

Comparison of diagnostic method of evaluating vibration induced sensorineural impairment among shipyard's grinders

Abstract

The objectives of this study are to investigate diagnostic value of two different tests amongst tests highly recommended and used for diagnosis of HAVS of the sensorineural component; Semmes Weinstein Monofilament (SWM) and Purdue Pegboard (PP) tests using vibrotactile perception threshold (VPT) test as standard objective quantitative test. For the method, a total of 176 grinders as vibration exposed respondent of a shipyard's fabrication participated in this study. Questionnaire and vibration exposures data were collected for all respondents where 67 respondents further performed the three quantitative sensorineural testing. The result showed that mean acceleration magnitude of grinding tools used were 4.9 ms^{-2} , exceeding recommendation by European Commission. Both cut-off point methods of mean plus two times standard deviation ($\text{mean} + 2\text{sd}$) and z-score (at 75th percentile) show significant difference among healthy and HAVS ($p < 0.001$). Correlation between SWM with VPT and PP with VPT was weak. However, results suggests progressive pathological damage to sensorineural component of the digits starts with fast-adapting II (FA II) mechanoreceptors indicated with significant correlation primarily at 125 Hz. Analyses of sensitivity and specificity found that monofilament at 0.16g force best discriminate HAVS from healthy. In the other hand, Purdue Pegboard test shows best diagnostic value of indicating HAVS at minimum insert of 16 pin and 14 pin respectively for dominant and non-dominant hand. Both Semmes Weinstein Monofilament and Purdue Pegboard tests has limited diagnostic value to be used as screening tools for early detection of HAVS.

Keyword: HAVS; Monofilament; Purdue pegboard; Sensitivity; Specificity; VPT