

Herbal Anti-Dandruff Conditioner Spray

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ABSTRACT

Herbal hair-care preparations are increasingly considered for convenient scalp and hair maintenance. The supplied study describes a polyherbal anti-dandruff conditioner spray containing aloe vera, amla, bhringraj, fenugreek, onion extract, rose water, glycerine, castor oil, peppermint oil and sodium benzoate in a distilled-water base. The formulation was designed to combine dandruff-oriented scalp care with moisturization and conditioning. The source reports evaluation of colour, odour, appearance, texture, pH, viscosity, specific gravity, drying time, foamability, irritancy and stability. Three formulations (F1-F3) were prepared using different proportions. F2 was selected as the best formulation on the basis of the reported overall performance, with pH 5.8, viscosity 52 cP, specific gravity 1.03, drying time 2.5 min, good foamability and non-irritant behaviour. Stability observations over one month were reported to be satisfactory under room, refrigerated and accelerated conditions. This review reorganizes the supplied project material into a review-paper structure and discusses the botanical ingredients, formulation approach, evaluation parameters, findings and limitations. The available project evidence is preliminary and supports further development rather than establishing clinical superiority over established anti-dandruff treatments. [1,17] [10,11]

Keywords: Herbal cosmetics; anti-dandruff spray; conditioner; aloe vera; amla; bhringraj; fenugreek; onion; peppermint oil; hair care.

I. INTRODUCTION

Hair is an important part of personal appearance, hygiene and confidence, while scalp condition strongly influences perceived hair health. The supplied study identifies dandruff, hair fall, split ends, premature greying, dryness, scalp irritation and thinning among common hair-related concerns. It links increasing concern with pollution, stress, hormonal imbalance, poor nutrition, unhealthy lifestyle and excessive use of chemical-based cosmetic products. [17] [10,11]

Herbal cosmetics contain naturally occurring phytoconstituents such as flavonoids, alkaloids, tannins, vitamins, proteins, minerals and essential oils. In the supplied project, these constituents are considered relevant to scalp nourishment, moisturizing, conditioning and protection. A polyherbal formulation can combine ingredients with complementary cosmetic roles in a single preparation. [1] [12,13]

The spray dosage form is intended to offer convenient application, good distribution and a comparatively non-greasy cosmetic feel. Compared with heavier oil- or cream-based preparations, a spray can be applied directly over selected scalp and hair areas and can dry within a short period. The formulation therefore aims to unite hair-conditioning benefits with scalp-oriented anti-dandruff care. [1] [1,5]

1.1 Rationale for Polyherbal Formulation

The project combines botanical extracts with supporting excipients. Aloe vera is used mainly as a moisturizer and soothing component; amla as a nourishing ingredient; bhringraj as a traditional conditioning herb; fenugreek as a strengthening and scalp-care ingredient; onion extract for scalp and follicle support; rose water for freshness; glycerine for humectancy; castor oil as an emollient; peppermint oil for cooling; and sodium benzoate as a preservative. [1,3] [2,3,4,6,7,9]

1.2 Scope of the Review

This review consolidates the supplied material without adding unsupported experimental claims. It covers ingredient profiles, formulation design, preparation method, qualitative phytochemical screening, evaluation parameters, stability observations, results, discussion and future development needs.

II. NEED AND SIGNIFICANCE

The project identifies a need for natural and convenient approaches to dandruff and scalp care. Dandruff management is not limited to visible flakes; an acceptable cosmetic preparation should also support scalp comfort, moisture balance and hair manageability. The project therefore combines anti-dandruff-oriented botanicals with conditioning excipients. (Hay; Wasim et al.) [10,11,14]

2.1 Need of the Work

- Provide a natural approach to dandruff management using selected herbal ingredients.
- Address scalp dryness, itching and irritation through soothing and conditioning components.
- Combine dandruff-oriented scalp care with hair conditioning in one dosage form.
- Use traditional hair-care botanicals such as aloe vera, amla, bhringraj, fenugreek and onion extract.
- Develop a spray that permits convenient application and distribution.
- Minimize reliance on a formulation based only on synthetic cosmetic ingredients.

2.2 Advantages of the Spray Concept

- Convenient application with uniform sprayability.
- Moisturizing and emollient components can improve hair feel and reduce dryness. [1]
- Peppermint oil and rose water provide refreshing sensory properties. [2]
- Multiple botanical ingredients allow several cosmetic functions in a single preparation.

2.3 Limitations

- Natural preparations may require careful preservation and packaging. [3,4]
- Botanical extracts can vary with source and processing method. [5]
- Some users may be sensitive to individual herbs or essential oils.

- The supplied study provides preliminary evidence and short-term stability observations only.

III. HERBAL INGREDIENTS - I

3.1 Aloe Vera

Aloe vera (*Aloe barbadensis*; family Asphodelaceae in the supplied profile) is included mainly as a moisturizer and soothing botanical. The source lists anthraquinones such as aloin and aloe-emodin, glycosides, vitamins, enzymes, minerals and salicylic acid. Its stated hair-care uses include moisturizing dry scalp, supporting scalp comfort, improving softness and helping maintain scalp pH balance. [12] [12,15]



Figure 1. Aloe vera - herbal ingredient

3.2 Amla

Amla or Indian gooseberry (*Phyllanthus emblica* Linn.) is incorporated as a nourishing ingredient. The supplied profile lists vitamin C, alkaloids and hydrolysable tannins including emblicanin A and B. The stated uses include support for hair growth, reduction of breakage, scalp care and natural conditioning. [13] [12,13]



Figure 2. Amla - herbal ingredient

3.3 Role in the Formulation

Aloe vera and amla provide the moisture- and nourishment-oriented part of the polyherbal system. Their inclusion helps balance the stronger botanical and sensory components used elsewhere in the spray.

IV. HERBAL INGREDIENTS - II

4.1 Bhringraj

Bhringraj (*Eclipta alba*; family Asteraceae) is described as a traditional hair-care herb. The source lists wedelolactone, demethyl wedelolactone, flavonoids, alkaloids and stigmasterol. It is associated in the project with hair-growth support, anti-dandruff preparations and scalp care. [6]



Figure 3. Bhringraj - herbal ingredient

4.2 Fenugreek

Fenugreek (*Trigonella foenum-graecum* Linn.; family Fabaceae) consists of dried ripe seeds. The supplied profile lists trigonelline, diosgenin, flavonoids and fixed oil. The project associates fenugreek with reduction of dandruff and scalp irritation, strengthening of hair and conditioning. [7]



Figure 4. Fenugreek - herbal ingredient

4.3 Significance

Bhringraj and fenugreek strengthen the traditional hair-care character of the formulation. In the reported formulation series, their proportions were adjusted across F1-F3 to obtain acceptable viscosity and cosmetic performance.

V. HERBAL INGREDIENTS - III

5.1 Onion Extract

Onion (*Allium cepa*) is included as a distinctive botanical component. The source lists quercetin, organosulfur compounds, flavonoids, thiosulfates, saponins, vitamins and minerals. The stated uses include support for scalp health, nourishment of hair follicles and control-oriented scalp care. [8]



Figure 5. Onion - herbal ingredient

5.2 Glycerine

Glycerine (glycerol; $C_3H_8O_3$; molecular weight 92.09 g/mol) is a clear, viscous, hygroscopic liquid. It is used as a humectant to help retain moisture and improve softness, shine and scalp hydration. [3]



Figure 6. Glycerine - formulation excipient

5.3 Combined Role

Onion extract contributes the botanical scalp-care component, while glycerine supports the physical feel and moisturization of the final spray. Together they help balance functional and cosmetic properties.

VI. SUPPORTING INGREDIENTS

6.1 Rose Water

Rose water is prepared from rose petals by steam distillation. The supplied profile lists phenyl ethyl alcohol, geraniol, citronellol, nerol and linalool. It is used for freshness, fragrance, hydration and a soothing sensory effect. [2]



Figure 7. Rose water - supporting ingredient



Figure 9. Peppermint oil

6.2 Castor Oil

Castor oil (*Ricinus communis*; family Euphorbiaceae) is a fixed oil rich in triglycerides of ricinoleic acid. It is described as an emollient and is associated with conditioning damaged hair, reducing frizz and protecting hair from dryness. [9]



Figure 8. Castor oil - supporting ingredient

6.3 Peppermint Oil and Sodium Benzoate

Peppermint oil from *Mentha piperita* contains menthol, menthone, menthyl acetate, cineole and limonene and is used for cooling and refreshing effects. Sodium benzoate is incorporated as a preservative to limit microbial growth and support product stability. [4] [16,4]



Figure 10. Sodium benzoate

VII. FORMULATION DESIGN

Three experimental formulations were described in the supplied project. The proportions of the main herbal extracts and excipients were varied to identify a preparation with acceptable appearance, viscosity, sprayability, stability and conditioning performance.

Ingredient	F1	F2	F3	Primary role
Aloe vera extract	20	25	30	Moisturizer
Amla extract	10	8	6	Nourisher
Bhringraj extract	5	6	7	Conditioner
Fenugreek extract	5	4	3	Strengtheners
Onion extract	8	10	12	Scalp / follicle support
Rose water	30	25	20	Freshener
Glycerine	5	6	7	Humectant
Castor oil	3	4	5	Emollient

Peppermint oil	1	1	1	Cooling
Sodium benzoate	0.5	0.5	0.5	Preservative
Distilled water	q.s.	q.s.	q.s.	Solvent / base

7.1 Formulation Logic

F1 represents the lower aloe vera and onion-extract levels, while F3 uses higher levels of several of these components and has the highest reported viscosity. F2 provides an intermediate composition and was selected as the best formulation after evaluation.

7.2 Important Product Attributes

- Suitable pH for scalp application;
- Sprayable viscosity and uniform distribution;
- Acceptable colour, odour and texture;
- Stable appearance without phase separation;
- Conditioning and non-sticky feel after application.

VIII. METHODS OF PREPARATION

The selected herbal extracts and excipients were collected in suitable form and prepared for incorporation into the spray. The supplied procedure describes filtration of extracts, aqueous mixing, addition of humectant and emollient components, preservation and final filtration before filling. [1,5]

8.1 Preparation Steps

- Accurately weigh and filter the selected herbal extracts separately.
- Mix aloe vera, onion, amla, bhringraj and fenugreek extracts with measured distilled water.
- Add glycerine and castor oil slowly with continuous stirring.
- Add rose water to improve fragrance and refreshing character.
- Add sodium benzoate as preservative.
- Add peppermint oil dropwise and mix uniformly.
- Stir continuously until a homogeneous spray is obtained.
- Filter the final preparation, fill into suitable spray bottles and store appropriately.



Figure 11. Ingredients and excipients used during preparation in the college laboratory

IX. EVALUATION OF THE FORMULATION

9.1 Organoleptic Evaluation

Parameter	F1	F2	F3
Colour	Light brown	Brown	Dark brown
Odour	Pleasant herbal	Pleasant herbal	Strong herbal
Appearance	Clear	Slightly turbid	Clear
Texture	Smooth and light	Smooth and slightly thick	Soft and uniform

9.2 Physicochemical Evaluation

Parameter	F1	F2	F3
pH	5.5	5.8	6.0
Viscosity	48 cP	52 cP	56 cP
Specific gravity	1.01	1.03	1.05
Drying time	2 min	2.5 min	3 min
Stability	Stable	Stable	Highly stable
Foamability	Moderate	Good	Good
Irritancy	Non-irritant	Non-irritant	Non-irritant

The reported pH values were 5.5, 5.8 and 6.0 for F1, F2 and F3, respectively. Viscosity increased from 48 cP to 56 cP across the series. F2 showed intermediate viscosity and drying time with good foamability and non-irritant behaviour.



Figure 12. Filtration step observed during experimental work in the college laboratory

X. STABILITY STUDY

The stability study was performed to observe the physical and chemical stability of the formulations under different storage conditions. The supplied project reports room temperature, refrigerated temperature and accelerated conditions for one month.

Storage condition	Reported condition
Room temperature	$25 \pm 2^\circ\text{C}$
Refrigerated	$4 \pm 2^\circ\text{C}$
Accelerated	$40 \pm 2^\circ\text{C}$ with 75% RH

The formulations were periodically examined for changes in colour, odour, pH, viscosity, homogeneity, spray pattern and appearance. The source reports that the formulations remained stable without significant changes in these properties and that no phase separation, precipitation or microbial growth was observed during the study period.

10.1 Interpretation

The reported results support preliminary physical stability of the prepared spray. The one-month study is useful for formulation screening, but it does not by itself establish a commercial shelf life. Longer real-time studies and validated microbial and preservative assessments would provide stronger evidence. [1] [14,17]



Figure 13. Filtration / processing step during experimental work in the college laboratory

XI. RESULTS

From the reported organoleptic, physicochemical and stability observations, F2 was selected as the best formulation in the supplied study.

Parameter	F2 result
Colour	Light brown
Odour	Light herbal
Appearance	Pleasant herbal
Texture	Smooth and non-sticky
pH	5.8
LOD	2.10%
Ash value	0.18%
Anti-dandruff effect	Effective against dandruff
Conditioning effect	Soft and silky hair
Sprayability	Uniform spray pattern

11.1 Overall Interpretation

F2 provided a balance between sprayability, viscosity, cosmetic appearance and stability. Its pH of 5.8 and viscosity of 52 cP were reported as acceptable for the intended use. The preparation was also described as smooth, non-sticky and uniformly sprayable.



Figure 14. Mixing / formulation step during experimental work in the college laboratory

XII. DISCUSSION

The formulation represents a polyherbal strategy in which several botanicals are combined to provide complementary cosmetic functions. Aloe vera, glycerine and rose water form a moisture- and sensory-oriented group, whereas castor oil contributes an emollient component. Fenugreek, bhringraj and amla strengthen the traditional hair-care profile, while onion extract and peppermint oil are included for scalp-oriented functions. [1,6,8] [6,7,10,11]

The change in composition across F1-F3 was associated with differences in measurable product properties. The higher level of several thickening and emollient-oriented components in F3 corresponded with the highest viscosity and longest drying time. F1 had the lowest viscosity and fastest drying time. F2 occupied an intermediate position and was selected as the preferred formulation.

The stability findings are encouraging within the limits of the reported one-month study. However, the supplied material does not provide full quantitative microbiological data, statistical analysis, validated preservative-effectiveness testing or detailed clinical outcomes. The statement that the preparation is effective against dandruff should therefore be considered a preliminary formulation observation rather than definitive clinical evidence. [1] [10,11,14]

12.1 Future Development

- Extend real-time and accelerated stability studies.
- Standardize botanical extracts using suitable marker compounds.
- Perform quantitative antimicrobial / antifungal testing using relevant test organisms.
- Evaluate preservative effectiveness and microbial quality with validated methods.
- Conduct controlled safety, acceptability and efficacy studies.
- Assess packaging compatibility and spray-device performance during storage.

XIII. CONCLUSION

The supplied project describes a polyherbal anti-dandruff conditioner spray prepared using aloe vera, amla, bhringraj, fenugreek, onion extract, rose water, glycerine, castor oil, peppermint oil, sodium benzoate and distilled water. The formulation integrates scalp-oriented herbal care with moisturizing and conditioning functions in a convenient spray dosage form. [1,17] [10,11,14]

Three formulations were prepared and evaluated for organoleptic and physicochemical characteristics. F2 was reported as the best formulation, with pH 5.8, viscosity 52 cP, specific gravity 1.03, drying time 2.5 min, good foamability and non-irritant behaviour. The project also reported satisfactory one-month stability under room, refrigerated and accelerated conditions.

Overall, the preparation shows potential as a herbal cosmetic hair-care product, particularly where convenience, moisturization and conditioning are desired alongside anti-dandruff-oriented scalp care. The current evidence is preliminary; further standardized microbiological, safety, stability and controlled human studies would be needed to establish reproducible efficacy and define an appropriate product shelf life.

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