2014

Do symptoms and physical examination findings predict elbow pain and functional outcomes in a working population?

Alexis Descatha

Universite Versailles St-Quentin

Ann Marie Dale

Washington University School of Medicine in St. Louis

Lisa Jaegers

Washington University School of Medicine in St. Louis

Bradley Evanoff

Washington University School of Medicine in St. Louis

Follow this and additional works at: https://digitalcommons.wustl.edu/ohs_facpubs

Recommended Citation

Descatha, Alexis; Dale, Ann Marie; Jaegers, Lisa; and Evanoff, Bradley, "Do symptoms and physical examination findings predict elbow pain and functional outcomes in a working population?". *Journal of Occupational and Environmental Medicine*, e131-2. 2014.

This Article is brought to you for free and open access by the Occupational Health and Safety at Digital Commons@Becker. It has been accepted for inclusion in OHS Faculty Publications by an authorized administrator of Digital Commons@Becker. For more information, please contact vanam@wustl.edu.

Readers are invited to submit letters for publication in this department. Submit letters online at <http://joem.edmgr.com>. Choose "Submit New Manuscript." A signed copy-right assignment and financial disclosure form must be submitted with the letter. Form available at www.joem.org under Author and Reviewer information.

Do Symptoms and Physical Examination Findings Predict Elbow Pain and Functional Outcomes in a Working Population?

To the Editor:

Epicondylitis (medial and lateral) is one of the most common disorders among active workers,^{1,2} prompting recommendations for surveillance^{3,4} or post-offer pre-placement examinations.⁵ Nevertheless, little is known about the value of symptoms and physical examination findings for epicondylitis in predicting future elbow pain, epicondylitis, and job impairment. In a large cohort of newly employed workers, we measured symptoms and physical examination findings of epicondylitis at the time of initial employment and examined the predictive value of these findings for elbow pain, epicondylitis, and work impairment 3 years later.

We recruited 1107 newly employed workers in several industries in St Louis between July 2004 and October 2006.^{6,7} Subjects completed a symptom questionnaire (elbow and forearm symptoms occurring more than three times or lasting more than 1 week in the last year) and received a

physical examination (PE) at baseline. The PE was considered positive if the subject reported pain or discomfort in either arm when the examiner palpated the medial or lateral epicondyles, muscle insertions, and surrounding musculature, or if the subject reported any pain or discomfort in the elbow when the examiner applied resistance against extension or flexion at the wrist (resistance was applied mid-dorsally to the subject's hand with the elbow in 90° of flexion). Examiners were trained in the use of a structured PE protocol.

Subjects' baseline status was classified in four categories: (1) subjects with no elbow symptoms and negative (normal) PE; (2) subjects without elbow symptoms, but with a positive (abnormal) PE; (3) subjects with elbow symptoms and negative PE; and (4) subjects meeting our epicondylitis case definition of elbow symptoms and positive PE occurring in the same arm. We conducted follow-up questionnaires and performed PE 3 years after baseline measures using similar protocols. At follow-up we defined "severe" elbow pain as elbow pain within the past 30 days with a rating of five or higher on a scale of 0 (no discomfort) to 10 (worst discomfort imaginable). Job impairment was assessed using a composite outcome⁶ that included any worker who reported a limitation attributed to elbow symptoms in any one of the following areas: (1) limited ability to work, (2) decreased productivity, (3) lost time from work, (4) placed on job restrictions, and (5) change in job or employer because of symptoms. Analysis compared baseline subject categorization with three outcomes at follow-up: epicondylitis, severe elbow pain, and job impairment. Comparisons used nonordinal multinomial logistic regression models (for outcomes with more than two categories) and simple logistic regression models for the outcomes of job impairment and severe elbow pain. We also examined the predictive value of baseline subject categorization for elbow pain, epicondylitis, and work impairment 3 years later.

The study group included 1107 newly hired workers, 65.1% male, with a mean age of 30.3 years (standard deviation, 10.3 years). Symptom questionnaires and repeated physical examination data were available on 742 subjects. Median follow-up was 34 months, with a range of 26 to

71 months. There were no differences in baseline classification of elbow outcomes between subjects lost to follow-up and those who were followed up. The evaluation of symptoms and PE findings by category are summarized in Table 1. Of the subjects with epicondylitis at follow-up, 59.6% ($n = 34$) had no elbow symptoms and positive elbow PE at baseline. The natural history of symptoms was also complex. Across all outcomes, subjects with both elbow symptoms and PE findings (epicondylitis) had the strongest association with future pain (odds ratio $\text{severe pain} = 7.2$ [2.8 to 21.4]), PE findings (odds ratio $\text{epicondylitis} = 10.3$ [3.4 to 31.5]), and job impairment (odds ratio $\text{job impairment} = 7.2$ [2.4 to 21.3]). Although PE findings in subjects without pain were associated with future epicondylitis (and with future PE findings), PE alone was not associated with job impairment, whereas pain alone was associated with all outcomes. The positive predictive value of different combinations of symptoms and PE was low for all categories (<30%, Table 1). In this relatively healthy worker cohort, negative predictive values were high for all combinations of symptoms and PE.

This study of elbow pain in newly hired workers found that elbow pain and physical findings suggestive of epicondylitis predicted future pain and job impairment, though the predictive value of symptoms and physical findings was low. Limitations of the study include the follow-up intervals, which may have been too widely spaced to detect all cases of elbow pain or epicondylitis. This information is useful for designing surveillance programs for epicondylitis.

Alexis Descatha, MD

Univ Versailles St-Quentin, F-78035, Versailles, and Inserm, UMS 011, Population-Based Epidemiological cohorts Unit and AP-HP, Occupational Health Unit/EMS (Samu92), University hospital Poincaré, Garches, France

Ann Marie Dale, PhD

Lisa Jaegers, PhD

Bradley Evanoff, MD, MPH

Division of General Medical Sciences, Washington University School of Medicine, St Louis, MO

This study was supported by CDC/NIOSH (grant # R01OH008017-01) and by the National Center for Research Resources (NCRR) (grant # UL1 RR024992), a component of the National Institutes of Health (NIH), and NIH Roadmap for Medical Research. Its contents are solely the responsibility of the authors and do not necessarily represent the official view of NIOSH, NCRR, or NIH. No authors in this study are affiliated with any organization that to any author's knowledge have direct interests, including financial interest, in the subject matter, or materials discussed.

The authors declare no conflicts of interest.

Address correspondence to: Ann Marie Dale, PhD, Division of General Medical Sciences, Washington University School of Medicine, St Louis, MO 63110 (adale@dom.wustl.edu).

Copyright © 2014 by American College of Occupational and Environmental Medicine

DOI: 10.1097/JOM.0000000000000293

TABLE 1. Evaluation of Symptoms and PE Findings, and Predictive Values, According to Baseline Categories

Baseline Categorization	Outcome at Follow-Up					Predictive Values of severe Elbow Symptoms, Clinical Examination, and Job Impairment at Follow-Up According to Baseline Elbow Clinical Examination Findings					
	No Elbow Symptoms and PE Negative (n = 525)	No Elbow Symptoms and PE Positive (n = 121)	Elbow Symptoms Positive and PE Negative (n = 39)	Elbow Symptoms Positive and PE Positive (ie, Epicondylitis, n = 57)	Total (n = 742)	Severe Elbow Symptoms		Epicondylitis		Job Impairment	
	n (%)	n (%)	n (%)	n (%)	n (%)	PPV	NPV	PPV	NPV	PPV	NPV
No elbow symptoms and PE positive	35 (6.6)	31 (25.6)	2 (5.1)	10 (17.5)	78 (10.5)	0.12	0.93	0.12	0.94	0.07	0.94
Elbow symptoms positive and PE negative	14 (2.6)	4 (3.3)	4 (10.2)	7 (12.2)	29 (3.9)	0.21	0.93	0.24	0.94	0.16	0.94
Elbow symptoms positive and PE positive (ie, epicondylitis)	8 (1.5)	3 (2.4)	3 (7.6)	6 (10.5)	20 (2.7)	0.30	0.93	0.30	0.94	0.25	0.95

PE, physical examination (for epicondylitis); PPV, positive predictive value; NPV, negative predictive value.

REFERENCES

- Shiri R, Viikari-Juntura E, Varonen H, et al. Prevalence and determinants of lateral and medial epicondylitis: a population study. *Am J Epidemiol*. 2006;164:1065–1074.
- Roquelaure Y, Ha C, Rouillon C, et al. Risk factors for upper-extremity musculoskeletal disorders in the working population. *Arthritis Rheum*. 2009;61:1425–1434.
- Harrington JM, Carter JT, Birrell L, et al. Surveillance case definitions for work related upper limb pain syndromes. *Occup Environ Med*. 1998;55:264–271.
- Sluiter BJ, Rest KM, Frings-Dresen MH. Criteria document for evaluating the work-relatedness of upper-extremity musculoskeletal disorders. *Scand J Work Environ Health*. 2001;27(suppl 1):1–102.
- Harbin G, Olson J. Post-offer, pre-placement testing in industry. *Am J Ind Med*. 2005;47:296–307.
- Gardner BT, Dale AM, Vandillen L, et al. Predictors of upper extremity symptoms and functional impairment among workers employed for 6 months in a new job. *Am J Ind Med*. 2008;51:932–940.
- Descatha A, Dale AM, Jaegers L, et al. Self-reported physical exposure association with medial and lateral epicondylitis incidence in a large longitudinal study. *Occup Environ Med*. 2013;70:670–673.