

# Altitude Sickness: An Integrated Perspective

Ronda Wimmer, PhD, MS, LAc, ATC, CSCS, CSMS, SPS

Skiing, snowboarding, mountain climbing and snow-mountain biking season is at its peak during the winter holidays for athletes and tourists alike. When a person travels from sea level to 7,000 feet and immediately goes running, skiing, snowboarding, climbing or mountain biking, he/she has the potential to develop early symptoms of altitude sickness. This condition is insidious and can affect some athletes at altitudes low as 5,000 feet. Many athletes are familiar with the effects of flying, but this condition also can happen in a car or on skis. Quickly climbing to 10,000 feet, one can develop headaches and sleeping problems; the first signs of altitude sickness.

To give you a reference point, mountain peaks in the United States range from 8,000 feet to 14,000 feet. Extreme hikers/trekkers tackle the Swiss Alps or mountains in Nepal at a range of 12,000 feet to 15,000 feet. Extreme mountain climbers achieve climbs beyond 15,000 feet, such as Mt. McKinley in Alaska and Mt. Everest at 29,028 feet - the highest peak in the world.

## Causes of Altitude Sickness: Western Perspective

The direct cause is thin air, or a decreased amount of available oxygen. The air at sea level is compressed by the weight of all the air above it. As an individual travels from sea level and increases in altitude, the air pressure drops, and the air's density decreases. If an individual reaches 18,000 feet, the molecules are so spread out that he or she is inhaling 50% less oxygen compared to sea level.

The physiological effects include the lungs taking in less oxygen. Thus, less oxygen is available to transfer into the blood, tissues and organs. In serious conditions the body develops a form of hypoxia, or lack of oxygen, which can prove fatal.

The body counterbalances oxygen starvation by increasing heart and respiratory rates, causing more blood to be pumped through the body. Chemical changes in the blood allow more oxygen to be released into the body tissues. One of the drawbacks is that some cells tend to accumulate fluids (especially those in the hands, feet and face). More serious fluid retention is associated in the lung spaces, where the gas exchange of carbon dioxide for oxygen takes place. This is called high-altitude pulmonary edema, which develops within the first two-to-four days of rapid climbing or ascents over 8,000 feet. Another more serious condition is brain swelling, or high-altitude cerebral edema. Both are life-threatening complications of altitude sickness.

## Causes of Altitude Sickness: Eastern Perspective

The three patterns are affected as *qi*, blood and body fluids according to traditional Chinese medicine. First, the spleen *qi* becomes deficient, while the blood is also deficient. The progression of deficient *qi* will affect other organs as the stomach, heart and lungs become deficient. The spleen's function of transportation and transformation diminishes and creates accumulations internally, as well as externally contracted wind edema yin or yang, depending upon the pre-existing conditions individually present. If this problem is not counterbalanced, the kidney yang is

unable to support the spleen yang. Ultimately, they are unable to support one another. This is severe internal cold, which progresses to yang collapse with liver and heart blood deficiency. In extreme cases, liver blood deficiency progresses to internal wind.

## Symptoms

Altitude sickness develops from "mild" to "acute" stages. Mild symptoms can develop within hours by performing a rapid unacclimatized climb, or may show up within a few of days after starting.

### Key symptoms:

- Fatigue
- Headache
- Nausea
- Loss of appetite
- Insomnia
- Bizarre dreams
- Frequent waking
- Shortness of breath
- Heavy/light breathing cycles
- Difficulty breathing
- Decreased ability to exercise or perform work
- Mental sluggishness
- Forgetfulness
- Apathy

As the oxygen levels continue to drop, the condition worsens and one experiences a rapid decline of mental/physical abilities, becoming progressively clumsy, lethargic and confused. The individual may start to hallucinate and have breathing difficulties, including coughing and gurgling sounds in the chest. The subject's vision blurs, and the skin starts to turn blue. The acute stage leads to unconsciousness, coma and even death.

## Adjusting to the Altitude

There are key steps to remember whenever venturing above 5,000 feet.

1. Allow time for your body to acclimatize
  - a. Rest a day or two before activity
  - b. Climb slowly - it is the speed at which a person ascends that creates health risks
    - i. Two to four days after 8,000 feet
    - ii. Then rest one day for every two days of climbing
  - c. If above 10,000 feet, travel back down 1,000 or 2,000 feet to sleep (dramatic benefits the first day)
2. Recognize early warning signs/symptoms
  - a. Especially if above 7,000 to 8,000 feet
3. If condition worsens, descend to a lower altitude
  - a. After three to four days, if the person is not feeling better, descend immediately to between 2,000 to 5,000 feet.

Mild forms of altitude sickness appear as headaches and/or insomnia, and are frequently harmless and short-lived. Once you have arrived at a particular altitude, it takes about two-to-four days for the body to acclimatize to the thinner air, and the symptoms will disappear. Of course, descending below 5,000 feet will take care of the symptoms, along with tonifying the *qi* and blood for quick recovery.

Prevention through education means being aware and remembering there is no substitute for common sense. However, there are complementary methods that can possibly prevent or speed up the body's ability to acclimatize to the altitude recovery and prevention.

#### Eat healthfully

- Two days before the climb, consume high amounts of complex carbohydrates to prevent spleen *qi* deficiency.
- Eat a complex carbohydrate diet the entire trip to support the spleen *qi* and damp.
- Eat frequent small meals rather than large meals to prevent spleen *qi* deficiency and damp accumulation.
- High amounts of green leafy vegetables and other chlorophyll-rich foods (wheat grass, barley grass) increase hemoglobin levels and carry oxygen from lungs to tissues. This helps prevent heart, lung and spleen *qi* deficiency, and damp accumulation aggravating any *qi* stagnation present.

#### Drink plenty of fluids

- Sipping small amounts every 15 minutes prevents fluid consumption leading to potential yin deficiency.

#### Take vitamins on a regular basis and increase certain vitamins beforehand

- A multivitamin should be taken on a regular basis, supporting nutritive *qi*.
- Increase vitamin C intake.
- Increase vitamin E intake.
- Take co-enzyme Q10 (CoQ10).
- Take antioxidants and vitamins in liquid form on the trip to prevent *qi* deficiency and potential *qi* stagnation.

Studies have indicated that these vitamins and enzymes taken before and during a climb improve the body's ability to remove free radicals, as exercising increases free radical activity. Vitamins C and E are strong antioxidants. CoQ10 increases the body's cellular ability to use oxygen, aids in supporting the spleen/stomach *qi*, and prevents potential liver *qi* stagnation.

#### Increase amounts of tyrosine

- Tyrosine is an amino acid considered unessential because it is manufactured by the body. The importance of this particular amino acid is its role in metabolism, and its support of proper nervous system functioning. It aids in supporting the spleen and liver *qi*.
- Take three times daily before meals, and gradually increase during the trip if above 10,000 feet, to prevent altitude- and exercise-induced deficiencies and stagnations.

#### Stop every four to six minutes taking 10-12 deep breaths

- This helps maintain optimal levels of oxygen in the body, and supports the lung, spleen and heart *qi*.

#### Avoid alcohol

- It dehydrates the body, contributes to altitude sickness, and creates spleen *qi* deficiency, accumulation of damp, liver *qi* stagnation and yin deficiency, among others things.

#### Participate in mild exercise while waiting to get acclimatized to altitude

- Walking at a slow pace is extremely beneficial for speeding up the acclimatization process. It prevents blood and *qi* stagnation and sudden deficiencies.

Counterbalance *qi* and blood deficiencies beforehand with acupuncture and herbal formulas.

- Tonify spleen, stomach, heart, lung and kidney beforehand, and gradually increase the frequency above 10,000 feet.
- If the individual tends to be yang deficient, tonify yang beforehand, and continue the entire trip.

In conclusion, altitude sickness can be prevented by being aware and educated about altitude differences and how the body responds physiologically (Western) and energetically (Eastern). If an individual does get altitude sickness, steps can be taken *synergistically* that can provide a speedy recovery without spoiling the fun. For those of you who are snowbirds, be safe and play smart!

Acupuncture Points Used to Treat This Condition	Traditional Base Formulas
Spleen Qi Deficiency -- R4, R12, ST28, ST36 moxa/tonify SJ6, SP6, SP9 (damp accumulation) sedate	Six Gentleman ( <i>liu jun zi tang</i> ) Six Gentleman with aucklandia ( <i>xiang sha liu jun zi tang</i> )
Alternate -- D4, D6, UB20, UB22, UB23, UB29 moxa/tonify; LI10, SP6 sedate	
LG Qi Deficiency -- LG5, LG7 tonify	Tonify Lung Decoction ( <i>bu fei tang</i> ) or Restore the Spleen Decoction ( <i>gui pi tang</i> )
HT Qi Deficiency -- HT7 tonify	Eight Treasures Decoction ( <i>ba zhen tang</i> )
SP Yang Deficiency -- Add points LI10, SP6 sedate	Tonify the Middle and Augment the Qi Decoction ( <i>bu zhong yi qi tang</i> )
K Yang Deficiency -- Add points K1, K2 moxa	Kidney Qi Pills ( <i>jin gui shen qi wan</i> )

### References

1. Xinnong, Cheng (chief editor). *Chinese Acupuncture and Moxibustion*. Beijing: Foreign Languages Press, 1990.
2. Maciocca, Giovanni. *Foundations of Chinese Medicine*. New York: Churchill Livingstone, 1989.
3. Kaptchuk, Ted. *The Web That Has No Weaver*. Ontario: Congdon & Weed, 1983.
4. Wiseman, Nigel; Ellis, Andrew. *Fundamentals of Chinese Medicine*. Brookline: Paradigm, 1985.
5. Mao-Liang, Qiu. *Chinese Acupuncture and Moxibustion*. New York: Churchill Livingstone, 1993.
6. Ross, Jeremy. *Acupuncture Point Combinations*. New York: Churchill Livingstone, 1995.
7. Bensky D, Barolet R. *Chinese Herbal Medicine: Formulas & Strategies*. Seattle: Eastland Press, 1990.
8. Yeung, Hin-che. *Handbook of Chinese Herbal Formulas: Chinese Materia Medica*. Rosemead: Institute of Chinese Medicine, 1996.

JULY 2003