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Acute Mountain Sickness; Prophylactic Benefits of Antioxidant Vitamin Supplementation at High Altitude

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Free-radical-mediated damage to the blood-brain barrier may be implicated in the pathophysiology of acute mountain sickness (AMS). To indirectly examine this, we conducted a randomized double-blind placebo-controlled trial to assess the potentially prophylactic benefits of enteral antioxidant vitamin supplementation during ascent to high altitude. Eighteen subjects aged 35 ± 10 years old were randomly assigned double-blind to either an antioxidant ($n = 9$) or placebo group ($n = 9$). The antioxidant group ingested 4 capsules/day⁻¹ (2 after breakfast/2 after evening meal) that each contained 250 mg of L-ascorbic acid, 100 IU of *d*- α -tocopherol acetate and 150 mg of α -lipoic acid. The placebo group ingested 4 capsules of identical external appearance, taste, and smell. Supplementation was enforced for 3 weeks at sea level and during a 10-day ascent to Mt. Everest base camp (~ 5180 m). Antioxidant supplementation resulted in a comparatively lower Lake Louise AMS score at high altitude relative to the placebo group (2.8 ± 0.8 points versus 4.0 ± 0.4 points, $P = 0.036$), higher resting arterial oxygen saturation ($89 \pm 5\%$ versus $85 \pm 5\%$, $P = 0.042$), and total caloric intake (13.2 ± 0.6 MJ/day⁻¹ versus 10.1 ± 0.7 MJ/day⁻¹, $P = 0.001$); the latter is attributable to a lower satiety rating following a standardized meal. These findings indicate that the exogenous provision of water and lipid-soluble antioxidant vitamins at the prescribed doses is an apparently safe and potentially effective intervention that can attenuate AMS and improve the physiological profile of mountaineers at high altitude.