

SELF-REPORTED MUSCULOSKELETAL SYMPTOMS AMONG OPERATORS OF HEAVY CONSTRUCTION EQUIPMENT

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The purpose of this study was to assess the adequacy of the cab design and to determine the percentage of musculoskeletal symptoms among workers. A questionnaire was designed to assess demographics, work information, job history, and musculoskeletal symptoms in operators of heavy construction equipment. Information concerning equipment included design of the seat/chair, levers, pedals, bothersome vibration, quality of egress from the equipment, proper preventative maintenance and repairs, and age of the equipment. The body regions that were evaluated included the neck, middle/upper back, low-back, shoulder/upper-arm, elbow/forearm, wrist/hand, hip, knee, and ankle/foot. One hundred and eighty nine operators completed the questionnaire. The results indicate that these workers are at risk for developing musculoskeletal disorders, the need to perform a larger survey to further substantiate the outcome, and the need to quantify risk factors (i.e., whole-body vibration and static sitting postures).

INTRODUCTION

Wikstrom et al. (1994) reviewed 45 health studies in which index groups exposed to WBV were compared to a reference group not exposed to WBV. In all, the review covered about 18,000 workers exposed to WBV and around 29,000 control subjects. The following conclusions were advanced from their review: 1) accumulative exposure (in years) to WBV may contribute to injuries and disorders of the lower back; 2) WBV in combination with awkward posture (including static sitting) may result in excessive risk of injury and disorder to the lower back; 3) an exposure-response relationship cannot be established at this time; and 4) disorders of the gastrointestinal system and urogenital system, especially in women, have been observed in those exposed to WBV. As such these health effects warrant further study.

Hulshof and Veldhuijzen van Zanten (1987) performed an evaluation of 19 epidemiological studies on the effect of WBV. In all, this review covered about 17,000 exposed and 11,000 reference workers. This review was restricted to

the relationship between WBV and symptoms and/or signs of thoracic and lumbar disorders. A scoring procedure was used to assess the relative contribution of each epidemiological study. The evaluative criteria were: the quality of exposure data, effect (health) data, study design and methodology. The most frequently reported adverse health effects were low back pain, early degeneration of the spinal system and herniated lumbar discs. Studies, particularly those with better methodology, demonstrated a strong tendency in a similar direction, thus the authors concluded that long-term exposure to WBV could be harmful to the spinal system. An exposure-response relationship cannot be established at this time. The main shortcomings of the epidemiological studies to date were that their description of vibration exposure, the exposure-time history and the contributing occupational environment was not sufficient, and that the challenge of finding groups that were not exposed to vibration was not met. The authors suggested that more epidemiological research, especially with better study design and methodology, are needed to understand the relationship between

long-term WBV exposure and adverse health effects.

A simple descriptive study by Zimmermann et al. (1997) provided insight into the specific population of interest (operating engineers). They investigated work-related musculoskeletal symptoms among operating engineers (N=410). There were no control groups used for comparison. There was a response rate of 38% among the operating engineers. Work-related musculoskeletal symptoms were greatest in the low back, neck, shoulders, and knees. Operators with longer work histories consistently reported greater percentages of symptoms, missed work, and physician visits than the less experienced group. For all body regions the percentage of work-related symptoms, missed work, and physician visits varied greatly among the five different types of equipment (backhoe, crane, pushcat/dozer, pull scraper, and end loader). These results are suggestive of equipment specific demands and stress experienced by the operating engineers. Operators using older equipment reported a higher percentage of missed work and physician visits due to musculoskeletal symptoms than those using newer equipment, and those using a combination of both newer and older equipment.

METHODOLOGY

A work and health questionnaire was designed to assess demographics, work information, job history and musculoskeletal symptoms in operators of heavy construction equipment. Information concerning equipment included design of the seat/chair, levers, and pedals, bothersome vibration, quality of egress from the equipment, proper preventative maintenance and repairs, and age of equipment. The body regions that were evaluated included the neck, middle/upper back, low-back, shoulder/upper-arm, elbow/forearm, wrist/hand, hip, knee, and ankle/foot.

Self-administered work and health questionnaires were distributed to operating engineers at the Western States Operating Engineers Institute of

Training (located in Spangle, WA and Pocatello, ID USA). The operators who attended their regularly scheduled training classes, from December 2001 to June 2002, at the Training Institute were requested to complete the questionnaire during their training session. The participation was voluntary, but participation was highly encouraged by the training officers. All of the participants were briefed about the purpose of the study and they signed an informed consent form.

RESULTS

One hundred and eighty nine operators out 192 (98%) completed the questionnaire. A majority of the participants were male (88%). The operators averaged 45 years of age and 18 years of experience. The majority of the operators (>65%) indicated that the cab (i.e., seat/chair, levers and pedals) was adequately designed for their job. Some of the operators reported that they were not bothered by vibration and that the quality of egress from the equipment was good. Most of the operators (>80%) indicated that proper maintenance and repairs were performed on their equipment. The classification of equipment as being old or new was almost identical. Five body regions that received the highest total percent of symptoms categorized as somewhat severe or higher, in descending order, included the low-back, hip, knee, shoulder/upper-arm, elbow/forearm, and wrist/hand.

SUMMARY

The current study is in agreement with the prevalence of musculoskeletal symptoms in various body regions as reported by Zimmerman et al. (1997). Also, similar results were observed in a pilot study of operators of heavy construction equipment (Kittusamy, 2003) that further reiterate the findings in the current study.

Construction workers are often afflicted with musculoskeletal symptoms that compromise their health and well-being. However, there have been few formal studies of the nature and potentially preventable causes of these symptoms. This study

assessed the adequacy of the cab design and determined the percentage of musculoskeletal symptoms among workers. The results from this study indicate that the operators are at risk for developing musculoskeletal disorders, the need to perform a larger survey to further substantiate the outcome, and the need to quantify risk factors (i.e., whole-body vibration and static sitting postures).

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