

Spearmint Herbal Tea has Significant Anti-androgen Effects in Polycystic Ovarian Syndrome. A Randomized Controlled Trial

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Hirsutism in polycystic ovarian syndrome (PCOS), consequent to elevated androgen levels leads to significant cosmetic and psychological problems. Recent research in Turkey has shown that spearmint tea has antiandrogenic properties in females with hirsutism. No research has yet been undertaken to assess whether a reduction in androgen levels brought about by spearmint tea, translates to a clinical improvement in the degree of hirsutism.

This study was a two centre, 30 day randomized controlled trial. Forty two volunteers were randomized to take spearmint tea twice a day for a 1 month period and compared with a placebo herbal tea. At 0, 15 and 30 days of the study serum androgen hormone levels and gonadotrophins were checked, the degree of hirsutism was clinically rated using the Ferriman-Galwey score and a questionnaire (the modified DQLI = Dermatology Quality of Life Index) was used to assess improvements in the level of self-reported hirsutism.

Forty one of 42 patients completed the study. Free and total testosterone levels were significantly reduced over the 30 day period in the spearmint tea group ($p < 0.05$). LH and FSH also increased ($p < 0.05$). Patient's subjective assessments of their degree of hirsutism scored by the modified DQLI were significantly reduced in the spearmint tea group ($p < 0.05$). There was, however, no significant reduction in the objective Ferriman-Galwey ratings of hirsutism between the two trial groups over the trial duration ($p = 0.12$). There was a clear and significant alteration in the relevant hormone levels. This is associated clinically with a reduction in the self-reported degree of hirsutism but unfortunately not with the objectively rated score.

It was demonstrated and confirmed that spearmint has antiandrogen properties, the simple fact that this does not clearly translate into clinical practice is due to the relationship between androgen hormones and follicular hair growth and cell turnover time. Simply put, the study duration was not long enough. The original studies from Turkey were in fact only 5 days long. The time taken for hirsutism to resolve is significant and a much longer future study is proposed as the preliminary findings are encouraging that spearmint has the potential for use as a helpful and natural treatment for hirsutism in PCOS. Copyright © 2009 John Wiley & Sons, Ltd.

Keywords: spearmint tea/*Mentha Spicata* Labiatae; hirsutism; polycystic ovarian syndrome; antiandrogen; Rotterdam criteria.

INTRODUCTION

Hirsutism in the context of polycystic ovarian syndrome (PCOS), secondary to elevated androgen levels, leads to significant cosmetic and psychological problems. Modern therapies such as metformin, cyproterone and spironolactone are not always successful in the alleviation of this problem.

Recent research in Turkey has shown that spearmint tea has antiandrogenic properties in both animals and females (Adkogan *et al.*, 2007; Guney *et al.*, 2006). It has also been reported anecdotally to reduce libido in male patients as well being shown experimentally to affect spermatogenic activity in rodents (Adkogan *et al.*, 2004; Sampaio, 2004). The work described above by Tamer

and colleagues was of a very short duration, only 5 days, giving spearmint tea twice a day to females with hirsutism over the follicular phase of a menstrual cycle (Adkogan *et al.*, 2007). They discovered that there was a significant decrease in free testosterone and an increase in luteinizing hormone (LH), follicular stimulating hormone (FSH) and oestradiol. It was a relatively modest change and they did not show if it would have any consequence for the patients clinically.

No research has yet been undertaken to assess whether a reduction in androgen levels brought about by spearmint tea, translates to clinical improvement in the degree of hirsutism. If a non-pharmacological therapy can be developed that is cheap and acceptable for women to use then this could generate a lot of benefit for these patients (Kultur, 2007). Therefore the basis of this current study has been to expand on the previous work to include subjective and objective monitoring of the hirsutism and to extend the duration of exposure to the spearmint tea.

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MATERIALS AND METHODS

Patients. Forty two female patients with confirmed PCOS and known hirsutism were seen in the endocrinology outpatient setting. Their diagnoses fulfilled the Rotterdam criteria of 2003. They were recruited from two district general hospitals within the same NHS (National Health Service) trust. The mean ages of the patients were 25.5 (age range 19–42) years old. All patients were provided with written informed consent. Full Ethics committee approval was given by Brighton West REC (Research Ethics Committee reference no. 07/H1111/58).

Study design. The project method was kept as simple as possible. The patients were randomized by computer equally into two groups of 21 patients to receive either spearmint herbal tea or camomile tea (which has no known endocrine disrupting properties) twice a day for a period of 30 days in total – to cover the average duration of a menstrual period. The researchers were blinded as to the type of tea given to each patient. Patients were given written instructions and a demonstration of how to make the tea to the required strength to allow for uniformity. The patients were asked to drink two cups of tea per day made from herbal tea bags with a standardized content of dried tea leaves.

The trial period began on the first clear day after the patient's menstrual period had ended. All patients had baseline blood tests for androgen hormones and gonadotrophin levels taken at 0, 15 and 30 days.

Assessments and outcomes. The patients' degree of hirsutism was scored using the Ferriman-Gallwey index, patient scores were 10–24 (maximum score =36) (Ferriman and Gallwey, 1961). Two investigators separately performed the scoring with good, reliable inter-observer correlation. The patients were also asked to complete a well validated questionnaire, the modified Dermatology Quality of Life Index (DQLI) which gives a self-reported rating of the degree of hirsutism as experienced by the patient with a score of 0–30 (Finlay and Khan 1992; Ching *et al.*, 2007).

Statistical analysis. Sample size was arrived at using power studies and data comparison was made using SPSS and Microsoft Excel software programs. Statistical significance was tested using a dependent paired *t*-test on the day 0 and 30 test results. A probability

value of less than 0.05 ($p < 0.05$) was considered as statistically significant (see Table 1).

The primary efficacy end-point regarded clinical reductions in the degree of hirsutism as scored by the modified DLQI and Ferriman-Galwey score.

The secondary end-point was a significant reduction in serum androgen hormone levels.

RESULTS

Forty two patients were recruited into the study and 41 completed the full 30 days. After 30 days treatment with the herbal teas the following results were obtained.

Free and total testosterone levels were reduced significantly over the 30 day period in the spearmint tea group ($p < 0.05$). LH and FSH also increased ($p < 0.05$).

The patient's subjective assessments of their degree of hirsutism scored by the modified DQLI were significantly reduced in the spearmint tea group ($p < 0.05$).

There was, however, no significant reduction in the objective Ferriman-Gallwey ratings of hirsutism between the two trial groups over the trial duration ($p = 0.12$).

The primary endpoint was therefore partially reached and this is discussed further below, the secondary endpoint was fulfilled with significant changes in the requisite hormone levels (see Tables 1 and 2).

Safety

There were no side effect or tolerability issues reported from within the study population. The one patient who discontinued did so because of a dislike of the flavour of the camomile tea.

DISCUSSION

It is estimated by the World Health Organization that approximately 75–80% of the world's population uses plant medicines either in part or entirely (WHO, 2008). Many medications used in clinical practice today come from nature, for example; aspirin is derived from willow bark, digoxin comes from foxglove flowers and metformin comes from French lilies. It is only through research trials that we can start scientifically to ascertain whether herbal treatments actually do work. In a problem such as hirsutism, the development of new treatments has understandable benefits (Swizlo *et al.*, 2008).

Table 1. Pre and post treatment results in patients taking spearmint tea; for androgen hormones (free and total testosterone, DHEA-S), gonadotrophins (LH and FSH), modified DLQI score and Ferriman-Gallwey score

	FT (pg/mL)	TT (ng/mL)	DHEAS (mcg/mL)	LH (mIU/mL)	FSH (mIU/mL)	DQLI (0–30)	FG
0 days	5.12 ± 2.14	0.81 ± 0.39	184.5 ± 82.1	5.25 ± 3.2	5.12 ± 1.98	17 (10–24)	17 (12–22)
15 days	3.70 ± 2.58	0.80 ± 0.22	187.2 ± 79.1	5.99 ± 4.1	4.57 ± 1.67		
30 days	3.64 ^a ± 2.67	0.62 ^a ± 0.34	183.3 ± 87.8	7.23 ^a ± 3.9	6.10 ^a ± 2.1	11 ^a (8–18)	16 (10–22)

^a $p < 0.05$.

FT, free testosterone; TT, total testosterone; DHEAS, dehydroepiandrosterone sulphate; LH, luteinizing hormone; FSH, follicular stimulating hormone; DQLI, dermatology quality of life index; FG, Ferriman-Gallwey score.

Table 2. Pre and post treatment results in patients taking camomile tea

	FT (pg/mL)	TT (ng/mL)	DHEAS (mcg/mL)	LH (mIU/mL)	FSH (mIU/mL)	DQLI (0–30)	FG
0 days	4.98 ± 2.84	0.87 ± 0.40	179.5 ± 85.3	5.47 ± 2.7	5.67 ± 1.99	18 (10–24)	17 (12–22)
15 days	4.70 ± 1.98	0.81 ± 0.21	183.2 ± 76.1	5.59 ± 4.1	5.52 ± 1.42		
30 days	4.49 ± 1.67	0.80 ± 0.14	183.3 ± 82.8	5.23 ± 2.8	5.59 ± 2.4	15 (9–18)	16 (11–22)

FT, free testosterone; TT, total testosterone; DHEAS, dehydroepiandrosterone sulphate; LH, luteinizing hormone; FSH, follicular stimulating hormone; DQLI, dermatology quality of life index; FG, Ferriman-Gallwey score.

Hirsutism consequent to elevated androgen levels leads to significant cosmetic and psychological problems. Many women opt for facial laser treatment which is expensive. Current therapies use either oral contraceptives to suppress androgen production, or medications such as spironolactone that prevent the body responding to androgens. Cyproterone is one drug commonly used to treat hirsutism, it is not without complications. The most serious potential side effect is liver toxicity, and patients should be monitored for changes in liver enzymes.

Recent research has shown that spearmint tea may be used as a treatment for mild hirsutism in women (Adkogon *et al.*, 2007; Guney *et al.*, 2006). Its antiandrogenic properties reduce the level of free testosterone in the blood, while leaving total testosterone and DHEAS unaffected. Researchers in Turkey found a significant decrease in free (active) testosterone in the blood and an increase in several female hormones including follicle-stimulating hormone. However, there was no decrease in overall testosterone levels, suggesting that more of the hormone was bound to protein in the bloodstream and was inactive.

Our current project confirms and expands on this earlier work. Testosterone was reduced and LH and FSH are elevated over a period of 30 days in our population of hirsute females with PCOS taking regular spearmint tea. Also, patients' self-reported scoring of their own degree of hirsutism was significantly better. This is not, however, matched by changes in Ferriman-Gallwey scores in the spearmint group. There was a non-significant reduction in comparison with the placebo group. The reasoning behind this is relatively

straightforward from a physiological point of view; it is due to the relationship between androgen hormones and follicular hair growth and cell turnover time (Stenn and Paus, 2001). Head hair, for example, grows on average approximately 1.3 cm (or 1/2 inch) per month. This growth rate varies among people by approximately +0.2 cm per month which can create a possible time variation of up to +1 week per month.

The mechanisms of action of *Mentha spicata* Labiatae are not clear at this time. More work is required on a molecular level to delineate the process of androgen interference.

CONCLUSION

Simply put, the study duration was not long enough. The original studies from Turkey were in fact only 5 days long. The time taken for hirsutism to resolve even with standard treatments is significant and a much longer future study is proposed as the preliminary findings are encouraging that spearmint tea has the potential for use as a helpful and natural treatment for hirsutism in PCOS.

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