

Nerve conduction and vibrotactile perception thresholds in female computer workers and hand-arm vibration-exposed male manual workers

Akademisk avhandling
för avläggande av medicine doktorsexamen vid Sahlgrenska akademien
vid Göteborgs Universitet

Avhandlingen kommer att offentligen försvaras i hörsal Arvid Carlsson,
Academicum, Medicinargatan 3, Göteborg
onsdagen den 10 november 2010 kl. 09.00

av

Helena Sandén

Fakultetsopponent:
Docent Britt Larsson,
Rehabiliteringsmedicin,
Institutionen för Klinisk och Experimentell Medicin,
Hälsouniversitetet, Linköping

Avhandlingen baseras på följande arbeten:

- I. Sandén H, Edblom M, Hagberg M, Wallin BG: Bicycle ergometer test to obtain adequate skin temperature when measuring nerve conduction velocity. *Clin Neurophysiol* 2005; 116(1):25–27.
- II. Sandén H, Edblom M, Ekman A, Tenenbaum A, Wallin BG, Hagberg M: Normal nerve conduction velocity and vibrotactile perception thresholds in computer users. *Int Arch Occup Environ Health* 2005; 78(3):239–242.
- III. Sandén H, Wallin BG, Hagberg M: Chronic pain has a small influence and mood has no influence on vibrotactile perception thresholds among working women. *Muscle Nerve* 2010; 42(3):401–409.
- IV. Sandén H, Jonsson A, Wallin BG, Burström L, Lundström R, Nilsson T, Hagberg M: Nerve conduction in relation to vibration exposure — a non-positive cohort study. *J Occup Med Toxicol* 2010; 5:21.



UNIVERSITY OF GOTHENBURG

Göteborg 2010

Nerve conduction and vibrotactile perception thresholds in female computer workers and hand-arm vibration-exposed male manual workers

Helena Sandén

Occupational and Environmental Medicine,
Department of Public Health and Community Medicine, Institute of Medicine,
University of Gothenburg, Gothenburg, Sweden

Abstract

Upper limb pain and disability are common problems, especially among working populations. The overall aim of this thesis was to investigate peripheral nerve function in the upper limb by nerve conduction test and vibration threshold test in working populations including female computer users (n = 82), hand-arm vibration-exposed male manual workers (n = 116), and female workers with chronic diffuse upper limb pain (n = 35). The studies have a cross-sectional design regarding peripheral nerve function measurements.

Exposure assessments regarding computer work were made using questionnaires, and the cumulative hand-arm vibration dose in manual workers was calculated as the product of self-reported occupational exposure, as collected by questionnaire and interviews, and the measured or estimated hand-arm vibration exposure in 1987, 1992, 1997, 2002, and 2008.

In contrast to nerve conduction measurements, the vibration threshold test is a psychophysical test. To investigate whether mood influences the measurements, perceived stress and energy were assessed using a two-dimensional mood adjective checklist, before the vibration threshold test.

Adequate control of tissue temperature is a crucial factor in nerve conduction studies, and a bicycle ergometer test proved to be a simple and effective method of raising hand temperature.

Nerve conduction measurements revealed no signs of early neural deficits of large myelinated nerve fibres measured in the upper limbs of either women who intensively use computer keyboard equipment or hand-arm vibration-exposed male manual workers, or female workers with chronic diffuse upper limb pain. In the present studies, the majority of the subjects did not have severe neurological symptoms and most subjects had not been referred to a clinic.

Vibration threshold test revealed no signs of early nerve affliction in the upper limbs in women who intensively used computer keyboard equipment. Women with chronic pain had a small elevation of vibrotactile perception thresholds in the territories of the ulnar and radial nerves. Perceived stress and energy before the vibration threshold testing did not influence the thresholds. Although a peripheral mechanism cannot be excluded, the findings support the idea that increased vibration perception thresholds in chronic diffuse upper limb pain may be secondary to pain.

Keywords: Computer use, Hand-arm vibration, Chronic upper limb pain, Nerve conduction, Vibrotactile perception threshold, Mood, Bicycle ergometer test, Temperature

ISBN 978-91-628-8180-1
<http://hdl.handle.net/2077/22920>