運動中のハイポトニック飲料の自由摂取が体液および電解質バランスに及ぼす影響

Effects of ingested fluids on voluntary drinking and fluid balance and metabolic responses to prolonged exercise in a hot environment in men

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Abstracts

This study examined the effects of ingested fluids on voluntary drinking, fluid balance and metabolic responses to prolonged exercise in a hot environment in men (temperature: 28.1 ± 1.5℃, humidity: 52.6 ± 3.1%). Six males (age 19.0 ± 0.6 yr) cycled for 90 min at 60 % of their maximum oxygen consumption. One of three beverages was assigned: a) unflavored water (W), b) Isotonic-carbohydrate drink (ISO): flavored water plus glucose 6.0 %, Osmolality 317 mOsm/kg, and c) Hypotonic-electrolyte drink (HYPO): flavored water plus glucose 4.1 %, Osmolality 193 mOsm/kg. Rectal temperature was calculated, and heart rate were recorded at rest, every 15 min during exercise and recovery. Venous blood samples were drawn before and after exercise, at 45 min exercise, and 30 min after exercise for determination of haemoglobin, haematocrit, blood metabolites and serum electrolytes and osmolality. Urine samples were drawn before and after exercise, at 30 min post exercise for determination of electrolytes and osmolality. Total fluid intake was higher ($P < 0.05$) during HYPO (1,403 ± 557 g) compared with W (701 ± 249 g). Euhydration was lower ($P < 0.05$) during ISO (-0.51 ± 0.4 kg) and HYPO (-0.5 ± 0.4 kg) compared with W (-0.95 ± 0.3 kg). The serum glucose was higher ($P < 0.05$) during ISO (137.5 ± 37 mg/dL) compared with HYPO (102.5 ± 17 mg/dL) and W (87.3 ± 8 mg/dL). The haemoglobin was higher ($P < 0.05$) during ISO compared with W. The haematocrit was higher ($P < 0.05$) during ISO compared with HYPO and W. No differences were observed in rectal temperature, heart rate, free fatty acid, catecholamine, osmolality, sodium and potassium did not differ among 3 drinks. In conclusion, a flavored hypotonic beverage seems to be better in easiness to drink in sports activities under the high temperature environment. Moreover, it seems that the hypotonic beverage are excellent under the situation that the plasma volume which is the index of dehydration is not lowered.

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