Health status and perception of pain: a comparative study between female patients with hand osteoarthritis and rheumatoid arthritis

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Objective: Osteoarthritis (OA) is the most frequent rheumatic joint disease and its occurrence is growing due to prolonged life expectancy and an increasing number of elderly individuals in the population. The main objective of this study was to compare the burden of disease, assessed by measures of pain and health-related quality of life (HRQoL), between female patients with hand osteoarthritis (HOA) and rheumatoid arthritis (RA).

Methods: One hundred and ninety female HOA patients were compared with 194 female RA patients of the same age. HRQoL was measured with the Arthritis Impact Measurement 2 Scale (AIMS2), the 36-item Short-Form Health Survey (SF-36) and its preference-based single index measure SF-6D, the Health Assessment Questionnaire (HAQ), the modified HAQ (MHAQ), self-efficacy scales, and visual analogue scales (VAS) for pain and fatigue. We also compared levels of fibromyalgia (FM)-like symptoms (headache, muscle pain, numbness, and concentration problems). Scores were compared by a multivariate analysis of covariance (ANCOVA), adjusted for age, number of comorbidities, and years of education. Sime’s procedure was used to adjust for multiple testing.

Results: RA patients had significantly lower levels of physical functioning compared to HOA patients, whereas pain measured on the Arthritis Impact Measurement Scale 2 (AIMS2) was significantly worse in HOA as compared with RA. The HOA patients also had worse scores for FM-like symptoms. SF-6D utility scores in HOA and RA were similar (0.63 and 0.64, respectively).

Conclusions: The overall impact of the disease on HRQoL was similar between RA and HOA patients, based on the SF-6D scores. Physical function was worse in RA patients, but HOA patients reported worse scores in pain measures and FM-like symptoms.

OA may cause reduced health-related quality of life (HRQoL) as a result of pain, stiffness, and functional impairment, probably due to psychosocial, mental, and even genetic and hormonal factors (7, 8). Hand OA (HOA) commonly affects the distal and proximal inter-phalangeal joints, and also the carpo-metacarpal joint of the thumb. It is usually considered part of a generalized disease and is a component in the proposed classification criteria for generalized OA (9).

Rheumatoid arthritis (RA) is established as a severe and progressive disease that causes reduced life expectancy (10) and has a major impact on HRQoL (11). HOA occurs more frequently than RA, and a previous study has indicated that patients with HOA have a considerably reduced HRQoL, compared to healthy controls (12).

The Oslo HOA cohort and the Oslo RA register (ORAR) provide an opportunity to assess the comparative burden of disease between HOA and RA patients (13, 14), as patients in both registers have completed the same questionnaires and tests. Previous studies have found that pain is a major concern for patients with HOA, as it is for patients...
with RA (12, 15). Fibromyalgia (FM)-like symptoms occur frequently in RA patients (16), but we are not aware of studies that have explored the concurrent presence of FM-like symptoms in HOA.

The main objective of this study was to evaluate the burden of disease by a comparative analysis of pain and HRQoL between female patients with HOA and RA, with the opportunity of using several patient-reported outcomes that are widely used in arthritic conditions. We also compared levels of FM-like symptoms in the two patient groups.

**Patients and methods**

**HOA patients**

HOA patients from 50 to 70 years of age (mean age 61.6 years) were enrolled in the HOA group over a period of 1.5 years, between 2000 and 2002. Patients with any other inflammatory rheumatic diseases (e.g. RA or psoriatic arthritis, ankylosing spondylitis, etc.) were excluded. Seventy-six per cent (209 patients) of the originally invited 275 patients agreed to participate in the study after receiving printed and verbal information (13). For the current analyses the 19 male participants were excluded. All participants had been referred to an outpatient rheumatology department within the previous 2 years. Eighty-three per cent (159 patients) fulfilled the ACR clinical classification criteria for HOA, whereas 16.3% (31 patients) had clinical HOA without formally fulfilling the classification criteria (17). Radiographic OA abnormalities in at least one finger joint (Kellgren and Lawrence grade 2 or more) were found in 93% (176 participants) (18). Nine per cent (17 patients) of the patients fulfilled the clinical and radiographic ACR classification for hip OA concurrently, and 59% (112 patients) also fulfilled the clinical ACR classification criteria for knee OA (19, 20).

**RA patients**

Records of 194 female RA patients from the ORAR between 50 and 70 years of age (mean age 61.1 years) fulfilling the ACR criteria for RA (21) were analysed (14, 22). All RA patients had participated in a comprehensive prospective data collection in the period 1998–99 (23). Only RA patients who had been routinely examined in the outpatient department during the previous 2 years and who were without any clinical evidence of HOA were eligible for the current comparative analyses.

**Data collection**

Both patient populations underwent a comprehensive clinical examination including completion of several self-reported health status questionnaires focusing on HRQoL. Relevant questionnaires for the current study objective were the Arthritis Impact Measurement Scale 2 (AIMS2), the 36-item Short-Form Health Survey (SF-36), the Health Assessment Questionnaire (HAQ), the modified HAQ (MHAQ), self-efficacy scales, and visual analogue scales (VAS; pain, fatigue, global). We also collected data on FM-like symptoms (24), and measured grip strength. The procedures for data collection were similar across the patient groups. Data on the number of comorbidities, level of education, and other demographic variables were recorded at an interview performed by a study nurse. Unfortunately, no data on aesthetic damage were collected. All patients with HOA were examined by the same trained clinician, with several years of experience in rheumatology, and the same qualified study nurse. Assessments of RA patients and controls were performed by another clinician/study nurse team from the same department, who had received similar training.

**SF-36 and SF-6D**

The 36-item Short-Form Health Survey (SF-36) is a broadly used generic health status questionnaire. It assesses eight dimensions of health: physical function (10 items), role limitations due to physical health problems (four items), bodily pain (two items), general health (five items), vitality/energy (four items), role limitations due to emotional problems (three items), and mental health (five items). SF-36 scores range from 0 to 100, low scores indicating poor health (25). The Norwegian version of the SF-36 has been validated (13, 26).

The SF-6D is a preference-based utility instrument, based on data from the SF-36 that are converted to a utility score. The score is calculated from six dimensions (physical functioning, role limitations, social functioning, pain, mental health, and vitality), each with 4–6 levels. It ranges from 0.29 to 1.0, with 1.0 indicating perfect health (27).

**AIMS2**

The Arthritis Impact Measurement Scale 2 (AIMS2) was developed for RA but can also be used in other rheumatic diseases such as OA. It is widely used in the field of rheumatology and measures physical function, mental health, social integration, and pain. The questionnaire has 12 scales that can be merged into five main components: physical, mental, social, pain, and work. Each scale is graded from 0 to 10, with 10 representing the poorest health (28).
HAQ and MHAQ

The Arthritis Impact Measurement Scale 2 (HAQ) was developed to measure self-reported physical function in RA and is also used for other rheumatic diseases (29). The disability index consists of 20 questions on eight categories of relevant physical functions: dressing and grooming, arising, eating, walking, hygiene, reach, grip, and common daily activities. The scores in each category range from 0 (without any difficulty) to 3 (unable to do), and are upgraded by 2 if the patient reports use of helping devices and/or receives assistance within the same category. The highest score for any question in each of the eight categories is selected to represent that respective category and a mean score of the eight categories is calculated (range 0–3, with 3 the worst disability). The MHAQ is a modified version of the original HAQ. Each of the eight items represents one of the eight components of the HAQ (26, 30). A mean MHAQ score was computed from all eight items, with a range from 1 to 4, with 4 the worst health.

Self-efficacy

The Self-Efficacy Scale assesses the rheumatic patients’ perceived ability to influence rheumatic pain (five items), physical function (nine items), and symptoms (six items). Responses are measured on a scale from 10 (very uncertain) to 100 (very certain) (31).

VAS

Visual analogue scales (VAS, 0–100 mm) were used for joint pain, fatigue, and patient global assessment (general OA disease activity), with no and intolerable pain/fatigue/disease activity as the anchoring points.

Perceived intensity of FM-like symptoms was also explored by VAS. The following symptoms were examined: abdominal pain, headache, numbness in fingers, muscle pain/muscular tenderness, and concentration problems, with anchors being no symptoms/intolerable symptoms.

Performance-based measure

Grip strength (kg) was measured in both groups by using the Jamar hand dynamometer. The best performance out of two attempts on each hand was used in the analyses (32, 33).

Ethics, analyses, and statistics

All patients signed an informed consent form and the study was approved by the Norwegian Data Inspectorate and the local Ethical Committee. For continuous variables, the two study groups were compared by one-way analysis of variance (ANOVA) and the Tukey post hoc test (for crude values). The least square means were calculated in a multivariate analysis of covariance (ANCOVA), adjusting for age, number of comorbidities, and years of education. We used the Statistical Package for Social Sciences (SPSS) version 14.0 and Statistical Analysis Software (SAS) version 9.1.3 in the analyses. p-values \( \leq 0.05 \) were regarded as significant. To correct for multiple testing we applied Simes’ procedure. Based on this procedure all p-values \( \leq 0.014 \) remained statistically significant.

Results

Both patient groups had similar age, level of education, and number of comorbidities, but disease duration was much longer in patients with RA (Table 1).

Table 2 shows that RA patients had statistically significant worse health compared to HOA patients within physical function, and were numerically worse for fatigue VAS and SF-36 vitality scores. Hand and finger function was similar in both groups, but grip strength was significantly worse in RA. Pain measured by AIMS2 was significantly worse in HOA patients, and mental health scores were numerically worse in HOA compared to RA patients. Measures of self-efficacy were similar. The mean SF-6D utility

Table 1. Description of study populations.

<table>
<thead>
<tr>
<th></th>
<th>HOA (n = 190)</th>
<th>RA (n = 194)</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>61.6 (49.9–70.9)</td>
<td>61.1 (49.6–70.0)</td>
<td>0.42</td>
</tr>
<tr>
<td>Disease duration (years)</td>
<td>10.7 (2.0–36.0)</td>
<td>18.8 (6.0–54.0)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Education (years)</td>
<td>12.4 (7.0–17.0)</td>
<td>11.5 (7.0–17.0)</td>
<td>0.008</td>
</tr>
<tr>
<td>Number of comorbidities</td>
<td>1.40 (0.0–7.0)</td>
<td>1.10 (0.0–16.0)</td>
<td>0.03</td>
</tr>
</tbody>
</table>

HOA, hand osteoarthritis; RA, rheumatoid arthritis; NA, not applicable.
Values given as mean (range).
*ANOVA.
Recorded co-morbidities: hypertension, angina, myocardial infarction, other cardiovascular disease, asthma, bronchitis, other pulmonary disease, allergy, eczema, hay fever, sciatic pain, stroke, cerebral haemorrhage, cancer, neurological disease, diabetes, metabolic disease/thyroid disease, mental disease, abuse of alcohol or narcotics, renal disease, hepatic disease, gastric ulcer, anaemia, or other haematological disease.
scores for patients in HOA and RA were similar (0.63 and 0.64, respectively) (Table 2).

The HOA cohort had higher scores on FM-like symptoms (headache, concentration problems, numbness, muscle pain), the latter two showing statistical significance in comparison with RA (Table 3).

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## Table 2. Mean values of HRQoL measures in OA and RA (adjusted for age, number of comorbidities, and years of education) and estimated standard deviation (SD) from the analysis of covariance (ANCOVA) model.

<table>
<thead>
<tr>
<th></th>
<th>OA (n = 190)</th>
<th>RA (n = 194)</th>
<th>Estimated SD</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical scales</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>AIMS2 physical</td>
<td>1.74</td>
<td>2.38</td>
<td>1.26</td>
<td>&lt;0.001†</td>
</tr>
<tr>
<td>AIMS2 hand and finger</td>
<td>3.12</td>
<td>3.47</td>
<td>2.39</td>
<td>0.18</td>
</tr>
<tr>
<td>AIMS2 arm</td>
<td>0.99</td>
<td>1.82</td>
<td>1.69</td>
<td>&lt;0.001†</td>
</tr>
<tr>
<td>SF-36</td>
<td>58.3</td>
<td>47.9</td>
<td>22.3</td>
<td>&lt;0.001†</td>
</tr>
<tr>
<td>HAQ (0-3)</td>
<td>0.91</td>
<td>1.23</td>
<td>0.59</td>
<td>&lt;0.001†</td>
</tr>
<tr>
<td>MHAQ (1-4)</td>
<td>1.48</td>
<td>1.64</td>
<td>0.45</td>
<td>0.002†</td>
</tr>
<tr>
<td><strong>Pain</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VAS pain</td>
<td>38.6</td>
<td>36.40</td>
<td>21.7</td>
<td>0.35</td>
</tr>
<tr>
<td>AIMS2</td>
<td>5.52</td>
<td>4.83</td>
<td>2.28</td>
<td>0.006†</td>
</tr>
<tr>
<td>SF-36</td>
<td>40.4</td>
<td>43.7</td>
<td>18.6</td>
<td>0.11</td>
</tr>
<tr>
<td><strong>Fatigue</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VAS fatigue</td>
<td>44.2</td>
<td>50.4</td>
<td>27.7</td>
<td>0.04</td>
</tr>
<tr>
<td>SF-36 vitality</td>
<td>41.0</td>
<td>42.9</td>
<td>20.4</td>
<td>0.40</td>
</tr>
<tr>
<td><strong>Mental</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AIMS2 affect</td>
<td>3.75</td>
<td>3.18</td>
<td>1.61</td>
<td>0.03</td>
</tr>
<tr>
<td>SF-36</td>
<td>68.9</td>
<td>73.2</td>
<td>19.0</td>
<td>0.04</td>
</tr>
<tr>
<td><strong>Social functioning</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AIMS2 social interaction</td>
<td>4.39</td>
<td>4.15</td>
<td>1.52</td>
<td>0.16</td>
</tr>
<tr>
<td>SF-36 social functioning</td>
<td>68.7</td>
<td>68.2</td>
<td>25.0</td>
<td>0.86</td>
</tr>
<tr>
<td><strong>Role</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SF 36 physical</td>
<td>34.6</td>
<td>29.4</td>
<td>37.4</td>
<td>0.21</td>
</tr>
<tr>
<td>SF36 mental</td>
<td>56.9</td>
<td>56.1</td>
<td>25.0</td>
<td>0.67</td>
</tr>
<tr>
<td><strong>General</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VAS global</td>
<td>40.6</td>
<td>39.4</td>
<td>22.2</td>
<td>0.63</td>
</tr>
<tr>
<td>SF-36</td>
<td>52.8</td>
<td>46.2</td>
<td>21.1</td>
<td>0.005†</td>
</tr>
<tr>
<td>SF-6D</td>
<td>0.64</td>
<td>0.63</td>
<td>0.12</td>
<td>0.59</td>
</tr>
<tr>
<td><strong>Self-efficacy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain</td>
<td>55.3</td>
<td>55.5</td>
<td>20.7</td>
<td>0.94</td>
</tr>
<tr>
<td>Symptoms</td>
<td>68.0</td>
<td>63.7</td>
<td>16.7</td>
<td>0.22</td>
</tr>
<tr>
<td><strong>Performance test</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grip strength</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right hand</td>
<td>19.5</td>
<td>15.5</td>
<td>7.16</td>
<td>&lt;0.001†</td>
</tr>
<tr>
<td>Left hand</td>
<td>16.9</td>
<td>13.8</td>
<td>7.19</td>
<td>&lt;0.001†</td>
</tr>
</tbody>
</table>

*ANCOVA.
†Statistically significant (level <0.014 after adjustment for multiple testing by Sime’s procedure).

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## Table 3. Mean values of FM-like symptoms (VAS) (adjusted for age, number of comorbidities, and years of education) and estimated standard deviation (SD) from the analysis of covariance (ANCOVA) model.

<table>
<thead>
<tr>
<th></th>
<th>OA (n = 190)</th>
<th>RA (n = 194)</th>
<th>Estimated SD</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muscle pain</td>
<td>43.5</td>
<td>36.1</td>
<td>26.5</td>
<td>0.01†</td>
</tr>
<tr>
<td>Headache</td>
<td>19.5</td>
<td>16.0</td>
<td>22.7</td>
<td>0.16</td>
</tr>
<tr>
<td>Concentration problems</td>
<td>22.7</td>
<td>18.1</td>
<td>21.7</td>
<td>0.06</td>
</tr>
<tr>
<td>Numbness</td>
<td>27.9</td>
<td>16.3</td>
<td>24.1</td>
<td>&lt;0.001†</td>
</tr>
<tr>
<td>Abdominal pain</td>
<td>20.7</td>
<td>22.6</td>
<td>22.6</td>
<td>0.45</td>
</tr>
</tbody>
</table>

*ANCOVA.
†Statistically significant (level <0.014 after adjustment for multiple testing by Sime’s procedure).

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### Discussion

We have previously shown that both HOA and RA patients have a considerable reduction of HRQoL compared to healthy controls and populations norms for SF-36 scores (12). The current study focused on comparisons between HOA and RA, with the...
opportunity to use both generic and disease-specific measures. The overall impact of the disease on HRQoL was similar. However, physical function was worse in RA, whereas HOA patients reported worse scores in pain and FM-like symptoms.

OA is the most common type of arthritis in individuals aged ≥50 years (34–36). An increasing number of publications is focusing on the impact and importance of OA on patients and society worldwide, particularly because of increasingly aged populations (1, 34, 37–39). The current study also emphasizes the major overall burden of OA as HOA is a more prevalent disease than RA and the HRQoL is similar. The levels of HRQoL should be interpreted in the context of the occurrence of the disease when the burden of a disease is considered in a societal perspective.

We chose RA as a comparative group for this study because HOA and RA can have clinical similarities, and are often subject to differential diagnosis. RA is recognized as a severe disease with a major influence on HRQoL (10). We did not compare structural damage as the patterns of radiographic abnormalities are different in RA and OA (40–45).

Patients with HOA had worse pain scores compared to RA patients, which is important taking into account that RA is generally regarded as a severe, painful, and disabling disease (46). At the same time, it is unclear whether our results on pain measures are of much clinical relevance as the pain scores did not show a great numerical difference and a statistical significant difference was only observed in one out of three scores (AIMS2 pain). Mental health was numerically worse in HOA compared to RA (AIMS2 and SF-36) but the significant difference was not maintained after adjustment for multiple testing (Sime’s procedure).

Levels of self-efficacy were similar in our study. Self-efficacy in RA has been shown to predict improvement in pain and other symptoms (47). We are not aware of similar studies in HOA. An ongoing longitudinal follow-up study will provide an opportunity to explore the longitudinal association between levels of self-efficacy and health status in HOA.

We are not aware of previous studies exploring FM-like symptoms in HOA. It has been reported that patients with established RA and systemic lupus erythematosus (SLE) often suffer from FM-like symptoms (16, 48). Our clinical experience indicated that FM-like symptoms are prevalent in HOA, and this observation initiated the inclusion of VAS of FM symptoms in the questionnaire. The higher scores of FM-like symptoms in HOA compared to RA, as well as pain scores, especially on AIMS2, suggest differences in pain perception. A recently published editorial (8) discusses the apparent disparity between objective findings of peripheral damage and patient-reported symptoms such as pain and functional impairment in rheumatology. Advances in the field of pain research indicate that we have to think ‘outside the joint’ in terms of pain in OA and other rheumatic diseases (8).

There are some limitations to this study. A considerable proportion of our patients had OA signs and symptoms at other sites (9% hip, 59% knee); it can thus be hypothesized that the HOA patients in this study have a more advanced OA disease than patients with OA limited to hand involvement. However, exclusion of patients with clinical knee OA did not substantially change the HOA versus RA results.

Disease duration was significantly greater in the RA patients. We lacked information on disease duration for a substantial number of patients in the OA group. Inclusion of this variable in the multivariate analyses would have led to the exclusion of a considerable number of patients from the analyses. After discussing this issue thoroughly with the statistician, we therefore chose to omit disease duration in the final analysis.

Several instruments are available to measure pain in rheumatic diseases (49). We chose a combination of established pain outcome measures (AIMS2, SF-36, self-efficacy, and VAS). It can be argued that AIMS2 pain focuses on the disease impact, but this scale has a strong correlation to measures of pain intensity such as VAS pain and SF-36 bodily pain (26).

The instruments used to assess FM symptoms in our study were VAS on muscle pain, headache, concentration problems, numbness, and abdominal pain as suggested by Yunus et al (24). However, a recent publication by Prodinger et al (50) reviewed 16 commonly used instruments to assess symptoms in FM and concluded that the choice of instruments should reflect the objective and focus of the study. A more comprehensive data collection on FM should ideally have been performed, but this issue was not the main focus of this study and we had to select a small number of established and feasible questionnaires when we performed the data collection early in this decade. Thus, our observation can only partially mirror the condition of FM in patients with HOA and RA, and needs to be explored further in future studies.

The subject of aesthetic damage, which has been shown to be a concern for HOA patients, was not addressed (51, 52). It is established that aesthetic considerations play a role in RA (53, 54). This dimension of health should therefore also be considered in future studies on HOA.

Our results addressing the comparative burden of disease in HOA and RA need replication in other populations and cannot be generalized. The HOA patients had been referred to a rheumatology outpatient department during the 2 years preceding the study, and therefore are not fully representative of a general HOA population. Thus, the group of HOA
patients examined probably had a more severe disease than a random sample of HOA. However, for the comparative analyses we selected RA patients, who had also been examined at the same rheumatology outpatient department during the 2 years preceding the data collection.

We do not suggest that HOA is a similarly severe or more severe disease than RA. However, our results indicate that HOA can have a considerable impact on health, similar to the impact of RA in some areas of HRQoL. Our findings emphasize that HOA affects a diversity of health dimensions that need to be approached by multidisciplinary treatment and rehabilitation.

Acknowledgements

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References