Abstract


Vitamin D3 supplementation modulates inflammatory responses from the muscle damage induced by high-intensity exercise in SD rats.

Choi M, Park H, Cho S, Lee M.

Dept. of Food and Nutrition and Research Institute of Obesity Sciences, Sungshin Women's University, Seoul, Republic of Korea.

BACKGROUND: Vitamin D is an important factor for calcium and phosphorus homeostasis. A negative relationship has been observed between vitamin D status and diseases such as cancer, arthritis, diabetes, and muscle fiber atrophy. However, the relationship between vitamin D and prevention of skeletal muscle damage has not been clearly elucidated.

OBJECTIVE: The purpose of this study was to investigate the effects of vitamin D on exercise-induced muscle changes.

METHODS: Rats were divided into 3 groups: (1) sedentary control (C: n=10), (2) high-intensity exercise (HE: n=10), and (3) high-intensity exercise with vitamin D supplementation (HED: n=10; i.p. 1000IU/kg body weight). Rats were trained for 30min/day on treadmills (5days/week for 8weeks) with the running speed gradually increased up to 30m/min at a 3° incline. At the end of the training period, the running speed was 38m/min at a 5° incline.

RESULTS: The high-intensity exercise significantly increased plasma creatine kinase (CK) and lactate dehydrogenase (LDH) activity. In addition, IL-6 and TNF-α levels as well as phosphorylation of AMPK, p38, ERK1/2, IKK, and IκB were significantly increased. Vitamin D-treated rats showed a significant decrease in plasma CK level, phosphorylation of AMPK, p38, ERK1/2, IKK, and IκB, and gene expression of IL-6 and TNF-α. Furthermore, the protein expression of vitamin D receptor (VDR) was highly increased in the muscles of HED-treated rats, respectively.

CONCLUSION: Therefore, we concluded that vitamin D may play a pivotal role in exercise-induced muscle damage and inflammation through the modulation of MAPK and NF-kB involved with VDR.

PMID:23669253