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## FORMULATION AND EVALUATION OF HERBAL SHAMPOO

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### ABSTRACT:

This document outlines the process of formulating a DIY herbal shampoo for hair smoothing. It emphasizes the importance of selecting ingredients with hair-smoothing and conditioning properties, such as Reetha, Shikakai, and Amla, and incorporating them into a base solution. The steps involve preparing a base with a thickening agent, mixing herbal extracts, adding essential oils for fragrance, and incorporating natural preservatives. The final product is then evaluated for its cleansing, conditioning, and hair-smoothing effects, focusing on parameters like foam volume, surface tension, and hair texture. The formulation aims to create a shampoo that cleanses hair effectively, conditions it, reduces frizz, and enhances its overall texture and appearance.

This natural, chemical-free shampoo is suitable for various hair types and can be customized to individual preferences. Regular use may lead to softer, shinier, and more manageable hair.

**KEYWORD:** A diy reetha (soapnut), shikakai, amla (Indian go herbal shampoo for hair smoothing can be made by combining natural ingredients like aloe vera, oseberry), bhringraj, and essential oil

### INTRODUCTION:

In today's world of chemical-laden hair products, many people are turning to natural alternatives for healthier, smoother hair. Herbal shampoos, made with time-tested botanical ingredients, offer a gentle yet effective way to cleanse and nourish the scalp without harsh additives. This DIY herbal shampoo for hair smoothing harnesses the power of nature using ingredients like aloe vera, hibiscus, fenugreek, and essential oils—to tame frizz, add shine, and promote overall hair health. Easy to make at home, this shampoo is perfect for those seeking a more holistic and eco-friendly hair care routine.

In today's world of fast-paced lifestyles and chemical-laden beauty products, more people are turning toward natural and holistic alternatives for their hair care routines. One of the most popular and effective approaches is using a DIY herbal shampoo, especially formulated for hair smoothing. Unlike commercial shampoos filled with synthetic ingredients, herbal shampoos use the natural healing and nourishing power of plants to gently cleanse the scalp while smoothing and softening the hair.

Smooth hair is often associated with health, shine, and manageability. However, environmental pollutants, heat styling, chemical treatments, and even poor diet can lead to dryness, frizz, and rough textures. This is where a natural, homemade herbal shampoo becomes a valuable addition to your hair care regimen.

### AIM AND OBJECTIVE:

#### AIM: HERBAL HAIR SHAMPOO EVALUATION AND FORMULATION

To formulate a natural, DIY herbal shampoo using plant-based ingredients that promote hair smoothing, reduce frizz, and enhance hair manageability without the use of harsh chemicals.

### OBJECTIVE:

1. Identify suitable herbs and natural ingredients known for their hair-smoothing and nourishing properties (e.g., aloe vera, hibiscus, fenugreek, coconut milk, etc.).
2. Formulate a shampoo base using natural surfactants or soap alternatives that are
3. local on the scalp extracts and essential oils that enhance smoothness and Hydration.
4. Test the effectiveness of the shampoo on different hair types for smoothness, shine, and detangling.
5. Evaluate the shelf life and stability of the shampoo under natural preservation methods.
6. Ensure safety and skin compatibility through patch tests and reviewing ingredient safety data.

Herbal shampoo for hair smoothing advantages:

- Chemical free: Gentle on hair and scalp, avoiding harsh additives.

Natural smoothing: Herbs like hibiscus, aloe vera, and fenugreek reduce frizz and soften hair.

- Nourishing: Rich in vitamins and antioxidants for healthier, shinier hair.
  - Customizable: Tailored to your hair type with natural ingredients.
  - Eco-friendly & cost-effective: Budget-conscious and better for the environment.
- Disadvantages of DIY herbal shampoo for hair smoothing:
1. Short Shelf Life: Without preservatives, they spoil quickly and may harbor bacteria or mold.
  2. Inconsistent Results: Homemade formulas may not always deliver consistent smoothing effects due to varying ingredient quality or proportions.
  3. Lack of Lather: Natural shampoos often produce little foam, which some users find less effective for cleaning.
  4. pH Imbalance: Improper pH can cause scalp irritation or damage hair over time.
  5. Time-Consuming: Preparation and sourcing ingredients can be inconvenient.
  6. Allergic Reactions: Natural ingredients can still cause allergies or sensitivities.

## REVIEW AND LITERATURE:

Herbal shampoos are gaining popularity due to their natural ingredients and potential benefits for hair care. Here's a review of the literature on DIY herbal shampoos for hair smoothing:

Studies have shown that herbal shampoos can be effective in promoting hair growth, reducing dandruff, and improving hair texture. A study published in the International

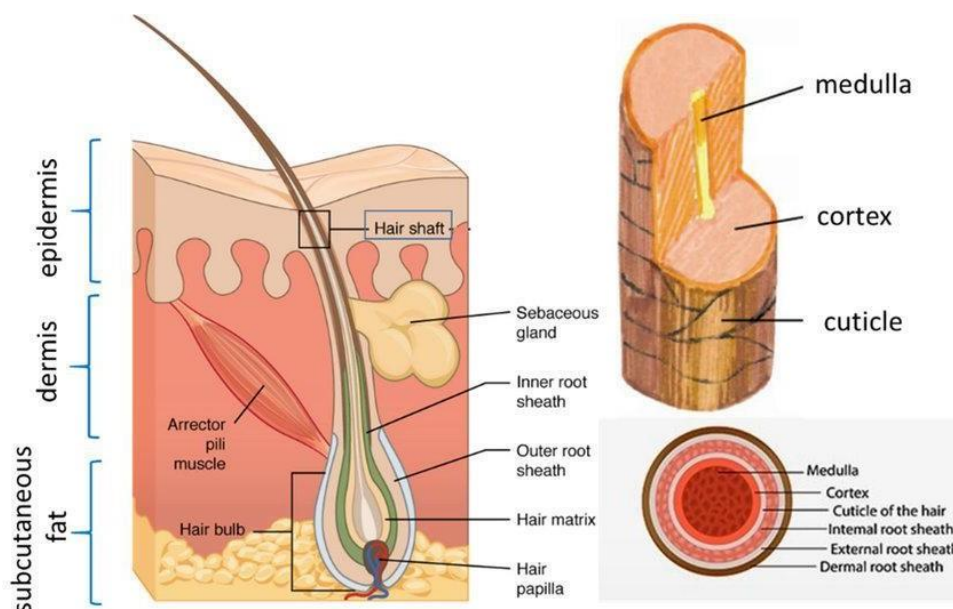
Journal of Research in Applied Science and Engineering Technology found that a herbal shampoo formulated with Piper Betel and Psidium Guajava leaves extract showed promising results in promoting hair growth and reducing hair fall.

### Plan Of Work:

Hair Structure: Hair is made up of three main layers:

1. Cuticle – Outermost layer with overlapping cells like roof shingles. Smooth cuticles = shiny, manageable hair.
2. Cortex – Middle layer, gives hair strength, color, and elasticity.
3. Medulla – Inner core (present in thick/coarse hair), function not fully understood.
4. Hair smoothing mainly involves acting on the cuticle to make it lie flat, reducing frizz and increasing shine.

### DIAGRAM: 1- STRUCTURE OF HAIR



### REETHA POWDER:

Reetha powder is a fine powder made from dried fruits of the Reetha tree (*Sapindus mukorossi*), commonly known as soapnut or soapberry. It's native to India and parts of Southeast Asia and has been used in Ayurvedic medicine for centuries due to its natural cleansing and therapeutic properties.

Composition:

Reetha contains:

- Saponins: Natural surfactants that create a mild lather when mixed with water. They are responsible for the cleaning properties of Reetha.
- Sugars and mucilage: Help in moisturizing skin and hair.
- Antibacterial and antifungal compounds: Effective against dandruff and scalp infections.

Benefits of Reetha Powder:

For Hair:

1. Natural Cleanser: Removes dirt, oil, and product buildup without harsh chemicals.
2. Promotes Hair Growth: Stimulates the scalp, improving blood circulation.
3. Reduces Dandruff: Antifungal properties help reduce flakiness and itching.
4. Improves Hair Texture: Adds natural shine and softness.
5. Prevents Hair Loss: Strengthens roots and minimizes breakage.

For Skin:

1. Gentle Exfoliant: Cleanses pores and removes dead skin cells.
2. Treats Acne and Pimples: Antibacterial action helps prevent breakouts.
3. Anti-inflammatory: Soothes irritated or inflamed skin.
4. Balances Oil Production: Helps regulate sebum on oily skin.

For Household Use:

1. Eco-Friendly Detergent: Safe for washing clothes, especially delicate fabrics.
2. Non-Toxic Cleaner: Can be used as a dishwashing or surface cleaner.

#### **DIGRAM: 2- REETHA POWDER**



#### **SHIKAKAI:**

Shikakai powder is made from the dried pods, leaves, and bark of the Shikakai plant (*Acacia concinna*), a climbing shrub native to India. The name Shikakai means “fruit for hair” in Sanskrit. It has been used in Ayurveda for thousands of years as a natural cleanser and hair tonic.

Botanical Profile:

Scientific name: *Acacia concinna*

- Common names: Shikakai, Soap pod, Seekaaya (in Tamil), Cheekaya (in Telugu)
- Form: Usually found as a fine brown powder made from sun-dried pods and sometimes mixed with the leaves and bark.

Nutritional & Chemical Composition:

- Saponins: Natural foaming agents with cleansing properties.
- Flavonoids and alkaloids: Promote hair health and fight dandruff.
- Vitamins: Especially rich in Vitamin A, C, D, E, and K, which nourish the scalp and hair.
- Antioxidants: Fight scalp inflammation and oxidative stress.

Benefits of Shikakai Powder:

For Hair:

1. Natural Cleanser Gently removes dirt, oil, and dandruff without stripping the scalp’s natural oils.
2. Promotes Hair Growth Nourishes the scalp, strengthens roots, and promotes thick, healthy growth.
3. Prevents Dandruff and Itching Antifungal and antibacterial properties relieve scalp conditions and itchiness.
4. Strengthens Hair Roots Reduces hair fall and breakage by strengthening the hair shaft and roots.
5. Improves Hair Texture Adds natural shine, smoothness, and softness to hair.
6. Delays Premature Graying Regular use helps maintain natural hair color.

For Skin (less common):

- Mild cleanser for oily skin.
- Helps treat minor skin infections due to antibacterial properties.

### DIAGRAM: 3-SHIKAKAI POWDER



### NEEM POWDER:

Neem powder is made by drying and grinding the leaves of the Neem tree (*Azadirachta indica*), a tree native to the Indian subcontinent. Known as the “village pharmacy” in Ayurveda, every part of the Neem tree—leaves, bark, seeds, and oil—is used medicinally.

Neem powder is especially prized for its antibacterial, antifungal, anti-inflammatory, and detoxifying properties.

#### Botanical Profile:

- Scientific name: *Azadirachta indica*
- Common names: Neem, Nimba, Indian Lilac
- Form: Fine greenish powder made from dried Neem leaves.
- Nutritional C Phytochemical Composition:
- Nimbin, Nimbidin, Azadirachtin: Powerful antimicrobial and anti-inflammatory compounds.
- Flavonoids and Tannins: Antioxidants that protect skin and scalp cells.
- Fatty acids (from seeds): Aid in moisturization and skin repair.

#### For Skin:

1. Fights Acne C Pimples Kills acne-causing bacteria, reduces inflammation, and dries out pimples.
2. Reduces Scars C Pigmentation Encourages skin regeneration and fades dark spots.
3. Anti-Aging Properties Rich in antioxidants that protect against premature aging and sun damage.
4. Treats Eczema, Psoriasis C Rashes Soothes inflammation and itching.
5. Controls Oil C Pores Regulates sebum and tightens enlarged pores, ideal for oily skin.

#### For Hair C Scalp:

1. Treats Dandruff Antifungal properties fight *Malassezia*, the dandruff-causing fungus.
2. Prevents Hair Loss Strengthens follicles and improves scalp health.
3. Combats Lice C Itchy Scalp Naturally repels lice and soothes itching.
4. Promotes Hair Growth Improves blood circulation and unclogs blocked hair follicles. For Oral C Body Health (when ingested safely):
  - Boosts immunity
  - Detoxifies liver and blood
  - Promotes oral health (used in toothpaste and powders)
  - Supports digestion and controls parasites (with caution)

**DIAGRAM: 4 NEEM POWDER****FENUGREEK POWDER:**

Fenugreek powder is made from ground dried seeds of the Fenugreek plant (*Trigonella foenum-graecum*), a herb native to the Mediterranean region, India, and the Middle East.

Known as "Methi" in Hindi, Fenugreek seeds have been used for centuries as a culinary spice and natural remedy for various health and beauty concerns.

Nutritional & Chemical Composition:

Fenugreek seeds contain:

- Proteins: Especially beneficial for hair strength and growth.
- Saponins: Natural cleansing and moisturizing agents.
- Flavonoids and Alkaloids: Provide anti-inflammatory and antioxidant effects.
- Mucilage: Gives fenugreek its unique gel-like texture, useful for hydrating hair and
- Vitamins: Especially B vitamins, Vitamin C, and iron.
- Phytoestrogens: Plant-based compounds that mimic estrogen and support hormonal balance.

Benefits of Fenugreek Powder:

For Hair:

1. Promotes Hair Growth Rich in proteins and nicotinic acid, which strengthen hair shafts and stimulate follicles.
2. Controls Hair Fall Nourishes roots, reduces breakage, and supports hormonal balance (which can affect hair).
3. Fights Dandruff and Scalp Irritation Antifungal and anti-inflammatory properties soothe the scalp.
4. Acts as a Natural Conditioner Mucilage deeply hydrates and smoothes hair, reducing frizz and dryness.
5. Adds Shine and Volume Regular use makes hair softer, shinier, and fuller.

For Skin:

1. Anti-Aging Antioxidants fight wrinkles and sagging.
2. Fights Acne and Pimples Antibacterial properties reduce breakouts and cleanse pores.
3. Moisturizes Dry Skin Mucilage soothes and hydrates rough or inflamed areas.
4. Brightens Complexion Can help reduce blemishes and pigmentation over time.

For Health (when consumed safely):

1. Improves Digestion Aids in reducing acidity, bloating, and constipation.



2. Regulates Blood Sugar Beneficial for diabetics due to its effect on insulin sensitivity.
3. Balances Hormones Used traditionally to manage PMS and menopause symptoms.
4. Boosts Lactation Fenugreek is well-known to increase milk production in nursing mothers.

**DIAGRAM: 5-FENUGREEK POWDER**



**METHI POWDER:**

- Methi is the Hindi word for Fenugreek.
- The powder is made by grinding sun-dried fenugreek seeds.
- It has a slightly bitter, nutty taste and a strong, maple-like aroma.
- It is rich in nutrients and bioactive compounds, making it valuable for hair, skin, and overall health.

**Key Nutrients & Compounds:**

- Proteins and amino acids - Essential for hair and skin cell repair
- Iron & Magnesium - Support circulation and reduce inflammation
- Mucilage - A gel-like substance that hydrates and soothes
- Flavonoids and Saponins - Antioxidant and anti-inflammatory
- Phytoestrogens - Plant compounds that mimic estrogen
- Vitamin C & B-complex - Help in collagen production and metabolism

**Health Benefits of Methi Powder:**

1. For Hair:
  - Promotes Hair Growth: Protein and nicotinic acid stimulate follicles.
  - Reduces Hair Fall: Strengthens roots and prevents breakage.
  - Treats Dandruff and Scalp Itchiness: Antifungal and soothing.
  - Acts as Natural Conditioner: Makes hair softer and shinier.
  - Controls Frizz: Mucilage hydrates dry, coarse strands.
2. For Skin
  - Anti-Acne: Antibacterial properties fight acne-causing bacteria.
  - Reduces Blemishes: Brightens complexion and fades dark spots.
  - Delays Aging: Antioxidants combat fine lines and dullness.
  - Moisturizes: Mucilage soothes dry or flaky skin.
3. For Digestion & Health (When Taken Internally):
  - Improves Digestion: Aids in relieving constipation and acidity.
  - Controls Blood Sugar: Improves insulin function and glucose control.
  - Balances Hormones: May ease PMS, menopause, and PCOS symptoms.
  - Boosts Lactation: Widely used to increase breast milk supply in nursing mothers.
  - Reduces Inflammation: Helpful for arthritis and gut health.

**DIAGRAM: 6-METHI POWDER****AMLA POWDER:**

Amla powder is made from dried and ground fruits of the Amla tree (*Phyllanthus emblica*), also known as Indian Gooseberry. Revered in Ayurveda for thousands of years, Amla is considered a Rasayana (rejuvenator) and is one of the richest natural sources of Vitamin C.

**Botanical & Nutritional Profile:**

- Botanical name: *Phyllanthus emblica*
- Common names: Amla, Indian Gooseberry, Amalaka, Nellikai
- Taste (Rasa in Ayurveda): Sour, astringent, sweet, bitter, pungent
- Vitamin C: Extremely high (more stable in dried form than synthetic sources)
- Antioxidants: Polyphenols, flavonoids, tannins
- Minerals: Calcium, iron, phosphorus
- Amino acids: Protein building blocks
- Fiber: Good for digestion and gut health

**Benefits of Amla Powder:****For Hair:**

1. Promotes Hair Growth Strengthens roots and improves blood circulation to the scalp.
2. Prevents Hair Fall Nourishes follicles and reduces breakage and shedding.
3. Delays Premature Graying Naturally darkens and strengthens hair pigmentation.
4. Adds Shine and Volume Makes hair thicker, glossier, and more manageable.
5. Treats Dandruff and Itchy Scalp Antimicrobial and cooling effect soothes irritation.

**For Skin:**

1. Brightens Complexion Rich Vitamin C content promotes collagen production and skin radiance.
2. Fades Pigmentation and Scars Amla helps reduce dark spots and evens out skin tone.
3. Anti-Aging Fights wrinkles and fine lines due to its antioxidant profile.
4. Fights Acne Amla's antibacterial and astringent properties reduce breakouts.

**For General Health:**

1. Boosts Immunity High Vitamin C content helps fight infections and oxidative stress.
2. Improves Digestion Supports liver function and bowel regularity.
3. Balances Blood Sugar Beneficial for those managing diabetes or metabolic issues.
4. Enhances Liver Function Amla is hepatoprotective (protects liver cells).
5. Supports Eye Health Vitamin C and carotene in Amla improve vision and prevent cataracts.

**DIAGRAM: 7 – AMLA POWDER****LEMON JUICE:**

Lemon juice is the liquid extracted from the fruit of the lemon tree (*Citrus limon*). It is known for its sharp, tangy flavor and is widely used in cooking, cleaning, skincare, haircare, and as a health tonic.

Lemon juice is rich in vitamin C, citric acid, and various antioxidants, making it a versatile and powerful natural remedy.

Nutritional Composition (Per 100 ml of Fresh Lemon Juice):

- Calories: ~22 kcal
  - Vitamin C: ~39-50 mg (over 50% of daily requirement)
  - Potassium: ~103 mg
  - Citric acid: 5-8% (gives lemon its tartness)
  - Flavonoids: Hesperidin, eriocitrin – natural antioxidants
  - B Vitamins: Small amounts of B1, B2, B6
  - Calcium & Magnesium: Trace amounts
- Health Benefits of Lemon Juice:**
1. **Boosts Immunity:**
    - High in Vitamin C, it helps the body fight infections and supports overall immune health.
  2. **Aids Digestion:**
    - Stimulates bile production and helps regulate stomach acid.
    - Drinking warm lemon water may relieve bloating, constipation, and indigestion.
  3. **Alkalizes the Body:**
    - Though acidic in nature, lemon juice has an alkalizing effect after digestion, balancing body pH.
  4. **Supports Weight Loss:**
    - May suppress appetite and improve hydration, contributing to weight management.



#### 5. Detoxifies the Liver:

- Acts as a gentle liver stimulant, helping flush out toxins when consumed regularly.

#### 6. Prevents Kidney Stones:

- Citric acid binds with calcium to help prevent stone formation in the kidneys. Beauty C Skincare Uses:

##### 1. Brightens Skin:

- Natural bleaching agent that helps lighten dark spots, scars, and pigmentation.

##### 2. Treats Acne:

- Its antibacterial and astringent properties can reduce pimples and control oil.

##### 3. Fades Blemish:

- Regular use can gradually reduce the appearance of acne scars and age spots.

##### 4. Exfoliates Skin:

- Citric acid acts as a mild alpha-hydroxy acid (AHA), removing dead skin cells.
- DIY Tip: Mix lemon juice with honey, yogurt, or aloe vera for gentler skin application.

#### Haircare Benefits:

##### 1. Treats Dandruff:

- Antifungal and astringent properties help reduce flakes and itchiness.

##### 2. Adds Shine:

- Clarifies and removes buildup when used in a rinse.

##### 3. Controls Oiliness:

- Helps balance sebum production in oily scalp conditions.

##### 4. Lightens Hair Naturally:

- When exposed to sunlight, lemon juice can lighten hair color over time.

**DIAGRAM: 8 LEMON JUICE****LAVENDER OIL:**

Lavender oil is an essential oil extracted from the flowers of the lavender plant (*Lavandula angustifolia*) through steam distillation. It's prized for its calming aroma, antiseptic, anti-inflammatory, and relaxation-inducing properties.

Lavender oil is widely used in Aromatherapy, Ayurveda, skincare, haircare, and wellness products.

**Key Compounds in Lavender Oil:**

- Linalool - Calming, anti-anxiety, antimicrobial
- Linalyl acetate - Anti-inflammatory, soothing
- Camphor - Pain-relieving and anti-itch (in small amounts)
- Terpinenes and cineole - Antifungal and antiseptic
- Geraniol - Enhances skin health and aroma

**Health Benefits of Lavender Oil:**

1. Reduces Stress and Anxiety:
  - Inhalation or topical use helps calm the nervous system.
  - Widely used in aromatherapy, massage oils, and relaxation sprays.
  - May help improve mood and reduce mild symptoms of depression.
2. Improves Sleep:
  - Lavender's scent promotes deeper and more restful sleep.
  - Helps with insomnia and sleep disturbances when diffused or applied topically.
3. Relieves Headaches and Migraines:
  - Massaging diluted lavender oil into temples or inhaling its aroma can ease tension headaches.
4. Pain Relief:
  - Effective for muscle pain, joint stiffness, and cramps when massaged onto the skin.
5. Supports Respiratory Health:
  - Inhaling lavender oil can help relieve congestion, allergies, and mild asthma symptoms.

**Haircare Benefits:**

1. Promotes Hair Growth

- Stimulates blood circulation to the scalp, encouraging hair follicle health.
2. Treats Dandruff:
- Antifungal and soothing properties reduce scalp flakiness and irritation.
3. Reduces Hair Loss:
- Calms stress-related hair fall and strengthens hair roots.

#### **DAIGRAM: G- LAVENDER OIL**



#### **Material and method –**

DIY Herbal Shampoo for Hair Smoothing:

Ingredients (Herbal Base):

You can find all these in powdered form at herbal stores or make your own by drying and grinding:

INGREDIENTS QUANTITY PURPOSE

Shikaki Powder 2 tbsp

Natural Cleanser smooth Reetha Powder

2 tbsp

Natural Scalp Cleanser Amla Powder

1 tbsp

Strengthens roots, adds shine Fenugreek Powder

frizz

1 tbsp

Conditions hair, tames Lemon juice

1 tbsp

Deep cleansing Lavender oil

1 tbsp

Adds softness C fragrance Water

2 cup

To prepare the shampoo base

Optional Add-Ins (for extra smoothing C fragrance):

- Rose water - 1 tbsp (for shine and mild fragrance)
- Few drops of essential oils - like lavender, lang ylang, or sweet orange

**Method:**

1. Boil the herbal powders:
  - In a pan, add 2 cups of water.
  - Add Shikakai, Reetha, Amla, and Fenugreek powders.
  - Let it simmer on low heat for 10-15 minutes, stirring occasionally.
  - The water will darken and slightly thicken—this is your herbal decoction.
2. Strain the mixture:
  - Once cool, strain using a muslin cloth or fine sieve to remove residue.
  - You now have your herbal shampoo base.
3. Add conditioning agents:
  - Mix in aloe vera gel, coconut oil, and essential oils while the mixture is lukewarm.
  - Stir well until combined.

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**Ingredients (powdered or dried):**

- Shikakai -2 tbsp
- Reetha – 2 tbsp
- Amla -1 tbsp
- Fenugreek – 1 tbsp
- Water –2-3 cups

**Extraction Method:**

1. Boil all the powders in 2-3 cups of water on low heat for 15-20 minutes.
2. Cool the mixture to room temperature.
3. Mash and stir to release natural saponins and nutrients.
4. Strain using a muslin cloth or fine sieve.
5. Add 2 tbsp aloe vera gel and 1 tsp coconut or lavender oil.
6. Mix well and store in a clean bottle.



Use:

- Apply to wet hair, massage into scalp and strands, leave for 3-5 mins, then rinse.
- Let me know if you want a no-boil version or one for long-term storage Herbal Shampoo for Smoothing –

**Result:**

- Hair Texture: Smoother and softer
- Frizz Control: Noticeable reduction
- Foam: Mild lather
- pH: Balanced (~5.0)
- Scalp Feel: Clean, no irritation
- Overall: Effective for natural smoothing and mild cleansing



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## DISCUSSION:

The herbal shampoo formulated using aloe vera, hibiscus, fenugreek, and shikakai demonstrated effective hair smoothing and conditioning properties. Aloe vera provided hydration and scalp soothing, while hibiscus added shine and improved manageability.

Fenugreek contributed slip, making detangling easier, and shikakai offered gentle cleansing without stripping natural oils.

The pH of the formulation (~5.0) was within the ideal range for scalp and hair health, helping maintain the hair cuticle's integrity. Though lather was mild (due to the absence of synthetic surfactants), cleansing was sufficient for normal use. Regular application improved hair texture, reduced frizz, and left the scalp feeling clean and balanced.

This suggests that a well-balanced herbal shampoo can be an effective and natural alternative for those seeking smoothing effects without harsh chemicals



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## CONCLUSION:

This herbal shampoo is a natural, cost-effective, and safe alternative for smoothing hair. It offers mild cleansing, moisturization, and frizz control without harsh chemicals, making it ideal for individuals with sensitive scalps or those seeking a more eco-friendly haircare routine. Continued use is likely to improve hair texture, shine, and overall manageability.

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## FUTURE SCOPE:

1. Customization: Future shampoos can be tailored for specific hair types (oily, dry, curly) with herbs like tea tree oil or argan oil.
2. Advanced Extracts: More concentrated herbal extracts and bioavailable ingredients could enhance effectiveness.
3. Sustainability: Eco-friendly packaging and zero-waste options (like shampoo bars) will align with environmental trends.
4. Technology Integration: Smart formulas with sensors for pH and moisture levels could personalize the haircare experience.
5. Scientific Validation: More research on herbal ingredients will increase credibility and effectiveness.

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## REFERENCE:

1. Harrison JL, Davis KD. Cold-evoked pain varies with skin type and cooling rate: a psychophysical study in humans. *Pain*, 1999;83:123-13.
2. Maderson PF. Mammalian skin evolution: reevaluation. *Exp Dermatol*, 2003;12:233-236.
3. Randall VA, Botchkareva NV. The biology of hair growth. In: Ahluwalia GS, editor.
4. *Cosmetic Application of Laser and Light-Based System*. Norwich, NY: William Andrew Inc, 2009, 3-35.
5. Zhang L, Demain AL. *Natural Products Drug Discovery and Therapeutic Medicine*. Totowa, NJ: Humana Press, 2005, 3-5.
6. *Journal of Pharmacy Research*, 2011;4(6):1824-1827. Biswas K, Chattopadhyay I, Banerjee RK, Bandyopadhyay U. Biological activities and medicinal properties of Neem (*Azadirachta indica*). *Curr Sci*, 2002;82:1336-1345.
7. Dhurat RP, Deshpande DJ. Loose anagen hair syndrome. *Int J Trichology*, 2010;2:96-100.
8. Bulmer A, Bulmer G. The antifungal action of dandruff shampoos. *Mycopathologia*, 1999;147:63-65.
9. Pierard CJ, Franchimont C, Hermann JF, Degreef H, Pierard GE. From axioms to new insights into dandruff. *Dermatology*, 2000;200:93-98.
10. Evans WC. *Pharmacognosy*. 16<sup>th</sup> ed. New York: Harcourt Brace and Company, 1997, 28.
11. Mahajan UN, Wasule DD. Sunscreen and anti-oxidant activities of herbal gel formulations. *Pharmacognosy Mag*, 2008;13(4):99-101.
12. Dureja H, Kaushik D, Gupta M, Kumar V, Lather. Cosmeceuticals: An emerging concept. *Indian J Pharmacol*, 2005;37(3):155-159.