ORIGINAL CONTRIBUTION

Rosemary Oil vs Minoxidil 2% for the Treatment of Androgenetic Alopecia: A Randomized Comparative Trial

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ABSTRACT

Rosmarinus officinalis L. is a medicinal plant with diverse activities including enhancement microcapillary perfusion. The present study aimed to investigate the clinical efficacy of rosemary oil in the treatment of androgenetic alopecia (AGA) and compare its effects with minoxidil 2%. Patients with AGA were randomly assigned to rosemary oil (n=50) or minoxidil 2% (n=50) for a period of 6 months. After a baseline visit, patients returned to the clinic for efficacy and safety evaluations every 3 months. A standardized professional microphotographic assessment of each volunteer was taken at the initial interview and after 3 and 6 months of the trial. No significant change was observed in the mean hair count at the 3-month endpoint, neither in the rosemary nor in the minoxidil group (P>.05). In contrast, both groups experienced a significant increase in hair count at the 6-month endpoint compared with the baseline and 3-month endpoint (P<.05). No significant difference was found between the study groups regarding hair count either at month 3 or month 6 (P>.05). The frequencies of dry hair, greasy hair, and dandruff were not found to be significantly different from baseline at either month 3 or month 6 trial in the groups (P>.05). The frequency of scalp itching at the 3- and 6-month trial points was significantly higher compared with baseline in both groups (P<.05). Scalp itching, however, was more frequent in the minoxidil group at both assessed endpoints (P<.05). The findings of the present trial provided evidence with respect to the efficacy of rosemary oil in the treatment of AGA. (*SKINmed.* 2015;13:15–21)

Androgenetic alopecia (AGA) is the most common type of hair loss in both men and women, affecting about 50% of patients before the age of 50.[1] This type of hair loss is more prevalent in men, however, and has significant social and psychological consequences.[1,2] AGA mostly occurs in the temple and crown areas of the head, representing an M-shaped pattern. The most widely used medications for AGA are topical minoxidil and 5α-reductase inhibitors; however, these drugs are associated with several adverse effects such as itching, circulatory problems, hirsuitism, decreased libido, male fetal anolamies, and recurrence of hair loss after stopping drug use.[1–3] Aside from these side effects, therapeutic efficacy of the current medications is not comprehensive. Therefore, avenues for research are open for finding novel agents with better efficacy and fewer side effects.

Rosmarinus officinalis L. (rosemary) is an aromatic evergreen and perennial herb belonging to the family labiateae. Rosemary is native to the Mediterranean region but is also extensively cultivated elsewhere. It is a well-known medicinal plant with a wide history of application in several traditional systems of medicine. This plant has been used as an anti-flatulent, anti-asthma, diaphoretic, emmenagogue, memory-enhancing, sedative, analgesic, anti-rheumatic, and digestive agent.[4–7] Furthermore, modern scientific research has unveiled several interesting pharmacologic activities for rosemary, such as antioxidant,[8] cholagogue, hepatoprotective,[9] neuroprotective,[10] antibacterial, antiviral, antifungal,[11,12] and smooth muscle cell relaxant[13,14] properties.

Rosemary oil is often used in the cosmeceutical industry because of its pleasant aroma and beneficial effects against eczema, acne,

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dermatitis, skin puffiness, and swelling. Since the spasmolytic activity of rosemary may enhance microcapillary perfusion,[15] this plant has been hypothesized to increase hair follicle blood supply, thereby being effective for the treatment of AGA. Therefore, the present study set out to investigate the clinical efficacy of rosemary oil in the treatment of AGA and compare its effects with minoxidil 2% as the most widely used medication.

PATIENTS AND METHODS

This was a 6-month randomized single-blind clinical trial in men referred to the dermatology clinic of the Baqiyatallah Hospital (Tehran, Iran) between April 2010 and June 2011. After obtaining institutional review board approval and informed consent, 100 patients were recruited. Recruited patients were aged 18 to 49 years with naturally dark hair and AGA characterized as vertex pattern grades II through IV according to the Hamilton Rating Scale for Depression.[16] Exclusion criteria were concomitant use of hair restorers, use of systemic drugs such as 5α-reductase inhibitors during the preceding 6 months, and hypersensitivity to minoxidil. After an initial screening evaluation, physical examination, and laboratory evaluation, eligible men were randomly assigned to rosemary oil (n=50) or minoxidil 2% (n=50). Rosemary oil lotion was standardized as having at least 3.7 mg 1,8-cineole per mL of the product, and provided by the Barij Essence Pharmaceutical Company, Kashan, Iran. All patients signed a written consent form before starting the trial.

Patients applied 1 mL of either assigned solutions twice daily at approximately 12-hour intervals (total daily dose of 2 mL) to the frontoparietal and vertex areas of the scalp (with gentle massage) for a period of 6 months. After baseline visit, patients returned to the clinic for efficacy and safety evaluations every 3 months. Rosemary and minoxidil lotions were matched regarding shape and color. A standardized professional microphotographic assessment of each volunteer was taken at the initial interview and after 3 and 6 months of the trial. Changes in these photographic assessments formed the primary outcome measure, with improvement as the most important factor. These changes were scored independently by two dermatologists who were unaware of the therapy administered. The efficacy of either intervention was also assessed by asking the participants' satisfaction from hair loss decrease and hair growth improvement. For each efficacy measure, participants were asked to express their satisfaction from treatment by giving a score of –3 (severe aggravation), –2 (moderate aggravation), –1 (mild aggravation), 0 (no change), +1 (mild improvement), +2 (moderate improvement), or +3 (severe improvement).

All data were analyzed using Student t test (within-group comparisons of hair count), analysis of variance with Bonferroni's adjustment for multiple comparisons (between-group comparisons of hair count), or chi-square test (frequency of adverse events). A probability <.05 was considered significant. Data were analyzed using SPSS software, version 16 (SPSS Inc, IBM Corporation, Armonk, NY).

RESULTS

Recruited patients were 100 men with a mean age of 24.03±3.21 years. A total of 71% of patients had stage II and 21% had stage III AGA based on the Hamilton scale. A total of 35% of participants previously used hair loss medications. The frequency for dandruff, scalp itching, dry hair, and greasy hair in the total study population were 16%, 31%, 16%, and 72%, respectively. There was no significant difference between the rosemary and minoxidil groups in terms of age, duration of hair loss, stage of AGA, and the frequency of dandruff, scalp itching, dry hair, and greasy hair at baseline (*P*>.05; Table I).

Table I. Demographic Characteristics of Study Patients

Parameters	2% Minoxidil	Rosemary	*P* Value
No.	50	50	–
Mean age, y	23.38±2.5	24.78±3.67	.76
Duration of hair loss, y	3.88±2.21	4.41±2.59	.27
Baseline hair count	138.4±38.03	122.8±48.9	.18
Stage of baldness			
II	34	37	.66
III	16	13	
IV	0	0	

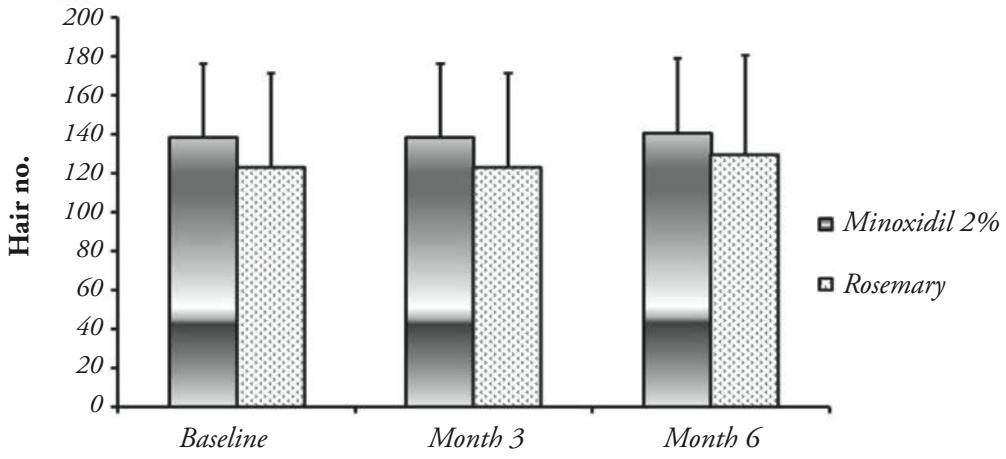

Figure 1. Comparison of hair count between the study groups at different intervals. Significant increases in mean hair count were observed at month 6 compared with month 3 and baseline in both groups (P<.05).

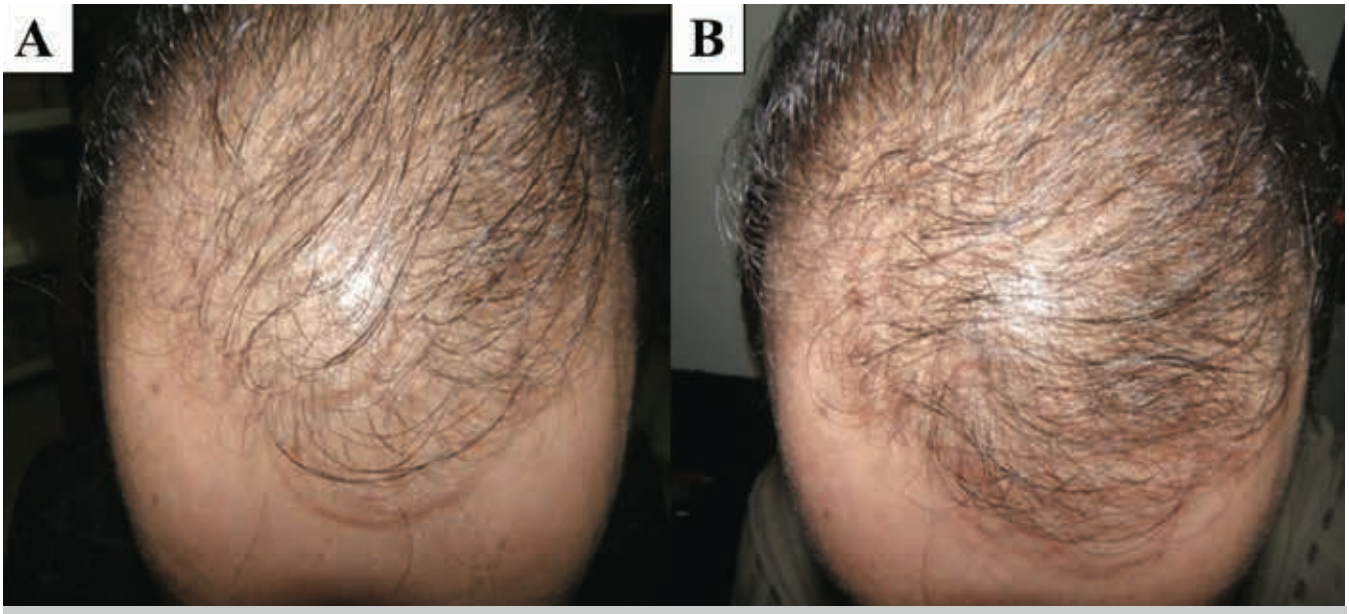

Figure 2. A sample pre-trial and post-trial scalp photograph in the rosemary group.

The groups were comparable regarding their baseline hair count (122.8±48.9 in the rosemary and 138.4±38.0 in the minoxidil group; P>.05). No significant change was observed in the mean hair count at the month 3 endpoint, neither in the rosemary (122.8±48.9) nor in the minoxidil (138.4±38.0) group (P>.05). In contrast, both groups experienced a significant increase in hair count at the month 6 endpoint compared with the baseline and month 3 endpoint (129.6±51.2 in the rosemary and 140.7±38.5 in the minoxidil group; P<.05). No significant difference was found between the study groups regarding their hair counts either at month 3 or month 6 (P>.05; Figure 1). Some sample pre-trial and post-trial scalp photographs of patients are shown in Figures 2 and 3.

No significant difference in the frequencies of dry hair, greasy hair, and dandruff was found at either month 3 or month 6 compared with baseline in both rosemary and minoxidil groups (P>.05; Figure 4). The frequency of scalp itching at month 3 and month 6 was significantly higher compared with baseline in both groups (P<.05; Figure 5); however, there was no significant difference between month 3 and month 6 (P>.05; Figure 6). Scalp itching was more frequent in the minoxidil group at both assessed endpoints (P<.05; Figure 7).

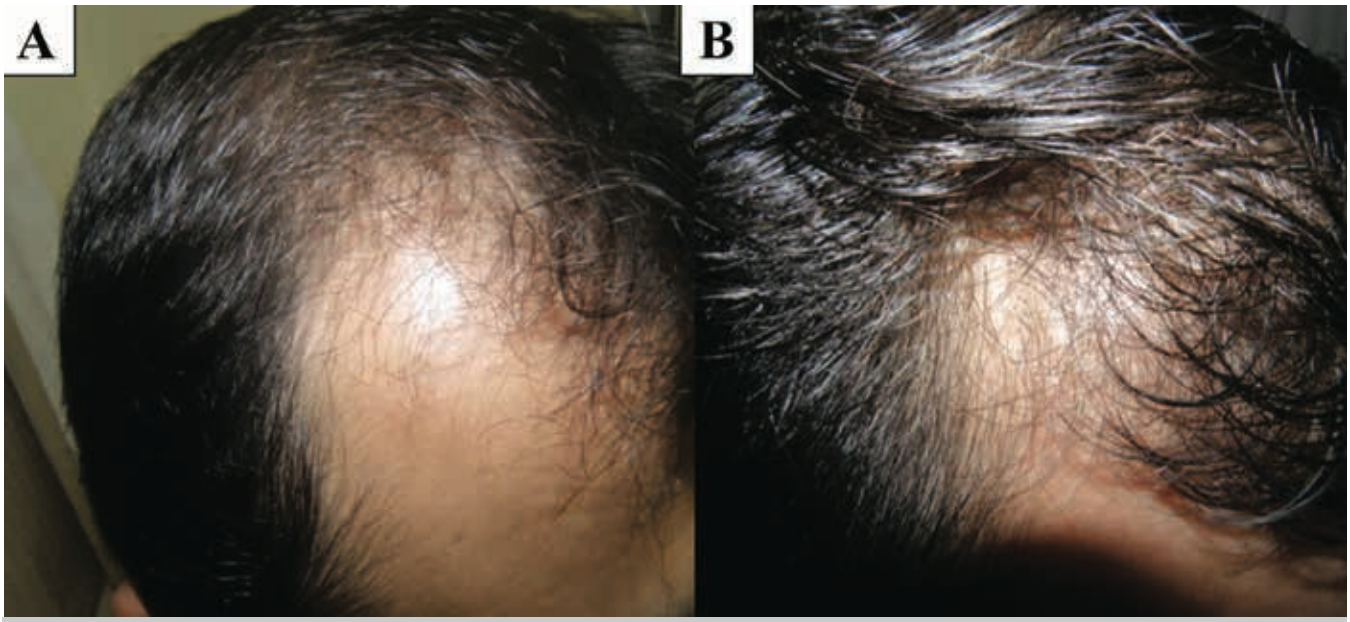

Figure 3. A sample pre-trial and post-trial scalp photograph in the minoxidil group.

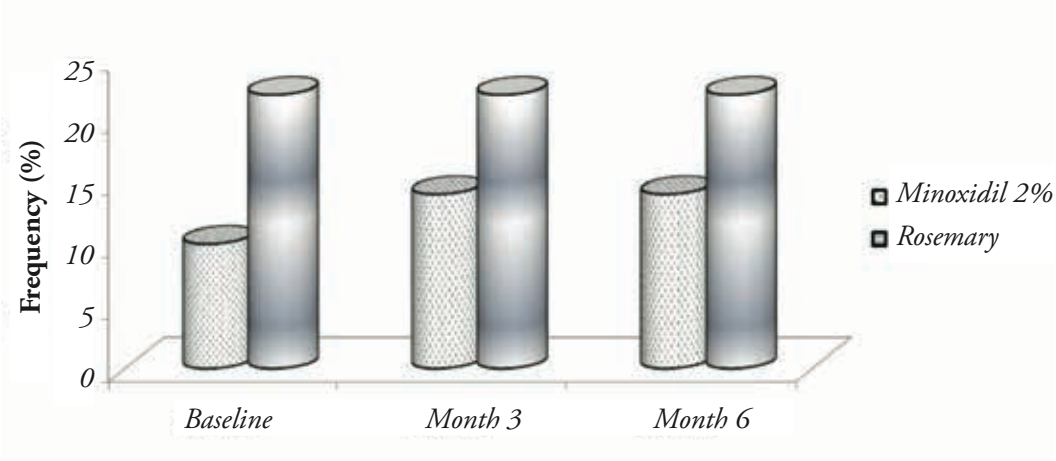

Figure 4. Frequency of dry hair in the study groups at baseline and months 3 and 6. No significant within-group or between-group difference was observed ($P>.05$).

In addition to hair count and hair disorders, questions in the patients' questionnaire were categorized to evaluate two aspects of hair growth: increase in hair growth and decrease in hair loss (mild, moderate, no change, and worse). The percentage of satisfaction with treatment (calculated from patient perspectives during treatment) demonstrated a marginally significant difference favoring the rosemary group over the 2% topical minoxidil group. Hair loss in both groups during the study was decreased. The proportion score for rosemary was significantly superior to 2% topical minoxidil group at months 3 and 6 with regard to decrease in hair loss ($P<.05$). Hair growth was equally increased in both groups during the study according to the patients' answers ($P>.05$; Table II).

DISCUSSION

Alternative medicine and botanical preparations have long been used in different traditional systems of medicine for the treatment of dermatologic disorders including alopecia. Recently, there has been a surge of interest in the use of alternative approaches, at least as adjuncts, for the treatment of hair loss. The present study aimed to evaluate the efficacy and safety of rosemary oil in the treatment of AGA and compare its effects with the widely prescribed drug minoxidil.

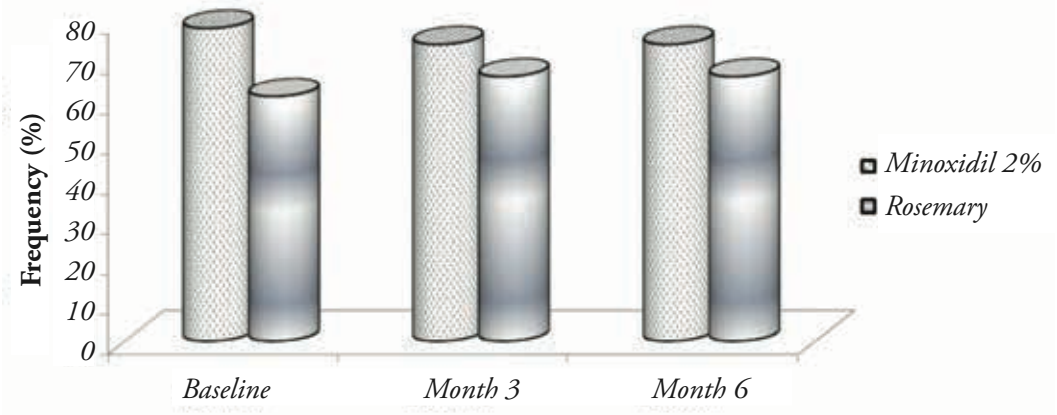

Figure 5. Frequency of greasy hair in the study groups at baseline and months 3 and 6. No significant within-group or between-group difference was observed (*P*>.05).

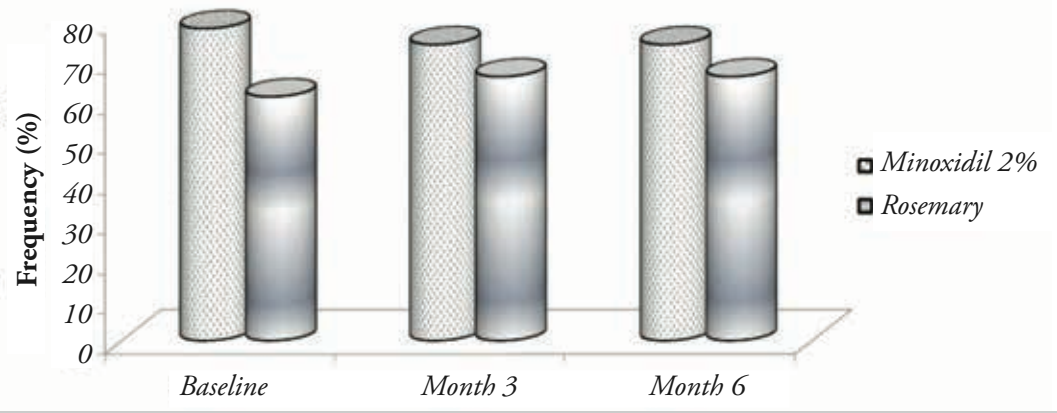

Figure 6. Frequency of dandruff in the study groups at baseline, 3 months and 6 months intervals. No significant within- or between-group difference was observed (*P*>.05).

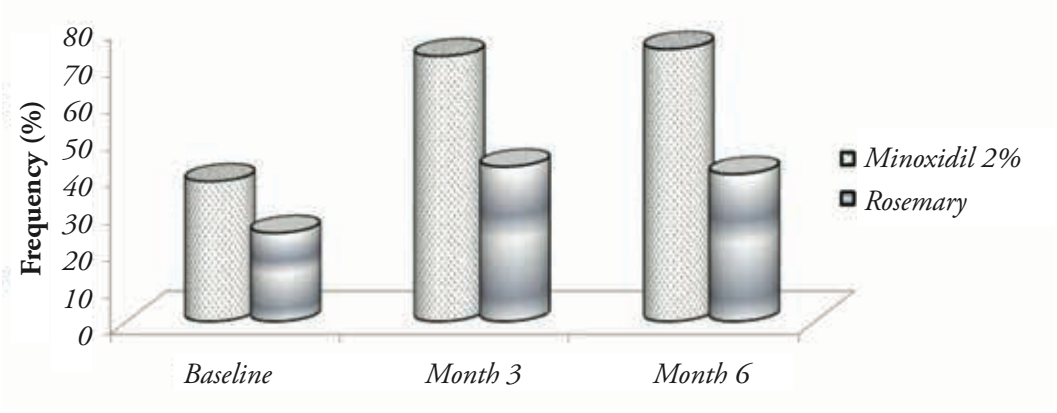

Figure 7. Frequency of scalp itching in the study groups at baseline, 3 months and 6 months intervals. Significantly higher frequencies were observed at months 3 and 6 compared to baseline, and in the rosemary compared to minoxidil 2% group at both assessed time points (*P*<0.05).

Table II. Percentage of Men With Improvement (Satisfying) in Scalp Hair During the Study According to Answers to a Self-Assessment Questionnaire

Parameters	2% Minoxidil				Rosemary			
	Mild	Moderate	No Change	Worse	Mild	Moderate	No Change	Worse
Increase in hair growth								
Month 3	1 (2%)	0%	47 (94%)	2 (4%)	3 (6%)	0%	47 (94%)	0%
Month 6	12 (24%)	0%	38 (76%)	0%	19 (38%)	0%	31 (62%)	0%
Decrease in hair loss								
Month 3	43 (86%)	0 (0%)	5 (10%)	2 (4%)	18 (36%)[a]	32 (64%)[a]	0 (0%)	0 (0%)
Month 6	46 (92%)	4 (8%)	0%	0%	9 (18%)[a]	41 (82%)[a]	0 (0%)	0 (0%)

[a]Significant difference ($P<.05$).

Leaves and branchlets of rosemary contain considerable amounts of essential oil. The essential oil content of rosemary has been reported to be 0.5% to 2.5% v/w and 1% based on the British Pharmacopea. The same as other oils, chemical composition and relative frequencies of volatile components in the rosemary oil varies with geographical and climatic changes, soil composition, extraction method, and source part of the plant[17,18]; however, the major volatile components of rosemary oil have been reported to be 1, 8-cineole, borneol, bornyl acetate, camphor, α-pinene, and β-pinene.

To our knowledge, no study has yet specifically investigated the efficacy of rosemary oil in the treatment of AGA. There has been just a single trial in this field,[19] in which the authors reported the efficacy and safety of 7-month application of an aromatherapy cocktail containing thyme, rosemary, lavender, and cedarwood oils in a mixture of carrier oils jojoba and grapeseed in the treatment of alopecia areata.[19] In the present study, application of topical rosemary solution was as effective as minoxidil 2% in the treatment of AGA. In addition, there was better treatment compliance in the rosemary group compared with the minoxidil group. This may be the result of decreased frequency of scalp itching and higher patient satisfaction with decreased hair loss in the rosemary group.

There is evidence favoring the efficacy of other herbal products in the treatment of hair loss. For instance, raspberry ketone—a natural aromatic phenol isolated from Rubus idaeus—was reported to promote hair re-growth. The mechanism of action of raspberry ketone appears to be the upregulation of IGF-I expression in the dermal papillae of hair follicles.[20] The impact of Dabao (a hair tonic mixture in Chinese medicine containing saffron flower, Mullberry leaves, stemona root, pepper fruits, sesame leaves, schan pepper skin, ginger root hawthorn fruit, and Chinese angelica root) has also been reported to be beneficial on overall growth of non-vellus hair.[21] Another herbal remedy that has shown efficacy in the treatment of AGA is the bioactive polyphenol procyanidin B-2 that has been shown to increase total and terminal hair counts through promotion of hair epithelial cell growth, shifting the hair cycle from telogen to anagen phase and antioxidant activity.[22] There are also findings on the efficacy of other types of other natural products such as Aloe vera, garlic, primula, onion, green tea, broomcorn millet, and capsaicin in the treatment of different types of alopecia.[23]

Rosemary possesses spasmolytic activity on smooth muscles.[15] Such an effect could lead to the relaxation of scalp vessels and enhanced perfusion of hair follicles. One of the phytochemicals that may account for these effects is camphor, which is known to exert local hyperemic effects. Another mechanism for the beneficial effects of rosemary oil is its antioxidant activity. Oxidative stress has been suggested to be associated with alopecia as significantly lower levels of antioxidants and elevated oxidants have been found in patients with alopecia.[24] Rosemary oil is well documented with respect to the antioxidant activity and has been shown to exert both free radical scavenging and lipid peroxidation inhibitory activities.[25] rosemary oil has several other pleiotropic effects, in addition to its potentiating effects on the scalp microcapillary circulation. For instance, antibacterial and antifungal properties of rosemary oil are well-established. In addition, this oil has nourishing and conditioning properties, leading to the softening and silky appearance of hair strands.[19]

CONCLUSIONS

The findings of the present trial provide evidence with respect to the efficacy of rosemary oil in the treatment of AGA. Further research is warranted to identify the active ingredients and their mechanism of action.

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