ABSTRACT

Background: Prolonged exposure to excessive hand-arm vibration (HAV) can induce hand-arm vibration syndrome (HAVS). Groundkeeping and landscaping workers routinely use hand-held power tools and they often wear the general-purpose safety gloves when operating the tools.

Objective: The aim of this study was to evaluate the effect of cowhide leather gloves, one of the most commonly used safety gloves, on the hand-arm vibration (HAV) levels during the operations of a weed eater and a backpack leaf blower.

Method: Two researchers alternatively operated a weed eater and backpack blower by changing roles (i.e., study operator and subject) for five minutes (n=3). Acceleration levels were measured with vibration tri-axial dosimeters on both palms of the subjects when the cowhide leather safety gloves were worn and not worn and a percent difference in acceleration was determined.

Results: A reduction in acceleration levels was observed on the dominant right hand for both subjects when the cowhide leather safety gloves were worn: 10.31% for a weed eater and 8.13% for a blower.

Conclusion: The use of the general-purpose cowhide safety gloves reduced HAV exposure levels during the operations of a weed eater and backpack leaf blower; the vibration attenuation effectiveness was considerable especially for a weed eater.

SITUATION/PROBLEM

- Long-term, excessive exposure to hand-arm vibration (HAV) can induce vascular, neurological, and musculoskeletal disorders, collectively known as hand-arm vibration syndrome (HAVS) (Blowey, M., 1996; Matoba, T., 2015).

- Many workers in ground maintenance industry use hand-held power tools and hand-gripped powered equipment on a regular basis and wearing general-purpose safety gloves during the operations of the tools is a common practice.

- Hand-vibration, vibration levels have traditionally been measured with accelerometers directly attached to tools which is a measure of vibration emission rather than exposure, and vibration attenuation effect of the general-purpose work gloves has not been fully understood to date.

- The aim of this study was to evaluate the effect of general-purpose safety gloves on the hand-arm vibration (HAV) levels during operations of a weed eater and backpack leaf blower by operating a weed eater and backpack blower.

METHODS

- Cowhide leather gloves (Condor, W. W. Grainger Inc., Lake Forest, IL, USA) were used in this study (Figure 1).

- Two researchers alternatively operated the use of a weed eater and backpack blower by changing roles: one time being a study subject and one time being a study operator (UAB IRB approved: obtained) (Figure 2).

- Weed eater: head was swung side to side approximately 1.5 seconds each side.

- Backpack blower: nozzle was swung side to side approximately 1.5 seconds each side.

- Each operating procedure above was performed for five minutes both when gloves (G) were worn and not worn (NG). Measurements were recorded three times (ms) and results averaged.

- Vibration tri-axial dosimeters with palm-strapped adaptors (1/3 octave band) were used to collect frequency spectra of vibration.

- Conventional 1/3 octave band analysis was performed to obtain frequency spectra.

CONCLUSIONS

- The vibration attenuation effect of general-purpose cowhide leather safety gloves was found in this study.

- The vibration attenuation effectiveness of the general-purpose safety gloves was direction specific and comparable amount of reduction in acceleration values was observed at around 200-250 Hz and 315 Hz on the dominant x-axis.

- The vibration attenuation effectiveness of different types of gloves on the HAV levels as well as the effect of different types of power tools.

References


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