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File: ■ Grape (*Vitis vinifera*, Vitaceae)
■ Proanthocyanidin
■ Oxidative Stress

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RE: Single Dose of Proanthocyanidin from Dry Grape Extract Provides Antioxidant Effect in Army Cadets

Gonçalves MC, Passos MCF, de Oliveira CF, Daleprane JB, Koury JC. Effects of proanthocyanidin on oxidative stress biomarkers and adipokines in army cadets: a placebo-controlled, double-blind study. *Eur J Nutr*. December 24, 2015; [epub ahead of print]. doi: 10.1007/s00394-015-1137-1.

Intense physical exercise can promote oxidative and energy imbalances. Such imbalances increase the rate of lipolysis and affect the plasma concentrations of leptin and adiponectin. Secreted from adipose and other tissues, leptin is related to appetite suppression and energy homeostasis and is sensitive to exercise-induced stress. Secreted from white adipose tissues, adiponectin is inversely associated with inflammatory processes. The goal of this placebo-controlled, double-blind study was to assess the effect of a single dose of proanthocyanidin from dry grape (*Vitis vinifera*, Vitaceae) on the concentrations of electronegative low-density lipoprotein [LDL(−)], a marker of oxidative imbalance, as well as plasma leptin and adiponectin concentrations, in Brazilian army cadets.

The authors recruited 54 healthy and physically conditioned men (mean age, 22 ± 1 years) from a military school in Rio de Janeiro, Brazil. The subjects were randomly assigned to either the control group (n=27) or the supplement group (n=27). Those in the control group received capsules of 200 mg starch; those in the supplement group received capsules of dry grape containing 200 mg proanthocyanidin. All capsules were produced by Novaera® in Rio de Janeiro, Brazil. The study was conducted during a traditional 3-day military training program of continued exercise.

Subjects completed a physical fitness test 14 days before the start of the study to determine aerobic conditioning. Maximal oxygen consumption (VO_2) was calculated and blood was drawn immediately before supplementation and exercise at baseline, after day 1 (24 hours) and after day 2 (48 hours) of military exercise, then again after 24 hours of rest at the end of the study. Total body mass was calculated at baseline and after 2 days of military training.

All subjects were similar in age, anthropometric measurements, and body composition. Subjects ran 1.7 ± 0.1 miles on average in 12 minutes; 13 subjects (23%) were in excellent aerobic condition and 39 (77%) were in good condition. No between-group differences were seen in VO_2 peak max. After blood collection at baseline, the subjects participated in an 8-

hour, 24-km (15 miles) hike dressed in their uniforms and fully equipped. On days 1 and 2, without any rest periods, the subjects performed calisthenics and aerobic, strength, and resistance exercises, and completed workshops to assess their physical and psychological resistance and professional knowledge. Food consumption was standardized throughout the study.

Leptin, adiponectin, and LDL(−) levels were similar in both groups at baseline. In the control group, adiponectin concentrations were similar at all time points, except on day 1, when the values were 25% lower than baseline ($P=0.04$). In the supplement group, a 34% lower adiponectin concentration was seen on day 2 ($P=0.02$) compared with baseline. The values were 25% higher on day 1 compared with day 2 ($P=0.05$). Compared with the control group, adiponectin levels in the supplement group were 24% lower on day 2 and 28% higher after 24 hours of rest ($P=0.02$ for both). Leptin concentrations decreased in both groups and remained, on average, 59% lower on day 1, 85% lower on day 2, and 56% lower after the 24-hour rest period ($P<0.05$ for all) than at baseline. The training effect on leptin levels was significant ($P=0.001$) in both groups.

Compared with baseline, only the control group showed an increase (62%) in LDL(−) concentrations after 2 days ($P<0.001$) of training, and remained elevated after the 24-hour rest period ($P=0.001$). In the supplement group, higher LDL(−) concentrations were reported after 24 hours of rest; the values were 118% higher than at baseline ($P=0.001$) and 160% higher than after 2 days of training ($P=0.03$). Between-group differences in plasma LDL(−) concentrations were significant after 1 and 2 days of exercise and after the 24-hour rest period, with the supplement group showing lower concentrations ($P<0.001$). The lower LDL(−) concentrations in the supplement group support the antioxidant function of polyphenols.

Since reduced total body mass was seen after 2 days of training in both groups ($P=0.001$), this could have affected adiponectin and leptin concentrations; however, according to the authors, changes in adiponectin were observed only in the supplement group. The authors state that the "results were influenced by exercise and by the interaction between exercise and supplementation" and this is similar to findings of other studies.[1,2]

The negative correlation found between plasma LDL(−) and adiponectin concentrations ($P=0.04$) in the supplement group after the 24-hour rest period seems to indicate that the use of the single dose of proanthocyanidin may protect against damage by LDL(−). The authors conclude that, in military personnel participating in intense physical training, consuming a single dose of proanthocyanidin from dry grape extract may reduce the cardiovascular risk that results from LDL(−) oxidation.

—*Shari Henson*

References

[1] Roupas ND, Mamali I, Maragkos S, et al. The effect of prolonged aerobic exercise on serum adipokine levels during an ultra-marathon endurance race. *Hormones (Athens)*. 2013;12(2):275-282.

[2] Jürimäe J, Rämson R, Mäestu J, et al. Interactions between adipose, bone, and muscle tissue markers during acute negative energy balance in male rowers. *J Sports Med Phys Fitness*. 2011;51(2):347-354.

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