



## Perspective

## High-altitude illness: Menace in Himalayas of Nepal

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## ABSTRACT

Nepal is a country of Himalayas including Mt Everest, the tallest mountain in the world, where a lot of people travel to high altitudes. Significant number of people develop high-altitude illness which includes acute mountain sickness (AMS), high altitude pulmonary edema (HAPE) and high-altitude cerebral edema (HACE) leading even to death. Addressing this issue demands more efforts on both the preventive and treatment aspects to decrease the sufferings of people in this modern time of advanced healthcare and technology.

## 1. Introduction

Nepal is a mountainous country with the northern border lined by Himalayan range including the tallest peak in the world, Mt. Everest, at an altitude of 8848 m. People have been enchanted by the mountains since long time back. A lot of trekkers, mountaineers, pilgrims, tourists and local people visit the mountains of Nepal every year. Data showed more than one hundred seventy thousand foreigners visited Nepal for trekking and mountaineering purposes in 2019 [1] before the COVID-19 pandemic badly hit the tourism sector. The Everest region, Annapurna region and Langtang region are the most common tourist destinations. There are a lot of local people going to high altitude areas for collection of herbs, rearing animals to make for their living. Many foreigners and local pilgrims go to worship in areas like Muktinath temple, Gosaikunda lake, etc. located at high altitudes of about 4000 m.

## 2. Discussion

Travelling to more than 2500 m is a risk for developing high-altitude illness including acute mountain sickness (AMS), high altitude pulmonary edema (HAPE), high altitude cerebral edema (HACE) [2]. AMS presents with headache as a cardinal symptom with an increase in altitude usually accompanied by anorexia, nausea, dizziness, malaise, sleep disturbances, etc. generally occurring within 6–12 hours. HACE is a serious condition characterized by truncal ataxia, decreased consciousness, mild fever and if untreated, may progress to coma and death from brain herniation. The symptoms of HAPE include dyspnea, loss of stamina and dry cough with exertion, followed by dyspnea at rest, rales, cyanosis, cough, and pink, frothy sputum. HAPE usually develops after two or more days in altitudes above 3000 m [3].

Rapid ascent, previous history of altitude sickness, young age, female sex and the presence of other comorbidities like migraine increase the risk of altitude sickness [4]. Additionally, smoking and high body mass index (BMI) were also considered in some studies [5]. Interestingly, with increasing development of transportation and other infrastructures, these areas have become more accessible and the tendency to travel fast has also led to high risk of altitude sickness as pointed out by a study in the Annapurna region [6].

Several studies are available showing the incidence and demographics of high-altitude related illness in Nepal. Among pilgrims visiting Gosainkunda, a sacred lake at 4380 m, for Janai Purnima festival, the incidence of AMS was found to be 34% [7]. Another study reported AMS in around 29% patients, including those with HACE [8]. Study in the Annapurna trekking region showed prevalence of AMS between 34% and 57% [9,10]. Similarly, studies in Everest region showed the prevalence to be around 30% [11]. Significant number of HAPE patients were treated in Pheriche medical post in Everest region [12]. Many local people going for collection of Yarsagumba fungus (“Himalayan Viagra”) are also suffering from AMS [13]. Mild illness usually resolves with simple treatment, but it can progress to severe altitude-related illness which can be life-threatening. A hospital-based study estimated the incidence of altitude illness-related death to be 7.7/100,000 which is a significant number [14]. High-altitude pulmonary edema accounts for most deaths from high-altitude illness.

Prevention is the key for high altitude illness management. Recommendation for travel above 3000 m suggests not to increase sleeping elevation by more than 500 m/day with a rest day every 3–4 days managing time for acclimatization [2]. Medical and rescue aid posts on high altitudes can be setup up so that every traveler can get necessary information and counseling. Identification and appropriate management of susceptible people should be done. Awareness on correct use of acetazolamide for prophylaxis should be widely done with more emphasis to porters and guides in addition to tourists [15]. Culturally sensitive pilgrims need to be appropriately counselled keeping in mind their harmful beliefs and traditional practices. Language barriers in dealing with the tourists should also be taken into consideration.

In addition to awareness on prevention, general idea of symptoms of high-altitude illness, identification of severity and seeking health care should be provided. We have to make people understand that descent remains the single best treatment along with the medical management. Provision of high-altitude medical clinics with suitably qualified healthcare professionals and necessary equipment needs to be arranged. Suitable emergency rescue plan, mainly air-rescue system, should be well established and the referral to specialized centres for the management of complications should be made effective.

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### 3. Conclusion

High altitude illness is one of the significant health problems in Himalayan region of Nepal, but still, it has been a neglected issue. For addressing this problem, we have to deal with the additional challenges of geographical location, unpredictable weather, poor infrastructures and lack of suitable technology. Appropriate strategies focusing both on preventive and treatment aspects should be implemented so that every traveler feels safe at high altitude. Multisectoral and holistic approach with the cooperation from the stakeholders involved will certainly help to alleviate the suffering of lots of people and premature loss of lives in the top of the world.

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### Registration of research studies

1. Name of the registry: Not required.
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Dr. Saral Lamichhane.

### Consent

Not applicable.

### Declaration of competing interest

None.

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