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REDUCED POSTURAL STABILITY IN 55- TO 65-YEAR-OLD MEN AND WOMEN EXPOSED TO 14-DAY HEAD-DOWN BED REST

Abstract

Static posturography gives indications of balance and postural control, providing insights into the risk of falls, a major concern in aging populations and astronauts coming back from space. While the deleterious effects of aging and microgravity exposure on postural control are well-documented, most simulated microgravity studies have been conducted on healthy young males. This research investigates the effects of 14-day head-down bed rest (HDBR), an analog of microgravity, on static posturography parameters among 55- to 65-year-old men and women. Besides this, the effect of a countermeasure based on physical exercise is evaluated. Twenty-two healthy subjects (11 females; age: 59 3 yr) were recruited and randomly allocated to either a control (n = 11) or exercise (n = 11) group. The exercise group performed three daily exercise sessions during HDBR, including high-intensity interval, aerobic, and resistance activities. Five-minute static posturography tests were conducted with eyes open before (BDC), about 5 hours after resuming upright posture (R0), and 4 weeks after (R4wk) the HDBR period. The last 180 seconds of each test were kept for the computation of a list of positional, dynamic, frequency, stochastic, and complexity features. Longitudinal changes were assessed with Wilcoxon tests, using the Bonferroni correction. Changes within each group were compared using Mann-Whitney tests. Results are presented as median [first and third quartiles] for the medio-lateral axis, but the antero-posterior axis gave similar results. Statistical significance was assumed for p¡0.05. No group differences were observed for the changes in any of the parameters. Compared to BDC, the center of pressure at R0 demonstrated a larger mean velocity (+20 [8; 50]The observed changes in positional, dynamic, and frequency parameters indicate a decreased stability in older middle-aged adults immediately following HDBR. Poorer stability caused by HDBR could add to the higher risk of falling associated with aging. The findings are especially relevant as bedridden patients are often older adults. As the population of older professional and tourist astronauts increases, additional research should be conducted to evaluate their risk for falls following spaceflight.