**Mediouni Z, Bodin J, et al. Carpal tunnel syndrome and computer exposure at work in two large complementary cohorts. BMJ Open 2015;5:e008156.**

PMID: 26353869

Design: two cohort studies in France and in the United States

Purpose of study: to evaluate a possible relationship between computer use and CTS

Population/sample size/setting:

* France: 3710 workers in the Loire Valley recruited between 2002-2005 and followed up during 2007-2010
  + Industries included agriculture, construction, and services
  + Recruitment took place during mandatory health examinations for all salaried employees in France, including temporary and part-time workers
* US: 1107 newly hired workers in the St. Louis area recruited between July 2004-October 2006 and followed up during 2007-2011
  + Workers came from eight companies and from three construction trade unions, with requirements of a minimum age of 18, working at least 30 hours per week, and being newly hired or benefits eligible in the previous 30 days
  + Workers were excluded if they had a history of CTS or peripheral neuropathy or a contraindication to nerve conduction studies (NCS)

Case definitions:

* France: self-report of upper-limb symptoms in a periodic study led to a physical examination by an occupational physician using a standardized clinical procedure, where the case definition included the presence of symptoms in the median nerve distribution on the day of the examination with at least one physical finding from the following: flexion or carpal compression test, Tinel or Phalen, static two-point discrimination, resisted thumb abduction weakness, or visible atrophy of the abductor pollicis brevis muscle
* US: in addition to median nerve symptoms, abnormal nerve conduction studies were required to meet the case definition: as measured at 14 cm between stimulus and response electrodes: distal median motor latency >4.5 sec, distal sensory latency >3.5 ms, or median-ulnar latency difference >0.5 sec

Exposure assessment:

* France: responses to questions asked at baseline regarding computer use: never or almost never, less than 2 hr/day, 2-4 hr per day, all or almost all of the working day
  + Separate questions were asked which changed as computer technology changed (keyboard, mouse, light ben, scanner, barcode reader…)
* US: exposure was based on a job-exposure matrix containing occupational codes from the Occupational Network (O\*NET), accompanied by a response on a 5 point scale regarding the importance of computers to the worker’s daily tasks (from “not important” to “extremely important”)
* Other variables related to potential risk of CTS were BMI, age, sex, and alcohol/tobacco use

Estimation of exposure/CTS association:

* For both French and US cohorts, the basic statistical exploration involved multivariable logistic regression in which the tested models included computer exposure variables and non-work variables such as BMI, age, gender
* Additional analyses were undertaken because of significant attrition in both cohorts (only 41.8% of the French cohort and 64.2% of the US cohort had complete followup data), with much of the attrition in the French cohort being due to the global economic downturn in 2007-10
  + In the French cohort, there was less attrition among older workers and who were employed for longer in their initial job
  + In the US cohort, there were no significant differences between those kept and those lost to followup with respect to age, gender, BMI, medical history, or baseline job category

Main findings:

* - ndings:al history, or baseline job catgeory ences between those kept and those lost to followup with respect to age, gender, There were 36 incident cases (2.3%) of CTS in the French cohort and 31 in the US cohort (4.3%)
* in the In in In the French cohort, 57% of the jobs were “service” and 37% were “clerical;” for the US cohort, 40.8% were “construction” and 36.9 were “clerical”
* feffefFew of the cases of CTS occurred in clerical jobs (only 3 in the French cohort and 2 in the US cohort)
* For both cohorts, the adjusted odds ratios (OR) in the logistic regression models did not show computer work as a risk factor for CTS
  + In the French cohort, the adjusted OR for CTS in workers whose jobs entailed computer use all or almost all of the working day was 0.39 (95% confidence interval 0.17 to 0.73) compared to workers whose work involved computers “never or almost never”
  + In the US cohort, the adjusted OR for the highest level of computer use was 0.16 (95% CI 0.05 to 0.59) compared to the lowest level of computer use
* The French cohort also was assessed with the Borg exertional scale, and the level of exertion was lower for computer workers than for workers in other occupations
* BMI was a risk factor in the US cohort; a BMI>=30 had an OR of 6.04 compared to a BMI of 18.5 to 24.9

Authors’ conclusions:

* In two separate cohort studies in France and the US, no association was observed between workplace computer use and CTS
* The study had many limitations in both cohorts
  + In France, there was high attrition, with only 42% of the baseline cohort available at followup due to the economic decline in employment that occurred during the study period
  + The French case definition did not include nerve conduction studies, and this could lead to disease misclassification
  + The degree of potential exposure misclassification in the French cohort was not clear, due to the self-report of the computer use variables, and due to the lack of separation of keyboard, mouse, and stylus use
  + The US cohort used a job exposure matrix in which the computer-related item asked the worker how important computer work was in the current job; this does not assess biomechanical factors in upper extremity use
* Forceful work exposures and computer use exposures were negatively correlated; hand exertion is rare among computer users compared to workers in other types of job
  + This does not rule out the possibility that some types of specific biomechanical factors in a subset of computer jobs may increase the risk of CTS
* However, computer users are at significantly lower risk of CTS compared to workers in food processing, manufacturing, construction, and other job sectors in which hand use is likely to entail forceful exertion with their associated increased risks of CTS

Comments:

* The computer users are being compared to workers in non-computer use industries, but the composition of these industries is not well characterized (for example, the percentage of each cohort involved in construction or manufacturing with hand tool use requiring forceful repetition)
* The authors cite a study (Ijmker 2011) which studied 1009 office workers in the Netherlands, comparing the association between self-reported computer use and self-reported upper extremity symptoms, for whom computer use was also measured with software recordings of all keyboard and mouse use
  + The study showed a positive association between self-reported computer use and upper extremity symptoms
  + However, there was no association between computer use measured by the software program and upper extremity symptoms
  + An inference was made by the authors from this study that there was a low correlation between the two measures of computer use
* The adjusted odds ratios for CTS and computer use are quite low in both cohorts, and the misclassification in both cohorts is not likely to minimize the association between computer use and CTS
* The evidence from both cohorts supports a conclusion that in comparison with workers in other industries which include jobs with high levels of had force; there was no comparison between computer workers and the general population or with people who are not working

Assessment: a combination of adequate studies from two separate cohorts supporting good evidence that workers whose jobs principally require computer use are at lower risk of carpal tunnel syndrome than workers in other industries which include food processing, manufacturing, service work, construction, and other occupations in which forceful hand exertions are likely to be risk factors for CTS

Reference:

Ijmker S, Huysmans MA, et al. Software-recorded and self-reported duration of computer use in relation to the onset of severe arm-wrist-hand pain and neck-shoulder pain. Occup Environ Med 2011;68:502–9.