EFFECTS OF ACETAZOLAMIDE ON BLOOD PRESSURE AND PULSE WAVEFORM CHANGES INDUCED BY HIGH ALTITUDE EXPOSURE

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Background

Exposure to high altitude (HA) may induce mountain sickness and increase blood pressure (BP) but little is known on the effects of this condition on arterial properties.

Acetazolamide (AC), antagonizing chemoreflex activation effects, has been proposed to prevent and treat mountain sickness, but no information is available on its effects on cardiovascular parameters at HA.

Aim

Aim of our study was to assess these issues in a group of healthy volunteers acutely exposed to very HA (Capanna Margherita, Mount Rosa, Italian-Swiss Alps, 4559 m a.s.l.)

Methods

42 healthy volunteers were randomized to receive AC 250 mg bid or placebo (PL) both at sea level (SL) and HA.

A tonometric evaluation of arterial properties (PulsePen, DiaTecne, Milan) by assessing carotid-femoral and carotid-radial PWV (CF-PWV, CR-PWV) and pulse wave analysis (augmentation index, Alx and subendocardial viability ratio, SEVR, i.e. the ratio between diastolic and systolic area under the pulse pressure curve) was performed in the following conditions:

- at baseline (SL pre)
- after 2 days of randomized treatment at SL (SL post)
- within 6 hours from arrival at HA (HA1)
- and on 3º full day of exposure to HA (HA2)

Systolic (S) and diastolic (D)BP were measured by a validated oscillometric device (AND UA 767-PC). Heart rate (HR) was derived from an ECG signal. Mean arterial pressure (MAP) was calculated by PulsePen software. Data are shown as means ± SD.

Results

- No difference in terms of anthropometric characteristics were found between the two groups.
- Acute exposure to HA significantly increased SBP, DBP, MAP and HR. Subjects in AC group, compared to PL group, showed however significantly lower values of these parameters at HA1. DBP and MAP were significantly lower with AC also at HA2.
- In all subjects CF-PWV and CR-PWV did not change, while Alx (adjusted for HR = 75 bpm) increased compared with SLpost both at HA1 and HA2. Its values were significantly lower in AC group.

Conclusions

- Our study shows for the first time that acute exposure to HA induces both a BP rise and changes in vascular function, whose magnitude is partly counteracted by treatment with AC.
- The effects of AC on the haemodynamic changes induced by hypobaric hypoxia may contribute to the beneficial role of this drug in subjects prone to mountain sickness.
- Based on these findings, also the possible clinical usefulness of AC in patients with diseases associated to hypoxemia might deserve to be re-assessed.