

# Could cardiac autonomic modulation be an objective method to identify hypobaric hypoxia symptoms at 25.000ft among Brazilian military airmen?

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## RESUMEN

Hypobaric hypoxia during a flight can cause accidents, resulting in deaths. Heart rate variability may be more sensitive than self-reported hypoxia symptoms to the effects of HH. The level of physical fitness can contribute to efficient cardiac autonomic modulation. However, no studies have examined the association between fitness, heart rate variability, and the time of onset of hypobaric hypoxia symptoms. To analyze the influence of hypobaric hypoxia on cardiac autonomic function at the time of onset of the first symptoms and its association with physical fitness. Male airmen trained and belonging to the staff of the Brazilian Air Force (n = 23; 30 ± 6.7 years) participated in a flight simulation in a 25.000 ft hypobaric chamber. Heart rate variability was recorded with a Polar® cardiac monitor. Data were analyzed in the time-domain method using Kubios software. We evaluated pulse oximetry with the Mindray PM-60 oximeter. Physical fitness assessment test results were collected from the archive. At moments rest vs. hypoxia revealed a decrease in heart rate variability indices iRR and RMSSD (p < 0.001). The individual analysis of hypoxia-rest variation showed that 100% of the airmen had a negative delta for both iRR and RMSSD indices. The time of onset of hypoxia symptoms was not associated with body composition, physical fitness, oxygen saturation, and HRV indices. Also, we suggest that cardiac autonomic modulation seems to be more sensitive to the effects of hypobaric hypoxia at 25.000 ft than the self-reported subjective perception of symptoms. Further devices that alert to a hypoxic condition during a flight should consider heart rate variability allowing more time and security to reestablish control of the flight.

**KEYWORDS:** hypoxia, altitude, aerospace medicine, physical exercise, heart rate variability, flight safety

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