

Effect of dietary nitrate supplementation on step test performance at sea level and altitude

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Nitrate-rich beetroot juice improves exercise performance in untrained and moderately trained individuals at sea level through increased production of nitric oxide (NO). Beetroot supplementation may be more effective during exercise in a hypoxic environment, where NO production is reduced, due to low O₂ tensions and muscle pH. However, results from studies that have examined the effects of nitrate supplementation on exercise performance at altitude have been equivocal. **PURPOSE:** To examine the effect of beetroot-juice ingestion on step test performance at sea level and altitude. **METHODS:** Undergraduate students enrolled in a 10-day study abroad to Peru that included a two-day hike on the Inca trail. Prior to traveling, all students performed a Queens College step test at sea level. Students stepped at a predetermined cadence for 3 minutes, after which recovery heart rate was recorded and entered into a standardized regression equation to estimate VO_{2max}. The test was repeated at sea level, 90 minutes after ingesting a 70 mL shot of beetroot juice (6.45 mmol nitrate concentration). The step test was completed twice more at an altitude of 3500 meters; both with and without beetroot juice ingestion. All tests were separated by at least 24 hours. **RESULTS:** Twelve students (age 21 ± 1.7 years; M:6, F:6) completed all aspects of the study. The estimated VO_{2max} at sea level without and following nitrate supplementation was 45.2 ± 9.3 ml•kg⁻¹•min⁻¹ and 46.8 ± 9.1 ml•kg⁻¹•min⁻¹, respectively. The estimated VO_{2max} at 3500 meters increased from 45.2 ± 9.8 ml•kg⁻¹•min⁻¹ to 47.7 ± 12.3 ml•kg⁻¹•min⁻¹ following nitrate ingestion. However, one-way repeated measures ANOVA revealed no differences in mean estimated VO_{2max} across conditions, F(3,33)= 1.31, p=0.29). **CONCLUSION:** We found no apparent effect of altitude or nitrate supplementation on step test performance in a group of college students. The duration of the exercise bout, as well as the dosage and timing of nitrate supplementation may explain our inability to observe an ergogenic effect.