

Dr. Ashis Bhattacharjee

Professor , Department of Mining Engineering and CoE in Safety Engineering and Analytics, Indian Institute of Technology Kharagpur

ASSOCIATION OF WHOLE-BODY VIBRATION EXPOSURE AND MUSCULOSKELETAL DISORDERS AMONG DUMPER OPERATORS: A CASE-CONTROL STUDY IN INDIAN IRON ORE MINES

Occupational exposure to whole-body vibration (WBV) is accredited as one of the major risk factors for musculoskeletal disorders (MSDs) at workplaces. This study focused on iron ore mines, which are located in the eastern part of India, to assess the WBV exposure of dumper operators. Further, it evaluated the association of WBV exposure with MSDs among dumper operators in mines. A case-control study was conducted to compare randomly selected 65 dumper operators and 65 office workers from two adjacent iron ore mines. Data were collected through face-to-face interviews using the Nordic Musculoskeletal Questionnaire (NMQ) and were analyzed using logistic regression models. The WBV exposure was measured in terms of vibration parameters such as frequency-weighted RMS acceleration, crest factor (CF), and vibration dose value (VDV) in the x, y, and z-axes, and the results were compared with the ISO 2631-1:1997 standards. The results revealed that the frequency-weighted RMS acceleration of dumper operators was highest in the z-axis (dominant axis) for all the dumper operators. The mean frequency-weighted RMS acceleration values of dumper operators in the z-axis was 0.47 m s^{-2} , which exceeded the lower limit of ISO-2631-1:1997, signifying the moderate health risk. Crest factor values in the z-axis exceeded the limit of ISO standard indicating that the dumper operators are exposed to multiple shocks. Based on the VDV (8) values, 90% of the operators were found to be exceeding the ISO-2631-1997 lower limit, indicating a moderate health risk. Compared with controls, the dumper operators had a much higher risk of upper back pain (age- overweight-adjusted odds ratio ORao=5.37, 95%CI=1.78-16.20), lower back pain (ORao=2.72, 95%CI=1.25-5.94), knee and leg pain (ORao=3.68, 95%CI=1.22-11.11), and having 2+ MSDs (ORao=5.05, 95%CI=1.88-13.51, vs. no MSDs). Older age and being overweight were associated with a higher risk of MSD pains. Anthropometric study was further explored to find out one of the root causes of WBV which leads to MSD problems.

Friday, June 10, 2022

Dow 610 3 p.m.

Join virtually: <https://michigantech.zoom.us/j/87418558643>

