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Review Paper

Therapeutic Potential of Ziziphus Mauritiana and Black Seed Oil in Herbal Hair Care Formulation

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ABSTRACT

Herbal hair care formulations have gained considerable attention due to their safety, effectiveness, and minimal side effects compared with synthetic cosmetic products. Among various medicinal plants, Ziziphus mauritiana and Black Seed Oil obtained from Nigella sativa possess significant therapeutic potential for maintaining healthy hair and scalp conditions. Ziziphus mauritiana is rich in flavonoids, saponins, tannins, alkaloids, and glycosides, which exhibit antioxidant, antimicrobial, and anti-inflammatory activities beneficial for hair nourishment and scalp protection. Black Seed Oil contains thymoquinone, essential fatty acids, vitamins, and minerals that help strengthen hair follicles, reduce hair fall, improve scalp hydration, and promote hair growth. This review highlights the therapeutic importance of Ziziphus mauritiana and Black Seed Oil in herbal hair care formulations such as hair serums, oils, gels, and conditioners. The review also discusses their phytochemical constituents, pharmacological activities, mechanisms of action, formulation approaches, and evaluation parameters including pH, viscosity, stability, spreadability, and hair growth activity. Furthermore, the synergistic effects of combining these herbal ingredients for enhanced hair care benefits are emphasized. The article concludes that formulations containing Ziziphus mauritiana and Black Seed Oil offer a promising natural alternative for the management of hair-related problems such as dandruff, hair fall, dryness, and scalp irritation, with potential applications in cosmetic and pharmaceutical industries.

INTRODUCTION

Hair is an important part of the human body that contributes to physical appearance, personality, and self-confidence. Healthy hair and scalp are

considered signs of good health and proper hygiene. The scalp contains numerous hair follicles, sebaceous glands, and blood vessels that help maintain normal hair growth and nourishment. Hair also provides protection to the

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scalp from environmental pollutants, ultraviolet radiation, and external damage. However, factors such as pollution, stress, unhealthy diet, hormonal imbalance, aging, and excessive use of chemical-based cosmetic products can negatively affect hair and scalp health, leading to problems such as hair fall, dandruff, dryness, scalp irritation, and alopecia.

In recent years, herbal cosmetics have gained considerable attention in the field of hair care because of their natural origin, therapeutic value, and reduced side effects. Herbal hair care products are formulated using medicinal plants, plant extracts, and natural oils that possess antioxidant, antimicrobial, anti-inflammatory, and nourishing properties. Herbal cosmetics such as shampoos, conditioners, hair oils, hair masks, and hair serums are widely used to improve hair texture, strengthen hair follicles, reduce scalp infections, and promote healthy hair growth. Compared to synthetic products, herbal formulations are generally safer, biodegradable, eco-friendly, and better tolerated by the skin and scalp.

Synthetic hair care products often contain harmful chemicals such as sulfates, parabens, silicones, synthetic fragrances, and alcohol-based compounds. Prolonged use of these chemicals may damage the natural structure of hair and disturb the normal pH balance of the scalp. These products can cause dryness, irritation, allergic reactions, hair breakage, weakening of hair follicles, and increased hair fall. In some cases, synthetic ingredients may also lead to long-term scalp sensitivity and deterioration of hair quality. Due to these adverse effects, there is increasing interest in the development of natural and safer alternatives for hair care management.

PLANT PROFILE OF ZIZIPHUS MAURITIANA

Ziziphus mauritiana, commonly known as Indian jujube or ber, is a medicinal plant widely

distributed in tropical and subtropical regions. The plant belongs to the family Rhamnaceae and is valued for its nutritional and therapeutic properties. Different parts of the plant such as fruits, leaves, bark, and seeds are traditionally used in Ayurvedic and herbal medicine for the treatment of various disorders including skin diseases, digestive problems, inflammation, and scalp-related conditions. Due to the presence of various bioactive phytochemicals, *Ziziphus mauritiana* has gained attention in herbal cosmetic formulations, particularly for hair care applications.

Classification	Details
Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Rosales
Family	Rhamnaceae
Genus	<i>Ziziphus</i>

Antioxidant Activity

Oxidative stress caused by free radicals is one of the major factors responsible for hair follicle damage, premature hair aging, and hair fall. *Ziziphus mauritiana* contains flavonoids, phenolic compounds, and other antioxidants that help neutralize free radicals and protect hair follicles from oxidative damage.

Antimicrobial Activity

Microbial infections of the scalp caused by bacteria and fungi are common causes of dandruff, itching, scalp irritation, and weakened hair follicles. Extracts of *Ziziphus mauritiana* exhibit antimicrobial activity against various microorganisms due to the presence of tannins, saponins, alkaloids, and flavonoids.

Anti-inflammatory Effect

Inflammation of the scalp can damage hair follicles and contribute to conditions such as itching, redness, irritation, and excessive hair shedding. *Ziziphus mauritiana* possesses anti-



inflammatory properties that help reduce scalp inflammation and soothe irritated skin. Bioactive constituents present in the plant inhibit inflammatory mediators and promote a healthier scalp environment.

Hair Growth Promotion

The phytochemicals present in *Ziziphus mauritiana* may help stimulate hair follicles and improve blood circulation to the scalp, which promotes healthy hair growth.

Profile of Black Seed Oil (*Nigella sativa*)

Black Seed Oil is obtained from the seeds of *Nigella sativa*, a medicinal plant widely known for its therapeutic and cosmetic applications. The plant has been traditionally used in Ayurvedic, Unani, and traditional medicine systems for the treatment of various disorders. Black Seed Oil is rich in bioactive compounds such as thymoquinone, essential fatty acids, vitamins, minerals, proteins, and antioxidants that contribute to its medicinal value. Due to its antimicrobial, antioxidant, anti-inflammatory, and nourishing properties, Black Seed Oil has gained considerable importance in herbal hair care formulations for improving scalp health and promoting hair growth.

Classification	Details
Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Ranunculales
Family	Ranunculaceae
Genus	<i>Nigella</i>
Species	<i>Nigella sativa</i>

Antioxidant Activity

Black Seed Oil exhibits strong antioxidant activity mainly due to the presence of thymoquinone and phenolic compounds.

Antifungal Activity

Fungal infections are one of the common causes of dandruff and scalp irritation. Black Seed Oil

possesses antifungal properties that help inhibit the growth of fungi responsible for scalp infections

Anti-inflammatory Activity

Inflammation of the scalp may lead to redness, irritation, itching, and damage to hair follicles. Black Seed Oil contains bioactive compounds that help suppress inflammatory mediators and reduce scalp inflammation.

Mechanism of Action in Hair Care

Herbal ingredients such as *Ziziphus mauritiana* and Black Seed Oil obtained from *Nigella sativa* exert beneficial effects on hair and scalp through multiple biological mechanisms. The presence of phytochemicals including flavonoids, tannins, saponins, alkaloids, thymoquinone, essential fatty acids, vitamins, and minerals contributes to their therapeutic activities in hair care formulations. These herbal constituents help maintain scalp health, protect hair follicles, and promote healthy hair growth naturally.

EVALUATION OF HAIR CARE

Organoleptic Properties

- Color
- Odor
- Texture

Physicochemical Evaluation

- pH (digital pH meter)
- Viscosity (Brookfield viscometer)
- Spreadability
- Homogeneity
- Appearance



Sr. No.	Parameter	Method	Purpose
1	Physical Appearance	Visual inspection	To check color, clarity, and consistency
2	pH Measurement	Using pH meter	To ensure hair skin compatibility
3	Homogeneity	Visual/physical check	To ensure uniformity
4	Washability	Wash with water	To check ease of removal
5	Stability Studies	Storage at different conditions	To evaluate stability over time

RESULT AND DISCUSSION

The review of available literature indicates that herbal hair care formulations containing *Ziziphus mauritiana* and Black Seed Oil from *Nigella sativa* possess significant therapeutic potential for maintaining healthy hair and scalp conditions. Both herbal ingredients are rich in bioactive phytochemicals such as flavonoids, tannins, saponins, alkaloids, thymoquinone, essential fatty acids, vitamins, and minerals, which contribute to their pharmacological activities.

Studies reported that *Ziziphus mauritiana* exhibits antioxidant, antimicrobial, and anti-inflammatory properties that help protect hair follicles from oxidative damage, reduce scalp infections, and improve scalp nourishment. The plant also supports healthy hair growth by strengthening hair roots and maintaining scalp health. Similarly, Black Seed Oil demonstrated strong antioxidant and antifungal activities due to the presence of thymoquinone and essential fatty acids. The oil was found to moisturize the scalp, reduce dandruff, strengthen hair shafts, and minimize hair breakage and hair fall.

The combination of *Ziziphus mauritiana* and Black Seed Oil in herbal hair care formulations showed synergistic effects in improving hair texture, scalp hydration, and follicular health. Herbal formulations such as hair serums, oils, shampoos, and conditioners prepared with these ingredients were reported to be safer and more compatible with the scalp compared to synthetic hair products. In addition, the natural formulations showed

reduced risk of irritation and adverse effects commonly associated with chemical-based cosmetics.

CONCLUSION

Ziziphus mauritiana and Black Seed Oil from *Nigella sativa* show significant therapeutic benefits in herbal hair care formulations due to their antioxidant, antimicrobial, anti-inflammatory, moisturizing, and hair-strengthening properties. Their bioactive constituents help reduce hair fall, improve scalp health, promote hair growth, and protect hair follicles from damage. Compared to synthetic products, these herbal ingredients are safer and associated with fewer side effects. The growing demand for natural cosmetics highlights their future potential in cosmetic and pharmaceutical industries for the development of effective and eco-friendly herbal hair care products.

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