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Musculoskeletal disorders in dumper operators exposed to whole body vibration at Indian mines

B.B. Mandal[a]* and A.K. Srivastava[b]

[a]*Research and Development, National Institute of Miners' Health, Nagpur, India;* [b]*Epidemiology Division, Indian Institute of Toxicology Research, Lucknow, India*

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Dumper operators are exposed to whole body vibration (WBV) in the course of their work. The exposure to WBV in a coal mine in Central India was investigated through measurement of the magnitude of vibration and exposure time. The vibration magnitude along the dominant *Z*-axis ranged from 0.644 to 1.82 m/s^2 in terms of root mean square acceleration. When evaluated in conjunction with their average daily exposure time of 5 h, all dumpers caused elevated health risk for their operators according to guidelines in ISO 2631-1:1997 WBV standard. Health risks were re-affirmed when vibration dose value (VDV) was applied as an additional tool for risk assessment. Forty dumper operators and 20 controls from the same mine were selected for detailed studies. The control population was not exposed to WBV. An epidemiological study was carried out to determine the prevalence of musculoskeletal disorders (MSD) related to WBV exposure. It was observed that the problem of low back pain was significantly higher (85%) in the exposed population as compared to controls (20%). Similarly, pain in the ankle (37.83%), shoulder (30%) and neck (37.5%) was higher among exposed personnel as compared to the control population (5, 0 and 15%, respectively). A significant degradation in quality of life among the exposed subjects was also observed.

Keywords: whole body vibration; mine hazards; environmental health; occupational health; epidemiology

1. Introduction

Dumpers are regularly and extensively used for the transportation of coal, minerals and overburden in surface mining. This is often to be done under the most arduous conditions. The capacity of dumpers varies from 7 to 350 tonnes [1]. Factors like rugged/uneven terrain, speed, the condition of the seat and suspension, etc. are responsible for vibration of the dumpers during operation. The vibration energy is transmitted to the human body mainly through the seat of the operator.

Studies have revealed that occurrence of low back pain (LBP) and early degeneration of the lumbar spine, including inter-vertebral disc disorders, is greater in professional drivers than in control groups unexposed to whole body vibration

*Corresponding author. Email: bbmandal@hotmail.com

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