Older Patients’ Perceptions of Quality of Chronic Knee or Hip Pain: Differences by Ethnicity and Relationship to Clinical Variables

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Background. There is marked ethnic or racial disparity in the utilization of joint replacement for osteoarthritis. The reasons are not known. Pain is the reason most patients with osteoarthritis seek care. Cultural and psychosocial factors influence how patients experience and express pain. We examined whether patient descriptions of chronic pain vary by ethnicity and if they correlate with important clinical measures used in arthritis care.

Methods. Sample consisted of 300 male veterans who were ≥50 years of age with moderate to severe symptomatic knee or hip osteoarthritis. Structured surveys were used to assess patient descriptions of pain and to collect important demographic, clinical, and psychosocial variables. Factor analysis was used to assess patterns of pain description in a comparison of African-American and Caucasian patients. Pearson correlations were used to examine relationships between pain descriptions and clinical variables.

Results. The two groups were similar with respect to age and other baseline clinical characteristics. A confirmatory factor analysis on quality of pain description showed that a four-factor model converged for Caucasian patients (χ² = 39.6, comparative fit index = 0.95, Tucker Lewis index = 0.93, and root mean square error of approximation = 0.047), but a three-factor model was supported by the data for African-American patients (χ² = 25.4, comparative fit index = 1.00, Tucker Lewis index = 1.05, and root mean square error of approximation ≤ 0.001). Chronic pain quality descriptions correlate significantly with Western Ontario and McMaster Universities Arthritis Index scores but not with radiologic stage of disease.

Conclusions. African-American and Caucasian elderly patients with chronic knee or hip symptomatic osteoarthritis describe the quality of their pain differently. Patient descriptions of quality of chronic knee or hip pain do not correlate with radiologic stage of disease.

PAIN as a symptom has gained prominence in health care. Pain is now a quality-of-care attribute and has spurred the proliferation of pain measurement scales in clinical practice and research (1–3). In osteoarthritis, pain is the most important reason why patients seek care (4), and pain relief is the primary indication for treatment. Pain and limitation in daily activities were noted to be the most important issues for patients with knee osteoarthritis (5). Knee pain severity is a strong risk factor for self-reported difficulty in performing tasks of upper and lower extremity function among osteoarthritis patients (6).

Pain remains a poorly understood, highly complex, and less well-studied phenomenon. Before the Gate Control Theory of Pain, pain was considered primarily a sensory phenomenon (7). Other components of pain such as motivational, affective, and cognitive factors received less attention (7). The role of patients’ perceptions of pain in the management of osteoarthritis is poorly understood. Primary care physicians often refer patients with knee or hip osteoarthritis for orthopedic evaluation on the basis of radiologic evidence of osteoarthritis, despite strong evidence that pain is poorly correlated with radiologic disease in osteoarthritis (8). Furthermore, pain control (not reversal of radiologic disease) is a major goal in total joint replacement (9).

Joint replacement is a cost-effective treatment option for end-stage osteoarthritis of the knee or hip (10,11). Although osteoarthritis is equally prevalent in all ethnic or racial groups (12,13), there is marked unexplained ethnic or racial disparity in the utilization of joint replacement (14–16). Understanding how patients report knee or hip pain vis-à-vis who gets referred for joint replacement may be important in explaining disparity in the utilization of joint replacement. For example, if African-American patients describe their knee or hip symptoms such as pain differently than Caucasian patients, it is conceivable that differential assessment of the need for joint replacement occurs. These differences might explain some of the observed African-American–Caucasian differences in the utilization of this procedure. Relatively few studies have examined whether African-American and Caucasian patients differ in how they report their chronic arthritis pain or how patients’ reporting of their pain perceptions relate to clinical measures used by physicians in arthritis management.

In a study of elderly, male Veterans Affairs (VA) patients with moderate to severe symptomatic knee or hip osteoarthritis, we explored whether African-American patients and Caucasian patients differ in their descriptions of the quality of pain and how these descriptions relate to common
clinical measures utilized by providers to assess disease severity.

**Methods**

**Patient Population**

After Institutional Review Board approval was obtained, potential study participants were identified from the log of patients scheduled for primary care visits at VA outpatient clinics. Eligibility criteria included age $\geq 50$ years and presence of moderate to severe pain for more than 6 months (evaluated by using the Lequesne scale) (17). Patients who already had knee or hip replacement were excluded. According to the Arthritis Supplement National Health and Nutrition Examination Survey I (NHANES-I), patients were initially asked two questions regarding the presence and duration of hip or knee pain (18): (i) “Have you ever had pain in and around your knee–hip on most days for at least one month?” and (ii) “Over the past month, have you had pain in the knee when walking or standing at least half of the day?” Patients who answered “yes” to both of these questions screened positive for chronic knee or hip pain consistent with the presence of symptomatic osteoarthritis. Three hundred African American and Caucasian patients who met the study criteria and gave informed consent to the study were enrolled.

**Data Collection**

**Baseline demographic information.**—Using field-tested questionnaires, interviewers gathered demographic information. Patients were asked to self-identify their race or ethnicity. Chart and VA clinical computer database abstractions provided information on medications, comorbidity, and health care utilization.

**Study measures: quality of pain.**—As a way to assess quality of pain perceptions, patients were asked, “Here are some words that patients like yourself sometimes use to describe their pain. Please tell us how applicable they are for your pain.” Patients were given the following list of pain descriptors to choose from: Sharp, Dull, Hot, Achy, Stabbing, Stiff, Sore, Tender, Throbbing, and Frozen. They were also asked to state the frequency of this feeling. The response options were Never, Sometimes, or Always.

**Western Ontario and McMaster Universities Arthritis Index.**—The Western Ontario and McMaster Universities Arthritis Index (WOMAC) was utilized to assess disease-specific functional status. This reliable (Cronbach’s alpha $\approx 0.80$) and validated scale was designed specifically to assess lower extremity pain and function in osteoarthritis. Summary scores range from 0 to 100. Patients with scores $\geq 39$ are considered candidates for joint replacement (19,20).

**Radiologic disease.**—Radiographic evaluation of the more symptomatic joint (hip or knee) was obtained to aid in the confirmation of the diagnosis of hip or knee osteoarthritis. All knee or hip x-rays were blindly read and graded by using the Kellgren–Lawrence scoring system (21). This scoring system has been extensively used in epidemiological research in osteoarthritis and has good reproducibility (22,23). Reproducibility is improved further with the use of Atlas of Standard Radiograph (23).

**Quality of life measure.**—A single-item global quality of life (QOL) question was used to assess patients’ perceptions of QOL. The question, “How would you rate your overall quality of life?” was rated by patients as Excellent, Very Good, Good, Fair, or Poor. The construct validity of this question has been confirmed by comparing its performance against standard health status measures (24).

**Visual analog scale (VAS) of pain.**—Patients were asked to mark a 10-cm scale anchored by “no pain” to “worst pain ever.” Scores were then converted to a 0–100 point scale. This validated measure is commonly used in clinical studies (3,25).

**Geriatric depression scale.**—A validated 15-item scale used to screen for depression in the elderly population (26) was utilized to assess depression in the sample.

**Charlson comorbidity index.**—This index was used to assess overall disease burden. Preprinted forms listing diseases that were defined in the original paper by Charlson and colleagues (27) were used to abstract information from patients’ medical records. The index is based on the mean number of comorbid diseases per patient; scores range from 0 to 13.

**Statistical Analysis**

**Descriptive statistics.**—Baseline comparisons were performed by utilizing the chi-square test for categorical variables and t test for continuous, normally distributed variables. Caucasian and African-American patients were compared with respect to demographics, disease severity (WOMAC), radiologic stage (Kellgren–Lawrence grade), scores on pain VAS, and global QOL.

**Factor analysis.**—Exploratory factor analysis was performed to reduce the number of variables and to explore quality of pain factor structure. Principal axis component analysis with varimax rotation was used for factor structure identification. Factor extraction criteria were as follows: (a) an eigenvalue of $\geq 1.0$; (b) the elbow of the skree plot; and (c) primary factor loading of $>0.4$ and secondary factor loading of $<0.3$.

Using the factors that emerged from the exploratory factor analysis, we performed a confirmatory factor analysis on the entire sample and also on subsamples of Caucasian patients and African-American patients. The purpose was to determine whether the data supported the factor structure identified in the exploratory factor analysis and whether the structure varied by race or ethnicity. Model fitness was assessed by using standard goodness of fit indices, that is,
the chi-square test, the comparative fit index (CFI), the Tucker Lewis index (TLI), and the root mean square error of approximation (RMSEA).

Correlations.—Pearson correlations were used to assess the relationship between each quality of pain factor and the following common clinical measures: WOMAC, Kellgren–Lawrence grade, VAS for pain, and global QOL ratings. African-American and Caucasian patients were analyzed separately.

RESULTS

Baseline Characteristics

African-American and Caucasian patients were similar with respect to age (66 ± 10 vs 66 ± 9; p = .60), severity of arthritis (measured by Lequesne scale; mean score 11 ± 4 vs 11 ± 4; p = .22), WOMAC scale (mean score 46 ± 17 vs 45 ± 17; p = .32), Charlson comorbidity index (mean score 2.3 ± 2 vs 2.5 ± 2; p = .24), and geriatric depression scale (mean score 4.5 ± 3.4 vs 5 ± 3.8; p = .07). African-Americans were less likely to be employed (8% vs 15%; p = .017), married (39% vs 56%; p = .001), and to have attained a high school education (43% vs 29%; p = .001). They were also more likely to report an annual household income of less than $10,000 (41% vs 20%; p = .001). Kellgren–Lawrence scores for African Americans and Caucasians were comparable (mean score 1.61 ± 1.2 vs 1.51 ± 1.1; p = .30) (Table 1).

Factor Analysis Results

A four-factor structure converged for the entire sample in the exploratory factor analysis: factor 1 combines variables Sharp and Stabbing; factor 2 combines variables Sore and Tender; factor 3 combines variables Dull, Stiff, and Achy; and factor 4 combines variables Hot, Frozen, and Throbbing. Confirmatory factor analysis confirms that the model (i.e., hypothetical four-factor solution) fits the data (Goodness of Fit indices are nonsignificant chi-square of 31.2, CFI = 0.99, TLI = 0.99, and RMSEA = 0.02) (Figure 1).

When we split the sample into Caucasians only and African Americans only and repeated the confirmatory factor analysis, again a four-factor solution converged for the Caucasians-only subsample (Figure 2). The goodness of fit indices suggested a good fit for this model (chi-square = 39.6, CFI = 0.95, TLI = 0.93, and RMSEA = 0.047). However, a four-factor solution did not converge for African-American patients. Instead, a three-factor solution was supported by the data (Figure 3). Factor 1 combines variables Sharp and Stabbing; factor 2 combines variables

![Factor Analysis Results Diagram](https://example.com/factor-analysis-diagram.png)

Figure 1. Confirmatory factor analysis of quality of pain descriptions for the FF total sample (N = 300). CFI = comparative fit index; TLI = Tucker Lewis index; RMSEA = root mean square error of approximation.

<table>
<thead>
<tr>
<th>Variable</th>
<th>African-American</th>
<th>Caucasian</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (y)</td>
<td>65 ± 9</td>
<td>66 ± 9</td>
<td>.42</td>
</tr>
<tr>
<td>Education (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;High school</td>
<td>39</td>
<td>27</td>
<td>.08</td>
</tr>
<tr>
<td>&gt;High school</td>
<td>61</td>
<td>73</td>
<td></td>
</tr>
<tr>
<td>Annual household income (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;$10,000</td>
<td>40.3</td>
<td>20.6</td>
<td>.00</td>
</tr>
<tr>
<td>$10,000–14,999</td>
<td>29.0</td>
<td>30.7</td>
<td></td>
</tr>
<tr>
<td>$15,000–29,999</td>
<td>20.2</td>
<td>36.1</td>
<td></td>
</tr>
<tr>
<td>&gt;$30,000</td>
<td>10.5</td>
<td>12.5</td>
<td></td>
</tr>
<tr>
<td>Employed (%)</td>
<td></td>
<td></td>
<td>.03</td>
</tr>
<tr>
<td>Married status (married) (%)</td>
<td></td>
<td></td>
<td>.04</td>
</tr>
<tr>
<td>WOMAC score</td>
<td>45 ± 15</td>
<td>45 ± 17</td>
<td>.24</td>
</tr>
<tr>
<td>Kellgren–Lawrence stage</td>
<td>1.6 ± 1</td>
<td>1.5 ± 1</td>
<td>.60</td>
</tr>
<tr>
<td>Geriatric depression score</td>
<td>4 ± 3</td>
<td>5 ± 4</td>
<td>.08</td>
</tr>
<tr>
<td>Charlson comorbidity index</td>
<td>2.3 ± 2</td>
<td>2.5 ± 2</td>
<td>.29</td>
</tr>
</tbody>
</table>

Notes: WOMAC = Western Ontario and McMaster Universities Arthritis Index.
Hot and Frozen; and factor 3 combines variables Dull, Stiff, Achy, Sore, Tender, and Throbbing. The goodness of fit indices suggest an excellent fit for this model (chi-square = 25.4, CFI = 1.00, TLI = 1.05, and RMSEA = 0.000).

Correlations with Clinical Measures

Table 2 summarizes Pearson correlations between the pain quality factors and a set of clinical measures for Caucasian patients. WOMAC scores correlated significantly but modestly with all pain quality factors. None of the four pain quality factors correlated with radiologic stage of disease as assessed by the Kellgren–Lawrence scale. VAS for pain scores correlated positively, but weakly, with all quality of pain factors. Global QOL ratings showed weak negative correlations with quality of pain factors. Table 3 summarizes Pearson correlations between quality of pain factors and a set of clinical measures for African-American patients. The correlations between quality of pain factors and WOMAC scores, radiologic stage of disease, and VAS for pain are similar to those shown for Caucasian patients. None of the quality of pain factors correlated with global QOL ratings for the African-American patients.

Figure 2. Confirmatory factor analysis of quality of pain descriptions for the Caucasian sample (n = 165). CFI = comparative fit index; TLI = Tucker Lewis index; RMSEA = root mean square error of approximation.

Figure 3. Confirmatory factor analysis of pain descriptions for the African-American sample (n = 135). CFI = comparative fit index; TLI = Tucker Lewis index; RMSEA = root mean square error of approximation.
Global QOL

Americans were reported to be "cate and express health concerns such as pain. Italian ethnic and cultural variations in how patients express and global QOL rating for African-American patients.

and significant but weak for both groups. Although the descriptions (factors) and the VAS for pain were positive WOMAC scores for both African-American patients and Lawrence criteria in either racial or ethnic group. There was with radiologic stage of disease as measured by Kellgren–Lawrence.

DISCUSSION

In this study of 300 African-American and Caucasian elderly patients with symptomatic knee or hip osteoarthritis, there are structural differences by race or ethnicity regarding patients’ descriptions of the quality of their chronic knee or hip pain. Quality of pain descriptions did not correlate with radiologic stage of disease as measured by Kellgren–Lawrence criteria in either racial or ethnic group. There was modest correlation between quality of pain factors and WOMAC scores for both African-American patients and Caucasian patients. The correlations between quality of pain descriptions (factors) and the VAS for pain were positive and significant but weak for both groups. Although the global QOL rating correlated negatively with some of the quality of pain factors for Caucasian patients, there were no correlations between any quality of pain factors and the global QOL rating for African-American patients.

Our results support findings by other studies that report ethnic and cultural variations in how patients express and communicate pain (28–31). For example, in studies of Irish and Italian Americans in Boston, Zola reported that cultural and psychosocial factors influence how patients communicate and express health concerns such as pain. Italian Americans were reported to be “emotional” and “dramatic” in their expression of health concerns (28), whereas Irish Americans were found to be more likely to downplay their distress (28). Likewise, Zborowski found responses to pain by Irish, Italian, and Jewish patients in New York to vary considerably as a result of their cultural experiences (29). In other studies, African-American patients have been reported to be less likely to seek treatment for chest pain (32), to receive less anti-ischemic therapy for chest pain (33), and to use less analgesic medication postoperatively than Caucasians (34). It has been shown that ethnic groups vary in their ratings of affective quality of cancer pain (31) and the intensity of ischemic pain (35). In a study of 251 patients regarding their description of back pain, African American and Caucasians differed significantly in the words they selected to describe their pain (30). Garron and Leavitt also reported significant interethnic differences in the description of quality of pain experience for African-American, Irish, Italian, Jewish, and Puerto Rican patients (30).

The lack of any correlation between quality of pain descriptions and radiologic stage of disease for both ethnic groups is also consistent with previous findings (8). A Framingham study that examined the epidemiology of osteoarthritis also found women and men to differ greatly in their symptom reporting, whereas differences in their radiologic disease were not as great (36).

We expected much stronger correlations between the VAS for pain scores and the pain quality factors than observed in our analysis. However, upon closer examination of the data, it became apparent that pain is a multidimensional phenomenon and that the VAS for pain is a good measure of pain intensity (a separate dimension of pain) but not of the quality of the pain (3). It is also possible that our weak, but significant, correlations between VAS for pain scores and quality of pain factors reflect previously reported finding that the VAS for pain is less reliable when used for assessing pain in elderly patients with limited education (3). A large proportion of our sample reported less than high school education.

Our finding of ethnic variation in the correlation between the quality of pain factors and global QOL ratings are intriguing for two reasons. First, these differences are in line with our previous finding that African-American patients rate their global QOL differently than Caucasians, even in the setting of similar disease stage, functional status, and other clinical and demographic confounders (37). Second, QOL perceptions influence patient decision making with respect to medical procedures such as joint replacement (38,39). More importantly, physicians may render recommendations such as referral to joint replacement on the basis of their impressions of patient’s QOL (40). For these reasons, it is important to further investigate the relationship between QOL ratings and pain vis-à-vis race or ethnicity and joint replacement utilization.

Our study has several limitations. First, we have studied only African-American and Caucasian male patients in one VA setting. Therefore, our findings may not be applicable to other ethnic minorities, women, or other health care sites. Second, our analysis is mainly exploratory in nature. Although we have found structural differences in how our comparison groups describe the quality of knee or hip pain, we have not examined the source of this difference or whether it is clinically significant. Furthermore, whether or how the pain factors we found in our exploratory factor analysis relate to anatomic or physiologic joint disease process is not clear. Lastly, quality of pain addresses, in part, an affective aspect of pain that may vary depending on the

<table>
<thead>
<tr>
<th>Variable</th>
<th>Factor I</th>
<th>Factor II</th>
<th>Factor III</th>
<th>Factor IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>WOMAC score</td>
<td>0.31 (p = .000)</td>
<td>0.31 (p = .00)</td>
<td>0.45 (p = .000)</td>
<td>0.32 (p = .00)</td>
</tr>
<tr>
<td>Kellgren–Lawrence stage</td>
<td>0.66 (p = .5)</td>
<td>0.54 (p = .62)</td>
<td>0.03 (p = .65)</td>
<td>0.02 (p = .72)</td>
</tr>
<tr>
<td>VAS pain</td>
<td>0.27 (p = .001)</td>
<td>0.22 (p = .005)</td>
<td>0.73 (p = .03)</td>
<td>0.16 (p = .04)</td>
</tr>
<tr>
<td>Global QOL</td>
<td>−0.2 (p = .005)</td>
<td>−0.10 (p = .2)</td>
<td>−0.16 (p = .04)</td>
<td>−0.12 (p = .13)</td>
</tr>
</tbody>
</table>

Notes: WOMAC = Western Ontario and McMaster Universities Arthritis Index; VAS = visual analog scale; QOL = quality of life.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Factor I</th>
<th>Factor II</th>
<th>Factor III</th>
</tr>
</thead>
<tbody>
<tr>
<td>WOMAC score</td>
<td>0.24 (p = .007)</td>
<td>0.22 (p = .014)</td>
<td>0.40 (p = .000)</td>
</tr>
<tr>
<td>Kellgren–Lawrence stage</td>
<td>0.015 (p = .87)</td>
<td>−0.113 (p = .21)</td>
<td>−0.14 (p = .12)</td>
</tr>
<tr>
<td>VAS pain</td>
<td>0.27 (p = .002)</td>
<td>0.12 (p = .018)</td>
<td>0.16 (p = .07)</td>
</tr>
<tr>
<td>Global QOL</td>
<td>−0.35 (p = .13)</td>
<td>−0.02 (p = .87)</td>
<td>−0.11 (p = .23)</td>
</tr>
</tbody>
</table>

Notes: AA = African-American; WOMAC = Western Ontario and McMaster Universities Arthritis Index; VAS = visual analog scale; QOL = quality of life.
psychosocial status of the patient at the time of the interview and over time.

In summary, African-American and Caucasian elderly patients with chronic knee or hip symptomatic osteoarthritis describe the quality of their pain differently. The relationship between quality of pain and global QOL ratings also varies between Caucasian patients and African American patients. Moreover, patient descriptions of quality of chronic knee or hip pain do not correlate with radiologic stage of disease. Further studies are needed to understand the significance of these differences and how they may relate to the observed African-American and Caucasian differences in the utilization of joint replacement for knee or hip osteoarthritis.

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