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## **Mortality and other outcome measures in osteoarthritis**

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# Chapter 3

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## Aesthetic dissatisfaction in patients with hand osteoarthritis and its impact on daily life

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## **ABSTRACT**

### **OBJECTIVE**

To evaluate nature and extent of aesthetic dissatisfaction in patients with hand osteoarthritis (OA), and to investigate its impact on daily life and their determinants.

### **METHODS**

Patients with primary hand OA, consulting secondary care, underwent physical examination for number of joints with bony joint enlargements, soft tissue swelling and deformities, and radiographs. Questionnaires were filled in to measure pain and function (Functional Index for Hand Osteoarthritis), dissatisfaction with the appearance of the hands and its impact (aesthetic scales from Michigan Hand Outcomes Questionnaire), anxiety and depression (Hospital Anxiety and Depression Scale) and illness perceptions (Illness Perception Questionnaire – Revised). Odds Ratio (OR) with 95% confidence intervals (CI) were calculated using multivariate logistic regression as measures of relative risk for dissatisfaction with appearance or its impact, adjusted for age, sex, BMI and joint-specific abnormalities (bony joint enlargements, deformities or radiographic severity), self-reported pain and function.

### **RESULTS**

Of 247 patients (mean age 61.6 years, 88% women), 63 patients (26%) were aesthetically dissatisfied and 33 patients (13%) reported impact on daily life due to dissatisfaction.

Patients with joint-specific abnormalities were at higher risk for reporting dissatisfaction. Patients who reported impact, also reported more depression and negative illness perceptions, independently from joint-specific abnormalities.

### **CONCLUSION**

Hand OA patients report aesthetic dissatisfaction with their hands regularly, especially in those with joint abnormalities. This dissatisfaction has negative impact in a small group of patients who also reported more depression and negative illness perceptions. These results indicate the influence of psychosocial factors on outcome measures in patients with hand OA.

## INTRODUCTION

To evaluate the outcome of hand osteoarthritis(OA), all domains of interest should be assessed. Recently, hand OA patients have reported aesthetic damage as a domain of importance.<sup>1,2</sup>

Aesthetic damage in hand OA has been described previously,<sup>2,4</sup> though impact of dissatisfaction with hand appearance on daily life remains unclear. Michigan Hand Outcomes Questionnaire(MHQ), a reliable and validated questionnaire, includes a scale assessing aesthetics of the hands, evaluating both dissatisfaction and impact of dissatisfaction.<sup>5,6</sup>

Aesthetic dissatisfaction can be considered as part of clinical outcome, which in turn result from disease processes and factors like illness perceptions and coping responses. Illness perceptions are determinants of outcomes, according to Leventhal's Common Sense Model(CSM). Illness perceptions in OA were previously associated with limitations in daily activities and quality of life, while changes in illness perceptions of OA patients were associated with changes in outcomes.<sup>7-10</sup>

We evaluated the prevalence of aesthetic dissatisfaction in hand OA patients, its impact on daily life and their determinants.

## METHODS

### Study design

Cross-sectional data were used of HOSTAS(Hand OSTeoArthritis in Secondary care), an ongoing study which has enrolled hand OA patients consecutively since 2009. Inclusion occurred when patients consulted the Rheumatology outpatient clinic of the Leiden University Medical Center (LUMC) for hand complaints and primary hand OA was diagnosed by the rheumatologist. Informed consent was obtained. Study was approved by LUMC's medical ethical committee.

### Demographics and clinical characteristics

Standardized questionnaires collected demographics and clinical characteristics. At inclusion and once every two years thereafter, participants underwent standardized physical examination. Distal interphalangeal(DIP) joints, proximal interphalangeal(PIP) joints, interphalangeal thumb(IP-1) joints, metacarpophalangeal(MCP) joints and first carpometacarpal(CMC-1) joints were

evaluated for absence or presence of bony joint enlargements and soft tissue swelling. 'Deformities' was assessed in DIP, PIP, IP-1, MCP-1 and CMC-1 joints.

### **Radiographs**

DIP, PIP, IP-1, MCP and CMC-1 joints were scored by WD using Kellgren-Lawrence (KL) grading scale (maximum=120). Intrareader reproducibility was high (ICC 0.95(0.89-0.97)).<sup>11</sup>

### **Pain and aesthetics**

Since January 2011, pain and aesthetics were measured at inclusion and biannually by the corresponding MHQ subscales and calculated by summing 5-point Likert scale responses. Pain was normalized to 0-100 (100=maximum pain). Normalization was not applied to aesthetics (higher scores=better hand performance), which contained one question measuring satisfaction (range 1-5, lower scores=more dissatisfaction) with appearance of the hands and 3 questions concerning its impact, namely discomfort in public, depression and/or interference with normal social activities (range 1-5 for each question, lower scores=more impact).<sup>6</sup> A <3 score was considered as dissatisfaction and a score of <3 for either one of the questions concerning impact was considered as experiencing impact.

Left and right hand scores were averaged, when no statistical differences were seen (Wilcoxon signed-rank test).

### **Disability**

The functional index for hand OA (FIHOA) rates disability on a 10-item questionnaire, all on a four-point Likert scale (0-30).<sup>12</sup>

### **Anxiety and depression**

Anxiety and depression were measured by the Hospital Anxiety and Depression Scale (HADS) (item range 0-3, 3=worst). Subscale scores, ranging from 0-21 (higher scores=higher anxiety or depression),<sup>13</sup> were divided into 3 ranges.<sup>14</sup>

### **Illness perceptions**

The Illness Perception Questionnaire-Revised (IPQ-R) measures both patients' cognitive and emotional representations of their illness.<sup>15,16</sup>

IPQ-R assesses the following subscales: 1)'identity' measures whether 14 common symptoms are related to their OA according to participants, 2)'acute/chronic timeline'(higher score=more beliefs on chronicity) represents the likely chronic duration of their illness, 3)'consequences'(higher score=more consequences) reflects the consequences of their illness, 4)'personal control'(higher score=higher

perceived control) represents personal control, 5) 'treatment control' (higher score=higher perceived efficacy of medical treatment) represents the effect of the treatment of their disease, 6) 'illness coherence' (higher score=higher coherence) reflects the patient's perceived understanding of OA, 7) 'cyclical timeline' (higher score=stronger belief in cyclical nature of OA) represents the likely variability of their disease, and 8) 'emotional representations' (higher score=more negative emotions) reflects negative emotions experienced due to OA.

### Data analysis

To investigate determinants of dissatisfaction with appearance and its impact, odds ratio (OR) with 95% CI were calculated using multivariate logistic regression as measures of relative risk, while adjusting for age, sex and BMI.

Additionally, multivariate analyses were performed adjusting for joint-specific variables or radiographic severity when appropriate.

All analyses used SPSS v20 (SPSS Inc, Chicago, IL)

## RESULTS

### Study population

Between May 2009 and July 13<sup>th</sup> 2012, 293 patients were included in the HOSTAS study and 253 patients completed the aesthetic scale of MHQ. Six patients were excluded later, when diagnosis changed. For this analysis, 247 patients were included, using the first available MHQ (Table 1).

Ninety-one percent of patients met ACR's criteria for hand OA and 193 patients (of 210 available radiographs) had at least one DIP or PIP joint with Kellgren-Lawrence (KL) scoring  $\geq 2$ ,

### Aesthetic dissatisfaction and its determinants

Sixty-three (26%) of all patients reported dissatisfaction with aesthetics of their hands (median score=4.0, range 1-5, Supplementary Appendix 1). Five male and 58 female patients reported aesthetic dissatisfaction.

We hypothesized that visible abnormalities of the hands and clinical symptoms, i.e. bony enlargements, soft tissue swellings, deformities and self-reported pain, could play a role in aesthetic dissatisfaction. Deformities were independently associated with dissatisfaction. Bony enlargements were associated with dissatisfaction, but no longer after adjustments (Table 2). Like deformities and bony enlargements, radiographic damage also belongs to the domain structural damage and was associated with dissatisfaction (Supplementary Appendix 2).

Anxiety, depression and IPQ-R scales were not associated with aesthetic dissatisfaction, with the exception of emotional representations.

**Table 1.** Characteristics of 247 patients with hand OA in HOSTAS, diagnosed at the rheumatology outpatient clinic

Baseline characteristics	Patients (n = 247)
Women (n (%))	217 (88)
Age (mean (SD))	61.6 (8.7)
BMI (kg/m <sup>2</sup> )	26.5 (17.6-47.7)
Kellgren-Lawrence score (range 0-120)	21 (0-75)
Number of joints affected* (n (%) (0-30))	5 (0-21)
Number of erosive joints# (n (%) (0-18))	0 (0-13)
Duration of symptoms (years)	5.6 (0.1-58.7)
Joints with bony enlargements (mean (SD)) (0-30)	11.4 (5.4)
Deformed joints (0-22)	5.0 (0-17)
Joints with soft tissue swelling (0-30)	0 (0-17)
MHQ pain (mean (SD)) (0-100)	43.2 (19.1)
FIHOA (0-30)	8.0 (0-24)
HADS anxiety (0-21)	4.0 (0-18)
HADS depression (0-21)	2.0 (0-17)
IPQ-R dimensions	
Identity (0-14)	5.0 (0-13)
Timeline acute/ chronic (6-30)	26.4 (12-30)
Consequences (6-30)	16.0 (6-30)
Personal control (6-30)	19.0 (6-29)
Treatment control (5-25)	14.0 (5-22)
Illness coherence (5-25)	19.0 (7-25)
Timeline cyclical (4-20)	14.0 (5-20)
Emotional representation (6-30)	13.5 (6-30)

Values are medians plus range unless stated otherwise.

OA= osteoarthritis; BMI= body mass index; MHQ= Michigan Hand Outcomes Questionnaire; FIHOA= Functional Index for Hand Osteoarthritis; HADS= Hospital Anxiety and Depression; IPQ-R= Illness Perception Questionnaire-Revised.

\*Number of joints at Kellgren-Lawrence  $\geq 2$

#At least 1 interphalangeal joint



**Table 2.** Multivariate analyses for the determinants of aesthetic dissatisfaction and impact due to aesthetic dissatisfaction

	Aesthetic dissatisfaction		Impact due to aesthetic dissatisfaction	
	Adjusted OR (95% CI)*	Adjusted OR (95% CI)**	Adjusted OR (95% CI)*	Adjusted OR (95% CI)**
Age	1.02 (0.99 - 1.06)	0.99 (0.95 - 1.03)	1.02 (0.98 - 1.07)	0.98 (0.92 - 1.03)
Sex	1.92 (0.69 - 5.36)	1.12 (0.36 - 3.53)	5.48 (0.71 - 42.33)	1.71 (0.19 - 15.03)
BMI	0.97 (0.91 - 1.04)	1.00 (0.93 - 1.08)	1.02 (0.94 - 1.10)	1.04 (0.94 - 1.14)
Bony joint enlargements tertiles				
0-8	1.0	1.0	1.0	1.0
9-14	1.76 (0.73 - 4.23)	1.14 (0.44 - 2.93)	3.00 (0.85 - 10.56)	2.99 (0.75 - 11.86)
≥15	3.12 (1.29 - 7.56) <sup>#</sup>	1.95 (0.76 - 5.01)	4.12 (1.15 - 14.84) <sup>#</sup>	3.59 (0.86 - 15.00)
Deformed joints tertiles				
0-4	1.0	1.0	1.0	1.0
5-6	2.66 (1.05 - 6.71)	2.37 (0.92 - 6.10)	2.39 (0.72 - 7.97)	1.76 (0.49 - 6.31)
≥7	6.21 (2.55 - 15.13) <sup>#</sup>	5.23 (2.05 - 13.36) <sup>#</sup>	4.39 (1.38 - 13.94) <sup>#</sup>	2.72 (0.78 - 9.54)
Swollen joints hands				
	1.07 (0.95 - 1.20)		1.10 (0.94 - 1.28)	
MHQ pain scale tertiles				
0-34	1.0	1.0	1.0	1.0
35-51	1.71 (0.79 - 3.70)	1.35 (0.58 - 3.12)	3.95 (0.82 - 19.11)	2.65 (0.52 - 13.60)
52-100	1.94 (0.89 - 4.24)	1.38 (0.58 - 3.27)	12.60 (2.82 - 56.41) <sup>#</sup>	10.30 (2.20 - 48.14) <sup>#</sup>

\*Adjusted for age, sex, BMI.

\*\*Multivariate model with age, sex, BMI, bony joint enlargements, deformed joints, self-reported pain

<sup>#</sup>p Value < 0.05

BMI= body mass index; MHQ= Michigan Hand Outcomes Questionnaire

### Impact due to dissatisfaction and its determinants

Thirty-three(13%) patients reported impact due to dissatisfaction. Median scores for each of the 3 separate items were 5(range 1-5, lower scores=more discomfort, depression and interference, supplementary Appendix 1). One male and 32 female patients reported impact.

Bony enlargements, deformities and self-reported pain were associated with impact due to dissatisfaction of hand appearance (Table 2). Self-reported disability was associated as well (See supplementary Appendix 3). After further adjustments for joint-specific factors, only self-reported pain and radiographic damage remained.

After adjustments, depression remained associated (Table 3) with impact.

Higher scores for consequences and emotional representation and lower scores of illness coherence were associated with impact (Table 3).

Additional analyses including radiographic damage showed the same results. Analyses investigating disability instead of self-reported pain, showed similar results (data not shown).

**Table 3.** Multivariate analyses for personal determinants of impact due to aesthetic dissatisfaction

	Adjusted OR (95% CI)*	Adjusted OR (95% CI)**
HADS anxiety range		
0-7	1.0	1.0
8-10	1.50 (0.47 - 4.81)	1.09 (0.31 - 3.91)
11-21	6.08 (2.15 - 17.18) <sup>#</sup>	2.34 (0.68 - 8.09)
HADS depression range		
0-7	1.0	1.0
8-10	3.49 (1.11 - 10.96) <sup>#</sup>	2.37 (0.64 - 8.82)
11-21	16.38 (4.34 - 61.89) <sup>#</sup>	10.54 (1.97 - 56.29) <sup>#</sup>
IPQ-R subscales		
Identity	1.27 (1.10 - 1.48) <sup>#</sup>	1.18 (0.99 - 1.40)
Timeline chronic	1.06 (0.95 - 1.20)	1.02 (0.90 - 1.17)
Consequences	1.24 (1.12 - 1.38) <sup>#</sup>	1.19 (1.06 - 1.34) <sup>#</sup>
Personal control	1.07 (0.95 - 1.20)	1.03 (0.92 - 1.17)
Treatment control	0.88 (0.76 - 1.03)	0.87 (0.73 - 1.03)
Illness coherence	0.81 (0.73 - 0.90) <sup>#</sup>	0.84 (0.75 - 0.94) <sup>#</sup>
Timeline cyclical	0.94 (0.83 - 1.08)	0.95 (0.83 - 1.09)
Emotional representation	1.19 (1.10 - 1.30) <sup>#</sup>	1.14 (1.05 - 1.25) <sup>#</sup>

\*Adjusted for age, sex, BMI

\*\*Adjusted for age, sex, BMI, bony joint enlargements, deformed joints and self-reported pain.

<sup>#</sup>p Value < 0.05

HADS= Hospital Anxiety and Depression Scale, IPQ-R= Illness Perception Questionnaire-Revised.

## DISCUSSION

This is the first study to investigate impact on certain aspects of daily life due to aesthetic dissatisfaction in hand OA patients using validated questionnaires. We found that although hand OA patients experience dissatisfaction with the appearance of their hands regularly, impact due to this dissatisfaction is reported by a small group only. Patients with joint-specific determinants were at higher risk for reporting dissatisfaction. Patients who reported impact, also reported more depression and negative illness perceptions. Personal factors were mainly associated with impact and not with simply aesthetic dissatisfaction. These results indicate the influence of personal factors on outcome measures in hand OA patients.

Deformed joints were only associated with aesthetic dissatisfaction. After adjustments, only a trend remains between bony enlargements and either aesthetic dissatisfaction or impact. This loss of association may be due to a lack of power, since bony enlargements were associated with high aesthetic concern in the first in-depth study on this domain.<sup>2</sup> Self reported pain, disability (by the FIHOA) and radiographic damage remain associated with impact due to dissatisfaction.

In contrast to the previous study,<sup>2</sup> a relatively small group of our patients experienced impact due to dissatisfaction. This difference in findings may be due to differences in methods. Previously,<sup>2</sup> assessment occurred by posing one standardized question to indicate the aesthetic impact of hand OA (scale of 0-100, 100=maximal aesthetic discomfort). Participants could interpret this as assessment of aesthetic impact of hand OA or just aesthetic dissatisfaction; the group experiencing impact could be smaller. In HOSTAS, this was measured separately.

However, their group of hand OA patients experiencing impact could indeed be larger, perhaps due to cultural differences.

In line with our expectations and previous study, depression was associated with impact, but not aesthetic dissatisfaction.<sup>2</sup>

IPQ-R subscales were only associated with impact, with the exception of emotional representations. We expected that aesthetic dissatisfaction especially depends upon joint-specific determinants and less on personal determinants. In contrast, patients with negative illness perceptions experienced more impact.

Our study had its limitations. For this study, MHQ was assessed in 247 patients, whose data were subsequently used for all analyses. Unfortunately, we were

limited by missing data. Although clinical examination and questionnaires were available in the far majority of patients, but not in all.

We were interested in factors associated with aesthetic dissatisfaction, so neutral satisfaction was grouped with satisfaction. If the neutral group was excluded, we may have found stronger associations.

MHQ's aesthetic scale is designed to yield one score. For a better understanding of not only the item aesthetic dissatisfaction but also of the impact that aesthetic dissatisfaction may lead to, we separated the scores and grouped patients who scored low on either one of the three aesthetic questions concerning impact. This was necessary to discern between presence of just aesthetic dissatisfaction and impact due to aesthetic dissatisfaction.

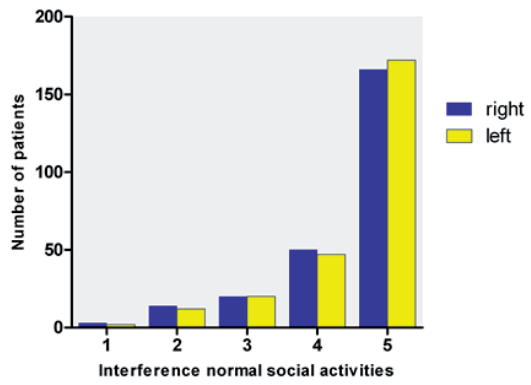
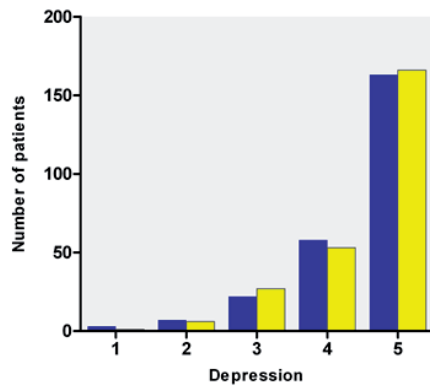
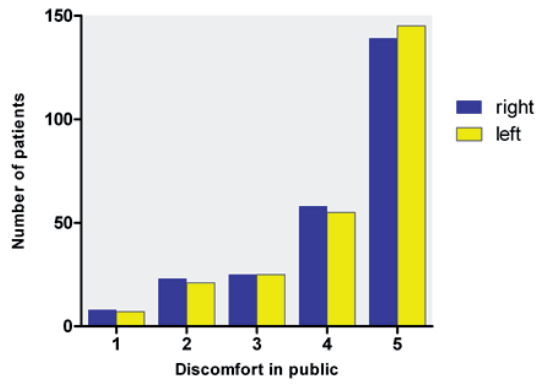
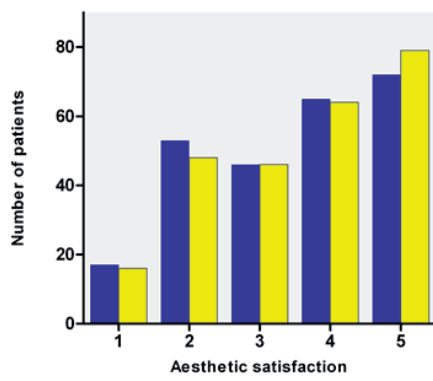
Programs teaching self-management skills can improve clinical outcomes in people with OA.<sup>17</sup> Our results have shown that patients who experienced more impact from hand OA, also reported having negative perceptions. We hypothesize that patients with negative perceptions, particularly those who report having a lower degree of understanding of their OA, may benefit especially from self-management training. The incorporation of self-management as a part of the treatment in hand OA patients should be considered in clinical practice. Future research on aesthetics of hand OA will be necessary to further our understanding and to confirm or not our hypotheses.

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**SUPPLEMENTARY APPENDIX 1.**



**SUPPLEMENTARY APPENDIX 2.** Multivariate analyses for the determinants of aesthetic dissatisfaction and impact due to aesthetic dissatisfaction

	Aesthetic dissatisfaction		Impact due to aesthetic dissatisfaction	
	Adjusted OR (95% CI)*	Adjusted OR (95% CI)**	Adjusted OR (95% CI)*	Adjusted OR (95% CI)**
Age	1.02 (0.99 - 1.06)	0.98 (0.94 - 1.03)	1.02 (0.98 - 1.07)	0.99 (0.93 - 1.04)
Sex	1.92 (0.69 - 5.36)	1.81 (0.60 - 5.44)	5.48 (0.71 - 42.33)	3.91 (0.47 - 32.33)
BMI	0.97 (0.91 - 1.04)	0.96 (0.89 - 1.03)	1.02 (0.94 - 1.10)	0.99 (0.91 - 1.09)
Kellgren-Lawrence score				
0-13	1.0	1.0	1.0	1.0
14-27	1.25 (0.50 - 3.15)	1.18 (0.47 - 2.99)	1.43 (0.44 - 4.58)	1.24 (0.37 - 4.18)
≥ 28	5.72 (2.29 - 14.34) <sup>#</sup>	5.49 (2.19 - 13.76) <sup>#</sup>	3.42 (1.07 - 10.90) <sup>#</sup>	3.42 (1.03 - 11.33) <sup>#</sup>
MHQ pain scale tertiles				
0-34	1.0	1.0	1.0	1.0
35-51	1.71 (0.79 - 3.70)	1.57 (0.67 - 3.65)	3.95 (0.82 - 19.11)	3.00 (0.59 - 15.34)
52-100	1.94 (0.89 - 4.24)	1.80 (0.76 - 4.26)	12.60 (2.82 - 56.41) <sup>#</sup>	11.63 (2.50 - 54.06) <sup>#</sup>

\*Adjusted for age, sex, BMI.

\*\*Multivariate model with age, sex, BMI, self-reported pain and Kellgren-Lawrence score

<sup>#</sup>p Value < 0.05

BMI= body mass index; MHQ= Michigan Hand Outcomes Questionnaire



**SUPPLEMENTARY APPENDIX 3.** Multivariate analyses for the determinants of aesthetic dissatisfaction and impact due to aesthetic dissatisfaction

	Aesthetic dissatisfaction		Impact due to aesthetic dissatisfaction	
	Adjusted OR (95% CI)*	Adjusted OR (95% CI)**	Adjusted OR (95% CI)*	Adjusted OR (95% CI)**
Age	1.02 (0.99 - 1.06)	0.99 (0.95 - 1.03)	1.02 (0.98 - 1.07)	0.97 (0.91 - 1.02)
Sex	1.92 (0.69 - 5.36)	1.16 (0.37 - 3.67)	5.48 (0.71 - 42.33)	2.82 (0.32 - 24.82)
BMI	0.97 (0.91 - 1.04)	1.00 (0.93 - 1.08)	1.02 (0.94 - 1.10)	1.03 (0.93 - 1.14)
Bony joint enlargements tertiles				
0-8	1.0	1.0	1.0	1.0
9-14	1.76 (0.73 - 4.23)	1.10 (0.43 - 2.80)	3.00 (0.85 - 10.56)	1.98 (0.50 - 7.89)
≥15	3.12 (1.29 - 7.56) <sup>#</sup>	1.87 (0.72 - 4.85)	4.12 (1.15 - 14.84) <sup>#</sup>	2.47 (0.59 - 10.35)
Deformed joints tertiles				
0-4	1.0	1.0	1.0	1.0
5-6	2.66 (1.05 - 6.71)	2.33 (0.91 - 5.98)	2.39 (0.72 - 7.97)	1.81 (0.50 - 6.58)
≥7	6.21 (2.55 - 15.13) <sup>#</sup>	5.12 (2.01 - 13.09) <sup>#</sup>	4.39 (1.38 - 13.94) <sup>#</sup>	2.44 (0.70 - 8.53)
FIHOA				
0-10	1.0	1.0	1.0	1.0
11-20	2.28 (1.23 - 4.23)	1.66 (0.83 - 3.29)	12.03 (4.33 - 33.37) <sup>#</sup>	10.66 (3.40 - 33.46) <sup>#</sup>
≥21	1.01 (0.20 - 5.05)	0.84 (0.14 - 5.14)	11.21 (2.21 - 56.78) <sup>#</sup>	15.35 (2.38 - 99.22) <sup>#</sup>

\*Adjusted for age, sex, BMI.

\*\*Multivariate model with age, sex, BMI, bony joint enlargements, deformed joints and FIHOA

<sup>#</sup>p Value < 0.05

BMI= body mass index; FIHOA= functional index for hand osteoarthritis