Date: April 15, 2021

RE: Blueberry Intake May Affect Metabolism, Lipoprotein, and Exercise Performance


Regular exercise has been shown to prevent cardiometabolic diseases by improving blood lipid and glucose levels and reducing blood pressure. On the other hand, strenuous muscular exercise has been shown to increase inflammatory markers as well as damage the contractile and connective tissue components of skeletal muscles. Studies have shown that blueberries (*Vaccinium corymbosum*, Ericaceae) reduce oxidative stress and inflammation. Recent data suggest that blueberries may have an effect on exercise-induced muscle damage and inflammatory markers. The purpose of this gap analysis and evidence mapping is to determine whether enough evidence supports a full systematic review examining the impact of blueberry consumption on exercise performance and inflammatory markers.

An electronic literature search was performed using Medline, Commonwealth Agricultural Bureau (CAB), and Cochrane Central databases from 1946 through September 2019. A total of 268 articles were identified; 236 did not meet inclusion criteria. Primary articles were retrieved for full-text screening (n = 32). Two additional articles were identified by key informants (KIs). Twenty-three articles were excluded for no exercise (n = 5), no outcome of interest (n = 2), duplicate study (n = 10), no design of interest (n = 2), in vitro (n = 1), and animal studies (n = 3). Eleven studies were included for this gap analysis and evidence mapping including nine randomized controlled trails, one single-arm study, and one observational study.

Both interventional and observational studies were included that evaluated blueberry consumption in any form against outcomes of interest. Outcomes of interest included inflammatory markers, lipid markers, tests for muscular damage, physical function outcomes, and other relevant outcomes. Articles were excluded that did not evaluate some form of exercise or were conducted on animals or in vitro.
The 10 interventional studies included randomized controlled parallel studies (n = 5), randomized crossover studies (n = 4), and single-arm studies (n = 1). Studies were conducted in the United States (n = 7), Canada (n = 1), Sweden (n = 1), and New Zealand (n = 1). Blueberry consumption ranged between one day and 17 weeks; participants ranged between nine and 63. Funding sources included industry (n = 4), a variety of non-industry (n = 5), and unreported (n = 1). Two studies included men only, one included women only, five included both, and two did not report gender of participants. Average age ranged between 22 and 69 years, and three studies included elderly participants. Participants included well-trained athletes (n = 2), moderately trained athletes or participants who regularly exercised (n = 2), some running or exercise (n = 2), untrained (n = 1), and elderly with the ability to walk unassisted (n = 3). Eight studies included healthy participants or excluded participants with known chronic diseases; two studies did not report on participants’ health. Six studies required participants to run on a treadmill, three required participants to walk, and one required a set of 100 eccentric repetitions isolating the quadriceps muscle prior to measuring final outcomes.

Reported outcomes included inflammatory and oxidative stress markers, metabolic markers, lipoprotein, and muscle damage. Gait-related outcomes were measured in three studies, including gait speed or velocity, stride length, and changes in step time and width and stride time and length. One study reported on balance. Results of the included studies showed that fasting glucose significantly decreased in the blueberry arm compared to the placebo arm. For the muscle damage outcomes, blood lactate levels were significantly reduced in the blueberry compared to placebo arm. Oxidative stress markers natural killer (NK) cell count and lipid hydroperoxides (ROOH) reported a significant change in the blueberry compared to placebo arms. A significant change in the inflammatory marker interleukin (IL)-10 was reported in the blueberry compared to placebo arms. No other significant differences were reported.

Limitations of the interventional studies included age of participants, small sample size, different diets, and self-reported adherence to intervention. Additionally, with the studies that used blueberry powder, no evidence was included whether any foods could potentially impact absorption and bioavailability of blueberry’s nutrients. Heterogeneity was observed related to daily consumption of blueberries (40 – 250 mg), forms of blueberry intake (fresh, freeze-dried, powder, or other), and duration (one day to four weeks). Large variations were noted in participants’ baseline health and physical status.

The cohort study examined the association between blueberry consumption and physical function impairment in 12,658 men. The study was conducted in the United States and assessed the average annual blueberry intake using a food frequency questionnaire. The Medical Outcomes Study Questionnaire Short Form-36 was used to assess physical functioning including bathing, walking, climbing stairs, lifting groceries, and moderate and vigorous activities. Results showed that blueberry consumption at least twice a week significantly improved physical impairment compared to blueberry consumption of less than once a month. However, the researchers reported that one-half cup of blueberries once a week and one-half cup of blueberries one to three times a month did not improve physical impairment when compared to blueberry intake less than once a month.

The authors conclude that the evidence map shows that further research is necessary to determine the association between blueberry intake and metabolism, lipoprotein, and
exercise performance. Additional studies should also include healthy, young, and
physically fit populations as well as physically impaired and geriatric populations and be
longer in duration.

The authors declare no conflict of interest.

—Samaara Robbins

Referenced article provided with permission from Mary Ann Liebert, Inc., 2 Madison Ave., Larchmont, NY
10438; Telephone (914)834-3100; Fax (914)834-3582; email: info@liebert.com.