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Women Going to Altitude

Intended for Physicians, Interested Non-medical
Persons and Trekking or Expedition Operators

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1 Introduction

This paper focuses women specific topics of altitude sojourns and reflects the official standard recommendation of UIAA MedCom, which is based on current literature.

2 Non pregnant women

2.1 AMS

- There is no difference between men and women in the incidence of AMS.
- The incidence of HAPE is lower in women than in men [1].
- The incidence of peripheral oedema is higher in women than in men [2].
- There is no reported difference between men and women in the incidence of HACE.
- Although progesterone increases hypoxic ventilatory response at sea level, there are no data that indicate a correlation between acclimatization to high altitude (HA) and menstrual cycle phases.

2.2 Menses and peri-menopausal hypermenorrhoea

- Menses can be modified by HA: menstruation can be blocked up, longer, shorter, or irregular. Amongst other causes, and probably more important than altitude, it can be influenced by jet lag, exercise, cold, and weight loss.
- To avoid or significantly reduce bleeding, OCPs or progesterone (pills, medroxyprogesterone injections, or intrauterine device with hormone release (IUD)) can be taken continuously for several months (but spotting may occur during the first 3 months).

2.3 Oral Contraception

- There is no proven advantage or disadvantage for altitude acclimatization when using oral contraceptives (OCPs).
- The theoretical risk of oral contraceptives (except for progesterone alone) is thrombosis during long stays at HA, in combination with polycythemia, dehydration and cold. Actually very few accidents have been reported. The risk is lower with the second-generation OCPs (versus first- or third-generation), which are recommended as a first choice at HA, but with these low-dosage pills 2 risks should be known:
 - It may be difficult to respect the exact time of administration during an expedition, compromising contraceptive efficiency.
 - The efficiency may also be compromised during and 7 days after the use of some antibiotics, especially broad-spectrum penicillins and tetracyclines.

2.4 Iron

- Latent iron deficiency can impede acclimatization at very high altitudes. Ferritin dosage can be useful before expedition for supplementation if indicated.

3 Pregnant women

3.1 Risk of travelling in remote and exotic countries

- To be far from medical/obstetrical assistance if needed.
- Infectious diseases can be more severe during pregnancy: especially diarrhoea, malaria, hepatitis E.
- Some drugs useful for prophylaxis or treatment are contra-indicated during pregnancy: most antimalarials, quinolones, sulphonamide, and others.

3.2 Risk of hypoxia

Most studies concern women living permanently at HA. For pregnant women living normally at low altitude, very few studies have been made during acute exposure (hours) at moderate altitude, with or without exercise, and there is no known study conducted during prolonged exposure (days to weeks). So most of the recommendations can only be based on extrapolations.

3.2.1 Physiological responses to altitude exposure:

Immediate increase of maternal ventilation and cardiac output (with increase of uterine artery and placental blood flow) preserves, at best, oxygen delivery to the fetus.

- AMS incidence is not different during pregnancy [3]. The use of acetazolamide is contra-indicated during the first trimester (risk of teratogenicity) and after 36 weeks of pregnancy (risk of severe neonatal jaundice).
- Adequate hydration is recommended because of hyperventilation (altitude + pregnancy) as the dry environment encountered at altitude will increase hydration needs..

3.2.2 First half of pregnancy:

- The risk of altitude exposure is low.
- Higher incidence of spontaneous abortion in the first trimester is suspected but not proved.
- Recommendation:
 - Those women who experience difficulties with becoming pregnant/or are at higher risk of spontaneous abortion should avoid high altitude.

3.2.3 Second half of pregnancy

- Potential high risk for mother and fetus, depending on individual factors, altitude level and exercise.

- Short stays without exercise (a few hours to a few days)
 - Obviously very low risk for healthy pregnancy up to 2500 m, but no data available.
 - Altitude is not recommended for women with risk factors (see below), even for short stays.
- Long stays without exercise (weeks to months), above 2500 m
 - Mother: higher incidence of hypertension, preeclampsia, placental abruption [4].
 - Fetus: intra-uterine growth retardation during 3rd trimester and low birth weight [5].
 - Recommendation: attentive clinical and echo-doppler supervision after 20 weeks of pregnancy.
- Exercise: competition for blood supply between skeletal muscles and placenta.
 - Risk of foetal hypoxia or preterm labour [6].
 - Recommendations:
 - Allow 3-4 days acclimatization before exercise above 2500 m.
 - Wait for full acclimatization (2 weeks) before strenuous exercise and avoid heavy exertion at higher altitudes.

3.2.4 Contra-indications to altitude in pregnancy (after 20 weeks) [7]

- Chronic or pregnancy-induced hypertension.
- Impaired placental function (ultrasound diagnosis).
- Intra-uterine growth retardation.
- Maternal heart or lung disease.
- Anaemia.
- Smoking combined with exercise is a high risk factor and could be a contra-indication.

3.2.5 Risk of trauma

Beware of changes in centre of gravity and joint laxity during pregnancy, predisposing to falls and trauma, with potential risk of placental disruption (e.g. during skiing). Take care that the climbing harness fits properly.

4 References

1. Hultgren, H.N., et al., High-altitude pulmonary edema at a ski resort. *West J Med*, 1996. 164(3): p. 222-7.
2. Hackett, P.H. and D. Rennie, Rales, peripheral edema, retinal hemorrhage and acute mountain sickness. *Am J Med*, 1979. 67(2): p. 214-8.
3. Niermeyer, S., The pregnant altitude visitor. *Adv Exp Med Biol*, 1999. 474: p. 65-77.
4. Moore, L.G., et al., The incidence of pregnancy-induced hypertension is increased among Colorado residents at high altitude. *Am J Obstet Gynecol*, 1982. 144(4): p. 423-9.
5. Moore, L.G., Fetal growth restriction and maternal oxygen transport during high altitude pregnancy. *High Alt Med Biol*, 2003. 4(2): p. 141-56.
6. Huch, R., Physical activity at altitude in pregnancy. *Semin Perinatol*, 1996. 20(4): p. 303-14.
7. Jean, D., et al., Medical recommendations for women going to altitude. *High Alt Med Biol*, 2005. 6(1): p. 22-31.

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History of this recommendation paper:

The first version was written in September 2003 by D.Jean and presented at the Copenhagen Meeting of UIAA MedCom by C.Leal, the final manuscript was approved by UIAA MedCom at the UIAA MedCom Teheran meeting in September 2004 and published later (see reference [7]). This shortened version for UIAA website was finalized in May 2006. At the UIAA MedCom Meeting at Snowdonia in 2006 the MedCom decided to update all the recommendations. The version presented here was approved at the UIAA MedCom Meeting at Adršpach – Zdoňov / Czech Republic in 2008.