



FORMULATION AND EVALUATION OF POLYHERBAL SHAMPOO FOR SCALP HEALTH AND STRESS RELIEF

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Abstract: - The goal of the current study is to create and assess a polyherbal shampoo with natural components including soap nut, hibiscus, amla, aloe vera, and other chosen herbal additives. A stable shampoo formulation was created by combining the powdered or extracted herbs with a moderate surfactant base. The physicochemical characteristics of the produced formulation such as pH, foam height, dirt dispersion, viscosity, solid content, wetting time, and stability, were assessed. The polyherbal shampoo demonstrated good foaming power, sufficient cleansing properties, stability during storage, and an acceptable pH suitable for scalp application, according to the results. The natural conditioning, antibacterial, and hair-strengthening qualities were provided by the herbal components. Overall, the prepared polyherbal shampoo showed good visual appeal, safety, and effective washing, indicating its promise as a natural substitute for synthetic commercial shampoos.

Keywords: Polyherbal Shampoo, Herbal Hair Care, Scalp Health, Natural Surfactants, Physicochemical Evaluation.



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INTRODUCTION:

An essential component of human beauty is hair. Since ancient times, people have utilised herbs for hair care, washing, and styling. The most popular method of hair maintenance is shampooing.^[1] Herbal shampoo is a type of cosmetic product made with natural plant materials called herbs. Any hair wash product made with an extract of ayurvedic herbs and flowers can be referred to as herbal shampoo. Polyherbal shampoo is a cosmetic product that cleanses the hair and scalp using herbs derived from plants. There are many different types of shampoo available on the market, such as powder, liquid, cream, and keratin. Water is added during preparation for powder shampoo. Low cloud point detergent is made with liquid shampoo. Lotion shampoo is another name for cream shampoo.^[2]

Keratin oil, which is a component of keratin shampoo, aids in smoothing and shining hair. The ability of the ingredients to protect, nourish, and clean hair while also preventing damage to the hair is the basis for choosing the active ingredient for haircare products.^[3] Hibiscus, Aloe vera, amla, soap nut, Agar Agar, apple cider vinegar, jasmine oil, and menthol oil were among the ingredients used to produce the polyherbal shampoo, which was then assessed based on its physicochemical characteristics.^[4]

ANATOMY OF HAIR:

Keratin, a fibrous, helical protein found in the skin and all of its attachments, including body hair and nails, makes up 95% of hair. The structure of hair is composed of three different parts: The medulla, the innermost layer of the

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hair shaft, is made up of amorphous, soft, and oily substances.

Cuticle: A thin protective outer layer that is nutrient-rich and encourages the growth of hair. It is extremely keratinized, with scale-like cells that are stacked one on top of the other and measure about 60 micrometers in length and

6 micrometers in width. The cortex, the main component of hair, is composed of lengthy keratin chains that give hair its resilience, suppleness, and elasticity. The cells of the cortex are held together by a protein-and lipid-rich intercellular cement.^[5,6,7]

HAIR ANATOMY

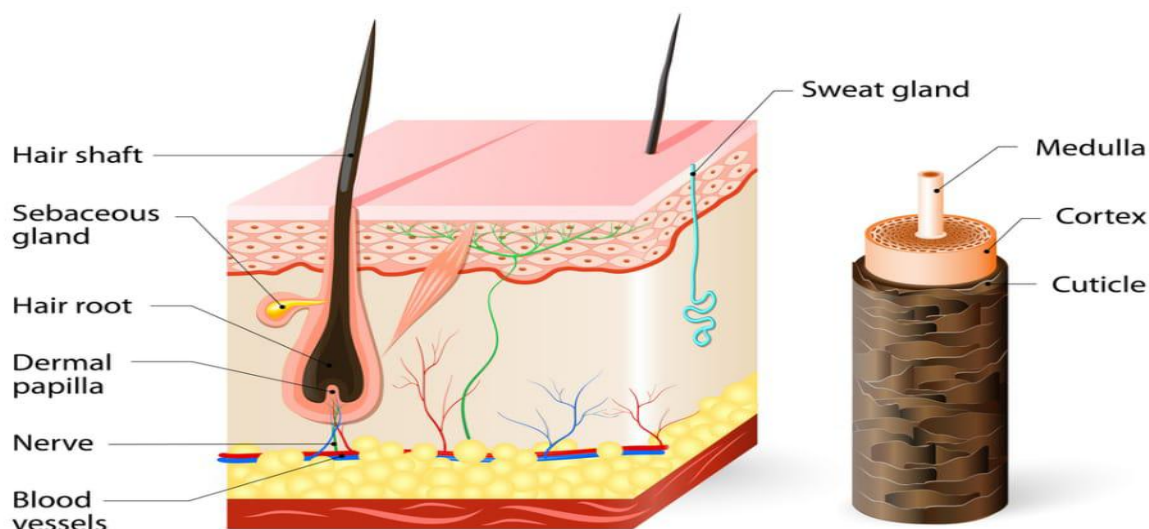


Figure 01: (Hair Anatomy)

The Hair Cycle

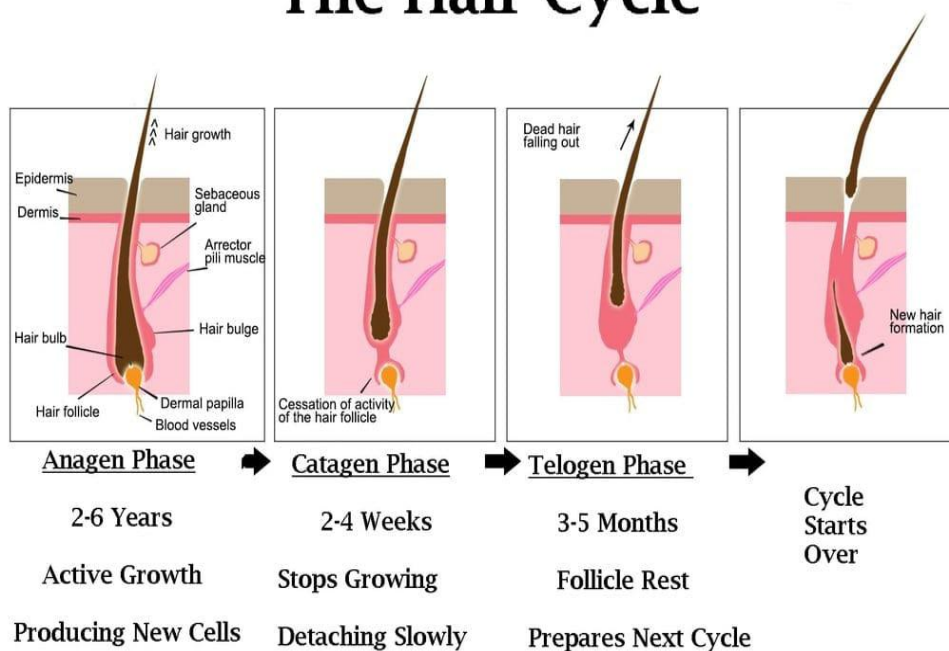


Figure 02: (Hair Cycle)

STAGE:

Anagen: The two to six-year period of active growth that is sustained by blood flow.

Catagen: During the one to two week transitional phase, the follicle cuts off from the blood supply.

Telogen: During the five to six week resting period, follicles are dormant.^[8,9]

THE SCALP DEFECT ON HAIR:

The anatomical region known as the scalp is bounded on the front by the face and on the sides and back by the

neck. It is characterized by a large number of sebaceous glands that contribute to a unique microenvironment and a generally high density of terminal hair development. Sebaceous regions have a higher species diversity than dry ones, which has implications for skin physiology and pathologic scenarios.^[10] Specifically, oxidative stress is often observed in pathologic conditions like dandruff, seborrheic dermatitis, psoriasis, atopic dermatitis, and eventually alopecia.^[11] One popular method in dermatology for determining the underlying oxidative stress is the measurement of lipid peroxidation.^[12]



Figure 03: (Conditions That Affect the Scalp)

DANDRUFF AND SEBORRHEIC DERMATITIS:

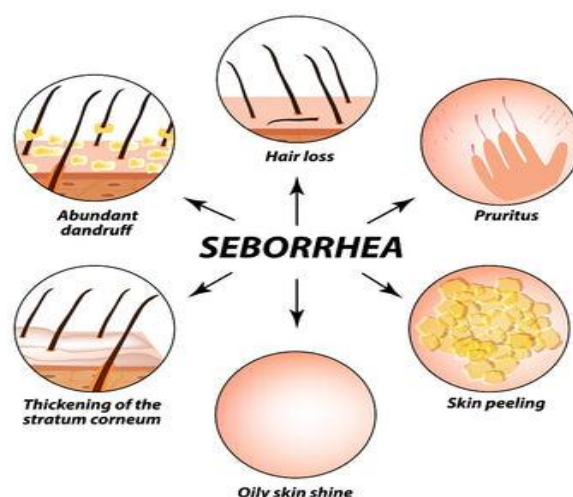
A specific scalp microclimate and accelerated exfoliation rate are caused by the distinct anatomical features of the skin on the scalp, such as the large number of terminal hair follicles and the increased epidermal surface due to multiple hair canals. If the hair is not washed, even a normal scalp will begin to flake within a week or two, unlike pathological dandruff, which is brought on by an accelerated proliferation of epidermal cells. This results in the breakdown of the normal columnar structure of the stratum corneum, which leads to the formation of cell aggregates that determine the size of the flakes and increased exfoliation of different-sized clusters of aberrantly keratinizing epidermal cells.

The process is caused by focal scalp irritation and parakeratosis, which alters the light refractive index of the

keratinized cell aggregates and causes abnormal exfoliation.^[13] The flakes' size, adherence, and light-refractive qualities affect how dandruff appears clinically. Inflammatory patches on the scalp can be caused by a variety of processes, including microbial colonization with *Malassezia* fungi, sebaceous lipids, and individual sensitivity.

Seborrheic dermatitis is characterized by ill-defined erythematous patches and scaling. sebaceous glands. In contrast to dandruff, seborrheic dermatitis frequently results in redness and scaling that extends from the scalp to the nose and eyebrows. Again, seborrheic dermatitis is believed to be caused by fungi in the genus *Malassezia*. Therefore, dandruff, which is considered to be the mildest form of seborrheic dermatitis, seems to have a pathogenic association with it.^[14]

SYMPTOMS OF SEBORRHEA



PSORIASIS:

The most well-studied skin condition that connects oxidative stress, *Malassezia* spp. involvement, and hair loss risk is psoriasis, a chronic inflammatory scalp disorder. Silver-white scaling on well-defined erythematous lesions is what sets the illness apart from seborrheic dermatitis. Tumor necrosis factor- α

inhibition is the most noticeable sign of the immune-mediated disease.^[14,15,16] It is a treatment-induced psoriasiform dermatitis of the scalp that can cause irreversible baldness because of scarring. Overgrowth of the scalp with *Malassezia* spp.^[17] Is another well-known feature of scalp psoriasis. In psoriasis, oxidative stress manifests as alterations in antioxidant enzymes, damaged proteins, and oxidized lipids.^[18,19,20,21]



Figure 05: (Psoriasis)

ATOPIC DERMATITIS:

Another common inflammatory skin condition that can have a major impact on the scalp is atopic dermatitis, which is chronic and recurrent. It has a complicated pathophysiology that includes immunologic processes, environmental variables, genetics, and altered skin permeability. The condition of some patients with head and neck dermatitis may worsen as a result of a reaction to the local *Malassezia* flora.^[22] It is probable that humoral and

cell-mediated immunity are both involved in this response. Compared to healthy controls and patients with atopy without head and neck dermatitis,^[23] patients with head and neck atopic dermatitis are more likely to have positive skin prick test results and *Malassezia*-specific IgE, even if there are no differences in *Malassezia* spp. colonization. Once more, there is a strong correlation between oxidative stress and atopic dermatitis: levels of oxidized surface proteins and urinary stress indicators are elevated, and environmental factors may contribute to the condition.^[24]



Figure 06: (Atopic Dermatitis)

SCALP AGING:

The principles underlying scalp aging are the same as those underlying skin aging, with the exception of a natural defense against UVR that is contingent on the quantity of hair on the scalp. Aging is the result of a combination of damage-related (nonprogrammed) and programmed factors that have accumulated over time. A biological schedule, possibly an extension of the one governing childhood growth and development, governs programmed factors. This

control would rely on modifications in gene expression that impact the defense, repair, and maintenance systems. Environmental and internal attacks are examples of damage-related factors that cause cumulative damage at different levels. Hair aging has an impact on the structural characteristics of the hair fiber (hair diameter, curvature, stretching, bending, and torsional rigidity of the hair fiber, as well as lipid composition), as well as the color (gray), production (alopecia), and manageability of the hair. ^[25]



Figure 07: (Causes of Scalp Aging)

On the non-balding scalp, however, the effects of aging are comparatively undetectable. There may be some laxity and a pale, dry appearance of the scalp beneath the hair. A balding scalp, on the other hand, displays the characteristics of photo aged skin, such as telangiectasia, wrinkling, atrophy, and irregular pigmentation, as well as signs of cutaneous premalignant and malignant conditions like actinic keratosis, basal cell carcinoma, and squamous cell carcinoma. In androgenetic alopecia, the onset of hair loss is preceded by the onset of solar elastosis of the scalp, indicating that additional scalp UVR protection is necessary because scalp hair does not fully shield the scalp from UVR effects. Unevenly distributed melanocytes, increased inflammatory cells in the dermis, and variations in the thickness and

cellularity of the epidermis are additional signs of aging that can be observed in the sun-damaged scalp. The elasticity and volume of the skin decrease, making it thinner and more vulnerable to damage. Additionally, the blood flow and glandular activity of aging skin decrease. Overall, these effects lead to a rise in skin pathologies and a decrease in the skin's capacity to heal itself. Surprisingly, aging does not seem to progress in a perfectly regular manner. Periods of more noticeable evolution alternated with periods of stability, or even partial remission. This could be due to the influence of personal factors like lifestyle and hygiene, risk factors for accelerated aging, and general health and nutritional status.^[25]

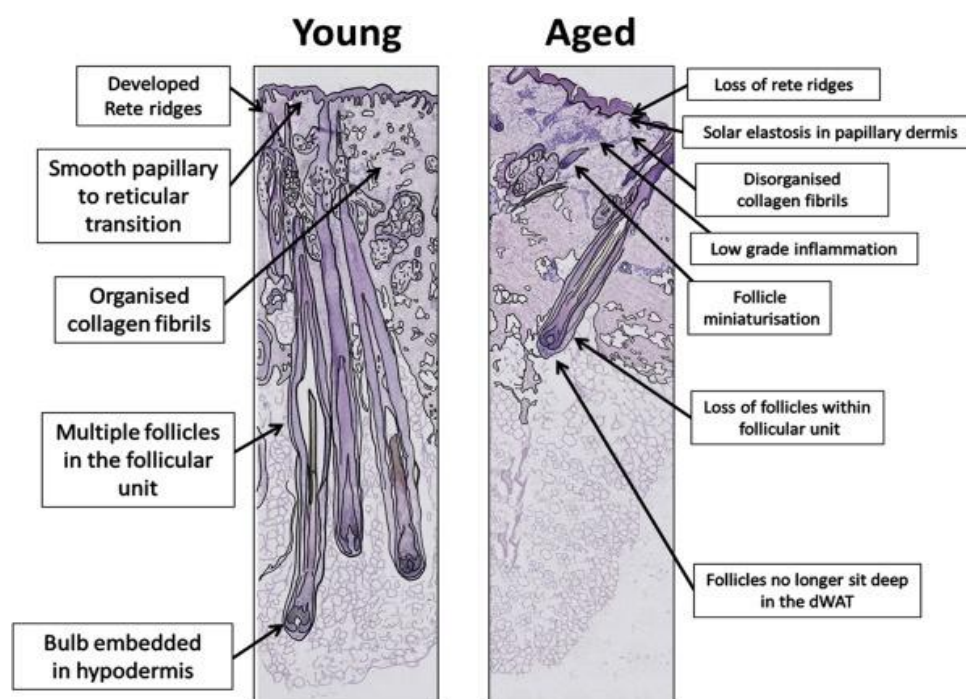


Figure : 08

LITERATURE REVIEW:

1. Sanjay Deshmukh..et.al., International Journal of Pharmacognosy and herbal Drug Technology (IJPHDT). Herbal shampoos are increasingly preferred over synthetic formulations due to their safety, biodegradability, and scalp-friendly nature. Polyherbal shampoos based on Ayurvedic principles combine multiple botanicals to achieve synergistic cleansing, conditioning, and antimicrobial effects with minimal irritation. Herbs such as amla, shikakai, hibiscus, bhringraj, aloe vera, ginger, and henna are well documented for their rich phytochemical content, including saponins, flavonoids, and phenolic compounds, which contribute to natural surfactant action, antioxidant protection, and hair nourishment. Literature reports indicate that such combinations improve key shampoo parameters

like pH balance, foam stability, viscosity, and sensory acceptability, supporting polyherbal shampoos as effective and eco-friendly alternatives to conventional hair care products.

2. Shweta Pate..et.al.,(2022). Journal for Research in Applied Sciences and Biotechnology. Hair and scalp health are essential for maintaining healthy and attractive hair, but factors such as pollution, stress, and the use of chemical-based shampoos often lead to hair fall, dandruff, dryness, and scalp irritation. Conventional shampoos may cause long-term damage due to synthetic ingredients, increasing the demand for safer herbal alternatives. The present study focuses on the formulation and evaluation of a polyherbal shampoo using natural ingredients such as Hibiscus flowers, Pomegranate peels, Neem leaves, Curry leaves, Shikakai, and Amla fruits, which are known for their cleansing,

nourishing, and antimicrobial properties. The formulated shampoo is designed to gently cleanse the scalp, remove dandruff, strengthen hair roots, and improve hair texture while maintaining scalp health, and its quality and effectiveness were assessed using various physicochemical evaluation parameters.

3. T. Kavya..et.al.,(2025). International Journal of Research in Pharmacy and Life Sciences. The study aimed to formulate and evaluate a safe, effective polyherbal shampoo using natural ingredients such as hibiscus, pomegranate peel, neem, curry leaves, shikakai, amla, and honey. The shampoo was assessed for physicochemical parameters including pH, viscosity, foam stability, cleansing ability, and conditioning performance. Results showed optimum pH, good foam stability, effective dirt and dandruff removal, and satisfactory conditioning, making it suitable for daily use. The formulation was economical, chemical-free, and demonstrated potential as a safe alternative to synthetic shampoos, though further studies are needed for validation.

4. Mugdha Banduke..et.al.,(2022). International Journal of Pharmaceutical Quality Assurance. Herbal ingredients have enhanced the effectiveness of cosmetic products by providing safe and multifunctional benefits. Studies report that shampoos formulated with herbal extracts such as coffee, fenugreek, green tea, bhringaraj, onion seeds, orange oil, and lemon oil show improved physicochemical and performance properties when compared with marketed products. Fenugreek, lemon, and orange peels enhance cleansing ability, while onion seeds and green tea improve foam generation and stability. Overall, the literature confirms that herbal extracts effectively remove oil, dirt, and dandruff while promoting smooth, healthy hair, supporting their role in high-performance shampoo formulations.

5. Sushil Kumar Pal..et.al.,(2024). International Journal of Life Science Research Archive. The present study aimed to formulate and evaluate a safe and effective herbal shampoo as an alternative to synthetic products, which can sometimes cause adverse effects due to chemical preservatives and detergents. The shampoo was prepared using powders of *Ficus religiosa* leaves, hibiscus leaves, reetha, shikakai, and aloe vera, and assessed for organoleptic, physicochemical, and performance parameters including pH, wetting time, solid content, surface tension, dirt dispersion, foam stability, and viscosity. The formulation demonstrated good appearance, froth stability, cleansing efficiency, conditioning ability, and an optimized pH of 6.2 to maintain scalp health.

6. Dr. Shweta Prashant Ghode..et.al.,(2025). This study developed polyherbal hair oils with coconut, orange, curry leaves, Bhringraj, hibiscus, fenugreek, onion seeds, and cinnamon. The hot maceration method produced stable oil with low acid value, and hibiscus extracts promoted hair

growth in rats, suggesting the formulation is a safe and effective natural hair care alternative.

7. Ralph M Trüeb, Jim P Henry..et.al.,(2019). International Journal of Trichology. Scalp health is crucial for hair growth, as oxidative stress and *Malassezia* can cause premature hair loss. Shampoos with *Malassezia*-inhibiting agents, like zinc pyrithione, help treat scalp conditions and may also reduce hair loss, supporting overall hair and scalp health.

8. Madhukar Shende..et.al.,(2022).World journal of pharmacy and pharmaceutical science. Dandruff, a common scalp condition caused by the yeast *Pityrosporum*, cannot be completely cured but can be effectively managed. Conventional anti-dandruff shampoos contain chemical agents like ketoconazole, sulfur, and zinc pyrithione, which control scaling and itching but may cause side effects such as irritation, hair loss, and photosensitivity. Herbal-based anti-dandruff shampoos, formulated with plant extracts and essential oils, offer a safer and cost-effective alternative with antibacterial and antifungal properties. Growing consumer awareness of their safety and efficacy has led to increased interest in herbal cosmetics, and recent research focuses on developing effective herbal shampoos for dandruff management.

9. Shweta Badure..et.al.,(2023) International Journal of Pharmacy and Herbal Technology. Shampoo is one of the most widely used hair care products, and increasing concerns over the adverse effects of synthetic preservatives and detergents have driven interest toward herbal alternatives. Modern shampoos not only cleanse but also aim to improve hair softness, smoothness, scalp health, and safety, which is important as the scalp is highly absorbent. Herbal shampoos formulated with natural ingredients such as fenugreek, shikakai, reetha, tulsi, aloe vera, hibiscus, amla, henna, and lemon are reported to provide effective cleansing, reduce hair loss during combing, and promote hair growth without harmful side effects. Studies emphasize replacing synthetic conditioners with aqueous herbal extracts to develop stable, durable, and effective shampoos, though continued scientific evaluation is necessary to validate their quality and performance.

10. Sutar Manisha..et.al., IJPBSShampoos are not only cleansing agents but are also expected to provide therapeutic and cosmetic benefits. The use of synthetic preservatives in conventional shampoos has been associated with adverse effects, creating a need for safer herbal alternatives. Several studies report that herbal shampoo powders containing traditional plant ingredients such as amla, hibiscus, neem, shikakai, aloe vera, henna, and ritha exhibit good cleansing, foaming, and conditioning properties with improved stability and reduced storage risks. These findings support

the formulation and standardization of polyherbal shampoo powders as safe and effective hair care products.

11. Tanmay Jit..et.al.,(2024) IJP. The present study aims to formulate and evaluate an herbal shampoo using safe natural ingredients to ensure its safety and efficacy. Shampoos are commonly used hair care products intended to remove dirt, oil, environmental pollutants, and other impurities from hair. In this formulation, various herbal extracts such as Punica granatum, Curcuma longa, Sapindus mukorossi, Azadirachta indica, Hibiscus rosa-sinensis, Citrus sinensis, Zingiber officinale, Allium cepa, and others were used without any synthetic additives. The herbal shampoo was prepared by a simple mixing method and evaluated for physicochemical parameters including appearance, pH, solubility, cleansing action, foaming ability, viscosity, detergency, dirt dispersion, solid content, and stability. The study emphasizes the use of traditional medicinal plants to promote hair growth, reduce hair loss, and provide conditioning effects while minimizing the adverse effects associated with synthetic ingredients.

12. Pratibha S. Chavan..et.al.,(2025) World Journal of Pharmaceutical Research. Aloe vera is a widely used medicinal plant in hair cosmetics due to its rich composition and multifunctional properties. It contains polysaccharides, vitamins (A, C, E, B-complex), minerals, amino acids, enzymes, and phytochemicals such as anthraquinones and flavonoids, which contribute to its antioxidant, anti-inflammatory, antimicrobial, and moisturizing effects. The presence of polysaccharides like acemannan helps in scalp hydration, wound healing, and hair strengthening. Aloe vera gel nourishes hair follicles, reduces dandruff, promotes hair growth, and improves hair luster and texture without leaving a greasy residue. Owing to its antibacterial and antifungal activities, aloe vera is beneficial in maintaining scalp health and preventing infections. Although generally safe, prolonged use may cause irritation or allergic reactions in sensitive individuals. Overall, aloe vera serves as an effective natural ingredient in herbal shampoos and other hair care formulations, supporting both scalp and hair health.

13. Shruti A Shinde..et.al.,(2024)IJTI. The growing use of cosmetics in daily life has increased interest in natural and herbal formulations due to the potential adverse effects associated with synthetic products. Herbal cosmetics are widely preferred because of their minimal side effects and therapeutic benefits. Hair-related problems such as dandruff, premature greying, hair thinning, split ends, and excessive sebum production are common, leading to increased demand for safe and effective hair growth solutions. Herbal ingredients like hibiscus, amla, curry leaves, olive oil, peppermint oil, and vitamin E have been reported to improve scalp health, strengthen hair follicles, reduce dandruff, and promote hair growth due to their antioxidant,

antimicrobial, and nourishing properties. The synergistic action of these natural components supports healthy hair growth and overall hair quality, highlighting the potential of herbal hair growth serums in cosmetic and pharmaceutical applications.

14. Montinee Teerarak..ET.AL..., (2025) Jasmine (Jasminum sambac) flowers are highly susceptible to rapid postharvest browning due to enzymatic oxidation. Studies have demonstrated that essential oil from Jasminum officinale possesses strong antioxidant and anti-browning properties by significantly reducing peroxidase, polyphenol oxidase, and phenylalanine ammonia lyase activities. GC-MS analysis revealed benzyl alcohol and benzyl acetate as major constituents responsible for antioxidant activity. To improve water solubility and effectiveness, the essential oil was formulated into a nanoemulsion with small droplet size, enhancing its delivery and stability. In vivo application of the nanoemulsion effectively delayed petal browning, preserved cellular integrity, and maintained flower quality during storage, indicating its potential as a natural alternative for controlling enzymatic browning in jasmine flowers.

AIM:

- To formulate and evaluate a poly-herbal shampoo using selected medicinal plant ingredients that promotes scalp health, ensures effective cleansing, and minimizes adverse effects associated with synthetic shampoos.

OBJECTIVES:

- ✓ To formulate a poly-herbal shampoo using selected herbal ingredients for scalp health.
- ✓ To evaluate physicochemical parameters of the formulated shampoo.
- ✓ To assess cleansing efficiency and scalp-nourishing effects.
- ✓ To ensure safety, stability, and suitability for regular use.

PLAN OF WORK:

- ❖ Literature Survey: Review herbal powders and their benefits for hair and scalp health.
- ❖ Selection of Ingredients: Choose suitable herbal powders like
 - ✓ Hibiscus
 - ✓ Aloe vera
 - ✓ Amla
 - ✓ Soap nut

- ❖ **Formulation:** Prepare the poly-herbal shampoo using selected powders in optimized proportions.
- ❖ **Evaluation:** Test the shampoo for pH, viscosity, foam, cleansing efficiency, and conditioning effect.
- ❖ **Safety and Stability:** Assess the shampoo for safety, stability, and suitability for regular use.
- ❖ **Comparison and Reporting:** Compare with marketed shampoos and document results.

MATERIALS:

Ingredients Used In Poly Herbal Shampoo:

1. Hibiscus
2. Aloe vera
3. Amla extract
4. Soapnut extract
5. Agar-agar
6. Apple cider vinegar

1. HIBISCUS:



Figure 09: (Hibiscus)

BOTANICAL INFORMATION:

- Scientific Name: *Hibiscus rosa-sinensis*
- Family: *Malvaceae*

Relevance of Hibiscus for Hair Care:

Vata, Pitta, and Kapha are the three basic energies, or doshas, that affect the body and are mirrored in the traits of hair, according to Ayurvedic philosophy. Every dosha affects hair differently, affecting its texture, growth, and overall health. In rare instances, a single dosha may dominate an individual's hair, but most people display characteristics of multiple doshas

·**Vata:** Hair can be thin or coarse with a mixture of curls and straight strands, and it grows quickly and is frequently unruly. Dry, brittle, frizzy hair with split ends is the result of an imbalance.

·**Pitta:** Pitta can harm hair roots, resulting in early graying and thinning.

·**Kapha:** Thick, wavy, robust, and full-bodied hair with a glossy graying is typical. However, excessive Kapha can lead to sticky hair strands and an oily scalp. These characteristics make hibiscus a great herb to use in hair care because it balances doshas and encourages hair vitality.^[26]

BENEFITS OF HAIR GROWTH:

·**Encourages Hair Growth:** High in vitamin C, flavonoids, amino acids, mucilage, moisture, and antioxidants, hibiscus is frequently used in herbal hair oils. These ingredients provide a silky texture while nourishing the scalp and hair, promoting healthy, thick hair growth.

·**Protects the Scalp:** The plant's hardy characteristics act as a natural sunscreen to protect the scalp from damaging UVB rays. Additionally, it stimulates dormant follicles, fights excessive oil and dandruff, and preserves the pH balance of the scalp.

·**Strengthens Hair Roots:** Amino acids aid in the synthesis of keratin, which is essential for robust hair strands, and hibiscus flavonoids enhance blood flow to hair follicles, encouraging new growth.

·**Prevents Premature Graying:** Packed with antioxidants and natural pigments, hibiscus may help postpone early graying by providing hair with nutrients that enhance color.

·**Controls Dandruff:** Hibiscus's antimicrobial properties help get rid of fungi that cause dandruff and lessen oily or dry flakes.

·**In-Depth Conditions Hair:** Its mucilage content helps dry, brittle hair by retaining moisture in the hair shafts, which restores elasticity and lessens breakage.

·**Balances Sebum Production:** By controlling sebaceous gland oil secretion, hibiscus helps prevent overly oily or sticky hair conditions.^[26]

2. ALOE VERA:



Figure 10: (Aloe vera)

- Scientific Name: Aloe vera (L.) Burm. f.,
- Family name: *Asphodelaceae*

BENEFITS OF ALOEVERA IN HERBAL SHAMPOO

Hair products:

Since hair is considered to be one of the main elements that improves a person's appearance, it is essential to take good care of your hair. The protuberances from the skin's follicles are called hairs, and they are defined as "an enhanced epithelial structure resulting from the keratinization of germinative cells." Keratin is a component of hair along with other chemicals such as carbon, nitrogen, sulfur, oxygen, and so forth. Alpha-keratin is the most common type of keratin found in vertebrates and is responsible for the growth of hair and nails, among other things.

The scalp is a vital component of the human hair system. It is composed of layers of soft tissue covering the skull and the area of the head where hair grows. It contains sebaceous glands and a large number of hair follicles. The environment is changing, and too much dirt, dust, and pollutant causes the scalp to produce too much sebum, which in turn causes a number of hair issues.^[27]

1. loss
2. Hair thinning
3. Excessive dandruff
4. Split ends
5. Dryness Hair and roughness of hair
6. Bald patches

3. AMLA:



Figure 11: (Amla)

- Scientific Name: *Phyllanthus emblica*
- Family name : *phyllanthaceae*

BENEFITS OF AMLA IN HERBAL SHAMPOO:

The Indian gooseberry tree (*Phyllanthus emblica*), a deciduous member of the Phyllanthaceae family, yields the fruit used to make amla powder. The tree has spreading branches and a crooked trunk, and it can grow up to 18 meters in height. Its light-green, simple leaves resemble pinnate leaves and are arranged closely along branchlets. The amla fruit is spherical, light green or yellowish, and has a distinctive fibrous texture. Its skin is smooth and translucent. It has six vertical grooves and is characterized by an astringent, sour flavor. The fruit, which has many health benefits and is rich in vitamin C, polyphenols, and other antioxidants, is highly prized in traditional Indian medicine.^[28]

4. SOAP NUT:



Figure 12: (Soapnut)

- Scientific Name: *Sapindus mukorossi*
- Family name: *Sapindaceae*

BENEFITS OF SOAP NUT IN HERBAL SHAMPOO:

Anti-inflammatory activity:

Rats with carrageenan-induced edema, granuloma pouch, and adjuvant arthritis were used to test the anti-inflammatory properties of hederagenin and crude saponin extracted from *Sapindus mukorossi*. These agents were also tested for their effects on vascular permeability and acetic acid-induced writhing in mice. Some experiments compared the outcomes with those obtained using oleanolic acid, crude platycodin, platycodigenin, and saikogenin A. In contrast to hederagenin and the other agents used, crude saponin administered both intraperitoneally and orally demonstrated anti-inflammatory activity on carrageenan edema. Rats' granuloma and exudate formations were not significantly inhibited by hederagenin at doses of 100 and 200 mg/kg p.o. daily for seven days, whereas crude saponin at doses of 100 and 200 mg/kg p.o. demonstrated significant effects.^[29]

5. AGAR AGAR:



Figure 13: (Agar agar)

·Scientific Name: **Agar agar**

·Family:**Gelidiaceae**

Agar-agar is an extremely special natural polymer that is becoming more and more popular over synthetic polymers and is being investigated as a potential substitute raw material for medical applications. Its remarkable inherent qualities, like the strength of the gel made from agar-agar, make it highly sought after in the pharmaceutical industry. Agar was used to make a phase-changeable, injectable composite hydrogel that can be used with photothermal and chemotherapy to treat cancers. Antibiotics and chemotherapy drugs can be loaded into this composite hydrogel and subsequently released. Furthermore, it was demonstrated that an agar-based nanocomposite film effectively inhibited the growth of *Listeria monocytogenes*. In the pharmaceutical industry, agar and polysaccharide blends are also becoming more and more popular. Agar-agar is mostly used as a thickening, stabilizing, and gelling agent in pharmaceuticals. Another common use for agar-agar is as a surgical aid and for purgative purposes. To create agar-based products for use in the pharmaceutical industry, researchers have put a lot of effort into creating composite hydrogels, nanocomposite films, and other materials.^[30]

6. APPLE CIDER VINEGAR:



Figure 14: (Apple cider vinegar)

· Scientific Name: *Malus domestica*

· Family name : *Belle`s family (Natalie)*

Customers should be advised that ACV can be irritating to eyes, mucous membranes, and severely irritated skin if it is not diluted in water. It may also be too caustic to apply directly to hair and cause damage. Additionally, using vinegar rinses on chemically damaged or processed hair may make it more brittle. 2, 3

The pH of the scalp ranges from 4.5 to 6.2, whereas the pH of hair fibers is 3.67. Bacteria, viruses, and other possible pollutants are kept at bay by this mildly acidic coating. According to studies, the pH of skin rises in direct proportion to the pH of the cleanser being used. Acid-balanced shampoos are therefore typically advised because of the scalp's naturally acidic pH. Because alkalization can cause hair shafts to swell, shampoos should not have a pH higher than 5.5. This can be avoided by adding an acidic ingredient (such as citric or glycolic acid) to the shampoo to bring the pH down to about 5.5. For this, apple cider vinegar is frequently utilized. However, according to one study, the pH of 82% of shampoos is already acidic.

Co-washing, also known as conditioner-only washing, is a popular hair stylistic technique. It is well-liked by people who think that commercial shampoos remove too much of the natural oils from their hair, leaving it unmanageable or rough. Co-washing is safe for hair, but the molecular makeup and purpose of a conditioner and a shampoo are very different. Since conditioners are designed to add substances to the hair rather than remove dirt and buildup, they are unable to thoroughly cleanse the hair and scalp. For this reason, co-washing is not a suitable substitute for shampooing. Quaternary conditioning agents are an exception because they contain amphoteric detergents comprised of both anionic and cationic groups, which allow them both the ability to remove dirt and sebum with their anionic group, typically found in shampoos, as well as the ability to coat and condition the hair due to the high affinity of the cationic group for the negatively charged hair fibers. Amphoteric detergents are commonly found in 2-in-1 conditioning cleansers, among other ingredients, such as hydrolyzed animal proteins that temporarily plug surface defects on the hair fiber, and dimethicone, a synthetic oil that creates a thin film over the hair shaft, increasing shine and mana. Of note, these conditioning shampoos are ideal for individuals with minimal product buildup on the hair and scalp and are not adequate scalp cleansers for individuals who either wash their hair infrequently or who regularly use hairstyling products.^[31,32,33]

7. JASMINE OIL:



Figure 15: (Jasmine oil)

· Scientific Name: *jasminum officinale*

· Family name: *Oleaceae*

A variety of microorganisms, such as yeast, fungi, and bacteria, can cause food to spoil. In general, low-acid foods like meat and vegetables are attacked by bacteria. Waste products, including acids, are produced when bacteria attack

and break down food. Although the bacteria themselves might not be dangerous to humans, the products they produce are unpalatable and occasionally dangerous, making them unfit for human consumption.^[34]

Because essential oils and their constituents have antibacterial qualities, they are utilized as antiseptics, dental root canal sealants, and feed additives for weaned piglets and nursing sows (Burt, 2004). Lang et al. (2012) reviewed the antifungal and antimicrobial properties of different essential oils. Linalool, the primary constituent of jasmine oil, demonstrates antimicrobial and antifungal properties against a range of bacteria and fungi. Jasmine oil's antimicrobial properties have led to its use as a preservative in food preparation for the same reason.^[35]

FORMULATION OF POLY HERBAL SHAMPOO:

► To the agar-agar solution (10%), added the herbal extract and mixed by shaking continuously at the time interval of 20 minutes.

► 1ml of apple cider vinegar was added constant stirring..

► To improve aroma in the formulation sufficient quantity of essential oil (Jasmine oil) was added and make up the volume up to 100 ml with agar -agar.

S.NO	DRUG NAME	PARTS	QUANTITY FOR 100G
1.	Hibiscus powder	flower	12%
2.	Aloe vera	leaves	07%
3.	Amla powder	fruit	25%
4.	Soap nut	nut	20%

S.NO	MATERIAL REQUIRED	QUANTITY	MEDICINAL USES
01.	Hibiscus	0.5g	Conditioning agent
02.	Aloe vera	0.1g	Moisturizing agent
03.	Amla powder	0.5g	Antidandruff agent
04.	Soapnut extract	0.5g	Foaming agent
05.	Agar agar	Quantity sufficient	Gelling agent
06.	Apple cider vinegar	Quantity sufficient	Antimicrobial agent
07.	Jasmine oil	Quantity sufficient	Fragrance

EVALUATION OF POLY HERBAL SHAMPOO:

MORPHOLOGICAL CHARACTERISTICS:

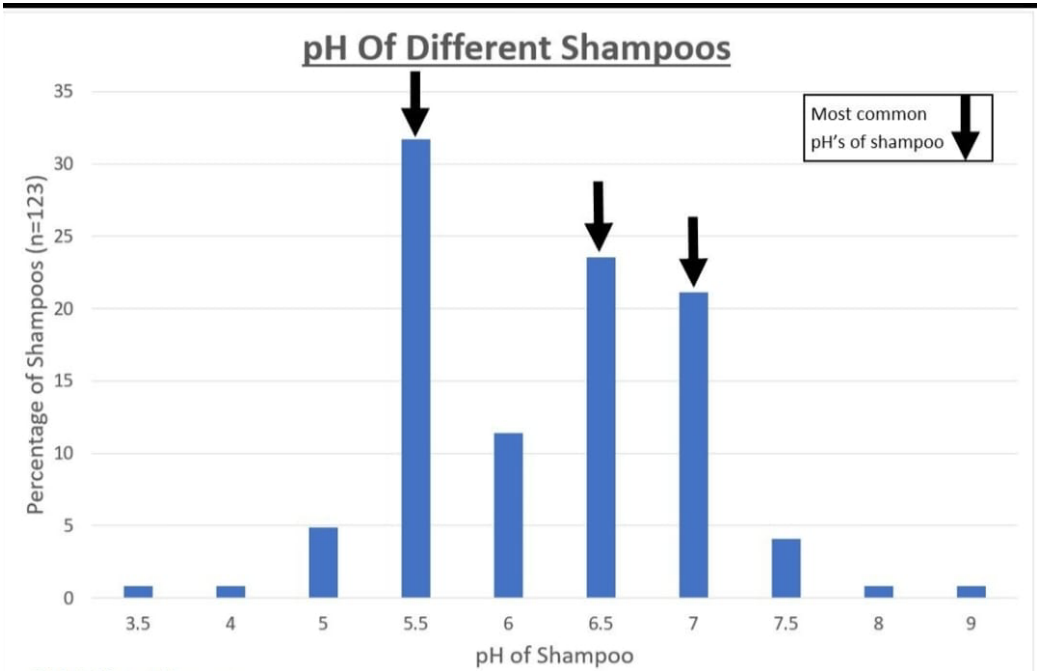
Colour : Brown

Nature: Semi solid

Solubility: Soluble in both organic and inorganic substance

pH TEST:

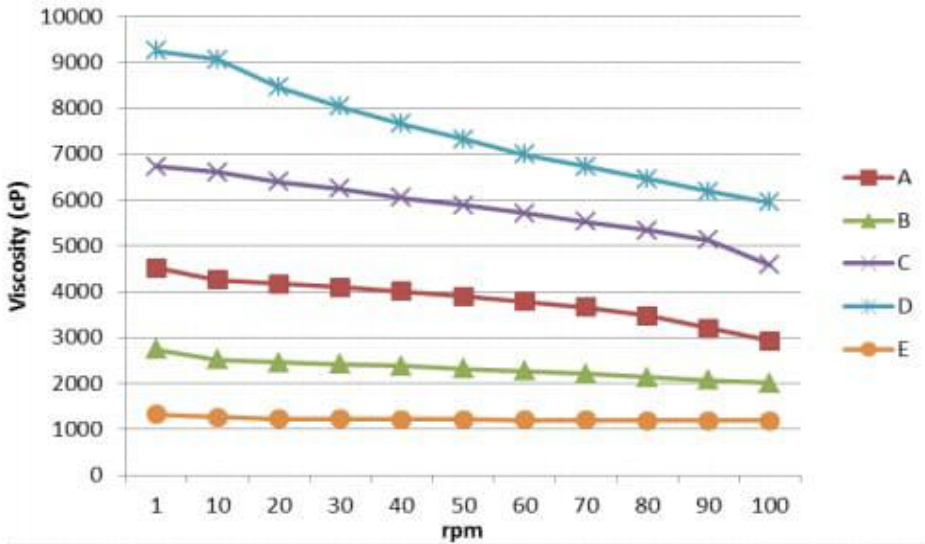
When the shampoo solution was made with 10% distilled water, its pH was measured at 25°C. In addition to stabilizing the scalp and reducing eye irritation, the shampoo's pH is crucial for boosting and improving the quality of the hair.^[36]



VISCOSITY MEASUREMENT TEST:

For shampoos to be easy to use, their consistency needs to be sufficient—low enough to make it easy to remove from the container and apply to hair, but high enough to keep it out of the eyes. Shampoo D had the highest viscosity, followed by shampoos C and A, as shown in figure 6. Shampoos B and E had lower viscosity values, with less variation over the rotation speed range under study. We compared the viscosity at a low rotation speed (10 rpm) to better observe the differences between

shampoos because, according to the literature, the shear rates applicable to the flow from the bottle are roughly 5–10 rpm. With viscosity values ranging from 4000 to 9000 cP, shampoos A, C, and D were easily controlled, but shampoos B and particularly E were too fluid. We believe that viscosity values less than 1250 cP are inappropriate for a shampoo, particularly for a baby shampoo, since it is hard to remove the desired amount from the container, flows very easily, and can enter the baby's eyes. Viscosity values can be visually linked to the shampoo's aspect; typically, opalescent products have higher viscosity values.^[37]



WETTING TIME:

Calculating a surfactant's wetting ability, which is dependent on its concentration, is necessary to assess the shampoo's effectiveness. The canvas disc method, which is a

dependable, quick, simple, and effective way to assess the shampoo's wetting ability, is employed. About 120 seconds is the wetting time displayed by the prepared shampoo. The shampoo's maximum wetting time indicates that it contains fewer detergents.^[38]



FOAM STABILITY TEST:

By employing the cylinder shake method, the foam's stability was assessed. A graduated cylinder with a capacity of 250 ml was filled with approximately 50 ml of the

formulated shampoo solution (1%) and vigorously shaken ten times. By measuring the shake test's foam volume after one and four minutes, respectively, foam stability was determined. After shaking for one minute, the total volume of foam was measured.^[39]



DIRT DISPERSION TEST:

In the dirt dispersion test using Indian ink, the volume of ink in the froth was measured and the result was graded as none, light, moderate, or heavy.



RESULT:

Adequate viscosity was obtained due to agar-agar and aloe vera gel, providing good spreadability and consumer acceptable consistency.

CONCLUSION:

The polyherbal shampoo formulated with hibiscus, amla, aloe vera, agar agar, soap nut, apple cider vinegar, and jasmine oil showed promising results, with good physical and stability characteristics, and effective cleansing and hair care properties. The pH range (5.3-5.8) is suitable for most hair types, indicating potential for commercial development.

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