

Biomechanical risk factors for surgically treated ulnar nerve entrapment in a cohort of Swedish male construction workers.

Jennie A. Jackson, PhD^{1*}, David Olsson, PhD¹, Laura Punnett, ScD², Alex Burdorf, PhD³, Bengt Järvholm, PhD¹, Jens Wahlström, PhD¹

1. Department of Public Health and Clinical Medicine, Occupational and Environmental Medicine Unit, Umeå University, Umeå, Sweden.
2. College of Health Sciences, University of Massachusetts Lowell, Lowell, USA.
3. Department of Public Health, Erasmus MC, Rotterdam, The Netherlands.

Background: The literature on occupational risk factors for ulnar nerve entrapment (UNE), also called cubital tunnel syndrome is sparse.

Objectives: The aim was study the association between occupational biomechanical exposures and UNE.

Methods: The occurrence of UNE was examined prospectively in a cohort of 229 689 Swedish male construction workers who participated in a nation-wide occupational health surveillance program between 1971 and 1996. UNE case status was defined on the basis of a surgical release of ulnar nerve entrapment; case data were obtained from a national out-patient database for a 13 year observation period (2001-2013). Individual risk factors considered were smoking status, BMI and age. Biomechanical exposure estimates were assigned at the occupational group level using a job exposure matrix developed specifically for the study and included 10 ergonomic (force/posture/repetition) and 2 hand-arm vibration exposure parameters determined *a priori* to be relevant to UNE. Relative risks (RR) for all biomechanical factors were modelled using negative binomial regression analyses and adjusted for age, smoking habits and BMI.

Results: There were 555 cases of surgically treated UNE in the cohort and the average annual incidence was 19.2 cases per 100,000 person-years. Smoking status (ever vs. never smoker RR=1.28, 95% CI=1.07-1.54) and BMI (≥ 25 kg/m² vs. < 25 kg/m² RR=1.60, 95% CI=1.34-1.91) were associated with increased risk of UNE.

Increased grip force (RR=1.54, 95% CI =1.24-1.92), hand-Arm-vibration (RR=1.35, 95% CI=1.07-1.71) upper extremity load (RR=1.63, 95% CI=1.30-1.92), and increased frequency of hand tool use (RR =1.37, 95% CI=1.09-1.71), elbow flexion and extension (RR=1.36, 95% CI=1.10-1.68), and static work (RR=1.36, 95% CI=1.12-1.65) were also associated with increased risk of UNE.

Discussion and Conclusions: Our findings demonstrate that multiple biomechanical factors were associated with increased risk of UNE. Many of the identified risk factors involved elevated hand grip force (grip force, upper extremity load, and frequency of hand tool use and hand-arm vibration) which may indicate it is a key etiological aspect of UNE.