

Feasibility of polysomnography sleep study among high altitude acclimatized shift workers in an industrial setting at 5050 m

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Abstract

Objective: Very few studies have exploited the use of full overnight polysomnography (PSG) for high-altitude sleep studies. Published studies have been limited by small sample sizes, lower sleeping altitudes and lack of data from high-altitude workers. Here, we investigate the feasibility of using full PSG sleep studies among high-altitude acclimatized shift workers from an astronomical observatory, the Atacama Large Millimeter Array (ALMA) in the Atacama Desert in Northern Chile.

Methods: High-altitude acclimatized workers at ALMA Array Operations Site (AOS, 5050 m) typically spend a week of high-altitude shift work followed by another week of rest at or near sea level (~500 m). During the week of high-altitude shift work, workers sleep at the ALMA Operation Support Facility (OSF, 2900 m) and go to work at the AOS during the day. AOS workers were recruited for a full PSG assessment during their week of shift work at high-altitude. The sleep data were analysed using Michele Sleep Scoring System (MSS).

Results: We have successfully recruited a total of fifty-three high-altitude acclimatized workers (36.5 ± 10.6 years old, male/female=36/17, body mass index= $27.3 \pm 3.8 \text{ kg/m}^2$). Traditional sleep parameters such as total sleep time (TST), sleep efficiency (SE), wake after sleep onset (WASO), sleep onset latency (SOL), awakenings and periodic limb movement index were assessed and will be presented. Similarly, we will present results for sleep apnea indices (apnea-hypopnea index (AHI), central and obstructive sleep apnea indices (CSA, OSA), hypoxia burden (oxygen desaturation index (ODI) and TST below blood oxygen saturation 90% (TST90)) and sleep depth parameters (deep sleep, transitional sleep, drowsy awake and full wakefulness).

Conclusion: Gold-standard sleep assessments using full PSG are feasible in industrial settings at high-altitude. Preliminary analyses show that the sleep data from high-altitude are as high quality as in-home PSG and in-hospital PSG studies at lower altitude.

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