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Does Adolescent Population Need Calcium Supplements?

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Introduction

The beauty of majestic mountains is the subject of many fairy tales across different cultures worldwide. This grandiose magnificence attracts tens of millions of tourists to high altitude areas every year worldwide. Lower barometric pressure & thus diminished inspired partial pressure of oxygen (PIO2) at high altitudes (>2500 m) means that in some visitors it can result in a fall in partial pressure of alveolar oxygen (PAO2), arterial PO2 (PaO2), & arterial oxygen saturation (SpO2). The resultant tissue hypoxia (called 'hypobaric hypoxia') is the initial root cause of high-altitude illness (HAI). Although most healthy children do well at high altitudes, those at risk of developing HAI include premature infants, infants under 6 weeks of age, infants up to one year of age with a history of oxygen requirement, and children with congenital heart disease, cystic fibrosis, pulmonary hypertension, Down syndrome, or neuromuscular problems compromising ventilation.

MATERIALS AND METHODS

A comprehensive search of PubMed & EMBASE from their inceptions to October 2019 was made using 4 search items: high-altitude illness; acute mountain sickness, high-altitude cerebral edema, and wilderness preparticipation. The search items were combined using the Boolean operator.

Results

The For any individual who normally resides at altitudes below 1500 m, the mainstay of preventative advice is 'slow & gradual ascent' which is best achieved by spending two or more nights at intermediate altitudes (like one night at 1600 m & another at 2200 m) before reaching the target altitude. Strenuous exercise (skiing, hiking, etc) should not be started within 1-2 days after reaching the target altitude. This is the time to acclimatize & not exert. Unlike ascent, which should be slow & gradual, should symptoms of HAI develop, the descent should be rapid. This implies that destinations where facilities for supplemental oxygen & rapid descent (the two most effective measures to treat HAI) are not readily available should ordinarily be avoided. Parents should also keep Ibuprofen (given to alleviate headaches) & Ondansetron (given to alleviate nausea/vomiting). Symptoms resembling those of an 'alcohol hangover': headache (the dominant symptom), plus, light-headedness, nausea, vomiting, disturbed sleep with frequent awakenings, & exertional dyspnoea would suggest acute mountain sickness (AMS) - the commonest HAI. Since AMS presents rather non-specifically in preverbal children, if suspected, supplemental oxygen (2-4 L/min by nasal cannula x 15-20 minutes) or a brief descent should be tried. If symptoms settle, a diagnosis of AMS may be entertained retrospectively. If untreated, AMS can progress to high-altitude cerebral edema (HACE) – a rare but potentially life-threatening illness. The clinical hallmark of HACE are the 'encephalopathic features': ataxic gait & profound lassitude gradually progressing to behavioural disturbance (irritability, confusion), drowsiness, stupor & finally coma. Parents must be aware of these red-flag symptoms so that they could appropriately respond by seeking prompt medical treatment (supplemental oxygen plus dexamethasone followed by immediate & rapid descent).

Conclusion

With proper education, most parents can prevent themselves & their children develop HAI. In cases with prior history of HAI, prophylactic acetazolamide should be used (commence 24 hours before ascent in a dose of 125 mg every 12 hours & continue for a few days after reaching the target altitude). In individuals with no prior history of HAI but who must travel by airplane directly from low altitude (sea level) to a destination above 2500 m, (i.e. no chance to acclimatize) using prophylactic acetazolamide is a reasonable consideration. Patients with stable cystic fibrosis who want to travel to high altitudes can possibly do so provided facilities for pulse oximetry during the entire course of journey and supplemental oxygen are made available.

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