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**File: ■ Chokeberry (*Aronia melanocarpa*, Rosaceae)
■ Antioxidants**

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RE: Chokeberry Juice Improves Antioxidant Status in Healthy Female Subjects

Kardum N, Konić-Ristić A, Šavikin K, et al. Effects of polyphenol-rich chokeberry juice on antioxidant/pro-oxidant status in healthy subjects. *J Med Food*. 2014;17(8):869-874.

Chokeberry (*Aronia melanocarpa*, Rosaceae) fruits are a rich source of polyphenols, a class of compounds associated with antioxidant activity. Although numerous studies have evaluated the antioxidant effects of chokeberries in vitro, limited information is available about the antioxidant effects of these berries in human subjects. The aim of this 12-week intervention study was to evaluate the antioxidant status of healthy female subjects that consumed a polyphenol-rich organic chokeberry juice over a 12-week period.

This study took place at the University of Belgrade, Serbia. A total of 29 healthy female subjects (aged 25-49 years) that were not taking medication or antioxidant supplements were recruited for the study. Subjects consumed 100 ml of polyphenol-rich organic chokeberry juice (Conimex Trade; Belgrade, Serbia.) per day for 12 weeks. The total phenolic and total anthocyanin content in the chokeberry beverage were 386 mg GAE/100 g of juice and 25 mg/100 g of juice, respectively.

Dietary habits were not altered for the study and were recorded by a food frequency questionnaire. Standard biochemical tests and anthropometric parameters were determined at baseline and after 12 weeks. Blood samples were obtained from subjects after an overnight fast. Serum oxidative status was assessed at baseline and at the end of the study by the following: thiobarbituric acid-reactive substances (TBARS; a byproduct of lipid peroxidation), total antioxidative capacity (TAC), total oxidative status (TOS), sulphhydryl (-SH) groups, paraoxonase-1 (PON1) activity toward paraoxon (POase), PON1 activity toward diazoxon (DZOase), and pro-oxidant-antioxidant balance (PAB).

The women in the study had an average height of 168.7 ± 6.2 cm and weight of 65.1 ± 11.5 kg. After completion of the study, no significant changes were found for biochemical parameters, and all values remained in the acceptable reference range. Although uric acid increased after the intervention, this effect was not significant ($P=0.08$). In terms of antioxidant status, chokeberry juice consumption significantly reduced the level of

TBARS ($P < 0.001$), PAB ($P < 0.05$), and TAC ($P < 0.05$). Subjects also had non-significant reduced levels of TOS ($P = 0.209$), -SH groups ($P = 0.200$), and POase ($P = 0.124$). DZOase was significantly increased at the end of the study ($P < 0.01$). In addition, it was also found that TBARS correlated with age, body mass index (BMI), waist circumference, and body fat, as well as systolic and diastolic blood pressure.

This study demonstrated that chokeberry consumption may improve antioxidant status based on decreased oxidative damage (TBARS, TOS) and PAB, as well as increased DZOase (protection against lipid oxidation). These results are consistent with 2 other studies that found chokeberry consumption decreased TBARS.^{1,2} Interestingly, the authors note that this is the first study to evaluate the PAB effects of chokeberry juice. In addition, the authors speculate that because this study was conducted in healthy subjects, where there is a lower concentration of reactive oxygen species, the anthocyanins (subclass of polyphenolic compounds) from the berries may have exhibited a slight pro-oxidant effect. To confirm the antioxidant benefits of chokeberry juice found in this study, randomized controlled trials, evaluating similar oxidative parameters, should be conducted in subjects with different health conditions that are associated with oxidative stress.

—Laura M. Bystrom, PhD

References

¹Pilaczynska-Szczesniak L, Skarpanska-Steinborn A, Deskur E, Basta P, Horoszkiewicz-Hassan M. The influence of chokeberry juice supplementation on the reduction of oxidative stress resulting from an incremental rowing ergometer exercise. *Int J Sport Nutr Exerc Metab.* 2005;15(1):48-58.

²Broncel M, Kozirog M, Duchnowicz P, Koter-Michalak M, Sikora J, Chojnowska-Jeziarska J. *Aronia melanocarpa* extract reduces blood pressure, serum endothelin, lipid, and oxidative stress marker levels in patients with metabolic syndrome. *Med Sci Monit.* 2010;16(1):CR28-CR34.

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