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ACUTE MOUNTAIN SICKNESS AMONG THAI TRAVELERS TRAVELLING TO HIGH ALTITUDE AREAS: A PROSPECTIVE STUDY

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Introduction (cont.)

- Acute mountain sickness (AMS) is a group of symptom, including headache , gastrointestinal discomfort, dizziness, difficult sleeping or loss of appetite.
- It typically occurs at above 2,400 meters above sea level.
- Incidence from previous study shown travelers developed AMS about 23-84% depending on altitude and several risk factors(1-6).
- No well-designed prospective study in Thai

1. Murdoch 1995,
2. Vardy, Vardy et al. 2006,
3. Dellasanta, Gaillard et al. 2007,
4. Ren, Fu et al. 2010,
5. McDevitt, McIntosh et al. 2014,
6. Gonggalanzi, Labasangzhu et al. 2016

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JA1 Jo Akkavish, 27/11/2560


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Purposed of the study

Primary objective

- To determine the incidence of AMS among Thai who traveled to high-altitude areas in 2017.

Secondary objective

- To determine risk factors and impact of AMS.

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Methodology

- Prospective cohort study
- Single-centered at Thai Travel Clinic, Hospital for Tropical Diseases, Faculty of Tropical Medicine, Mahidol University

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FlOW OF STUDY

EC approval

Pre-travel consultation

During travel

Post-travel Analysis

- Based on previous incidence ~50%
- Estimated no. travelers ~ 6,200
- **Sample size = 362**
- Received proper recommendation and research protocol
- Participants filled data everyday
- Follow-up for post-travel data

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Inclusion criteria

Inclusion

- Native Thai aged more than 18 years old.
- Plan to travel to high-altitude area and stay at least a night.

Exclusion

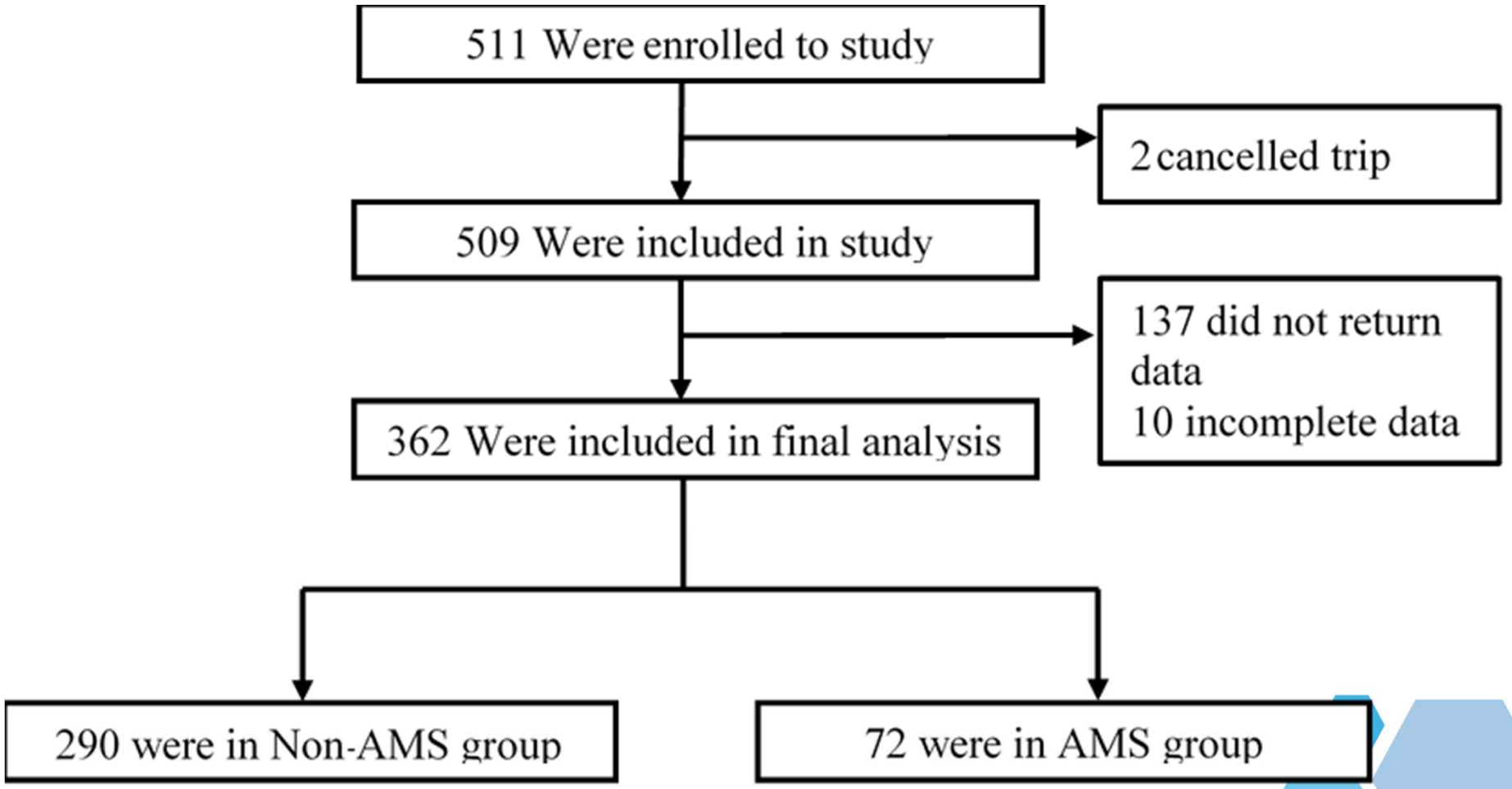
- Have been over 2,500 meters in the 4 weeks preceding this study.

Headache	No headache	**0**	
	Mild headache	**1**	
	Moderate headache	**2**	
	Severe headache, incapacitating	**3**	
Gastrointestinal symptoms	None	**0**	
	Poor appetite or nausea	**1**	
	Moderate nausea &/or vomiting	**2**	
	Severe nausea &/or vomiting	**3**	
Fatigue &/or weakness	Not tired or weak	**0**	
	Mild fatigue/ weakness	**1**	
	Moderate fatigue/ weakness	**2**	
	Severe fatigue/ weakness	**3**	
Dizziness/lightheadedness	Not dizzy	**0**	
	Mild dizziness	**1**	
	Moderate dizziness	**2**	
	Severe dizziness, incapacitating	**3**	
Difficulty sleeping	Slept as well as usual	**0**	
	Did not sleep as well as usual	**1**	
	Woke many times, poor sleep	**2**	
	Could not sleep at all	**3**	
	TOTAL SCORE:		

Assessment of AMS

- Lake Louise Score (LLS)
- Diagnosis of AMS
  - Total score ≥ 5
  - Having headache and at least one additional symptom

1. Roach RCBP HP, Oelz O. The Lake Louise acute mountain sickness scoring system: Pergamon Pr; 1993. 340 p.


511 Were enrolled to study
2 cancelled trip
509 Were included in study
137 did not return data
10 incomplete data
362 Were included in final analysis
290 were in Non-AMS group
72 were in AMS group

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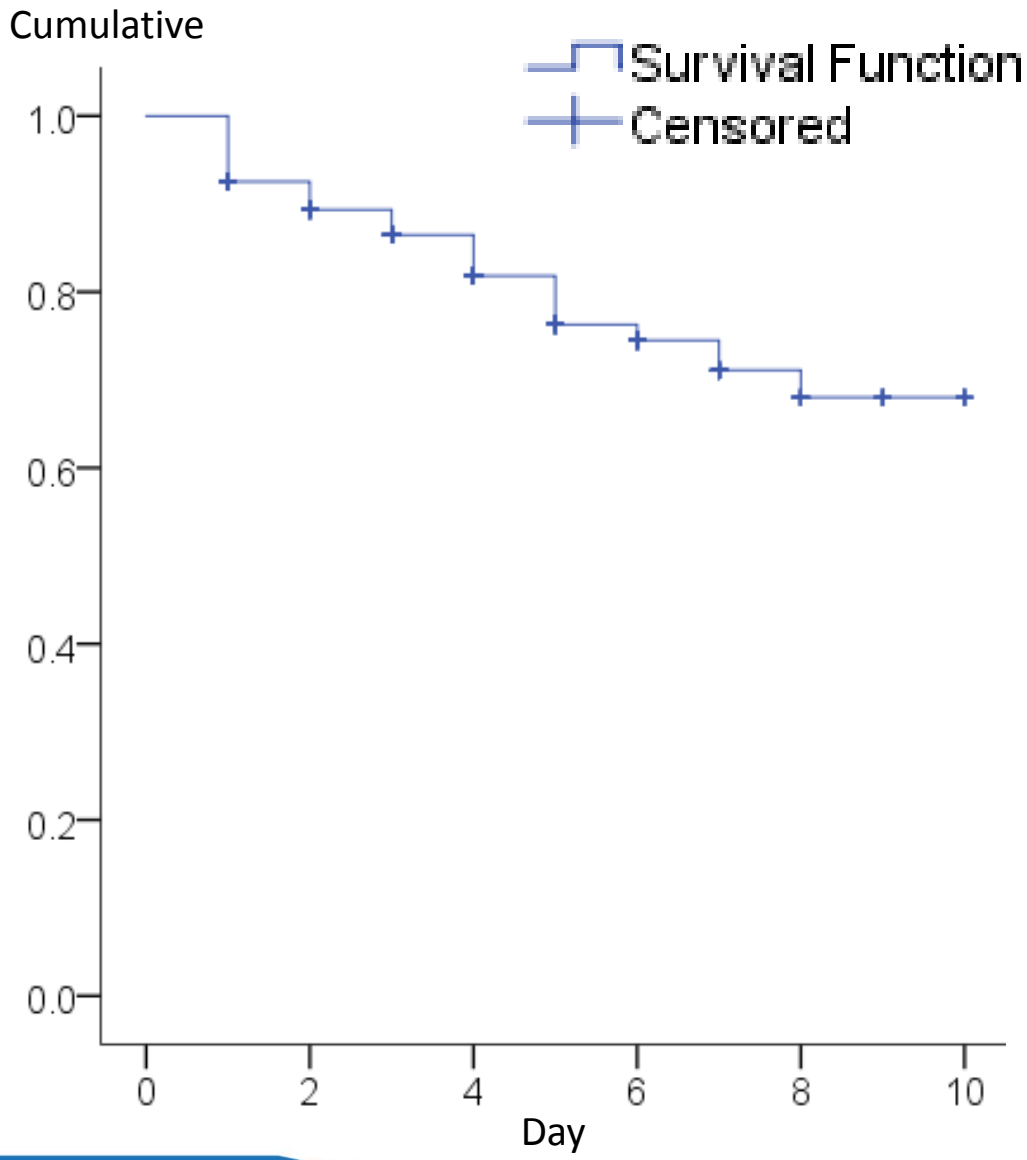
Demographic data

	Total (N=362)	AMS (N=72)	Non-AMS (N=290)	P-value
Female gender	254 (70.20%)	50 (69.44%)	204 (70.34%)	P = 0.88#
Mean age (years)	35.40 ± 9.41	37.68 ± 11.78	34.83 ± 8.67	P = 0.06*
BMI	22.68 ± 3.92	23.34 ± 3.95	22.52 ± 3.90	P = 0.11*
U/D				
• **HT**	16 (4.4%)	3 (4.2%)	13 (4.5%)	P = 0.91#
• **Asthma**	9 (2.5%)	5 (6.9%)	4 (1.4%)	P = 0.01!
• **AR**	35 (9.7%)	5 (6.9%)	30 (10.3%)	P = 0.71!
• **Migraine**	5 (1.4%)	2 (2.8%)	3 (1%)	P = 0.26#
• **Other**	31 (8.6%)	9 (12.5%)	22 (7.6%)	
Smoking status				
• **Never smoke**	337 (93.10%)	63 (87.5%)	274 (94.48%)	
• **Currently smoking**	18 (5.00%)	8 (11.11%)	10 (3.49%)	P = 0.03#
• **Quit smoking**	7 (1.90%)	1 (1.38%)	6 (0.2%)	
AMS Awareness	260 (71.80%)	45 (62.50%)	215 (74.14%)	P = 0.05#
History AMS	118 (32.60%)	21 (29.2%)	97 (33.4%)	P = 0.49#


Ladakh, India
N = 111 (30.70%)
EBC, Nepal
N = 34 (9.40%)
ABC, Nepal
N = 63 (17.40%)
Andes, Peru
N = 33 (9.10%)
Kinabalu, Malaysia
N = 25 (6.90%)
Other
N = 96 (26.50%)
P = 0.70

Cumulative incidence of AMS



Day	N	%
1	27	7.46
2	10	2.76
3	8	2.21
4	11	3.04
5	10	2.76
6	2	0.55
7	2	0.55
8	1	0.28
12	1	0.28
Incidence	72	19.88

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Acetazolamide prophylaxis

Dose	AMS (%)	Non-AMS (%)	P-value
Not taking	41.7	40.3	0.47
Underdosing	1.4	4.8	0.19
Appropriate dosing	56.9	54.83	0.98

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Multivariate analysis of factors relating to AMS

Risk factors	HR	95% CI	P-value
Age > 40 years	1.66	0.98 – 2.80	0.57
BMI ≥ 25	1.01	0.57 – 1.80	0.97
Asthma	3.54	1.27 – 9.92	0.16
Current active smoker	2.81	1.31 – 6.04	0.008
AMS awareness	0.69	0.42 – 1.15	0.15
Taking Diamox (appropriate dose)	0.26	0.03 – 1.90	0.18
Maximum altitude reach >4,200 ABSL	0.76	0.45 – 1.29	0.31
Rapid ascent on first day on high altitude	1.24	0.74 – 2.08	0.42

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Impact

Impact	**No.**	%
No impact	64	88.89
Cancellation	5	6.94
Visiting doctor	2	2.78
Cancellation and visiting doctor	1	1.39

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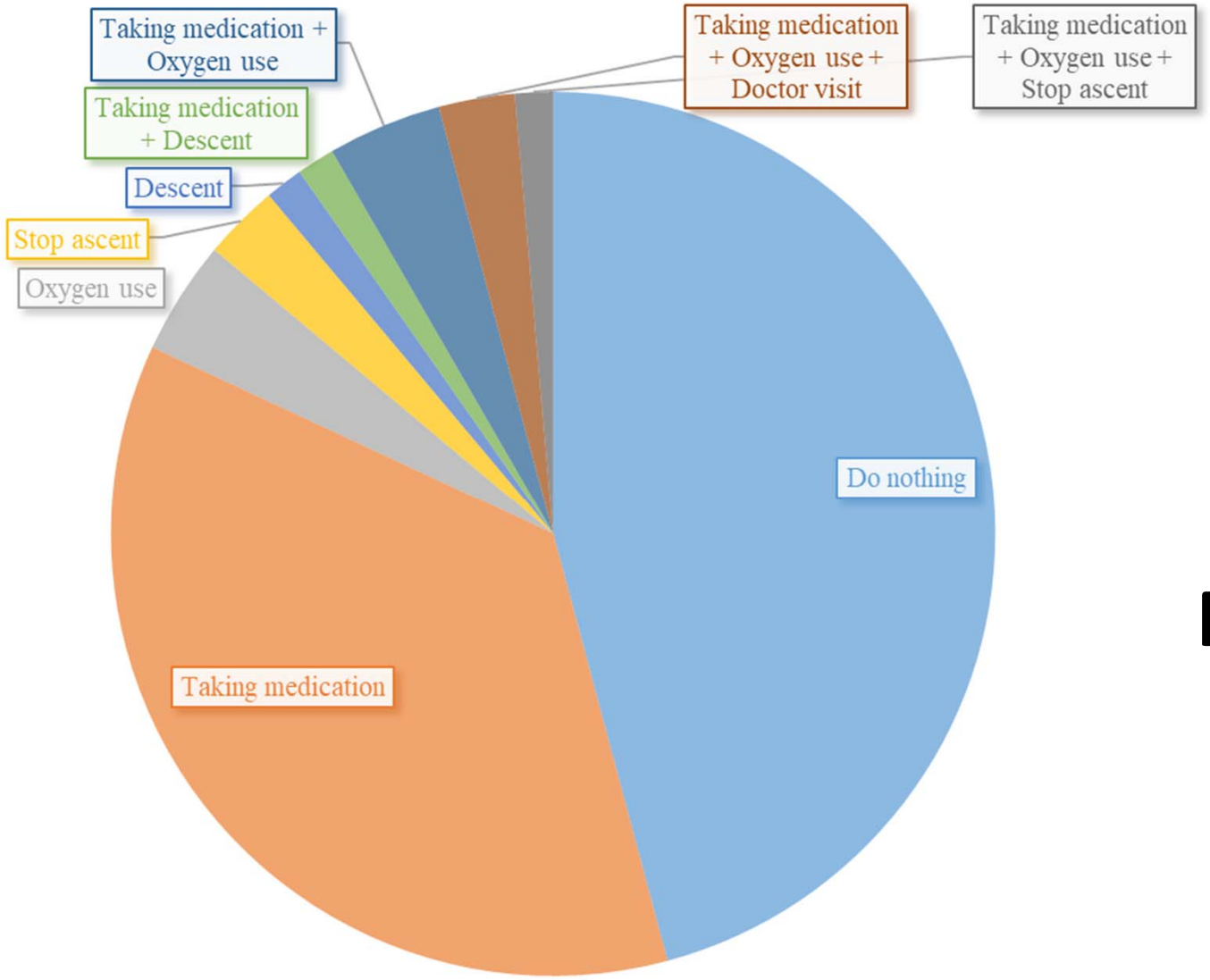

Practice

Conclusion

- Most popular high altitude destinations were Ladakh in northern India, Annapurna base camp and Everest base camp in Nepal.
- Overall incidence of AMS was 19.89%.
- Significant risk factors were pre-existing asthma and active smoking status.
- Acetazolamide was shown to be ineffective for prophylaxis among our overall participants.

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