Tea Flavonoids and Risk of Cardiovascular and All-Cause Mortality: A Systematic Review and Meta-Analysis

Ding Ding Wang¹, Aedin Cassidy², Mario G. Ferruzzi³, Paul Jacques⁴, Elizabeth Johnson⁴, Naisi Zhao⁴, Marissa Shams-White⁴, Micaela Karlsen⁴, Taylor C. Wallace⁵,⁶ and Mei Chung⁴

¹D&V Systematic Reviewe, LLC, Bronx, NY, USA, ²The University of East Anglia, Norfolk, USA, ³North Carolina State University, Kannapolis, NC, USA, ⁴Tufts University, Boston, MA, USA, ⁵Think Healthy Group, Inc., Washington, DC, USA and ⁶George Mason University, Fairfax, VA, USA

Abstract

There is increasing evidence that both black and green tea are beneficial for prevention of cardiovascular disease (CVD). We conducted a systematic review and meta-analysis evaluating the effects of tea flavonoids on cardiovascular (CVD) and all-cause mortality outcomes. Searches across five databases including PubMed and Embase were conducted through November 2018 to identify randomized controlled trials (RCTs) and prospective cohort studies reporting cardiovascular and all-cause mortality outcomes. Two investigators independently conducted abstract and full-text screenings, data extractions, and risk of bias (ROB) assessments using the Nutrition Evidence Library Bias Assessment Tool (NEL BAT). Mixed-effects dose-response meta-regression and standard random-effects meta-analyses for outcomes with ≥4 studies were performed. 0 RCTs and 38 prospective cohort studies were included in the systematic review. NEL BAT scores ranged from 0–15 (0 being the lowest risk). Our linear meta-regression model showed that each cup increase in daily tea consumption (about 280 mg and 338 mg of total flavonoids for black and green tea, respectively) was associated with 3–4% lower risk of CVD mortality (predicted adjusted RR = 0.96; CI 0.93–0.99 for green tea and RR = 0.97; CI 0.94–0.99 for black tea). Furthermore, each cup increase in daily tea consumption was associated with a 2% lower risk of all-cause mortality (predicted adjusted relative risk (RR) = 0.98; 95% CI 0.97–0.99 for black tea and RR = 0.98; CI 0.96–0.99 for green tea, respectively). Two studies reported multivariable Cox regression analysis results for the relationship between black tea intake and risks of all-cause mortality outcomes. The results from these two studies were combined with our linear meta-regression result in a random-effects model meta-analysis and showed that each cup increase in daily black tea consumption was associated with an average of 3% lower risk of all-cause mortality (pooled adjusted RR = 0.97; 95% CI 0.87–1.00) with large heterogeneity (I² = 81.4%; p = 0.005). Current evidence indicates that increased tea consumption may reduce cardiovascular and all-cause mortality in a dose-response manner. This systematic review was registered on PROSPERO.

Conflict of Interest

Funding for this research was provided through an unrestricted educational grant from Unilever. The funder had no role in the design, analyses, interpretation, or writing of the results.