World Academy of Science, Engineering and Technology
International Journal of Psychological and Behavioral Sciences
Vol:17, No:11, 2023

Effect of cold water immersion on bone mineral metabolism in aging rats

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Abstract : Physical activity and a balanced diet are among the key factors of "healthy ageing". Physical effort, including swimming in cold water (including bathing in natural water reservoirs), is widely recognized as a hardening factor, with a positive effect on the mental and physical health. At the same time, there is little scientific evidence to verify this hypothesis. In the literature to date, it is possible to obtain data on the impact of these factors on selected physiological and biochemical parameters of the blood, at the same time there are no results of research on the effect of immersing in cold water on mineral metabolism, especially bones, hence it seems important to perform such an analysis in relation to the key elements such as calcium (Ca), magnesium (Mg) and phosphorus (P). Taking the above into account, a hypothesis was put forward about the possibility of a positive effect of exercise in cold water on mineral metabolism and bone density in aging rats. The aim of the study was to evaluate the effect of an 8-week swimming training on mineral metabolism and bone density in aging rats in response to exercise in cold water (5oC) in comparison to swimming in thermal comfort (36oC) and sedentary (control) rats of both sexes. The examination of the concentration of the examined elements in the bones was carried out using inductively coupled plasma atomic emission spectrometry (ICP-OES). The mineral density of the femurs of the rats was measured using the Hologic Horizon DEXA System® densitometer. The results of our study showed that swimming in cold water affects bone mineral metabolism in aging rats by changing the Ca, Mg, P concentration and at the same time increasing their bone density. In males, a decrease in Mg concentration and no changes in bone density were observed. In the light of the research results, it seems that swimming in cold water may be a factor that positively modifies the bone aging process by improving the mechanisms affecting their density.

Keywords : swimming in cold water, adaptation to cold water, bone mineral metabolism, aging
Conference Title : ICHBE 2023 : International Conference on Human Behavior and Evolution
Conference Location : Kyoto, Japan
Conference Dates : November 20-21, 2023