

# Formulation and Evaluation of Herbal Shampoo

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**Abstract:** Polyherbal shampoos have gained increasing attention as safer and eco-friendly alternatives to synthetic formulations. Fenugreek (*Trigonella foenum-graecum*) is widely recognized for its hair revitalizing, strengthening, and conditioning properties due to its rich phytochemical profile. This review provides a comprehensive overview of the formulation and evaluation of a revitalizing polyherbal shampoo using fenugreek as an active pharmaceutical ingredient (API). It discusses phytochemistry, mechanism of action, formulation strategies, evaluation parameters, and recent advancements (2020–2025). The review highlights the synergistic effects of herbal ingredients and emphasizes the growing potential of herbal shampoos in modern cosmetology.

**Keywords:** Polyherbal shampoo, Fenugreek, *Trigonella foenum-graecum*, Herbal cosmetics, Hair care, Evaluation, Phytochemistry.

## I. INTRODUCTION

Hair plays a vital role in personal appearance and psychological well-being. Maintaining healthy hair requires proper cleansing, conditioning, and nourishment. Shampoos are among the most widely used hair care products, designed to remove dirt, sebum, and environmental pollutants.

Conventional shampoos often contain synthetic surfactants such as sodium lauryl sulfate (SLS), parabens, and silicones, which may cause irritation, dryness, and long-term damage. This has led to a growing preference for herbal formulations that are mild, biodegradable, and safe for prolonged use.

Polyherbal formulations combine multiple plant extracts to achieve synergistic therapeutic effects. Among these, fenugreek has emerged as a key ingredient due to its high protein content, mucilage, alkaloids, and saponins that contribute to hair strengthening and conditioning.

## II. PHYTOCHEMISTRY AND PHARMACOLOGICAL PROPERTIES OF FENUGREEK

Fenugreek seeds contain a diverse range of bioactive compounds, including:

- Alkaloids (trigonelline)
- Saponins (diosgenin)
- Flavonoids
- Proteins and amino acids
- Mucilage

### 2.1 Mechanism of Action in Hair Care

- Protein enrichment strengthens hair shaft
- Mucilage provides natural conditioning and smoothness
- Nicotinic acid promotes blood circulation to scalp
- Antifungal activity helps reduce dandruff

### 2.2 Benefits in Shampoo Formulation

- Reduces hair fall



- Enhances shine and texture
- Improves scalp health
- Provides natural detangling effect

### III. ROLE OF OTHER HERBAL INGREDIENTS

A polyherbal shampoo typically includes multiple plant extracts for enhanced efficacy:

#### 3.1 Amla (*Embllica officinalis*)

- Rich in vitamin C
- Promotes hair growth
- Prevents premature greying

#### 3.2 Shikakai (*Acacia concinna*)

- Natural cleanser
- Maintains scalp pH

#### 3.3 Neem (*Azadirachta indica*)

- Antibacterial and antifungal
- Controls dandruff

#### 3.4 Hibiscus (*Hibiscus rosa-sinensis*)

- Conditioning agent
- Prevents hair thinning

#### 3.5 Reetha (*Sapindus mukorossi*)

- Natural surfactant
- Produces foam

#### 3.6 Aloe vera

- Moisturizing and soothing
- Improves scalp hydration

### IV. FORMULATION STRATEGIES

#### 4.1 Selection of Ingredients

Selection is based on compatibility, efficacy, and availability. Fenugreek is used as the primary API, supported by cleansing and conditioning agents.

#### 4.2 Extraction Methods

- Maceration
- Soxhlet extraction
- Decoction
- Ultrasonic extraction (advanced method)

#### 4.3 Preparation Process

- Drying and powdering of plant materials
- Extraction using suitable solvents



- Filtration and concentration
- Mixing of extracts with base
- Addition of natural surfactants
- Homogenization
- Adjustment of pH and viscosity

#### **4.4 Ideal Formulation Composition**

- Active ingredient (fenugreek extract)
- Surfactant (reetha)
- Conditioning agents (aloe vera, hibiscus)
- Preservatives (natural)
- Fragrance (optional essential oils)

### **V. EVALUATION PARAMETERS**

#### **5.1 Organoleptic Evaluation**

Color  
Odor  
Appearance  
Consistency

#### **5.2 Physicochemical Evaluation**

pH (5.5–7)  
Viscosity  
Solid content  
Surface tension

#### **5.3 Performance Evaluation**

##### **Foam Test**

Foam volume  
Foam stability

##### **Wetting Time Test :**

Determines cleansing efficiency using canvas disc method.

##### **Dirt Dispersion Test :**

Ensures dirt is removed effectively without redeposition.

##### **Conditioning Performance**

Smoothness  
Shine  
Manageability

#### **5.4 Safety Evaluation**

Skin irritation test  
Eye irritation test (in vitro methods preferred)

#### **5.5 Stability Studies**

Accelerated stability testing  
Temperature variation studies

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Shelf-life estimation

#### **VI. RECENT ADVANCES (2020–2025)**

Recent studies have demonstrated significant improvements in herbal shampoo formulations:

Incorporation of nanotechnology for enhanced delivery

Use of eco-friendly preservatives

Development of sulfate-free formulations

Increased consumer preference for organic cosmetics

**Studies (2024–2025) reported that polyherbal shampoos showed comparable or superior performance to commercial synthetic shampoos in terms of foam stability, conditioning, and scalp compatibility.**

#### **VII. RESULTS AND DISCUSSION**

Polyherbal shampoos formulated with fenugreek exhibit excellent cleansing, conditioning, and strengthening properties. The presence of multiple herbal ingredients provides synergistic benefits.

The pH of formulations remains within acceptable limits, ensuring compatibility with scalp physiology. Foam stability and detergency are comparable to synthetic shampoos due to natural saponins.

Fenugreek significantly enhances conditioning and reduces hair breakage. Stability studies indicate that properly formulated herbal shampoos remain stable under standard storage conditions.

#### **VIII. ADVANTAGES OF POLYHERBAL SHAMPOO**

- Minimal side effects
- Biodegradable and eco-friendly
- Cost-effective
- Suitable for long-term use
- Free from harsh chemicals

#### **IX. LIMITATIONS**

- Variability in plant materials
- Standardization challenges
- Shorter shelf life
- Limited large-scale clinical studies

#### **X. FUTURE PERSPECTIVES**

- Future research should focus on:
- Standardization of herbal extracts
- Clinical validation
- Advanced formulation techniques
- Commercial scalability
- Regulatory approvals

#### **XI. CONCLUSION**

The revitalizing polyherbal shampoo formulated using fenugreek as an API demonstrates strong potential as a safe and effective alternative to synthetic shampoos. Its natural composition, combined with proven efficacy, makes it highly suitable for modern hair care applications. Continued research and innovation will further enhance its commercial viability.



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