A high-altitude mountain landscape with a large, snow-covered peak and a group of people on a snowy slope. The sky is blue with some clouds. The mountain is covered in snow and has some dark rocks visible. A group of people is gathered on a snowy slope, some are standing and some are sitting. There are some gear and supplies scattered around them. The overall scene is a high-altitude mountain environment.

the
ACUTE
MOUNTAIN
SICKNESS
manual



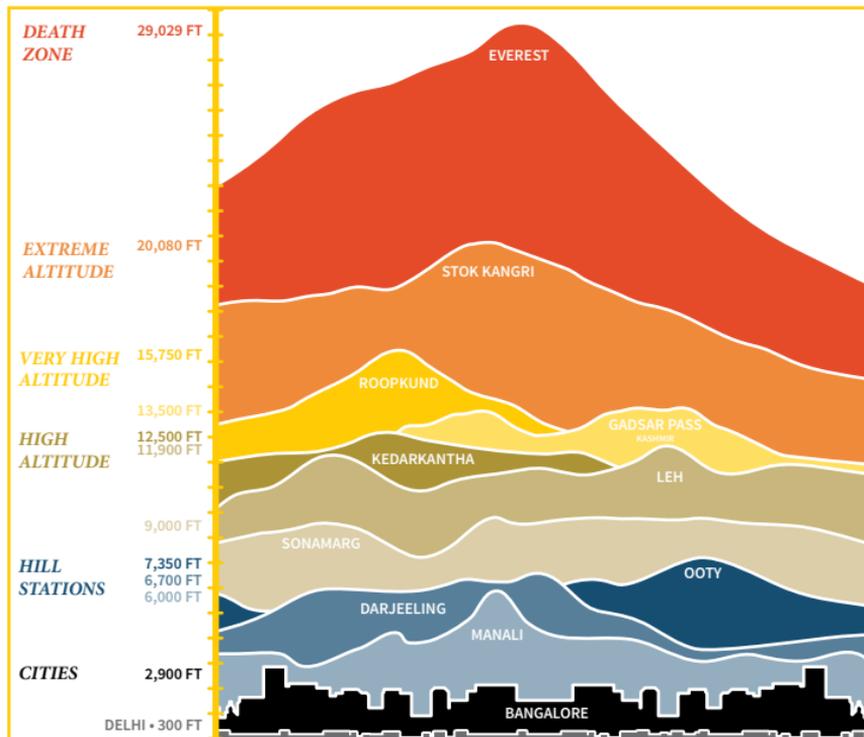
AMS (Acute Mountain Sickness) at high altitude is common. It is your body's way of telling you that it is not able to adapt to the lesser oxygen it is getting. Depending on the altitude gained and speed of ascent, incidence of AMS ranges from 20% to 80%. People often blame cold, heat, infection, migraine, indigestion etc for their AMS symptoms and carry on. Continuing to ascend with AMS is dangerous and has led to many deaths.

WHAT IS HIGH ALTITUDE?

As you go higher the air pressure gets lower (the air gets “thinner”), and this means for any single breath that you take there will be less oxygen for your body. Oxygen is needed to give you the energy to move, but is also needed simply to keep your body alive.

As your body gets less oxygen it adapts. You breathe faster and deeper. It makes more red cells to carry more oxygen in the blood. Changes take time to happen. If you go slowly you should stay healthy. Go up too fast and you risk suffering from altitude-related illnesses, such as Acute Mountain Sickness (AMS).

Altitude starts to have an effect around 7,500 ft. Go up too fast above this and altitude illnesses are common. Given enough time to adapt, most people can adjust to altitudes even between 16,000 and 18,000 ft. Above 18,000 ft, few people can adjust anymore.



ACCLIMATISATION

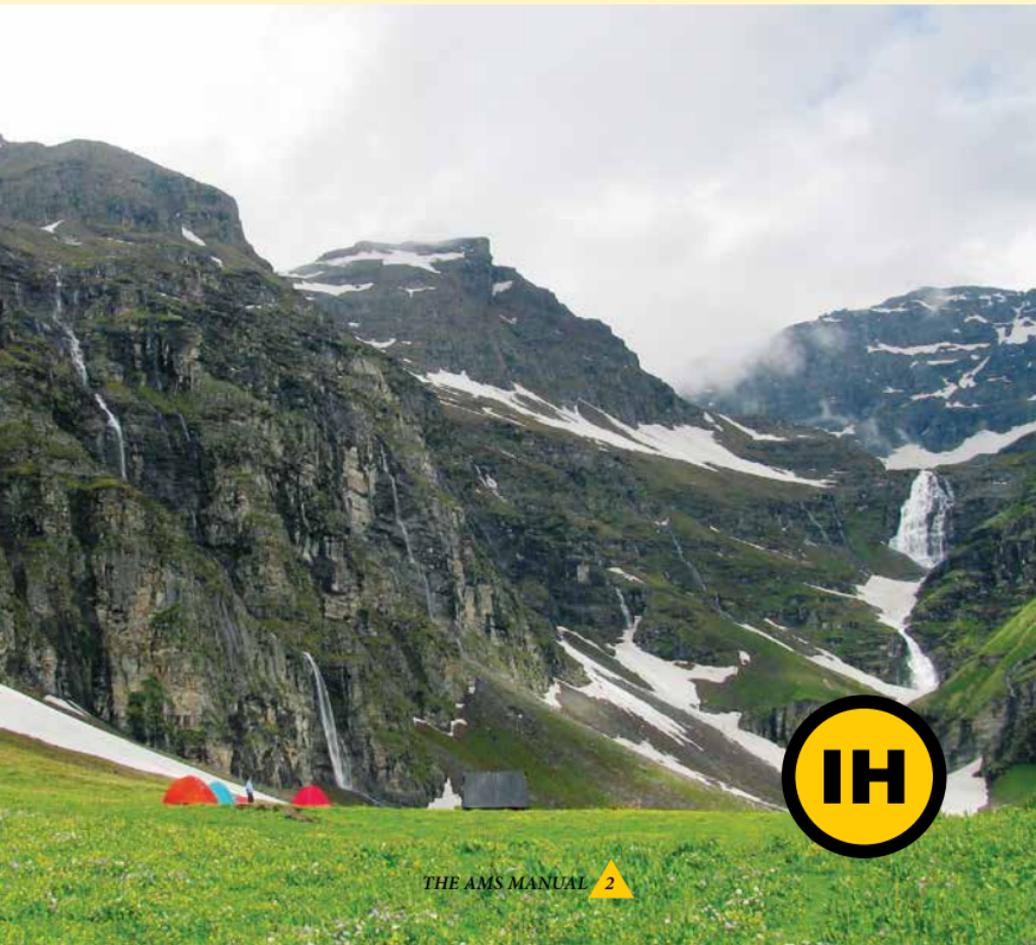
When the body slowly adapts to lower oxygen levels the process is called acclimatisation. Different people acclimatise at different speeds, so no rule works for everyone, but there are good guidelines.

The general guideline is over 10,000 ft go up slowly, sleeping no more than 1,000 ft higher at the end of each day. Going higher during the day is ok as long as you go down to sleep (“walk high – sleep low”).

This rule is hard to follow in the Indian Himalayan ranges as they tend to climb very rapidly. It can be impossible to get a place to camp after an 1,000 ft ascent. Trekkers invariably end up climbing 2,000–3,000 ft. **These are called forced ascents.**

Acetazolamide (trade name Diamox) helps in speeding up acclimatisation. **It is useful where forced ascents are unavoidable.** It does not mask the symptoms of AMS. You can still get AMS, HAPE and HACE while taking it.

Being honest about how you feel each day can make a difference and knowing what’s happening to you could save your life.



ACUTE MOUNTAIN SICKNESS (AMS)

The common symptoms of AMS are listed here. AMS can hit with all, many or even just one of these symptoms.

HEADACHE (Can be mild to severe): Headache at an altitude is not okay or normal. Do the triple one test to rule out dehydration: take one Disprin with one litre of water and wait for an hour. The headache must disappear totally and completely. If headache persists (even mild) after the triple one test you have AMS.

FATIGUE (feeling tired or lethargic): Everyone feels tired after 5-6 hours of trekking. But after an hours rest and food you must regain energy. If you continue to be fatigued after food and rest, suspect AMS. Fatigue may not be accompanied by headache. Fatigue after rest is an often overlooked sign of AMS.

NAUSEA (feeling sick): A sick feeling in the stomach mostly points to AMS. Do not attribute nausea to indigestion of food at an earlier camp or an earlier bad stomach.

POOR APPETITE: A loss of appetite is common in the mountains. On treks people tend to eat less. If you notice a total loss of interest in eating it shows signs of AMS. Wait for a few hours for the appetite to come back (not hunger). If it hasn't then suspect AMS. Take precautionary steps. Poor appetite may not be accompanied by feelings of nausea, fatigue or headache.

VOMITING: When people vomit in the mountains it is almost a sure sign of AMS. Vomiting in the mountains is not normal. Vomiting must not be attributed to indigestion or fatigue.

DIZZINESS: Feeling light headed shows lower oxygen levels in the blood. Dizziness is a very common symptom of AMS, take steps immediately.

SLEEP DISTURBANCE: Poor sleep in the mountains is common. Getting up frequently is normal, too. However, consistent poor sleep over a number of days could point to AMS.

At an altitude above 10,000 ft, trekkers often complain of lack of appetite, headache, uneasiness or just fatigue. None of these are to be taken as normal. At an altitude, attribute any degradation in health to altitude sickness first.

Past experience of having been in altitudes is not a sign of immunity from altitude sickness. In actuality, anyone can get AMS, even experienced trekkers.

AMS PREVENTION

Acetazolamide (Diamox) is the best drug for altitude sickness prevention and treatment. For prevention, 250mg twice daily starting one or two days before and continuing for three days once the highest altitude is reached, is effective. **Caution:** Smoking and drinking make symptoms of AMS worse.

AMS conditions improve after rest and a dose of diamox for those not allergic to sulphur. Most importantly, are the symptoms getting better or worse? If you think you are getting worse – go down at least 3,000 ft. Don't leave this decision until it's too late. Never go higher with even the slightest symptoms of AMS. It only becomes worse.

HIGH ALTITUDE CEREBRAL OEDEMA (HACE)

The brain is affected by altitude because it needs a good supply of oxygen and may swell causing pressure. **High Altitude Cerebral Oedema (HACE)** is caused by brain swelling and can kill very quickly if not treated. Some people feel no effects.

THE COMMON SYMPTOMS OF HACE ARE:

- ▲ Severe headache which is not relieved by ibuprofen, aspirin or paracetamol.
- ▲ Clumsiness.
- ▲ Acting differently – being unhelpful, violent, or lazy.
- ▲ Possible bad, non-stop vomiting.
- ▲ Blurred vision.
- ▲ Seeing, hearing, feeling, or smelling odd things.
- ▲ Confusion.
- ▲ Reduced consciousness.

WHAT TO CHECK FOR:

- ▲ Touch nose with index finger with eyes closed? Repeat rapidly.
- ▲ Walk heel to toe in a straight line?
- ▲ Stand upright, with eyes shut and arms folded?
- ▲ Do simple mental maths?

If not able to do or have difficulty doing any of the above, suspect HACE. HACE can develop very quickly with no other problems or can follow AMS and HAPE.



WHAT TO DO:

- ▲ Stay with the person at all times – do not leave them on their own.
- ▲ Descend now – not later or in the morning. Descend at least 1,000m /3,280 ft. Descend at night or in bad weather if necessary. Carry the patient if possible, as exertion can make the patient worse.
- ▲ Sit the person upright and keep them warm.
- ▲ Give oxygen 2 to 4 l/min or higher.
- ▲ Give 8 mg of dexamethasone followed by 4 mg dexamethasone every 6 hours. Dexamethasone takes several hours to work, quicker if given by IM (injection). Stop it once below 8,200 ft and after at least 3 days of treatment by tailing off the dose slowly. Last 3 doses 12 hourly.
- ▲ Give acetazolamide 250 mg 8 to 12 hourly.
- ▲ If really unable to descend, prolonged use of a pressure bag may be needed.

CONSEQUENCES IF IGNORED:

- ▲ Loss of consciousness – confusion, drowsiness.
- ▲ Reduced breathing.
- ▲ Death.

In serious cases, death can occur within as little as an hour of symptoms being noticed.

Remember it is possible to have AMS, HACE and HAPE at the same time. DESCEND, DESCEND, DESCEND.

HIGH ALTITUDE PULMONARY OEDEMA (HAPE)

Occasionally, more serious problems can occur with breathing. Fluid may collect in the lungs causing a problem known as **High Altitude Pulmonary Oedema (HAPE)**. It may appear on its own without any preceding symptoms of AMS (This happens in 50% cases). People who have had HAPE are likely to get it again, often at the same altitude. This is a serious (potentially life-threatening) condition and should not be ignored.

THE COMMON SYMPTOMS OF HAPE ARE:

- ▲ Reduction in physical performance (severe fatigue, tiredness) and dry cough are the earliest signs that HAPE is developing.
- ▲ Breathlessness – in early stages, this may mean just taking a little longer to get one's breath back when resting after mild exertion. Or breathlessness can occur while at rest.
- ▲ Coughing.
- ▲ Froth and later blood in spit.
- ▲ Lips, tongue, nails become blue.
- ▲ Drowsiness, difficulty waking up, coma, death.

HAPE can develop in 1-2 hours or over several days and even when descending. HAPE can occur even if there are no typical symptoms of AMS.

WHAT TO CHECK FOR:

- ▲ Has there been recent ascent?
- ▲ Does it take a long time to get breath back after exercise?
- ▲ Are they breathless when resting?
- ▲ Is the breathing rate increasing?
- ▲ Can "wet" / crackling sound be heard in chest? Put ear to back below shoulder blades.

WHAT TO DO:

- ▲ Stay with the person at all times – do not leave them on their own.
- ▲ Descend now – not later or in the morning.
- ▲ Sit upright and keep warm.
- ▲ Give oxygen at the rate of 4 to 6 l/min till recovering. Later 2 to 4 l/min.
- ▲ Give nifedipine. Modified release version of the tablet 20 mg 12 hourly for 2-3 days. This brings down blood pressure.
- ▲ Give acetazolamide 250 mg 8 to 12 hourly.
- ▲ An asthma reliever spray may help.
- ▲ If really unable to descend – prolonged use of a pressure bag may be needed.

CONSEQUENCE IF IGNORED:

- ▲ Breathing stops. DEATH.

In serious cases death can occur within as little as an hour of symptoms being noticed. Remember, it is possible to have AMS, HACE and HAPE at the same time.

DESCEND, DESCEND, DESCEND.

FACTS ON HACE AND HAPE

Here are a few quick facts about HACE AND HAPE:

- ▲ HACE and HAPE occur in approximately 1% to 2% of people going to high altitude.
- ▲ HACE and HAPE can occur together or alone.
- ▲ HAPE is roughly twice as common as HACE.
- ▲ HAPE may appear without any preceding symptoms of AMS.
- ▲ HAPE is more likely in people with colds and chest infections.
- ▲ HAPE often comes on after the second night at high altitude.
- ▲ HACE usually develops after symptoms of AMS and gets rapidly worse during the night.



EFFECTS OF ALTITUDE ON THE HEART / BLOOD

Traveling to altitude can have several effects on your heart. The lower oxygen in the air and exercise you are doing can make your heart beat faster. This is not normally a problem, but if you have a heart condition (eg: angina) it can put extra strain on your heart. Your blood pressure may go up at altitude.

One of the effects of altitude is for you to produce more red blood cells (so you can carry more oxygen). This can sometimes lead to the blood thickening, making the circulation sluggish. With this in mind, you should make sure you drink plenty.

If you have a known heart problem you should talk to your doctor to make sure that what you are planning is not going to put undue strain on your heart. If you are healthy then travel to altitude will not put any more strain on your heart than rigorous exercise at sea level.

PROTECT YOUR HEART:

- ▲ Walk slowly, don't race.
- ▲ Take plenty of rests.
- ▲ Drink plenty of fluids.
- ▲ If you have any problems, stay at that altitude, don't go higher.
- ▲ If problems persist then descend.

EFFECTS OF ALTITUDE ON THE KIDNEYS / BLADDER

As you acclimatise, your body will naturally make more urine. This is a good sign but may mean you need to pee more during the day and night.

Exercise in the dry air and heat of altitude can cause dehydration, which can be made worse by traveller's diarrhoea. Thirst, headache and tiredness are often signs of dehydration. These can be prevented by drinking several litres of safe fluid per day. Peeing at least four times a day with a good volume of clear urine shows that enough fluid is going in at the top end.

PROTECT YOUR KIDNEYS / BLADDER:

- ▲ Stay hydrated.
- ▲ Stay hydrated!
- ▲ Stay hydrated!

This manual has been compiled by **Indiahikes** with input from www.altitude.org and www.treksafe.com.au



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