Impact of Osteoarthritis on Quality of Life in a Hong Kong Chinese Population

JEAN WOO, EDITH LAU, POLLY LEE, TIMOTHY KWOK, WALLACE C.S. LAU, CYNTHIA CHAN, PETER CHIU, EDMUND LI, APRILLE SHAM, and DICKY LAM

ABSTRACT. ***Objective.*** To measure the impact of osteoarthritis (OA) on quality of life in the Hong Kong Chinese population.

Methods. This was a cross sectional, retrospective, non-random, cohort design stratifying disease severity and presence or absence of joint prostheses. Patients with OA (n = 574; 136 men and 438 women) were recruited from rheumatology, family medicine, orthopedics, and geriatric medicine clinics. They were divided into 2 equal groups based upon disease severity (either American College of Rheumatology functional classes I and II, or III and IV). The 36-item Medical Outcomes Study Short-Form Health Survey (SF-36) and Western Ontario and McMaster Universities (WOMAC) OA Index were used.

Results. Patients with severe disease had lower mean scores in all SF-36 domains and higher mean scores in all WOMAC domains, indicating poorer quality of life. Scores in patients who had had arthroplasty were better than those with severe disease only in certain domains: role physical, general health, vitality, and mental health (SF-36); and pain (WOMAC). Women with OA had poorer scores compared to men for bodily pain, general health, and mental health after adjusting for age and disease severity. Low educational attainment was independently associated with poorer scores when disease severity was taken into account.

Conclusion: OA has a significant impact on quality of life, only partly ameliorated by arthroplasty, as assessed by the SF-36 and WOMAC in this population. (J Rheumatol 2004;31:2433–8)

Key Indexing Terms:
QUALITY OF LIFE SF-36 WOMAC OSTEOARTHRITIS
ARTHROPLASTY CHINESE

Quality of life measurements in patients with chronic diseases are useful tools for estimating disease impact, as outcome indicators of disease management, and as important measurements in health economic valuations. They contribute to formulation of health policy when outcomes other than mortality are taken into account[1]. Quality of life scales may be generic or disease specific; they should be responsive to change and show differences between those with disease and the normal population. Among generic scales, the Medical Outcomes Study Short Form 36 (SF-36) has been widely used in Caucasian populations with osteoarthritis (OA)[2-7], and has been validated in the Hong Kong Chinese population[8]. The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) has been used as a disease specific scale among Caucasians[9] and has also been validated in Asians[10]. Both scales have been used together in patients with OA, covering both disease specific and generic aspects of quality of life[3,11-14].

There is little information on the impact of OA on quality of life among Hong Kong Chinese. Joint pain is the most common symptom affecting those aged 70 years and over (48-50% of women and 25-27% of men) with the knee joint being most frequently affected site[15]. However, a population survey suggests that the prevalence of OA is lower compared to Caucasians and that the disease pattern is different[16]. Therefore it would be of interest to measure the impact of OA on quality of life in the Hong Kong Chinese population and to compare the impact with results of published surveys in other populations, using the same tools.

MATERIALS AND METHODS

Patients. This study forms part of a larger study to estimate direct and indirect cost of OA in the Hong Kong population. It is a retrospective, cross sectional, non-random, cohort design with patients stratified by disease

From the Departments of Medicine and Therapeutics and Community and Family Medicine, The Chinese University of Hong Kong; the Departments of Medicine and Orthopaedics, The University of Hong Kong; and the Department of Orthopaedics, Tuen Mun Hospital, Hong Kong.

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J. Woo, MD, Departments of Medicine and Therapeutics and Community and Family Medicine; E. Lau, MD; P. Lee, MSc, RN, Department of Community and Family Medicine; T. Kwok, MB, Department of Medicine and Therapeutics, The Chinese University of Hong Kong; W.C.S. Lau, MD, Department of Medicine, The University of Hong Kong; C. Chan, MD, Department of Community and Family Medicine, The Chinese University of Hong Kong; P. Chiu, MD, Department of Orthopaedics, The University of Hong Kong; E. Li, MD, Department of Medicine and Therapeutics; A. Sham, MSc, Department of Community and Family Medicine, The Chinese University of Hong Kong; D. Lam, MB, Department of Orthopaedics, Tuen Mun Hospital.

Address reprint requests to Prof. J. Woo, Department of Medicine & Therapeutics, Prince of Wales Hospital, Shatin NT, Hong Kong. E-mail: jeanwoowong@cuhk.edu.hk

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severity and presence or absence of joint prostheses. A convenience sample of patients with a diagnosis of OA was recruited from 4 different types of clinics: family medicine, rheumatology, orthopedics, and geriatric medicine in 3 different geographic regions of Hong Kong. This accrual ensured sufficient numbers of patients with varying degrees of disease severity as well as those who have had joint replacement surgery. Patients not able to respond to the questionnaire (e.g., as a result of aphasia from stroke or presence of dementia) were excluded. Consecutive patients in each clinic were identified by the clinic doctor by chart review and referred to an interviewer. After informed consent was obtained, a questionnaire was administered by the interviewer during clinic attendance. All patients approached participated. The study had been approved by the Clinical Research Ethics Committee of the Chinese University of Hong Kong.

Questionnaire. The questionnaire consisted of demographic and socioeconomic characteristics, duration of OA, and information on disease severity based on functional limitation (American College of Rheumatology 1991 revised criteria[17]) Patients were classified as having mild disease if their functional status was class I (able to perform usual activities of daily living, including self-care, vocational, and avocational) or class II (limitation in avocational activities), and severe if the functional status was class III (able to perform usual self-care activities, but limited in vocational and avocational activities) or class IV (limited in ability to perform usual self-care, vocational, and avocational activities).

The questionnaire included 2 quality of life scales, SF-36 and WOMAC. The Chinese 36-Item SF-36 is a self-administered 36-item questionnaire comprising 8 health dimensions: bodily pain, physical function, role limitations related to physical health (physical role function), mental health, role limitations related to emotional health (emotional role function), social functioning, vitality, and general health[18]. Scoring for the 8 dimensions ranges from 0 to 100 points, with higher scores indicating better health. WOMAC comprises 24 multiple-choice items. Each item is scored using a 5-point scale (with 1 point indicating the best function and 5 points, the worst): aggregate scores for joint-specific pain (5 items), physical function (17 items), and stiffness (2 items) are calculated. Use of an overall score is not recommended[19].

The results were analyzed using SPSS version 11 (SPSS Inc., Chicago, IL, USA). Mean scores of different domains of SF-36 and WOMAC were compared between the 2 disease severity groups and the group having undergone joint replacement surgery, using Multiple Range Test, and analysis of variance (ANOVA). Student's t test was used to compare values between gender, within each OA disease category, and also between our study population and that of an age and sex matched normal population in Hong Kong[18]. Factors associated with each domain of the 2 scales were identified using univariate logistic regression and independent factors identified using multivariate logistic regression. The top tertile of scores was compared with the remainder, as the dependent variable.

RESULTS

Table 1 shows the characteristics of the study sample. The age, education, and occupational profile of those with arthroplasty was similar to the rest of the study sample. The scores for all domains for all subjects in the SF-36 were significantly lower, and those in the WOMAC higher in the group with severe disease, indicating poorer quality of life (Table 2). For those who have had joint replacement, scores for bodily pain and social function were still worse than the scores for the group with mild disease, but not significantly different from the group with severe disease. However, scores for role physical, general health, vitality, and mental health were higher in those with joint replacement compared with the group with severe disease. Patients with joint prostheses reported less pain measured by the WOMAC. When results were analyzed separately for men and women, men had higher mean scores in all SF-36 domains with the exception of social function and role emotional, and also better physical function as measured by WOMAC. Men with joint replacement appeared to have higher scores in more SF-36 domains compared with women. Notably, there was no difference in the pain domain scores in either SF-36 or WOMAC between the group with severe disease and the group with joint replacement among women in contrast to men.

Table 1. Characteristics of our study sample (n = 574).

	Number	%
Age		
< 50	83	14.5
50 – 69	220	38.3
70 +	271	47.2
Sex		
Male	136	23.7
Female	438	76.3
Formal education level		
None	253	44.1
Primary	170	29.6
Secondary and above	151	26.3
Occupation		
White collar	36	6.3
Blue collar	72	12.5
Not working	466	81.2
Disease severity		
Mild	219	38.2
Severe	290	50.5
Prosthesis	65	11.3
Site of OA		
Knee	472	82.2
Hip	58	10.1
Joint replacement		
Knee	44	7.7
Hip	21	3.7

Compared with the control population, mean scores for all patients for all SF-36 domains were lower (Table 3). No difference in vitality was observed when scores for men and women were analyzed separately and no difference in general health for women was observed. The association between age, gender, education level, occupation, and disease severity with each SF-36 and WOMAC domain is shown in Table 4. In multivariate analysis, disease severity was the single factor independently affecting all domains of the SF-36 and the WOMAC. Gender, age, and education level were also independent factors affecting certain domains of the SF-36, but not the WOMAC.

DISCUSSION

Our findings confirm that both SF-36 and WOMAC are appropriate quality of life tools for assessing OA in Hong Kong Chinese, since differences are found when compared

Table 2. SF-36 and WOMAC scale scores by OA severity. Statistical significance was determined by ANOVA.

	Mild (n = 219)	Severe (n = 290)	Arthroplasty (n = 65)	Total (n = 574)	p
SF-36 Quality of Life					
Physical function	62.2 ± 22.9[ab]	42.1 ± 25.2	36.5 ± 25.1	49.1 ± 26.5	< 0.001
Role physical	47.1 ± 46.3[a]	22.2 ± 37.2[b]	40.4 ± 45.9	33.8 ± 43.4	< 0.001
Bodily pain	58.6 ± 24.3[ab]	40.6 ± 22.9	47.0 ± 26.5	48.2 ± 25.3	< 0.001
General health	50.7 ± 22.0[a]	38.6 ± 21.7[b]	48.7 ± 26.5	44.4 ± 23.1	< 0.001
Vitality	61.8 ± 19.5[a]	51.5 ± 20.1[b]	61.1 ± 16.8	56.6 ± 20.1	< 0.001
Social function	72.4 ± 26.1[ab]	55.7 ± 29.1	62.3 ± 31.4	62.9 ± 29.3	< 0.001
Role emotional	51.0 ± 47.7[a]	32.4 ± 44.5	44.6 ± 50.1	40.9 ± 47.2	< 0.001
Mental health	67.0 ± 18.7[a]	59.5 ± 19.0[b]	70.2 ± 15.7	63.6 ± 19.0	< 0.001
WOMAC Scale					
Pain	9.4 ± 3.1[ab]	12.5 ± 4.0[b]	11.4 ± 5.5	11.2 ± 4.1	< 0.001
Stiffness	3.9 ± 1.7[ab]	4.9 ± 1.9[b]	4.4 ± 1.9	4.5 ± 1.9	< 0.001
Physical function	31.9 ± 9.9[ab]	44.7 ± 14.4	47.7 ± 18.1	40.2 ± 14.9	< 0.001

	Men (n = 136)				
	Mild (n = 62)	Severe (n = 59)	Arthroplasty (n = 15)	Total (n = 136)	p
SF-36 Quality of Life					
Physical function	66.6 ± 23.5[ab]	45.4 ± 27.3	46.7 ± 20.7	55.2 ± 26.9**	< 0.001
Role physical	56.9 ± 45.9[a]	22.0 ± 36.9[b]	53.3 ± 48.1	41.4 ± 45.5*	< 0.001
Bodily pain	65.3 ± 23.4[a]*	40.3 ± 23.6[b]	59.3 ± 21.2*	53.8 ± 26.0**	< 0.001
General health	55.9 ± 21.5[a]*	38.0 ± 22.8[b]	56.2 ± 30.0	48.2 ± 24.6*	< 0.001
Vitality	65.6 ± 18.3[a]	51.9 ± 20.2[b]	65.0 ± 13.4	59.6 ± 19.8*	< 0.001
Social function	76.4 ± 25.4[a]	50.6 ± 31.6[b]	75.8 ± 22.9*	65.2 ± 30.6	< 0.001
Role emotional	54.8 ± 47.9[a]	32.8 ± 45.7[b]	73.3 ± 45.8**	47.3 ± 48.4	0.003
Mental health	70.7 ± 18.9[a]	61.4 ± 20.6[b]	74.4 ± 15.8	67.1 ± 19.9*	0.011
WOMAC Scale					
Pain	9.1 ± 2.9[a]	12.6 ± 4.1[b]	10.3 ± 5.1	10.8 ± 4.1	< 0.001
Stiffness	3.5 ± 1.6[a]*	5.2 ± 2.2[b]	3.9 ± 1.7	4.3 ± 2.0	< 0.001
Physical function	30.2 ± 9.9[ab]	43.9 ± 14.9	42.1 ± 16.8	37.4 ± 14.6*	< 0.001

	Women (n = 438)				
	Mild (n = 157)	Severe (n = 231)	Arthroplasty (n = 50)	Total (n = 438)	p
SF-36 Quality of Life					
Physical function	60.5 ± 22.5[ab]	41.2 ± 24.7[b]	33.4 ± 25.6	47.2 ± 26.1	< 0.001
Role physical	43.3 ± 45.9[a]	22.3 ± 37.4[b]	36.5 ± 45.0	31.4 ± 42.6	< 0.001
Bodily pain	55.9 ± 24.3[ab]	40.7 ± 22.7	43.3 ± 27.0	46.4 ± 24.8	< 0.001
General health	48.7 ± 21.9[a]	38.7 ± 21.4[b]	46.4 ± 25.3	43.2 ± 22.5	< 0.001
Vitality	60.4 ± 19.8[a]	51.5 ± 20.1[b]	59.9 ± 17.6	55.6 ± 20.2	< 0.001
Social function	70.9 ± 26.3[ab]	57.0 ± 28.4	58.3 ± 32.6	62.1 ± 28.8	< 0.001
Role emotional	49.5 ± 47.7[a]	32.3 ± 44.3	36.0 ± 48.5	38.9 ± 46.6	0.002
Mental health	65.5 ± 18.4[a]	59.1 ± 18.6[b]	68.9 ± 15.6	62.5 ± 18.6	< 0.001
WOMAC Scale					
Pain	9.6 ± 3.1[ab]	12.5 ± 3.9	11.7 ± 5.6	11.4 ± 4.1	< 0.001
Stiffness	4.0 ± 1.7[a]	4.8 ± 1.3	4.5 ± 2.0	4.5 ± 1.8	< 0.001
Physical function	32.6 ± 9.8[ab]	44.9 ± 14.3[b]	49.4 ± 18.3	41.0 ± 14.8	< 0.001

[a] $p < 0.05$ by multiple range test vs severe disease. [b] $p < 0.05$ by multiple range test vs prosthesis. * $p < 0.05$, ** $p < 0.01$ by F test vs sex, same OA group.

to the normal population, and between disease severity, and joint replacement groups. Previous studies have found that WOMAC discriminates better among individuals with OA of the knee while the SF-36 discriminates better among individuals with varying levels of self-reported general health status and comorbidities[11]. In addition, WOMAC was shown to be a more responsive measure than SF-36 in documenting changes after surgery[3,12]. Although our survey is not strictly comparable in design, it would appear that in our Chinese population, both instruments are able to discriminate between disease severity categories including status after joint replacement surgery. It has been suggested that

Table 3. Quality of life of patients with OA compared to the general population.

	General Population (age 65+)[18]			Study Sample		
	Men (n = 174)	Women (n = 195)	Total (n = 369)	Men (n = 136)	Women (n = 438)	Total (n = 574)
SF-36 Quality of life						
Physical function	84.3 ± 17.2	74.6 ± 20.6	79.2 ± 19.7	55.2 ± 26.9**	47.2 ± 26.1**	49.1 ± 26.5**
Role physical	80.0 ± 33.4	68.1 ± 39.6	73.7 ± 37.2	41.4 ± 45.5**	31.4 ± 42.6**	33.8 ± 43.4**
Bodily pain	84.8 ± 22.8	70.8 ± 28.2	77.4 ± 26.7	53.8 ± 26.0**	46.4 ± 24.8**	48.2 ± 25.3**
General health	54.4 ± 19.7	44.5 ± 21.5	49.2 ± 21.2	48.2 ± 24.6*	43.2 ± 22.5	44.4 ± 23.1**
Vitality	63.3 ± 20.4	56.9 ± 18.8	59.9 ± 19.8	59.6 ± 19.8	55.6 ± 20.2	56.6 ± 29.3**
Social function	92.7 ± 16.7	91.5 ± 17.9	92.1 ± 17.3	65.2 ± 30.6**	62.1 ± 28.8**	62.9 ± 29.3**
Role emotional	78.9 ± 36.6	77.4 ± 37.9	78.1 ± 37.2	47.3 ± 48.4**	38.9 ± 46.6**	40.9 ± 47.2**
Mental health	78.1 ± 16.4	73.6 ± 19.3	75.7 ± 18.1	67.1 ± 19.9**	62.5 ± 18.6**	63.6 ± 19.0**

* $p < 0.05$, ** $p < 0.001$ by F test comparing with normal population, same sex.

Table 4. Summary of factors associated with quality of life using multivariate analysis. Values are odds ratios (95% confidence intervals). A higher SF-36 score indicates better health. A lower WOMAC score indicates lower severity of disease.

	SF-36								WOMAC		
	PF	RP	BP	GH	V	SF	RE	MH	Pain	Stiffness	Physical Functioning
Sex											
Men	—	—	1.0	—	—	—	—	1.0	—	—	—
Women	—	—	1.7 (1.1–2.6)	—	—	—	—	1.7 (1.1–2.6)	—	—	—
Age											
< 50	—	—	—	1.0	—	—	—	1.0	—	—	—
50–69	—	—	—	0.5 (0.2–0.9)	—	—	—	0.5 (0.3–1.0)	—	—	—
70 +	—	—	—	0.3 (0.1–0.6)	—	—	—	0.3 (0.1–0.6)	—	—	—
Formal education											
Secondary and above	—	—	—	—	1.0	1.0	—	1.0	—	—	—
Primary	—	—	—	—	1.6 (1.0–2.6)	1.3 (0.8–2.2)	—	1.3 (0.8–2.1)	—	—	—
None	—	—	—	—	2.4 (1.4–4.0)	2.5 (1.5–4.2)	—	1.9 (1.1–0.3)	—	—	—
Occupation											
White collar	—	—	—	—	—	—	—	—	—	—	—
Blue collar	—	—	—	—	—	—	—	—	—	—	—
Not working	—	—	—	—	—	—	—	—	—	—	—
Disease category											
Mild	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Severe	3.6 (2.4–5.3)	3.5 (2.3–5.3)	4.0 (2.7–5.9)	2.3 (1.5–3.4)	2.1 (1.4–3.1)	2.3 (1.6–3.5)	2.2 (1.5–3.2)	1.8 (1.2–2.6)	0.2 (0.1–0.3)	0.3 (0.2–0.5)	0.2 (0.1–0.3)

PF: physical function; RP: role physical; BP: bodily pain; GH: general health; V: vitality; SF: social function; RE: role emotional; MH: mental health.

both scales provide complementary information and may be useful in assessing both generic and disease specific aspects of OA[9]. The association between disease severity and all the scores (except mental health) is not surprising given that disease severity is determined by physical function and ability to carry out activities of daily living. The fact that this is reflected in the health measures chosen suggests that both SF-36 and WOMAC are appropriate tools for OA in Hong Kong.

The significant impact of the disease on quality of life is shown by poorer scores in all domains of the SF-36 compared with a normal aged-matched population, although general health and vitality are the domains least affected. The magnitude of impact is comparable to patients who have had a stroke, in that the scores for OA were better than for stroke patients at 6-9 months and worse than at 2 years[20]. A previous survey in a family medicine clinic in Hong Kong using a general health-related quality of life measure also showed that OA has a comparable impact compared with stroke, asthma, and chronic obstructive pulmonary disease[21]. The SF-36 and WOMAC scores are in the same order of magnitude as studies in Caucasians[3], although strict comparisons cannot be made because of the different structure of study samples.

Quality of life measurement is particularly important in health economic calculations regarding joint replacement surgery[22]. Improvement in SF-36 domains after total hip replacement appears dramatic and approaches that of the

general population[2,5,23], while total knee replacement also resulted in improvement, but not to the same extent as for hip replacement[2,3]. In one study, patients having arthroplasty had general and mental health scores close to the general population before the surgery and these did not change much[2]. Various studies have concluded that in general, after surgery, quality of life was still poorer when compared with the general population[14,24]. Our findings are not directly comparable to the above studies, since our study design was cross-sectional. However, we do support the finding that SF-36 scores for all domains for patients who have undergone arthroplasty, while better than the group with severe disease, were not better than the group with mild disease, showing that even after surgery, OA still has significant residual impact on quality of life. This may not be unexpected since the osteoarthritic process often affects more than one joint and surgery only targets more severely affected joints. Also, the site of OA in our study sample was the knee joint in 82% of patients, and the effect from previous studies of knee arthroplasty on quality of life appears to be poorer than for hip arthroplasty. This may account for the smaller differences in quality of life scores in the arthroplasty group compared with the severe disease group.

There were gender differences in the impact of OA on quality of life, with women having poorer scores compared to men. When adjusted for disease severity, age, and education, gender was still a factor independently associated with scores in bodily pain, general health, and mental health, with women having lower scores. Possible explanations for this gender difference include a lower pain threshold and tolerance in women[25], or poorer social support or lower income among women in this population, since socioeconomic factors have been shown to be health determinants[26]. Since the prevalence of OA is higher in women[16,27], and women have longer duration of disease, greater disability[28], and were more reluctant to have surgery despite pain[29], the impact of OA on quality of life is likely to be much greater among women.

Interestingly, education level appears to be a factor affecting quality of life independent of disease categories. Lower educational attainment is associated with lower scores in physical function, bodily pain, general health, vitality, social functioning, and mental health. It is possible that educational level is a surrogate of socioeconomic status and a better indicator than occupation in our study, reflecting the influence of socioeconomic factors on quality of life. The implication is that OA is likely to have a greater impact on quality of life among those with lower socioeconomic status.

Our study has some limitations. This was a convenience sample of patients with OA and there may have been some selection bias or overestimation of the impact of OA, since among people in the community, some may not have sought medical care. The majority of patients had OA of the knee (441 subjects), with few having hip involvement only (27 subjects); 31 patients had both knee and hip involvement. Therefore we were not able to make any comparison between the impact of knee versus hip OA on quality of life. Moreover, these results will largely apply to patients with knee OA. Our study was a cross-sectional comparison between patients with mild and severe disease, and those who have had arthroplasty. Ideally a longitudinal study should be carried out to determine the effect of arthroplasty on quality of life. Compared with other studies on the impact of OA, a high percentage of our population had not had formal education and this may have affected the completion of the questionnaire in some way, even though it was administered by an interviewer.

Despite these limitations, we can conclude that OA, as assessed by the SF-36 and WOMAC in this Chinese population, has a significant impact on quality of life that is only partly ameliorated by arthroplasty. Female gender and lower socioeconomic status were independently associated with poorer quality of life independent of disease severity.

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