

ORIGINAL RESEARCH

Risk Determinants of Acute Mountain Sickness in Trekkers in the Nepali Himalaya: a 24-Year Follow-Up

Marion McDevitt, DO, MPH; Scott E. McIntosh, MD, MPH; George Rodway, PhD, APRN; Jitsupa Peelay, MS; Doug L. Adams, MStat; Bengt Kayser, MD, PhD

From the Division of Emergency Medicine (Drs McDevitt and McIntosh), the Department of Biomedical Informatics, School of Medicine (Ms Peelay), and the School of Nursing (Mr Adams), University of Utah, Salt Lake City, UT, Division of Health Sciences, University of Nevada, Reno, NV (Dr Rodway), and the Institute of Sports Sciences, and Department of Physiology, Faculty of Biology and Medicine, University of Lausanne, Switzerland (Dr Kayser).

Objective.—Exposure to altitude may lead to acute mountain sickness (AMS) in nonacclimatized individuals. We surveyed AMS prevalence and potential risk factors in trekkers crossing a 5400-m pass in Nepal and compared the results with those of 2 similar studies conducted 12 and 24 years earlier.

Methods.—In April 2010, 500 surveys were distributed to English-speaking trekkers at 3500 m on their way to 5400 m, of which 332 (66%) surveys were returned complete. Acute mountain sickness was quantified with the Lake Louise Scoring System (LLSS, cutoff ≥ 3 and ≥ 5) and the Environmental Statistical Questionnaire III AMS-C score (ESQ-III, cutoff ≥ 0.7). We surveyed demographics, body mass index (BMI), smoking habit, rate of ascent, awareness of AMS, and acetazolamide use.

Results.—Prevalence of AMS was 22%, 23%, and 48% (ESQ-III ≥ 0.7 , LLSS ≥ 5 , and LLSS ≥ 3 , respectively) lower when compared with earlier studies. Risk factors for AMS were younger age, female sex, higher BMI, and smoking habit. Forty-two percent had elementary knowledge about the risk and prevention of AMS. Forty-four percent used acetazolamide. Trekkers took longer to climb from 3500 to 5400 m than in earlier studies.

Conclusions.—Prevalence of AMS continued to decline over a period of 24 years, likely as a result of slower ascent and increased use of acetazolamide. The AMS risk factors of younger age, female sex, and high BMI are consistent with prior studies. Awareness of risk and prevention of AMS remains low, indicating an opportunity to better educate trekkers and potentially further reduce AMS prevalence.

Key words: altitude, acute mountain sickness, Nepal, prevalence, tourism, trekking

Introduction

Acute mountain sickness (AMS) is a common form of high altitude illness that can develop in nonacclimatized persons shortly after ascent to high altitude (>2500 m). Acute mountain sickness is defined as the presence of headache appearing within a few hours upon ascent to altitude, accompanied by 1 or more of the following symptoms: loss of appetite, nausea, vomiting, weakness, lassitude, dizziness, and difficulty sleeping.^{1,2} It is generally self-limiting, resolving over the course of several days, but may progress to life-threatening high altitude cerebral edema (HACE).³ Risk factors for AMS include rate of ascent, altitude reached, sleeping altitude, and individual susceptibility.^{2–4}

The Himalaya attracts trekkers from all over the world. Since Nepal opened its borders to tourists in the mid-1900s, it has become a popular trekking and climbing destination. Significant morbidity and mortality attributable to altitude illness was subsequently reported.⁵ In response to these troubling observations, a Nepali nonprofit organization, the Himalayan Rescue Association (HRA), was formed in 1973. The HRA set up a health post in Pheriche (approximately 4300 m) to educate trekkers, climbers, and porters on their way to Mt Everest base camp, and to treat those afflicted by altitude illness. Inspired by the subsequent decrease in altitude illness prevalence in Pheriche,⁶ the HRA established a second health post. In 1981 the Manang Health Post was established (3500 m), en route to Thorong-La, a 5400-m pass located midway on the popular Annapurna circuit trek.

Corresponding author: Marion McDevitt, DO, Division of Emergency Medicine, University of Utah, 30 North 1900 East, Room 1C26, Salt Lake City, UT 84132 (e-mail: marion.mcdevitt@hsc.utah.edu).

Since establishing this post, prevalence rates of altitude illness around the Thorong-La have decreased. A study by Gaillard et al⁷ reported that from 1986 to 1998 AMS prevalence dropped from 43% to 29% and explained this finding by slower ascent rates, better knowledge of AMS risk factors, and increased use of prophylactic medication. One medication being used as a prophylactic medication for the prevention of AMS is acetazolamide, a sulfonamide medication that inhibits carbonic anhydrase. We hypothesized that in 2010 AMS prevalence would have further decreased and that this reduction would be related to increased awareness of AMS and use of prophylactic medication. The aims of our study were therefore to assess in trekkers 1) the prevalence of AMS around the Thorong-La, 2) awareness regarding altitude illness, 3) risk factors for AMS, and 4) prophylactic medication use. Additionally, we sought to compare the results with those obtained 12 and 24 years earlier.^{7,8}

Methods

In April 2010, English-language questionnaires were distributed to 500 adult trekkers who intended to trek over Thorong-La on the Annapurna circuit (Figure 1). April was selected because large numbers of trekkers typically complete the Annapurna circuit during this month. Surveys were distributed in Manang to be returned in Muktinath or vice versa. Inclusion criteria were trekkers 18 years or older who were able to read and write in English. Trekkers could freely choose not to participate or to abandon participation at any time. Total

count of trekkers registered in Manang during the survey period was obtained from the Annapurna Conservation Area Project (ACAP) checkpost in Manang.

The questionnaire consisted of 2 main parts. The first section asked age, nationality, sex, height and weight, previous altitude experience, rate of ascent, first aid supplies carried, knowledge of AMS, medications used and carried, and health history. This section was to be filled out in Manang (or Muktinath) on the evening before beginning the ascent to 5400 m. In contrast to previous studies in Manang,^{7,8} which surveyed participants after they had attended an HRA briefing on high altitude illness, the part of the survey used in this study was conducted before the HRA briefing to assess trekkers' basal knowledge of AMS.

The second part of the questionnaire consisted of 2 separate self-administered AMS scoring questionnaires that were completed after traversing the Thorong-La. The Lake Louise Scoring System (LLSS)⁹ and the Environmental Statistical Questionnaire III (ESQ-III)¹⁰ were used. The LLSS self-score is a 5-item questionnaire, which is based on the most frequent symptoms of AMS (headache, gastrointestinal symptoms, fatigue or weakness, dizziness or lightheadedness, and difficulty sleeping). Each item is scored 0 (not present) through 3 (severe or incapacitating). Single item scores are added up, and the maximal score is 15. A score of 3 or higher with the presence of headache is considered AMS. Some studies, including the predecessors of this study, used $LLS \geq 5$ as a measure of AMS. We therefore examined prevalence based on both criteria. The ESQ-III uses a more complex set of 67 symptoms. The subjects rate

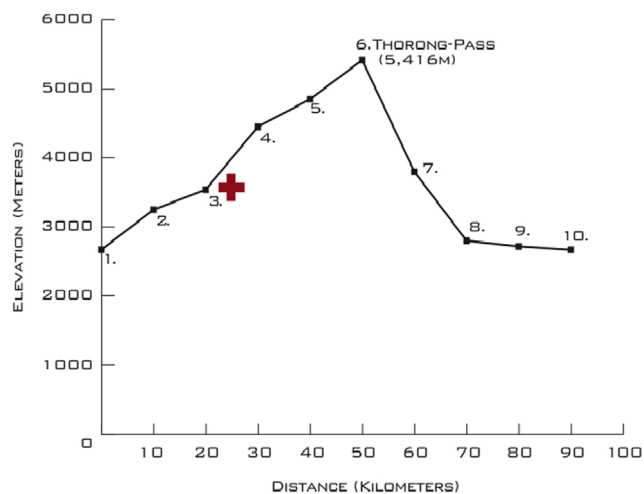


Figure 1. Thorong-La altitude profile showing typical route spending nights in each village marked (distance in kilometers, elevation in meters): 1. Chame (0 km, 2670 m); 2. Lower Pisang (19 km, 3250 m); 3. Manang (34 km, 3540 m); 4. Thorong Phedi (49 km, 4450 m); 5. High Camp (50 km, 4850 m); 6. Thorong La (55 km, 5416 m); 7. Muktinath (65 km, 3800 m); 8. Kagbeni (75 km, 2800 m); 9. Jomson (84 km, 2720 m); 10. Marpha (90 km, 2670 m). + indicates the Himalayan Rescue Association aid post in Manang.

Download English Version:

<https://daneshyari.com/en/article/2614106>

Download Persian Version:

<https://daneshyari.com/article/2614106>

[Daneshyari.com](https://daneshyari.com)