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File: ■ Green Tea (*Camellia sinensis*)
■ Blood Pressure
■ Lipid Profile
■ Systematic Review/Meta-analysis

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RE: Systematic Review Shows Green Tea Intake Associated with Reduced Systolic Blood Pressure, Total Cholesterol, and Low-density Lipoprotein Cholesterol

Onakpoya I, Spencer E, Heneghan C, Thompson M. The effect of green tea on blood pressure and lipid profile: a systematic review and meta-analysis of randomized clinical trials. *Nutr Metab Cardiovasc Dis.* August 2014;24(8):823-836.

Although some dietary supplements are used to manage hypertension, a major risk factor for cardiovascular disease, the evidence for their effectiveness is mixed. Because green tea (*Camellia sinensis*) catechins are thought to stimulate thermogenesis, modify appetite, and down-regulate the enzymes involved in lipid metabolism,¹ they are often marketed as weight-loss aids. Green tea has been studied also for its antihypertensive effect. One meta-analysis concluded that green tea had no beneficial effect on blood pressure,² one meta-analysis reported beneficial effects of green tea on blood vessel dilatation,³ and two meta-analyses reported beneficial effects on lipid profiles.^{4,5} The purpose of the systematic review reported here was to evaluate the evidence for or against the efficacy of green tea extracts and catechin-rich beverages on blood pressure and lipid profile.

The authors searched Medline, Embase, AMED, CINAHL, and The Cochrane Library from inception to May 2013 for double-blind, randomized clinical trials (RCTs) that tested the effectiveness of single-ingredient green tea supplements against placebos or identical controls in reducing blood pressure in normotensive or hypertensive human subjects. Outcome measures reported in the studies had to include blood pressure and lipid profile, and study duration had to be at least two weeks.

Of the 34 eligible trials identified, 21 articles reporting on 20 RCTs including a total of 1,536 subjects were included in the review. Of those, 18 had a parallel design, and three were crossover studies. The authors identified nine RCTs as reporting adequate randomization techniques, four that reported adequate allocation concealment, and three that did not report adequate blinding procedures. Only one RCT included subjects who were all hypertensive. Study duration ranged from two weeks to 24 weeks.

The authors report that eight RCTs were funded by green tea manufacturers, five by government or public institutions, and one by both government and a green tea manufacturer. Of the six RCTs that received no funding, the authors in all but one were affiliated with green tea manufacturing industries.

In only one RCT did the subjects have no restrictions on tea or caffeine intake.

The authors found two RCTs that reported no significant changes in systolic blood pressure between green tea and controls. A meta-analysis of 18 RCTs (including 1,342 subjects) revealed significantly reduced systolic blood pressure in the green tea groups compared with placebo groups ($P=0.0002$). The authors found a correlation between the green tea catechin epigallocatechin gallate (EGCG) intake and a reduction in systolic blood pressure in trials lasting at least 12 weeks, but no additional effects with doses above 200 mg. A meta-analysis of 15 RCTs (including 1,202 subjects) with adequate blinding of care providers and subjects showed significantly reduced systolic blood pressure in favor of green tea intervention ($P=0.006$). Sensitivity analysis of 13 RCTs (including 993 subjects) lasting 12 weeks or longer revealed significantly reduced systolic blood pressure with green tea intervention ($P<0.00001$).

A meta-analysis of 12 RCTs (including 1,010 subjects) funded by manufacturers or with manufacturer-affiliated authors showed significantly reduced systolic blood pressure associated with green tea intake ($P=0.003$). The six RCTs (including 332 subjects) funded by public institutions or with authors affiliated with public organizations, however, revealed no significant difference. "The discrepancies in the direction of study results when manufacturer-funded trials were compared with government-sponsored studies requires further investigation," write the authors.

No significant changes in diastolic blood pressure were observed between green tea and control groups in two RCTs. The meta-analysis of 18 RCTs (including 1,342 subjects) did not show a significant reduction in diastolic blood pressure between green tea and control groups. The meta-analysis of 12 RCTs (including 1,010 subjects) funded by manufacturers or with manufacturer-affiliated authors also revealed no significant difference in diastolic blood pressure between green tea and control groups. Similar findings were observed in the six RCTs publicly funded or with authors affiliated with public organizations.

Total blood cholesterol levels were significantly reduced in subjects receiving green tea compared with controls ($P<0.0001$) in a meta-analysis of 19 RCTs (including 1,487 subjects). A meta-analysis of 17 RCTs (including 1,422 subjects) showed significantly reduced low-density lipoprotein cholesterol (LDL-C) in the green tea intervention group compared with the control group ($P=0.0004$); no significant differences were seen, however, in high-density lipoprotein cholesterol or triglyceride levels.

The authors report further that in subjects with normal lipid levels, green tea had a greater effect in reducing systolic blood pressure and LDL-C; in those with dyslipidemia, green tea had a greater effect in reducing total cholesterol levels.

Adverse events, including constipation, elevated blood pressure, and rash, were reported in seven RCTs. Nine RCTs reported no adverse events, and four did not

provide such information. The frequency and severity of events were greater in RCTs with daily dosages of more than 200 mg of EGCG.

Addressing the implications of these findings, the authors suggest that daily consumption of 5-6 cups of green tea could help reduce systolic blood pressure, total cholesterol, and LDL cholesterol. "However, at this time," they state, "green tea should not be recommended as a substitute for current management of patients with established hypertension or dyslipidaemia."

The authors conclude that "green tea intake results in significant reductions in systolic blood pressure, total cholesterol, and LDL cholesterol; and effects appear greater with longer duration of intervention." Although the authors did a good job in providing comparative data and weaknesses of RCTs, it would have been beneficial to provide a table showing the actual amounts of total catechins in the extract and or EGCG, so a comparison can be made of doses.

—Shari Henson

References

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