

Roquelaure Y, Mechali S, et al. Occupational and personal risk factors for carpal tunnel syndrome in industrial workers. Scand J Work Environ Health 1997;23:364-9.

Design: Case-control study

Population and setting:

- 65 workers with CTS (55 women, 10 men, mean age 41) matched for age, gender, and industrial plant in 3 large production plants in France
- Excluded from study if CTS was diagnosed before 1990, or if there were rheumatologic disease, thyroid disorders or diabetes before 1990

Main findings:

- CTS determined by 2 assessors reviewing medical files filled out annually by the company occupational physicians
- CTS diagnosed on the basis of median nerve symptoms, physical findings, and sensory or motor median nerve latency slowing; surgical release of the carpal ligament was also accepted as a case definition
- For each case, a control was selected of the same year of birth and sex from the payroll rosters of the same plant
- Nonoccupational activities were collected by self-administered questionnaire from cases and controls on schooling, odd jobs, household duties, etc
- Occupational activities were assessed by two trained assessors unaware of the medical status of the workers, using direct observation of the work stations
- The assessors recorded the pace of work, the type of tools and materials used, the number of motions per cycle and the length of the elementary work operations
- The assessors also recorded the weight of the tools and parts handled; force was considered "high" when the load was > 1 kg with a frequency of exertion over 10 times per hour
- Most medical factors were not related to CTS, with the exception of parity in women; women with CTS were more likely than women without CTS to have had more than 3 children
- Nonoccupational exposures, including odd jobs, gardening, and sports, were not associated with CTS
- Logistic regression models reported increased odds ratios for weight of tools >1 kg (OR=9.0), shortest elementary operation <10 seconds (OR=8.8), and lack of change in tasks or breaks (OR=6.0)
- Work station design with manual supply by workers (rather than by automation) had an increased odds ratio (OR=5.0), as did a lack of job rotation between work stations (OR=6.3)
- Obesity was not associated with CTS
- There was a dose-response relationship between the number of factors (parity, manual workstation supply, lack of operator turnover, force >1 kg, lack of breaks, and shortest task operation <10 seconds) and being a case of CTS
- Other postural factors of wrist and elbow were not associated with CTS

Authors' conclusions:

- The key risk factors for CTS in an industrial setting are occupational
- There is a cumulative effect of risk factors and occurrence of CTS
- Manual supply of the work station was associated with CTS; contrary to the assumption that automatic supply would increase the time constraint and thereby increase the risk of CTS, the biomechanical stress on the upper limb is more significant than the machine-driven work pace
- The prevention of CTS can be achieved by encouraging operators to rotate between workstations, by minimizing effort, and decreasing the repetitiveness of motion

Comments:

- Although a case-control study, most of the data used in the analyses came from chart review and observation of the work station; this removes most recall bias, which is often a threat to the validity of case-control studies
- Some personal factors associated with CTS (thyroid/rheumatologic disorders and diabetes) were exclusionary criteria; although they are rarely significant confounders, their contribution to CTS could not be measured in this study
- Although effort >1 kg seems small, only a small number of workers had efforts >2 kg
- The study is done in a production-line industrial setting, where it is likely that the work factors were present for most of the work day (6 hours or more)

Assessment: Adequate for evidence that a combination of factors increases the risk of CTS, and that force and repetition, together with a lack of task rotation, increase the risk of CTS