**Descatha A, Dale AM, et al. Self-reported physical exposure association with medial and lateral epicondylitis incidence in a large longitudinal study. Occup Environ Med. 2013 September ; 70(9): 670–673.**

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Design: industry-based cohort study

Purpose of study: to examine the association of physical occupational risk factors in a cohort of workers in the United States

Population/sample size/setting:

* 1107 newly employed workers (demographics not given) in St. Louis, MO, hired between July 2004 and October 2006
* Subjects were 18 years or older, working at least 30 hours per week, and recruited from 8 employers and 3 trade unions representing health care, manufacturing, construction, and biotechnology
* Workers with a history of carpal tunnel syndrome were excluded

Assessment of exposure:

* Baseline questionnaires included age, gender, BMI, educational level, prior history of arthritis, and elbow and forearm symptoms occurring more than 3 times of lasting more than one week in the past year
* Self-reported workplace measures asked about 3 general categories of physical exposure, ascertained six months after the workers had begun their new jobs
  + “Bending”: how long on average the worker frequently bent or twisted the hands or wrists
  + “Rotating”: how long altogether the worker did tasks involving rotating, twisting, or screwing motion of the forearm
  + “Gripping”: How long on average the worker used the hand in a forceful grip
  + Responses were categorized into four categories:
    - None or less than 1 hr/day
    - 1-2 hr/day
    - 2-4 hr/day
    - 4 or more hr per day
* In addition to physical exposure variables, a social support scale was used to define a low level of support, defined as the lowest quartile of support in the population

Assessment of outcome:

* Medial and lateral epicondylitis were assessed, using questionnaires and a physical examination, 3 to 5 years after the baseline information was gathered
* Workers who had elbow or forearm pain at baseline were excluded from the assessment of epicondylitis
* The case definition required recurrent or persistent elbow pain in the past year and a positive physical exam of the same arm
  + The examination was positive if pain was elicited by examiner palpation of the medial or lateral epicondyles, muscle insertions, or surrounding musculature, or if pain occurred on resisted flexion or extension of the wrist when the elbow was held in 30 degrees of flexion
  + Both arms were examined, but cases of epicondylitis were counted at the level of the worker

Results:

* Of the 1107 workers in the inception cohort, 76 had forearm or elbow pain at baseline and were excluded
* At the time of followup (a median time of 34 months from baseline), 699 completed the followup questionnaire and examination
* Loss to followup was more common in workers with a high school education or less, but no other variables were associated with loss to followup
* At followup, 34 workers had lateral epicondylitis, 30 had medial epicondylitis, 48 had either medial or lateral epicondylitis, and 16 workers had both
* Due to the number of workers exposed and due to the correlation between bending and twisting, the work exposure variables were recoded into one variable that required both bending of over 4 hr/day and rotating over 2 hr/day; this single bending/rotating variable was used in addition to the separate exposures of bending, rotating, and gripping
* Odds ratios (OR) were estimated using a logistic regression model in which the exposure variables were entered one at a time (univariable) and together with demographic variables (multivariable)
  + Univariable analyses for bending, for rotating, and for gripping appeared to show a dose-response relationship for both medial and for lateral epicondylitis
    - For example, for bending, the workers with no bending or bending less than one hour per day had, by definition, an OR of 1.0 for lateral epicondylitis; for 1-2 hr/day, the OR was statistically not different from 1.0; for 2-4 hr/day, the OR was 2.8 but with a 95% confidence interval which was so wide that it included the null value of 1.0; however, for 4 hr/day, the OR was 4.4 with a 95% CI from 1.5 to 13.1
    - Bending also was associated with medial epicondylitis; for 2-4 hr/day, the OR was 4.9 with a 95% CI from 1.1 to 20.7, and for 4 or more hr/day, the OR was 8.2 with a 95% CI from 2.4 to 20.9
  + For the recoded variable requiring bending 4 or more hours per day plus rotating 2 or more hours per day, the multivariable OR for lateral epicondylitis was 2.5 with a 95% CI from 1.1 to 5.3; for medial epicondylitis, the OR was 3.1 with an OR from 1.4 to 6.8
    - The addition of the gripping variable to the model did not influence the OR for epicondylitis
* The authors also performed a separate sensitivity analysis which was restricted only to workers who had not changed jobs during the followup period; the OR for bending/rotating and epicondylitis was very similar to the analysis for all workers
* Lack of social support was not associated with epicondylitis
* Low educational attainment defined as high school or less was associated with medial epicondylitis (OR 3.5 with 95% CI from 1.3 to 8.6) but was not associated with lateral epicondylitis

Authors’ conclusions:

* Self-reported physical exposures of wrist bending and forearm rotation were associated with the incidence of medial and lateral epicondylitis after three years of followup in a cohort of workers who did not have epicondylitis originally
* The study had several limitations, which included the fact that serial followup examinations were not done during the period from baseline to three years; this had the potential to miss cases of epicondylitis which occurred and then resolved during the followup time
* Also, the study relied on self-report of exposure, and assumed that the job exposure information elicited at 6 months represented the exposure throughout the entire followup period
  + However, this may not have been important, since restricting the analysis to workers who had not changed jobs did not change the strength of the association
  + The self-report of exposure also occurred more than two years before the assessment of outcome, which protects against the possibility of epicondylitis influencing the reporting of work exposures

Comments:

* The 1107 workers in the inception cohort are not described in terms of age and sex, but the 699 workers who were accounted for in the followup consisted of 449 men and 250 women
* There were both univariable and multivariable odds ratios for the bending/rotating variable, and the magnitude of the odds ratios was not greatly different; however, it was not clear which demographic variables were added to the univariate model to obtain the multivariable model (presumably age and sex, but not clear what else)
* There are wide confidence intervals for some exposures due to the small numbers of epicondylitis cases available for analysis in some exposure categories (e.g., only 1 case of medial epicondylitis for bending more than 4 hours per day)
  + However, the odds ratios for the combined bending/rotating exposure variable and having either medial or lateral epicondylitis had 22 exposed cases, and the OR of 3.5 had a 95% CI from 1.9 to 6.5
* It is not clear whether the examiners who certified the epicondylitis cases had information concerning the baseline exposure variables; blinding of outcome assessment is not clear and the study protocol is not listed at the NIOSH website under the grant number in the acknowledgements
* The main strengths of the study are a population free of epicondylitis at the beginning of their new jobs and ascertainment of exposure more than two years before ascertainment of the outcome
* Although there is a dose-response relationship for bending alone, for rotating alone, and for gripping alone, the combined bending/rotating variable had the most stable odds ratio due to combining the categories into a single yes/no variable rather than several ordered exposure variables

Assessment: adequate for some evidence that in workers who are newly hired and free of epicondylitis at the time of hire, there is an increased risk of medial and lateral epicondylitis with bending, gripping, and rotating; and the combination of bending the wrist for 4 or more hours per day and rotating the forearm for more than two hours per day approximately triples the risk of developing epicondylitis during three years of work exposure