



Review Article

Rosmarinus Officinalis L. : Used for the Treatment of Hair Loss

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ABSTRACT

Rosemary oil has received considerable attention in hair because it is said to promote hair growth and prevent hair loss. Rosemary oil is an essential oil obtained from the rosemary plant native to the Mediterranean region. It has been used for centuries and is known for its aromatic fragrance. Rosemary oil has several beneficial properties and has been used in the folk medicine, pharmaceutical, and cosmetics industries, mainly for its antioxidant and anti-inflammatory properties, which are attributed to the presence of carnosol/carnosic and ursolic acids. The therapeutic use of rosemary has been explored for the treatment of inflammatory diseases; however, other uses have been studied, such as wound healing and skin cancer and mycoses treatments, among others. Besides its therapeutic uses, rosemary has potential applications in cosmetic formulations and in the treatment of pathological and non-pathological conditions, such as cellulite, alopecia, ultraviolet damage, and aging. This review aims to critically discuss the topical applications of rosemary found in the literature while also offering relevant information for the development of topical formulations of its bioactive compounds. Topical application is an important administration route for drugs requiring local action on the skin, thereby avoiding their systemic absorption and adverse side effects. Numerous research have proven that topically carried out rosemary oil can certainly stimulate hair regrowth and assist basic hair health. In fact, one examine even as compared its effectiveness to that of minoxidil, a usually used medicinal drug for hair loss[25].

INTRODUCTION

Rosmarinus officinalis L. commonly known as rosemary, belongs to the Lamiaceae family. The genus Rosmarinus was combined with the genus Salvia in a recent phylogenetic analysis. This means that Rosmarinus officinalis is no longer the correct name of the species under study. Since the

name Salvia officinalis was already used at the time of the merger, that species needed a new special epithet for Salvia, which is why it is now known as Salvia Rosmarinus[1]. An evergreen perennial shrub belonging to the Lamiaceae family Rosemary, originally from the Mediterranean region, is cultivated today around the world

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because it is used as a natural preservative and spices. Rosemary was also used as a source of traditional medicine for centuries[2]. The plant blooms in spring and summer in temperate climates, but in hot climates the plants can bloom continuously; flowers are white, pink, purple or deep blue. Rosemary tends to bloom outside of its normal flowering period; it can bloom as early as December and as early as mid-February (in the Northern Hemisphere)[7,8]. Rosemary was once known as "rosmarine". Ros comes from the word "dew" and marinus refers to the sea, belonging to the sea. Thus put together, the word means "dew of the sea". It was beloved by the Ancient Greeks, the Romans and by many generations to follow, for its aromatic and medicinal properties[3]. The best studied components of rosemary are caffeic acid and its derivatives, rosmarinic acid. These compounds are thought to have antioxidant properties and have are being investigated as potential therapies for cancer, hepatotoxicity and inflammation to the conditions. There are currently no high-quality human trials on rosemary and its potential therapeutic applications. A small number of methodological studies show promise in improving mental state (through aromatherapy) and a against hair loss[9].

PHYSICAL DESCRIPTION

Rosemary is a perennial shrub and usually grows to about 1 meter (3.3 ft) tall, although some plants can be up to 2 meters (6.6 ft) tall. The linear leaves are about 1 cm (0.4 in) long and somewhat resemble small curved pine needles. They are dark green and shiny above, with white undersides and curly leaf edges. The small blue flowers are borne in axillary clusters and attract bees. Rosemary is quite resistant to most pests and plant diseases, although in humid climates it is susceptible to certain fungal infections such as powdery mildew. Rosemary is a dense, branched, evergreen shrub with bluish-white flowers reaching a height of about 1 m. It is characterized by 1-4 cm long

and 2-4 mm wide, sessile, leathery, linear or linear-lanceolate, curved edges, dark green upper side and granular and lateral base heavy, with a prominent central band and very characteristic[4,5,6].



SCIENTIFIC CLASSIFICATION OF ROSMARINUS OFFICINALIS L

Kingdom	Plantae
Sub kingdom	Tracheobionta
Super division	Spermatophyta
Division	Magnoliophyta
Class	Magnoliopsida
Sub class	Asteridae
Order	Lamiales
Family	Lamiaceae
Genus	Rosmarinus L.
Species	officinalis
Binomial nomenclature	Rosmarinus officinalis L

Rosemary Phytochemistry and Biological Activity

The bioactive compounds of rosemary—such as monoterpenes, diterpenes, and polyphenols—are products obtained from plant materials by steam distillation or similar processes. The most used classic extraction methods of essential oil are maceration, decoction, hydrodistillation, and solvent extraction. Others, related to so-called green chemistry, are supercritical fluid extraction (SCF) and the use of microwave and ultrasound methods[21].

TABLE OF BIOACTIVE COMPONENT OF ROSMARINUS OFFICINALIS L.

<p>Main Monoterpenes 1,8-Cineole (eucalyptol), Camphor (ketone), α-pinene, Borneol, β-pinene, Limonene y p-cymene, Verbenone (ketona), and Sesquiterpenes (β-caryophyllene)</p>
<p>Main diterpenes Carnosic acid, carnosol, rosmarol, epirosmanol, isorosmanol, and rosmaridifenol</p>
<p>Main triterpenes Oleanolic acid, ursolic acid, betulin, α-amyirin, and β-amyirin.</p>
<p>Flavonoids Luteolin, apigenin, genkwanin, diosmetin, hispidulin, 5-hidroxi-7,40-dimetoxi-flavone, and cirsimaritin.</p>
<p>Phenolic acids Caffeic acid, chlorogenic acid, and rosmarinic acid.</p>

THERAPEUTIC PROPERTIES OF ROSMARINUS OFFICINALIS L.

To explore how rosemary leaf extract can benefit your hair, we must first examine its ingredients and their combined healing properties. The main chemical compounds of rosemary extract are α -pinene, 1,8-cineole, camphor, rosmarinic acid, carnosic acid and borneol. These substances are found in both rosemary oil and rosemary leaf extract, although in different concentrations, and are known to have the following properties

- Anti-inflammatory
- Antifungal
- Antibacterial
- Antioxidant
- Analgesic (pain relieving)
- Vasodilation (improving blood flow)

Rosemary leaf extract and rosemary oil offer roughly the same benefits for hair and scalp health. The main reason why rosemary leaf extract is more often found in hair and scalp care products than rosemary oil is that rosemary oil does not always mix well with other ingredients.

There's been a lot of excitement surrounding this humble plant in recent years and with good reason.

Unlike many growth promoting ingredients, rosemary's ability to improve scalp health and promote hair growth is well documented.

IMPROVING CIRCULATION

Improving blood circulation to the scalp is one possible mechanism by which rosemary leaf extract stimulates hair growth. In this study, rosemary was shown to improve blood flow in these areas, possibly by stimulating the cells that line blood vessels (endothelial cells) and facilitating the movement of platelets. Rosemary leaf extract can stimulate hair follicles and encourage faster hair growth by improving blood circulation in the scalp. Vasodilators such as rosemary can also reduce hair loss by ensuring that new hair is thick, healthy and well attached to the scalp.

STIMULATING NERVE FUNCTION

Hair and scalp care products containing rosemary leaf extract can be especially beneficial for people with limited hair growth due to damage to the nerve endings in the scalp. The results show that a topical formulation containing rosemary extract was able to accelerate tissue regeneration and restore nerve endings around hair follicles. This effect is thought to be due to rosemary's carnosic acid content, as this compound may have nerve-stimulating properties.

BENEFITS OF ROSMARINUS OFFICINALIS L. LEAF EXTRACT TO TREAT HAIR LOSS

There is ample evidence that serums, conditioners and shampoos containing rosemary oil or rosemary leaf extract can stimulate hair growth in people with relatively healthy scalps. A growing body of research also shows that rosemary can treat hair loss and promote new hair growth in people with androgenetic alopecia. Let's look at some of the more common causes of hair loss and how rosemary can help with regrowth in each case.

PROMOTES HAIR GROWTH

Rosemary extract is known for its ability to stimulate hair follicles, which can promote hair growth. When applied to the scalp, rosemary oil increases circulation and transports oxygen and nutrients to the hair follicle. This stimulation of the follicles can help strengthen existing hair and promote the growth of new hair fibers.

Studies have shown that rosemary oil can effectively promote hair growth, making it a popular choice for those looking to improve the health and thickness of their hair.

- **Stimulates hair follicles:** Rosemary extract has been shown to increase circulation to the scalp, which stimulates hair follicles and promotes hair growth.

- **Improves Scalp Health:** The anti-inflammatory and antibacterial properties of rosemary oil help maintain a healthy scalp, which is essential for optimal hair growth.

- **Improves hair quality:** Rosemary oil can strengthen the hair shaft, making it less sensitive and improving overall hair quality.

- **Prevention of dandruff:** Rosemary oil creates an ideal environment for hair growth by removing dandruff and keeping the scalp clean[16]. Improves the health of the scalp Using rosemary extract for hair not only stimulates hair follicles and promotes hair growth, but also improves the health of the scalp. The anti-inflammatory and antioxidant properties of rosemary oil help reduce the inflammation and irritation of the scalp, making it beneficial for people with dandruff. In addition, rosemary extract has been linked to potential stress reduction, which may help prevent premature graying of hair. If you want to add rosemary oil to your hair care routine, focus on applying it directly to the scalp, give it time to work, and make sure you're using pure rosemary oil with no added fragrance[17].

HAIR LOSS

Hairs are protein filaments that grow from follicles in the skin. The hair of mammals is one of their

most distinctive features. Hair is most commonly associated with hair development, hair types and hair care, but it is also an important biomaterial composed mainly of proteins, especially alpha-keratin. Dandruff, hair loss, dry hair, split ends, frizzy hair, dull hair, heat damage, color damage, gray hair and other problems are common in cosmetics. There are many products on the market such as hair oils, hair shampoos, conditioners, hair serums, hair gels, hair masks and hair dyes that help treat these problems[11-13]. Hair loss is characterized by partial or total hair loss and is classified as a chronic dermatological disorder. The prevalence of hair loss has increased due to stress and dietary factors. Significantly associated with this condition is an excess of testosterone in the blood capillaries; as such, antiandrogens have been reported to reduce hair loss[14].

CAUSE OF HAIR LOSS

1. Heredity
2. Physical and Emotional Stress
3. Alopecia
4. Anemia
5. Fungal or bacterial infections of the scalp
6. Hormonal changes[15].

SOME SEVERE PROBLEM ASSOCIATE WITH HAIR

- Alopecia Areata
- Telogen Effluvium
- Scalp Folliculitis
- Scalp Psoriasis
- Seborrheic Dermatitis[15].

MECHANISM ACTION OF ROSMARINUS OFFICINALIS L

Due to its anti-microbial and anti-inflammatory properties, as well as its blood circulation and fatty acid content, rosemary oil has proven to be a natural remedy worth exploring for those looking to improve their hair growth. Whether you have coarse or fine hair, you can incorporate this

essential oil into your hair care routine with a few simple tips and tricks.

- **Antimicrobial:** Rosemary oil has antimicrobial properties that can help eliminate dandruff and promote a healthy scalp.
- **Anti-inflammatory:** The oil has anti-inflammatory properties that soothe the scalp and reduce irritation.
- **Increased circulation:** Rosemary oil can stimulate blood circulation when applied to the scalp, which helps promote hair growth.
- **Contains fatty acids:** The oil contains fatty acids that nourish hair follicles and provide essential nutrients for healthy hair growth.

Rosemary (*Rosmarinus officinalis*) exhibits antimicrobial properties primarily due to its essential oils, such as cineole, camphor, and borneol. These compounds have been found to have antimicrobial effects against various bacteria, fungi, and viruses.

1. **Cineole (Eucalyptol):** It has been shown to have antibacterial and antifungal properties. Cineole can disrupt the cell membranes of bacteria, leading to cell death.
2. **Camphor:** This component possesses antimicrobial and antifungal activities. It can interfere with the growth and survival of microorganisms.
3. **Borneol:** Borneol has been reported to have antimicrobial effects against various bacteria. It may disrupt microbial membranes and interfere with essential cellular processes.
4. **Phenolic Compounds:** Rosemary contains phenolic compounds like rosmarinic acid, which contribute to its antimicrobial activity. These compounds can disrupt microbial cell walls and inhibit enzymes essential for microbial growth.
5. **Antioxidant Activity:** Rosemary's antioxidant properties also play a role in its antimicrobial effects. By reducing oxidative stress, it can

indirectly inhibit the growth of certain microorganisms.

In summary, the antimicrobial mechanism of action of Rosemary involves disrupting cell membranes, interfering with cellular processes, and exerting antioxidant effects. It's important to note that while these properties have been observed in laboratory studies, the application in real-world scenarios may vary, and further research is ongoing[18].

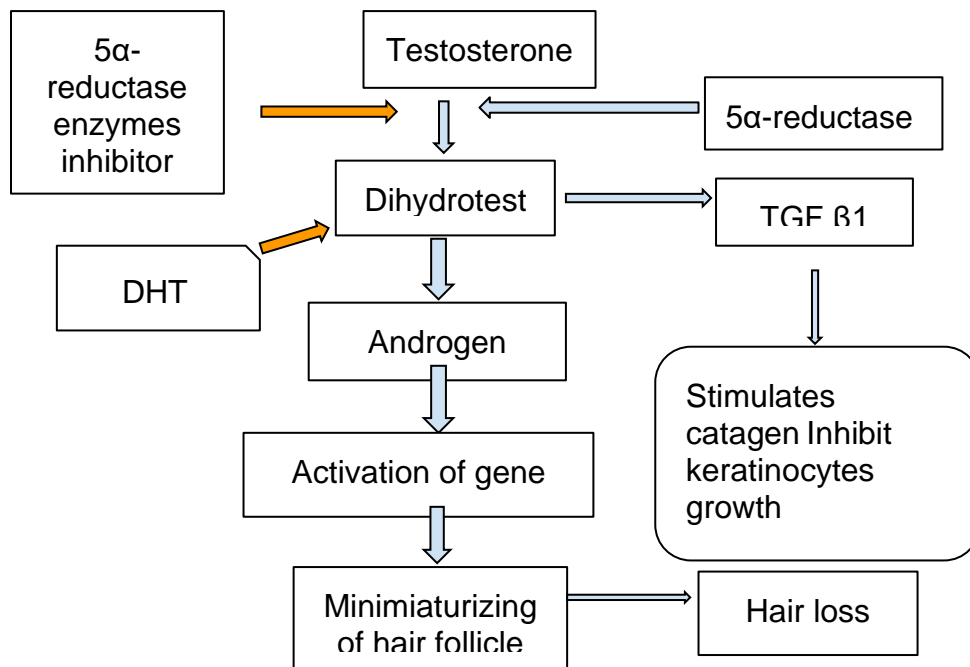
ROSMARINUS OFFICINALIS L. ALSO EFFECTIVE ON ANDROGENETIC ALOPECIA

Androgenetic alopecia (AGA), also known as male pattern hair loss (MPHL) or female pattern hair loss (FPHL), is the most common type of hair loss worldwide and is characterized by progressive hair loss after puberty. The incidence of the disease increases with age, affecting at least 80% of men and 50% of women before age 70.

Androgenetic alopecia (male or female pattern baldness) is thought to be caused by an androgen (the hormone that causes male physical characteristics to develop) called dihydrotestosterone or DHT. Excessive testosterone in men is transformed into DHT, which attaches to androgen receptors in hair follicles and leads to hair thinning[24]. *Rosmarinus officinalis* L. is a medicinal plant with multiple effects, including a plant that improves microcapillary perfusion. The study showed that the rosemary had a significant effect on hair growth in AGA. The aim of this study was to investigate the clinical efficacy of rosemary oil in the treatment of androgenetic alopecia (AGA) and to compare its effect with 2% minoxidil. Patients with AGA were randomized to receive rosemary oil (n=50) or 2% minoxidil (n=50) for six months. DHT is an androgen (male hormone) produced in the prostate, testicles and some other tissues from testosterone. It is necessary to develop and

maintain male sex characteristics such as a deep voice, facial hair and muscles. Testosterone is converted to DHT by 5 α -reductase (pronounced 5-alpha-reductase), an enzyme stored in the sebaceous glands of the hair follicle. If you are

genetically predisposed to male pattern baldness, DHT binds to receptors in your hair follicle, causing the follicle to shrink (which basically means shrink) and eventually stop new hair growth.



Research on Rosemary Oil for Hair Growth

Scientific studies have investigated the effectiveness of rosemary extract for hair growth, although more research is needed to understand its effectiveness. One study compared rosemary oil to minoxidil, a popular hair growth agent. The results showed that hair growth increased significantly in both groups after six months of treatment. Another study found that rosemary extract can affect blood circulation and skin health, possibly promoting hair growth. In addition, rosemary extract has been shown to have antibacterial and antifungal properties, suggesting that it may be beneficial in promoting a healthy scalp environment. However, it is important to note that

current research on rosemary oil for hair growth is limited and more research is needed to confirm its effectiveness and safety. People should consult a doctor before adding rosemary oil to their hair care routine [18].

Other Uses of Rosemary for Hair

1. Scalp itchininess relief

If you have an itchy scalp, rosemary oil can help. Its natural anti-inflammatory and antiseptic properties can soothe the scalp and relieve discomfort. Here are some ways to use rosemary oil for an itchy scalp.

2. The benefits of mental wellness

a Better memory: Greek researchers used rosemary essential oil to improve memory,

and a study published in the International Journal of Neuroscience found that it can significantly improve memory quality and mental alertness.

- b Stress relief: Inhaling the aroma of rosemary essential oil can reduce blood levels of the stress hormone cortisol. Its anti-stress properties can help combat chronic stress and promote relaxation.
- c Improved mental energy: Rosemary oil can refresh the mind and calm the body, making it a popular choice in aromatherapy for mental clarity and focus.
- d Calming Effects: Rosemary essential oil has a woody scent that can calm the mind, reduce anxiety and promote general well-being.

Precautions and Considerations for Using Rosemary oil

Sensitive skin reactions

When using rosemary for hair, it is important to be aware of possible reactions on sensitive skin. Although rosemary is generally safe to use, some people with more sensitive skin may experience irritation. Here are some tips to reduce the risk of skin reactions:

1. Always dilute rosemary with a carrier oil or other product before applying to scalp and hair. This helps prevent direct contact of the undiluted oil with the skin.
2. Apply the patch before using rosemary for the first time. Apply a small amount of the diluted oil to a small area of skin and monitor for possible side effects within 24 hours.
3. Discontinue use if irritation or discomfort occurs. If you have a history of skin sensitivity or allergies, it is best to consult a dermatologist before using rosemary.
4. Avoid getting rosemary essential oil in your eyes, as it can cause eye irritation. In case of contact, wash the eyes immediately with cold water.

5. It is important to note that the specific effects of rosemary on sensitive skin have been poorly studied. Therefore, it is recommended to check the reaction of your skin and stop using if irritation occurs.

Pregnancy and breastfeeding concerns

When it comes to using rosemary oil for hair, it is important to consider possible problems for pregnant and breastfeeding women. Although there are no specific studies on whether rosemary oil is safe for these people, it is generally recommended to avoid using the oil completely during pregnancy and breastfeeding. Here are some considerations and precautions regarding rosemary and its use during pregnancy and breastfeeding:

1. Lack of research: Direct research on the effects of rosemary oil, especially during pregnancy and breastfeeding, is limited. Therefore, it is best to be cautious and avoid using rosemary oil during this time.
2. Potential adverse effects: Anecdotal evidence suggests that rosemary oil may have harmful effects in pregnant women or women with high blood pressure. However, more direct research is needed to confirm these claims.
3. Seek Professional Advice: If you are pregnant or breastfeeding and considering using rosemary oil for hair, it is recommended that you consult your doctor or a qualified dermatologist before proceeding. They can provide personalized recommendations and help assess potential risks.
4. Do patch tests: Before using rosemary oil or any new hair care product, it is important to do a patch test to check for allergic reactions or sensitivity. Apply a small amount of diluted rosemary oil to a small area of skin and monitor for side effects before using it more widely.

While rosemary oil has shown potential benefits for hair growth and scalp health, it is important to



prioritize the safety and well-being of both mother and baby during pregnancy and breastfeeding. It is always best to consult a doctor for personal advice[20].

FUTURE PERSPECTIVE

A formulation study on rosemary for hair loss might involve investigating the potential benefits of rosemary extract or oil in promoting hair growth. This could include evaluating its antioxidant properties, impact on blood circulation, and potential to reduce inflammation on the scalp. Formulation aspects may include creating hair products like shampoos or oils with varying concentrations of rosemary and assessing their efficacy through controlled trials. Keep in mind that while some studies suggest rosemary's positive effects on hair health, more research is needed for conclusive evidence.

While current research suggests that rosemary may have potential benefits for hair growth, future studies could explore optimized formulations, dosages, and delivery methods to enhance its efficacy in promoting hair health. Advances in scientific understanding may lead to more targeted and potent formulations, offering promising prospects for those seeking natural solutions for hair growth.

The following formulation are available for future studie of rosmarinus officinalis l for hair loss

1. Rosemary Essential oil

While some studies suggest that rosemary oil may promote hair growth by improving circulation and reducing hair loss, formulations can vary. A common method is to mix a few drops of rosemary essential oil with a carrier oil like jojoba or coconut oil. Apply this mixture to the scalp and leave it on for about 30 minutes before washing it out. It's important to patch test and be cautious with essential oils, as they can be potent. Consult with a healthcare professional before trying any new hair care regimen.

2. Hair regrowth serum is a Scalp and Hair treatment for intense hair growth and prevents hair thinning. Regrows hair by stimulating hair follicles and blood flow to the scalp Promotes faster and healthy hair growth,Nourishes hair and scalp.

3. Rosemary shampoo[23].

CONCLUSION

In this article the therapeutic potential of rosmarinus officinalis l on hair loss was reviewed. Rosemary extract carries a massive sort of bioactive molecules with excellent healing potential. These encompass triterpenes (e.g., ursolic and oleanolic acid), tricyclic diterpenes (e.g., carnosic acid and carnosol), phenolic acids (e.g., caffeic acid and rosmarinic acid), and critical oils. These secondary metabolites were formulated in dosages. This approach may be carried out to enhance the homes of beauty products like serum, essential oil, shampoo. The rosmarinus officinalis l also show the effect on the androgenetic alopecia their mechanism of action was mentioned. The rosemary have therapeutic properties like anti-inflammatory , antifungal, antibacterial ,antioxidant ,analgesic (pain relieving) ,vasodilation (improving blood flow). It also promote the blood circulation and reduce itching in scalp. While using the rosmarinus officinalis l their contraindication also remember.

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