



Acute Mountain Sickness in the Himalayas: Preliminary Report

Inderjeet S. Sahota^{1,2}

1. Faculty of Medicine, University of British Columbia; 2. A Thousand Metres Above Foundation



FACULTY OF MEDICINE

INTRODUCTION

Acute Mountain Sickness (AMS) is a high-altitude medical emergency that can rapidly progress to high-altitude pulmonary edema or cerebral edema, both of which can be fatal, if not adequately diagnosed and treated. In recent years high altitude trekking in the Himalayas has grown tremendously in popularity. However, despite this, limited data exist on the prevalence of AMS for high altitude sojourners in this region.

OBJECTIVES

The purpose of this project is to determine prevalence of AMS on popular trekking routes in the Himalayas.

METHODS

- Here we report the preliminary results of our ongoing study.
- Results from 17 individuals (4 females) embarking on multi-day (>1 day) treks throughout Nepal are shown.
- AMS was assessed daily using self-completed standardized Lake Louise Symptom Scores (LLSS), which were distributed via trekking companies based in the region.
- Scores were interpreted as: no AMS if 0-2, mild AMS if 3-5, severe AMS if >5.
- Data collected included: baseline characteristics, a brief medical history, AMS scores, and trek specifications.
- All data shown as mean \pm SEM unless otherwise indicated.

RESULTS

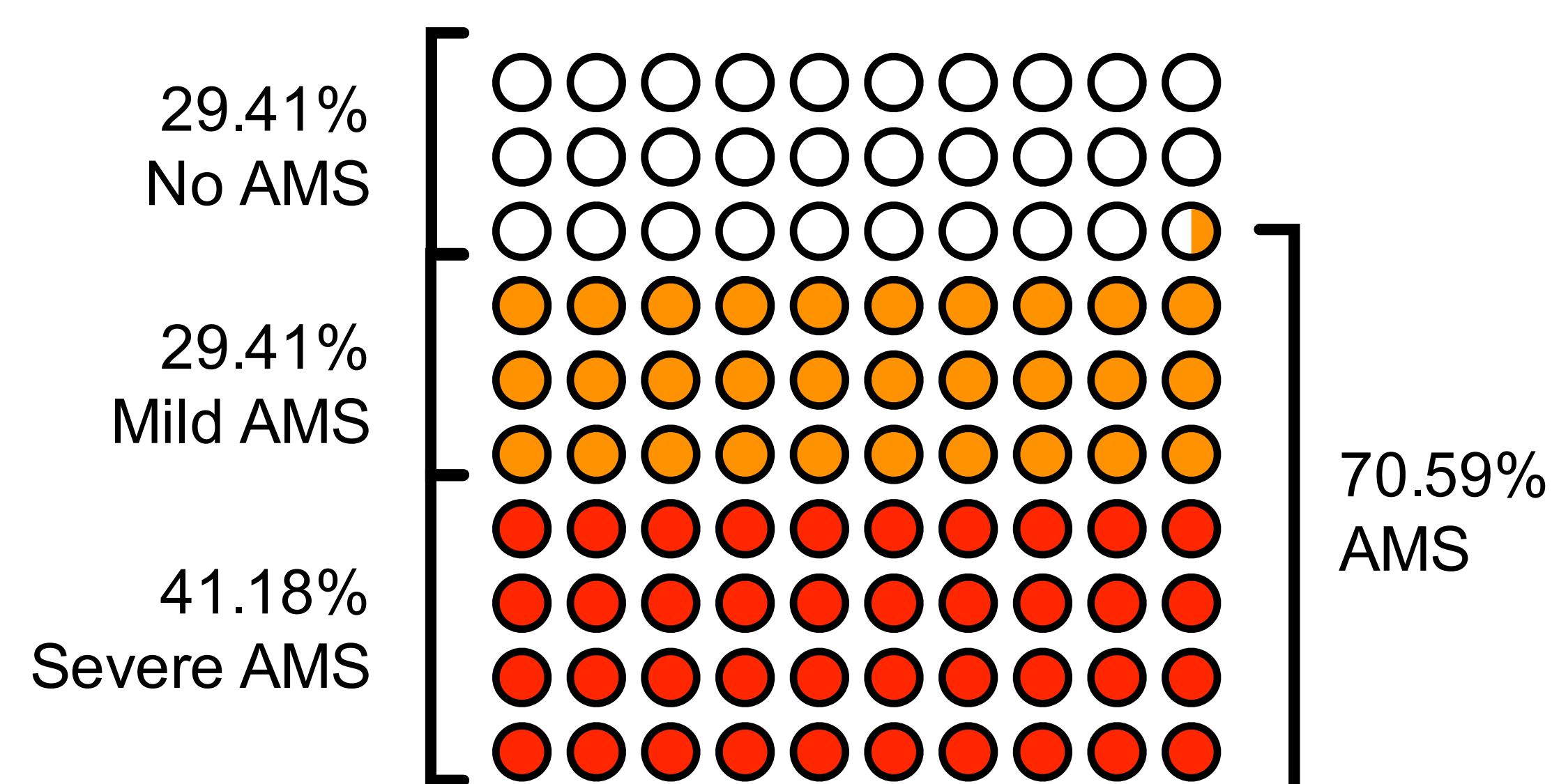
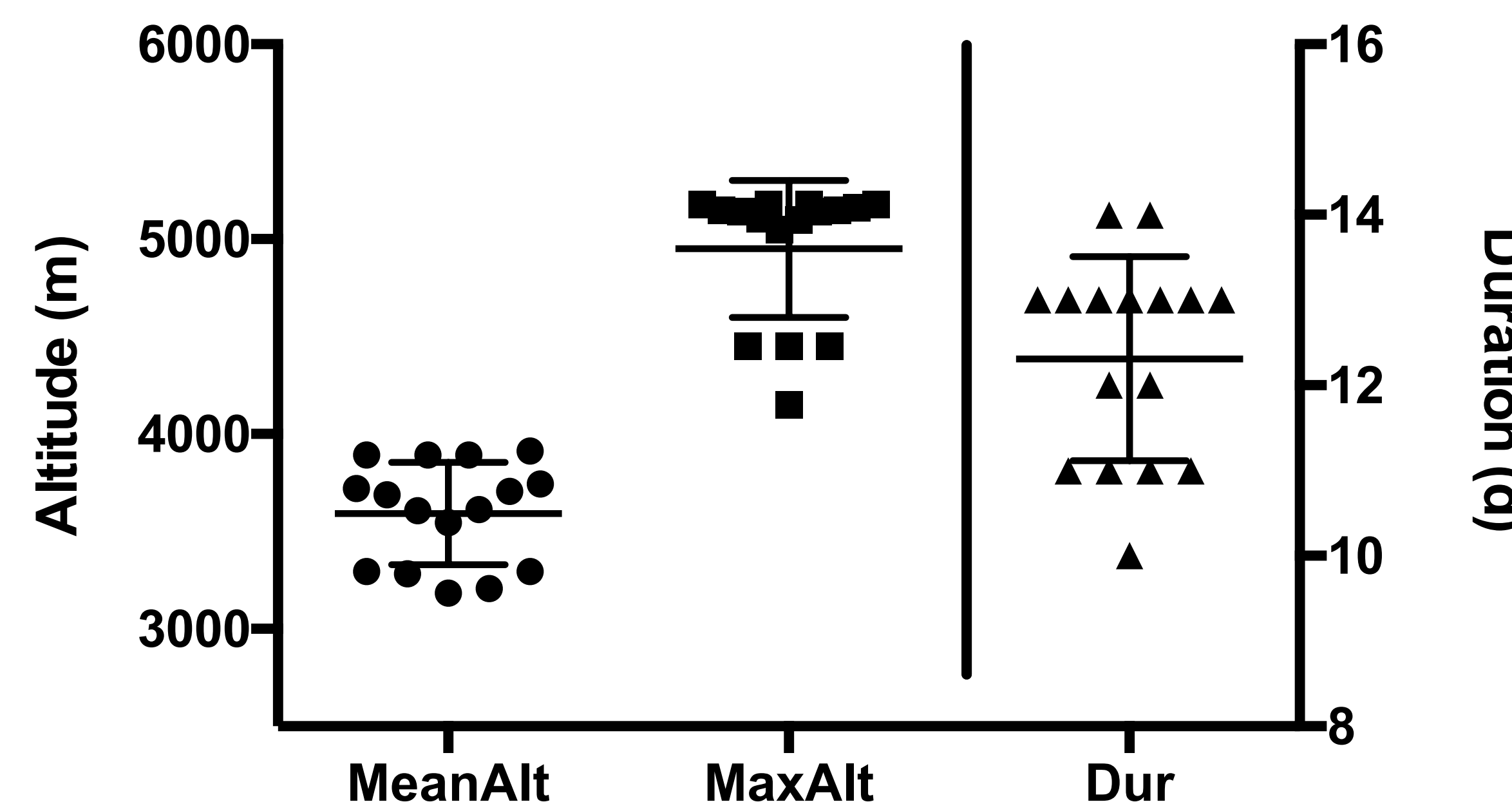


Figure 1: AMS Prevalence in the Himalayas 70.59% of trekkers experienced AMS during their trek. Of those with AMS, 46.67% suffered from severe AMS (41.18% of the total cohort).

Figure 2: Trek Route Specifications Mean trekking altitude was 3650m with an average max altitude of 5012m. Mean trek duration was 12d. The most popular trekking route was the Everest Base Camp trek (n=9; data not shown). *Legend: Alt=altitude, Dur=duration.*



Variable	All	AMS	No AMS	P-value
N	17	12	5	-
Age (y)	43.65 \pm 3.89	36.42 \pm 2.81	61.00 \pm 8.28	0.018
Gender (F)	4	3	1	1.000
Height (cm)	172.1 \pm 1.7	174.5 \pm 1.73	166.4 \pm 23.0	0.024
Weight (kg)	72.53 \pm 3.3	73.5 \pm 3.9	70.2 \pm 10.5	0.681
BMI (kg/m ²)	24.41 \pm 0.99	24.05 \pm 1.10	25.27 \pm 3.07	0.642
Resident Alt (m)	76.67 \pm 32.19	95.45 \pm 42.93	25.00 \pm 57.27	0.133
Prev Trek >2500m (%)	68.8	80.0	60.0	0.560
Prev Knowledge AMS	1.13 \pm 0.13	1.09 \pm 0.16	1.20 \pm 1.04	0.785
Prev Hx AMS (%)	25.0	27.3	20.0	1.000
Smoker (%)	43.8%	40.0 (n=4)	60.0 (n=3)	0.608
Smoking Amount (pack-years)	7.02 \pm 3.40	1.91 \pm 1.07	13.83 \pm 4.46	0.190
Fitness Level	3.63 \pm 0.15	3.73 \pm 0.19	3.40 \pm 0.89	0.180
Water Consump. (L/d)	2.63 \pm 0.31	2.91 \pm 0.39	1.88 \pm 1.17	0.043
Medication Use (%)	81.3	73.0	100.0	0.509

Table 1: Baseline Characteristics and Comparison of AMS vs. No AMS Groups Descriptive statistics of our study sample as well as differences in characteristics between those who developed AMS during the trek versus those who did not. There were no significant differences in current or past medical issues (data not shown). 68.8% of individuals described their fitness as "fit". Only 6.25% of trekkers reported having no knowledge of AMS, with the majority reporting limited knowledge. 25% of trekkers had previously experienced AMS. Most trekkers (81.3%) used prophylactic medication for AMS, of which 92% used acetazolamide (Diamox).

ABOUT US

A Thousand Metres Above (ATMA) is a registered, non-profit society that supports healthcare initiatives in the Himalayas. For more information visit www.athousandmetresabove.org.

Variable	
Mean AMS Score	1.48 \pm 0.31
Max AMS Score	4.76 \pm 0.75
Mean Alt w AMS (m)	4431 \pm 97
Min Alt w AMS (m)	4033 \pm 172
Duration of AMS on Trek (d)	3.17 \pm 0.61
Duration of Severe AMS (d)	2.14 \pm 0.70
% Days w AMS (%)	26.90 \pm 5.11
% Days w Severe AMS (%)	18.14 \pm 6.14

Table 2: AMS The mean daily AMS score was 1.48. Of those who developed AMS the mean altitude when experiencing AMS was 4431m. The avg minimal altitude at development of AMS was 4033m. Those trekkers that developed AMS suffered, on average, for 3.17 days (26.9% of their total trek duration).

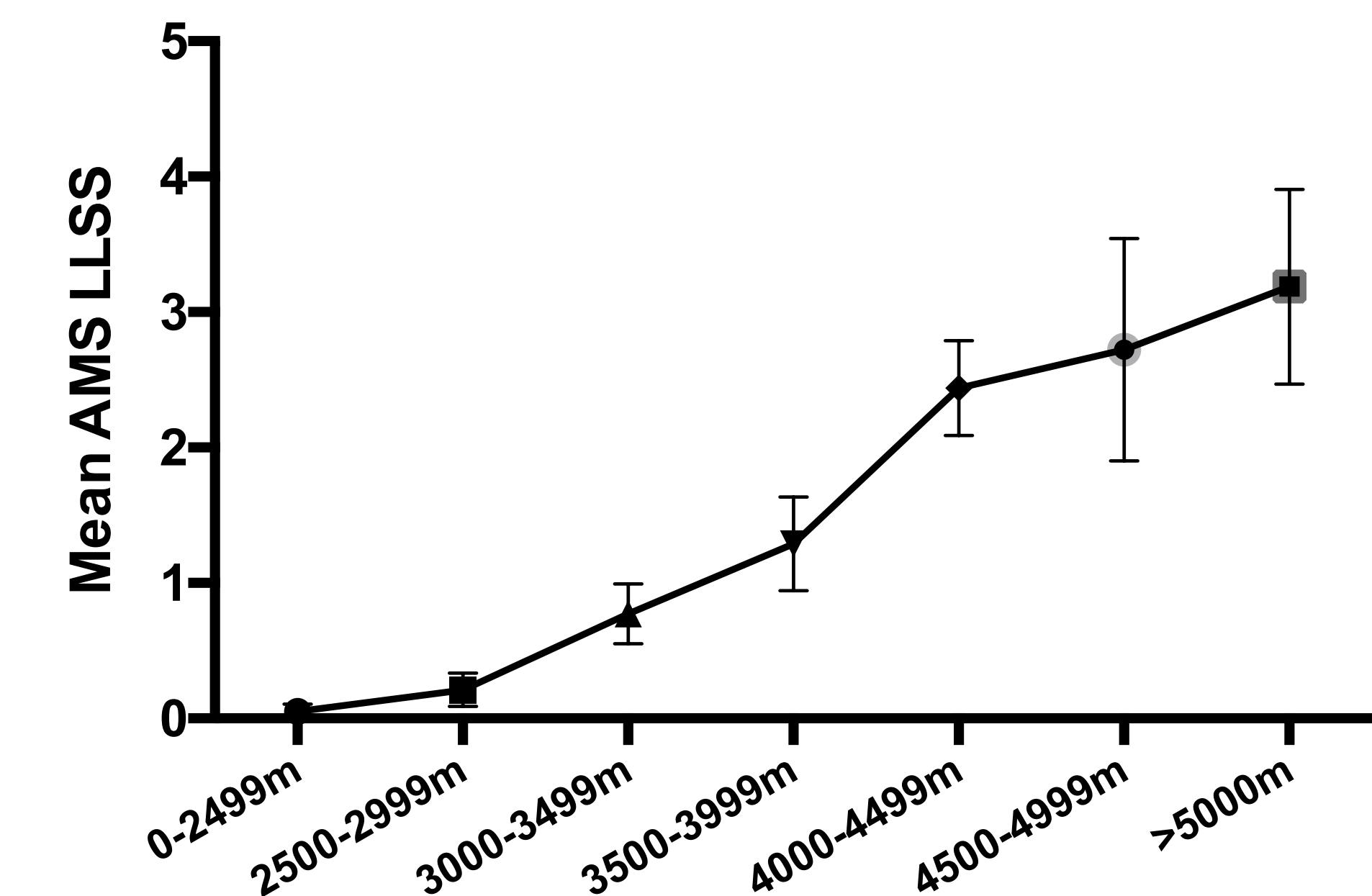


Figure 3: AMS score and Altitude Category AMS scores increased in a linear fashion as altitude increased ($p < 0.0001$). Note the increase in mean AMS symptoms >4000m.

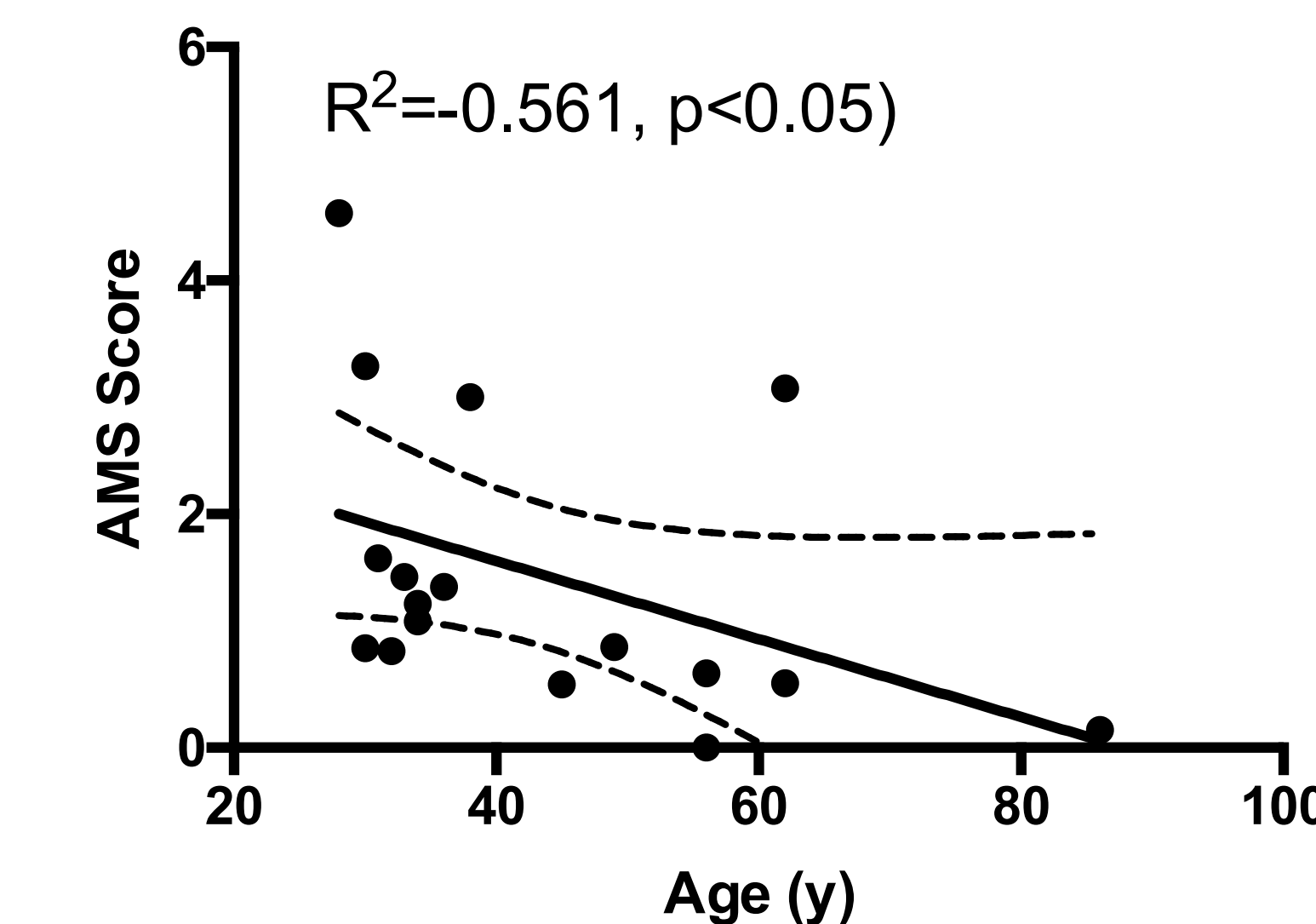


Figure 4: Correlation There was a significant correlation between AMS score and: altitude ($R^2 = 0.520$, $p < 0.0001$), age ($R^2 = -0.561$, $p < 0.05$); such that at higher altitudes and younger age, AMS scores were increased. There were no significant correlations with other trek specifications or baseline characteristics.

CONCLUSION

- 70% of trekkers in the Himalayas will experience AMS and over half of these people will suffer from severe AMS.
- Trekkers who experience AMS will, on average, experience symptoms for over a quarter of their total trek duration.
- Given the dangers of high altitude trekking, pre-departure education and medications for patients, especially those with chronic cardiac or respiratory diseases, may be warranted.
- Moving forward we plan to assess route-specific prevalence of AMS as well as determine how rate of ascent on certain trekking routes influences AMS risk.