

## **The Effects of Beetroot Juice Supplementation on Cycling Time-Trial Performance in Normoxia and Moderate Hypoxia**

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Recent research has shown that Beetroot Juice (BR) ingestion assists in Nitric Oxide (NO) production and may increase exercise efficiency, decrease muscular fatigue, increase mitochondrial respiration, increase calcium handling, elevate glucose uptake, and aid vasodilatation. Also, given evidence for the detrimental effects of environmental hypoxia on exercise due to decreases in partial pressure of arterial oxygen ( $P_aO_2$ ), as well as hypoxia-induced reductions in NO, increases in NO production via dietary nitrate supplementation may serve to enhance performance in hypoxia. **PURPOSE:** To investigate the effects of 3 day supplementation of beetroot juice on oxygen consumption ( $VO_2$ ), arterial oxygen saturation ( $SpO_2$ ), and average workload (W) during 15 minute time trial (TT) in both normoxic and simulated hypoxic ( $F_1O_2 = 15.3\%$ ) conditions in active males, aged 18-24. **METHODS:** Ten recreationally active healthy males participated in the study. Subjects were assigned in a double-blind randomized, crossover design consuming 140 mL of beetroot juice (2 shots) containing ~8.4mmol of nitrate ( $NO_3^-$ ) and nitrate depleted placebo (PL) for 2 days prior to testing and 2.5 hours prior to testing in both normoxic and hypoxic conditions. A 72 hour washout was utilized during the crossover. Prior to testing all subjects completed a maximal effort protocol to determine Maximal Power Output ( $W_{max}$ ). During testing, subjects completed a 5 minute warmup, a 15 minute steady state normoxic preload at 50%  $W_{max}$ , and finished with a 15 minute cycling time trial (TT) at 70%  $W_{max}$ , in either normoxia or simulated hypoxia ( $F_1O_2=15.3\% O_2$ ). **RESULTS:** No significant difference was found for BR vs PL group by condition in mean workload ( $164.5 \pm 20.7$  vs.  $166.5 \pm 18.7$  watts in normoxia and  $162.6 \pm 13.9$  vs.  $161.0 \pm 22.1$  watts in hypoxia,  $p=.769$ ). **CONCLUSION:** The present research found no significant differences in average workloads during a 15 minute cycling TT performed in either normoxia or moderate simulated hypoxia after chronic supplementation of beetroot juice (140 mL X 3 days) vs. placebo. A 3-day chronic dosing protocol of 8.4 mmol  $NO_3^-$  per day in the form of BR may not be beneficial to athletes competing in cycling time trials of ~15 minutes in duration at either sea level, or following acute altitude exposure at ~2500m.