

## **Cinnamon Supplementation Results in Increased Menstrual Cycle Frequency in Women with Polycystic Ovary Syndrome**

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Polycystic ovary syndrome (PCOS) is characterized by insulin resistance (i.e., ineffective use of insulin resulting in higher blood sugar levels) and an excess of androgenic hormones, with dysfunction of the hypothalamic-pituitary-ovarian axis and resultant anovulation (i.e., a menstrual cycle during which the ovaries do not produce an egg). Insulin resistance can occur in up to 95% of obese women with PCOS. Prescription medications used to treat insulin resistance have been found to decrease androgen hormone levels and increase menstrual cycle frequency, but have a high rate of adverse side effects.

There is evidence that oral cassia (*Cinnamomum aromaticum*, Lauraceae; syn. *C. cassia*) supplementation can increase insulin sensitivity, decrease serum glucose, and result in favorable changes in serum lipid levels. The goal of this pilot, randomized, double-blind, placebo-controlled study was to measure the effect of a proprietary cassia extract on menstrual cycle frequency in women with PCOS.

Women aged 18 to 38 years with PCOS who exhibited either clinical or biochemical evidence of hyperandrogenism or ultrasound evidence of multiple ovarian cysts were recruited for this study. Patients were excluded if they were pregnant or lactating; using infertility treatment, hormone treatments, or corticosteroids; had diabetes, seizure disorders, or cardiovascular disease; or were sensitive to cinnamon.

The treatment consisted of four capsules of a proprietary cassia extract (Cinnulin PF<sup>®\*</sup>; Integrity Nutraceuticals; Spring Hill, Tennessee) taken three times per day (125 mg each for a total of 1500 mg/day) for six months. The placebo was similar in appearance and regimen. Capsules were labeled in code by the manufacturer to ensure blinding. Patients were asked to eat a balanced diet not exceeding 1800 calories per day and keep a daily menstrual and activity calendar.

The following measurements were taken at the beginning of the study when subjects were in the early follicular phase of their menstrual cycle: weight, height, vital signs, subcutaneous fat thickness, antral follicle count, ovarian volume, fasting blood glucose, insulin sensitivity, and serum androgen and sex hormone-binding globulin (SHBG) levels. All measures were made again after six months of supplementation.

The primary outcome was menstrual cyclicity. Secondary outcomes included change in menstrual cyclicity from reported baseline, insulin sensitivity indices (Homeostasis Model Assessment of Insulin Resistance [HOMA-IR] and Quantitative Insulin Sensitivity Check Index [QUICKI]), glucose response, serum androgen and SHBG levels, weight, subcutaneous fat

measurements, and ovarian volume. Data were analyzed with the Mann-Whitney U test and Wilcoxon signed-rank test.

Forty-five patients were randomly divided into a cassia treatment group (n=23) and placebo group (n=22). There were no statistical differences in baseline variables between the groups. The dropout rate in the study was high; 11 patients in the treatment group and six patients in the placebo group completed the study. Reasons for dropout included pregnancy, loss to follow-up, surgery, relocation away from the study site, and beginning medication for insulin resistance. Adverse effects included headache, heartburn, cramps, and nausea, all of which resolved before the end of the study.

At the end of the study, menstrual cycle frequency — defined by the authors as the average number of menstrual cycles per month — was significantly higher in the treatment group (0.75 per month) than in the placebo group (0.25 per month,  $P=0.0085$ ). Within the treatment group, menstrual cycle frequency increased significantly over the course of the study ( $P=0.0076$ ). No significant differences were found in any of the other variables, including insulin or glucose parameters.

Despite the small sample size at the end of the study, six-month supplementation of the proprietary cassia extract was found to have a significant, positive effect on menstrual cycle frequency in women with PCOS. No mechanism of action explaining the results was identified by the authors. Other studies have found an increase in insulin sensitivity with cassia supplementation. In one study, insulin sensitivity increased after 20 days in patients taking three grams of cassia per day. A 2013 meta-analysis of cassia's effect on patients with diabetes reported a decrease in fasting blood glucose and increase in high-density lipoprotein (HDL) cholesterol.<sup>1</sup> It is difficult to draw conclusions concerning the other variables measured due to the small sample size at the end of the study. There would be value in repeating this study with a larger sample size.

—Cheryl McCutchan, PhD

## Reference

1. McCutchan C. Updated meta-analysis shows beneficial effect of cinnamon supplements on type 2 diabetes. *HerbClip*. November 15, 2013 (No. 101321-484). Austin, TX: American Botanical Council. Review of Cinnamon use in type 2 diabetes: An updated systematic review and meta-analysis by Allen RW, Schwartzman E, Baker WL, Coleman CI, Phung OJ. *Ann Fam Med*. 2013;11(5):452-459.