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Serum levels of bone formation and resorption markers in relation to vitamin D status in professional athletes and physically active men during upper and lower body high-intensity exercise

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INTRODUCTION:

Several reports on the effect of single exercise and regular training on bone marker levels have been published; however, the data are not consistent. Without a doubt, exercise intensity and its nature, in conjunction with dietary factors, determine the bone marker response. Of note, many indoor athletes who practice certain sports are vitamin D-deficient. Vitamin D plays an important role in bone metabolism. It also influences skeletal muscle strength, reduces muscle atrophy and parathyroid hormone concentration, and exerts many other effects. Despite of these positive effects, to the best of our knowledge, the acute effect of exercise on bone formation and resorption markers in relation to vitamin D status had not yet been assessed. Hence, the primary aim of the current study was to evaluate the effects of vitamin D status on changes in the serum PINP and CTX levels induced by Wingate anaerobic test (WAnT) in highly trained athletes and untrained young men.

METHODS:

Sixteen elite male artistic gymnasts (EG; 21.4 ± 0.8 years-old) and 16 physically active men (the control group, PAM; 20.9 ± 1.2 years-old) performed lower and upper body 30-s Wingate anaerobic tests (LBWT and UBWT, respectively). For biomarker analysis, blood samples were collected before, and 5 and 30 min after exercise. Samples for vitamin D levels were collected before exercise. N-terminal propeptide of type I collagen (PINP) was analysed as a marker of bone formation. C-terminal telopeptide of type I collagen (CTX) was analysed as a marker of bone resorption.

RESULTS:

UBWT fitness readings were better in the EG group than in the PAM group, with no difference in LBWT readings between the groups. UBWT mean power was 8.8% higher in subjects with 25(OH)D3 levels over 22.50 ng/ml and in those with 24,25(OH)2D3 levels over 1.27 ng/ml. Serum CTX levels increased after both tests in the PAM group, with no change in the EG group. PINP levels did not change in either group; however, in PAM subjects with 25(OH)D3 levels above the median, they were higher than those in EG subjects

CONCLUSION:

Vitamin D metabolites affect the anaerobic performance and bone turnover markers at rest and after exercise. Further, adaptation to physical activity modulates the effect of anaerobic exercise on bone metabolism markers.

Topic: Sports Medicine and Orthopedics

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