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Evaluation of health effects of exposure to whole body vibration in seated and standing metro passengers

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Abstract

Metro is one of the commonest vehicles of public transportation in all over the world. High range of transmitted vibration to passengers' bodies on most of the vehicles of public transportation could cause different kinds of diseases and health effects, especially backache, in human beings. This study is aimed to investigate probable health effects of vibration exposure in the passengers of Tehran's metro based on ISO 2631-1, utilizing SVAN 958 tri-axial oscillator during the usual daily activity of the metro's different lines. Average r.m.s acceleration of sitting passengers on three axes of x, y, and z were 0.57, 0.5, and 0.4 m/s^2, accordingly, and of standing passengers 0.64, 0.48, 0.39 m/s^2. While sitting, the dominant axis was z in 7 out of 11 evaluated trains. The total average r.m.s. for sitting passengers equaled 1.1 m/s^2 and for standing ones 0.91 m/s^2. Average vibration dose of both sitting and standing conditions was in Health Guidance Caution Zone, HGCZ, range, calculated as 6.72 and 6.48 $m/s^{1.75}$ in measurement time. Average amounts of exposures, which determine more cautious limits in shorter durations, were mostly under the low level of HGCZ in 30 minutes, while they were in the HGCZ range in 150 minutes. Therefore, health risk of exposure is likely. This amount of exposure is of significance for those who are exposed to whole body vibration because of their jobs.

Keywords: Vibration, Passengers, Vehicle, Metro, Whole body vibration

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