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Formulation and evaluation of herbal Anti-Dandruff Shampoo

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Abstract
Dandruff is a common scalp disorder characterized by flaking, itching, and irritation of the scalp. It is often associated with microbial imbalance and inflammation of scalp tissues. The growing concern about the adverse effects of synthetic chemicals present in commercial shampoos has increased interest in herbal formulations as safer alternatives. The present study focuses on the formulation and evaluation of a herbal anti-dandruff shampoo using plant-based ingredients such as Reetha (*Sapindus mukorossi*), Shikakai (*Acacia concinna*), Amla (*Phyllanthus emblica*), Bhringraj (*Eclipta alba*), Rosemary, Fenugreek seeds, Flaxseeds, Aloe vera gel, glycerine, and rose water. These ingredients possess natural cleansing, antifungal, conditioning, and scalp-nourishing properties.
The shampoo was prepared using the decoction method involving soaking, boiling, filtration, and incorporation of moisturizing and fragrance agents. The prepared formulation was evaluated for physicochemical parameters such as appearance, pH, viscosity, foaming ability, cleansing ability, skin irritation, and stability. The results showed that the shampoo had acceptable viscosity, moderate foaming ability, and a pH range of 5.5–6.5 suitable for scalp application. No irritation or adverse reactions were observed during testing, and the formulation remained stable under normal storage conditions. The study concludes that the developed herbal anti-dandruff shampoo is safe, effective, economical, and suitable for regular use.

Keywords: Herbal shampoo, Anti-dandruff, Reetha, Shikakai, Amla, Natural hair care, Herbal formulation, Scalp health

Introduction
Shampoo is one of the most widely used hair care products for cleansing the scalp and hair. It helps remove dirt, oil, and environmental pollutants that accumulate on the hair during daily activities. Traditionally, shampoos were mainly used as cleansing agents; however, modern formulations also aim to improve scalp health and treat hair-related problems such as dandruff, hair fall, dryness, and scalp irritation.
Dandruff is a common scalp condition characterized by excessive flaking of dead skin cells from the scalp. It is often accompanied by itching, irritation, and inflammation. The condition is commonly associated with the presence of *Malassezia* yeast, excessive sebum production, and microbial imbalance on the scalp. Although various synthetic anti-dandruff shampoos are available in the market, they often contain chemical agents such as zinc pyrithione, ketoconazole, and selenium sulfide, which may cause dryness, irritation, or long-term side effects.
In recent years, there has been increasing interest in herbal cosmetics due to their natural origin, safety, and eco-friendly nature. Herbal shampoos are formulated using plant-based ingredients that possess antimicrobial, antifungal, anti-inflammatory, and conditioning properties. These formulations are considered safer alternatives to chemical-based shampoos because they are biodegradable and generally produce fewer side effects.
Many medicinal plants have been traditionally used for hair care. Reetha (*Sapindus mukorossi*) contains natural saponins that provide cleansing and foaming properties. Shikakai (*Acacia concinna*) acts as a mild cleanser and natural conditioner. Amla (*Phyllanthus emblica*) is rich in vitamin C and antioxidants that strengthen hair follicles and promote scalp health. Bhringraj (*Eclipta alba*) is known for promoting hair growth and reducing hair fall. Fenugreek seeds provide antifungal activity and nourish the scalp, while Aloe vera acts as a soothing and moisturizing agent.
Herbal formulations often combine multiple plant ingredients to produce a synergistic effect. The combination of cleansing agents, antimicrobial compounds, and conditioning agents helps maintain scalp health and control dandruff naturally. Moreover, herbal shampoos are suitable for frequent use because they maintain the natural pH of the scalp and minimize irritation.

Methodology
a. Materials
The herbal ingredients used in the formulation include:
- Reetha (*Sapindus mukorossi*)
- Shikakai (*Acacia concinna*)
- Amla (*Phyllanthus emblica*)
- Bhringraj (*Eclipta alba*)
- Rosemary
- Fenugreek seeds
- Flaxseeds
- Aloe vera gel
- Glycerine
- Rose water
- Distilled water

These ingredients were selected due to their cleansing, antifungal, conditioning, and scalp-nourishing properties.

b. Table: Ingredients, Quantity, and Uses in Herbal Anti-Dandruff Shampoo (200 ml)

ngredient	Quantity	Purpose
Reetha	20 g	Natural cleanser and foaming agent
Shikakai	15 g	Mild cleanser and conditioner
Amla	10 g	Strengthens hair and provides antioxidants
Bhringraj	5 g	Promotes hair growth
Rosemary	3 g	Improves scalp circulation
Fenugreek seeds	7 g	Antifungal and nourishing
Flaxseeds	5 g	Provides conditioning mucilage
Aloe vera gel	15 ml	Moisturizing and soothing agent
Glycerine	5 ml	Humectant and moisturizing agent
Rose water	10 ml	Fragrance and scalp soothing
Distilled water	q.s	Solvent

c. Method of Preparation

Collection and Cleaning

Fresh and dried raw materials of Reetha, Shikakai, Amla, Bhringraj, Rosemary, Fenugreek seeds, and Flaxseeds were collected and cleaned properly to remove dust and impurities.

Soaking

All cleaned ingredients were placed in a stainless-steel container and soaked in water for 24 hours to soften the materials and facilitate extraction of active constituents.

Boiling and Extraction

After soaking, the mixture was boiled gently for 30–40 minutes until the active constituents were extracted and the volume was reduced to approximately 250–300 ml.

Cooling and Filtration

The herbal decoction was allowed to cool at room temperature and filtered using muslin cloth to remove solid residues and obtain a clear extract.

Addition of Base Ingredients

To the filtered extract:

- Aloe vera gel (15 ml) was added and mixed thoroughly.
- Glycerine (5 ml) was added as a moisturizing agent.
- Rose water (10 ml) was added to provide fragrance and soothing properties.

Final Volume Adjustment

The final volume was adjusted to 200 ml using distilled water to obtain a uniform herbal anti-dandruff shampoo.

Packaging

The prepared shampoo was transferred into a clean, dry bottle, properly labeled, and stored in a cool and dry place.

Parameter	Observation
Appearance	Brownish to dark green viscous liquid
Odor	Characteristic herbal odor
Texture	Smooth and uniform
pH	5.5 – 6.5
Foaming Ability	Moderate to good
Cleansing Ability	Effective removal of oil and dirt
Viscosity	Suitable for easy application
Skin Irritation Test	No irritation observed
Stability	Stable for 30 days

Results and Discussion

Results

The prepared herbal anti-dandruff shampoo showed the following characteristics after formulation and evaluation:

Discussion

The effectiveness of the herbal shampoo is mainly due to the combined action of its ingredients.

Reetha (*Sapindus mukorossi*) contains natural saponins that act as surfactants and produce foam, enabling effective removal of dirt and excess oil from the scalp. Shikakai (*Acacia concinna*) functions as a mild cleanser and natural conditioner, preventing dryness and maintaining scalp moisture.

Amla (*Phyllanthus emblica*) is rich in vitamin C and antioxidants that strengthen hair follicles and protect hair from oxidative damage. Bhringraj (*Eclipta alba*) is traditionally used in Ayurvedic medicine to promote hair growth and improve scalp health.

Fenugreek seeds provide antifungal and antimicrobial activity, which helps control dandruff caused by microbial imbalance. Rosemary stimulates blood circulation in the scalp and promotes hair growth. Flaxseeds produce mucilage that provides conditioning effects and improves hair softness.

The pH range of the formulated shampoo (5.5–6.5) is suitable for scalp application and helps maintain the natural balance of the scalp. The formulation also showed good stability and no signs of irritation during testing, indicating its safety for regular use.

Conclusion

The present study successfully formulated and evaluated a herbal anti-dandruff shampoo using natural plant ingredients. The formulation demonstrated satisfactory physicochemical characteristics including appropriate pH, acceptable viscosity, good foaming ability, and effective cleansing action.

The combination of herbal ingredients such as Reetha, Shikakai, Amla, Bhringraj, Fenugreek, Rosemary, and Flaxseeds contributed to antifungal, conditioning, and scalp-nourishing effects. Aloe vera, glycerine, and rose water provided additional moisturizing and soothing properties.

The prepared shampoo was stable under normal storage conditions and showed no signs of irritation during evaluation. Therefore, the developed herbal anti-dandruff shampoo can be considered a safe, economical, and effective alternative to commercial chemical-based shampoos.

Further studies such as microbial analysis, long-term stability testing, and clinical evaluation may be conducted to improve the formulation and confirm its effectiveness for large-scale use.

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