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Effects of Beetroot Juice Supplementation on Physiological Response During Submaximal Exercise in Normoxia and Hypoxia

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Exercise in hypoxia is associated with reduced oxidative function and impaired exercise tolerance due to the reduced partial pressure of oxygen. Recent studies have shown beetroot juice ingestion assists in NO production and may consequently increase exercise efficiency, decrease muscular fatigue, increase mitochondria respiration, increase calcium handling, elevate glucose uptake, and aid vasodilation. Dietary nitrate ingestion may serve to enhance exercise performance in hypoxia via increased NO production.

PURPOSE: The current study examined physiological responses during submaximal exercise in simulated altitude following beetroot consumption. **METHODS:** Eight active healthy males participated in the study. Subjects were assigned in a double-blind, randomized, crossover design consuming 140mL of beetroot juice (2 shots) containing ~8.4mmols of nitrate or nitrate depleted placebo for 2 days prior to testing and again 2.5 hours prior to testing. A 72 hour washout was utilized during the crossover. During testing, subjects completed a 5-min warm up (25% of the subjects' VO_2 max), followed by four 5-min cycling bouts (40, 50, 60 and 70% of VO_2 max) each separated by 4 min rest periods in either normoxia ($F_1O_2 = 20.93\%$) or simulated hypoxia ($F_1O_2 = 14.5\% O_2$). A two-way ANOVA with repeated measures on conditions (4 levels) and intensity groups (5 levels) was used to determine any treatment differences for dependent variables. Post hoc analysis was performed when significant F-values were observed by application of a Tukey correction. The alpha level for all analyses was set at $p \leq 0.05$ **RESULTS:** There was a significant main effect for condition in VO_2 , SpO_2 , HR. Specifically, VO_2 in H-PL (21.23 ± 8.36) was significantly less from N-BR (23.42 ± 8.42 , $p < 0.000$) and N-PL (23.90 ± 8.79 , $p < 0.000$). For SpO_2 H-BR (90.33 ± 1.97) was significantly less than N-BR (96.48 ± 1.45 , $p < 0.000$) and N-PL (96.78 ± 1.56 , $p < 0.000$). Finally, HR for N-BR (134.03 ± 29.29) was significantly higher than N-PL (132.28 ± 27.18 , $p = 0.034$). **CONCLUSIONS:** These findings indicate that supplementation with dietary nitrate in the form of beetroot juice may confer some benefit to aerobic exercise performance in hypoxic conditions.