Vibration Injury Network

Research Network on Detection and Prevention of Injuries due to Occupational Vibration Exposures

A unique national survey of exposure to hand-transmitted and whole-body vibration in working-aged men and women

Appendix H2B to Final Report
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WORK PACKAGE WP2H REPORT

Abstracts to documents describing the results of a unique national survey on 12,907 working-aged men and women.

Palmer,K.T., Coggon,D.N., Bednall,H.E., Kellingray,S.D., Pannett,B., Griffin,M.J., Haward,B. (1999). Health and Safety Executive Contract Research Report 232/1999, HSE Books, ISBN: 0-7176-2476-5. Hand-transmitted vibration: occupational exposures and their health effects in Great Britain.
(154 Pages, 11 Figures, 40 Tables, 67 References) [In English]

Authors' Summary. A postal survey was conducted to estimate the prevalence of occupational exposure to hand-transmitted vibration (HTV) in Great Britain and to explore its association with finger blanching and sensorineural symptoms in the upper limbs. The aims were: a) To estimate the number of workers in Great Britain currently employed in processes that entail significant exposure to HTV. b) To identify the occupations and the industrial sectors where exposures arise. c) To estimate the approximate extent of work exposure to HTV in occupations and industries where exposures is likely to be significant. d) To estimate the prevalence and prevalence rate ratios for symptoms attributable to HTV by occupation. e) To examine factors that might interact with HTV in causing health effects.

Palmer,K.T., Coggon,D.N., Bednall,H.E., Pannett,B., Griffin,M.J., Haward,B. (1999). Health and Safety Executive Contract Research Report 233/1999, HSE Books, ISBN: 0-7176-2477-3. Whole-body vibration: occupational exposures and their health effects in Great Britain.
(143 Pages, 10 Figures, 36 Tables, 37 References) [In English]

Authors' Summary. A postal survey was conducted to estimate the prevalence of occupational exposure to whole-body vibration (WVB) in Britain and to explore its association with low back pain. The aims were: a) To estimate the number of workers in Great Britain currently employed in processes that entail exposure to WBV. b) To identify the occupations and industrial sectors where significant exposures arise. c) To estimate the approximate extent of occupational exposure to WBV in occupations and industries where significant exposure occurs. d) To estimate the prevalence and prevalence rate ratios for symptoms associated with the WBV in employed men and women. e) To examine factors that might interact with WBV in causing health effects. In addition, a series of workplace visits were made to determine the accuracy of self-reports of exposure.

Paddan,G.S., Haward,B.M., Griffin,M.J., Palmer,K.T. (1999). Health and Safety Executive Contract Research Report 234/1999, HSE Books, ISBN: 0-7176-2480-3. Hand-transmitted vibration: Evaluation of some common sources of exposure in Great Britain.
(79 Pages, 5 Figures, 5 Tables, 7 References) [In English]

Authors' Summary. As part of a national survey of exposure to hand-transmitted vibration, workplace visits have been undertaken to observe workers exposed to vibration and measure selected vibration exposures. One objective of the workplace visits was to compare worker responses to some of the questions in the postal survey with the tools they were observed to use, the tools available for their use, and the durations for which they used the tools. This information has been presented in the Final Report on the postal survey. Further qualitative observations relating to ergonomics, the work environment and work organisations are presented in this report. Vibration measurements have been undertaken during workplace visits so as to: (i) check the relevance of some average vibration magnitudes assumed in the analysis of the postal survey (ii) to provide information on the range of magnitudes appropriate to individual tools, and (iii) to provide information on the characteristics of vibration to which workers are exposed so as to assist the consideration of alternative methods of evaluating exposure severity. A total of 411 measurements for triaxial vibration on the handles of 125 different powered tools show that in most cases the vibration magnitude assumed in the analysis of the postal survey fell within the range of measured values. Where this was not the case, the differences can be explained by the conditions of measurement and small samples. Although the assumed magnitudes may be considered average values, the measurements show very wide ranges of magnitudes, indicating that the assumed magnitudes will be too high for some users and too low for others. The wide range arose from variability between tools of different designs and from variability within individual tools according to the method of tool operation. It is shown that these differences are far greater than the difference between evaluating only the axis of vibration with the greatest magnitude of frequency-weighted acceleration or the root-sums-of-squares of weighted magnitudes over the three axes. The ergonomic conditions, the work environment and work organisation were observed in 116 users of hand-held power tools and machines. Qualitative information was gathered relating to working posture, grip force, manual handling and duration of tool use. Work environment details (location, physical aspects, space layout, and personal protective equipment usage) were recorded. The work organisation factors that were reviewed included workload level, shift patterns and attitudes to workplace health and safety. Observed differences in posture and grip force were related to the type of powered hand tool and the tasks required of the job, although differences were also apparent between individuals using the same tool types and carrying out similar tasks. Manual handling activities were common, with the need to either lift a tool or machine (e.g. lifting a floor polisher from a cleaner's cupboard), or handle raw materials and finished products (e.g. large carpentry items such as doors). Duration of tool use varied depending on the occupation and the nature of the task. Work environments varied and, not surprisingly, reports of cold hands whilst using power tools were most common for jobs based outdoors, or in buildings open to the air such as vehicle workshop and shipyards. Work organisation resulted in variations in workload levels and shift patterns, depending on the occupation. Few companies had hand tool maintenance programmes, so tool were used often until breakdown or end of life.

Paddan,G.S., Haward,B.M., Griffin,M.J., Palmer,K.T. (1999). Health and Safety Executive Contract Research Report 235/1999, HSE Books, ISBN: 0-7176-2481-1. Whole-body vibration: Evaluation of some common sources of exposure in Great Britain.
(70 Pages, 6 Figures, 5 Tables, 6 References) [In English]

Authors' Summary. As part of a national survey of exposure to whole-body vibration, workplace visits have been undertaken to observe workers exposed to vibration and obtain measurements of selected vibration exposures. One objective of the workplace visits was to compare worker responses to some of the questions in a postal survey with the vehicles and machines they were observed to use, the vehicles and machines available for their use, and the durations for which they were exposed to whole-body vibration. This information has been presented in the Final Report on the postal survey. Further qualitative observations of ergonomic aspects, the work environment and work organisation are presented in this report. Vibration measurements have been undertaken during workplace visits so as to: (i) check the relevance of some average vibration magnitudes assumed in the analysis of the

postal survey, (ii) to provide information on the range of magnitudes appropriate to individual vehicles, and (iii) to provide information on the characteristics of vibration to which workers are exposed so as to assist the consideration of alternative methods of evaluating exposure severity. A total of 187 sets of measurements of whole-body vibration were made in 39 vehicles and machines. In each vehicle, vibration was measured in five axes: in the vertical direction on the floor beneath the seat, in three axes on the seat surface and in the fore-and-aft direction on the backrest. The measurements show that in many cases the vibration magnitude assumed in the analysis of the postal survey fell within the range of measured values. Where this was not the case, the differences can be explained by the conditions of measurement and small samples. Although the assumed magnitudes may be considered reasonable average values, the measurements show wide ranges of magnitudes, indicating that the assumed magnitudes will be too high for some drivers and too low for others. The wide range arose from variability between vehicles of different designs and from variability within vehicles according to the method and conditions of operation. It is shown that these differences are generally greater than the difference between evaluating only the vertical axis of vibration on the seat, as opposed to a summation of the vibration in the three axes on the seat and the fore-and-aft axis on the backrest. The difference is also far greater than the differences between weighted values calculated according to BS 6841- or ISO 2631, although assessments of the risk of injury can be very different between these two standards. Ergonomic matters relating to whole-body vibration were investigated during observation of 63 drivers of a range of vehicles. Qualitative information gathered related to driving posture, seat adjustment, ride comfort, manual handling and duration of driving. The work environment, such as location, vehicle type, physical aspects and personal protective equipment requirements were recorded. Work organisation factors included workload level and work shift patterns. The most common feature of the seated positions adopted whilst driving was affixed static back posture, regardless of vehicle type. The nature of the work requirements influenced posture (e.g. bus drivers were required to twist to the left to operate bus ticket machines, groundsmen and fork lift truck drivers twisted to look behind to carry out safety checks). Most vehicles were provided with adjustable seats, but it was not always possible to ascertain if they were adjusted correctly. Ride comfort was highlighted as a problem by fork lift truck drivers with reports of back pain and discomfort. Drivers of ride-on mowers reported tingling sensations in their hands and wrists from vibration transmitted via the steering wheel. Manual handling activities were a component of most of the jobs observed, although their characteristics varied depending on occupation. Public utilities workers and groundsmen often used hand shovels for digging work. Delivery drivers lifted containers of varying sizes and carried these to their destination. The duration of driving varied depending on the occupation and the nature of the work tasks, and was either continuous throughout the observation period or for the duration of a particular activity (e.g. mowing grass). Most driving occurred outdoors, with vehicles ranging from small vans to 31 tonne lorries, used in a variety of locations (e.g. motorways, fields and warehouses). Although many of the drivers were seated in cabs, others were exposed to the weather, but generally they were well clothed to cope with adverse conditions. Work organisation information indicated variations in work load and shift patterns. A small number of drivers worked overtime. Farm tractors drivers reported long working hours, especially during the summer months and it was common to work seven days in a week.