

Risk from vibration in Indian mines

Abstract

Equipment-induced vibration is widely recognized as a health hazard. It is a physical stressor to which many people are exposed at workplace. Mining industry is no exception. In spite of extensive research undertaken in the developed countries, information on the magnitude of the problem in India is not available. An estimated 1 million workers were engaged in the Indian mining industry in the year 2003. The actual figures could be much higher. Analysis of employees' database of several mines reveals that 18% employees in the Indian mining industry are occupationally exposed to vibration. Large-scale mechanization considerably adds to the severity and complexity of the problem because of 1) increase in the percentage of exposed population and 2) increased years of exposure. The clinical picture and health outcomes of exposure to hand-arm vibration and whole-body vibration are scantily documented in the Indian context. In view of the health risk and action taken in other countries, we submit that there is an urgent need to develop a practical management strategy for evaluation, monitoring and control of equipment-induced vibration in the mining industry.

Key words: Hand-arm vibration, Indian mining industry, legislation, occupational health, whole-body vibration

INTRODUCTION

Vibration is defined as oscillatory motion. Oscillatory displacement involves alternate velocity in one direction and then a velocity in the opposite direction. This change of velocity means that the object is constantly accelerating, first in one direction and then in the opposite direction.^[1] The oscillatory motion from a source, e.g., a vehicle or a tool, may be simple harmonic sine wave or a multiple wave complex differing in frequency and acceleration; or a random non-repeating series of complex waves.^[2]

In 1977 the International Labor Office (ILO) listed vibration as an occupational hazard and recommended that 'measures have to be taken to protect employees from vibration and the responsible authorities have to establish criteria to determine the danger; when necessary, the exposure limits must be defined by means of these criteria. Supervision of employees

exposed to occupational hazard as a result of vibration at their places of work must also include a medical examination before the beginning of this particular job, as well as regular checkups later on.'

The problem is inherent to large-scale mechanization and is responsible for severe ill health. The present article is an effort to review the problem and evaluate the risk of vibration from the perspective of mining industry in our country.

Health impacts

The human responses to vibration depend on the part of the body that is exposed. There are two broad types of vibrations that workers are exposed to:

- Vibration transmitted to the whole body (whole-body vibration or WBV) through a supporting surface, for example, the feet of a standing person or the buttocks of a seated person
- Vibration applied to a part of the body, i.e., segmental vibration. When vibration is applied to the hand, it is termed as 'hand-arm vibration' or HAV.

Whole-body vibration and segmental vibration need to be studied separately because they are measured and evaluated using different standards. They also require different control measures and have differing effects on the human body.

The earliest literature available on health impact of vibration chiefly refers to the miners. The widespread use of jackhammers in the mining industry is a potential source of hazardous vibration affecting limbs in

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