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The influence of a series of ten sauna baths on hematological biomarkers and changes of plasma volume following a submaximal exercise test in elite athletes

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INTRODUCTION:

It is known that numerous conditions, including environment, exercise and training, can affect changes in plasma volume. These modulations pose a particular problem when trying to determine the consequences of incorporating regular sauna bathing into the training process of elite athletes. Elite athletes often have developed certain thermal adaptations as a result of their long-term training history, which may limit the effectiveness of thermal interventions (HA), such as plasma volume increases, or greatly hinder the ability to identify the beneficial effects of HA on the body. The purpose of this study was to examine the effects of a series of ten sauna baths on selected hematological biomarkers and changes of plasma volume following a submaximal exercise test in elite athletes.

METHODS:

The study included 14 male professional cross-country skiers (VO_{2max} 64.5 ± 6.33 ml/kg/min). Selected hematological (Hb, RBC, HCT, MCV, RBCSD) and biochemical (TPP, ALB) biomarkers were studied twice: before [C] and after completed ten Finnish sauna baths [MT] with two days of rest between 5-6 heat exposures. In each phase participants performed a running exercise in thermoneutral conditions at the predetermined intensity, below HR-AT for ~60 min. The average heat stress (HS) session lasted ~35 min (internal temperature >38.5 °C). Sauna baths took place in the afternoon after part of the days training session in the transition (TP) and preparatory (PP) phase of the training program. Blood samples were taken: at rest (t_0), post-exercise (t_1), 1 hr (t_2) and 24 hr (t_3) of recovery, in each series of experiments, respectively. Relative changes in plasma volume (del PV%) were calculated according to the formula of Dill and Costill (1974).

RESULTS:

The results of this study indicated that there were significant differences in resting hematological biomarkers between the TP and PP phases for RBC [$p<0.05$], MCV [$p<0.05$] and RCBSD [$p<0.05$]. The PV had increased after MT by 2.38%, $<+1.5$ $+3.72$ > in both TP and PP phases. The regular MT had impact on resting Hb [$p=0.06$] and TPP [$p=0.04$] in the TP phase. No significant difference was found between the TP and PP phase in del PV% either in control or after MT, immediately after exercise (t_0 - t_1), and after 1 h recovery (t_0 - t_2). The plasma volume increased after 24h recovery [$+0.69\%$ vs $+3.92\%$; $p<0.05$] mainly in TP.

CONCLUSION:

The results of the present study indicate that ten sauna baths included in the annual training program induced in a small expansion of PV in elite cross-country skiers. However, MT had an effect on post-exercise plasma volume recovery after a submaximal exercise test. This effect was noted mainly during the transition phase of the training program.

Topic: Health and Fitness

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