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Grape extract improves antioxidant status and physical performance in elite male athletes

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ABSTRACT

Excessive physical exercise overproduces reactive oxygen species. Even if elite sportsmen increase their antioxidant status by regular physical training, during the competition period, this improvement is not sufficient to limit free radical production which could be detrimental to the body. The aim of this randomized, double-blind, placebo controlled, and crossover study on 20 elite sportsmen (handball = 10, basketball = 5, sprint = 4, and volleyball = 1) during the competition period was to determine if the consumption of a grape extract (GE; Vitis vinifera L.) was able to improve the parameters related to (i) anti-oxidative status and oxidative stress and (ii) physical performance. Specific biomarkers of antioxidant capacity, oxidative stress, skeletal cell muscle damage, and other general biomarkers were determined in plasma and urine before (D0) and after one month (D30) of placebo or GE supplementation (400mg·d<sup>-1</sup>). Effort tests were conducted using the Optojump® system, which allows determining the total physical performance (EnR45), explosive power (RJ110), and fatigue (RJL5). The plasma ORAC value was not modified in the placebo group; however, GE increased the ORAC value compared to the placebo at D30 (14 966±/335 vs 14 242±/339 μmol Teq·L<sup>-1</sup>; p < 0.05). The plasma FRAP value was significantly reduced in the placebo group, but not in the GE group. Therefore, GE limited the reduction of FRAP compared to the placebo at D30 (1 053.7±/31.5 vs 993.7±/26.7 μmol Teq·L<sup>-1</sup>; p < 0.05). Urinary isoprostane values were increased in the placebo group, but were not modified in the GE group. Consequently, GE limited the production of isoprostanes compared to the placebo at D30 (1.24±/0.12 vs 1.26±/0.13 ng·mg<sup>-1</sup> creatinine; p < 0.05). GE administration, compared to the placebo at D30, reduced the plasmatic creatine phosphokinase concentration (CPK, 695.7±/177.0 vs 480.0±/81.1 IU·L<sup>-1</sup>, p = 0.1) and increased hemoglobin levels (Hb, 14.5±/0.2 vs 14.8±/0.2 vs g·dL<sup>-1</sup>, p < 0.05), suggesting that GE administration might protect cell damage during exercise. The high variability between sport disciplines did not permit to observe the differences in the effort test. Analyzing each individual group, handball players increased their physical performance by 24% (p < 0.05) and explosive power by 6.4% (p = 0.1) after GE supplementation compared to the placebo. Further analyses showed that CPK and Hb were the only biomarkers correlated with the increase in performance. In conclusion, GE ameliorates the oxidative stress/antioxidant status balance in elite athletes in the competition period, and enhances performance in one category of sportsmen (handball). Our results suggest that the enhancement in performance might be caused by

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