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Characteristics of bone metabolism in middle-aged and older mountaineers

(中高年登山者における骨代謝の特徴)

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Abstract

The objective of this study was to reveal the characteristics of bone metabolism in middle-aged and older mountaineers by comparing them with people who regularly walk and those who do not exercise regularly.

The subjects of this study were 17 middle-aged and older mountaineers (8 males and 9 females) in the Mountaineer Group, 20 subjects who regularly walk (10 males and 10 females) in the Walker Group, and 17 sedentary subjects (9 males and 8 females) in the Control Group.

The main measurements were the osteo sono-assessment index (OSI) and bone-metabolism markers. Bone alkaline phosphatase (BAP) and amino terminal propeptides of type-I procollagen (P1NP) were used as bone-formation markers. Tartrate-resistant acid phosphatase 5b (TRACP 5b) and type-I collagen crosslinked N-telopeptide in serum (sNTX) were used as bone-resorption markers. Body composition was also measured. The bone-specific physical activity questionnaire (BPAQ) was conducted to assess the effect of subjects' past and current physical activity on bone metabolism. Japanese short version of the international physical activity questionnaire (IPAQ) was also conducted to assess subjects' current average physical activity.

As a result, there was no significant difference in OSI among three groups in males and females. Regarding bone-metabolism markers, there was no significant difference in males for BAP and P1NP, but the value was highest in the Mountaineer group followed by Walkers and Control Groups in order. Regarding bone-resorption markers, the Mountaineer Group (459.5mU/dL) was significantly ($p<0.05$) higher than the Control Group (333.0mU/dL) in TRACP-5b. The ratio of the bone-formation / bone-resorption was not significantly different among three groups in any marker. There was no significant difference for any markers in females among three groups. There was not significant difference in the postmenopausal period, but the value was shortest in the Mountaineer Group among three groups.

Our study showed no clear difference in bone strength between the Mountaineer Group, the Walker Group and the Control Group both in males and females. However, the results showed that bone turnover was activated in the male Mountaineer Group than the Control Group. In addition, it is possible that sudden decrease in bone density after menopause could be restrained by mountain climbing even though any significant difference was shown in females.