

Cardiac autonomic activity during sleep in high-altitude resident children compared with lowland residents

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Abstract

Study Objectives

We aimed to characterize heart-rate variability (HRV) during sleep in Andean children native to high altitude (HA) compared with age, gender, and genetic ancestry-similar low-altitude (LA) children. We hypothesized that the hypoxic burden of sleep at HA could induce variation in HRV. As children have otherwise healthy cardiovascular systems, such alterations could provide early markers of later cardiovascular disease.

Methods

Twenty-six LA (14F) and 18 HA (8F) children underwent a single night of attended polysomnography. Sleep parameters and HRV indices were measured. Linear mixed models were used to assess HRV differences across sleep stage and altitude group.

Results

All children showed marked fluctuations in HRV parameters across sleep stages, with higher vagal activity during nonrapid eye movement sleep and greater variability of the heart rate during rapid eye movement (REM). Moreover, HA children showed higher very low-frequency HRV in REM sleep and, after adjusting for heart rate, higher low-to-high frequency ratio in REM sleep compared with children living at lower altitude.

Conclusions

We confirmed previous findings of a stage-dependent modulation of HRV in Andean children living at both HA and LA. Moreover, we showed subtle alteration of HRV in sleep in HA children, with intriguing differences in the very low-frequency domain during REM sleep. Whether these differences are the results of an adaptation to high-altitude living, or an indirect effect of differences in oxyhemoglobin saturation remains unclear, and further research is required to address these questions.

[apnea](#), [autonomic nervous system](#), [children](#), [high altitude](#), [hypobaric hypoxia](#), [heart-rate variability](#), [REM sleep](#), [very low-frequency power](#)

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