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Review Article

**TO STUDY HERBAL HAIR OIL FROM ROSEMARY LEAVES
AND SESAMEA SEEDS**Bhavika.S.Chavan^{1*}, Swati.M.Kanoje², Dr.Swati.P. Deshmukh³¹Bachelor of pharmacy student, Shraddha Institute of Pharmacy.²Assistant Professor, Shraddha Institute of Pharmacy.³Principal, Shraddha Institute of Pharmacy.**Abstract:**

Herbal hair oils have long been used in traditional medicine systems for maintaining healthy hair and scalp. With increasing concern over synthetic cosmetic products and their adverse effects, herbal oils have re-emerged as preferred alternatives due to their safety, efficacy, and eco-friendly nature. This review focuses on the significance of herbal hair oil prepared using Rosmarinus officinalis (rosemary) and Sesamum indicum (black sesame), two well-known medicinal plants with complementary therapeutic actions. Rosemary possesses antioxidant, anti-inflammatory, and circulatory-stimulating properties that promote hair growth and reduce dandruff, while black sesame is rich in essential fatty acids, lignans, and vitamin E, providing nourishment, UV protection, and prevention of premature greying. The combined use of these botanicals offers synergistic benefits for scalp health, hair strength, and appearance. This article reviews their phytochemistry, biological activities, and relevance in natural hair care, highlighting their potential as safe, effective, and sustainable alternatives to chemical formulations.

Keywords: Herbal hair oil, Rosmarinus officinalis, Sesamum indicum, antioxidant, hair growth, traditional medicine.

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INTRODUCTION:

The use of herbal preparations for personal care and therapeutic purposes dates back to ancient civilizations and continues to play a vital role in modern day health and cosmetic industries. Herbal formulations are derived from plant-based materials such as leaves, seeds, roots, and flowers, which are rich sources of bioactive phytoconstituents. These natural compounds possess a wide spectrum of pharmacological activities including antioxidant, antimicrobial, anti-inflammatory, and rejuvenating properties. In recent years, there has been a growing global shift toward the use of herbal and natural products because they are considered safe, biodegradable, and compatible with the human body, unlike synthetic cosmetics which may cause irritation, allergies, or long-term damage [1,3].

Among herbal products, herbal oils occupy a significant position due to their extensive use in hair care, skin therapy, and aromatherapy. Herbal oils are prepared by infusing or extracting medicinal plant materials into a suitable carrier oil such as sesame, coconut, or castor oil. This process facilitates the transfer of active phytochemicals into the oil phase, producing a product that offers both therapeutic and cosmetic benefits. Herbal oils serve as an excellent medium for topical application because they improve absorption, stability, and bioavailability of active ingredients while providing lubrication, nourishment, and protection to the skin and hair [4,5].

Hair care, in particular, has been a primary focus of herbal medicine since antiquity. Hair is not only a biological structure that protects the scalp but also a symbol of beauty, youth, and identity. Modern day challenges such as pollution, nutritional deficiencies, hormonal imbalance, stress, and excessive use of synthetic hair products have resulted in widespread hair and scalp disorders including hair fall, dandruff, premature greying, and scalp irritation [6]. Conventional hair care products, although effective in the short term, often contain harsh chemicals like parabens, sulfates, silicones, and mineral oils that may disrupt the natural scalp balance and damage the hair shaft over prolonged use [7]. This has led to a resurgence in the popularity of herbal hair oils, which are valued for their safety, effectiveness, and restorative action.

Herbal hair oils work through multiple mechanisms. They nourish hair follicles, improve blood microcirculation in the scalp, and provide essential fatty acids and antioxidants required for healthy hair growth. Many herbs also exhibit antimicrobial and antifungal properties, helping to prevent infections and dandruff while maintaining scalp hygiene.

Furthermore, the antioxidants present in herbal oils neutralize free radicals that cause oxidative stress a major factor responsible for hair ageing and pigment loss [8].

Two of the most promising ingredients for herbal hair oil are rosemary (*Rosmarinus officinalis*) and black sesame (*Sesamum indicum*), both widely used in traditional and modern herbal medicine. Rosemary, a member of the Lamiaceae family, is renowned for its stimulant, antimicrobial, and antioxidant activities. Its essential oil contains bioactive components such as cineole, camphor, borneol, and rosmarinic acid, which enhance scalp circulation, strengthen hair follicles, and promote hair regeneration [9,10]. On the other hand, black sesame, belonging to the Pedaliaceae family, is one of the oldest oilseed crops known to humanity and is rich in linoleic acid, sesamin, sesamol, and vitamin E. These compounds provide deep nourishment, protect hair from UV damage, and prevent premature greying [11].

The combined use of rosemary and black sesame in herbal hair oil offers a synergistic effect, wherein rosemary enhances scalp stimulation and detoxification, while black sesame provides nourishment and moisture retention. Together, they help maintain healthy, strong, and lustrous hair while reducing common scalp problems. Thus, the study and review of herbal hair oil prepared using rosemary leaves and black sesame seeds are highly relevant in the current era of natural and sustainable hair care.

The purpose of this review is to provide a comprehensive overview of the phytochemical composition, biological activities, and therapeutic benefits of rosemary and black sesame in hair care. It aims to summarize existing scientific evidence supporting their role in promoting scalp health, preventing hair loss, and improving hair texture, while highlighting their potential as safe, natural alternatives to synthetic cosmetic products.

IMPORTANCE OF HERBAL HAIR OILS

Herbal hair oils are among the most significant and widely used products in natural and traditional hair care systems. They play an essential role in maintaining scalp health, promoting hair growth, and protecting hair from environmental damage. Derived from medicinal plants and natural carrier oils, these preparations provide a combination of therapeutic and cosmetic benefits that make them superior to synthetic hair products.

One of the major advantages of herbal hair oils is their ability to nourish the scalp and moisturize the hair shaft. They are rich in essential fatty acids, vitamins (such as vitamin E and vitamin A), and minerals that penetrate deeply into the scalp, replenishing nutrients lost due to pollution, stress, and frequent washing. This nourishment strengthens hair roots, prevents breakage, and helps maintain softness and elasticity. The moisturizing effect also prevents dryness and flakiness, ensuring a well-hydrated scalp environment suitable for healthy hair growth.

In addition to their nourishing effect, herbal oils act as natural conditioners that enhance the texture, manageability, and shine of hair. Unlike chemical conditioners that coat the hair temporarily, herbal oils penetrate the hair fiber, improving its internal structure and making it smooth and glossy. Oils such as sesame, coconut, and castor are commonly used bases that naturally soften the hair and help restore its natural sheen. Regular application makes hair less prone to tangling, split ends, and roughness.

Herbal hair oils also play a vital role in reducing dandruff, hair fall, and scalp infections. Many herbs, such as rosemary, neem, hibiscus, and amla, contain natural antifungal and antibacterial agents that help control microbial growth on the scalp. This prevents dandruff, itching, and other scalp disorders. The strengthening properties of certain herbal compounds improve follicular health, reducing hair fall and encouraging new growth. In this way, herbal oils provide a safe and effective remedy for maintaining scalp hygiene and promoting long-term hair vitality.

Another significant feature of herbal hair oils is their antioxidant potential, which helps protect hair from oxidative stress caused by UV radiation, pollution, and chemical exposure. The antioxidants present in herbs such as flavonoids, polyphenols, and vitamin E neutralize free radicals that damage the scalp and hair follicles. This action helps prevent premature greying, dryness, and dullness, while maintaining natural pigment and elasticity.

Furthermore, regular scalp massage with herbal oil promotes blood circulation, which in turn enhances the supply of nutrients and oxygen to hair follicles. Improved circulation strengthens the hair roots, accelerates growth, and rejuvenates dormant follicles. This physiological stimulation not only supports follicle health but also helps in stress relief and relaxation, which are indirectly beneficial to hair maintenance.

From an environmental and economic perspective, herbal hair oils are eco-friendly, cost-effective, and non-toxic alternatives to synthetic hair products. Being derived from renewable plant sources, they are biodegradable and safe for both human use and the environment. They do not contain harmful chemicals like parabens, silicones, or sulfates, which are commonly present in synthetic hair care products. Hence, herbal oils are suitable for all hair types and can be used regularly without adverse effects.

About Rosemary (*Rosmarinus officinalis*)

Rosemary (*Rosmarinus officinalis* L.) is a fragrant evergreen herb belonging to the family Lamiaceae, which also includes several aromatic and medicinal plants such as mint, sage, and basil. It is native to the Mediterranean region, where it has been traditionally used as a culinary spice, medicinal herb, and natural preservative. The plant thrives in warm, sunny climates and is well known for its distinctive aroma and therapeutic properties. Throughout history, rosemary has been valued in various traditional medical systems, including Ayurveda, Greek, and Roman medicine, for its roles in improving memory, stimulating circulation, and promoting overall vitality.

Phytochemically, rosemary is a rich source of biologically active compounds that contribute to its diverse pharmacological properties. The key constituents of rosemary essential oil include 1,8-cineole (eucalyptol), camphor, borneol, α -pinene, β -pinene, verbenone, and rosmarinic acid. These compounds are known for their antioxidant, antimicrobial, and anti-inflammatory activities. In addition, rosemary contains phenolic acids, flavonoids, and diterpenes, particularly carnosic acid and rosmarinic acid, which play a vital role in neutralizing free radicals and protecting cellular components from oxidative stress.

The antioxidant potential of rosemary is one of its most valuable properties in hair and scalp care. Reactive oxygen species (ROS) and oxidative stress contribute to premature ageing of hair follicles, leading to hair thinning and greying. The antioxidant compounds in rosemary, particularly carnosic acid, help counteract these effects by scavenging free radicals and enhancing scalp health. This not only prevents damage to hair follicles but also supports pigment preservation, thereby delaying premature greying.

Another important property of rosemary is its ability to stimulate blood circulation in the scalp. Increased blood flow ensures a continuous supply of nutrients

and oxygen to the hair follicles, which is essential for maintaining strong and healthy hair. Studies have shown that rosemary oil can promote hair growth by improving microcirculation and encouraging new follicular activity. It also helps strengthen the roots, reduce hair thinning, and enhance hair density. In fact, research comparing rosemary oil to minoxidil (a common synthetic hair growth agent) has demonstrated that rosemary can achieve comparable results without causing scalp irritation or side effects.

Rosemary also exhibits potent antimicrobial and antifungal effects, which make it highly effective in treating dandruff, seborrheic dermatitis, and other scalp infections. Its essential oil helps inhibit the growth of microorganisms such as *Malassezia furfur* a fungus often responsible for dandruff and itching. Regular use of rosemary oil or extracts can therefore help maintain scalp cleanliness, reduce flaking, and restore a balanced scalp environment.

Furthermore, rosemary's anti-inflammatory and soothing properties make it beneficial for calming scalp irritation and redness caused by harsh chemicals or pollutants. It helps maintain the scalp's natural sebum balance, preventing both excessive oiliness and dryness. The presence of rosmarinic acid contributes to this effect by reducing inflammatory mediators and promoting overall scalp comfort.

In addition to these therapeutic benefits, rosemary offers protection against environmental damage. Its natural antioxidants act as a shield against ultraviolet (UV) radiation, pollution, and oxidative stress, which can weaken the hair shaft and lead to dullness. By protecting keratin proteins and lipids in the hair structure, rosemary preserves the hair's strength and shine.

Overall, rosemary is one of the most valuable herbal ingredients in natural hair care due to its multi-directional activity stimulating hair growth, strengthening follicles, controlling dandruff, preventing premature greying, and protecting against external damage. Its safety profile, pleasant aroma, and proven scientific efficacy make it a key component in herbal hair oils, shampoos, and scalp treatments, supporting both cosmetic and therapeutic applications.

About Black Sesame (*Sesamum indicum*)

Black sesame (*Sesamum indicum* L.) is an ancient and highly valued oilseed crop belonging to the family Pedaliaceae. It is one of the oldest cultivated plants known to humankind, with historical roots in Asia, Africa, and the Mediterranean region.

Archaeological and literary records reveal that sesame has been used for over 3,000 years for its nutritional, medicinal, and cosmetic properties. Among the different varieties of sesame, the black-seeded type is especially prized in traditional medicine, particularly in Ayurveda, Unani, and Traditional Chinese Medicine (TCM), for its rejuvenating and restorative actions.

Phytochemically, black sesame is a rich source of essential fatty acids, including linoleic acid (omega-6) and oleic acid (omega-9), which are vital for maintaining the structural integrity and moisture balance of the hair and scalp. These fatty acids nourish the hair follicles, promote elasticity, and prevent dryness and brittleness. The seeds also contain unique lignans such as sesamin, sesamol, and sesamol, which possess potent antioxidant, anti-inflammatory, and anti-ageing properties. These lignans are responsible for the high oxidative stability of sesame oil, preventing rancidity and extending its shelf life a characteristic that makes it an ideal base oil for herbal hair preparations.

In addition to fatty acids and lignans, black sesame is a natural source of vitamin E, B-complex vitamins, and minerals such as calcium, zinc, magnesium, phosphorus, and iron. These nutrients play a critical role in maintaining hair health. For instance, calcium and zinc strengthen hair roots and support follicle regeneration, while iron improves oxygen supply to the scalp through enhanced blood circulation. The presence of vitamin E provides additional antioxidant protection, helping to neutralize free radicals that cause cellular damage and premature ageing of hair follicles.

The antioxidant properties of black sesame are particularly beneficial in combating oxidative stress induced by ultraviolet (UV) radiation, pollution, and chemical exposure. Regular use of black sesame oil helps protect hair from UV-induced protein degradation, keeping it strong, smooth, and naturally glossy. It also minimizes oxidative damage that leads to premature greying, thereby maintaining the natural color and vitality of hair.

From a therapeutic standpoint, black sesame exhibits antimicrobial and anti-inflammatory actions that contribute to scalp health. Its oil helps reduce dandruff, itching, and flakiness caused by fungal or bacterial infections. The soothing properties of the oil calm scalp irritation and restore the natural oil balance, making it suitable for all hair types, including dry and sensitive scalps.

In Ayurvedic literature, black sesame oil is classified as a “Rasayana” a rejuvenating and restorative tonic that enhances strength, vitality, and longevity. It is believed to nourish “Shukra Dhatu” (reproductive tissue) and “Majja Dhatu” (nervous tissue), which are traditionally linked to hair nourishment and pigmentation. Regular application of black sesame oil is said to promote thick, dark, and lustrous hair, prevent greying, and delay signs of ageing.

Scientific research supports many of these traditional claims. Studies have shown that sesame oil’s lignans, particularly sesamin and sesamol, exhibit free radical scavenging and melanin-stimulating effects, helping to preserve the natural color of hair. Furthermore, its high lipid content forms a protective layer around the hair shaft, reducing protein loss during washing and improving resistance to environmental damage.

Overall, black sesame serves as a powerful natural ingredient in herbal hair oils, combining nourishment, protection, and therapeutic value. Its unique combination of fatty acids, antioxidants, vitamins, and minerals provides comprehensive care for both scalp and hair. By strengthening roots, reducing dandruff, and restoring shine, black sesame oil not only improves appearance but also supports long-term scalp health and vitality. Its long-standing use in traditional medicine and modern cosmetic formulations underscores its importance as a natural, safe, and effective hair care ingredient.

Combined Benefits of Rosemary and Black Sesame

The combination of rosemary (*Rosmarinus officinalis*) and black sesame (*Sesamum indicum*) in herbal hair care represents a powerful and synergistic blend of two botanicals with complementary therapeutic properties. While rosemary primarily functions as a scalp stimulant and circulatory enhancer, black sesame serves as a nourishing and protective base, rich in essential nutrients. Together, they provide a balanced approach to promoting hair and scalp health by addressing both internal follicular nourishment and external protection.

One of the most important combined effects of rosemary and black sesame is their ability to promote hair growth and reduce hair loss. Rosemary enhances microcirculation in the scalp, ensuring that hair follicles receive a continuous supply of oxygen and nutrients, which is vital for healthy growth and follicle regeneration. It also helps stimulate dormant hair follicles and prolong the anagen (growth) phase of the hair cycle. On the other hand, black sesame is rich in essential fatty acids, amino acids, and

minerals such as calcium, iron, and zinc, which provide structural nourishment to the hair roots and shafts. The combined action of these two ingredients ensures that the scalp environment remains healthy, hydrated, and conducive to steady hair growth.

The mixture of these herbs also contributes to strengthening hair roots and minimizing breakage. Rosemary oil strengthens the connective tissue surrounding the follicle and prevents follicular damage caused by oxidative stress. Simultaneously, the emollient properties of black sesame oil form a thin protective layer around each hair strand, preventing moisture loss and reducing protein degradation. This dual mechanism of internal reinforcement and external protection helps reduce brittleness, split ends, and excessive shedding.

Another important benefit of this combination is its ability to delay premature greying and restore natural shine. Rosemary contains high levels of antioxidants, such as rosmarinic acid and carnosic acid, which neutralize free radicals that damage melanin-producing cells in the hair follicles. This helps preserve natural pigmentation and delay the onset of greying. Black sesame complements this action through its traditional rejuvenating (“Rasayana”) properties and its rich content of vitamin E, sesamol, and anthocyanins, which nourish the scalp and support melanin synthesis. Regular application of this blend imparts a healthy, glossy appearance to the hair, enhancing smoothness and natural luster.

In addition, both rosemary and black sesame exhibit antimicrobial and anti-inflammatory properties that maintain scalp cleanliness and prevent infections. Rosemary’s essential oils have been proven to inhibit the growth of bacteria and fungi such as *Malassezia furfur*, a common cause of dandruff. Similarly, the lignans in black sesame possess mild antibacterial and antifungal effects that soothe scalp irritation, itching, and inflammation. The combined use of these oils helps maintain a balanced scalp microbiome, preventing dandruff and promoting a fresh, clean scalp surface.

The most remarkable aspect of the rosemary black sesame combination lies in its synergistic mechanism of action. Rosemary acts as a stimulant and detoxifier, rejuvenating the scalp and activating follicular cells, while black sesame functions as a deep moisturizer and restorative nutrient source, replenishing essential lipids and proteins. Together, they create a holistic hair care system that not only promotes growth but also enhances resilience, shine,

and protection from environmental stressors such as UV radiation, dust, and pollutants.

Overall, the combined use of rosemary and black sesame oils offers comprehensive care for both scalp and hair. This dual-action approach ensures that the hair is strengthened from within, nourished at the roots, and protected on the outside. It represents a natural, sustainable, and scientifically supported alternative to synthetic hair treatments, aligning traditional herbal wisdom with modern cosmetic science.

Importance in Modern Hair Care

In recent years, there has been a significant transformation in the global hair care industry, with consumers showing a growing preference for natural, herbal, and sustainable products. This shift is primarily driven by increased awareness about the harmful effects of synthetic chemicals commonly used in conventional hair cosmetics, such as parabens, sulfates, silicones, and artificial fragrances. These chemical ingredients, though effective in the short term, can cause scalp irritation, dryness, hair breakage, and even allergic reactions after prolonged use. As a result, both consumers and manufacturers are increasingly turning toward plant-based and eco-friendly alternatives that are safe, gentle, and effective for long-term use.

Herbal hair oils perfectly align with this modern trend toward sustainability and holistic wellness. They are composed of naturally derived ingredients and are free from harsh additives, making them safer for both human health and the environment. The production of herbal oils is also eco-conscious, as it involves renewable plant resources, minimal processing, and biodegradable formulations. Moreover, the use of traditional extraction techniques such as cold pressing or maceration preserves the bioactive components of the plants, ensuring high therapeutic efficacy.

Beyond their natural origin, herbal hair oils offer a unique combination of therapeutic and cosmetic value. Unlike synthetic products that only provide external conditioning, herbal oils act on multiple levels—they nourish the scalp, strengthen the hair follicles, improve blood circulation, and protect against external stressors such as UV rays and pollution. Their antioxidant and antimicrobial properties make them effective in preventing common scalp disorders like dandruff, hair fall, and premature greying, while also enhancing shine, softness, and manageability.

Importantly, herbal hair care practices are gaining acceptance not only among consumers but also

within the scientific and industrial communities. Modern cosmetic research increasingly supports the development of safe and standardized herbal formulations backed by both traditional knowledge and scientific validation. The integration of ancient Ayurvedic principles with contemporary formulation science has led to the creation of high-quality, evidence-based herbal products that meet modern regulatory and consumer standards.

Thus, in the context of modern hair care, herbal hair oils represent a bridge between traditional wisdom and advanced cosmetic science. Their effectiveness, combined with safety and sustainability, positions them as an essential part of the future of natural hair care systems.

CONCLUSION:

The present review highlights the significance of rosemary (*Rosmarinus officinalis*) and black sesame (*Sesamum indicum*) as potent natural ingredients for herbal hair oil applications. Both plants possess an exceptional range of biological activities, including antioxidant, antimicrobial, anti-inflammatory, and rejuvenating properties, which contribute to improved scalp health and hair vitality. When used together, they offer a synergistic effect—rosemary stimulating blood circulation and strengthening follicles, while black sesame provides deep nourishment and protection against oxidative damage.

The combination of these two botanicals helps promote hair growth, strengthen roots, delay premature greying, and enhance shine, resulting in overall improvement of hair quality. Their rich phytochemical composition ensures that the hair and scalp receive complete care without the risks associated with chemical-based products. As such, rosemary and black sesame oils present a natural, safe, and eco-friendly alternative to conventional synthetic hair care formulations.

Furthermore, these herbal ingredients align perfectly with the global demand for green, sustainable, and wellness-oriented cosmetics. Their long history of traditional use, supported by emerging scientific evidence, validates their therapeutic potential and positions them as key components in modern herbal cosmetic development.

Future research should focus on advanced extraction and processing techniques to enhance the bioavailability of active constituents, clinical evaluation of efficacy and safety, and standardization of formulations to ensure consistency and consumer confidence. Continued collaboration between traditional medicine and

modern scientific research will further strengthen the global recognition of herbal hair oils as effective and sustainable solutions for maintaining healthy, strong, and naturally beautiful hair.

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