EFFECT OF HEAT ACCLIMATION ON FIELD HOCKEY SKILL PERFORMANCE

Caroline Sunderland[1]; Simon Marwood[2] and Mary Nevill[3]
[1]Department of Life Sciences, The Nottingham Trent University, Nottingham, United Kingdom.
[2]School of Applied Science, Southbank University, London, United Kingdom.
[3]Department of Physical Education, Sports Science and Recreation Management, Loughborough University, Loughborough, United Kingdom.

Hockey skill performance is poorer following intermittent running in the heat than in moderate conditions (Sunderland et al., 2001). During field hockey and other games, the performance of skills is at least as important as the maintenance of physiological function. Therefore, if the decrement in skills seen when exercising in the heat can be diminished, it could make the difference in the result of a match or even a tournament. No previous studies have examined the effect of heat acclimation on performance of motor skills.
Eight, well trained, unacclimatised female hockey players volunteered to participate in the study. Two main trials were completed before and after acclimation. Each main trial required the participants to complete 4 sets of the Loughborough Intermittent Shuttle Test (LIST) and 3 field hockey skill tests in the heat (31^{o}C, 28% RH). One set of the LIST required the subjects to exercise over a 20 m distance and repeat a walk, sprint, cruise (~85% $\dot{V}O_2$max) and jog (~50% $\dot{V}O_2$ max) pattern of exercise until 11 sprints had been completed. Each set took approximately 15 min and was followed by a 3 min rest period. A field hockey skill test was completed prior to and after 2 and 4 sets of the LIST. Following the second set of the LIST the rest was 10 min to mimic the half time period of a hockey match. Exercise was terminated prior to the completion of the trial if rectal temperature reached 40^{o}C or subjects were exhausted. Participants drank water ad libitum. In the ten days prior to the post-acclimation trial, all the subjects completed four 30 min acclimation sessions (30^{o}C) on separate days of 2 sets of the LIST. The study had Loughborough University Ethical Committee approval. Statistical analyses were undertaken using a two-way analysis of variance with repeated measures and a student's t-test where appropriate. Field hockey skill performance was not different before and after acclimation prior to the commencement of the LIST. However, skill performance was poorer after intermittent running before acclimation than after (pre: 93.81 ± 1.48, 95.85 ± 1.26 and 96.64 ± 1.20 s; post: 93.22 ± 1.19, 93.49 ± 1.40 and 92.86 1.63 s; main effect trial $P<0.01$). Maximal sprint performance over 15 m declined during the LIST, but did not differ before and after acclimation (main effect time $P<0.01$). Rectal temperature did not differ with acclimation status, however thermal comfort was lower after acclimation during sets 3 and 4 (interaction trial x time $P<0.05$; set 3 and 4 pre vs post: 8 ± 1 vs 5 ± 1). Perceived exertion and perceived thirst did not differ between trials. Mean heart rate increased throughout the LIST, but did not differ before and after acclimation (main effect time $P<0.01$). Resting serum progesterone concentrations were not different before and after acclimation (Pre 4.5 ± 1.8 vs Post 3.1 ± 0.4 nmol.l^{-1}) confirming that menstrual cycle phase was the same. Serum cortisol, aldosterone, and prolactin concentrations were unaffected by acclimation status. Similarly, plasma volume and blood glucose concentration during and immediately following exercise were not different prior to and after acclimation. However, blood lactate was higher during the LIST after acclimation (main effect trial $P<0.05$). Fluid consumption and changes in body mass were unaffected by acclimation.
These results demonstrate that following heat acclimation, performance of a field hockey skill test after 30 and 60 min of intermittent running was improved. This increase in performance could be in part due to an enhancement in thermal comfort.

Sunderland, C., Nevill, M. E., Cooke, K., Lakomy, H. K. A., Milne, H. and Pout, M. (2001). The effect of intermittent, high intensity shuttle running and hot environmental conditions on field hockey skill performance. Journal of Sports Sciences, 19, 608.