International Journal of Pharmacognosy and Herbal Drug Technology (IJPHDT)
ISSN: 3049-1630, Vol.02, Issue No. 08, 2025 (pp.39-53)
AKT PUBLICATION
ORIGINAL ARTICLE
https://www.aktpublication.com/index.php/ijphdt

Formulation and Evaluation of Polyherbal Based Shampoo

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ABSTRACT
This study aimed to develop and evaluate a polyherbal shampoo using natural, plant-based ingredients that deliver effective cleansing, conditioning, and scalp compatibility without synthetic additives. In response to growing consumer demand for eco-friendly personal care products, Ayurvedic botanicals such as amla, ginger, hibiscus, aloe vera, bhringraj, senna, and shikakai were selected for their well-documented antimicrobial and nourishing properties. Herbal extracts were prepared via maceration and decoction, followed by phytochemical screening to identify bioactive constituents. Seven formulations (F1–F7) were developed using a gelatin base, incorporating herbal extracts, natural fragrance, gelling agents, and pH regulators. Each shampoo was evaluated for physicochemical and aesthetic parameters, including appearance, pH, viscosity (measured at 26 ± 1°C and 120 rpm using a Labman LMDV60 viscometer), foam generation and stability, total solids, dirt dispersion, and washability. Among all prototypes, Formulation F5 demonstrated superior performance: pH of 5.16, viscosity of 946.0 mPa·s, foam stability of 90 mL after 1 minute, and solid content of 23.88%. It effectively dispersed ink and rinsed cleanly, while also exhibiting favorable sensory attributes such as pleasant aroma, golden honey color, and commercial-grade texture. These results confirm that combining multiple herbal extracts in a single formulation can yield a safe, effective, and sensorially appealing shampoo. Formulation F5 stands out as a promising eco-conscious alternative to conventional shampoos, supporting further innovation in herbal-based personal care products.

Key Words:
Polyherbal shampoo, Herbal cosmetics, Ayurvedic botanicals, Natural formulation, Eco-friendly personal care, Phytochemical screening, Foam stability, Viscosity analysis, Dirt dispersion, Scalp compatibility

Article History:
Received April 28, 2025
Revised June 18, 2025
Accepted July 19, 2025
Published July 19, 2025
DOI: https://doi.org/10.64063/30491630.vol.2.issue8.4

1. INTRODUCTION:

The word "cosmetic" comes from the Greek word *kosmetics*, meaning "beautifying." Cosmetics are used to enhance appearance and include products like lotions, makeup, perfumes, and hair care items. Herbal cosmetics, made from natural ingredients, are growing in popularity worldwide due to their safety and wellness benefits. As awareness of herbal alternatives rises, demand increases, driving innovation and sustainability in the beauty industry. While modern science has reduced the use of natural resources, herbs remain important for beauty, nutrition, and medicine [1].

The essential component of human beauty is hair. Since ancient times, people have used herbs to manage, clean, and adorn their hair. As the Time has gone by. Although synthetic agents have a significant market share, consumers are now becoming more conscious of their detrimental

effects on skin, eyes, and hair. These factors drew the population to herbal products because they are less costly and have fewer negative effects. Shampoos and hair cleansers are used for more than just cleaning; they also give hair a glossy finish and keep it manageable and healthy [2]. cosmetic preparation that cleans the hair and scalp. Its primary goal is to remove accumulated sebum, debris from the scalp, and residue from hair care products from the hair. Shampoos can also be used as drugs, conditioners, lubricants, and for other purposes. The main ingredient used to make the shampoo is surfactant; other ingredients are added to increase the product's effectiveness [3].

The herbal shampoo is a type of cosmetic preparation that uses herbs that is natural ingredients from the plant. 'Herbal shampoo' can refer to any hair washing product that is created using extracts of Ayurvedic herbs and flowers. It can also be described as a thick liquid hair care solution that cleans and removes oil and debris from hair [4].

1.1 Anatomy and Physiology of Hair [5]

1.1.1 Anatomy of Hair:

Hair grows from follicular units located in the fatty layer of the scalp. Each unit contains 1–4 hairs and a hair bulb at the base that produces hair cells, nourished by blood vessels in the dermis. As hair grows, its outer layer hardens into keratin once it emerges from the epidermis.

Structure of Hair:
Hair is composed of keratinized, dead cells arranged in three layers [5].

- **Medulla:** Inner core; present in thick hair; contains air gaps and pigment granules.
- **Cortex:** Middle layer; provides strength and color.
- **Cuticle:** Outer layer of flat, keratinized cells; protects inner layers.

1.1.2 Physiology of Hair [6]:

Hair growth occurs in three main phases:

1. **Anagen (Growth Phase):** Active hair production; can last years.
2. **Catagen (Transitional Phase):** Short phase where hair growth stops.
3. **Telogen (Resting Phase):** Hair sheds, and new growth begins.

During **Anagen VI**, the hair bulb fully forms around the dermal papilla, pushing new hair to the surface.

1.2 Hair Problems

Common issues include dandruff, dry or oily hair, split ends, frizz, limpness, hair loss, and damage from heat, chemicals, or color.

1.2.1 Dandruff:

A widespread scalp condition characterized by flaking, itching, and irritation due to abnormal shedding of epidermal cells [7].

Types of Dandruff [8]:

- **Dry Dandruff (Pityriasis simplex):** Fine, white flakes without irritation.
- **Oily Dandruff (Pityriasis steatoides):** Greasy, yellowish flakes; often leads to hair loss and irritation.

Causes of dandruff:

The formation of dandruff involves the release of enzymes called lipases by the Malassezia fungus. These enzymes break down the sebum on the scalp into oleic acid. In people who are sensitive to it, this oleic acid penetrates the outer layer of the skin, accelerating skin cell turnover. This rapid turnover results in flaking, which appears as dandruff, and can also cause redness and irritation [9].

- Fungal overgrowth (Malassezia)
- Excess oil production
- Harsh shampoos, poor hygiene
- Stress, poor diet, and environmental changes

Symptoms:

- Itchy scalp
- White flakes
- Redness and irritation

Treatment:

- Balanced diet and stress management
- Use of anti-dandruff shampoos
- Herbal remedies for long-term scalp health

1.2 Shampoo and Herbal Alternatives

1.3.1 Shampoo:

A hair cleanser that removes oil, dirt, and dead skin without irritation. Modern shampoos may contain both synthetic and herbal ingredients [5].

1.3.2 Herbal Shampoo:

Formulated with Ayurvedic herbs to cleanse the scalp naturally and treat dandruff and hair issues safely [10].

Ideal Characteristics:

- Non-irritating, biodegradable, slightly acidic (pH < 7)
- Effective cleanser with good foaming and rinsing ability
- Adds shine and smoothness

Types of Shampoo [1]**:**

- Liquid, Powder, Cream, Lotion, Baby, Conditioning, Anti-dandruff, etc

Advantages [10]**:**

- Treats dandruff, hair fall, dryness, and improves texture
- Maintains scalp hygiene and hair health

Disadvantages [10]**:**

- May cause dryness or irritation with prolonged use

Shampoo Composition [1]**:**

Surfactants, anti-dandruff agents, herbal extracts, conditioners, thickeners, preservatives, pH adjusters, and fragrance.

2. MATERIAL AND METHODS:

2.1 Plant profile:

2.1.1 Ginger (*Zingiber officinale*) [11][12][13]:

Family: Zingiberaceae

Chemical constituent: ginger contain several chemical constituents like gingerol, shogaol, zingiberene, vitamins and mineral and essential oils.

Useful part: rhizome (the underground stem)

Figure 1: ginger

Mechanism:

- Contains anti-inflammatory and antimicrobial properties. It stimulates blood circulation in the scalp, promoting hair growth and preventing hair loss.

Uses:

- Promotes scalp health, reduces dandruff and stimulates hair growth.
- Ginger oil can be used in scalp massages to enhance circulation and nourish hair follicles.

Amla (*Phyllanthus emblica*) [1][2][3]:

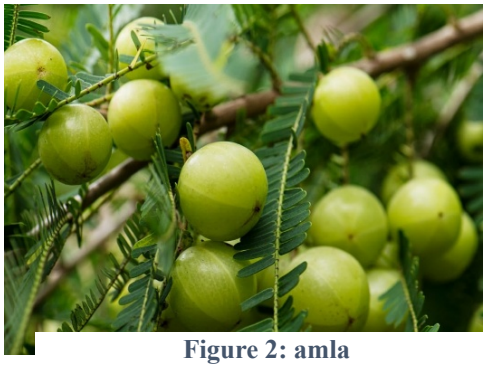

Figure 2: amla

Family: Euphorbiaceae

Chemical constituents: Amla is a rich source of vitamin C (ascorbic acid) and contains a variety of bioactive phytochemicals, predominantly polyphenols such as ellagic acid, chebulinic acid, gallic acid, chebulagic acid, apigenin, quercetin, corilagin, luteolin, and phyllembin. The fruit also contains two hydrolysable tannins known as Emblicanin A and B. Additionally, amla

is abundant in essential minerals like phosphorus, iron, and calcium, as well as pectin. Fresh amla fruits typically consist of about 75% moisture.

Useful part: amla fruit

Mechanism:

- Rich in vitamin C and antioxidants. It nourishes hair follicles, strengthens hair, and prevents premature greying. Amla also helps to improve scalp health and reduce dandruff.

Uses:

- Promote hair growth
- Prevent premature graying
- Strengthen hair
- Improves scalp health
- Conditions hair
- Balance pH

2.1.2 Shikakai (*Acacia concinna*) [1][2][3]:

Family: fabaceae

Chemical constituent: shikakai, contains, saponins, tannins, flavonoids, proteins and minerals.

Figure 3: shikakai

Useful part: dried pods(powder)

Mechanism:

- A natural cleanser that has a low pH, which makes it gentle on the hair. It helps in removing dirt and excess oil without stripping natural oils. Shikakai also conditions hair and promotes shine.

Uses:

- Cleanses hair
- Add more shine to hair
- Prevent grays
- Prevents lice, psoriasis eczema & scabies
- Provide nourishment to the hair and, promote healthy rapid hair growth

2.1.3 Hibiscus (*Hibiscus rosa-sinensis*) [1][10]:

Family: Malvaceae

Chemical constituents: Anthocyanins, Flavonoids, Vitamin C, Polysaccharides, Essential Oils, Minerals.

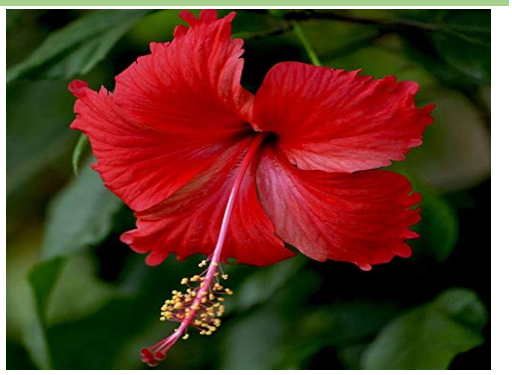

Figure 4: hibiscus

Useful part: Flower

Mechanism:

- Contains vitamins A and C, which nourish hair and promote growth. It also helps in preventing dandruff and has moisturizing properties that keep hair hydrated.

Uses:

- Stimulate hair growth
- Conditions hairs
- Prevent dandruff
- Balance scalp pH
- Enhance shine and texture

2.1.4 Bhringraj (*Eclipta alba*) [1][13]:

Family: Asteraceae

Figure 5: bhringraj

Chemical constituents: bhringraj contains ecliptine, wedelolactone, bhringraj oil, flavonoids, saponins, vitamins and minerals.

Useful part: Leaves

Mechanism:

- Known for its hair rejuvenating properties. It promotes hair growth, reduces hair loss, and improves overall scalp health. Bhringraj is also believed to darken hair naturally.

Uses:

- Promotes Hair Growth, Strengthens Hair, Conditions Hair
- Soothes Scalp, Enhances Shine and Texture
- Balances Scalp pH

2.1.5 **Senna (*Cassia angustifolia*)** [14][15]:

Family: Fabaceae

Figure 6: senna

Chemical constituents: Senna contains anthraquinone-based compounds, specifically dimeric glycosides, which serve as the drug's active components. These include sennosides A, B, C, and D.

Useful part: leaves

Mechanism:

- Often used as a natural conditioner. It strengthens hair strands, adds shine, and can help with dandruff. Senna can also improve the overall health of the hair.

Uses:

- Cleansing agent
- Conditioning properties
- Detoxifying
- Promotes hair health

2.1.6 **Aloe vera (*Aloe barbadensis miller*)** [2][3][4]:

Family: Asphodelaceae

Figure 7: aloe-vera

Useful part: leaves

Mechanism:

- Contains enzymes that promote hair growth and has moisturizing properties. It helps soothe the scalp and reduce itchiness while providing hydration to the hair.

Uses:

- Used as thickening agent
- Moisturizing soothing and conditioning

2.2 Material:

Table.1: list of ingredients:

S.no.	Ingredients	Scientific name	Form used	Purpose in formulation	Source
1	Ginger	*Zingiber officinale*	Dried rhizome powder	Antimicrobial, sclap stimulant	Sunita nursery, Raipur
2	Amla	*Phyllanthus emblica*	Crushed fruit	Antioxidant strengthen hair	Sunita nursery, Raipur
3	Shikakai	*Acacia concinna*	Dried pod powder	Natural cleanser lather enhancer	Sunita nursery, Raipur
4	Hibiscus	*Hibiscus rosa-sinensis*	Dried petal powder	Shine promoter hair conditioning	Sunita nursery, Raipur
5	Bhringraj	*Eclipta alba*	Dried leaves	Hair growth promotes cooling effect	Sunita nursery, Raipur
6	Senna	*Cassia angustifolia*	Dried leaves	Antifungal/ Antidandruff	Sunita nursery, Raipur
7	Aloe vera	*Aloe barbadensis*	Fresh gel	Moisturizing and soothing	Local herbal supplier
8	Lemon juice	-	Fresh juice	pH adjuster	Local market

2.2.1 **Collection of plants:** Fresh botanical samples — rhizomes of ginger, fruits of amla, pods of shikakai, petals of hibiscus, leaves of bhringraj, and leaves of senna — were procured from Sunita Nursery, Raipur. The collected materials were washed thoroughly under running tap water to remove surface contaminants and then shade-dried for 7–10 days. Once dried, they were pulverized into coarse powder using a mechanical grinder and stored in labeled, airtight containers for further extraction.

2.2.2 **Authentication of plants:** All plant materials were authenticated by a qualified botanist from ["the Department of Botany, Shri N P A Government Ayurved College, Raipur"]. Herbarium specimens were prepared and deposited for reference. Botanical names were verified using The Plant List and Indian Medicinal Plants Database, ensuring taxonomical accuracy before proceeding with formulation.

Table. 2: list of chemicals:

S.no.	Chemical	Function	Source
1	Ethanol (95%)	Solvent for maceration extraction	Loba chemie Mumbai, India
2	Gelatin	Natural gelling and thickening agent	Loba chemie, mumbai, India
3	Xanthan gum	Thickener and viscosity stabilizer	Loba chemie, Mumbai, India
4	Sodium lauryl Sulphate Needle (SLS)	Surfactant for foam formation and cleansing	Loba chemie Mumbai, India
5	Geogard ECT	Natural preservative	Purenso global India
6	Rose oil	Fragrance enhancer	Local cosmetic shop
7	Distilled water	Solvent and vehicle	-

2.3 Method:

- **Preparation of plant extract:** Extracts were prepared by maceration and decoction method individually.

- **Phytochemical test of plant extracts:** Phytochemical screening of the herbal extracts was conducted using standard qualitative tests to identify key bioactive compounds. Alkaloids were detected using Mayer's or Dragendorff's reagent, producing a creamy white or orange precipitate. Tannins and phenolic compounds were confirmed by ferric chloride, yielding greenish-black or dark blue coloration. Saponins were identified through foam formation upon shaking with water, while flavonoids showed yellow coloration with ammonia that disappeared upon acid addition. Terpenoids were indicated by a red or brown interface using chloroform and sulfuric acid. Reducing sugars were detected via Benedict's test, forming a red precipitate upon heating. Glycosides produced a brown ring at the interface of acetic acid, ferric chloride, and sulfuric acid. Quinones were confirmed by color change (red, yellow, or orange) upon reaction with sodium hydroxide. These tests validated the presence of multiple phytoconstituents contributing to the shampoo's cleansing, conditioning, and therapeutic properties [16].

- **Method of preparation:**

- All herbal extracts (ginger, amla, shikakai, hibiscus, senna, and bhringraj) were prepared using appropriate extraction methods and measured as per the formulation design. In a beaker, gelatin was dissolved in warm distilled water with gentle stirring. Once fully hydrated, xanthan gum was slowly sprinkled in and stirred continuously until a uniform gel base was formed. After

cooling slightly, surfactant (SLS), lemon juice, aloe vera gel, and rose oil were added gradually under moderate stirring. The prepared herbal extracts were incorporated one by one to ensure even distribution. Finally, the preservative was added, and the mixture was stirred until a smooth, homogenous shampoo was obtained.

- **Evaluation** [3][17]:

1. **Visual assessment:**

- The visual assessment test perfume for the color, odor and foam producing ability etc.

2. **pH determination:**

- the pH of 10% shampoo solution in distilled water was determined at room temperature 25°c. The pH was measured by using digital pH meter.

3. **Viscocity:**

- Viscosity of each shampoo formulation was evaluated using a Labman LMDV60 digital rotational viscometer equipped with spindle L2. Approximately 100 mL of the shampoo sample was transferred into a 250 mL clean beaker and maintained at 26 ± 1°C using a temperature-controlled water bath. The spindle was immersed into the sample to the designated groove marking and rotated at 120 rpm. Viscosity readings were recorded in mPa·s (centipoise) after stabilization (30–60 seconds).

4. **Foaming stability test:**

- The foam stability was assessed using the cylinder shake method. For this, 50 mL of a 1% shampoo solution was poured into a 250 mL graduated cylinder and shaken vigorously ten times. The stability of the foam was then evaluated by measuring the foam volume after 1 minute and again after 4 minutes. The total foam volume was initially recorded at the 1-minute mark following shaking.

5. **Dirt dispersion test:**

- To perform the test, two drops of shampoo were mixed with 10 mL of distilled water in a large test tube. One drop of India ink was then added to the mixture. The test tube was sealed and shaken ten times. The presence of ink within the foam was then evaluated and categorized as None, Light, Moderate, or Heavy based on its intensity.

6. **Solid% test:**

- A Clean dry china dish was weighed and 4 grams of shampoo was added to it. The weight of dish and shampoo was noted. The exact weight of shampoo was calculated. Place the china dish with herbal shampoo on hot plate until the liquid portion was evaporated. The weight of shampoo (solids) after drying was calculated.

7. **Washability test:**

- The washability test of a polyherbal shampoo on the hand involves applying a small amount (about 1 mL) of the shampoo directly onto the palm or back of the hand. The shampoo is gently rubbed with a little water to produce lather, simulating actual use. After lathering for about 1–2 minutes, the hand is rinsed thoroughly under running tap water without vigorous scrubbing. The ease with which the shampoo is removed, absence of slipperiness or stickiness, and the feel of the skin after rinsing (smooth, non-greasy, and residue-free) are noted. A shampoo with good washability will rinse off completely, leaving the skin clean and free from any film or oily residue.

3. RESULTS:

Table. 3: result of phytochemical test

Tests	Ginger	Amla	Shikakai	Hibiscus	Bhringraj	Senna
Alkaloids	+	+	+	-	-	+
Tannins	-	+	-	+	+	+
Saponins	+	+	+	+	+	+
Phenols	-	+	-	+	+	+
Terpenoids	+	+	+	+	+	-
Glycoside	+		+		-	+
Carbohydrate	+	+	+	-	+	+
Flavonoids	+	+	+	+	-	-
Quinone	-		-			-

Table. 4: formulations of herbal shampoo

Ingredients	F1	F2	F3	F4	F5	F6	F7
Ginger	8g	3g	5g	4g	6g	5g	6g
Amla	4g	8g	5g	4g	6g	5g	5g
Shikakai	1g	1g	1g	0.5g	0.5g	0.5g	1g
Hibiscus	0.5g	0.5g	1g	1g	0.5g	0.5g	1g
Bhringraj	0.5g	0.5g	1g	1g	0.5g	2g	0.5g
Senna	0.5g	0.5g	1g	0.5g	0.5g	0.5g	0.5g
Aloe-vera gel	8g	10g	6g	12g	10g	8g	10g
Gelatin	1.5g	1.5g	1.2g	1.5g	1.3g	1.5g	2g
Lemon juice	4ml	5ml	4ml	3ml	3ml	4ml	3ml
Rose oil	0.5ml	0.5ml	0.5ml	0.7ml	0.3ml	0.5ml	1ml
SLS Needle	2.0g	2.5g	3.0g	3.5g	3.5g	2.5g	2.5g

Xanthan gum	0.1g	0.2g	0.2g	0.3g	0.3g	0.2g	0.3g
Geogard ect	0.2ml	0.2ml	0.2ml	0.2ml	0.2ml	0.2ml	0.2ml
Distilled water	Qs.	Qs.	Qs.	Qs.	Qs.	Qs.	Qs.

Table. 5: organoleptic properties:

Parameter	F`1	F2	F3	F4	F5	F6	F7
Color	Reddish brown	Amber orange	Dark brown	Light orange brown	Golden honey	Pale brownish yellow	Deep reddish brown
Odor	Mild herbal	Mild citrus	Slightly pungent	Mild fruity	Pleasant herbal	Neutral	Earthy
Appearance	Translucent with slight turbidity	Clear and bright	Slightly opaque	Clear and glossy	Transluc ent, foamy film	Mild trbidity with bubbles	Viscoussl ightly hazy

Table. 6: pH measurement:

Formulation	F1	F2	F3	F4	F5	F6	F7
pH	4.28	5.39	5.52	5.50	5.16	5.48	4.81

Table. 7: viscocity

Formulation	F1	F2	F3	F4	F5	F6	F7
Viscocity	483.5 mPa.s	835.5 mPa.s	875.0 mPa.s	928.7 mPa.s	946.0 mPa.s	350.6 mPas	383.8 mPa.s

Table. 8: dirt dispersion

Formulation	F1	F2	F3	F4	F5	F6	F7
Ink dispersed in water	Partial	Full	Moderate	Poor	Full	Slightly	Moderate
Ink retained in water	Yes	No	Slightly	Yes	No	Yes	Slightly
Dirt dispersion	Moderate	Good	Good	Poor	Good	Poor	Moderate

Table. 9: solid content%

Formulation	F1	F2	F3	F4	F5	F6	F7
Solid content%	20..04%	15.73%	18.25%	26.21%	23.88%	16.49%	19.07%

Table. 10: foam volume and stability (foaming test)

Formulation	F1	F2	F3	F4	F5	F6	F7
Initial Foam height (ml)	100ml	80ml	90ml	95ml	100ml	90ml	95ml
Foam height after 1 minute(ml)	60ml	55ml	60ml	65ml	90ml	95ml	76ml
Foam stability	Moderate	Moderate	Moderate	Good	Good	Execellent	Good

Table. 11: washability test

Formulation	F1	F2	F3	F4	F5	F6	F7
Wash ability	Good	Good	Moderate	Moderate	Good	Moderate	Good

4. DISCUSSION:

The optimized formulation F5 demonstrated a balance of functional performance and sensory appeal, validating the synergistic effect of combining Ayurvedic herbs such as ginger, amla, hibiscus, bhringraj, senna, aloe vera, and shikakai. Phytochemical screening confirmed the presence of saponins, flavonoids, glycosides, alkaloids, terpenoids, and phenolics—compounds known to support cleansing, conditioning, and scalp health. F5 exhibited ideal physicochemical characteristics, including pH compatibility (5.16), viscosity (946.0 mPa·s), rich solid content (23.88%), high foam stability, and complete dirt dispersion, aligning with commercial shampoo benchmarks. Compared to other prototypes, F5 maintained consistency across all parameters without compromising washability or aesthetic appeal. These findings highlight that thoughtful herbal pairing and formulation structure can yield an effective, safe, and eco-conscious alternative to synthetic hair care products.

5. CONCLUSION:

This study successfully formulated and evaluated a polyherbal shampoo by integrating traditional Ayurvedic botanicals with modern scientific protocols, resulting in a product that is both effective and environmentally conscious. Using extracts from seven well-characterized herbs—ginger, amla, shikakai, hibiscus, bhringraj, senna, and aloe vera—the research demonstrated the potential of herbal synergy in cosmetic innovation. Among the seven prototypes developed, Formulation F5 emerged as the most promising, exhibiting optimal physicochemical properties including ideal pH (5.16), viscosity (946.0 mPa·s), high foam stability, rich solid content, and complete dirt dispersion. Organoleptic evaluation further confirmed its commercial viability, with favorable color, fragrance, and texture. Phytochemical screening validated the presence of bioactive compounds such as saponins, flavonoids, glycosides, alkaloids, and phenolics, reinforcing the therapeutic and cleansing efficacy of the formulation. Supported by standardized performance tests and literature-based evidence, F5 offers a replicable model for scalp-safe, biodegradable personal care solutions. Overall, this work contributes meaningfully to the advancement of eco-conscious cosmetic formulation and lays a strong foundation for future research in herbal hair care, including potential enhancements in delivery systems, microbiome compatibility, and multifunctional benefits.

6. REFERENCES:

1. Satyanarayana, T., Nirmala, D., Sai, C., Dileep, K., Sai, K., Akshitha, M., Sucharitha, V., & Sagarika, M. (2022). *Formulation and Evaluation of Poly Herbal Shampoo Powder: Vol. Issue*. www.ijppr.humanjournals.com
2. Sutar, M., Deshmukh, S., Chavan, M., & Singh, S. (2013). *Preparation and Evaluation of Polyherbal Shampoo Powder*. In *International Journal of Pharmacy and Biological Sciences*. www.ijpbsonline.com
3. More, A. G., Pote, P. D., Kore, P. S., & Garhwani, Y. D. (2022). *Formulation and Evaluation of Polyherbal Anti-Dandruff Shampoo. Internationnal Journal of Ayurvedic Medicine*, *13(2)*, 365–369. http://ijam.co.in
4. Gholve, S., Nadarge, S., Hindole, S., Bhusnure, O., Bhosale, P., & Thonte, S. (2015). *Formulation and Evaluation of Polyherbal Antidandruff Powder Shampoo. World Journal of Pharmaceutical Research World Journal of Pharmaceutical Research SJIF Impact Factor 5*, *4*(10), 1714–1731. www.wjpr.net
5. John, P., Satheesh, K., Joseph, J., Antu, T., & Professor, A. (n.d.). Formulation and Evaluation of Polyherbal Powder Shampoo Using Indian Medicinal Plants. *International Journal of Pharmaceutical and Biological Science Archive NLM*, *11*(4). www.ijpba.in
6. Singh, S., & Maury, S. (2015). *Formulation and Evaluation of Polyherbal Antidandruff Powder Shampoo Using Pomegranate Seed and Guava Leave. World Journal of Pharmaceutical Research Www.Wjpr.Net* | , *11*. https://doi.org/10.20959/wjpr20226-24088
7. Patil, V. K., Patil, Y., Patkari, M. A., Chaudhari, R. M., Pawar, S. P., & Pharmacy, B. (n.d.). *Formulation and Evaluation of Multi-Purpose Herbal Shampoo. Indo American Journal of Pharmaceutical Research*, 2024. https://doi.org/10.5281/zenodo.11561478

8. Kameswararao, K., Lakshmiprasanna, B., Aparnadevi, M., Nagadevi, G., & S Rajeswari. (2018). *Formulation and Evaluation of Polyherbal Shampoo* (Vol. 13, Issue 1). www.ijppr.humanjournals.com
9. Babasaheb, B. A., Vilas, D. R., Bhanudas, T. A., & Sudam, G. P. (2022). *Formulation and Evalution of Polyherbal Shampoo. JETIR2206691 Journal of Emerging Technologies and Innovative Research (JETIR) www.jetir.org*. www.jetir.org
10. Bhojane, R., Deurmalle, S., Jaiswal, P., & Sufi, B. (2023). Formulation and Evaluation of Herbal Anti-Dandruff Shampoo. In *IJNRD.ORG IJNRD2306395 International Journal of Novel Research and Development* (Vol. 8, Issue 6). www.ijnrd.org
11. Kasar, T. M., Mahale, C. B., Mahale, S. D., More, V. I., Solanke, R. A., & Shewale, V. (2024). *Formulation and Evaluation of Herbal Hair Mask* (Vol. 11). JETIR. www.jetir.orgc408
12. Pushpam, S., Parashar, T., Rani, S., & Jakhmola, V. (2022). *Formulation and Evaluation of Herbal Hair Pack*. www.ijcrt.org
13. More, G. B., & Jain, S. (2023). *Formulation and Evaluation of Herbal Shampoo*. *International Journal of Creative Research Thoughts*, *11*, 2320–2882. www.ijcrt.org
14. Bhagwat, S. S. (2020). *Formulation and Evaluation of Herbal Shampoo*. *International Journal of Creative Research Thoughts* (Vol. 8). www.ijcrt.org
15. Dudhe, S. P., & Rothe, S. P. (2017). *Phytochemical Screening of Selected Plant Species Related to Cosmetics* (Vol. 3). www.ijariie.com
16. Kumar, P. P., Priyanka, N., Subrahmanyam, M. G., Kumar, K. A., Venkat, A. E., Sangeetha, V., Manjari, K., Pavani, D., & Sirisha, D. (2024*). Formulation and evaluation of herbal shampoo. Journal of Pharmacognosy and Phytochemistry*, *13*(2), 165–170. https://doi.org/10.22271/phyto.2024.v13.i2b.14897
17. Nikam, P. V., Rathod, J. V., Waghmare, V. B., Jadhav, R. O., Shinde, V. P., & Raut, B. (2023). *Development and Evaluation of Polyherbal Shampoo.* (Vol. 29, Issue 1). https://www.researchgate.net/publication/377500396