EFFECTS OF PRE-COOLING PROCEDURES ON INTERMITTENT-SPRINT EXERCISE PERFORMANCE IN WARM CONDITIONS.

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Previous research has shown limited improvement in intermittent-sprint performance in warm conditions following pre-cooling interventions. However, research has traditionally examined the influence of pre-cooling on sprint efforts, not sub-maximal work performed between sprints (which are also an integral aspect of team-sport performance). Therefore, the aim of this study was to determine whether pre-cooling procedures improve both maximal sprint and sub-maximal work during intermittent exercise in the heat. Nine male rugby players performed a familiarisation session and 3 testing sessions of a 2 x 30-min intermittent-sprint protocol, which entailed a 15-m sprint every min separated by free-paced hard-running, jogging and walking in 32oC and 30% humidity on an enclosed 20-m synthetic running track. The three sessions included a control condition, ice-vest condition and combined ice-bath/ice-vest condition. Cooling interventions were imposed for 15-min pre-exercise, during the warm-up and for 10-min at half-time. Performance measures of sprint time, including %decline, and distance covered during sub-maximal work were recorded. Physiological measures of core temperature (Tcore), mean skin temperature (Tskin), heart rate, nude mass, rate of perceived exertion, rating of thermal comfort and capillary blood measures of lactate [La-], pH, Sodium (Na+) and Potassium (K+) were recorded, while heat storage was estimated. Results for exercise performance indicated no significant differences between conditions for the time or %decline in 15-m sprint efforts (p>0.05) or the distance covered during sub-maximal work bouts (p=0.08); however, large effect size data (d=0.9) indicated an increase in hard running and total distance covered after combined ice-bath/ice-vest cooling. Significantly lower (p<0.05) Tcore, Tskin, heart rate, sweat loss and rating of thermal comfort were present, particularly in the first 30min, following ice-bath cooling compared to ice-vest or control conditions respectively. Finally, no differences (p>0.05) were present between capillary blood measures of [La-], pH, K+ or Na+. While Tcore was above 39.5oC in all conditions, exercise was not terminated due to hyperthermia, indicating that the reduction in exercise intensity in vest and control conditions was self-selected and seemingly not attributable to peripheral metabolic factors. Hence, the increased distance covered and delayed heat storage following ice-bath cooling suggests subjects could perform more work for the same given heat strain. As such, the ergogenic benefits of pre-cooling procedures in warm conditions for team-sports may be predominantly evident during sub-maximal, rather than maximal bouts of exercise. Further, as the effects of pre-cooling wane, to maximise potential benefits, whole-body pre-cooling interventions should be utilised where possible, with regional body-part cooling continued until as close as possible to exercise (game) commencement.

Keywords: Environmental Physiology, Sport Physiology, Thermoregulation

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