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OCCUPATION AND EPICONDYLITIS: A POPULATION-BASED STUDY

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Abstract

Objectives—To explore the relationship between occupational exposures and lateral and medial epicondylitis and the effect of epicondylitis on sickness absence in a population sample of working aged adults.

Methods—This was a cross-sectional study of 9696 randomly selected adults aged 25-64 years involving a screening questionnaire and standardised physical examination. Age- and sex-specific prevalence rates of epicondylitis were estimated and associations with occupational risk factors explored.

Results—Among 6038 respondents, 636 (11%) reported elbow pain in the last week. 0.7% of those surveyed were diagnosed with lateral epicondylitis and 0.6% with medial epicondylitis. Lateral epicondylitis was associated with manual work (OR 4.0, 95% CI 1.9-8.4). In multivariate analyses, repetitive bending/straightening elbow > 1 hour day was independently associated with lateral (OR 2.5, 95% CI 1.2-5.5) and medial epicondylitis (OR 5.1, 95% CI 1.8-14.3). 5% of adults with epicondylitis took sickness absence because of their elbow symptoms in the past 12 months (median 29 days).

Conclusions—Repetitive exposure to bending/straightening the elbow was a significant risk factor for medial and lateral epicondylitis. Epicondylitis is associated with prolonged sickness absence in 5% of affected working-aged adults.

Keywords

lateral epicondylitis; medial epicondylitis; epidemiology; occupation; sickness absence

BACKGROUND

Lateral epicondylitis (tennis elbow) and medial epicondylitis (golfer's elbow) are common painful soft tissue upper limb conditions. Lateral epicondylitis, thought to be synonymous

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with Morris' 1882 description of 'lawn tennis arm' [1], is associated with characteristic pain and sensitivity in the lateral elbow region, at or near the origin of the extensor carpi radialis brevis. Medial epicondylitis is a disorder similar to lateral epicondylitis affecting the medial elbow in the region of superficialis flexor digitorum. The disability associated with epicondylitis can be remarkable. Although a common disease with significant consequence, little knowledge of its aetiology is based upon systematic research and concepts of its patho-anatomical basis are controversial.

There have been several cross-sectional epidemiological studies of the occurrence of epicondylitis in workplace settings, which generally, but not universally, suggest an increased risk of epicondylitis in association with strenuous manual tasks [2]. In the meat-processing industry, for example, several studies, including one that was prospective, suggested that workers exposed to sausage making, packaging/folding and meat cutting had increased incidence rates for epicondylitis compared with their colleagues who were office workers or supervisors [3-5].

Workplace studies are clearly valuable but are subject to potential biases, not least the healthy worker effect, responder bias and issues associated with accurate measurement of exposure. Accurate attribution of the principal outcome has also varied: most occupational studies have measured lateral and medial epicondylitis together or taken no account of medial epicondylitis. Where a physical examination has been included [6-9], the diagnostic criteria utilised are heterogeneous and have limited evidence of reliability or validity [10]. In their critical appraisal of this literature, the US NIOSH felt that these studies provided 'sufficient evidence to suggest that there is a strong association of combinations of factors (force, repetition and vibration) with increased risk of epicondylitis but insufficient evidence that exposure to any one of these types of exposures alone is associated' [11].

In 1996-7, the UK Health and Safety Executive (HSE) convened a multidisciplinary panel which derived consensus diagnostic criteria for, among other upper limb conditions, medial and lateral epicondylitis [12]. The case definition for lateral epicondylitis was 'lateral epicondylar pain and tenderness and pain on resisted extension of the wrist and for medial epicondylitis was 'medial epicondylar pain and tenderness and pain on resisted flexion of the wrist'. These criteria were incorporated into a comprehensive standardised examination protocol for use in epidemiological studies [13,14]. We have shown that the examination protocol can be taught to trained research nurses, performs reliably within- and between-observers, and has face validity when assessed against physicians' clinical diagnoses [13,14].

The aim of the current study was to investigate the role of occupational factors in medial and lateral epicondylitis in a general population sample and explore the impact of epicondylitis on sickness absence using a standardised physical examination algorithm.

Subjects and Methods

Study design

This was a cross-sectional population-based study. At baseline, the presence or absence of elbow pain was recorded in addition to the assessment of demographic factors. The questionnaire enquired about exposure to mechanical workplace factors (use of a keyboard > 1 hour/day and/or > 4 hours/day; repetitive movements of the wrist or fingers > 1 hour and/or > 4 hours/day; bending/straightening elbow > 1 hour/day; use of hand/arm vibrating tools > 1 hour/day; working with arms above shoulder height > 1 hour/day; carrying weights on one shoulder; lifting weights > 5kg in one hand; working with neck bent forwards > 2 hours/day; and working with neck twisted); and psychosocial workplace factors (bonuses, targets;

piecemeal work and deadlines; available support from colleagues and seniors; latitude at work and job satisfaction). Symptomatic respondents were invited to attend an interview and clinical examination (Figure 1).

Study subjects

The study population (n=9696) comprised all men and women aged 25-64 years who were: a) registered with one of two general practices (chosen to represent a diverse socio-economic profile); b) still living at the most recent address listed in the practice's records; and c) not suffering from illness or recent bereavement that, in the opinion of their GP, made it inadvisable for them to be approached or impossible for them to answer a self-administered questionnaire. The study had ethical approval from the Southampton Local Research Ethics Committee. All subjects gave written informed consent.

Methods

Between June 1998 and August 2000, each member of the study population was sent a validated questionnaire [15] asking about demographic variables, lifestyle, employment and symptoms of pain lasting at least one day in the past 7 days in the elbow. Non-responders were sent a single reminder after four weeks. All respondents reporting elbow pain in the past week were invited to undergo interview and physical examination. At interview, a trained research nurse used a structured questionnaire to collect supplementary and updated information about the distribution and impact of symptoms in the elbow, and examined the subject according to the Southampton examination protocol [13,14]. Those who failed to attend for interview were invited to a further appointment after 3-4 weeks.

An algorithm was applied to the findings from the interview and physical examination to classify elbow pain as lateral or medial epicondylitis, or non-specific elbow pain, in either the dominant or non-dominant arm or both. The prevalence of medial and lateral epicondylitis was estimated for the study population, under the assumption that responders to the initial postal questionnaire were representative of the study population overall, and that those who underwent interview and examination were representative of all who were invited to attend.

Analysis was carried out with the STATA® statistical package. The age- and sex-specific prevalence of lateral and medial epicondylitis among men and women was explored. Initially, associations of epicondylitis with age, sex, body mass index, employment status, diabetes, smoking status and psychological wellbeing were explored. Associations of epicondylitis with mechanical and psychosocial workplace factors were then explored. Finally, the risk factors for epicondylitis among working aged adults were explored by age-adjusted logistic regression with mutual adjustment for the different risk factors.

Results

Response rates

Overall, useable replies were received from 6038 (62%) individuals (Figure 1), mean age 45.6 years (range 24.6 - 66.3 years), and 3342 (55%) female. Most (95%) were Caucasian and 77% were in paid employment (83% of men and 71% of women).

Prevalence rates

In total, 636 (11%) respondents reported elbow pain in the baseline questionnaire (310 (12%) men and 326 (10%) women) (Table 1). All 636 subjects were invited for interview and 412 (65%) attended. At interview (median 8 weeks later), elbow pain persisted in 240 (58%) subjects. 45 subjects fulfilled diagnostic criteria for lateral epicondylitis (21 men and

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24 women) (estimated point prevalence 0.8% among men and 0.7% among women), 0.5% in the dominant arm, 0.3% in the non-dominant arm and 0.1% in both arms (Table 1). 34 subjects were classified with medial epicondylitis (10 men and 24 women) (estimated point prevalence 0.4% among men and 0.7% among women); 0.4% in the dominant arm, 0.3% in the non-dominant arm and 0.1% in both arms (Table 1). The highest rate of prevalence of epicondylitis was seen in the age band 45-54 years in both genders. A predisposition for lateral and medial epicondylitis in the dominant arm was seen among women (0.5% vs. 0.3% and 0.4% vs. 0.3% respectively) but not among men (0.4% vs. 0.5% and 0.2% vs. 0.3% respectively).

Impact

In total 27% of those diagnosed with lateral epicondylitis and 24% of those with medial epicondylitis reported that at least one of dressing, carrying, driving or sleeping was impossible. The same functional impairment was only reported among 8% of those with non-specific elbow pain. More than 40% of subjects with epicondylitis had seen their GP about their elbow symptoms in the last 12 months as compared with 33% of those with non-specific elbow pain. 5% of the subjects with epicondylitis had taken sickness absence because of their elbow symptoms as compared with 3% of those with non-specific elbow pain. The median sickness absence attributable to epicondylitis was an estimated 29 days in the last 12 months.

Risk factors for lateral epicondylitis

After adjustment for age and gender, lateral epicondylitis was statistically significantly associated with psychological distress (OR 4.5, 95% CI 2.1-9.5) and being a blue collar (manual) worker (OR 3.8, 95%CI 1.8-7.9) in the univariate analyses but was not associated with BMI, smoking status, or diabetes (data not shown). When explored in the multivariate models, both factors remained statistically significant independent risk factors for lateral epicondylitis. Subsequently, the effect of the occupational exposures was explored with adjustment made for psychological distress, blue collar status, age and gender (Table 2). Lateral epicondylitis was independently statistically significantly associated with self-reported bending/straightening the elbow > 1 hour/day (OR 2.5, 95% CI 1.2-5.5). Other exposures including keyboard use, working with arms above shoulder height and exposure to hand transmitted vibration were not significantly associated.

Risk factors for medial epicondylitis

After adjustment for age and gender, medial epicondylitis was statistically significantly associated with psychological distress (OR 4.9, 95% CI 2.0-12.4) but not with any other personal factors and not with blue collar working status (data not shown). After adjustment for age, gender and psychological distress the only workplace factor that remained statistically significantly associated with medial epicondylitis was bending/straightening elbow > 1 hour/day (OR 5.1, 95% CI 1.8-14.3) (Table 2).

Discussion

The results of this population-based study suggest that there is an important relationship between occupation and epicondylitis. After adjustment for age, gender and psychological distress, lateral and medial epicondylitis were highly significantly associated with repetitive bending/straightening of the elbow for greater than one hour/day (OR 2.5, 95%CI 1.2-5.3 and OR 5.1, 95%CI 1.8-14.3 respectively). This study also allows an estimation of the impact of epicondylitis on the workplace such that 5% of those diagnosed with epicondylitis reported having taken sickness absence in consequence and the median estimated duration of sickness absence was 29 days out of the last 12 months.

The demonstration of an association between physical workplace factors and epicondylitis is not new having been shown in several manually intensive occupations, such as butchers and meat cutters [3-5] construction workers [16] and automobile assembly workers [17]. However, workplace based studies can be subject to bias, not least the healthy worker effect. The strength of the current study is that it includes information from more than 6000 working-aged adults across the age range 25-64 years, in or out of work. The outcomes of both medial and lateral epicondylitis have been verified by a clinical examination algorithm which has been shown to be reliable and valid and, if anything, to be specific rather than sensitive. This suggests that the cases of epicondylitis diagnosed by the examination algorithm are highly unlikely to be overturned by clinicians. Uniquely, this study separates lateral from medial epicondylitis and demonstrates that the relationship between manual occupations and epicondylitis holds true in both types of epicondylitis.

In the past, occupational epidemiological studies have focussed on physical workplace exposures and taken little account of psychosocial factors. Our finding of strong associations (OR 3.9 and 4.9) of lateral and medial epicondylitis with psychological distress are of course cross-sectional and therefore cannot be interpreted as cause or effect. However, these findings together with those of another recent small study, which showed that sufferers of lateral epicondylitis were significantly more anxious and depressed than controls [18], suggest that prevention and treatment of epicondylitis should focus not only on physical and ergonomic measures but also that psychological factors and the Karasek [19] model (demand/control/support) of psychosocial workplace factors need to be considered within any intervention.

The findings of this study need to be considered alongside several limitations. An important consideration when interpreting our observations is the potential for bias from incomplete participation of subjects who were eligible for study. The 62% response rate and 65% response rate at each of the sampling stages were comparable to that in other recent UK population studies. Furthermore, subjects who attended for examination had a similar symptom profile and demography to that of those invited who did not attend and in each case, closely resembled the demography of the UK population. Our sampling frame was the register of two large general practice surgeries purposively sampled so as to represent two widely different socio-economic profiles. In the UK, GP registers are recognised to be 98-99% complete for all the population and as such, are considered highly representative of the local population of any area.

The area of assessment of mechanical (workplace) exposure is fraught with controversy [20]. For a survey on this scale, we opted to use self-defined exposure according to a carefully validated list of exposures ranging from working with the neck bent/twisted; working with arms raised above shoulder height; through to keyboard use. However it is widely believed that self-reported exposure may result in relative over estimates of exposure [20]. This might clearly apply selectively in individuals who believe themselves to have been harmed by their workplace exposure. However, in this study which recorded details of pain at multiple sites in the neck and upper limb and included questions about exposure to different anatomical sites, it seems unlikely that such a selective bias would have applied.

In conclusion, we found that epicondylitis affects approximately 1% of working-aged adults at any point in time. We have produced one of the first ever population estimates of the occurrence of medial epicondylitis and find it to be only marginally less prevalent than lateral epicondylitis. Both medial and lateral epicondylitis were strongly cross-sectionally associated with psychological distress and independently with exposure to bending/straightening the elbow > 1 hour/day. Our findings support those of others in suggesting a role for physical workplace factors in the aetiology of epicondylitis and add new data on the importance of epicondylitis as a cause of sickness absence.

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KEY MESSAGES

1. Lateral and medial epicondylitis are common among working aged adults (prevalence 0.7% and 0.6% respectively)
2. Exposure to repetitive bending/straightening of the elbow > 1 hour/day is independently associated with medial and lateral epicondylitis
3. Occupational factors are associated with epicondylitis and, in 5% of cases, epicondylitis is associated with prolonged sickness absence

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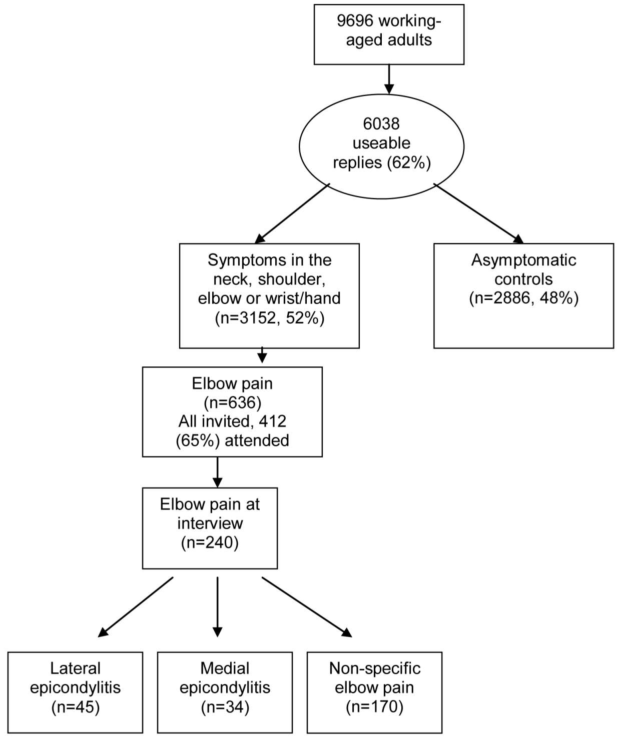

Figure 1. Flow chart of the study population, Southampton 2000-2001

Response rates

Note that 9 subjects were diagnosed with both lateral and medial epicondylitis

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Table 1

Prevalence of lateral and medial epicondylitis by age, sex and handedness

	Total No of subjects	Elbow pain on baseline questionnaire No (%)	Elbow pain and attended for examination* No (%)	Lateral epicondylitis				Medial epicondylitis			
MEN				**All**	**Dominant No (%)**	**Non-dominant No (%)**	**Both No (%)**	**All**	**Dominant No (%)**	**Non-dominant No (%)**	**Both No (%)**
25-34	514	21 (4)	11 (2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
35-44	716	88 (12)	54 (8)	6 (0.8)	3 (0.4)	4 (0.6)	1 (0.1)	4 (0.6)	2 (0.3)	3 (0.4)	1 (0.1)
45-54	766	111 (14)	65 (8)	8 (1.0)	4 (0.5)	4 (0.5)	0 (0.0)	3 (0.4)	1 (0.1)	3 (0.4)	1 (0.1)
55-64	700	90 (13)	62 (9)	7 (1.0)	4 (0.6)	5 (0.7)	2 (0.3)	3 (0.4)	2 (0.3)	1 (0.1)	0 (0.0)
All	2696	310 (12)	192 (7)	21 (0.8)	11 (0.4)	13 (0.5)	3 (0.1)	10 (0.4)	5 (0.2)	7 (0.3)	2 (0.1)
WOMEN											
25-34	796	28 (4)	16 (2)	1 (0.1)	0 (0.0)	1 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
35-44	910	73 (8)	40 (4)	4 (0.4)	3 (0.3)	1 (0.1)	0 (0.0)	6 (0.7)	5 (0.5)	2 (0.2)	1 (0.1)
45-54	870	130 (15)	98 (11)	14 (1.6)	11 (1.3)	3 (0.3)	0 (0.0)	11 (1.3)	9 (1.0)	5 (0.6)	3 (0.3)
55-64	766	95 (12)	66 (9)	5 (0.7)	3 (0.4)	3 (0.4)	1 (0.1)	7 (0.9)	5 (0.7)	3 (0.4)	1 (0.1)
All	3342	326 (10)	220 (7)	24 (0.7)	17 (0.5)	8 (0.2)	1 (0.03)	24 (0.7)	19 (0.6)	10 (0.3)	5 (0.1)
Total	**6038**	636 (11)	412 (7)	45 (0.7)	28 (0.5)	21 (0.3)	4 (0.1)	34 (0.6)	24 (0.4)	17 (0.3)	7 (0.1)

* Elbow pain is recorded at BASELINE (NOT examination)

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Table 2

Occupational factors associated with epicondylitis

Risk factors	Univariate analyses*			Multivariate analyses*		
	OR	**95% CI**	**P value**	**OR**	**95% CI**	**p-value**
Lateral epicondylitis						
Bending/straightening elbow (referent)	1.0			1.0		
Bending straightening elbow >1 hr/day	**2.5**	**1.2 – 5.5**	**0.017**	**2.5**	**1.2 – 5.3**	**0.020**
Choice of work: often (referent)	1.0			1.0		
Choice of work: sometimes	1.5	0.6 – 3.7	0.43	1.4	0.6 – 3.6	0.47
Choice of work: seldom/never	1.8	0.7 – 4.3	0.20	1.7	0.7 – 4.0	0.26
Medial epicondylitis						
Bending/straightening elbow (referent)	1.0			1.0		
Bending straightening elbow >1 hr/day	**5.1**	**1.8 – 14.3**	**0.002**	**5.3**	**1.9 – 14.9**	**0.002**
Choice of work: often (referent)	1.0			1.0		
Choice of work: sometimes	0.7	0.2 – 2.1	0.53	0.6	0.2 – 1.9	0.40
Choice of work: seldom/never	0.9	0.3 – 2.4	0.78	0.7	0.3 – 2.0	0.54

*adjusted for vitality, white/blue collar, age in 4 age bands and sex

Results highlighted in bold are statistically significant at the p<0.05 (95% CI) level

NB: These analyses include the 2266 subjects in work only