

High Altitude Medicine/Children

'Altitude illness is common with rapid ascent to above 2500m'

Introduction: 'The High Altitude Medicine Handbook', Pollard & Murdoch

'Children are as likely to get AMS as adults are... Children are more at risk of hypothermia and cold injury'. 'The High Altitude Medicine Handbook', Pollard & Murdoch

'Any child who has recently ascended to altitude and has become unwell must be assumed to be suffering from AMS unless there are clear signs of an alternative diagnosis'. Ch 28: 'High Altitude Medicine & Physiology', Ward, Milledge & West, 3rd Edition, 2000.

'The mainstay of treatment is descent'. Clinical Review 'Altitude Illness', British Medical Journal Vol 326, 26 April 2003.

I have tried to summarise (in note form) the current state of play in the field of high altitude medicine and physiology with regard to children. I come on to the specific question of racing on a high glacier at the end. Surprisingly, the literature is actually very limited.

Acclimatisation begins to occur at altitudes 1500m+

Takes place over the first 1-3 days at a given altitude. Features:

- Improved sleep
- Absence of altitude illness

Acute Mountain Sickness (AMS)

- Incidence in teenagers and children seems to be roughly same as for adults (7-8% at 2600-3000m, and 35% at 4500m).
- 9% at 2850m, 13% at 3050m, 34% at 3650m, 53% at 4559m (climbers in the Swiss Alps).
- Tourists flying in to 3800m (Hotel Everest View in Nepal) – 84% suffer from AMS.

Non-specific symptoms may be difficult to recognise in the young - > diagnostic delay. Typically comes on within 6-12 hours of rapid ascent.

Risk factors

- Altitude gained
- Rate of ascent
- Individual susceptibility
- Altitude at which the traveller sleeps
- Level of exertion*

**Seems that exertion may be a risk factor; lack of physical fitness is not.*

Symptoms

- Headache
- Nausea
- Fatigue
- Anorexia
- Dizziness
- Sleep disturbance

Prevention – ascend slowly

Treatment – rest, descent, then oxygen, medication, etc.

Remember – it is the mild end of the spectrum of altitude illness, and may progress to more serious problems if does not resolve/do not descend.

High Altitude Cerebral Oedema (HACE)

Must have a high index of suspicion. Early features are:

- Headache
- Nausea

High Altitude Pulmonary Oedema (HAPE)

NB Pre-existing respiratory infection predisposes to HAPE in children, as in adults.

Features:

- Dyspnoea
- Fatigue
- Reduced exercise tolerance
- Cough

Cold

- Major problem on a glacier in winter

Ultraviolet

Immune Response Depression

- Note that there is decreased immunity against infection at altitude.

Racing & Training at altitude

Special circumstances on Stubai Glacier Jan 2003:

- Daily travel from altitudes as low as 500m (by the River Inn) up to 3000m+ at the start of the race
- Cold – a very significant risk here
- Exertion at high altitude

Acclimatisation cannot take place whilst exposure to high altitude is intermittent. But – the fact that everyone was staying at a much lower altitude meant that symptoms of AMS were unlikely to occur because they take some time (a few hours) to develop, so the daily travelling (whilst tiring and tedious) was actually beneficial in terms of the descent to lower altitude for sleeping.

There is actually very little literature available in the field of children/altitude, and I could not find anything specific relating to the sort of yo-yoing that was going on. Only the anecdotal comments from ski instructors who believe it is not good to take kids up and down the hill too much too often.

I contacted **Dr. Andy Pollard**, one of the world's leading authorities, author of two of the definitive works on high altitude medicine and physiology, and Co-Chairman of the '**International Consensus Statement on Children at High Altitude**' – the definitive guide to this subject published in March 2001 in the Journal of High Altitude Medicine & Biology - download from http://www.ismmed.org/ISMM_Children_at_Altitude.htm

Dr Pollard's reply:

There is no more data to help on this other than that summarised in the consensus statement that you have already looked at. Yo-yo-ing per se is not a problem I think at these altitudes but the length of the exposure might be..... However, presumably much of the 6-8 hours is spent descending below 3100m and the daily activity is not really an 8 hour daily exposure at 3100m which would probably lead to symptoms in some. I guess that most of the children are experiencing repeated brief exposures at the start of a run after getting up to 3100m on the ski lift.

- The cold and the fatigue were probably therefore the most significant risk factors here, and both would have taken their toll on performance.
- As far as the altitude itself goes, it is clear that if you have to take them up that high, get them back down again as quickly as possible, and certainly make sure they sleep at low altitude.
- A full day at the top of the race (think of the poor start referee) just might lead to problems of AMS in some!
- The importance of resting on first exposure to high altitude is emphasised.
- Any exertion over 3000m should be regarded as extreme.

Jenny Shute, July 2004

