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Effects of exercise-induced dehydration on cognitive ability, muscular endurance and surfing performance

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ABSTRACT

The aim of this study was to measure the degree of dehydration experienced during surf practice and examine the effect this might have on surfing performance, cognitive function and muscular endurance of elite surfers. Twelve male national and international level surfers volunteered to take part in the study. Their mean (\pm SD) age, body mass, height and surfing experience were 27.0 ± 3.3 years, 73.2 ± 7.1 kg, 1.7 ± 0.05 m and 21.0 ± 3.1 years, respectively.

The participants were randomly assigned to one of two trials: no fluid ingestion (NF) or fluid ingestion (FI) during 100 min of surf practice in a steamer wetsuit. The experiment was designed to emulate not only the physical and cognitive demands of surfing but also the ambient environment in which it takes place. Before and immediately after surf practice, the participants had their hydration status measured, completed a cognitive test battery and upper and lower-body muscular endurance tests. Surfing performance was assessed during the first and last 20 min of practice.

At the conclusion of the NF trial, participants showed a $3.9 \pm 0.7\%$ body mass (BM) loss, this was significantly greater ($P < 0.05$) than the $1.6 \pm 0.7\%$ BM loss seen at the end of the FI trial. In the NF trial, surfing performance decreased by $20.3 \pm 7.1\%$, but showed a slight improvement in the FI trial ($1.9 \pm 10.2\%$). Of the six cognitive domains assessed (short-term memory, information processing speed, working memory, attention, visuomotor skill and visual acuity) all were significantly impaired when at a $3.9 \pm 0.7\%$ BM loss ($P < 0.05$) yet were unaffected at a $1.6 \pm 0.7\%$ BM loss. Information

processing speed and working memory were the most strongly correlated to surfing performance ($r = 0.74$; $P < 0.05$). At the conclusion of the NF trial upper and lower-body muscular endurance were diminished by $21.2 \pm 5.5\%$ and $4.4 \pm 5.8\%$, respectively. At the conclusion of the FI trial upper-body muscular endurance was reduced by $17.0 \pm 4.1\%$ while lower-body muscular endurance was marginally better ($1 \pm 3\%$). There was a significant difference in muscular endurance capacity between trials yet no significant correlation was observed between muscular endurance and surfing performance.

The findings of this study suggest that surf practice for 100 min in a steamer wetsuit results in BM loss severe enough to significantly impair surfing performance, cognitive function and muscular endurance. Yet, when water is consumed during surf practice, surfing performance, cognitive function and lower body (but not upper-body) muscular endurance is maintained.

Keywords: fluid ingestion, surf training, steamer wetsuit, hypohydration.

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