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EFFECT OF EXTREME ENVIRONMENTAL CONDITIONS ON PHYSICAL ACTIVITY PATTERNS OF SOCCER PLAYERS

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Soccer teams may sometimes be obliged to play under difficult environmental conditions. Activity patterns of players of different standards have been analyzed by time-motion analysis, but there is dearth of knowledge how the players' match performance is affected by environmental conditions.
Purpose: This study aimed to evaluate changes in the activity patterns during a soccer match played in different conditions of environmental temperature and humidity.
Methods: Non-acclimatized soccer players (n=10, the goal keeper was excluded, 20 ±2 y, V'O2max=63 ±7 ml/min/kg) played 2 matches in different environmental conditions. Players ingested telemetric core temperature (Tc) sensors prior to each match and wore a heart rate (HR) and global positioning system (GPS) monitor during the match. A computer based analysis program was used to evaluate heart rate and speed changes during the match. The following locomotor categories were used: standing (0 – 0.4 km/h), walking (0.5 – 7.5 km/h), jogging (7.6 – 14.5 km/h), low – moderate running (14.6 – 19.5 km/h), high speed running (19.6 – 25.5 km/h) and sprinting (> 25.6 km/h). These were later divided into five categories: (1) standing; (2) walking; (3) running, encompassing jogging and low – moderate intensity running and (4) high intensity running, consisting of high speed running and sprinting.
Results: The average ambient temperature for the June 2007 match was 34 ± 1 ⁰C with a relative humidity of 38 ± 2 %. In the July 2007 match, ambient temperature was recorded as 36 ± 0 ⁰C with a relative humidity of 61 ± 1 %. Peak Tc values recorded for June and July matches were 39.1 ± 0.4 ⁰C, and 39.6 ± 0.3 ⁰C respectively. Total distance covered during June and July matches was 8.6 ± 0.6 and 8.1 ± 0.7 km respectively. The total distance covered in the first and second halves were: 4.4 ± 0.4 and 4.2 ± 0.3 km for June and 4.3 ± 0.5 and 3.8 ± 0.4 km for July matches. The difference between the halves of the July match was significant. The running distance covered in the second half of the July match was significantly shorter than first half of July and second half of June matches (2.1 ± 0.4 and 1.9 ± 0.3 km for the first and second halves of June and 1.9 ± 0.5 and 1.3 ± 0.4 km for the first and second halves of July matches;p<0.05)
Conclusion: In soccer matches played in high environmental temperature and humidity, the physical performance of the players may decrease due to high thermal stress. In the present study, the players' increased body core temperature at half time was followed by a decrease in total distance covered in the second half of the game. This may point to a centrally-driven performance reduction.

COOLING INTERVENTION AND SOCCER UNDER EXTREME HEAT CONDITIONS

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Whole body pre-cooling with fluid ingestion had been discusses as one of the main interventions to improve athletic performance in extreme heat conditions. Extensive research had been performed to evaluate the effect of precooling on athletic performance and body core temperature, but the influence on a soccer match had not been investigated. Purpose: The aim of this study was to investigate the effect of cooling intervention on athletic performance and body core temperature during a competitive soccer game. Methods: 11 soccer players aged 21 ± 2 y (mean ± SD) with V'O2max of 59.8 ± 5.0 ml/kg/min volunteered to play two matches (without – C and with cooling intervention-CI) for this study. The ambient temperature and humidity was 34.3 ± 0.6 oC and 64 ± 2 % for the first and 34.0 ± 0.5⁰C and 62 ± 0 % for the second game (CI) respectively. Players had opportunity to consume ad libitum plain water during the C, plain water or sports drink by choice during CI study. A cooling tent and icy water filled buckets placed beside the soccer field were used for cooling intervention. Match activity was recorded by a global positioning system. Thermosensor pills were used for body core temperature (Tc) measurements. Blood samples were withdrawn from an antecubiteal vein 5 hours before and immediately after the game to determine hematocrit (Htc), hemoglobin content (Hb), calculate plasma volume loss, and changes of serum electrolytes. ANOVA and paired sample t-test was used to evaluate the level of significance, and p values < 0.05 were accepted as significant. . Results: The highest Tc value recorded during the last ten minutes of the first half and the difference between C and CI groups was not significant (39.54 ± 0.5 vs 39.3 ± 0.5oC respectively). Total liquid consumption was measured as 1473±422 ml for C, and 1230±494 ml for CI group (926±604 ml plain water, and 304±240 ml sports drink). Post-match dehydration % was similar for both C (2.49±0.67) and CI match (2.54±1.21). Pre- and post-match Htc (48.9±3.3 vs 49.2±3.3 %) and Hb (161±14 vs 163±13 g/L) were used to calculate % plasma volume change (0.1±5.5 %) for the C match. The plasma volume loss for the CI group was calculated as -5.1±5.6 with pre- and post-match Htc (46.2±2.3 vs 46.9±2.1) and Hb (153±10 vs 156±9) content. Plasma volume loss for C and CI groups were not significant. Pre- and post-match difference of serum Na (145±2.5 vs 144±3 mmol/L), and K (5.4±0.4 vs 5.4±0.4 mmol/L) for C and CI groups were not significant. CI did not change distance covered during the game significantly (8298 ± 589 meters vs 8315±549 meters for C and CI groups respectively) Conclusion: Cooling intervention was not sufficient to reduce Tc and improve match performance significantly. Slight reduction of Tc that observed with whole body cooling, may be important for prevention of heath related problems that occur in extreme heat conditions.

PLAYING FOOTBALL <SOCCER> UNDER EXTREME HEAT CONDITIONS – EFFECT OF ACCLIMATISATION

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Exercise intensity is an important factor to induce thermal strain, and soccer is a challenge for the players who have to play under extreme heat conditions. Acclimation is an important intervention to improve thermal tolerance and endurance capacity.
Purpose: We aimed to evaluate effect of acclimation on sportive performance during a game played under extreme heat conditions Methods: 11 male acclimated soccer players (age 23  2 y, VO2 max 61.8  1.1 ml.min-1.kg-1) and 10 unaccli-