts aimed at cleansing the hair and scalp. A more radical approach in popularizing herbal shampoo would be to change the consumers' expectations from a shampoo, with emphasis on safety and efficacy. The present paper emphasizes on composition, types, methods of evaluation, also a brief review on herbal shampoo formulations.

2. **Pawan Maurya, Shashikant maurya, Piyush Yadav, Manoj kumar Yadav, Suraj Maurya, Satyam jaysawal. (2021)** Herbal shampoo is the natural hair care products which is use to remove grease, dirt, dandruff and promote hair growth, strengthens and darkness of the hair. It is also provide softness, smoothness, and shines for the hair.

3. **Utane R, Deo S and Itankar P. (2017**) We are utilizing manufactured items for our hair, losing their magnificence, quality, strength, volume and shine. Every single manufactured item like cleanser contains a destructive substance which is in charge of damage of hair.

4. **Vinayak M. Chavan, Kundan J. Tiwari Kiran A. Suryavanshi, Aditya S. Bhor. (2019)** The formulation at laboratory scale was done and evaluated for number of parameters such as pH, foam formulation, viscosity, conditioning and wet ability werw evaluated, and also to ensure its safety and efficacy.

HERBAL CONSTITUENTS AND USES

S. No	FORMULATION	METHOD	PURPOSE
1	NEEM	MIXING	ANTIBACTERIAL, ANTIDANDRUFF,ANTI SEPTIC
2	HIBISCUS	MIXING	ANTIDANDRUFF, CONDITIONING HAIRS
3	SHIKAKAI	MIXING	NOURIS HAIRS, DETERGENT, HEAL DAMAGE
4	AMLA	MIXING	HAIR DARKENING, GROWTH PROMOTER
5	ALOE VERA	MIXING	ANTIDANDRUFF, CONDITIONER
6	BHRINGRAJ	MIXING	HAIR DARKENING, HAIR GROWTH
7	LIQUORICE	MIXING	HAIR GROWTH, PREVENT PREMATURE GREYING

Table no 01 :- Herbal Constituents And Uses

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MARKETED PRODUCTS

S. No	MARKETED PRODUCT	COMPANY NAME
1		HIMALAYA
2		DOVE
3		HEAD AND SHOULDER
4		CLEAR

Table no 02 :- Marketed Products

AIM AND OBJECTIVES

AIM: - Formulation and evaluation ofHerbalShampooPowder.

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.

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PLAN OF WORK

- **Literature Survey**
- **Selection of Drugs**
- **Pre formulation Studies**
- **Formulation And Preparation of Herbal Shampoo Powder**
- **Evaluation Of Prepared Shampoo**

DRUG AND EXCIPIENT PROFILE HERBS USED IN THE HERBAL SHAMPOO:

1. NEEM

Neem (Azadirachtaindica)-It belongs to the family Meliaceae.
Synonyms – Margosa
Chemical constituents- Neem contains fatty acids like oleic and stearic acid. Neem also consists glycerides of saturated and unsaturated fatty acids.
Parts used- leaves, barks
Reasons- The anti-fungal properties of neem help to treat dandruff. The effective use of Neem to hair can relieve the itchiness, inflammation and irritation. The regenerative properties of Neem help in reducing hair fall. Neem consists of fatty acids, it helps the scalp to nourish and keeping the hair smooth.
Formulations- Shampoo, Hair Mask




Fig no 03:- Neem.

2. TULSI

Tulsi(Ocimum tenuiflorum)- It belongs to family Lamiaceae.
Synonyms- Holy Basil
Chemical constituents- Tulsi contain linalol, eugenol, ocimem, estragol, thymol.
Reason- The anti-fungal properties of tulsi help to treat dandruff. The effective use of tulsi to hair can relieve the itchiness, inflammation and irritation. The regenerative properties of tulsi help in reducing hair fall.
Formulation- Shampoo




Fig no 04:- Tulsi

3. SHIKAKAI

Botanical name- Acacia concinna
Family – Fabacae
Common name- shikakai

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Plants parts used -Bark, Leaves, Pods
Benefits-

- makes hair soft and shiny.
- Prevents itchy scalp.
- Eliminates lice.
- Boosts hair growth.

Formulation- Shamp



Fig No 05 :-Shikakai

4. HIBISCUS

Botanical name- Rosa sinensis
Family – Malvaceae
Common name- China Rose
Plants parts used -Bark, Leaves, Pods **Benefits-**

- makes hair soft and shiny.
- Prevents hair loss.
- Healer
- Boosts hair growth.

Formulation- Shampoo



Fig no 06:- Hibiscus

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5. BRAHMI

Botanical name- Brahmiis bacopa monnieri
Family – Plantaginaceae
Common name- Brahmi
Plants parts used - Leaves, Pods, flower
Benefits- • Antidandruff

- Prevents hair loss.
- Healer
- Boosts hair growth.




Fig No 07:- Brahmi

EXPERIMENTAL WORK

1. **COLLECTION OF PLANT MATERIALS**:
   - HIBISCUS ROSASINENSIS,
   - OCIMUM TENIFLORAM (TULSI)
   - AZADIRACHTA INDICA(NEEM)
   - ACACIA CONCINNA (SHIKAKKAI)
   - WATERHYSSOP (BRAHMI)
2. **DRYING**: Drying dried in shade in shade for 5 days.
3. **GRINDING**: All the dried leaf grinded into fine powder.
4. **WEIGHING**: All the powder herbs were weighted on digital weight machine according to formulation.



Fig No 08:-Weighing

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

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Fig No 09:-Sieving

6. MIXING: Mix all The Powder Herbs Together.



Fig NO 10:-MIXING

7. 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

Organoleptic evaluation on the parameters like color, odor taste, and texture was carried out. Color and texture were evaluated by vision and touch sensation respectively. For taste and odor evaluation a team offivetasteandodorsensitive persons was formed and random sampling was performed.

2. General powder characteristics:

General powder characteristics include evaluation of those parameters which are going to affect the external properties (like flow properties, appearance, packaging criteria etc.) of the preparation, Characteristics evaluated under this section are powder form, particle size angle of repose and bulk density. Samples for all these evaluations were taken at three different levels i.e. from top, middle and lower level.

I. Particle size

Particle size is a parameter, which affect various properties like spread ability, grittiness etc., particle size was determined by sieving method by using I.P. Standard sieves by mechanical shaking for 10 min.

II. Angle of repose

It is defined as the maximum angle possible in between the surface of pile of powder to the horizontal flow.

Funnel Method

Required quality of dried powder is taken in a funnel placed at a height of 6cm 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 were noted and recorded the angle of repose (θ) can be calculated by using the formula. (25)

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Fig no 11:- Funnel Method

II. Bulk Density

Bulk Density is the ratio between the given mass of a powder and its bulk volume. The required amount of the powder is dried and filled in a 50 ml measuring cylinder up to 50 ml mark. Then the cylinder is dropped onto a hardwood surface from a height of 1 inch at 2- second intervals. The volume of the powder is measured. Then the powder is weighed. This is repeated to get average values. The Bulk Density is calculated by using the below-given formula.

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

III. Tapped Density

The tapped density is an increased bulk density attained after mechanically tapping a container containing the powder sample. After observing the initial powder volume or mass, the measuring cylinder or vessel is mechanically tapped for 1 min and volume or mass readings are taken until little further volume or mass change was observed. It was expressed in grams per cubic centimeter. (22)

$$\text{Bulk Density} = \frac{\text{Mass of the herbal powder shampoo}}{\text{Volume of the herbal powder shampoo after Tapping}}$$

3. Physicochemical Evaluation

I. 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.



Fig no 12:- Ph test

II. Washability

Formulations were applied on the skin and then ease and extent of washing with water were checked manually.

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III. 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.

IV. 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

RESULTS AND DISCUSSION

S.No.	Evaluation Test	Results
1.	**Organoleptic evaluation**	
	a) Color	Moss green
	b) Odour	Characteristic
	c) Taste	Bitter
	d) Texture	Smooth and fine powder
2.	**General Powder Characteristics**	
	a) Particle Size	0.177mm
	b) Angle Of Repose	31^{o}
	c) Bulk Density	$1.2g/cm^3$
	d) Tap Density	$2.5g/cm^3$
3.	**Physicochemical Characteristics**	
	a) pH	6
	b) Solubility	Soluble in water with moderate heating
	c) Washability	Easily washable with water
	d) Dirt Dispersion	Moderate
	e) Moisture Content	9.01gm remain out of 10gm
	f) Wetting Time	60sec
	g) Foaming Index	Good foaming
	h) Skin/Eye Irritation Test	No harmful effect on skin
	i) Stablility	Stable at room temperature

Table no 04 :- RESULT TABLE

- The present work was formulation and evaluation of herbal shampoo powder using different kinds of plant herbs like Tulsi, Neem, Hibiscus, Brahmi, Shikakai.
- All the plant materials were collected from the college medicinal garden fresh. Then air dried the collected materials then milled, and sieved.
- Further, the powders were used as per the formulation table and formulated as herbal shampoo powder.

CONCLUSION

The purpose of this study was to create a shampoo that is entirely herbal and comparable to the synthetic shampoos that are sold today. We created an herbal shampoo by utilizing plant extracts, which are widely used in traditional Asian medicine and highly regarded for their ability to cleanse hair. All the components that go into making shampoo are safer than synthetic conditioning agents like silicones and polyquaterniums, and they can also significantly lessen the loss of hair or protein during mixing. To achieve the conditioning effect, we have used plant extracts such as Shikakai and Amla in place of cationic conditioners.Several experiments were conducted to assess and contrast the physicochemical characteristics of shampoos that were prepared and marketed. (26)

Our prepared shampoo showed comparable result with that of marketed shampoo for quality control tests further research and development is required to improve its overall quality.

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