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The relationship between knee pain characteristics and symptom state acceptability in people with knee osteoarthritis

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SUMMARY

Objective: To examine the association between osteoarthritis (OA) pain characteristics and symptom acceptability.
Design: Using a cross-sectional study design in a knee OA cohort we assessed socio-demographics, knee pain characteristics (Intermittent and Constant Osteoarthritis Pain (ICOAP); higher scores worse), frequency of intermittent pain 'without warning' (unpredictable) or 'after a trigger' (predictable) (never to very often) and the acceptability of knee pain symptoms (yes/no). Using logistic regression, we examined the relationship between pain characteristics and symptom acceptability.
Results: 136 cohort members' participated (mean age 74 years, SD 9.5; 54% female). Most (97%) reported intermittent pain (mean ICOAP intermittent score 36.8, SD 19.7) and 62 (46%) reported constant pain (mean ICOAP constant score 46.7, SD 20.2). Of those with intermittent pain, 42% reported frequent (often/very often) predictable pain and 27% frequent unpredictable pain. 35% reported "unacceptable" knee symptoms. In multivariable analysis, the odds of reporting an unacceptable symptom state increased with increasing intermittent knee pain scores and the effect was greater for those with vs without frequent unpredictable intermittent pain (adjusted OR per 10-point increase in ICOAP intermittent score 3.31, 95% confidence interval (CI) 1.38–7.97 vs 1.23, 95%CI 0.88–1.74, respectively; *P* value for the interaction = 0.03).
Conclusion: In a community cohort with symptomatic knee OA, both the severity and predictability of intermittent knee pain contributed to symptom state acceptability. Unpredictable intermittent knee pain was more likely to be associated with an unacceptable symptom state than predictable intermittent pain. Research is warranted to elucidate potentially modifiable determinants of unpredictable intermittent pain in people with knee OA.

Introduction

Osteoarthritis (OA) is the most common form of arthritis, affecting one in eight Canadians[1]. OA is characterized by joint pain resulting in functional limitations, sleep disruption, fatigue, mood disturbance, and increased health care use[2–7]. Thus, efforts to reduce the impact of OA in the population must incorporate strategies to address OA pain. A first step towards this goal is the development of valid, reliable and responsive measures of the OA pain experience.

In prior research carried out under the auspices of the Osteoarthritis Research Society International–Outcomes Measures in Rheumatology Clinical Trials (OARSI–OMERACT) OA pain initiative[8–10], focus groups were conducted to examine the pain experience of people with hip/knee OA from early to late disease, including those aspects of the OA pain experience that were considered most distressing. Two distinct types of OA pain were identified: an aching and fairly constant background pain; and a less frequent, but more intense and often unpredictable intermittent pain. Of these, intense intermittent pain, particularly when unpredictable, was reported to have the greatest impact on quality of life (e.g., mobility, mood and sleep)[9]. Based on these findings, the OARSI–OMERACT OA pain measure – the Intermittent and Constant Osteoarthritis Pain (ICOAP)[11] – was developed. Work to date has confirmed the reliability, validity and responsiveness of the ICOAP[11–13].

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The current study sought to validate focus group findings with respect to the influence of different types of OA pain, including its predictability, on patients' assessments of the acceptability of their OA symptoms[14,15]. Patient acceptable symptom state (PASS) is defined as "the value beyond which patients consider themselves well"[15]. It represents the concept of well-being or remission of symptoms and is considered a clinically relevant outcome for the patient[15]. Knowing the PASS for a measure enables better understanding of study results, which aids in the treatment decision-making process by patients and physicians. Based on our qualitative findings of the features of OA pain that participants found most distressing and that negatively affected their well-being[9], we hypothesized that among individuals with knee OA the likelihood of reporting an unacceptable knee OA symptom state would be greater in those with more severe intermittent and constant pain and, for those with similar levels of intermittent pain severity, would be greater in those whose intermittent pain was unpredictable.

Methods

Study population

This cross-sectional study capitalized on an existing community cohort of individuals aged 45+ years with hip or knee OA. The cohort was initially recruited from a survey of 100% of the population of two Ontario counties between 1996 and 1998 to identify those with painful, disabling hip or knee OA[16,17]. At recruitment, cohort members met the following criteria: difficulty in the past 3 months with each of stair climbing, arising from a chair, standing and walking; swelling, pain, or stiffness in any joint lasting ≥6 weeks in the past 3 months; and indication on a joint homunculus that a hip or knee was "troublesome". The positive predictive value of these criteria for hip/knee arthritis on radiographs and joint examination was 96%[16]. Annual follow-up has been by mail and telephone interviews.

The current study (Dec 2011–May 2012) utilized data collected from a cohort sub-study conducted to gain greater understanding of the magnitude of change in ICOAP scores that might be considered clinically meaningful, and whether they differed by patient gender or baseline pain severity. Cohort members who reported at least one painful knee on their most recent assessment were mailed a study information letter. 2 weeks post mailing, the study coordinator telephoned to confirm eligibility (a positive response to the question: "In the past 48 h, have you experienced pain in one or both of your knees?"), determine their interest in participating, and answer any questions they might have. To detect a mean effect of 10 points on the ICOAP normalized scores, and using a standard deviation (SD) in baseline scores of 25, 80% power, two-sided alpha 0.05, and an expected 80% participation rate, 124 participants needed to be recruited. To enable comparisons by gender and to ensure sufficient variability in baseline pain severity, among eligible and interested participants, approximately equal numbers of men and women with a range of reported knee pain severities (based on an 11-point Numeric Rating Scale) were recruited.

Assessments

Using a standardized telephone interview, study participants were asked to report their most painful knee in the 'past 48 h'. The ICOAP was then completed for that knee. The ICOAP is comprised of 11 items in two subscales: a 5-item scale for 'constant knee pain' and a 6-item scale for 'knee pain that comes and goes'. Item responses are on a 5-point scale from 'not at all' (0) to 'extremely' (4) (for items asking about intensity) or 'never' (0) to 'very often' (4) (for items about frequency)[18]. Subscale scores are created by summing item scores and normalizing the score from 0 (no pain) to 100 (extreme pain). A total ICOAP score is calculated by summing the subscale scores and normalizing from 0 (no pain) to 100 (extreme pain). In prior work, the ICOAP was found to be psychometrically sound: reliability (Cronbach's alpha of 0.93; intraclass correlation coefficient of 0.85 [95% confidence interval (CI) 0.76–0.91]), validity (ICOAP scores are significantly correlated with scores on the Western Ontario and McMaster Universities Osteoarthritis Index pain scale [rho of about 0.8], the Knee Injury and OA Outcome Score symptoms scale, and self-rated effect of hip/knee [rho of about 0.6]), and responsiveness to changes in OA pain following both pharmacological and surgical intervention[11–13]. Those with intermittent pain were additionally asked to report the frequency with which the pain occurs 'without warning' (i.e., unpredictably) and 'after a trigger' (i.e., predictably), from 0 (never) to 4 (very often). Finally, they were asked: "Think about all the ways your knee OA has affected you during the last 48 h. If you were to remain in the next few months as you were the last 48 h would this be acceptable or unacceptable to you?" Participants' sociodemographic characteristics (gender, age, level of education, living arrangements, and number of comorbid conditions) were obtained from their most recent cohort assessments.

Statistical analysis

Participants in the parent study were assessed at two time points, 2 weeks apart; the current study utilized data collected at the first time point. Descriptive statistics were calculated for all data and expressed as means (standard deviations [SD], ranges), medians (inter-quartile ranges [IQR]), and proportions as appropriate. The Spearman rho correlations between ICOAP subscale scores and the frequency of each of 'pain after a trigger' (predictable pain) and 'pain without warning' (unpredictable pain) were calculated. Characteristics of participants who reported an acceptable vs unacceptable symptom state were compared using a Student's *t* test for continuous variables or chi-square test for categorical variables. Unpredictable and predictable intermittent pain were considered as frequent if participants reported 'pain without warning' and 'pain after a trigger', respectively, as occurring 'often' or 'very often'. Participants were considered as having constant or intermittent pain if their scores on the ICOAP constant and intermittent subscales, respectively, were greater than 0. Those with scores of 0 were considered to have no intermittent or constant knee pain, respectively. Logistic regression models were used to investigate the relationship between knee pain characteristics (ICOAP subscale scores, the presence of frequent unpredictable and frequent predictable intermittent pain, and an interaction between intermittent scale score and unpredictable OA pain) and having reported an unacceptable symptom state (yes vs no). Additional covariates considered were the patient age (years), gender, level of education (≤high school; >high school), living arrangement (alone vs with others), and number of comorbid conditions (0, 1–2, 3+)[15,19,20,21]. In a secondary exploratory analysis, we used Receiver Operating Characteristic (ROC) curves to evaluate the ability of ICOAP scores to discriminate those who did vs did not report an acceptable symptom state. An 'area under the ROC curve' (AUC) of 0.7–0.8 was defined *a priori* as indicating good accuracy, while an AUC > 0.8 indicated excellent accuracy[22]. The score threshold values that provided optimal discrimination were determined. Analyses were conducted using SAS 9.3 and R 2.15.1.

The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement for cross-sectional studies was used to report our findings[23].