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File: ■ Cinnamon (*Cinnamomum* spp., Lauraceae)
■ Cholesterol
■ Triglycerides
■ Lipids
■ Systematic Review/Meta-analysis

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RE: Systematic Review/Meta-analysis Finds Cinnamon Significantly Lowers Total Cholesterol and Triglycerides, but Not Low-Density Lipoprotein or High-Density Lipoprotein Cholesterol

Maiorean SM, Serban MC, Sahebkar A, et al.; on behalf of the Lipid and Blood Pressure Meta-analysis Collaboration (LBPMC) Group. The effects of cinnamon supplementation on blood lipid concentrations: A systematic review and meta-analysis. *J Clin Lipidol*. November-December 2017;11(6):1393-1406.

When plaques build up in the coronary arteries depriving the heart of oxygen-rich blood, coronary heart disease results. This lack of oxygen-rich blood can damage the heart and lead to a heart attack, angina, arrhythmia, and heart failure. Blood lipids, including low-density lipoprotein (LDL) cholesterol, high-density lipoprotein (HDL) cholesterol, and triglycerides (TG), have been associated with coronary disease outcomes. Low levels of LDL cholesterol and TG and high levels of HDL cholesterol are considered beneficial. A supplement that can safely and effectively modify lipids could be used as an adjuvant with conventional medicine. This could mitigate the need to increase conventional medicines and lessen their possible adverse effects. Cinnamon (*Cinnamomum* spp., Lauraceae) inner tree bark extract is widely consumed, safe, inexpensive, and a known source of polyphenols. This systematic review and meta-analysis was conducted to determine what effect cinnamon has on lipids.

To identify appropriate articles, the authors searched the SCOPUS, Embase, and MEDLINE databases for the following terms: randomized controlled trials OR RCT OR randomized OR lipid OR total cholesterol OR LDL-cholesterol OR HDL-cholesterol OR triglycerides, and cinnamon. They also used "*" to enhance search sensitivity. The literature was searched up to July 31, 2015, and was not limited to English-language publications. Eligible studies (1) were randomized placebo-controlled trials with a simple or crossover design, (2) investigated how blood lipid concentrations were affected by any cinnamon species or by a cinnamon-enriched standardized extract, and (3) contained sufficient baseline and endpoint data on blood lipid concentrations in the interventional and control groups. Studies were excluded if they were animal,

observational, or uncontrolled studies; if the intervention was not standardized or resulted in a daily cinnamon intake of < 5 mg; or if they provided insufficient baseline or endpoint lipid concentration data. When data were insufficient, the authors requested additional data.

Thirteen trials published between 2003 and 2015 were included in the meta-analysis. Sample size ranged from 17 to 137 patients, with a total of 750 patients; 388 were randomly assigned to the cinnamon treatment groups and 362 to the control groups. Studies were conducted in China, Germany, Iran (n = 3), the Netherlands, Pakistan, Sweden, Taiwan, Thailand, the United Kingdom, and the United States (n = 2), and ranged from six weeks to four months. Most trials used cinnamon capsules (one used tablets) providing from 120 mg of cinnamon to 6 g of cinnamon a day. One trial used "spray-dried water extract of cinnamon containing more than 4% type A procyanidins," and another employed Cinnulin PF[®] (IN Ingredients, Inc.; Spring Hill, Tennessee), equivalent to 20 g of ground cinnamon a day. The duration of supplementation with cinnamon or cinnamon extracts ranged between 60 days and four months. [Note: According to Table 1, the shortest duration of supplementation was six weeks.] All 13 trials were designed as parallel-group trials.

The authors found that cinnamon supplementation resulted in a statistically significant decrease in total cholesterol (P < 0.01) and TG (P < 0.01), but did not have a statistically significant effect on HDL or LDL cholesterol. (Total cholesterol = LDL cholesterol + HDL cholesterol + TG/5.) However, with the removal of one study, HDL cholesterol was significantly elevated (P < 0.01).

Meta-regression analysis revealed that cinnamon dosage and lipid parameter changes had no significant association. However, supplementation time did have a significantly positive association with total cholesterol (P < 0.01), LDL cholesterol (P = 0.05), and TG (P < 0.01).

The authors acknowledge that their analysis is limited by the study population, which was limited to people with diabetes; the heterogeneity of the cinnamon species used in the interventions; and the fact that most of the patients included in the meta-analysis were taking lipid-lowering medications (only two explicitly excluded patients taking lipid-lowering medication).

The authors conclude that cinnamon was found to significantly lower total cholesterol and TG, but not LDL or HDL cholesterol, and that "cinnamon supplementation may be of marginal benefit to diabetic patients and patients with impaired glucose tolerance, especially with atherogenic dyslipidemias." To determine whether these findings are clinically significant, more research is needed.

The authors declare no relevant interests.

—*Heather Anderson, MD*

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