

Concise Report

Chronic musculoskeletal pain rarely presents in a single body site: results from a UK population study

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Objective. To investigate the frequency and health impact of chronic multi-site musculoskeletal pain, in a representative UK sample.

Method. Population postal questionnaire survey, using 16 general practices in the southeast of England, nationally representative urban/rural, ethnic and socioeconomic mix. A random selection of 4049 registered patients, aged 18 or over, were sent a questionnaire. The main outcome measures were chronic pain location, identified using a pain drawing; distress, pain intensity and disability as measured by the GHQ12 and the Chronic Pain Grade.

Results. A total of 2445 patients (60%) responded to the survey (44% male, mean age 52 yrs); 45% had chronic musculoskeletal pain. Of those with chronic pain, three quarters had pain in multiple sites (two or more sites). Variables significantly predicting this were: age under 55, [odds ratio (OR) 0.5, 95% confidence interval (CI) 0.4, 0.6]; psychological distress (OR 1.8, CI at 95% 1.4, 2.2) and high pain intensity (OR 5.2, CI at 95% 4.1, 6.7). Only 33% of multi-site pain distributions conformed to the American College of Rheumatology definition of chronic widespread pain.

Conclusions. Multi-site chronic pain is more common than single-site chronic pain and is commonly associated with other problems. Indiscriminate targeting of research and care for chronic musculoskeletal pain on single sites may often be inappropriate.

KEY WORDS: Chronic, Multi-site, Musculoskeletal, Pain, Community survey, Prevalence, Treatment, Planning.

Introduction

Chronic (non-specific) musculoskeletal pain is a major health problem. This may affect a single body site, for example the lower back, or may affect multiple body sites [1–3]. Recognizing this, the American College of Rheumatology (ACR) developed a definition for chronic widespread pain as:

pain present in two contralateral quadrants of the body above and below the waist and in the axial skeleton that has been present for at least three months [4].

This was based on the diagnostic criteria for fibromyalgia. Hunt *et al.* [5] proposed a more stringent definition of chronic widespread pain ('The Manchester definition'):

pain which has been present for at least three months in at least two sections of two contralateral limbs and in the axial skeleton.

This definition is more strongly associated with distress, fatigue, lower levels of self-care and somatic symptoms than the ACR definition [5].

These definitions of chronic widespread pain may not adequately describe the impact of pain in multiple body sites. For example, extensive pain can occur in the upper and lower body independently without meeting either of these classification criteria. Chronic musculoskeletal pain in multiple body sites

(multi-site pain) that does not meet these classification criteria may also be associated with increased pain, disability, work absenteeism and psychological distress [1]. It is possible that multi-site pain has more impact on quality of life, health care utilization and mental health than site-specific pain, irrespective of whether the pain experienced by the individuals concerned satisfies the existing criteria for chronic widespread pain. Understanding the relationship between pains in different body sites, frequency of multi-site pain and the health impact of multi-site pain are needed to help inform management.

Methods

Sample

We did a community survey to measure the nature and distribution of chronic pain in 16 General Practices from the MRC General Practice Research Framework (www.mrc-gprf.ac.uk) in the South Eastern quadrant of England. The practices were representative of England in terms of urban/rural, ethnic and socio-economic distribution. We sent postal questionnaires to 4049 randomly selected adults registered with these practices.

Questionnaire

We identified the sites of chronic pain by asking responders to shade the locations of pain that they had for more than half the days in the last year [6] on a body manikin. Using a bespoke software program, we identified 13 pain sites representing the major body regions often used in site-specific research (Table 1). Percentage agreements for inter and intra-rater agreements for coding were 96 and 97%, respectively [7]. Pain was recorded as present or absent in each site. We defined multi-site pain as pain in two or more of our 13 body sites.

We collected basic demographic data and assessed psychological distress using the General Health Questionnaire [8], and pain severity and disability using the Chronic Pain Grade [9].

Standard General Health Questionnaire guidelines [8] were used to determine those with psychological distress; a cut-off score of four or more was used to denote distress. The Chronic Pain Grade is a combination of pain intensity and pain related

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Submitted 26 October 2006; revised version accepted 27 March 2007.

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TABLE 1. Single-site chronic pain

Location	Number (%) with pain n=2445	Number (%) with single-site pain n=2445	% of single-site pain in each location
	A	B	B/A
Head	140 (6)	19 (1)	14
Neck	287 (12)	12 (<1)	4
Up back	276 (11)	7 (<1)	3
Shoulders/up arm	411 (17)	24 (1)	6
Elbow/forearm	183 (7)	7 (<1)	4
Wrist/hand	316 (13)	39 (2)	12
Low back	618 (25)	78 (3)	13
Upper leg	336 (14)	17 (1)	5
Knees	455 (19)	53 (2)	12
Low leg	180 (7)	5 (<1)	3
Ankle/foot	289 (12)	15 (1)	5
Chest	136 (6)	9 (<1)	7
Abdomen	204 (8)	20 (1)	10
Total		305 (12)	

disability scores. These scores are used to develop a grading of pain severity between 0 and IV. In our analysis, we chose to use the disability and pain intensity scores separately rather than combine them to calculate the pain grade. The individual scales and cut-off points developed by Von Korff [9] were used to determine those with high and low levels of pain and pain-related disability. The disability scores ranged between 0 and 6; with high disability being determined by scores of 3 or more. The scale for pain intensity ranged between 0 and 10. High pain was classified as 5 or more.

Statistical analysis

We investigated the extent of pain, using the number of sites where pain was reported. We then explored, the relationship between pain extent and age, gender, levels of pain intensity, pain-related disability and psychological distress.

We used descriptive statistics to report pain distribution and detail the number of sites of pain reported. We employed the ACR definition [4] of chronic widespread pain. Since chronic pain in this population did not follow a linear relationship with age [7], we split the group at the median age of the responders. We calculated odds ratios (ORs) for the presence or absence of each condition/state and used multivariate analyses to investigate the relationship between high disability, high pain and psychological distress, age and gender, with single-site chronic pain, chronic widespread pain and the multi-site chronic pain. We included variables significant at $P < 0.05$ level in a logistic regression model. We used SPSS (Version 11) to manipulate the data.

Results

We received responses from 2445/4049 (60%) of those approached. Mean age was 52 (s.d. 17.3, range 18–102) and 44% (1076) were male. The prevalence of subjects with pain for more than half the days in the last year was 45% (1092/2445). The prevalence of pain in specific sites is shown in Table 1.

Twelve percent (294) of the survey sample reported having single-site chronic pain; 25% of all those with chronic pain; 52% had pain in two to four sites, 18% in five to seven sites and 4% in more than eight sites. Thus, about three quarters of the pain sample reported having chronic pain in multiple body sites (two or more sites); 33% of the total survey population.

The most common sites of chronic pain that presented as single-site pain were head, low back, knee and wrist/hand. Single-site chronic pain was uncommon (Table 1), for example the point prevalence of chronic low back pain was 25% but the prevalence of single-site chronic low back pain was 3% (78/2445). This only rose to 4% (95/2445) when those with upper leg pain, who might have referred pain, were included with low back as one pain site.

TABLE 2. Univariate and multivariate analyses showing relationships of variables with single-site, chronic widespread and multi-site pain

Variables associated	Univariate analysis—unadjusted odds ratios (CI at 95%)	Multivariate analysis—adjusted odds ratios (CI at 95%)
Single-site chronic pain		
Gender male	1.5 (1.2, 2.0)	1.4 (1.1, 1.9)
Under 56 yrs	1.3 (1.0, 1.8)	—
Psychological distress	0.5 (0.4, 0.7)	0.7 (0.5, 1.0)
High disability	0.5 (0.3, 0.7)	0.7 (0.4, 1.2)
High pain intensity	0.5 (0.4, 0.7)	0.6 (0.4, 0.8)
Chronic widespread pain		
Gender male	0.5 (0.4, 0.7)	0.5 (0.4, 0.7)
Under 56 yrs	0.6 (0.5, 0.8)	0.5 (0.4, 0.7)
Psychological distress	3.1 (2.5, 4.0)	1.9 (1.4, 2.6)
High Disability	3.4 (2.5, 4.6)	1.4 (1.0, 2.1)
High pain intensity	4.0 (2.9, 5.5)	4.0 (2.9, 5.5)
Multi-site chronic pain		
Gender male	0.8 (0.7, 0.9)	0.8 (0.7, 1.0)
Under 56 yrs	0.6 (0.6, 0.8)	0.5 (0.4, 0.6)
Psychological distress	2.7 (2.2, 3.3)	1.8 (1.4, 2.2)
High disability	3.1 (2.4, 4.1)	1.4 (0.9, 2.0)
High pain intensity	5.2 (4.2, 6.3)	5.2 (4.1, 6.7)

The bold type face indicates variables significant at $P < 0.005$.

Chronic widespread pain

Chronic widespread pain (ACR definition) was reported by 12% (285/2445) of our respondents; 14% of females (197/1368) and 8% of males (88/1076). In those with chronic pain, 31% of females (197/638) and 19% of males (88/473) had chronic widespread pain. Of those with multi-site pain, 33% (285/862) had chronic widespread pain. The remaining 577, 24% of our respondents, had multi-site chronic pain that was not chronic widespread pain.

The relative risk of females compared with males for presence of chronic widespread pain was 1.3 (95% CI 1.2, 1.4).

Single-site, chronic widespread pain and multi-site chronic pain

Our first univariate analysis found significant associations between single-site chronic pain and; being male, not distressed, low disability and low overall pain. In the multivariate analysis, being male and having low pain intensity were the only significant factors (OR 1.4, 95% CI 1.1, 1.9 and 0.6, 95% CI 0.4, 0.8, respectively) (Table 2).

In the second univariate analysis, we found significant positive associations between chronic widespread pain, psychological distress, high disability and high overall pain levels and negative associations with younger age and being male. The adjusted odds ratio for being: male (OR 0.5, 95% CI 0.4, 0.7), younger age (0.5, 95% CI 0.4, 0.7), psychological distressed (1.9, 95% CI 1.4, 2.6) and high pain intensity (4.0, 95% CI 2.9, 5.5) remained significant in the multivariate analysis (Table 2).

The third univariate analysis showed all of our variables were significantly associated with multi-site pain. The significant adjusted odds in the multivariate analysis were, age under 56 (0.5, 95% CI 0.4, 0.6), psychological distress (1.8, 95% CI 1.4, 2.2) and high pain intensity (5.2, 95% CI 4.1, 6.7) (Table 2).

Discussion

The finding that single-site chronic pain is comparatively uncommon is important. Smith *et al.* [10] highlighted the distinction between pain extent (number of sites) and distribution. They argued that extent may be more important than the actual site(s) of pain in determining the impact on peoples' lives. They stated a case for using chronic pain as a diagnosis in primary care settings to accommodate the associated risk factors, such as psychological distress, somatization and fatigue [11] in order to consider these in care plans. Our study showed more

people had chronic pain that was multi-site than single site (73% to 27%) and that two-thirds of our sample (67%) had multi-site chronic pain which did not meet the definition of chronic widespread pain. This population has been largely overlooked in both research and care.

Implications

These findings have major implications for the design and interpretation of body site-specific trials. For example, few, if any, trials of treatment for chronic simple low back pain measured the effect of pain outside the lower back. Since only 13% of those with low back pain have isolated pain, interventions targeted specifically at the lumbar spine may fail to have a substantial effect on overall pain and disability. Future intervention studies should consider recording other pain sites to identify predictors of response to treatment. We hypothesize that those with isolated simple low back pain may gain the greatest benefit from specific low back treatments such as manipulation whilst those with multi-site pain may gain the greatest benefit from less location-specific approaches, such as an exercise or cognitive behavioural treatment.

Our findings indicate that developing services to manage chronic non-specific pain at single body locations, for example the low back, may be inappropriate; setting broader parameters for patients with chronic musculoskeletal pain may be needed. By convention, the process of referral starts from generalists in primary care, to more site-specific and specialized services in secondary and tertiary care. This process of care may be appropriate for the minority of patients with one site of pain, but for those with multi-site chronic pain addressing one painful site is unlikely to be sufficient if the patient continues to have pain elsewhere.

The reasons for assessing and treating musculoskeletal pain in a site-specific way are likely to be many and varied, but may include the site-specific focus in undergraduate training in musculoskeletal medicine. This may explain the clinical uncertainty faced by practitioners when confronted with multi-site pain. Given patients' tendency to prioritize their problems to accommodate limited consultation times, it is perhaps understandable that practitioners select one main pain problem and one main body site to focus on. This may be a self-defeating strategy.

Psychological factors are implicated in almost all types of chronic pain, with an emphasis on affect (anxiety, depression, anger and fear). However, the relationship between multiple pain sites and increased distress is clearly under-researched. A better understanding of the relationship between multiple pain sites and psychological factors could provide further refinement of current interventions.

Self-reported measures of multi-site pain are problematic with pain measures that are site-specific. Pain in other areas may render them less reliable and responsive. This may explain why longitudinal studies often only register small differences in pain and/or disability, or encounter non-normal distributions. Conversely, when global improvement scales are used as outcomes in studies of site-specific conditions, responses may refer to multiple sites of pain and not specifically about the location of pain that the researcher is investigating. Such findings are less illuminating when the extent of multi-site pain is unknown.

The data in this survey were subject to a response bias (gender, female and age, top heavy) and is comparable with other studies of this nature. The number of pain sites used as a measure to determine pain extent was crude, but representative of all major

body areas. Using 13 sites of pain, as opposed to 20 or 30 sites, was unlikely to affect the overall outcome statistically. Subtle site-specific clinical effects might be lost to the analysis but further division of sites would increase the chances of finding multi-site chronic pain.

Conclusions

Of those with chronic musculoskeletal pain, only one in four have single-site chronic pain. Single-site chronic pain is uncommon, therefore planning health services and research studies for chronic musculoskeletal pain on the basis of isolated areas of bodily pain may be inappropriate.

Ethical approval

Ethical approval was granted by the London Multicentre Ethical Committee.

Rheumatology key message

- Chronic musculoskeletal pain rarely presents as a single-site problem.

Acknowledgements

Appreciation is extended to the Arthritis Research Campaign for funding the main survey and Barts and The London Joint Research Board for funding the first author.

M.U. has received speaker fees from Pfizer, the manufacturer of celecoxib and from the General Osteopathic Council. The other authors have declared no conflicts of interest.

References

- 1 Davies H, Crombie I, Macrae W. Where does it hurt? Describing body locations of chronic pain. *Eur J Pain* 1998;2:69–80.
- 2 Papageorgiou A, Silman AJ, Macfarlane GJ. Chronic widespread pain in the population: a seven year follow-up study. *Ann Rheum Dis* 2002;61:1074.
- 3 Walker-Bone K, Reading I, Coggan D, Cooper C, Palmer K. The anatomical determinants of pain in the neck and upper limbs: an epidemiologic study. *Pain* 2004;109:45–51.
- 4 Wolfe F, Smythe H, Yunus M *et al.* The American College of Rheumatology 1990 criteria for the classification of fibromyalgia: report of the Multicenter Criteria Committee. *Arthritis Rheum* 1990;33:160–72.
- 5 Hunt IM, Silman AJ, Benjamin S, McBeth J, Macfarlane GJ. The prevalence and associated features of chronic widespread pain in the community using the 'Manchester' definition of chronic widespread pain. *Rheumatology* 1999;38:279.
- 6 Von Korff M. Studying the natural history of back pain. *Spine* 1994;19:S2041–6.
- 7 Underwood M, Parsons S, Breen A, Foster N, Letley L, Pincus T, Vogel S. Prevalence and comparative troublesomeness by age of musculoskeletal pain in different body locations. *Family Practice* 2007, accepted subject to revision.
- 8 Goldberg D, Williams P. The user's guide to the General Health Questionnaire. Windsor: NFER-NELSON, 1988.
- 9 Von Korff M, Ormel J, Keefe F, Dworkin S. Grading the severity of chronic pain. *Pain* 1992;50:133–49.
- 10 Smith BH, Elliot AM, Hannaford P, Chambers A, Cairns Smith W. Factors related to the onset and persistence of chronic back pain in the community. *Spine* 2004;29:1032–40.
- 11 McBeth J, Macfarlane GJ, Hunt IM, Silman AJ. Risk Factors for persistent chronic widespread pain: a community-based study. *Rheumatology* 2001;40:95–101.