

SPACE LIFE SCIENCES SYMPOSIUM (A1)
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SLEEP QUALITY AND CIRCADIAN PATTERNS IN SHORT TERM SPACE FLIGHTS DURING
TIANGONG-1 DOCKING MISSIONS**Abstract**

Purpose: Circadian disturbance, sleep quality decrease and fatigue have been reported in many previous manned space flight missions among international crew members. It is of importance to maintain the robustness of circadian rhythm and stability of sleep quality for crews, who will need optimal alertness and neurobehavioral function to cope with challenges or tough tasks during on-orbit missions. This study aims to monitor and assess the impacts of short term space flight on human sleep quality and circadian rhythm in China's Tiangong-1 docking space flight missions. **Methodology:** Crew members in Tiangong-1 space module docking missions were recruited. We utilized the actigraph to monitor the sleep quality and circadian rhythm, which were continuously real-time recorded by a wrist-worn device (Actiwatch). At the same time, sleep questionnaire were filled in for subject sleep quality evaluation. Sleep quantity and sleep efficiency were calculated by actiware software. Sleep-wake period was calculated and activity phase was depicted by ClockLab software. Statistical differences were analyzed by general linear model repeated measure analysis of variance. **Results:** The two missions showed approximately the similar tendency or results of sleep quality and circadian patterns changes. Mean total sleep time of crew members showed a tendency of decrease, while the sleep efficiency increased. And mean sleep latency exhibited relatively shorter duration than both pre- and post-flight. Besides, for the circadian patterns, the mean period was identified shortened and higher activity was found in 0-90 degree phase field in crew members. Furthermore, the mean subjective sleep quality index had reduction tendency, with decrease tendency in the mean sleep quality and increase tendency in the sleep duration score, daytime dysfunction, etc. **Conclusions:** During China's short term manned space flight, sleep quality of crew members were found changed compared with pre- and post-flight duration, characterized by the tendency of reduced total sleep time and increased sleep efficiency. Significantly, subjective sleep quality evaluation results also supported these findings. Intriguing, the two space flights in Tiangong-1 missions shared the consensus tendency and validated each other. It is essential to further explore the mechanism underlying the effects of gravity changes and isolation conditions on sleep quality and circadian timing system in space. **Acknowledgments:** This study was supported by the National Basic Research Program of China (Grant NO. 2011CB707704 and 2011CB711000), and the Foundation of State Key Laboratory of Space Medicine Fundamentals and Application, China Astronaut Research and Training Center (Grant NO. SMFA13B02, SMFA09A06 and SMFA12B05).