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File: ■ Chokeberry (*Aronia melanocarpa*, Rosaceae)
■ Cardiovascular Disease
■ Blood Pressure

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RE: Chokeberry Juice Consumption Improves Blood Pressure and Lipid Levels in Subjects with Untreated High Normal Blood Pressure

Kardum N, Milovanović B, Šavikin K, et al. Beneficial effects of polyphenol-rich chokeberry juice consumption on blood pressure level and lipid status in hypertensive subjects. *J Med Food*. October 2015;18(11):1231-1238.

Epidemiological studies have found the intake of foods rich in antioxidants to be associated with lower incidences of cardiovascular disease. Among plant foods, berry fruits tend to have the greatest antioxidant potential due to their high polyphenol content. Compared with other berries, chokeberry (*Aronia melanocarpa*, Rosaceae) has a significantly higher content of polyphenols and, thus, higher antioxidant activity. The goal of this study was to evaluate the effects of daily chokeberry juice consumption on blood pressure (BP), biochemical parameters, and function of the autonomic nervous system in subjects with high normal BP or grade I hypertension. In a previous study conducted by these authors, chokeberry juice consumption had a positive impact on cellular oxidative status in healthy subjects by stimulating antioxidant enzyme activities and improving membrane fatty acid composition.[1]

The current study was conducted at Clinical Hospital Center Bezanijska Kosa in Belgrade, Serbia. Twelve men and 11 women (mean age, 47.5 ± 10.4 years) not using antihypertensive drugs were included. The subjects had high normal BP or grade I hypertension according to the European Society of Hypertension and the European Society of Cardiology classification, meaning a systolic BP (SBP) of 130-159 mm Hg and diastolic BP (DBP) of 85-99 mm Hg. The subjects were instructed to drink 200 mL of polyphenol-rich organic chokeberry juice (donated by Conimex Trade d.o.o.; Belgrade, Serbia) daily for 4 weeks as part of their usual diet. The chokeberry juice contained 386 ± 9.7 mg of total phenolics, expressed as gallic acid, per 100 g. Results of phenolic content analyses revealed cyanidin 3-galactoside to be the most abundant anthocyanin (107.6 ± 7.8 mg per 100 g).

At baseline and after 4 weeks of treatment, the subjects underwent blood draws for biochemical analysis, as well as assessment of the autonomic nervous system and hemodynamic status. Short-term heart rate variability (HRV) and 24-hour

electrocardiogram (ECG) monitoring with long-term HRV analysis were included in the assessment. Biochemical parameters included cardiovascular disease markers such as lipid profile, C-reactive protein (CRP), and glucose levels.

After 4 weeks, there were reductions in total cholesterol, low-density lipoprotein cholesterol (LDL-C), and triglycerides; however, the only significant reduction was in the triglyceride levels ($P<0.05$). Markers of kidney and liver function remained within normal limits during the study. Significant reductions ($P<0.05$) were also observed in the average 24-hour and awake SBP and DBP, and 24-hour pulse pressure.

Because the autonomic nervous system plays a central role in BP regulation, the authors divided the subjects into 2 groups based on sympathetic or parasympathetic activity. The authors used low-frequency power (LF) and high-frequency power (HF) analysis to assign subjects into either the sympathetic (n=12) or parasympathetic (n=11) group. In the sympathetic activity group, a statistically significant reduction ($P<0.05$) was observed in 24-hour and awake SBP, awake DBP, standard deviation (SD) of awake SBP, and awake pulse pressure. No significant changes were seen in the parasympathetic activity group.

Short-term HRV analysis revealed significant decreases in both very low-frequency power ($P<0.05$) and HF ($P<0.01$) after 4 weeks of chokeberry juice consumption. Long-term HRV analysis revealed a decreasing effect ($P<0.01$) on the SD of normal RR intervals. The RR interval, or 1 complete cardiac cycle, is used to assess ventricular rate. No significant changes were observed in 24-hour ambulatory ECG recordings after 4 weeks. The authors point out that measures of HRV, particularly the RR interval, could be used as independent indicators for risk of coronary deaths.[2] After 4 weeks, CRP levels were reduced, but not significantly.

These findings agree with previously published data, which show significant reductions in DBP and SBP after chokeberry consumption.[3,4]

The authors attribute the beneficial effects of chokeberry juice consumption on BP levels to its high polyphenol content, which reduces vascular oxidative stress not only by directly interacting with reactive oxygen species, but also by stimulating endogenous antioxidant defense. Other cardioprotective effects of polyphenols could be exerted through improved endothelial function, based on an increase in endothelium synthesis of nitric oxide.

In this study, the consumption of polyphenol-rich chokeberry juice improved BP levels and lipid status in subjects with pharmacologically untreated high normal BP or grade I hypertension. And because a greater decrease of BP was noted in subjects with prevalence of sympathetic activity, the use of chokeberry juice to prevent cardiovascular disease could be more effective in subjects at higher risk. The study was limited by small sample size and short duration.

—*Shari Henson*

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