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Effect of the sauna-induced thermal stimuli of various intensity on the thermal and hormonal metabolism in women

W Pilch, Z Szyguła, M Torii

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The aim of the present study was to compare basic physiological, biochemical, and hormonal reactions in women who prior to the study had never had a sauna and who were subjected to a single or multiple (i.e., applied repeatedly over two weeks) thermal stress in a Finnish sauna and to evaluate these reactions in relation to the duration of the stress. Twenty healthy women tested in the present investigation were divided into two groups, each group having a sauna every two days for two weeks (i.e., seven exposures in total). The subjects from the first group bathed continuously for 30 min, while those from the second group bathed for 45 min with a five-min cooling break in the middle of the bath. The temperature and relative humidity in the sauna equalled to 80°C and 5-27%, respectively. All the physiological and biochemical tests were performed on the first and 14th days of the experiment both before and after the thermal exposure. The results indicate that the exposures to thermal stress led to reduction in the body mass which was more pronounced in group 2 ($p < 0.005$) and to elevation of the tympanic temperature (T_{ty}) which, in both groups, was smaller after the last visit to the sauna. The first bath in the sauna stimulated the heart rate (HR) to a similar extent in both groups of the subjects but after the last bath HR was significantly lower in group 2 ($p < 0.005$). Enhanced secretion of the stress hormones (i.e., human growth hormone [hGH], corticotropin [ACTH] and cortisol) after the last bath in the sauna was less pronounced in group 2, whereas in group 1 the rates of elevation of hGH and ACTH were higher after the last than after the first visit to the sauna. In turn, stimulation of the production of hGH following the first sauna was significantly more pronounced ($p < 0.005$) in group 2 than in group 1. Similar statistical difference was noted between the two groups with respect to changes in the concentration of TSH. Overall, the obtained results indicate that the 30-min continuous sauna bath is a greater stress for the organism than the 45-min bath with a 5-min break for cooling. The smaller elevations in the body temperature, HR, and serum levels of hGH, ACTH, and cortisol detected after the last sauna bath in women from group 2 suggest that in these subjects adaptive changes to thermal stress were more favourable than in those from group 1.

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