Deep Ocean Minerals Adding into Fructose Drink Minimize Muscle Inflammation after Exercise

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Abstract

Introduction: Fructose is a commonly used ingredient in sports drink, however, high fructose supplementation increases oxidative stress. Whether adding Deep Ocean Minerals (DOM) into the fructose drink can reverse the outcome.

Methods: A total of 47 male Sprague Dawley (SD) rats were randomized into 4 groups: Control (C, N = 12), Fructose (F, N = 12), Fructose + Exercise (FE, N = 12), and Fructose + Exercise + DOM (FED, N = 11). In all Fructose groups, 11% fructose was freely accessible in a drinking bottle for 9 weeks. Soleus muscles were collected 24 h after an acute bout of downhill running.

Results: DOM supplementation induced significantly decreased mitochondrial proton leak, maximal respiration and basal respiration. Under EE-challenged condition, increases in invaded cells, TNF alpha mRNA, and COX2 mRNA were attenuated by DOM supplementation (FE vs. FED, P < 0.05). Long term consumption of fructose drink decrease GSH/GSSG ratio and GSH level in skeletal muscle (C vs. F, P < 0.05). However, an acute bout of exercise attenuated GSH/GSSG and GSH level decreased by daily fructose drinking. DOM supplementation further increased GSH level above exercise group in fructose-treated rats (FE vs. FED, P < 0.05).

Conclusion: Our data suggest a promising nutraceutical application of DOM for sweetened sports beverage aiming to prevent exercise induced muscle inflammation and protect mitochondrial proton leak.

Keywords: Sports beverage, Mitochondrial oxygen consumption, Macrophage