

Lassen CF, Mikkelsen S, et al. Elbow and Wrist/Hand Symptoms Among 6943 Computer Operators: A 1-Year Follow-Up Study (The NUDATA Study). Am J Ind Med 2004;46:521-533.

Design: Prospective cohort study

Population/sample size/setting:

- 6943 workers (4347 women, 2596 men) in a Danish trade union for professional technicians followed for 1 year of employment beginning in 2000
- These were drawn from a population of 9480 unionized workers in more than 3500 workplaces; they received a questionnaire at baseline and a second questionnaire in 2001

Main outcome measures:

- Elbow and wrist/hand pain were ascertained both at baseline and at follow-up, and classified as either present or as “severe”
- Symptoms were classified as “severe” if the worker reported more than 30 days of pain or discomfort and at least “quite a lot of trouble” during the past 12 months
- Several aspects of the workplace and use of computers were gathered with the questionnaires: (1) hours per week using a computer keyboard, (2) hours per week using a computer mouse, (3) posture-related variables such as the position of the mouse in relation to the shoulder and the edge of the desk, keyboard position, and forearm/wrist support, (4) desk chair adjustment, and (5) overall satisfaction with the physical work environment
- Questions about personal characteristics included age, sex, height, weight, tendency to worry or to be competitive, leisure-time physical activity, social network support outside work, and concurrent medical diagnoses of diabetes, rheumatologic diseases, thyroid disease, and disorders of the nervous system
- Participants who reported at least moderate pain were invited to a standardized clinical exam by trained physicians blinded on exposure information
- Criteria for epicondylitis and tendinopathy, including DeQuervain’s, were applied by the examiners in a similar manner
- Logistic regression analyses were used in several ways, using different mathematical models; the exposure variables of main interest were computer mouse, keyboard, and personal characteristics
- Baseline symptoms were common; for example, the prevalence of wrist/hand pain was 46.2% and of elbow pain was 27.5%
- For mouse use, linear effects were seen for all 8 examined pain states
- Mouse use effects were seen beginning with exposures as low as 2.5 hr per week for baseline elbow and wrist pain; for severe baseline elbow and wrist/hand pain, the effects of mouse use were seen beginning at 5 hr/week
- Mouse use effects were also seen in the follow-up questionnaires; the effects began as low as 2.5 hr/week, but for severe elbow or wrist follow-up pain, the effects of mouse use were not seen until mouse use exceeded 20 hr/week

- For keyboard use at baseline, effects did not parallel those for mouse use; the odds ratios for elbow and hand/wrist pain were not significant, except for wrist/hand pain with keyboard use in excess of 20 hr/week
- For keyboard use at follow-up, significant effects were seen for severe elbow pain beginning at 10-15 hours/week; for wrist/hand pain, keyboard time was not significantly associated with symptoms
- Only a small number of specific diagnoses were made: at baseline, there were 31 cases of epicondylitis, 9 with DeQuervain's, and 37 with tendinopathy
- On follow-up, 7 cases of lateral epicondylitis, 3 of DeQuervain's, and 8 of tendinopathy were diagnosed

Authors' conclusions:

- There were weak and sporadic associations between upper extremity symptoms and self-reported mouse/keyboard use
- Few workers met commonly accepted criteria for clinical diagnoses
- Self-reported mouse and keyboard use predicted elbow and wrist/hand pain without threshold effects, but mouse use and keyboard time were not predictors of clinical conditions
- Biases may arise if persons prone to upper extremity symptoms move to lower levels of computer exposure, but attribute their pain to work exposure
- As has happened in other studies, the hours of actual use may be overestimated by the self-reported computer mouse and keyboard times

Comments:

- There was a very large difference between the prevalence of pain and the prevalence of clinical diagnoses
- The low thresholds for mouse and keyboard use in symptom reporting may be due to the increased sensitivity to discomfort when symptoms are already present, as the authors speculate
- Keyboard use appears not to be associated with most wrist/hand symptoms
- Table VI reports increased odds of severe elbow pain beginning at 10-15 hours of exposure, but the regression coefficient for keyboard time yields an odds ratio whose confidence interval includes the null value
- Since the keyboard time by category does not show a non-linear pattern (such as a U shape), which might lead to a non-significant coefficient for keyboard use, the time by category coefficients are difficult to interpret, and a relationship between keyboard use and elbow symptoms are not clear
- By contrast, the regression coefficient for mouse time excludes the null value in Table VI and in the other tables, making the category coefficients easier to interpret

Assessment: Adequate for evidence that mouse use is associated with upper extremity symptoms; inadequate for evidence that keyboard use is associated