Pharmacogenetic And Pharmacological Activity on Hibiscus Rosa Sinansis Linn. Herbal Shampoo

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***Abstract*— In years, hair fall has become one of the most prevalent concerns affecting individuals across different age groups. Factors such as stress, pollution, unhealthy lifestyle habits, and excessive use of chemical-based hair products have significantly contributed to this problem. Therefore, the primary objective of the present study is to develop a formulation capable of reducing hair fall while simultaneously promoting healthy hair growth. Hair not only enhances physical appearance but also serves as a natural protective layer for the scalp. Among various hair-care products, shampoos are considered one of the most widely used cosmetic preparations for maintaining scalp hygiene and improving hair texture. Although commercial shampoos are effective cleansing agents, many contain synthetic chemicals that may result in adverse effects upon prolonged use. Herbal shampoos are cosmetic preparations formulated using natural, plant-based materials, especially traditional Ayurvedic herbs. These shampoos aim to cleanse the hair and scalp effectively, similar to conventional shampoos, but without causing harmful side effects. Additionally, they offer benefits such as nourishment, conditioning, and therapeutic action The goal of this research is to formulate an herbal shampoo containing active ingredients with hair growth-promoting and anti-lice properties.**

***Index Terms*— Herbal shampoo, Hair fall, Hair growth, Ayurvedic formulation, Anti-lice, Natural ingredients.**

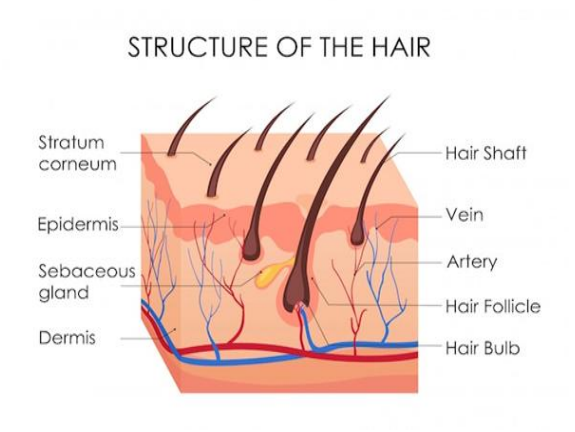
I. INTRODUCTION

The stunning flowering plant Hibiscus rosasinensis, commonly known as the "Queen of Tropics" or "China rose," is primarily found in southeast China and a few islands in the Pacific and Indian Oceans. The extract from dark flowers is utilised in shoeblacking and eyeliners.[1] Additionally, the juice derived from the leaves and blossoms has long been utilised in herbal cosmetics as wilted leaves and as a natural medicine for a number of illnesses and uncomfortable [2,3] Several studies have proved the presence of anti-oxidant, anti-fungal, and antimicrobial properties in flowers of Hibiscus rosa-sinensis. Research on extracts of stems, roots, leaves, and flowers from Hibiscus have revealed that its photochemical components contributed to beneficial findings to human's health such as antioxidant activity [4] Additionally, the juice extracted from the leaves and petals has been employed in natural cosmetics for unpleasant symptoms and as a herbal remedy for a number of infections for a portion of its extension [5,6] The Food and Drug Cosmetic Act defines cosmetics as "articles intended to be rubbed, sprinkled, or sprayed on, introduced into, or otherwise applied Cosmetics[7] Surfactants are typically used in synthetic shampoos because of their capacity to clean and create foam. However, frequent use of these surfactants can cause major problems like dry hair, hair loss, and irritation of the scalp and eyes. We can use shampoos with natural herbal ingredients instead of synthetic ones. Making cosmetics with only natural materials is really difficult. Shampoo formulas contain a variety of medicinal plants that have been used traditionally for years all over the world and may have benefits on hair. These therapeutic plants can be used as extracts, powders, crude forms, or derivatives. Because of their washing and foaming qualities, synthetic surfactants are mostly included to synthetic shampoos.

Anatomy Of the Hair:

Anatomy of Hair: One of the body's vital parts, hair is considered an accessory structure of the integument,

along with sweat glands, sebaceous glands, and nails. Adults frequently have the most hair around the brows, across the head, around the external genitalia, and in the axillae. Despite their limited capacity to do so, hairs on the head shelter the scalp from injury and UV rays. Additionally, it reduces heat loss from the scalp. Protection from foreign items is provided by the hair in the nose, external ear canal, eyelashes, and brows.[8] The regularity of Hair is composed of columns of dead, keratinised epidermal cells bound together by extracellular proteins. The shaft is the portion of the hair that is visible above the skin's surface. The root is the portion of hair that goes deep into the shaft and sometimes into the subcutaneous layer. The three concentric layers of cells that comprise the hair shaft and root are called the medulla, cortex, and cuticle. Thinner hair may lack the inner medulla, which is composed of two or three rows of unevenly formed cells. The middle cortex is composed of elongated cells that make up the majority of the shaft.[9]



Hair Growth Cycle:

Hair growth cycle consists of four phases:
Anagen (Growth Phase): It is the growing phase. This phase lasts for several years.
Catagen (Transitional Phase): During this phase, the hair follicle shrinks and hair growth slows.
Telogen (Resting Phase): It is the resting phase where hair growth stops and new hair begins the growth phase, pushing the old hair out.
Exogen Phase: Last phase of the hair growth cycle where the hair strand completely detaches from the scalp and sheds

Shampoo:
As people look for more natural and organic alternatives to traditional hair care products, herbal shampoos have become more and more popular in recent years. Without the harsh chemicals frequently found in conventional shampoos, these shampoos are made with botanical elements including herbs, plants, and essential oils, which are thought to support hair health and treat a variety of scalp issues. Growing awareness of the possible negative effects of synthetic substances and a move towards sustainable and environmentally friendly products are major factors

contributing to the popularity of herbal shampoos.[10] Herbal therapies have been utilised for ages in many cultures; the benefits of herbs for hair care have been documented in ancient literature from Ayurveda, Traditional Chinese Medicine, and indigenous practices. Aloe vera, neem, hibiscus, and tea tree oil are among the ingredients that have been praised for their nourishing, antibacterial, and antifungal qualities, making them perfect for supporting healthy scalp and hair growth. For example, aloe vera is praised for its calming and moisturising properties, while neem is known for its anti-inflammatory and antibacterial properties that can help reduce dandruff and irritation. The effectiveness of herbal shampoos is frequently ascribed to their special combination of organic components that offer vital nutrients and promote general scalp health. Numerous herbal components appear to contain bioactive chemicals, according to research.[11]

Mechanism Of Shampoo:

Shampoo contains surfactant molecules with a lipophilic tail and a hydrophilic head. The hydrophilic end is drawn towards water and the tail is drawn towards grease and oil on the hair and scalp when we apply shampoo and water to the hair to create lather. Particles of skin and debris are present in the oil and grease. The surfactants create micelles at high concentrations. Anionic surfactants with hydrophobic tails are adsorbed to hair oil or debris during shampooing. Therefore, additional rinsing is used to get rid of these dirt particles.

Function Of Herbal Shampoo:

1. Medication
2. Conditioning
3. Hair Growth
4. Maintenance of Hair Color

Desired Properties of Herbal Shampoo:

1. Ease of Application
2. Removal of More Debris
3. Easy Wet Combing
4. Fragrance
5. Low Level of irritation
6. Well, Preserved
7. Good Stability

Advantages Of Herbal Shampoo:

1.Natural components including amla, shikakai, reetha, neem, and aloe vera are used to make herbal shampoo.

2. It is safer to use on a regular basis because it contains very few or no synthetic ingredients.

3.Minimal side effects include dryness, itching, or irritation of the scalp.

4. By fortifying the hair roots, herbal shampoo aids in lowering hair loss.

5. It promotes healthy hair development by nourishing the scalp and enhancing blood circulation.

6.Herbs that can reduce scalp infections and dandruff include neem and tulsi.

7.It naturally softens, smoothes, and glosses hair.

8.All hair types, especially those with sensitive scalps, can benefit from using herbal shampoo.

9.It keeps the hair and scalp's natural oil balance intact.

10. Herbal shampoos are safe for the environment because they are biodegradable and eco-friendly

II. PLANT PROFILE

Hibiscus rosa-sinensis Linn.

Synonyms: Jaswand, Shoe flower, Jaswandi

Biological source: Biological source: it comprises of blooms of hibiscus rosa-sinensis or hibiscus sabdariffa

Family: Malvaceae

Chemical constituents: The main chemical constituents are taraxeryl acetate, beta-sitosterol, stigmasterol, cholesterol, lipids. flowers contain diglucoside, flavoids, vitamins and niacin. is a shrub that is believed to be native to Tropical Africa or Asia (from India to Malaysia). The plant is extensively grown as a home garden crop in tropical regions such as the Caribbean, Central America, India, Africa,

Brazil, Australia, Hawaii, Florida, and the Philippines. It is a significant export crop in Sudan, particularly in the western region where it ranks second in terms of area behind pearl millet and sesamum.[12]
Uses: The adaptable roselle plant is used to make jelly, jam, juice, wine, syrup, pudding, cake, ice cream and flavouring. Its outer leaves, or calyx, are also known as natal sorrel. Its unique aroma and stunning crimson colour make it a prized culinary product. Roselle is an annual crop used in nutraceuticals, cosmeceuticals, food, medicines, and animal feed. Additionally, hibiscus promotes hair growth, texture, colour, antidandruff qualities, scalp health, and shine.[13]

III. AIM AND OBJECTIVE

Aim:
To create and assess a herbal shampoo using the extract from the leaves of Hibiscus Rosa Sinansis for its therapeutic and cosmic properties in hair care and natural hair growth.

Objective:
1. The application of nutraceuticals with antibacterial, hair growth-promoting, and skin and hair care qualities.
2. Assess the therapeutic advantages, such as moisturising and conditioning.
3. To evaluate the hibiscus shampoo's capacity to cleanse and condition hair.
4. To determine the phytochemical components of hibiscus that support scalp nutrition and hair growth.
5. To contrast the prepared herbal shampoo with one that is sold commercially.
6. To assess the manufactured shampoo's skin compatibility and safety.
7. To produce a natural and effective hair-cleansing solution that decreases hair fall, strengthens hair roots.

III. MATERIAL AND METHOD

Material:
Raw materials and Exipeant Profile:
All the materials used in the present study i.e., aloe vera gel, soap nut powder, gelatin, lemon juice, rose water, methyl paraben, distilled water, were purchased from local market. The details of materials used for the formulation of hibiscus herbal shampoo is mentioned below:

1.Aloe Vera:

Synoname: Aloe, Musab bar, Kumari
Biological source: Aloe Vera is made from the fresh juice that is extracted by cutting the bases of various aloe species' leaves. Aloe ferox, Aloe Barbadensis Mil, or Aloe perryi.[14]
Chemical constituents: The most critical dynamic boss constituents of Aloe vera Barboloin and Isobarbaloin, which constitute the purported crystalline Aalin, present in the medication at from 10 to 30% constituent are shapeless Aaloin, sap, emodin and Aloe-emodin [15]
Uses: Serves as a smoothing agent, possesses antibacterial and anti-lice qualities, balances the pH of the scalp, includes vitamins B2, B6, B12, and B.C. promotes the growth of hair.

2.Reetha:

synonyms -soapberry, washnut, ritha, and arishtak.
Biological source: Fruit from Sapindus emarginatus trees and shrubs. Family: Sapindaceae
Chemical contents: saponins, sugars, fatty acids, tannins, flavonoids, and calcium oxalate.
Uses: Soap nut is commonly used in hair care for its natural cleansing, anti-dandruff properties, ability to encourage hair growth, prevent thinning, and minimise frizz.[16]

3.Shikakai

Synonyms: Acacia concinna, Shikakai Tree, and Soap Pod.
Biochemical Source: Shikaka is made from the dried pods of the Acacia concinna tree, which is native to tropical and subtropical parts of Southeast Asia and India.[17]
Family: Fabacea's
Uses: Shikakai is frequently utilised in conventional and cosmetic skin and hair treatments.

4.Amla :

Synoname: Indian Gooseberry
Biological source: Phyllanthus emblica fruits, either fresh or dried
family: Phyllanthaceae
Use: In hair care products, as a digestive tonic, antioxidant, and rejuvenator.

5.Gelatin

The natural polymer gelatin is produced by of collagen's hydrolytic protein breakdown and its unique amino acid composition gives it a number of health advantages. Chemically speaking, gelatin is composed of eighteen different types of complicated amino acids, Ca. 57% of glycine.

6. Lemon Juice

biological source: is a little evergreen tree that is a member of the Citrus limon
Family: Rutaceae
Chemical constituents: include minerals, flavonoids, citric acid, ascorbic acid, and essential oils.
Therapeutic Uses: Due to their therapeutic qualities, lemon fruit and juice have long been utilised in many cultures.

7. Rose Water:

The virtues of the rose plant have been known for millennia in the ayurveda medical system. The rose plant, which is a member of the Rosaceae family, is well-known for its fragrant blossoms, which are used extensively in medications, cosmetics, and perfumes [19

8. Methyl Paraben:

One of a homologous sequence of parabens, methylparaben can be used alone or in combination to achieve the desired antimicrobial effect. Pure methyl paraben is a white or colourless powder with antibacterial properties that is safe to use.[20]

9. Destiled Water:

Water that has been cooked into vapour and then condensed back into liquid in a different container is known as distilled water. Contaminants in the original water that don't boil below or close to the water's boiling point stay in the original container. Therefore, one kind of purified water is distilled water. Water that is virtually devoid of chemicals and microorganisms is called pure water.[21]

Formulation Table:[22]

Sr.	Ingredient	Quantity	Role
1	Hibiscus leaf powder	35 g	Strength hair, reduces hair fall, improves conditioning
2	Ritha (Reetha) powder	15 g	Natural cleanser, provides mild foaming
3	Shikakai powder	10 g	Cleansing+conditioning, helps reduce dandruff
4	Aloe vera gel	15 ml	Moisturizer,soothes scalp, prevents dryness
5	Gelatin (optional)	2 g	Naturalthickener,improves shampoo texture
6	Lemon juice	10 ml	PH balance reduces dandruff, adds shine
7	Rose water	0.2 g	Fragrance, scalp cooling, improves consistency
8	Methyl paraben	0.2 g	Preservative to prevent microbial growth
9	Distilled water	q.s	Adjusts viscosity and smooth blending

IV. AUTHENTICATION AND METHOD:

1. Weigh each component in accordance with the recipe.
2. A decoction of hibiscus powder, Reetha, Shikakai, and amla pawder was made in a beaker with 70 millilitres of water. The mixture then simmered for 20 minutes until the water was reduced by half.
3. Use a muslin cloth to strain the decoction.
4. In 50 millilitres of warm water, dissolve the gelatin.
5. Combine the dissolved gelatin with the active substance.
6. Add rose water, lemon juice, and aloe vera gel.
7. Incorporate methyl paraben into the mixture.
8. After letting the product cool, it is moved to a container that is tightly sealed.[23]

V. DIRECTIONS FOR USING HERBAL SHAMPOO

1. Wet Your Hair: To begin, thoroughly moisten your hair with water. Apply Shampoo: Gently apply a sufficient quantity of shampoo to your scalp and hair using your palms.
2. Gently massage the scalp for two to three minutes using circular motions with your fingertips. This guarantees that the shampoo reaches every area of your scalp and hair and helps to promote blood circulation.

3. Allow for Absorption: To give the herbal ingredients time to do their job, let the shampoo on your scalp and hair for two to three minutes.
4. Rinse Completely: Use water to rinse away all of the shampoo. Make sure your hair is free of residue.
5. necessary, repeat: If your hair is extremely unclean or oily.

VI. EVALUATION PARAMETERS:

1.Physical Appearance:
Outward Look The created formulation was assessed for its fluidity, capacity to produce foam, clarity, brown colour, and pleasant odour.[24]
2. pH measurement:
Using a pH meter and litmus paper, the pH of a 10% shampoo solution in distilled water was measured at room temperature (25 degrees Celsius).[25]
3. Calculating the percentage of solid contents:
Four grammes of shampoo were applied to a clean, dry China dish after it had been weighed. The shampoo-filled dish was weighed. The shampoo's precise weight was determined.[26]
4. Rheological Evaluation:
The viscosity of the shampoo was Calculated by using Oswald's viscometer. When a Liquid flows through the capillary tube, the time Required for the liquid to pass between two marks (A and B) is determined.The viscosity. [27]
5. Dispers of Dert
Ten millilitres of distilled water and two drops of shampoo should be added to the big test tube. Shake the test tube ten times while using this Indian ink and stopper. The foam's ink content was measured and found to be None.[28]
6.Measurement of Surface Tension:
Use distilled water to dilute the shampoo to a concentration of 10%. Drops that develop when the fluid level moves from A to B were measured.
7.Foaming Ability and Foam Stability:
The foaming ability was assessed using a slightly modified cylinder shake method. A 250 ml graduated measuring container was filled with 50 ml of the 1% shampoo solution and covered with a hand. The total amount of foam was measured after a minute of shaking. For five minutes, the process was carried out.
8. Anti – Dandruff in – Vitro Activity:
This procedure involves melting the agar, cooling it to 45 o C, inoculating it with Candida albicans, and then pouring it into a sterile petri plate. After the agar plate has set, holes about 9 mm in diameter are made in the medium using a sterile corn borer. The antimicrobial agent is then inserted into one of the holes, and another hole is filled with a commercial formulation that serves as a reference.

VII. CONCLUSION

Using Hibiscus rosasinensis and other natural ingredients like aloe vera, soap nut, Shikakai, Amla, and lemon juice, the study effectively developed and assessed herbal shampoos. The results showed that while avoiding the negative effects of synthetic shampoos, herbal shampoos are efficient in cleaning, conditioning, encouraging hair development, and minimising dandruff. The stability, safety, and effectiveness of the herbal formulations were verified by the assessment parameters, which included pH, foam stability, surface tension, and dirt dispersion. Additionally, the results of the in vitro antidandruff activity test verify that, in comparison to the commercial formulation, our herbal shampoo showed the greatest inhibition. The herbal formulations showed similar or better performance when compared to commercial shampoos, indicating their potential as consumer-preferred, safe, and environmentally responsible substitutes in the hair care sector. The feasibility of using natural substances is demonstrated by this study

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