

FACTORS AFFECTING FINGER AND HAND PAIN IN WORKERS WITH HAVS

R. House,^{1*} K. Krajnak,² D. Jiang³

(1) St. Michael's Hospital and University of Toronto, Toronto, Ontario Canada; (2) Engineering and Control Technology Branch, Health Effects Laboratory Division, National Institute for Occupational Safety and Health, Morgantown, WV, USA; (3) Department of Community Health Sciences, University of Manitoba, Winnipeg, Manitoba, Canada.

Introduction

Pain in the upper extremities is a common symptom in workers with Hand-arm Vibration Syndrome (HAVS). Ayers and Forshaw¹ previously reported that HAVS subjects in focus groups complained about a lack of information on alternative pain control methods, which suggests that pain and its management are important aspects of workers' experience of HAVS. Pain in the upper extremities that arises proximal to the hand is thought to be due mainly to musculoskeletal factors. However workers with HAVS often report pain in the fingers and hands and improved understanding of the cause of finger and hand pain in HAVS would be useful. This study was carried out to investigate the relation between finger and hand pain and a number of possible predictive factors in HAVS subjects, with an emphasis on neurological variables.

Methods

136 male patients with HAVS were recruited over a two year period at a hospital occupational medicine clinic and 134 (98.5%) agreed to participate. Most of the workers came from the construction and mining sectors. Participants were asked if they frequently experienced any pain in the fingers and hands. They were not asked specifically if the pain was cold-induced. Finger and hand pain were scored separately on a scale of 0-10 using the Borg Scale. Clinical assessment was carried out by an occupational physician to determine the Stockholm neurological scale (SNS) and Stockholm vascular scale (SVS) stages. Current perception threshold (CPT) was measured at the fingertips for the median and ulnar nerves in milliamps at 2000 Hz, 250 Hz and 5 Hz corresponding to Abeta (large myelinated), Adelta (small myelinated) and C (unmyelinated) sensory nerve fibres respectively. Nerve conduction testing was carried out to measure the presence of median neuropathy at the wrist, consistent with clinical carpal tunnel syndrome (CTS), and ulnar neuropathy. Grip strength was measured with a Jamar dynamometer and the average of three measurements was obtained. The results for the worse side were used for all predictor variables. The Borg pain data were not normally distributed and therefore Spearman rank correlations were calculated to examine the correlations between finger and hand pain and possible predictor variables.

Results

85 % of subjects reported having some finger pain (Borg \geq 1) and 76% some hand pain. Finger and hand pain were significantly correlated ($r=0.719$, $p<0.001$). As indicated in Table 1, the highest correlation with finger pain was obtained for the Stockholm vascular variable ($R=0.239$; $p < 0.01$). CTS was the only neurological variable with a statistically significant correlation with finger pain ($r=0.184$; $p<0.05$). The correlation of the CPT ulnar 2000 Hz variable and finger pain was borderline statistically

significant ($p=0.07$). Grip strength was the only variable that had a statistically significant (negative) correlation with hand pain, although the correlations for CTS, SNS and SVS were of borderline statistical significance.

Table 1. Spearman Rank Correlations for Finger and Hand Pain

Predictor Variable	Finger Pain	Hand Pain
CPT Median 5 Hz	0.038	0.026
CPT Median 250 Hz	0.022	0.024
CPT Median 2000 Hz	0.061	0.074
CPT Ulnar 5 Hz	0.134	0.064
CPT Ulnar 250 Hz	0.099	0.039
CPT Ulnar 2000 Hz	0.157 *	0.118
Carpal Tunnel Syndrome	0.184 **	0.158 *
Ulnar Neuropathy	-0.036	0.009
Stockholm Sensorineural Scale	-0.011	0.158 *
Stockholm Vascular Scale	0.239 ***	0.164 *
Grip Strength	-0.136	-0.185**
Age	-0.036	0.030

* $0.05 < p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

Discussion

The results confirmed that finger and hand pain occur commonly in subjects with HAVS. The statistically significant predictors identified were the SVS stage and CTS for finger pain and grip strength for hand pain.

There was some suggestion from our data that the sensorineural component of HAVS (digital sensory neuropathy) may be associated with finger and/or hand pain. The SNS had a borderline statistically significant correlation with hand pain. As well, the correlations of CPT variables with finger and hand pain were highest for the 2000 Hz median and ulnar CPT variables, in comparison to other CPT frequencies and the CPT ulnar 2000 Hz variable correlation with finger pain fell just short of statistical significance. A larger sample size with increased power may have found the result to be significant. Previous work has shown that it is the CPT at 2000 Hz that is principally affected by vibration exposure in workers² and in animals using the rat tail model.³

There is also evidence from CPT studies in animals that segmental vibration exposure may produce an initial hyperesthesia phase associated with increased sensitivity⁴ and possibly pain. Our study involved subjects with HAVS symptoms for many years and therefore our data did not allow us to assess this issue, which would require subjects with early onset of HAVS. This might be a focus of future work on the association of pain with HAVS clinical findings.

References

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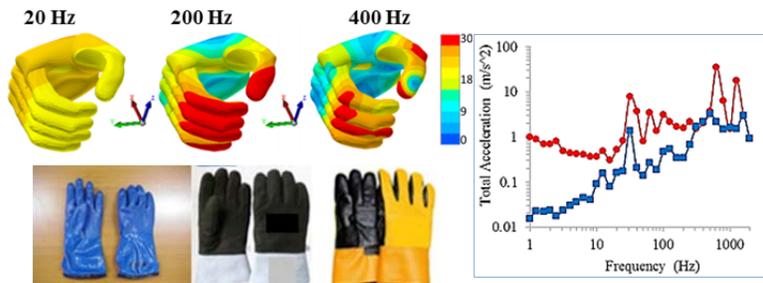


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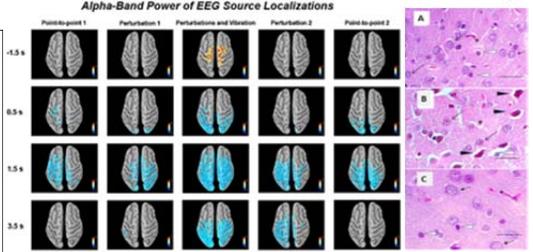
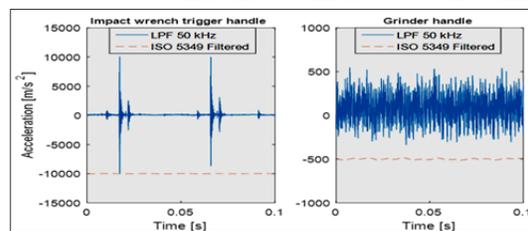
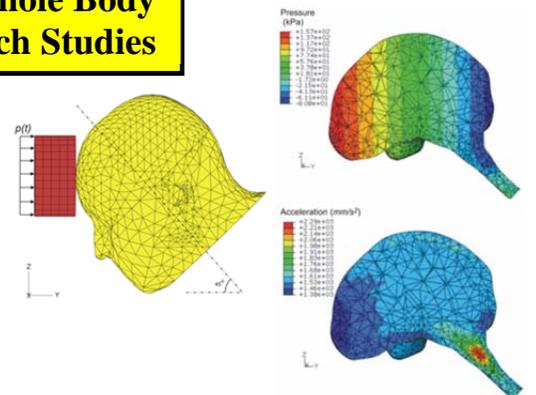
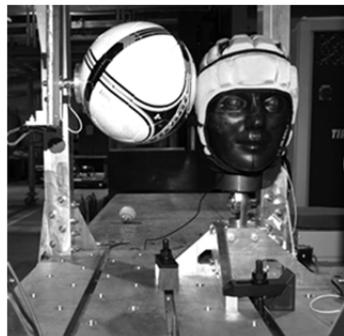
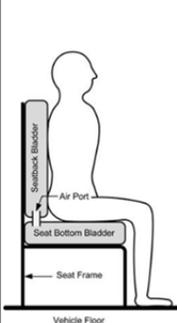


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