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CORRELATION BETWEEN AUDIOLOGICAL AND PSYCHOPHYSIOLOGICAL STRESS PROFILE
AMONG ASTRONAUTS DURING LONG-DURATION SPACEFLIGHT MISSIONS

Abstract

Background: Even though space is quiet, space stations are not. Since Apollo space missions, Spaceflight-Associated Hearing Loss (SAHL) has been considered a medical risk. As the astronauts at the international space station (ISS) are exposed to loud motorized noise caused by essential equipment that runs continually, such as generators for life support equipment, ventilation systems, exercise equipment, environmental monitoring equipment, etc; it was hypothesised that noise is the leading cause for SAHL. The noise level of 74–76 dBA for the entire duration of their stay on the ISS which can last up to 6 months to years in future missions may cause transient hearing shifts leading to High or Low-frequency hearing loss. As the exact cause of spaceflight-associated hearing loss is unknown; the resulting hearing loss may be due to a combination of factors endured during space flight.

Objective: To identify the possible risks that lead to SAHL, and define the co-relation between SAHL and mental health in astronauts.

Methods: A literature review was conducted using all existing published data from 1960 to 2022. We searched PubMed, Scopus and WOS using broad terms of SAHL.

Results: Our results showed that Psychological Stress is a potential key player leading to development of SAHL. We hypothesized that anxiety may lead to hearing loss in space along with the vice-versa relationship as a possibility too. We also classified the risks of getting hearing loss in space into three categories: 1) Environmental risks (microgravity, radiation, launching and landing environments); 2) Psychological changes; 3) Physiological risks (role of vestibular, visual, cardiovascular systems on SAHL). It was noted that the contributing factors to hearing loss synergistic to noise depend upon individual susceptibility, slightly higher CO₂ levels, Space Radiation, Microgravity, Eustachian Tube Dysfunction (ETDs), psychological stress and Ototoxins.

Conclusion: We identified a new scale to determine the whole possible risks for SAHL. We hope this novel classification shedding additional light on stress and depression/anxiety will guide future case definitions for SAHL and its association with mental health, which catalyse the field of research to develop new ways for mitigating hearing problems in space.