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Research Paper

Formulation And Evaluation of Herbal Shampoo Powder

Dr. Vijaykumar Kale*, Vijay Bhosale, Nikita Dube, Mahesh Thakare, Vaibhav Narwade

Kasturi Shikshan Sanstha College of Pharmacy, Shikrapur, Pune-412208.

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ABSTRACT

The global inclination toward natural and herbal personal care products has led to significant interest in the development of herbal shampoo powders as an effective, safe, and eco-friendly alternative to conventional liquid shampoos. Unlike traditional shampoos, herbal shampoo powders are free from synthetic detergents, preservatives, and chemical additives, thus minimizing scalp irritation, allergic reactions, and environmental pollution. This study aims to formulate a herbal shampoo powder using potent natural ingredients renowned for their therapeutic effects on hair and scalp, and to systematically evaluate its physicochemical, cleansing, and conditioning properties.The formulation was developed by selecting and optimizing a blend of well-known Ayurvedic herbs including Shikakai (Acacia concinna), Reetha (Sapindus mukorossi), Amla (Phyllanthus emblica), and Brahmi (Bacopa monnieri), which have been traditionally used for hair cleansing, nourishment, strengthening, and promoting scalp health. These herbs were procured in dried form, powdered, and passed through standard sieves to achieve a fine powder with consistent particle size. The optimized herbal blend was combined in precise ratios to formulate a stable shampoo powder capable of effective cleansing and conditioning without the need for synthetic surfactants.The prepared herbal shampoo powder was evaluated for several parameters including organoleptic properties (color, odor, texture), solubility in water, and foam generation capacity to ensure user acceptability and performance. The pH of the shampoo solution prepared by dissolving the powder in water was measured to confirm scalp compatibility, targeting a slightly acidic pH range (4.5-6.0) to maintain natural scalp flora and prevent irritation. Cleansing efficacy was assessed through both in vitro sebum removal tests and in vivo trials on volunteers, wherein parameters such as scalp oiliness, hair softness, and shine were documented. Conditioning effects were also evaluated by measuring hair smoothness and combability post-wash.Microbiological analysis was conducted to ascertain the microbial load and ensure the safety and shelf

***Corresponding Author:** Dr. Vijaykumar Kale
Address: *Principal Department of Pharmacology Kasturi Shikshan Sanstha College of Pharmacy, Shikrapur, Pune-412208..*
Email ✉: vijaybhosale9860@gmail.com
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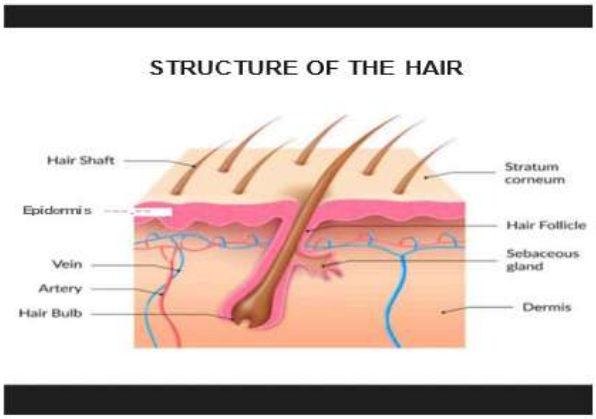
life of the herbal shampoo powder, which is naturally less prone to microbial contamination compared to liquid formulations. Stability studies over a three-month period indicated that the product maintained its physical and chemical properties, suggesting a favorable shelf life. The results demonstrated that the herbal shampoo powder effectively cleansed the scalp and hair, produced moderate foam without harsh chemicals, and imparted nourishment, softness, and shine to the hair. The absence of synthetic surfactants and preservatives in the formulation reduces the risk of adverse dermatological reactions and environmental impact, making it a sustainable alternative to synthetic shampoos. Moreover, the dry powdered form facilitates easier storage, transportation, and dosing, enhancing consumer convenience.In conclusion, this study successfully formulated a natural, efficacious, and user-friendly herbal shampoo powder with desirable physicochemical and cleansing properties. The findings suggest that herbal shampoo powders can serve as a viable alternative to conventional liquid shampoos, catering to the growing consumer demand for natural and eco-conscious personal care products. Further research focusing on large-scale production, detailed toxicological evaluation, and market acceptability studies is warranted to establish commercial viability and consumer safety.

INTRODUCTION

Human hair is a filamentous biomaterial that grows from follicles found in the dermis (the skin). It is primarily composed of a protein called keratin, which also forms the structure of nails and the outer layer of skin. Hair serves various functions including protection, sensory input, regulation of body temperature, and social communication. Hair growth occurs in cycles consisting of growth (anagen), regression (catagen), and rest (telogen) phases. The color, texture, and growth rate of hair vary among individuals and are influenced by genetics, age, hormones, and health. On average, the human scalp contains about 100,000 to 150,000 hairs, and people shed between 50 to 100 hairs daily as part of the natural renewal process. Hair has cultural, social, and cosmetic significance across the world. It is often styled, cut, dyed, or removed to reflect personal identity, fashion trends, or cultural norms. Human hair is a filamentous biomaterial that grows from follicles found in the dermis (the skin). It is primarily composed of a protein called keratin, which also forms the structure of nails and the outer layer of skin. Hair serves various functions including protection, sensory input, regulation of body temperature, and social communication. Hair growth occurs in cycles consisting of growth (anagen), regression (catagen), and rest (telogen) phases. The color, texture, and growth rate of hair vary among individuals and are influenced by genetics, age, hormones, and health. On average, the human scalp contains about 100,000 to 150,000 hairs, and people shed between 50 to 100 hairs daily as part of the natural renewal process.Hair has cultural, social, and cosmetic significance across the world. It is often styled, cut, dyed, or removed to reflect personal identity, fashion trends, or cultural norms.

STRUCTURE OF HAIR



Hair is a complex structure made up of multiple layers and components. Here's a detailed breakdown of hair structure:

1. Hair Anatomy (Main Parts)

A. Hair Shaft:

Definition: The visible part of the hair that extends above the skin.

Layers:

Cuticle: The outermost layer made of overlapping cells like shingles on a roof. It protects the inner layers and gives hair its shine.

Cortex: The middle layer containing keratin and pigment (melanin). It gives hair strength, color, and texture.

Medulla: The innermost layer (not always present). It's a soft, central core that may be absent in fine or light-colored hair

B. Hair Root:

Definition: The part of the hair located beneath the skin surface.

Structures:

Hair Follicle: A tunnel-like segment of the epidermis that extends into the dermis. It houses the hair root.

Hair Bulb: The base of the hair follicle where hair cells are produced.

Dermal Papilla: Contains blood vessels that supply nutrients and oxygen to the hair bulb, promoting growth.

2. Hair Composition

Keratin: A strong protein that forms the bulk of the hair shaft.

Melanin: Pigment produced by melanocytes in the cortex; determines hair color. Lipids and Water: Help maintain moisture and hair flexibility.

Trace Elements: Includes zinc, iron, and other minerals.

3. Hair Growth Cycle

1. Anagen (Growth Phase): Lasts 2-7 years. Hair grows approximately I cm per month.
2. Catagen (Transitional Phase): Lasts 2-3 weeks. Hair growth slows, and the follicle shrinks.
3. Telogen (Resting Phase): Lasts around 3 months. Hair doesn't grow but stays attached before falling out.
4. Exogen (Shedding Phase): Old hair is shed and new growth begins.

4. Hair Types & Texture

Determined by the shape of the follicle and the distribution of keratin:

Straight Hair: Round follicle. Wavy Hair: Oval follicle.

5. Common Hair Concerns

Breakage: Often due to cuticle damage.

Split Ends: Result from wear and tear on the cuticle and cortex.

Hair Loss (Alopecia): Can be genetic, hormonal, or related to health issues. Curly Hair: Elliptical or flat follicle.

GROWTH CYCLE OF HAIR

STRUCTURE OF HUMAN HAIR FIGURE

The hair growth cycle is a continuous, dynamic process that every hair follicle undergoes. This cycle includes distinct phases that regulate hair production, shedding, and regrowth. Each hair strand operates independently, meaning that not all hairs are in the same phase at the same time.

Here is a detailed explanation of each stage:

1. Anagen Phase (Growth Phase)

Duration: 2 to 7 years (varies by genetics, health, and hair type)

Activity:

Influencing Factors:

Longer anagen phases = longer hair potential.

Influenced by genetics, nutrition, hormones (like thyroid hormones and androgens).

2. Catagen Phase (Transition Phase)

Duration: 2 to 3 weeks Activity:

This is a short transitional phase marking the end of active growth. Hair growth stops, and the hair follicle shrinks (involution).

The lower part of the follicle is reabsorbed. Blood supply to the follicle is reduced.

The hair detaches from the dermal papilla and is called a club hair. Percentage of hair in this phase: About 1-3%.

3. Telogen Phase (Resting Phase) Duration: About 3 months Activity:

Hair does not grow but remains attached to the follicle. The follicle is inactive and rests.

Around 10-15% of your hairs are in this phase.

Stress, illness, or trauma can push more hairs into this phase (called telogen effluvium, a type of temporary hair shedding).

4. Exogen Phase (Shedding Phase)

Duration: A few days to weeks (overlaps with telogen) Activity:

The old hair is shed from the scalp to make way for a new hair emerging from the same follicle.

It's normal to lose 50-100 hairs per day during this phase

Cycle Summary :

PHASE	DESCRIPTION	% OF HAIRS
Anagen	Active growth	85-90%
Catagen	Tnasition/follicle shrinks	1-3%
Telogen	Resting/ no growth	10-15%
Exogen	Shedding old hairs	Part of telogen

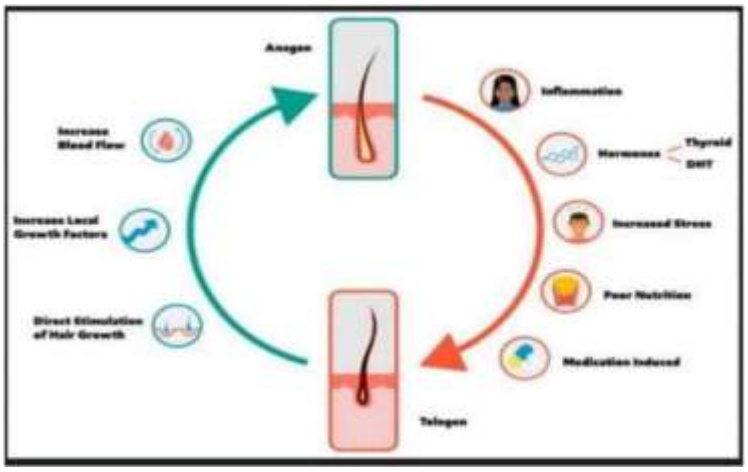
Key Influences on Hair Growth Cycle

Age: Anagen phase shortens with age.

Hormones: Androgens (like DHT) can shorten anagen, leading to hair thinning.

Health & Nutrition: Deficiencies (iron, protein, etc.) and diseases can disrupt the cycle. Stress: Can push hairs nto the telogen phase prematurely (telogen effluvium).

Genetics: Determines how long your anagen phase lasts and your hair density



KEY INFLUENCES OF HAIR GROWTH CYCLE FIGURE

HAIR PROBLEMS

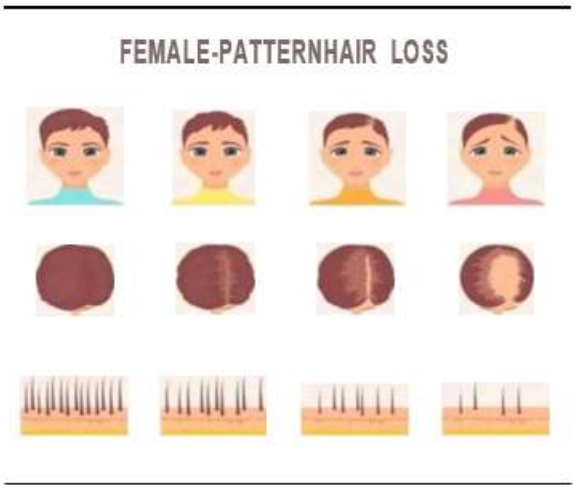
Hair probles refer to any isues that affects te health , appearance , or growth of your hair or scalp. These can include hair loss ,dandruff, dryness, split ends and more .They may be temporaray or long lasting, depending on the cause. Hair problems are common and can affect people of all ages and genders. These issues can arise due to genetics, lifestyle, environmental factors, underlying health conditions, or improper hair care. Here's a detailed explanation of common hair problems, their causes, symptoms, and possible treatments:

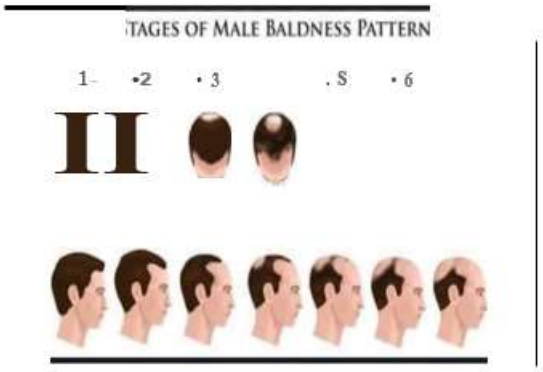
1. Hair Loss (Alopecia):

Types:

Androgenetic Alopecia (Male/Female Pattern Baldness): Genetic and hormonal. Alopecia Areata: Autoimmune condition where the immune system attacks hair follicles. Telogen Effluvium: Temporary hair shedding after stress, illness, or childbirth.

Traction Alopecia: Caused by tight hairstyles pulling on the scalp. Cicatricial Alopecia: Scarring conditions that destroy follicles permanently.





Causes:

1. Genetics
2. Hormonal changes (e.g., pregnancy, menopause, thyroid issues)
3. Nutritional deficiencies (iron, zinc, vitamin D)
4. Stress
5. Certain medications (chemotherapy, antidepressants)
6. Autoimmune disorders

Symptoms:

1. Thinning hair
2. Bald patches
3. Widening part line
4. Excessive hair shedding

Treatment:

1. Minoxidil (topical)
2. Finasteride (for men)
3. Corticosteroid injections (for alopecia areata)
4. Hair transplant
5. Addressing underlying health issues
6. PRP therapy (Platelet-rich plasma)

2. Dandruff (Seborrheic Dermatitis)

Fig. Dandruff

Symptoms:

1. White or yellow flakes
2. Itchy scalp
3. Red, irritated skin

Treatment:

1. Anti-dandruff shampoos (zinc pyrithione, ketoconazole, selenium sulfide)
2. Tea tree oil
3. Scalp exfoliation
4. Reducing hair product us

3. Dry and Brittle Hair

Causes:

1. Excessive heat styling
2. Frequent chemical treatments (coloring, perming)
3. Environmental exposure (sun, wind, chlorine)
4. Poor diet or hydration
5. Hypothyroidism

Symptoms:

1. Frizz
2. Split ends
3. Breakage
4. Lack of shine

Treatment:

1. Deep conditioning treatments
2. Limiting heat styling
3. Using sulfate-free shampoos
4. Healthy diet (rich in proteins, vitamins)
5. Regular trims

4. Split Ends (Trichoptilosis)

Causes:

1. Mechanical damage (brushing wet hair)
2. Heat styling
3. Chemical treatments
4. Lack of trimming

Symptoms:

1. Hair strands split at the ends
2. Frizzy appearance

Treatment:

1. Regular haircuts
2. Leave-in conditioners
3. Avoiding heat tools
4. Protective hairstyles

- **SHAMPOO**

Shampo is hair care product specificaaly formulated to cleanse the scalp and hair by removing dirt, oil, sweat , environmental pollutants, dead skin cells, and product buildup. Its usually a viscous liquid through it can also be found in bars, powders or dry spray forms .

BENEFITS OF HERBALS HAMPOO:

1. More shine
2. Less hair loss
3. Long lasting colour
4. All natural, no chemicals
5. Stronger and more fortified hairs
6. Wont irritate skin or scalp
7. Keep healthy natural oils

TYPES OF SHAMPOO:

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. Maintainance of hair growth
5. Medication

NEED

Herbal shampoos are regulated as the greatest hair care product because natural ingridients have been utilized by humans for eons. Shamppos enriched ith natural extracts are kbown as herbal shampoos. The best and most durable are produced by these shampoos , which is there greatest quality . These shampoos don't harm hairs and don't containany harsh chemicals.

The gole of mixing two or more different herbs to provide the hair with a variety of benefits.The addition of various hair product ingridients allows this shampoosto serve multiple purposes. Shampoos clear dirt ,nourish the hairremove the lice giving cooling effect after shampooing , remove the dandruff, increase the hair volume and hair strength and it isnatural conditioner for hair.

ADVANTAGES OF HERBAL SHAMPOO

1. Pure and organic ingridients
2. Free from side effects
3. No synthetic eg. SLS
4. No synthetic addtitives
5. No animal testing
6. Promote hair growth
7. Skin friendly
8. Remove dandruff

FORMULATION OF HERBAL SHAMPOO:

1. Foam stabilizers : softens custumors 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 , softeness, texture , stability and removal by rising are all components of foaming qualities.These properties are primarily ehanced byaddiionof fatty acids alkonol amide , whicis impart a creamy feel as wel as softer and stable foam

2. Thickners : consistency and richness are provide by natural gums (karaya, tragakanth) , cellulose hydrocolloids, acrylic polymers or salt such sodium.

3. Conditiners : They are intended to bring softness and gloss to reduce flyway and enhance detanging . There are role in a shampoo is not effective as conitioner because of multiple function. They are useful in shampoo fordry and damage hair .A great number of compoundare added to type of formulation , the purpose , care, and beautifying aims they are mostly fatty ingredients , protein and cationic polymers.

4. Preservatives : help in increaing shelf life of herbal product.

LITERATURE REVIEW

1. Bhanu Pratapl, Swarnika Sharma2, Prof {Dr) Kshitii Agarawal: The essential component of human attractiveness is hair. Since ancient times, people have used herbs to clean, adorn, and manage their hair. Synthetic substances have risen in popularity throughout time, but people are now more conscious of their negative effects on skin, eyes, and hair. Shampoos and hair cleansers are used for more than just cleaning; they also give hair a glossy finish and keep it manageable and greasy. There are many different kinds of shampoos, including lotion shampoo, clear liquid shampoo, powder shampoo, solid gel shampoo, medicinal shampoo. Each type caters to specific needs, whether it's for moisturizing, volumizing, or addressing scalp conditions. As consumers become more conscious of the ingredients in their hair care products, the demand for natural and organic options continues to rise, leading to an expansion of the market.

2. Ms. Praiakta V. Gaikwad, Ms. Samruddhi M. Gaikwad: This study aims to develop and assess herbal shampoo powder that uses natural ingredients, with a focus on efficacy and safety. It removes debris and dandruff, encourages hair development and shine, darkens and fortifies hair of all the hair care products, shampoo is most likely the most popular. Given that human hair is a unique and treasured trait, shampoos are among the cosmetics used on a daily basis. Hair care products are further defined as preparations intended for cleaning, altering the texture, changing the color, revitalizing stressed hair, nourishing the tresses, and enhancing the appearance of well-groomed hair. Fans of specialty shampoos include those with gluten intolerance, color-treated hair, and dandruff. Allergies to wheat, a focus on using organic products, and baby shampoo for infants and young children may be less irritating. Additionally, there are animal-specific shampoos available that include pesticides or other drugs to treat parasite infestations or skin diseases. Pests such as fleas. Given that the chosen medications have been used for a considerable amount of time, either alone or in combination, the current studies will also aid in the establishment of standard formulation and evaluation parameters, which will undoubtedlyaid in the standardization of the quality and purity of these kinds of powdered herbal shampoos.

3. Ayesha Siddigua Gazi, Syeda Adiba Sameen, Sayyada Haiira, Zebra Unnisa : Preparing and evaluating a herbal shampoo with an emphasis on the product's safety, effectiveness, and quality is the primary goal of the current study. Herbal shampoo is a natural hair care solution that is used to eliminate grime, dandruff, and grease as well as to encourage hair growth, strength, and blackness. Since shampoos are a common cosmetic item used in daily life, the shampoo industry has the most units sold of any hair care product. Consumers have occasionally

experienced negative consequences as a result of synthetic detergents and preservatives. Incorporating natural extracts with similar functionality to their synthetic counterparts is a more extreme method of minimise the use of synthetic compounds. Shampoo is one of the most important beauty items since it helps clean the hair. Herbal shampoo is a cosmetic product similar to ordinary shampoo in that it uses traditional ayurvedic herbs to clean the hair and scalp.

4. Bhanu Pratap, Swarnika Sharma, Dr. (ProQ Kshitii Agarawal: The essential component of human attractiveness is hair. Since ancient times, people have used herbs to clean, adorn, and manage their hair. Synthetic substances have risen in popularity throughout time, but people are now more conscious of their negative effects on skin, eyes, and hair. Shampoos and hair cleansers are used for more than just cleaning; they also give hair a glossy finish and keep it manageable and greasy. There are many different kinds of shampoos, including lotion shampoo, clear liquid shampoo, powder shampoo, solid gel shampoo, medicinal shampoo. Each type caters to specific needs, whether it's for moisturizing, volumizing, or addressing scalp conditions. As consumers become more conscious of the ingredients in their hair care products, the demand for natural and organic options continues to rise, leading to an expansion of the market.

5. Jaya Preethi P., Padmini K., Srikanth J., Lohita M., Swetha K., Vengal Rao

P. Java Preethi P.*, Padmini K., Srikanth J., Lohita M., Swetha K., Vengal Rao P.: Shampooing is the most common form of hair treatment. Shampoos are primarily been products aimed at cleansing the hair and scalp. In the present scenario, it seems improbable that herbal shampoo, although better in performance and safer than the synthetic ones, will be popular with theconsumers. 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.

6. Praiakta V. Gaikwad, Samruddhi M. Gaikwad, Vaishnavi L. Gavhane, Dipali B. Ghuge, Aishwarya Sakhare: This study aims to develop and assess herbal shampoo powder that uses natural ingredients, with a focus on efficacy and safety. It removes debris and dandruff, encourages hair development and shine, darkens and fortifies hair of all the hair care products, shampoo is most likely the most popular. Given that human hair is a unique and treasured trait, shampoos are among the cosmetics used on a daily basis. Hair care products are further defined as preparations intended for cleaning, altering the texture, changing the color, revitalizing stressed hair, nourishing the tresses, and enhancing the appearance of well-groomed hair. Fans of specialty shampoos include those with gluten intolerance, color-treated hair, and dandruff. Allergies to wheat, a focus on using organic products, and baby shampoo for infants and young children may be less irritating. Additionally, there are animal-specific shampoos available that include pesticides or other drugs to treat parasite infestations or skin diseases. Pests such as fleas. Given that the chosen medications have been used for a considerable amount of time, either alone or in combination, the current studies will also aid in the establishment of standard formulation and evaluation parameters, which will undoubtedly aid in the standardization of the quality and purity of these kinds of powdered herbal shampoos.

7. Divya K. Chavan, Bhagyashri G. Shelar, Shveta R. Bhoye, Sachin B. Chavan: The main purpose of present study is to evaluate natural ingredients used in polyherbal shampoo for Safety and efficacy. Today, the Shampoo sector is the largest Sector among products. It is one of the Cosmetic formulations used daily as the hair

formulation for the beautifying purpose. In a Market different types of Synthetic, Semi-synthetic Shampoos are available which is used to remove grease, dandruff and provide softness and nutrition to hair. The main objective is to study how to eliminate harmful synthetic ingredients from Shampoo formulation & substitute them with safe natural ingredients. Herbal Shampoo was formulated using natural ingredients like HibiscusFlowers/leaves, Palas flower, Rose flower, beets root, banana root sandalwood powder. The Combination of several ingredients of herbal origin made highly effective Powder Shampoo which reduces many side effects. The present paper significance on composition, types, methods of evaluation of poly herbal Shampoo powder. Method: For the study of polyherbal powder shampoo 50 review papers were selected out of which 25 are referred for article. Out of rejected25papers: 11 papers don't have relevant information, 5 papers contain outdated content, some mistakes are observed in 3 papers and 6 papers contained advance information. To get appropriate information along with selected 25 papers we referred research gate, Shodhganga, Shodhgangotri like websites and Pharmacopoeia. Conclusion: The polyherbal powder shampoo is a safe, effective, and stable natural alternative for hair care, promoting healthy hair growth and scalp health.

HERBAL CONSTITUENTS AND ITS USES CHART:

SRNO	FORMULATION	METHOD	PURPOSE
1	NEEM	MIXING	ANTIBACTERIAL ANTIDANDRUFF ANTICEPTIC
2	HIBISCUS	MIXING	ANTIDANRUFF CONDITIONING HAIRS
3	SHIKAKAI	MIXING	NOURISH HAIR HEAL DAMAGE
4	AMLA	MIXING	HAIR DARKNING GROWTH, PROMOTER
5	ALOE VERA	MIXING	ANTIDANDRUFF
			CONDITIONER
6	BHRINGRAJ	MIXING	HAIR DARKNING HAIR GROWTH
7	LIQUORICE	MIXING	HAIR GROWTH PREVENT PREMATUREGREYING

2		HIMALAYA DOVE
3		H ·AD ANDSHOULDER
4	CLEAR 	CLEAR

AIMS AND OBJECTIVES :

Aim:

The primary aim of this study is to formulate and evaluate a safe, effective, and eco-friendly herbal shampoo powder using natural plant-derived ingredients with established therapeutic properties for scalp and hair care. The study seeks to develop a herbal shampoo powder that provides efficient cleansing, conditioning, and nourishment to the hair while minimizing the adverse effects associated with synthetic shampoos.

Objectives:

To achieve the above aim, the study is designed to fulfill the following specific objectives

1. Selection and Procurement of Herbal Raw Materials:

To conduct a thorough literature review and traditional knowledge survey to identify herbs commonly used in Ayurvedic and folk medicine for hair care.

To select herbs with proven efficacy for cleansing (e.g., Reetha, Shikakai), conditioning (e.g., Amla, Brahmi), and scalp health (e.g., Neem, Tulsi).

To procure high-quality, authenticated, and standardized raw herbal materials from reliable sources or vendors.

2. Preparation and Standardization of Herbal Powders:

To clean, dry, and powder the selected herbs using standardized methods such as shade drying and mechanical grinding.

To sieve the powders through appropriate mesh sizes to obtain uniform particle size for better formulation performance.

To analyze the physical properties of each herbal powder, including color, texture, moisture content, and flow properties.

3. Formulation of the Herbal Shampoo Powder:

To develop multiple trial formulations by blending the selected herbal powders in various ratios.

To identify the most effective formulation based on parameters such as foaming ability, cleansing efficiency, and conditioning effect.

To maintain the formulation as free from synthetic surfactants, preservatives, or artificial fragrances, ensuring it is 100% natural.

4. Evaluation of Physicochemical Properties:

To assess organoleptic properties such as color, odor, texture, and appearance.

To evaluate physicochemical parameters including moisture content, bulk density, solubility in water, and flow characteristics.

To measure pH of the aqueous solution prepared from the powder, ensuring it is within the scalp-friendly range (4.5 to 6.0).

5. Functional Evaluation of the Shampoo Powder:

To perform foam height and stability tests using standard methods like the cylinder shake method to assess the surfactant activity of the herbal blend.

To conduct cleansing ability tests by evaluating the removal of artificial sebum or oil from hair samples or volunteers' scalps.

To evaluate the conditioning effect post-application through sensory analysis (e.g., smoothness, combability, shine, softness) and by collecting user feedback.

6. Microbial and Safety Analysis:

To determine the total microbial load (bacterial and fungal counts) of the herbal shampoo powder to ensure product safety.

To verify the absence of pathogenic organisms such as E. coli, Salmonella, and Staphylococcus aureus.

To confirm the stability and shelf life of the product by monitoring changes in physical, chemical, and microbial properties over a specified storage period.

7. Comparative and Consumer Analysis:

To compare the formulated herbal shampoo powder with commercial herbal and synthetic shampoos based on cleansing efficiency, foaming ability, and user satisfaction.

To conduct a user trial or pilot study to assess the overall performance, acceptability, and skin compatibility of the shampoo powder.

To collect and analyze feedback from volunteers on aspects such as ease of use, washing experience, hair texture post-use, and willingness to switch from regular shampoos.

8. Documentation and Recommendation:

To document all experimental observations, findings, and evaluation results

systematically . To purpose recommendations for further improvements m formulations , scalability and commercialization potential.

Need of Work

The formulation and evaluation of herbal shampoo powder are essential due to the growing consumer demand for natural, sustainable, and chemical-free personal care products. Below are the key reasons why this work is important.

1. Demand for Natural Alternatives

Consumers are increasingly seeking natural and organic products due to concerns over synthetic chemicals in commercial shampoos (e.g., sulfates, parabens, silicones).

Herbal ingredients are considered safer and gentler on the scalp and hair.

2. Reduced Side Effects

Synthetic shampoos may cause scalp irritation, dryness, hair fall, and allergic reactions.

Herbal powders typically have fewer side effects and offer better compatibility with various hair types.

3. Environmental Sustainability

Herbal shampoo powders are biodegradable and generate less environmental waste.

They often come with minimal or eco-friendly packaging, reducing plastic use compared to liquid shampoos.

4. Cost-Effectiveness

Herbal powders can be more economical for both consumers and manufacturers. Many herbal ingredients are locally available and inexpensive.

5. Traditional Knowledge Integration

Many herbs used in shampoo powders (like shikakai, reetha, amla, neem) are rooted in Ayurvedic and traditional medicine. Utilizing traditional knowledge helps preserve cultural heritage while modernizing its application.

6. Multifunctional Benefits

Herbal powders often offer multiple benefits like cleansing, conditioning, dandruff control, and promoting hair growth. They may also have antimicrobial, anti-inflammatory, and antioxidant properties.

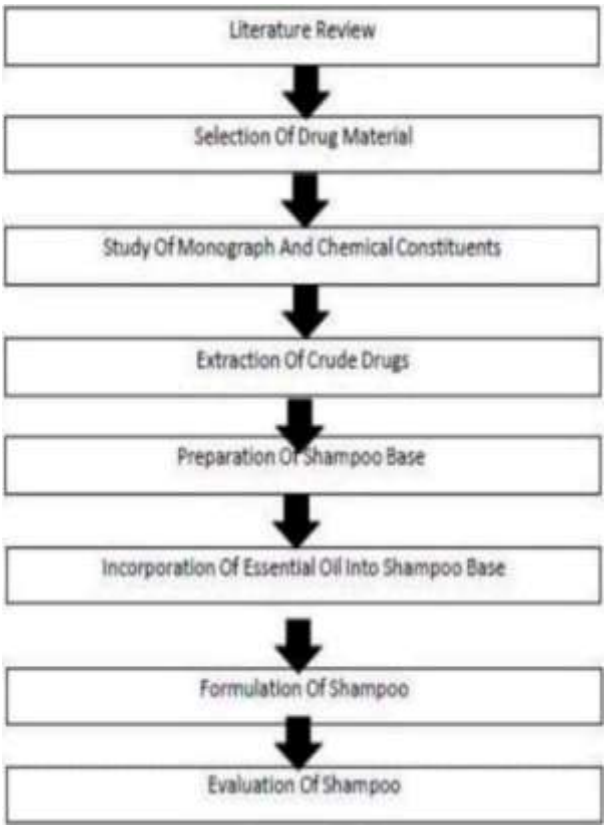
7. Customization and Innovation

Formulating herbal powders allows for innovation in combinations of herbs tailored for different hair types and problems (dry scalp, dandruff, oily hair, etc.). It provides opportunities for R&D in optimizing formulation techniques, improving shelf life, and enhancing consumer acceptability.

8. Evaluation Ensures Quality and Efficacy

Scientific evaluation ensures the safety, efficacy, stability, and consumer satisfaction of the product. Parameters such as pH, foamability, cleansing action, physical stability, and microbiological safety are crucial for market acceptance

PLAN OF WORK :



The following plan of work outlines the sequential steps that will be undertaken to successfully formulate and evaluate a herbal shampoo powder. Each stage is critical to ensure the efficacy, safety, and quality of the final product.

1. Literature Review and Conceptualization

Conduct an extensive review of scientific literature, traditional Ayurvedic texts, and ethnobotanical sources to understand:

Commonly used herbs for hair care

Traditional formulations and preparation methods

Existing commercial herbal shampoo powders

Define the scope, objectives, and potential benefits of the herbal shampoo powder project.

2. Selection and Procurement of Raw Materials

Identify and select suitable herbs with cleansing, conditioning, and therapeutic properties such as:

Shikakai (Acacia concinna) Reetha (Sapindus mukorossi) Amla (Phyllanthus emblica) Brahmi (Bacopa monnieri)

Neem, Hibiscus, Tulsi, etc. (optional additions)

Source high-quality, authenticated plant materials from reliable vendors or local markets.

3. Preparation of Herbal Powders

Clean and dry the raw herbs using standardized drying techniques (shade drying or oven drying at low temperature).

Grind the dried herbs into fine powder using a mechanical grinder.

Sieve the powders using standard mesh sizes (e.g., #60 or #80) to obtain uniform particle size.

Store powders in airtight containers under dry, cool conditions to prevent moisture absorption.

4. Formulation of Herbal Shampoo Powder

Design various trial formulations by blending selected herbal powders in different ratios. Optimize the formulation based on traditional knowledge and preliminary tests to achieve: Adequate foaming

Good cleansing

Soft and manageable hair post-wash

5. Physicochemical Evaluation of the Formulated Powder

Conduct the following tests:

Organoleptic properties: Color, odor, texture, appearance Moisture content: Using loss on drying (LOD) method Solubility in water: Qualitative observation

Flow properties: Bulk density, tapped density, angle of repose pH of solution: pH measurement of 1% solution

6. Performance Evaluation

Foaming ability and foam stability:

Using the cylinder shake method or other standard tests Cleansing efficiency:

Using artificial sebum/oil-coated hair swatches Comparing before and after washing Conditioning effect:

Evaluating hair smoothness, shine, and ease of combing after application Using feedback from volunteers or trained sensory panel

7. Microbial Load Testing

Conduct microbiological analysis to determine:

Total viable bacterial and fungal count

Presence/absence of pathogens like E. coli, Salmonella, Staphylococcus aureus

Ensure the powder complies with permissible microbial limits for topical herbal products.

8. Stability Studies

Store the final formulation under different environmental conditions (room temperature, humidity, etc.)

Monitor changes in:

Color, odor, texture Microbial load

pH and moisture content

Record observations over a 1-3 month periood

9. User Acceptability and Feedback

Conduct a small-scale user trial among volunteers to evaluate: Ease of use

Skin/hair compatibility Overall satisfaction

Collect structured feedback using a questionnaire.

10. Data Compilation, Analysis, and Conclusion

Compile all experimental data and user feedback.

Analyze results to determine the performance and market viability of the product.

Draw conclusions regarding the success of the formulation and potential for commercial development.

11. Documentation and Report Preparation

Prepare a detailed project report or thesis including: Introduction, Literature Review, Aims

and Objectives Methodology, Results, Discussion, and Conclusion Bibliography and Annexures

DRUG USED IN EXCIPIENT PROFILE

HERB AND HERBAL SHAMPOO :

1. **Neem** - belongs to the family Meliaceae

Synonym - Margosa

Chemical constituents - Neem is pharmacologically rich and contains numerous bioactive compounds

The major constituents include:

COMPOUND	FUNCTION
Azadirachtin	Insecticidal, anti- lice, antibacterial
Nimbin	Anti-Inflammatory, antiseptic
Nimbdin	Antifungal Antibacterial
Gedunin	Anti- microbial Antifungal
Quercetin	Antioxidant Anti -inflammatory
Salannin	Insect repellent
Fatty acids	Moisturizing effect

2. TULSI- It belongs to family Lamiaceae

Synonym - Holy basil

Chemical constituents - tulsi contains linaol, eugonel, ocimen , estragol , thymol.

Reason - The anti - fungal properties of tulsi help to treat the dandruff. The

effective use of tulsi to hair can reileve the ichiness , inflammation and irritation . The regenerative properties of tulsi help in reducing hair fall

Formulation - Shampoo

3. SHIKAKAI -

Botanical name- Acacia concinna
Family- Fabacae
Common name - Shikakai
Plants parts used - bark, leaves, pods

Benefits -

- Makes hairs soft and shiny
- Prevent itchy scalp
- Eliminates lice
- Boosts hair growth .

4. HIBISCUS -

Botanical name - Rosa sinensis
Family- Malvaceae
Common name - China Rose
Plant part used - bark, leaves, pods

Benefits -

- Makes hair soft and shiny
- Prevent hair loss
- Healer
- Boosts hair growth

s. BRAHMI

Botanicaal name - Brahmiis bacopa monnieri
Family- Plantaginaceae Common name - Brahmi
Plants parts used - Benefits -

- Antidandruff
- Prevents hair loss
- Healer
- Boosts hair growth

Experimental Work

1. COLLECTION OF PLANT MATERIALS:

HIBISCUS ROSASINENSIS, OCIMUM TENIFLORAM (TULSI) AZADIRACHTA INDICA(NEEM) ACACIA CONCINNA (SHIKAKKAI) WATERHYSSOP (BRAHM!)

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.

5. SIEVING:

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

6. MIXING:

Mix all the powder herbs together.

7. PACKAGING AND LABELLING:

The formulation of dry shampoo was well stored into 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.

a) 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.

b) 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 (0) can be calculated by using the formula.

1. 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 I 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.

Mass of the herbal powder shampoo

Bulk Density = Volume of the herbal powder shampoo

2. 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 I 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.

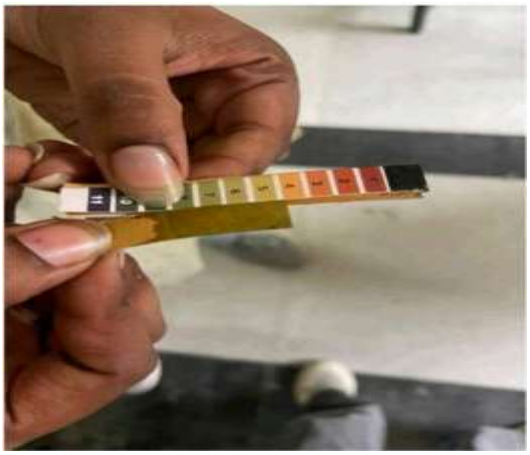
Mass of the herbal powder shampoo

Bulk Density = 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.



II. Washability:

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

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. I 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.

[4:38 pm, 5/6/2025] Komal L:

V. Moisture content:

of each herbal shampoo powder was weighed in a tare evaporating dishand kept in hot air oven at 105°C. Repeated the drying until the constant weight loss was observed after the interval of 30 minutes. The moisture content was calculated for each sample. (19)

VI. Wetting time:

The canvas was cut into I-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.

VII. 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 the standard volumetric flask. This extract is taken in 10 test tubes in a series of the successive portion of 1, 2,

3....10 ml and the remaining volume is made up of water to 10 ml. Then the test tubes were shaken in longwise motion for 15 seconds at speed of2 frequencies/second. Then the tubes are allowed to stand for 15 minutes.

he height of the foam was measured.

VIII. Skin/eye irritation test:

The skin/eye irritation tests revealed that the herbal shampoo powder shows no harmful effect on the skin and eye. This is due to the absence of synthetic surfactants. Most 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 the skin and eye.

RESULT AND DISCUSSION

Sr.No.	Evaluation Test	Results
1.	Organoleptic Evaluation a) Color b) Odour c) Taste d) Texture	Moss green Characteristic Bitter Smooth and fine powder
2.	General Powder Characteristics a) Particle Size b) Angle Of Repose c) Bulk Density d) Tap Density	0.177 mm 31° 1.2 g/cm3 2.5 g/cm3
3.	Physicochemical Characteristics a)pH b) Solubility c) Washability d) Dirt Dispersion e) Moisture Content f) Wetting Time g) Foaming Index h) Skin/Eye Irritation Test i) Stability	6 Soluble in water with moderate heating Easily washable with water Moderate 9.01 gm remain out of 10 gm 60 sec Good foaming No harmful effect on skin Stable at room temperature

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.

The work concluded that the formulation and evaluation of herbal shampoo powder with different herbs shown good results on the hair. That is the hair became smoother and covering grey hair.

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 polyquatemiums, 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. 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.

FUTURE SCOPE

The future scope for research and development in herbal shampoo powder is promising, considering ongoing trends in natural products, sustainability, and personal care innovation. Below are key areas of potential growth and exploration:

1. Advancement in Herbal Formulations

Development of novel combinations of herbs to target specific hair and scalp conditions (e.g., dandruff, hair fall, scalp infections).

Use of standardized extracts to ensure consistent quality and therapeutic efficacy.

2. Incorporation of Nanotechnology

Integration of nanoformulations (e.g., nanoemulsions or herbal nanoparticles) to enhance penetration and efficacy of active herbal ingredients.

Potential for improved shelf life, better absorption, and targeted delivery.

3. Scientific Validation and Clinical Trials

More in-vitro and in-vivo studies can help validate traditional claims and establish scientifically backed mechanisms of action.

Scope for clinical trials to assess safety and performance on a wider population.

4. Sustainable Packaging Innovations

Development of eco-friendly, biodegradable, or refillable packaging to make the product even more sustainable.

Focus on zero-waste concepts aligned with modern environmental goals.

5. Personalization and AI Integration

use of AI and data-driven platforms to recommend personalized herbal shampoo formulations based on hair type, scalp condition, and environmental factors.

Possibility for DIY kits or custom blending for end use

6. Commercialization and Global Market Potential

Huge scope for scaling up production and entering global natural and organic cosmetics markets.

Herbal shampoo powders can be marketed as a chemical-free, travel-friendly, and waterless alternative to liquid shampoos.

7. Regulatory and Quality Standardization

Development of standard protocols and regulatory guidelines for herbal cosmetics. Focus on quality control, stability testing, and ensuring microbial safety for commercial scalability.

8. Integration with Other Herbal Hair Care Products

Opportunity to develop a complete herbal hair care range, including conditioners, hairs oils, masks, and serums using complementary herbs.

Enhances brand identity and customer retention.

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