

Shiri R, Miranda H, et al. Physical work load factors and carpal tunnel syndrome: a population-based study. Occup Environ Med 2009;368-373.

Design: Cross-sectional study

Population/location/sample size:

- 6254 Finnish citizens participating in an interview and clinical examination as part of the Health 2000 Survey in 5 university hospital regions in Finland
- The general health survey targeted men and women age 30 and over, in order to obtain prevalence of musculoskeletal, cardiovascular, respiratory, and mental disorders, and was conducted between fall 2000 and spring 2001
- Information was gathered at 5 field clinics, where trained nurses did an interview and physicians performed a standardized physical examination, which included the status of the upper extremities

Main results of survey:

- Diagnosis of CTS was based on (1) pain/paresthesia in median nerve distribution on Katz hand diagram, (2) either positive Tinel's, combined wrist flexion & carpal compression test, decreased sensation in median nerve distribution, weakness of thumb abduction, or wasting of thenar eminence
- Probable CTS was defined as Katz hand diagram symptoms in 2 of the 3 radial digits, with positive findings in at least 2 of the clinical examination tests
- Physical load factors were assessed in a home interview obtaining information from the five longest-duration jobs of at least 1 year
- Physical load variables included: working with hands above shoulders for at least 1 hour/day, manual handling of loads (carrying, lifting, pushing, pulling) heavier than 5 kg at least 2 times per minute a least 2 hours/day, manual handling of loads heavier than 20 kg at least 10 times/day, vibrating tool use at least 2 hours/day, handgrip forces of 3 kg at least 1 hr/day, or repetitive movements of hands/wrists at least 2 hr/day
- Additional information included age, gender, education, smoking, rheumatoid arthritis, diabetes, hypothyroidism, exercise habits, depression, somatization, and BMI
- For participants who were working, work-related psychosocial factors (job satisfaction, workplace threats, social atmosphere, social support) were summarized into a single score which was then dichotomized as either (1) good/fair or (2) poor
- Men and women reported comparable levels of exposure to repetitive hand movements, but men reported more exposure to most other exposures: working with hands above shoulder level, handling of loads greater than 5 or 20 kg, high handgrip force, and use of vibrating tools
- For current jobs, odds ratios adjusted for age and sex were elevated for CTS and these exposures: high forces, vibrating tools, manual handling of loads greater than 20 kg, repetitive movements of the hands, or vibrating tools

- When odds ratios were adjusted for BMI, smoking, and somatization scores in addition to age and sex, handling of loads greater than 5 kg, high handgrip forces, repetitive movements, and vibrating tool use
- Further adjustment for other potential confounders did not affect the associations: arthritis, diabetes, hypothyroidism, and depressive symptoms
- Work-related psychosocial factors (job satisfaction, social climate, job strain, social support) did not change the results; the same physical load factors remained associated with CTS

Authors' conclusions:

- Work tasks requiring handgrip with high forces or use of vibrating tools in current jobs are associated with an increased risk of CTS; repetitive hand movements may further increase the risk
- Other known risk factors for CTS (BMI, smoking, psychosocial work factors, medical diagnoses) do not account for the association between work and CTS
- There is a risk of differential exposure misclassification which may overestimate the association between CTS and work factors; the interviews tried to minimize this misclassification by avoiding subjective words like "heavy" and using weights in kg; also, the exposure interviews were conducted before the clinical examination and diagnoses of CTS were made

Comments:

- The exposure interviews were done prior to the clinical examinations, ensuring that the interviewers were unaware of the clinical diagnoses; however, it is not clearly stated that the physicians who made the diagnoses were unaware of the exposure interview results
- If the physicians were aware of exposure information, their clinical diagnoses may have been affected by this knowledge; this is a source of potential bias in the direction of overestimating the CTS-work association
- The home interview asks about forces in kg; but it is not clear how an interviewee is expected to estimate whether a grip force exceeds 3 kg; it seems unlikely that most workers would have an accurate estimate of grip forces unless they calibrate their estimates against forces measured with a dynamometer
- The authors do not speculate on why manual handling of loads greater than 20 kg were not associated with CTS in the adjusted model, but it seems reasonable to speculate that such high loads are handled by other muscle groups (legs, back, shoulder) and not in the hand muscles

Assessment: Adequate for an evidence statement concerning a qualitative association between CTS and vibration/handgrip force/repetition. There is not convincing evidence for a quantitative estimate (e.g., a "3 kg" handgrip force).