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Exercise-Induced Dehydration Has No Effect on Alcohol Pharmacokinetics but Influences Willingness to Drive

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PURPOSE: This study investigated the influence of exercise-induced dehydration on alcohol pharmacokinetics and subjective ratings of impairment following an acute moderate dose of alcohol.

METHODS: Twelve male volunteers (22.6±4.2 yrs, 77.22±6.85 kg body weight, 180.5±5.0 cm; values are mean±SD) participated in 3 experimental trials completed in a randomised cross over design and separated by at least 7 days. In one trial, participants exercised to cause dehydration of ~2.5% body weight loss (DA trial). For the other trials, participants were required to be in a rested and euhydrated state (A1 and A2 trials). A set volume of alcohol was then consumed in each trial and participants were monitored over a 4 hr period. Blood (BAC) and breath (BrAC) alcohol samples were collected throughout and analysed to calculate pharmacokinetic variables associated with the blood alcohol curve. Total urine production, estimates of BrAC, and subjective ratings of mood, intoxication and impairment were also recorded throughout each trial.

RESULTS: There was no difference in the pharmacokinetics of alcohol between any of the trial conditions. BrACs were higher than BACs for 2 hrs following alcohol consumption, but lower at measures taken 3 and 4 hrs post ingestion in all of the trials. Total urine production was greater in the euhydrated trials (1182±393 ml vs. 300±125 ml, $p<0.05$), with significantly more urine produced in the first 2 hrs after alcohol ingestion (1039±378 ml vs. 190±121 ml, $p<0.05$). Participants' ratings of confusion and intoxication were significantly lower in the DA trial compared to the A2 trial, and they were also more willing to drive a car a short distance under these conditions.

CONCLUSIONS: These findings suggest that subtle changes in total body water as a result of exercise induced sweat loss, has no impact on alcohol pharmacokinetics. However, dehydration may influence the subjective effects of alcohol and increase the likelihood of risk-taking behaviours such as drink-driving. This may have direct implications for individuals who consume alcohol following physical activity and then consider driving a motor vehicle.
