Effect of Nitrate Supplementation on Oxygen Saturation Level as Acute Mountain Sickness Prevention

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Introduction
Lowlanders going to high altitudes could face acute mountain sickness (AMS) due to hypoxia. Theoretically, nitrate supplementation, which can be easily found in beetroot juice, could increase the body's resistance to hypoxia. However, the evidence is still inconclusive.

Objective
This study aimed to systematically review the effect of nitrate supplementation on blood oxygen saturation.

Method
Two reviewers independently searched published studies from PubMed, Scopus, and Cochrane Library databases using pre-registered search strategies from inception to October 5th, 2022, following a registered protocol on PROSPERO. Randomized controlled trials that examined the effect of dietary nitrate supplementation compared to placebo on oxygen saturation among non-acclimated people were included. The ROB 2.0 tool was used to assess the risk of bias in the included studies. Results were described using a vote counting analysis, then meta-analyses using random effects models were conducted. The quality of evidence was analyzed using GRADE and publication bias was examined using a forest plot.

Result
Vote counting analysis from 11 records (294 participants) showed nitrate supplementation could improve oxygen saturation particularly in simulated conditions among men.

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However, the result from the meta-analysis was inconclusive and did not reach a clinically significant threshold with a mean difference of –0.51 (95% CI: –1.66 to 0.63) with I2=0%. This result was consistent even after subgroup analyses based on the type of condition, testing method, and gender. The quality of evidence is low-to-medium, underpowered, and there was publication bias.

Conclusion
From the available studies, it cannot be concluded whether nitrate supplementation improves oxygen saturation clinically among lowlanders who went to high altitudes. Further studies with large participants and minimization of bias examining nitrate supplementation as complement therapy, not a single therapy, were still needed.

Keywords:
Acute mountain sickness; ; hypoxia; nitrate supplementation; beetroot juice