

Atroshi I, Gummesson C, et al. Carpal Tunnel Syndrome and Keyboard Use at Work. A Population-Based Study. Arthritis Rheum 2007;56(11)3620-3625.

Design: Cross-sectional study

Population/sample size/setting:

- 2465 persons of working age randomly sampled from a general population register in a region of 170,000 inhabitants in southern Sweden
- Target population was similar to the Swedish general population in terms of age, sex, socioeconomics, education, type of employment, unemployment, and frequency of medical conditions and disorders
- A general health questionnaire was mailed in 1997 asking participants about demographics, work status, work activities, general health, medical history, and regional musculoskeletal symptoms (upper extremity, lower extremity, spine)
- Publicity for the study described it as a survey of general health, without reference to upper extremities, CTS, or work-relatedness of any condition

Main outcome measures:

- Keyboard use was asked about with 5 response choices: none, <1 hour, 1 to 4 hours, 4 to 6 hours, and >6 hours
- All respondents who reported median nerve distribution sensory symptoms in the past 4 weeks were invited to undergo clinical examination and nerve conduction studies (NCS) by an examiner who was unaware of the reported keyboard exposure levels
- A control group of 5% of respondents having no median nerve symptoms was also invited for clinical examination and NCS
- Case definition of CTS was a hand diagram of probable or possible CTS with abnormal median NCS (≥ 0.8 ms median-ulnar sensory latency difference)
- There were 301 subjects with median nerve symptoms; 240 underwent clinical examination, 10 had previous surgery and 11 had no symptoms at the time of the exam; leaving 219 who underwent NCS; of these 219, 97 had NCS abnormality and were classified as CTS cases for the analysis
- There were 270 subjects who reported >4 hours/day of keyboard use; of these, only 7 (2.6%) had CTS; by contrast, 636 subjects reported no keyboarding, and of these, 33 (5.2%) had CTS; there was a significant trend that higher levels of keyboard use were associated with lower risk of CTS
- The trend toward lower risk of CTS with higher levels of keyboarding remained unchanged when potential confounders (age, sex, BMI) and comorbidities (diabetes, arthritis, hypothyroidism) were taken into account
- Although they were not confounders (did not affect the relationship between keyboarding and CTS), age, overweight, and smoking were all associated with increased risk of CTS
- Among subjects who reported no keyboard use, 60% were nonprofessional workers, 16% were professional workers, and 21% were retired or

unemployed; among subjects with ≥ 4 hours/day of keyboarding, these percentages were 18%, 69%, and 12%

- Keyboard use information was missing in 411 subjects, and was missing in 30 of the 97 CTS cases
- Subjects who did not provide information on keyboard use tended to be older and more overweight than those who did provide keyboard information
- In a multiple imputation analysis to handle missing data, the combined prevalence of CTS for subjects who use a keyboard for more than 1 hour per day was only half of the prevalence of CTS for subjects who keyboard for less than 1 hour per day

Authors' conclusions:

- Intensive keyboard use at work is associated with a reduced risk of CTS
- These results do not apply to repetitive activity in general, since those subjects who reported little keyboard use may have had exposure to other work activities that increase the risk of CTS
- Those who did not respond to the keyboarding question were more likely to be those who seldom used a keyboard at work; the missing data would most likely underestimate the reported association of a lower CTS risk with keyboard use

Comments:

- The questionnaire appears not to have asked about other kinds of force/repetition, which would have been useful in assessing the CTS risk factors in the subjects who reported little or no keyboard use
- The authors' handling of the missing data involves special analytical methods, but it is known from other sources that persons with low levels of keyboard use tend to over report their actual level of use
- This means that the respondents with missing keyboard information are unlikely to be failing to report intensive keyboard use
- The authors propose that repeated low-force muscle activity may decrease the risk of edema and of increased carpal tunnel pressure; however, this is speculative, since it depends on wrist position and other ergonomic factors

Assessment: High quality (CTS diagnosis based on symptoms plus nerve conduction studies, reliance on self-report of exposure is likely to understate the reported association) for an evidence statement that computer keyboarding is unlikely to cause CTS