



**JAMSA**  
Journal of Asian Medical Students' Association

# ABSTRACT BOOK

*MOUNTAIN AND  
WILDERNESS MEDICINE*



**EASTERN ASIAN MEDICAL  
STUDENTS' CONFERENCE  
NEPAL 2023**

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The Journal of Asian Medical Students' Association (JAMSA) (ISSN: 2226-3403) is an international peer-reviewed, online open-access student-led biomedical journal of the Asian Medical Students' Association-International (AMSA International). It is published biannually and listed in ICMJE, member of the CrossRef, and indexed in Ulrichsweb, Google Scholar, ROAD (Directory of Open Access Scholarly Resources) Indexing, Gale Cengage, BASE (Bielefeld Academic Search Engine), and Genamics Journal Seek. Its vision is to foster student-led research in regions of Asia, Asia-Pacific, and beyond.

Research and Scientific writing by medical students is being increasingly acknowledged all over the world. AMSA International with its vision of Knowledge, Action and Friendship, wants to encourage all forms of research and creative work from medical students. JAMSA is a platform for young and budding researchers from Asia-Pacific and beyond who are just beginning their careers in the medical and scientific fields.

## SCOPE

The main objective of JAMSA is to serve as a portal by documenting the research activities. We encourage all forms of scientific writing including Original Research articles, Review Articles, Case Reports, feature articles, letters to the editor etc. If you are interested in submitting your research article please go through the Author Guidelines and Submission Guidelines under the Submission section of our website.

The journal accepts scientific articles authored by medical students including but not limited to the member countries of AMSA International. Scientific articles related to all the disciplines of medicine, public health or health care management and those articles having impact on health in any form will be accepted. However, the editorial board reserves the right to deny publication of any article if it deems so. One of our priorities is to keep the article processing time to a minimum. Our online submission and article processing system has been tailored to fulfill this objective. Preference will be given to original articles with structured methodology.

If you have any questions feel free to contact us at [j-amsa@amsa-international.org](mailto:j-amsa@amsa-international.org) or refer to our website ([here](#)).



The East Asian Medical Students' Conference (EAMSC) is an annual conference hosted by various AMSA Chapters in Asia-Pacific and beyond. At its inception, it aimed to inspire delegates to become active in the amelioration of global healthcare problems through networking with other medical students from Asian Region. In the recent decades, it has expanded to involve delegates from all AMSA members allowing exchange of ideas, knowledge, and cultural understanding.

The EAMSC continues to inspire medical students to analyze global health issues more closely and to utilize the role of medical students in the promotion of public health. It challenges students to think beyond what is learnt at university through various academics, sociocultural, and community service activities which explore a nominated conference theme.

The 31st EAMSC conference was organized in Nepal as EAMSC 2018 Nepal with the theme of "Maternal and Neonatal Health". Medical students from countries around Asia and Asia-Pacific attended the program. Five years later, the Himalayan nation is all set to host the 36th EAMSC in its homeland as EAMSC 2023 Nepal (27th-31st January) with the theme of 'Mountain and Wilderness Medicine'. The COVID-19 pandemic may have had its repercussions but through this year's conference, we are ready to bounce back.

With home to highest peaks of the world, blessed with diverse culture, geography and magnificent wildlife, the theme perfectly fits our country. Rapidly evolving adventurous fields has brought up the potentially hazardous activities with it. Human activities in wild areas has increased globally in recent decade, leading to increased risk of injury and illness.

Wilderness medicine has developed in response to both need and interest. Following are the subthemes to be addressed in our conference :

- Infectious, Tropical and Travel medicine
- Trauma, First-aid and Wound care
- Thermal and Cold injuries
- Envenomation
- High Altitude Medicine

# FOREWORD

Dear Readers,

I am delighted to welcome you all to the Book of Abstracts of the scientific papers and posters presented at the East Asian Medical Students' Conference 2023 (EAMSC), Nepal. The Journal of Asian Medical Students' Association (JAMSA) wishes to provide the solid ground of an international, indexed, peer-reviewed, student-led biomedical journal for budding early career researchers in Asia Pacific and beyond who are presenting their scientific work at the conference. JAMSA is more than excited to share the scientific conclusions from EAMSC 2023 Nepal promoting a greater exchange of ideas and scientific inputs along with the dissemination of the recent research findings in Asia-Pacific for finding novel solutions.

With the virtue of AMSA International's vision of Knowledge, Action, and Friendship, JAMSA was established in the year 2011 to encourage student-lead research in the Asia Pacific region, training medical students with the necessary research and analytical skills, supporting the research endeavors of member chapters of AMSA International and providing a recognized platform for them to publish, disseminate and share their research findings as indexed publications gaining international authentic recognition.

JAMSA believes that scientific research is the central pillar of medical knowledge and gives it its dynamic nature. Representing medical students of one of the largest continents of the world AMSA must contribute to the growing field of medicine, by supporting young and budding researchers to embark on their journey on this road not taken. JAMSA strongly believes that the potential of these young ignited curious minds, with experienced guidance, can change medicine in a way others can't.

We hope that this abstract book can become a source of inspiration and make you realize your critical thinking and problem-solving potential, encouraging you to contribute to this endless pool of medical knowledge. Along with becoming the future clinicians, may you all unleash the scientists within you and become the physician-scientists of tomorrow!

With warm regards

**Pratyush Kumar**

Chief Editor

Journal of Asian Medical Student's Association



# FOREWORD

Greetings, People of Tomorrow!

Namaste from the top of the world!

Our ecstasy knows no bounds as we embrace this incredible opportunity to welcome delegates from AMSA-International chapters around the globe to Nepal for East Asian Medical Students' Conference 2023. 5 years on after hosting an AMSA Conference for the first time in our history, organizing an international conference in the post-pandemic world hasn't been without unique challenges but the unwavering support of many helping hands have made the journey less painstaking.

The theme of the conference, 'Mountain and Wilderness' is one that is unique and largely undiscovered. Even in the age of rapid development and technological advancements, people's appetite for daring adventures have opened the door for many new challenges for a medical doctor. Nepal, home to the world's highest peak in Mt. Everest, is the epitome of adventure. Wilderness activities have helped Nepal build a reputation around the world as a go-to for the daring souls.

Every AMSA Conference provides an opportunity for medical students to contribute to the scientific community. JAMSA is the perfect platform to for delover novel discoveries to the wider medical world and this time again, we feel proud and privileged to publish the JAMSA Abstract Book for EAMSC 2023 Nepal. We can look forward to some immaculate research articles under a theme that is both captivating and uncharted in equal measures. The Conference Organizing Committee extends its sincerest gratitude to JAMSA for the astutely prepared abstract book which will undoubtedly become another huge milestone in the fast changing dynamics of the medical world. Happy reading!

Viva AMSA!

**Aramva Bikram Adhikari**

*Head of Conference*

East Asian Medical Students' Conference  
2023 Nepal





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# **SCIENTIFIC PAPER**

# 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.

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  $I^2=0\%$ . 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*

# Positive Pressure Ventilation Therapy for Improvement of Symptoms and Physiological Measurement in Acute Mountain Sickness: A Systematic Review and Meta-Analysis

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## Introduction

Acute mountain sickness (AMS) is a high altitude disease characterized by headache, dizziness, fatigue, and gastrointestinal symptoms. AMS leads to hypobaric hypoxia and potentially develops into dangerous conditions such as pulmonary or cerebral edema. Current pharmacological treatments such as acetazolamide, dexamethasone, and analgesics have not been proven to be consistently effective to prevent AMS and shown unpleasant adverse effects. Alternatively, positive pressure ventilation therapy has shown some promising results in treating AMS.

## Objective

The aim of this systematic review and meta-analysis is to evaluate the efficacy of positive pressure ventilation therapy in improving symptoms and physiological measurement in acute mountain sickness.

## Method

This systematic review and meta-analysis was reported based on the PRISMA statement. The literature search was conducted on several databases, such as PubMed, Cochrane, Science Direct, and Scopus. Results were shown as mean difference (MD) and standard deviation (SD). A fixed-effect model (FEM) was used when the included studies were considered homogenous), which were indicated by an I<sup>2</sup> value less than 40%. Risk of bias was assessed using the cochrane risk-of-bias tool for randomized trials (RoB 2).

## Result

This systematic review and meta-analysis included four randomized control studies with the total of 277 participants. Lake Louise Score declining with a significant pooled mean difference (MD) of -1.16 [95% CI: (-1.90) - (-0.41), P = 0.002].



Arterial oxygenation improvement with a significant pooled MD of 4.13 [95% CI: (-0.83) - 9.08,  $P < 0.00001$ ]. Heart rate measurement showed no significant effect, MD of -0.19 [95% CI: (-7.26) - 6.68,  $P = 0.96$ ]

### Conclusion

This systematic review and meta-analysis showed evidence that positive pressure ventilation therapy is a prospective therapy to significantly improve acute mountain sickness symptoms and arterial oxygenation, but has no significant effect on heart rate.

### Keywords:

*Acute mountain sickness; Review; meta-analysis; ventilation therapy*

# Is Acetazolamide Still the Best Option? -A Retrospective Review to Identify the Optimal Approach for Preventing Acute Mountain Sickness

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## Introduction

The percentage of mountaineers affected by Acute Mountain Sickness (AMS) at 3000m was 75%. The risk factors were maximum altitude, age, sex, physical condition, exercise intensity, migraine, and pre-existing diseases. As a preventative measure, Acetazolamide has always been the first prescription choice by physicians. However, other medications, such as Ibuprofen and Dexamethasone have also been used recently, and there is insufficient information on optimal prevention.

## Objective

This paper aims to evaluate the optimal medication for AMS by comparing each drug's efficacy and side effects to acetazolamide.

## Method

PubMed was used to search for the latest articles that were published between 2005 and 2022 by using the keywords [AMS], [Prevention], [Acetazolamide], [Dexamethasone], [Ibuprofen], and [Ginkgo Biloba]. Information on pharmacological measures' efficacy on the prevention of AMS were gathered. We used descriptive statistics to evaluate the efficacy.

## Results

The number of published articles, the range and median incidence rates for the drugs investigated were, 15, 0-62% and 36% for Acetazolamide respectively; 10, 10-74% and 30% for Dexamethasone; 6, 16-62% and 33.7% for Ibuprofen; 2, 0-65% and 32.5% for Ginkgo Biloba.

## Conclusion

Despite various biases, the incidence of AMS was best prevented by Dexamethasone based on median values obtained from a review of previous studies. However, while the effectiveness of each drug was evaluated individually in this study, there is also a possibility that a combination of drugs may be more effective, and further detailed analysis will be needed in order to maximize the preventive effect of AMS.

## *Keywords:*

*Acute mountain sickness; Review; Prevention*

# Clinical Profiles and Predictors of Traumatic Brain Injury Mortality: A Post Hoc Analysis

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## Introduction

Traumatic brain injury (TBI) can be life-threatening. Investigating its clinical profiles and mortality predictors is crucial for understanding the disease epidemiology, devising public health interventions, and improving patient outcomes.

## Objective

To assess the correlation between age, sex, socioeconomic status, and the in-hospital mortality of TBI, and whether these factors are strong predictors of TBI patients' outcomes.

## Method

This retrospective study analyzed head trauma patients treated in the Emergency Department. A total of 140,806 cases from 2000 to 2021 were included from the Clinical Data Analysis and Reporting System (CDARS) Database using the following International Classification of Diseases, Ninth Revision (ICD9) codes: 800-804, 850-854, 873.8(4), 900(0). Patients were stratified by age, sex, and neighborhood socioeconomic status (based on their residential districts' Social Deprivation Index [SDI]), and comparative analyses were performed using all-cause in-hospital mortality as the primary outcome measure.

## Result

11,006 out of 140,806 TBI patients died from 2000 to 2021, yielding an all-cause mortality rate of 7.82%. Univariate analysis revealed that sex and age group were correlated with mortality rate differences. Male patients suffered higher mortality (8.15% vs 7.38%; Odd Ratio [OR]: 1.11, 95% Confidence Interval [CI]: 1.07-1.16,  $P < 0.0001$ ), and so did elderly patients aged 70 years or above (14.8% vs 3.83%; OR: 4.37, 95% CI: 4.19 - 4.55,  $P < 0.0001$ ).



However, the linear regression model of SDI vs mortality revealed no statistically significant correlation between neighborhood socioeconomic status and TBI mortality (R square = 0.006820; P = 0.3167).

### Conclusion

Patients' sex and age group were independent predictors of in-hospital mortality of TBI, with the strongest correlation observed in male patients aged  $\geq 70$ . Higher neighborhood socioeconomic status, however, does not significantly protect against TBI mortality.

### Keywords:

*Traumatic brain injury, Head trauma, Injury epidemiology*

# Ginkgo Biloba Flavonoid Extracts as a Carbonic Anhydrase II Inhibitors for Acute Mountain Sickness Prevention: A Molecular Docking Study

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## Introduction

Based on research regarding phytomedicine as a prophylactic agent for acute mountain sickness (AMS), Ginkgo biloba extracts are among promising candidates. However, a mechanism of action of these extracts remains unknown. Previous studies have shown that some flavonoids, a phenolic metabolite found in various plants, have capability to inhibit carbonic anhydrase II (CAII), a zinc metalloenzyme that regulates acid-base homeostasis. This inhibition could potentially ameliorate an increase in systolic pressure and respiratory alkalosis found in AMS.

## Objective

We aim to investigate effectiveness of flavonoid extracts from Ginkgo biloba as CAII inhibitor for opening up more possibilities of new AMS drug development based on natural extracts.

## Method

Molecular docking technique was applied to screen candidate substances in order to shorten a period of the pre-clinical phase of drug development. Applying AutoDockVina docking and LigPlot+ interaction plotting, the results predict a binding affinity and interaction diagram of the coherence between the selected ligands and the CAII zinc binding site.

## Result

All flavonoid extracts demonstrated higher binding affinity score compared to CAII original substrates: carbon dioxide and bicarbonate. Moreover, quercetin, the highest affinity flavonoid, has zinc interaction and H-bond on the enzyme active site, similar to natural ligands with the greater cohesion stability from higher hydrophobic contact.

## Conclusion

From the affinity results, G Biloba flavonoids competitively inhibit CAII and consequently mitigate the AMS. They are, therefore, highly likely to be tested as substitute drugs for acetazolamide, which is currently commercially used, in order to reduce the potential side effects of synthetic drug and increase bioavailability. Since this study is a pre-screening in silico, further studies including molecular dynamic, preclinical and clinical testing are essential for further development of a drug for AMS.

## Keywords:

*Ginkgo biloba; flavonoid; carbonic anhydrase isozyme II (CAII) inhibitor; acute mountain sickness (AMS); acetazolamide (AZM)*

# Impact of COVID-19 Pandemic on Pulmonary Tuberculosis Care in Secondary and Tertiary Care Centers of Thailand

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## Introduction

Historically, a pandemic usually disrupted a country's public health systems. COVID-19 pandemic, as well, has disrupted the care of several tropical infectious diseases, including tuberculosis (TB). In the past years, the pace of TB elimination has lagged behind the goal of End TB Strategy. It remains to be seen whether the COVID-19 pandemic will hamper this process.

## Objective

The purpose of this study was to address the effects of COVID-19 pandemic and its consequences on pulmonary TB care, as well as risk factors of unsuccessful TB treatment outcomes during the pandemic.



## Methods

Retrospective cohort study was conducted on 1,500 TB patients receiving treatment during 2012 to 2021. Collected data included treatment dates, demographic data, sputum collection for acid fast bacilli smear and culture, directly observed therapy (DOT), follow-ups, and treatment outcomes. Incidence was calculated using person-time function. Risk factors were calculated by Cox proportional hazard model.

## Results

A total of 188 cases received treatment during COVID-19 pandemic (2020-2021). Patients who had no facility-based DOT during the pandemic were markedly higher than before the pandemic.

Incidence rates of unsuccessful pulmonary TB treatment in 2020 was 24.3 per 100 PY and 8.0 per 100 PY in 2021. Monthly notification of new pulmonary TB cases had downward trend. Risk factors of unsuccessful treatment during COVID-19 pandemic were tobacco use (AHR 6.12, 95%CI 1.31-28.56) and having history of missing follow-up or no doctor's appointment at any point during the treatment course (AHR 3.63, 95% CI 1.44-9.17)

## Conclusion

This study described the effects of the pandemic and its consequence toward pulmonary TB care. Management of pulmonary TB in Thailand was severely hit by COVID-19 pandemic, but it also resulted in novel innovations for the future of pulmonary TB care.

### *Keywords:*

*Pulmonary tuberculosis; COVID-19; Thailand; Impact; Management*

# The Effects of Post Coronavirus Disease 2019 Conditions on High Altitude Illness

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## Introduction

High altitude illness (HAI) refers to cerebral and pulmonary syndromes related to hypoxemia during mountain trekking. Beyond symptoms and complications, people with long coronavirus disease 2019 (COVID-19) are resuming mountain trekking activities. Pooled prevalence data has shown that fatigue, breath shortness, and headache are common symptoms for both HAI and post-COVID-19.

## Objective

This quantitative study design investigates the prevalence of HAI and post-COVID symptoms, identifying the body reactions of different group subjects.

## Method

The targeted participants climbed Mount Xue or Mount Hehuan from May 1, 2022, to October 17, 2022. Upon receiving 236 effective responses, a chi-squared test and 2-sample t-Test were run through SAS Enterprise Guide (SAS EG) and Excel. Participants were then controlled under similar backgrounds, like normal BMI range, residency altitude, cardiopulmonary medical history, non-smokers, and no drug usage before climbing. The remaining 125 participants meeting our study criteria were grouped under four identical conditions.

## Result

Significantly, more participants in Group Post COVID-19 experienced HAI symptoms during mountain trekking compared with participants in Group Normal, by 14.13% more in Mount Xue and 4.23% more in Mount Hehuan.

An increase is observed in females developing HAI symptoms after being diagnosed with COVID-19, an average of 13.96% higher than the prevalence in infected men. Besides, participating in mountain trekking one month after diagnosis of COVID-19 could reduce developing HAI symptoms by at least 44.44%.

### Conclusion

The HAI incidence among post-COVID-19 participants was 8.95% statistically higher than normal participants, on average, during trekking in MountXue and MountHehuan. Symptoms were mostly mild, with “Tiredness or Fatigue” being the most common symptom. Our study analysis provided a direction for future studies of the relationship between post-COVID-19 conditions and HAI, such as the pathological mechanisms and prevention research.

### Keywords:

*High altitude illness, Post-COVID symptoms, Mountain trekking, Coronavirus-disease 2019*



# SCIENTIFIC POSTER



# The Clinical Manifestations and Mechanisms of Malayan Pit Viper (MPV) Envenomation

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## Introduction

*Calloselasma rhodostoma* (Malayan pit viper) is a hematotoxic snake distributed throughout Southeast Asia and is one of the most common snake bites in Thailand. Although death is not common, its venom can cause irreversible morbidity resulting from local necrosis and decoagulation.

## Objective

This study aimed to collect and review information regarding the clinical manifestations and mechanisms of *Calloselasma rhodostoma* envenomation.

## Method

We conducted a systematic review following the PRISMA guidelines 2020. The PubMed and Scopus databases were searched until 25 October 2022. Articles were screened at the title, abstract and full-text phases.

## Result

We identified 185 studies via the electronic database, of which 31 were included in the review. According to the review, the majority of the patients were male (64%) and were bitten at lower limbs (70%). The main protein constituents of the venom are Snake venom metalloproteinases (SVMP) including kistomin and rhodostoxin, C-type lectins (snaclec), Snake venom serine protease (SVSP), L-amino acid oxidase, Phospholipase A2 and Cysteine-rich secretory protein. Each of these affects the body both locally and systemically. Local effects, including swelling, pain, and tissue necrosis, exhibited in approximately 95% of the group, while the percentage of systemic effects, generally detected by impairment of blood coagulation resulting from attacks in various stages of the coagulation pathway, varies from 33% to 88%. Hemolysis was also witnessed.

## Conclusion

The review indicates that MPV envenomation leads to local effects and systemic effects via disrupting different stages in the coagulation cascades as well as necrosis. However, the review implies that venom with thrombin-like mechanisms like MVPs would not be effective in treating thrombotic disorders. Thus, future studies should focus on alternative pathways instead.

## *Keywords:*

*Malayan pit viper, snake venom, coagulopathy, local effect, enzymatic activity*

# A comparison of lowest effective dose (62.5 mg vs 125 mg) of acetazolamide for acute mountain sickness: a meta-analysis

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## Introduction

Acetazolamide is the recommended medication for the chemoprophylactic prevention of Acute Mountain Sickness (AMS). Acetazolamide is believed to speed up acclimatization primarily via enhancing ventilation through acidotic activation of the chemoreceptors in the brain. Acetazolamide has been shown to be efficient for AMS in dosages starting at 125 mg to 375 mg dosage twice daily. Over the past few decades, there have been repeated recommendations to reduce the dose of acetazolamide, often to lessen side effects such as headache, nausea, polyuria, and dysgeusia as well as to prevent misdiagnoses and unnecessary treatments.

## Objective

To compare the effectiveness of Acetazolamide (62.5 mg vs 125 mg twice daily) for the prevention of AMS.

## Method

PubMed, Embase, Google Scholar, and reference lists were searched for clinical trials if they compared two dosages (62.5 mg vs 125 mg twice daily) of Acetazolamide for AMS. The extracted data were used to calculate the pooled odds ratios with a 95% confidence interval using the Mantel-Haenszel fixed-effects model while heterogeneity was calculated using I<sup>2</sup> statistics. The quality of included trials was assessed using the Cochrane Collaboration tool.

## Result

Two clinical trials included a total of 179 AMS patients (the 62.5 mg group [93 patients] and the 125mg group [86 patients]). Patients in the 62.5 mg group had a higher risk of AMS than patients in the 125mg group but were statistically non-significant. (OR: 1.16, 95%CI: 0.64-2.09, p=0.62, I<sup>2</sup>=0%). The side effects were similar between the two groups in both trials.

## Conclusion

Based on the analysis, 62.5 mg of acetazolamide twice daily is non-inferior to the recommended dose of 125mg twice daily for the prevention of AMS. Further studies are needed along with placebo based on patients' characteristics and degree of prior acclimatization with the uniform endpoint altitude.

## Keywords:

*Acetazolamide, Acute Mountain Sickness, Meta-analysis*

# Prevalence, Preparedness, and Factors associated with Injuries among Thai Trekkers in a Thai National Park

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## Introduction

Trekking has become one of the most popular recreational activities among Thais. Injury susceptibility varied according to location, season, and environment. Injury may have been prevented with proper planning and preparation.

## Objective

The objective of this study was to determine the prevalence, preparation, and factors associated with trekking injuries in Thailand's national parks.

## Method

This was a cross-sectional study conducted in Thailand in October 2022. An online survey (REDCap) was distributed through online social media platforms. Adult ( $\geq 18$  years old) Thai trekkers who visited Thailand's national parks were invited to participate. Porters, park rangers, tour guides, and locals were excluded.

## Result

A total of 179 subjects were available for analysis. The mean age was 40 years old. 19.5% were first-time trekkers. The median (IQR) preparation time was 2 (1-7) days. The prevalence of injuries was 35.8%, with 50.3% occurring on the trunk. Scratching (41.9%), bruising or contusion (23.5%), and sprain (7.8%) were the most common injuries. There were no reported fractures. Ticks/fleas (27.4%), black flies (19.6%), and slugs (16.8%) assaulted the majority of trekkers. Thai trekkers obtained travel health information via the internet (77.7%) and from friends (41.3%). 54.2% had a first-aid kit with antipyretic (45%), muscle relaxant (45%), and antihistamine (43.6%) medications.

Playing in the water during a trekking trip was associated with moderate to severe injuries (aOR 28.2, 95% CI 1.46-543.13, p-value 0.027) and mild injury (aOR 4.8, 95% CI 1.63-13.86, p-value 0.004). When adequate risk awareness was a protective factor for moderate to severe injuries while trekking (aOR 0.25, 95% CI 0.06-0.99, p-value 0.048).

### Conclusion

A third of Thai trekkers suffered minor injuries while trekking. Travel medicine practitioners should inform trekkers about the risks of injury and provide adequate health preparation to reduce injuries.

### Keywords:

*Injury, Trekker, Thailand, Traveler, Health problem*



# The Implementation of Traditional Herbal Medicine on High-altitude Illness: A Cross-Sectional Study and Meta-Analysis

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## Introduction

High-altitude illness (HAI), including acute mountain sickness (AMS), high-altitude cerebral edema (HACE), and high-altitude pulmonary edema (HAPE), occurs above 2500m sea level, which is caused by rapid exposure to lower oxygen levels and air pressure at high altitudes. Rhodiola has a long history of clinical application for the prevention and treatment of acute mountain sickness (AMS). Similarly, some studies also stated that Traditional Herbal Medicine (THM), such as Ginseng, can also be applied to HAI.

## Objective

To determine the relationship between THM and HAI and examine the implementation of THM on HAI symptoms.

## Method

A cross-sectional quantitative research study is conducted from October 10, 2022 to October 18, 2022, as a means to investigate the use of THM on HAI symptoms among Taiwanese mountaineers. After excluding invalid responses, a total of n=292 effective responses were obtained through snowball sampling. Meta-analysis was also used to determine the implementation of THM. Electronic databases were searched from 2002 to 2022. PRISMA flowchart and statement were used in the screening process. After screening with selection bias, 9 studies were included in this review.

## Result

This study has shown the use of THM or the combined use of western medicine and THM among mountain trekkers in Taiwan to prevent HAI. The results of the reviewed article broaden our understanding of the implementation of THM on HAI. Taken together, these findings suggest that THM has a significant impact on decreasing the incidence rate of AMS and increasing the recovery rate of this disease, respectively.

## Conclusion

This study stated the application of THM on HAI symptoms. Our findings also suggested that future research can focus on: taking THM as a daily supplement may be an alternative method to lower the incidence rate of HAI.

## Key Words:

*Traditional herbal medicine; High-altitude illness; Acute mountain sickness; Rhodiola; Ginseng*

# Characteristics and Trends of Heatstroke-Related Emergency Department Visits: A Multicentre Retrospective Study

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## Introduction

With the rise in ambient temperature as a result of global climate change, multiple health concerns have been raised about the increased risk of developing heat-related illnesses. Heatstroke remains one of the most common and severe forms of thermal injury and is of particular significance in the field of mountain and wilderness medicine.

## Objective

To examine the epidemiological pattern and trend of heatstroke patients.

## Method

This is a retrospective analysis of heatstroke-related emergency department (ED) visits using data extracted from the Clinical Data Analysis and Reporting System (CDARS) database. Visits were stratified by sex, age group, and residential districts, and the total and demographic-specific incidence were computed with respect to population data from the Census and Statistics Department.

## Result

Between 2016 and 2021, 1980 ED visits for heatstroke were recorded, resulting in an incidence of 4.44 visits per 100,000 per year (95% Confidence Interval [CI] = 4.25-4.64). 16 deaths were reported, yielding an overall mortality of 0.81%. While the annual incidence remained relatively constant from 2016 to 2020 (changes <10%), it increased considerably (+27.6%) in 2021. Rates of heatstroke-related visits also varied by sex, age, and residential area.

There were significantly higher incidences in males (7.33 per 100,000; 95% CI = 6.97-7.71), adults aged 65-69 years (6.93 per 100,000; 95% CI = 5.99-8.02), and residents living in the following districts: Southern (7.84 per 100,000; 95% CI = 6.46-9.51), North (7.18 per 100,000; 95% CI = 5.96-8.64), and Islands (10.3 per 100,000; CI = 8.36-12.7).

### Conclusion

This study offered valuable insights into the local epidemiological pattern of heatstroke, revealing the recent rise in incidence and population at heightened risk (men, elderly, and residents of Southern, North, and Islands districts).

### *Key Words:*

*Heatstroke, Exertional heat illness, Emergency medicine, A&E, Epidemiology*

# Regulating the Temperature and Level of Cold Water Immersion as an Effective First-aid of Hyperthermia

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## Introduction

Heat stroke, an emergency condition characterized by severe hyperthermia and organ dysfunction, causes significant morbidity and mortality if left untreated. Common in hot environments, the number of individuals exposed to high heatwave frequency is predicted to increase to 2.02 billion in 2050. Study in tropical countries estimated the mortality rate for heat-related illness was 19.5%. As one of the best first-aid, cold water immersion (CWI) was proven to have superior cooling rates, unsurpassed survival rates, and accessible implementation than ice water. However, to this date, the most effective temperature and the best level of cold water immersion have yet to be determined.

## Objective

To investigate the effectiveness of cold water immersion in managing exertional heat stroke, including the most effective temperature and level of immersion.

## Method

This study followed the Preferred Reporting Item for Systematic Review and Meta-analysis (PRISMA). We systematically searched PubMed, Scopus, Cochrane, Wiley, and ProQuest for relevant literature up to 16 September 2022. The included documents were further assessed for risk of bias using the Cochrane Risk of Bias 2.0. We then pooled the effect estimates using random-effects meta-analysis.

## Result

Nineteen randomized studies cumulating a total of 332 participants are included. Cold water immersion showed a beneficial effect on hyperthermia (MD=0.02 [95%CI: 0.01-0.03],  $p<0.001$ ;  $I^2=12\%$ ). The temperature of 14-16°C turned out to be the most optimal temperature for cold water immersion, significantly increasing the body temperature by 0.02°C·min<sup>-1</sup> (95%CI: 0.01-0.03,  $p<0.001$ ). Level of immersion above the iliac crest showed significant results (MD=0.02 [95%CI: 0.01-0.03],  $p<0.001$ ;  $I^2=24\%$ ) as well as below iliac crest (MD=0.02 [95%CI: 0.00-0.04],  $p<0.020$ ;  $I^2=0\%$ ).

## Conclusion

Hyperthermia patients who were treated with cold water immersion significantly had superior cooling rates and it is potentially the best choice for the first aid. Implementation of optimal temperatures and immersion level through proposed guidelines is needed.

## Key Words:

*Cold water immersion, immersion level, meta-analysis, temperature*



# High Altitude Pulmonary Edema in a Healthy Highlander Porter: A Case Report from Nepal

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## Introduction

High Altitude Pulmonary Edema (HAPE) is a form of non-cardiogenic pulmonary edema that develops due to rapid ascent of a non-acclimatized person from lowland to altitude more than 2500m. HAPE in porters is pretty uncommon with only a few cases reported till date.

## Case Discussion

We report a case of 24-year porter, otherwise healthy with the ascending history from Lukla (2840m) to Pengboche (3980m) on day 1, Pengboche (3980m) to Pheriche (4240m) in day 2, and Pheriche (4240m) to Gorakshep (5140m) on day 3 presenting to Pheriche Aid Post on day 4 with shortness of breath at rest and with activity, cough with frothy sputum, headache, dizziness, and fatigue. On examination, he was tachypneic, tachycardic, with decreased breath sounds on the left side, and had no focal neurological deficits. His oxygen saturation was 40 percent, and his 2018 Lake Louise Acute Mountain Sickness (AMS) score was 8. Based on his clinical picture, a diagnosis of HAPE with moderate AMS was made. He was managed with oxygen support via face mask, nifedipine, acetazolamide, and ibuprofen at the aid post. Furthermore, he was advised for rapid descent to Kathmandu where he was managed further. A week later he was medically clear.

## Conclusion

Even porters are at risk of suffering from high altitude sickness including HAPE. By increasing our consideration about high-altitude illness in porters we can more easily identify porters developing HAPE as well as other high-altitude illness and save porters from such life threatening but completely recoverable disease.

**Keywords:**  
Altitude,  
Acclimatization,  
Nifedipine





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