EXTENDED REPORT

Defining hip pain for population studies

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Background: Identifying pain as coming from the hip joint is more complex than for other large joint sites. There is no accepted best approach to defining hip pain for use in clinical and epidemiological studies.
Objective: To compare the use of verbal and pictorial descriptions in ascertaining hip pain.
Methods: A cross sectional population based study on 2935 subjects compared groups reporting hip pain either using a pain diagram, or answering a question specifically asking about hip pain. The groups were compared with a group reporting no pain for various clinical indices of hip disease, including limitation of range of movement and evidence of radiographic change.
Results: Subjects who satisfied both criteria for hip pain were substantially more likely to have used analgesics, consulted a physician, or had walking difficulty. Differences in range of movement were less clear cut but radiographic damage was more evident in those with both criteria.
Conclusions: Subjects whose pain satisfies both a pictorial and a verbal definition (where the patient uses the word "hip") have the strongest relation to indicators of hip disease. This approach is recommended when a specific definition is required for ascertaining individuals for study.

Osteoarthritis of the hip is one of the major causes of locomotor disability in the population, with 50 000 hip arthoplasties being undertaken in England every year.[1] Pain is the major prerequisite for determining the need for surgical replacement according to various national guidelines.[2–4] Population surveys have been undertaken of the occurrence of hip pain in the population and the consequent need for joint surgery.[5] However, such studies require that an approach for assessing hip pain is available that can truly ascertain the occurrence of this symptom.

Compared with other joints such as the knee, pain from the hip is difficult to define, for three main reasons: first, the joint is not superficial, so pain arising from structures in and around the hip joint can be felt across a broader region; second, pain from structures outside the hip—for example, the low back, the groin, and the urinary and genital tracts—may also be associated with pain in the hip region (referred pain); third, it is unclear whether there is a specific topographical area that can usefully be distinguished as "the hip". We have previously developed and validated a preshaded drawing, covering the "bathing trunk area," to be used for defining the presence of hip pain in studies of patients attending primary care[6] (fig 1). The use of such a drawing has the advantage of allowing standardisation between different observers for the purposes of multicentre clinical studies. The performance of this preshaded drawing in the community has not been studied. Furthermore, it is untested whether the use of such a pain drawing is superior to conventional ascertainment based on the word "hip," as used by the subject to describe the region where the pain is centred.

In this study we therefore undertook a population based cross sectional survey to identify individuals with hip pain, based on the use of a pain diagram, a question asking specifically about hip pain, or both. We compared the accuracy of these approaches to defining hip pain by examining the association between the presence of pain and various constructs of hip disease including restriction of movement, radiographic changes of osteoarthritis, and types of medical intervention used by the subject.

METHODS

Design

A population prevalence survey was undertaken to identify subjects with hip pain ascertained by a pain drawing, a question about hip pain, or both. Subjects in each of these three groups were then compared with a sample of individuals without pain for restriction of joint movement in three planes, evidence of radiographic joint damage, and various other measures of hip pain severity including disturbance of walking and the use of specific interventions.

Subjects

Subjects were selected from the population based age–sex register of a suburban general practice in Greater Manchester which comprised 3868 adults aged 18 to 80, for whom a correct address was available.

Ascertainment of hip pain

The selected subjects were sent a postal questionnaire. Hip pain was first determined by asking the question "In the past month have you had any pain in the hip lasting one day or longer?". A hip pain drawing was also used (fig 1) and the subject was asked "Have you had any pain in the shaded area of the diagram below over the past month lasting one day or longer?". In all, 2935 subjects (76%) responded to the

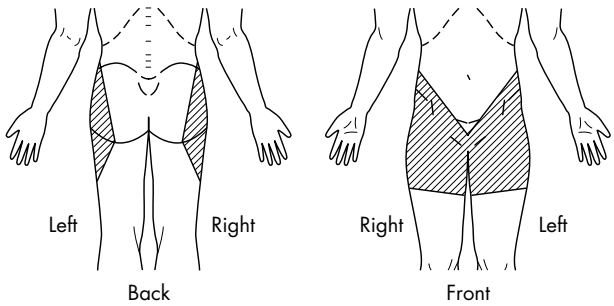

Figure 1 Hip pain drawing.

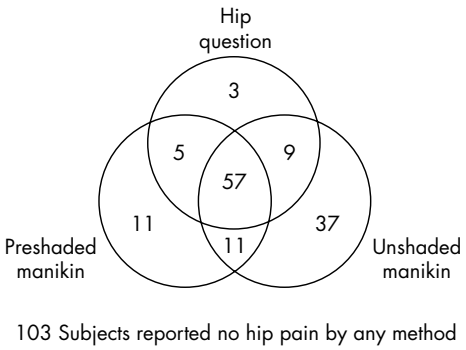

Figure 2 Agreement between definitions of hip pain

questionnaire and provided data on the occurrence of hip pain using these approaches.

Markers of hip disease

The questionnaire used to ascertain hip pain also covered items employed to determine certain markers of hip disease. Specifically, subjects were asked whether they had consulted their general practitioner in their past year about hip pain. Second, they were asked whether they had taken any prescribed analgesics or other medication for hip pain in the previous month. Third, subjects were asked whether they had used a walking stick because of hip pain. Subjects also completed the short form 36 item health questionnaire (SF36).[7] Difficulty in walking was defined from the SF36 as being ''limited a lot'' in walking more than a mile.

A consecutive sample of individuals with hip pain, however ascertained, was matched by age and sex to a sample of subjects without any hip pain. In all, 151 (93%) of 162 subjects with hip pain, but only 185 (63%) of 296 subjects without hip pain, accepted the invitation to take part in the study.

Subjects selected for further investigation were offered a visit at home. At this visit, the range of joint movement in three planes—internal rotation, external rotation, and flexion—was assessed using a plurimeter following a procedure which we had previously shown to be reproducible between trained observers.[8] Subjects aged over 40 were also invited to attend for a standard pelvic *x* ray. These *x* rays were then scored by two observers for minimum joint space and the Croft modification of the Kellgren and Lawrence system.[9]

Analysis

Three groups of hip pain subjects were compared with the group with no pain. The three pain groups were as follows:

- subjects who had pain if using the verbal definition but not the drawing;
- subjects who had pain using drawing but not the verbal definition;
- those subjects who had pain ascertained by both methods.

The frequency of the different questionnaire items was compared using all the respondents. Further analysis was then undertaken on the subjects in each of the groups who were investigated for movement restriction and radiographic damage. The mean range of movement was compared between each of these groups individually and with those with no pain. As the groups varied in their composition by age and sex, we needed to adjust the differences between groups for those variables. We therefore present adjusted means—the expected values in each group for a man in the 60+ age group. The differences between groups would be the same if we chose to adjust to a different sex or age group, but the absolute values would be different. The associations for the dichotomous outcome variables considered were assessed using logistic regression, taking the no-pain group as the referent category. From the logistic regression equation, we calculated the predicted prevalence of each feature, again adjusting for differences in age and sex between the pain groups, as we did for the continuous outcomes. These are presented as the predicted proportions among men in the oldest age group (over 60), with 95% confidence intervals. We then used linear regression to compare range of movement between the groups after adjusting for age and sex.

RESULTS

The distributions of those reporting pain using the different definitions are shown in fig 2. Overall 294 subjects (10.0%) had hip pain using the verbal definition and 376 subjects (12.8%) had hip pain using the drawing definition. In all, 238 individuals (8.1%) satisfied both the verbal and drawing requirement; thus there were 56 subjects (1.9%) who only satisfied the verbal requirement and 138 (4.7%) who only satisfied the drawing requirement. Subjects who reported no pain were younger and more likely to be male than subjects in each of the pain groups (table 1). Subjects who had ''drawing only'' pain were also younger and more likely to be male than those in the other pain groups. As discussed above, all subsequent analyses are, however, adjusted for age and sex.

A comparison of the indicators of impact by pain group is shown in table 2. Subjects who satisfied both the criteria for pain were more likely to have been prescribed analgesics, to report difficulty with walking, to have consulted a general practitioner for their hip pain, and to use a walking stick. For each of these variables these differences were statistically significant.

Data on the subgroups who were examined for joint movement are shown in table 3. The results shown are the observed mean range and the age and sex adjusted means in all three planes. The observed and adjusted range of joint movement was more often lower in those with pain than in the group without pain. However, subjects who satisfied both the pain criteria had the lowest range of movement for internal rotation and flexion, and these differences were statistically significant. By contrast, subjects who only satisfied the drawing criterion had a range of movements similar to the no-pain group. Those with verbal-only pain were intermediate.

The data on the subgroups aged over 40 who had radiography are shown in table 4. There were relatively few individuals in this community survey with evidence of radiographic damage either based on minimum joint space

Table 1 Demographic characteristics of subjects by pain category

Hip pain category	Verbal only (n = 56)	Drawing only (n = 38)	Both (n = 238)	No pain (n = 2503)
Age (years) (mean (SD))	54.9 (14.0)	51.3 (16.3)	56.7 (13.4)	49.0 (15.4)
Female (n (%))	38 (68)	73 (53)	147 (62)	1235 (49)

Table 2 Indicators of the impact of hip pain by pain group

Indicator	Pain group			
	Verbal only (n = 56)	Drawing only (n = 138)	Both (n = 238)	No pain (n = 2503)
Analgesic use (n (%))	15 (27)	11 (8)	122 (51)	12 (0)
Adjusted proportion (95% CI)	0.34 (0.20 to 0.51)	0.12 (0.06 to 0.21)	0.60 (0.49 to 0.70)	0.01 (0.0 to 0.2)
Consultation (n (%))	10 (18)	7 (5)	92 (39)	30 (1)
Adjusted proportion (95% CI)	0.21 (0.11 to 0.37)	0.07 (0.03 to 0.14)	0.44 (0.34 to 0.55)	0.02 (0.01 to 0.03)
Aid/stick use (n (%))	2 (4)	3 (2)	34 (14)	6 (0)
Adjusted proportion (95% CI)	0.08 (0.02 to 0.28)	0.06 (0.02 to 0.17)	0.28 (0.18 to 0.41)	0.01 (0.0 to 0.02)
Walking difficulty (n (%))	16 (35)	35 (27)	131 (58)	297 (12)
Adjusted proportion (95% CI)	0.47 (0.32 to 0.63)	0.41 (0.31 to 0.52)	0.70 (0.63 to 0.77)	0.26 (0.16 to 0.40)

CI, confidence interval.

or on overall Croft grade, but the prevalences were higher in those who satisfied both pain criteria (table 4). By contrast, those with verbal-only pain had approximately the same age and sex adjusted prevalence as the no-pain group. The numbers who had *x* rays in some of the pain groups were very small, with consequently wide confidence intervals.

DISCUSSION

In summary, and not surprisingly, the prevalence of hip pain depends on the approach used for its ascertainment. There is no gold standard to assess the validity of reported hip pain. The purpose of this investigation was to assess the construct validity of different options for ascertaining pain against a variety of markers of hip disease. There were differences in the associations between these markers depending on the criteria used to define hip pain. Thus for all markers considered there was a much stronger association when there was a requirement for both a verbal and drawing assessment of pain. One interpretation of these results is that a combination of both these requirements is more likely to ascertain an individual's pain as truly coming from the hip. The combination approach is better than either of the approaches individually in defining hip pain in community based studies.

There are several methodological issues to be considered. The approach we used for the pain drawing was based on its validation in a study undertaken in primary care. In that study, consecutive new attenders to primary care with pain in the broad ''bathing trunk'' area were evaluated to identify those in whom the clinical diagnosis was that the pain was derived from the hip. The resulting narrower region (fig 1) best discriminated those patients from those, for example, with referred pain from the back.[10] Other approaches to a pain drawing might have produced different results. In addition to the methods described in this study, however, we concurrently asked subjects to shade areas on a blank manikin where pain was experienced, following which we overlaid a template to determine the presence of hip pain in the same area as fig 1. This proved to be of little value. Thus of 115 subjects whose shading overlapped this area, 46 (40%) failed to indicate the presence of pain using the preshaded manikin and 48 (42%) answered negatively to the verbal question of hip pain. Subjects who have back pain or other pains in and around the lower part of the body are quite likely, in broadly shading a manikin, to make their shading overlap the hip area of interest. By contrast, restricting subjects to the preshaded area (as shown in fig 1) is implicitly asking the question whether the subjects feel the main focus of their pain is in that area.

In the questionnaire the word ''hip'' was used without further categorisation, approaching the method routinely used. It is conceivable that different populations may have a different understanding of what constitutes their ''hip.'' The population recruited for this study represented a broad socioeconomic mix of a British suburban population. It is possible that a more health aware population might have a more specific appreciation of where their hip is, and that different cultures could have a completely different concept of the hip. It is also possible that some of the participants reporting pain in the hip were sensitised to that ''diagnosis'' as a consequence of medical or related consultation. However, only 18% of the verbal-only group reported a consultation for their hip pain, and the impact of any such bias is likely to be small.

We used several constructs to define the presence of hip disease in terms of its severity and structural abnormality.

Table 3 Restriction of movement by pain group

Movement	Pain group			
	Verbal only (n = 11)	Drawing only (n = 46)	Both (n = 91)	No pain (n = 185)
Internal rotation (˚)				
Mean (SD)	33.1 (9.4)	37.0 (8.5)	31.5 (10.4)	35.7 (8.7)
Adjusted mean (95% CI)	26.2 (21.4 to 31.1)	29.4 (26.6 to 32.1)	24.4 (22.1 to 26.4)	28.1 (26.2 to 29.9)
External rotation (˚)				
Mean (SD)	35.3 (6.2)	39.5 (7.6)	35.7 (8.7)	39.7 (8.3)
Adjusted mean (95% CI)	30.8 (25.9 to 35.7)	34.9 (32.2 to 37.7)	31.5 (29.4 to 33.7)	35.3 (33.5 to 37.2)
Flexion (˚)				
Mean (SD)	130 (15)	131 (10)	122 (17.0)	130 (12)
Adjusted mean (95% CI)	123 (115 to 131)	123 (119 to 128)	115 (111 to 118)	122 (119 to 125)

CI, confidence interval.

Table 4 Radiographic change by pain group

Radiographic feature	Pain group			
	Verbal only (n = 8)	Drawing only (n = 22)	Both (n = 63)	No pain (n = 132)
Minimum joint space <2.5 mm (n (%))	2 (25)	6 (27)	18 (29)	22 (17)
Adjusted proportion* (95% CI)	0.33 (0.08 to 0.72)	0.36 (0.17 to 0.61)	0.40 (0.25 to 0.57)	0.26 (0.16 to 0.40)
Croft grade 3 (n (%))	1 (13)	4 (18)	13 (21)	11 (8)
Adjusted proportion* (95% CI)	0.16 (0.02 to 0.64)	0.22 (0.08 to 0.48)	0.32 (0.17 to 0.51)	0.14 (0.07 to 0.27)

*Result from logistic regression, adjusted for age and sex.
CI, confidence interval.

Some of the constructs—for example, radiographic change—were specific for osteoarthritis, whereas others, such as analgesic use, were generic for other causes of hip pain.

We had non-response to the original questionnaire and non-participation of questionnaire responders selected for further investigation. The response rate to the original questionnaire was approximately 75%. The major aim of this study was to compare associations between groups of individuals with hip pain defined in different ways; thus it is unlikely that a selective non-response in relation to the way the hip pain was categorised would have altered the results. In those subjects with hip pain who were selected for follow up, participation in the follow up was very high (93%). By contrast, those without pain were much less likely to agree to a home visit for examination (63%) and then to attend for *x* ray. Participation among the hip pain groups was, however, similar and unlikely to have explained the differences observed between these groups.

It is interesting to compare approaches to studying knee pain and hip pain. The ''knee,'' as well as being a joint, also defines a topographical region of the body. By contract, the ''hip'' is a less well defined concept in everyday language. Thus the hip region encompasses areas including the upper thigh, the groin, and the buttocks, and it is perhaps not surprising that the use of the word ''hip'' may be subject to error in determining the true localisation of the pain. In studies of the shoulder, we have previously shown that a combination of a verbal and a drawing approach to the ascertainment of pain produced a stronger association between various aetiological factors.[10] This might suggest either that this dual approach was selecting a more severe group, or that it was selecting a group more likely to have pain in the shoulder. In a similar way, we cannot easily distinguish which of these two options is true for our results with regard to the hip.

We have shown, however, that the use of the combined approach for defining pain in the hip region is associated with stronger associations with the key constructs of hip disease. There is inevitably a loss of sensitivity in restricting inclusion criteria to those satisfying the combined criteria. However, it is recommended that such a dual approach is used for future population studies to determine the presence of this important symptom when specificity is the key concern.

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