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File: ■ Montmorency Tart Cherry (*Prunus cerasus*, Rosaceae)
■ Blood Pressure
■ Hypertension

HC 051612-555

Date: October 31, 2016

RE: Montmorency Tart Cherry Beverage Induces an Acute Reduction of Blood Pressure in Men with Early Hypertension

Keane KM, George TW, Constantinou CL, Brown MA, Clifford T, Howatson G. Effects of Montmorency tart cherry (*Prunus cerasus* L.) consumption on vascular function in men with early hypertension. *Am J Clin Nutr*. June 2016;103(6):1531-1539.

Cardiovascular disease (CVD) is a major cause for mortality and morbidity around the world. Epidemiological studies have suggested that polyphenol-rich foods provide cardiovascular health benefits. Montmorency tart cherries (MCs; *Prunus cerasus*, Rosaceae) are rich in polyphenols and have been shown to attenuate inflammation and oxidative stress. The aim of this placebo-controlled, blinded, randomized, crossover study was to examine the acute effects of MC juice on vascular function in subjects with systolic blood pressure (SBP) elevated above 130 mm Hg.

This study was conducted at Northumbria University in Newcastle upon Tyne, United Kingdom. The major criterion for inclusion was early hypertension (a resting SBP ≥ 130 mm Hg). A total of 16 nonsmoking men with SBP ≥ 130 mm Hg, diastolic blood pressure (DBP) ≥ 80 mm Hg, or both, met the inclusion criterion for the study, and 15 completed the study. The exclusion criteria were food allergies; history of gastrointestinal problems, renal disease, or CVD; use of blood pressure (BP)-lowering or anticoagulant medication; current use of any food supplements; and other problems that could interfere with the study results.

Subjects were assigned to receive either 60 mL of MC concentrate (CherryActive®; CherryActive Ltd; Hanworth, Middlesex, United Kingdom) and then a placebo (fruit-flavored cordial; Kia Ora®; Coca-Cola Enterprises; Uxbridge, United Kingdom), or placebo followed by MC concentrate. Each visit was at the same time of day and was preceded by an overnight fast (≥ 10 h). Subjects reported to the laboratory at 8 a.m. and provided a baseline venous blood sample. The washout period between consumption of MC and the placebo was at least 14 days. The MC concentrate, equivalent to 180 whole cherries, was diluted with 100 mL of water. The placebo fruit drink was mixed with water, whey protein isolate, and maltodextrin to match the MC drink for both volume and macronutrient content. Subjects were instructed to follow a low-phenolic diet (avoiding

vegetables, fruits, etc.) for 48 hours before each trial period. Based on detecting a change in SBP of 5 mm Hg, the investigators estimated they needed to enroll 12 subjects.

Fasting whole-blood samples were collected at baseline (before supplementation) and at 1, 2, 3, 5, and 8 hours after intake of the beverages. Microvascular reactivity (laser Doppler imaging [LDI] with iontophoresis) and arterial stiffness (pulse wave velocity [PWV] and analysis [PWA]) also were measured at these time points; BP was measured every hour. Blood samples were used to evaluate phenolic acid absorption, antioxidant capacity, and plasma nitrate/nitrite concentrations. Both juices also were evaluated for phenolic and anthocyanin contents.

There were no adverse effects reported. All subjects complied with the low-phenolic diet. Also, the washout period was determined to be sufficient based on the lack of MC metabolites in the blood samples.

In terms of microvascular effects, there was no time, treatment, or treatment × time interaction effect observed for endothelium-dependent or endothelium-independent vasodilation. The incremental effect of microvascular vasodilation (1-8 h after ingestion) was not significantly different between groups ($P > 0.05$). Evaluation of arterial stiffness indicated that no significant differences were found for PWV in the MC trial compared to the placebo across the 8-hour trial.

There was a significant time ($P = 0.001$) and treatment × time interaction effect ($P = 0.001$) for SBP in the MC trial. The peak reduction for SBP relative to the placebo was 7 ± 3 mm Hg, which occurred 2 hours after MC intake. In contrast, DBP showed a significant time effect ($P = 0.01$), but no treatment or treatment × time interaction effects. Mean arterial pressure showed a significant time ($P = 0.001$) and treatment × time interaction effect ($P = 0.01$). Other vascular variables were not significantly affected. There was also no time, treatment, or time × treatment interaction effect for plasma nitrate or nitrite ($P > 0.05$).

The overall incremental effect of protocatechuic acid (PCA) (1-8 hours post-intake) was different between MC and placebo (93.7 ± 2.3 μg·h/mL and 4.2 ± 0.3 μg·h/mL, respectively; $P = 0.005$). Similarly, the values for vanillic acid (VA) were statistically significant compared to placebo (39.6 ± 2.5 μg·h/mL and 0.5 ± 0.1 μg·h/mL, respectively; $P = 0.026$). No chlorogenic acid was detected in the plasma. Both peak plasma PCA and VA (peak = 1 hour) negatively correlated with SBP at 2 hours after MC consumption ($r = −0.131$ and $r = −0.095$, respectively). PCA (1 h) also negatively correlated with SBP at 1 hour ($r = −0.182$). Although these effects were not significant, no negative correlations were found with placebo.

The authors note that this is the first study to evaluate the acute effects of MC on arterial stiffness, BP, and microvascular vasodilation in men with early hypertension. The major finding in this study was that 60 mL of MC significantly reduced SBP ≤ 3 hours postprandially, which was around the time of peak phenolic absorption. In another study, no changes in BP or arterial stiffness were observed with tart cherry intake in normotensive subjects.[1] The authors hypothesize that the BP-lowering effect may be related to baseline BP. Future studies should confirm the BP-lowering effects of MC and investigate additional parameters to better understand the mechanism that contributes to these effects.

This study was supported by Northumbria University and the Cherry Marketing Institute (Dewitt, Michigan), an organization funded by North American Montmorency tart cherry growers and processors.

—Laura M. Bystrom, PhD

Reference

[1]Lynn A, Mathew S, Moore CT, et al. Effect of a tart cherry juice supplement on arterial stiffness and inflammation in healthy adults: a randomised controlled trial. *Plant Foods Hum Nutr*. 2014;69(2):122-127.

Referenced article can be accessed at
http://ajcn.nutrition.org/content/early/2016/05/04/ajcn.115.123869.full.pdf+html.