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Anti-Androgenic Effects of Spearmint Tea (Mentha Spicata)

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Abstract

Background: Females with elevated androgens can suffer from hirsutism, the most common clinical manifestation of hyperandrogenemia. Hirsutism affects 5 to 10% of females and is defined as excessive hair growth in females in a male pattern, for example excess hair growth on the jaw, neck, chest or back. Other clinical manifestations of elevated androgens include alopecia, acne and ovulatory and menstrual irregularities. Spearmint tea has been shown to lower androgenic hormones in rats prompting the more recent studies involving humans. If spearmint tea is effective in treating hirsutism and elevated androgens it may have the potential to become a first-line, low risk, non-pharmaceutical treatment option.

Methods: An exhaustive search was conducted using MEDLINE-Ovid, Web of Science, CINAHL and Google Scholar using the keywords hirsutism, spearmint tea (mentha spicata) and androgens. The Grading of Recommendations, Assessment, Development and Evaluation (GRADE) approach was used to assess the quality of the relevant articles. A search was conducted of the National Institute of Health clinical trials website and no current trials related to anti-androgenic effects of spearmint tea were noted.

Results: The initial search resulted in 4 articles for analysis. Two articles met the inclusion criteria and were included in this review. The first study revealed a decrease in free testosterone and an increase in luteinizing hormone and follicle stimulating hormone over a 5-day period of drinking spearmint tea. Hirsutism was not scored at the end of the trial. The second study, a randomized controlled trial, demonstrated a decrease in free testosterone and total testosterone and an increase in luteinizing hormone and follicle stimulating hormone over a 30-day period of drinking spearmint tea. The study demonstrated a reduction in the self-reported scoring for hirsutism but noted no significant change in the more objective Ferriman-Gallwey score.

Conclusion: Spearmint tea may be useful in lowering androgenic hormones for female patients suffering from the effects of hirsutism and other symptoms associated with elevated androgens. In order to see benefits in the hirsute patient, it is likely that longer treatment time is necessary as well as extended follow up time with patients to monitor symptomatic improvement.

Keywords: Hirsutism, spearmint tea, androgens

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Anti-Androgenic Effects of Spearmint Tea (Mentha Spicata)

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Biography

[Redacted for privacy]

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List of Abbreviations

DHEA-S	Dehydroepiandrosterone-Sulfate
DQLI	Dermatology Quality of Life Index
E_2	Estradiol
FT	Free Testosterone
FSH	Follicle Stimulating Hormone
LH	Luteinizing Hormone
PCOS	Polycystic Ovarian Syndrome
SHBG	Sex Hormone Binding Globulin
T	Testosterone
TT	Total Testosterone

Anti-Androgenic Effects of Spearmint Tea (Mentha Spicata)

BACKGROUND

Females with elevated androgens can suffer from hirsutism, the most common clinical manifestation of hyperandrogenemia.[1] Hirsutism affects 5 to 10% of females and is defined as excessive hair growth in females in a male pattern, for example excess hair growth on the jaw, neck, chest or back.[2] Other clinical manifestations of elevated androgens include alopecia, acne and ovulatory and menstrual irregularities.[1] Ovulatory and menstrual irregularity can lead to infertility, while hirsutism and the other symptoms can lead to significant psychological distress. Elevated androgenic hormones in females are most commonly caused by polycystic ovarian syndrome (PCOS) but can also be due to adrenal hyperplasia, androgenic medications, and androgen secreting tumors.[2] Hirsutism may also occur in the absence of elevated androgens. It is thought that females with idiopathic hirsutism may have increased sensitivity to androgens or increased numbers of androgen receptors.[2]

First line treatments for hirsutism include hair removal procedures (e.g., shaving, laser therapy or photoepilation) and oral contraceptives. Anti-androgen medications are usually considered after 6 months of oral contraceptive treatment if the response is poor, but they can also be used first-line in addition to oral contraceptives.[2] Monotherapy with the anti-androgenic medications spironolactone, finasteride, flutamide or cyproterone acetate is not recommended

due to the potential of teratogenic effects. Additional treatments to address excess androgens can also include fertility medications like clomiphene or gonadotropins sometimes used in conjunction with metformin.[1]

Spearmint tea has been used as a non-traditional medicinal therapy for many years. It is often used to treat gastrointestinal distress and respiratory issues[3] and is also a common ingredient in toothpaste and chewing gum. While spearmint is generally thought of as safe, there have been animal studies[11-13] revealing dose-dependent hepatotoxicity, nephrotoxicity and uterine tissue damage in rats, but the rat study results have not been replicated in humans. Moreover, reports[14] of allergic contact dermatitis to spearmint leaves have been documented.

The animal studies on the effects of spearmint tea on androgenic hormones were prompted by complaints of decreased libido in men in a specific region in Turkey where spearmint is grown and found as a frequent ingredient in tea.[4] In this initial study it was found that spearmint tea reduced testosterone (T) and spermatogenesis while increasing luteinizing hormone (LH) and follicle stimulating hormone (FSH) in male rats, prompting the more recent studies in humans.[4] If spearmint tea is effective in lowering androgens in females it could be a low cost and easily accessible treatment option for management of elevated androgens and the resultant conditions of hirsutism, acne, infertility and hair loss.

METHODS

An exhaustive search was conducted using MEDLINE-Ovid, Web of Science, CINAHL and Google Scholar using the keywords hirsutism, spearmint tea (mentha spicata) and androgens. The search was further narrowed to include studies only involving humans and articles in the English language. The articles included in this review involved females with elevated androgens or hirsutism who drank spearmint tea twice daily for the duration of the study. Relevant review articles were used for background information. The Grading of Recommendations, Assessment, Development and Evaluation (GRADE) approach was used to assess the quality of the relevant articles.[5] A search was conducted of the National Institute of Health clinical trials website and no current trials related to anti-androgenic effects of spearmint tea were noted.[15]

RESULTS

The initial search resulted in 4 articles for review. One article was a literature review[6] and one was a study[4] on the effects of spearmint tea on rats. The remaining two articles included an observational study[7] and a randomized controlled trial[8] that fit the inclusion criteria. See Table I.

Akdogan et al

This study[7] examined the effects of spearmint tea on androgenic hormones and hirsutism. Participants were recruited from an endocrinology outpatient clinic. The trial included 21 females with hirsutism between the ages of 18-40 years old: 12 with PCOS and 9 with idiopathic hirsutism. The degree of hirsutism was graded by one physician using the Ferriman-Gallwey scoring system.[9] The

Ferriman-Gallwey scores for the females in the study ranged from 8-23. A score of 8 or greater is associated with androgen excess and the maximum score is 36.[7]

The trial was conducted for 5 days during the follicular phase of the participants' menstrual cycles. The following hormones were tested pre- and post-treatment: total testosterone (TT), free testosterone (FT), luteinizing hormone (LH), follicle stimulating hormone (FSH), estradiol (E_2) and dehydroepiandrosterone sulfate (DHEA-S). They did not report a post-treatment Ferriman-Gallwey score, likely due to the short duration of the study. The participants were given a cup (250 mL) of spearmint tea to drink twice daily for 5 days and their pre- and post-treatment lab results were compared. The study revealed a significant decrease in FT ($p < 0.05$) and an increase in FSH, LH and E_2 ($p < 0.05$). See table II. There were no significant decreases in TT, DHEA-S or the additional biochemical markers that were tested. The authors suggest that a decrease in FT without a decrease in TT is likely due to more T bound to the sex-hormone binding globulin (SHBG). Since FT is the active form of T, the authors conclude that spearmint tea can be used as an anti-androgenic treatment for hirsutism.[7]

Grant

This randomized controlled trial[8] also examined the effects of spearmint tea on androgen levels and hirsutism. Forty-two female patients (19-42 years old) with PCOS and hirsutism were recruited from an endocrinology outpatient setting. The Ferriman-Gallwey scores for the study group ranged from 10-24. The scoring was done by two separate individuals and then corroborated. In addition,

the participants were asked to complete the Dermatology Quality of Life Index (DQLI) questionnaire,[10] which allowed the participants to self-report the degree of hirsutism with a score from 0-30. Using computer randomization, the participants were separated into 2 groups, 1 group received spearmint tea and the other received chamomile tea. Chamomile tea is not known to disrupt the endocrine system. The researchers were blinded and the participants were asked to drink 2 cups of the tea daily. This trial began on the first day after completion of each participants' menstrual period and continued for 30 days. The primary outcome measured in this study was the level of hirsutism as measured by the DQLI and Ferriman-Gallwey scores at day 0 and 30. The secondary outcome was the androgenic hormones and gonadotropin (LH, FSH) levels measured at day 0, 15 and 30.[8]

After 30 days the spearmint tea participants reported a statistically significant decrease in the degree of their hirsutism by 6 points, from 17 to 11. However, there was no substantial change in the objective Ferriman-Gallwey scoring. The secondary outcome revealed a significant decrease at day 30 in both FT and TT ($p < 0.05$) and an increase in both LH and FSH ($p < 0.05$). See table III. The control group results revealed a slight decrease in DQLI score of 3 points but no significant changes in the Ferriman-Gallwey scores, androgenic hormones or the gonadotropins levels.[8]

The author states that the primary limitation of the study was the short duration of only 30 days. However, with the significant decreases in FT and TT, the author concludes that spearmint tea may be a useful, more natural option for the treatment of hirsutism and androgen excess.[8]

DISCUSSION

Elevated androgenic hormones can lead to hirsutism and other unpleasant symptoms. Females with elevated androgenic hormones, like those with PCOS, can suffer from psychological distress related to hirsutism or secondary disorders that can result from elevated androgens like infertility, acne, alopecia and irregular menses.[1] While the studies[7,8] have shown a reduction in androgenic hormones with the treatment of spearmint tea, it is unclear if it is beneficial for hirsutism or other symptoms related to high androgen levels.

Both studies[7,8] that were analyzed for this systematic review showed a reduction in FT. The Grant study,[8] which was of longer duration, also showed a decrease in TT. It is unknown if spearmint affects the production or the function of androgenic hormones.[8] For hirsutism, the Akdogan et al study[7] did not report a post-treatment or follow up Ferriman-Gallwey score and the Grant study[8] observed no objective improvement in hirsutism. Both studies concluded that spearmint tea is likely a potential natural treatment for hirsutism and lowering androgenic hormones.

The studies[7,8] also revealed increases in the gonadotropin hormones, LH and FSH. While Akdogan et al study[7] suggested the increases may be due to physiological changes during the follicular phase of the menstrual cycle, the Grant study[8] showed progressive increases in LH over the 30 day study and significant increases in FSH from day 0 to day 30 when compared to the control

group. Fertility treatments for patients with high androgen levels often involve gonadotropins[1] and this finding may lead to further studies of spearmint tea and the treatment of infertility in patients with hyperandrogenemia and PCOS.

Assessment of the studies revealed serious limitations leading to low quality of evidence as seen in Table I. The Akdogan et al study[7] did not involve a control group with which to compare results and differentiate between normal hormonal fluctuations. In addition, they did not report a post-treatment Ferriman-Gallwey score for rating of hirsutism, a secondary outcome of the study.[7] Both the Akdogan et al[7] and Grant[8] studies were of short duration. Most treatments for androgen excess require at least 6 months of treatment to see improvement in symptoms.[2] While the studies both revealed decreased androgens, a study of longer duration would be necessary to assess the improvement in hirsutism and the other symptoms associated with elevated androgens. Additionally, both studies report statistically significant results ($p<0.05$) but neither study reported confidence intervals.

Despite these limitations and the low quality of evidence, spearmint is generally thought of as a safe, natural remedy.[3] It is an affordable, easily accessible option for patients and 2 cups of spearmint tea daily may be useful in improving symptoms over time. It will be especially appealing for patients who are adverse to synthetic medications and interested in a more natural approach to their healthcare.

CONCLUSION

Spearmint tea may be useful in lowering androgenic hormones for female patients suffering from the effects of hirsutism and other symptoms associated with elevated androgens. In order to see benefits in the hirsute patient, it is likely that longer treatment time, beyond 30 days, is necessary as is extended follow up with participants to measure their Ferriman-Gallwey score. It should be noted that the effects of spearmint tea have only been studied for 30 days and long-term treatment may require monitoring for adverse effects. Further research is necessary to determine the effects of spearmint tea beyond the lowering of androgenic hormones and increase in gonadotropins. A study with longer duration of treatment with spearmint tea would be helpful, in addition to continued follow up to monitor for the improvement of symptoms like hirsutism and the other symptoms of elevated androgens that may take 6 or more months to improve or resolve. While further studies will be helpful, recommending a trial of spearmint tea should be considered for the patient who is interested in trying a more natural approach to treatment first.

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Table I: Quality Assessment of Reviewed Articles

Outcome	Number of studies	Study Designs	Downgrade Criteria					Upgrade Criteria	Quality
			Limitations	Indirectness	Inconsistency	Imprecision	Publication bias		
Androgenic Hormones	2	Observational, RCT	Serious[a]	Not Serious	Not Serious	Serious[b,c, d]	Unlikely	None	Low
Hirsutism	2	Observational, RCT	Serious[a]	Not Serious	Not Serious	Serious[b,c,d]	Unlikely	None	Low

[a] Lack of control group in Akdogan et al study
[b] Small study population (21 patients in the Akdogan et al study and 42 patients in the Grant study)
[c] Short study duration (5 days in the Akdogan et al study and 30 days in the Grant study)
[d] Lack of reported confidence intervals in Akdogan et al study and Grant study

Table II. Summary of Findings Akdogan et al

Outcome	Pre-treatment (day 0)	Post-treatment (day 5)	P-value
FT (pg/mL)	5.49 +/- 2.94	3.92 +/- 2.80	<0.05
TT (ng/mL)	0.75 +/- .40	0.67 +/- 0.35	
LH (mIU/mL)	6.34 +/- 4.53	8.04 +/-5.14	<0.05
FSH (mIU/mL)	4.56 +/- 1.49	5.36 +/-1.84	<0.05
E_2(pg/mL)	46.50 +/- 29.01	63.43 +/- 47.57	<0.05
DHEA-S (µg/L)	189.41 +/- 92.73	192.60 +/- 88.02	

abbreviations: free testosterone (FT), total testosterone (TT), luteinizing hormone (LH), follicle stimulating hormone (FSH), estradiol (E_2), dihydroepiandrostenedione sulfate (DHEA-S)

Table III. Summary of Findings Grant

Outcome	Pre-treatment (day 0)		During Treatment (day 15)		Post-treatment (day 30)		P-value
	Intervention[a]	Control[b]	Intervention	Control	Intervention	Control	
FT (pg/mL)	5.12 +/- 2.14	4.98 +/- 2.84	3.70 +/- 2.58	4.70 +/- 1.98	3.64 +/- 2.67	4.49 +/- 1.67	<0.05
TT (ng/mL)	0.81 +/- 0.39	0.87 +/- 0.40	0.80 +/- 0.22	0.81 +/- 0.21	0.62 +/- 0.34	0.80 +/- 0.14	<0.05
LH (mIU/mL)	5.25 +/- 3.2	5.47 +/- 2.7	5.99 +/- 4.1	5.59 +/- 4.1	7.23 +/- 3.9	5.23 +/- 2.8	<0.05
FSH (mIU/mL)	5.12 +/- 1.98	5.67 +/- 1.99	4.57 +/- 1.67	5.52 +/- 1.42	6.10 +/- 2.1	5.59 +/- 2.4	<0.05
DHEA-S (µg/L)	184.5 +/- 82.1	179.5 +/- 85.3	187.2 +/- 79.1	183.2 +/- 76.1	183.3 +/- 87.8	183.3 +/- 82.8	
FG score (0-36)	17 (12-22)	17 (12-22)			16 (10-22)	16 (11-22)	
DQLI (0-30)	17 (10-24)	18 (10-24)			11 (8-18)	15 (9-18)	<0.05

abbreviations: free testosterone (FT), total testosterone (TT), luteinizing hormone (LH), follicle stimulating hormone (FSH), estradiol (E_2), dihydroepiandrostenedione sulfate (DHEA-S), Ferriman-Gallwey (FG), dermatology quality of life index (DQLI)

a: Invention (n=21): spearmint tea
b: Control (n=20): chamomile tea