Name of research institute or organization:

Pneumologie, Medizinische Fakultät der Ludwigs-Maximilians-Universität München

Title of project:

Correlation of blood gas analysis at 3454 m with symptoms of acute mountain sickness – ongoing study

Project leader and team:

Prof. Dr. med. Rainald Fischer, project leader

Project description:

According to current knowledge, acute mountain sickness is induced by hypobaric hypoxia. In a number of studies, there is a correlation of oxygen saturation and acute mountain sickness, while in other studies the correlation is not convincing. As new small portable blood gas monitors are now available, not only oxygen saturation, but arterial blood gas samples can easily be drawn, even during the ascent to maybe remote areas.

We therefore aim to find out whether we can detect correlations between parameters of arterialized blood gas samples with symptoms of acute mountain sickness during acute exposure to an altitude of 3454 m for at least 24 h.

Methods: The ongoing study will sample blood gases from healthy young subjects with or without previous altitude exposure. The blood gas samples are drawn from the arterialized ear lobe and are measured with a portable point of care blood gas analyser (EPOC, Alere Inc., Ontario, Canada). The blood gas samples are taken at least at three time points during the stay at altitude: after 3 – 4 h (T1), 12 – 15 h (T2) and 22 – 25 h (T3) after arrival at 3454 m. In parallel, symptoms of acute mountain sickness were monitored with the Lake Louise Acute Mountain Sickness Score (AMSS).

Results: Until now, 41 subjects have been studied (18 female, 23 males, mean age 24,3 years). The highest values of AMSS were recorded T2, with a mean of 2.5, median 2 (ordinal scale, minimum 0 – maximum 18). The overall mean AMSS was 2.23. AMS – values of 3 or higher (defining acute mountain sickness) were found in 24/41 subjects. However, if the cut-off point is set at 4 or higher, only 16/41 subjects experienced acute mountain sickness. The highest score with 18 was found in a child after the first night at altitude. In one subject, rescue oxygen had to be given due to a beginning high altitude pulmonary edema, although the AMS score was only 5 in this subject. For all other subjects, no rescue medication had to be given.

Mean PaO2 at arrival was 51.2 mmHg, increased to 57.3 after the first night at altitude and decreased again to 54.2 mmHg on the second evening. Mean PaCO2 was 33.1-34.1 mmHg, mean SaO2 was between 87 and 84 percent, depending on the time of measurement.

With the current measurement, we found no significant correlation of AMS-score and oxygenation, neither measured with PaO2 or with SaO2.

Conclusion: With the current sample size we are not able to detect a significant correlation of AMS and oxygenation at an altitude of 3454 m. This may be due to the relatively low severity of AMS at the high altitude research station Jungfraujoch, but we expect that increasing the sample sizes will help us to find out if arterialized blood gas sampling is superior to the measurement of SaO2 for predicting acute mountain sickness. However, our data challenge the theory that low PaO2 or SaO2 is directly related to AMS symptoms. As during two samplings in winter and summer 2015 the PaCO2 measurements were not reliable, we hope to increase our sample size further to expand our knowledge on the relationship between AMS and alveolar ventilation.

Key words:

Acute mountain sickness, oxygenation, blood gas sampling

Scientific publications and public outreach 2015:

As the study is ongoing, no publications have been written in 2015

Address:

Lungenheilkunde München – Pasing
Gleichmannstrasse 5
D-81241 München

Contacts:

Prof. Dr. med. Rainald Fischer
Tel.: +49 89 880 347
Fax: +49 89 887 626
e-mail: rainald.fischer@lmu.de
URL: http://www.lungenarzt-pasing.de