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Effect of fluid nutrition on cognitive performance of experienced recreational athletes during different exercise intensities

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Cognitive function is pivotal for athletic success, encompassing decision-making processes, concentration, and overall performance. Sports beverages include carbohydrates for energy and sodium to enhance rehydration⁽¹⁾. Research has suggested they offer numerous advantages for mental function during exercise⁽²⁾. The intensity of exercise also has a significant impact on an athletes cognitive ability. High-intensity exercise gradually enhances arousal to an optimal level, shifting from a state of rest to high-alert, consequently leading to improved cognitive performance, confirmed by measurement via an electroencephalogram⁽³⁾. This aim of this study was to examine the acute effect of a beverage containing carbohydrate and sodium on cognitive performance, including interference control, response inhibition, working memory and cognitive flexibility, following moderate-intensity continuous exercise (MICE) or high-intensity interval exercise (HIIE). Healthy experienced recreational runners were recruited. Baseline data was collected before the first trial. Participants (n = 11) underwent four trials in a randomised crossover design. A combination of 8 KM MICE running (64–76% of maximum heart rate) and 8 KM HIIE running (77–93% of maximum heart rate) were completed, while ingesting either SB (carbohydrate: 6.2%, sodium: 21 mEq/L) or plain water (W); average intake: 308 ± 188 ml. Computer-based cognitive performance tests (Simon task, Go and No-Go task, N-Back task & Stroop task) were conducted after the completion of each exercise session, where response time and accuracy were measured. Paired T-tests were used to determine where the differences existed within the treatments and vs the baseline. A significant impairment of Simon effect was seen in MICE+SB and HIIE+SB compared to baseline (p = 0.022, p = 0.005). Response time in congruent stimuli was significantly improved in HIIE+SB compared to baseline and to MICE+SB (p = 0.008, p = 0.021). Response time in incongruent stimuli was significantly improved in HIIE compared with MICE in both SB and W ingestion (p = 0.001, p = 0.042) and significantly impaired in MICE+SB compared with baseline (p < 0.001). In the Go and No-Go task, no significant differences were observed in response inhibition. In the N-Back task, working memory response time was significantly improved in MICE+SB compared with baseline (p = 0.019). Response time in the Stroop task in incongruent stimuli was significantly improved in MICE+SB and HIIE+W compared to baseline (p = 0.039, p = 0.047). In conclusion, beverages containing carbohydrate and sodium were found to generally improve cognitive performance. In addition, HIIE can be considered a practical approach to improve acute cognitive performance. However, further studies are required to more accurately investigate the optimal combination of exercise intensity and beverage carbohydrate concentration required to maximise cognitive performance.

References

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