

# Whole body vibration exposure in heavy earth moving machinery operators of metalliferous mines

A. P. Vanerkar · N. P. Kulkarni · P. D. Zade ·  
A. S. Kamavisdar

Received: 26 May 2007 / Accepted: 27 August 2007 / Published online: 15 September 2007  
© Springer Science + Business Media B.V. 2007

**Abstract** As mining operations get mechanized, the rate of profit generation increases and so do the rate of occupational hazards. This study deals with one such hazard – occupational vibration. The present study was carried out to determine the whole body vibration (WBV) exposure of the heavy earth moving machinery (HEMM) operators in two types of metalliferous mines in India, when they were engaged in the mining activity. Cross-comparison was done of the vibration dose value (VDV) for HEMM operators as well as each type of mine. The VDV for the shovel operator in bauxite mine was observed to be  $13.53 \pm 5.63 \text{ m/s}^{7/4}$  with 25% of the readings higher than the prescribed limit whereas in iron ore mine VDV for dumper operator was  $10.81 \pm 3.44 \text{ m/s}^{7/4}$  with 14.62% readings on the higher side. Cross-comparison of the VDV values for bauxite and iron ore mines revealed that it was  $9.57 \pm 4.93$  and  $8.21 \pm 5.12 \text{ m/s}^{7/4}$  with 21.28 and 14.95% of the readings on the higher side respectively. The Student's *t* test level was found to be insignificant for both type of mines, indicating that the WBV exposure is not dependent on the type of mine but is dependent on the working condition and type of HEMM in operation.

**Keywords** Bauxite · HEMM · Iron ore · Operator · VDV · WBV

## Introduction

Occupational vibration is a grossly over-looked area, as its deleterious effects are not visible immediately but take years of prolonged exposure to be apparent. The health effects of WBV have been the topic of many research studies over the years with evidence indicating that the exposure of professional drivers to WBV (Bovenzi and Hulshof 1999), and other factors in the driving occupation (Palmer et al. 2003) leads to an increased risk of developing musculo-skeletal disorders mainly of the back and spinal system. Minor effects such as back-pain, and spinal problems surface early but are often over-looked considering them as day-to-day problems until they turn serious. However, WBV does not have a specific target organ which it affects, making it a hazard with non-specific health outcomes which are not easy to clearly discern (Darren 2002). Hence though it is a well-known fact that vibration affects human performance, its implications on human health receives little importance.

The major reason for performing occupational vibration measurements is to evaluate the vibration impinging on the operators exposed to it. Occupational vibration can be divided into two categories depending on the vibration exposure route into the human body and its effects on the body i.e. hand arm

A. P. Vanerkar · N. P. Kulkarni · P. D. Zade (✉) ·  
A. S. Kamavisdar  
National Institute of Miners' Health,  
JNARDDC Campus, Opp. Wadi Police Station, Wadi,  
Nagpur 440 023 Maharashtra, India  
e-mail: p\_zade2000@yahoo.com