

Influence of knee osteoarthritis on physical function, quality of life and pain in elderly people

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OBJECTIVE

Osteoarthritis is the most common age-related joint disease, affecting more than 80% of the elderly, and it is one of the main reasons for outpatient visits elderly in the hospital. Data about physical function and its correlation to quality of life (QoL) and some clinical variables in knee osteoarthritis (KOA) in Iranian elderly is limited.

METHOD

A cross-sectional study composed of 332 patients with KOA was conducted. KOA were diagnosed based on the clinical criteria of the American College of Rheumatology. Demographic and clinical variables were recorded. QoL, disability, and pain were assessed using the SF-36, the Western Ontario and McMaster (WOMAC) index, and VAS scale. For statistical analysis we used X^2 , Independent t-test and Pearson's correlation.

RESULTS

The mean age of the patients was 68.35 ± 5.51 years, of which 213 (64.2%) were women. QoL domains were significantly associated with disability in all three domains of pain, stiffness and function ($p < 0.001$). A significant negative correlation was also found between the QoL domains and the VAS pain ($p < 0.001$). QoL was lower and the disability and pain intensity was higher in women than in men. A correlation was shown between BMI, comorbidity and polypharmacy with some QoL domains. Age, sedentary leisure, and duration of KOA symptoms were correlated with all eight domains of QoL.

CONCLUSION

Individual differences in predictors of QoL and physical function suggest KOA management strategies should be individualized based on patient characteristics.

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INTRODUCTION

Knee osteoarthritis (KOA) is a progressive disease with subsequent limitations in range of motion and loss of the ability to walk.¹ As the disease progresses, patients' functional ability deteriorates. Therefore, due to the limited range of joint and pain, the daily activities of these people are endangered, which causes damage to work, leisure, and social relationships, and as a result, a significant reduction in their quality of life (QoL) is created.²⁻³ QoL is an important consequence of health status and evaluating treatment measures.⁴

The prevalence of symptomatic KOA is reported to be 13.1% -71.1% in various Asian countries.⁴ A few studies in Iran found that the prevalence of KOA in the general population ranged from 15.5 to 47.7 by age.⁵ Many studies have been done on pain and physical disability in osteoarthritis⁶⁻⁷ and there is a great interest in measuring the impact of such diseases on QoL, mainly KOA in the elderly.⁸⁻¹⁰ To our knowledge, this is the first study to assess health-related QoL in the elderly with KOA in Iran.

This study aimed to evaluate QoL in elderly people with KOA based on gender, as well as to examine the correlation between QoL domains with disability domains and personal data as potential risk factors for KOA.

MATERIALS AND METHODS

In a cross-sectional study, 332 people aged 60 and over were enrolled from January 2019 to August 2020. The participants were those who had been referred to the physiotherapy clinic of Yahyanejad Hospital affiliated to Babol University of Medical Sciences, Iran, with a previous diagnosis of KOA and complained of unilateral or bilateral knee pain without a history of knee surgery, significant hip or spinal arthritis and a recent serious illness. All participants met the ACR (American College of

Rheumatology) clinical classification criteria for KOA, including knee pain with at least three of the following criteria: age > 50 years, morning stiffness < 30 minutes, crepitus on knee motion, bony tenderness, bony enlargement, and no palpable warmth.¹¹

Data collection tools included personal and clinical characteristics questionnaire, QoL, disability and Iranian Short-Form McGill Pain Questionnaire (SF-MPQ). The Questionnaires were completed by the researcher with a face-to-face interview on the first day of the patient's visit to the physiotherapy clinic.

Weight was measured by SECA Digital Scale. Height was determined by a stadiometer in standard conditions. Body mass index (BMI) was calculated as weight (in kg) divided by height in meters squared. Age, gender, symptom duration, marital status, comorbidity, polypharmacy, dependence, sedentary leisure, exercise, use of walking aid devices were recorded. Sedentary behavior was measured based on the average time spent sitting or lying down during the day. Independence was defined as a good memory and the ability to do all daily and semi-independent work as a person in need of help with some daily tasks. Comorbidity is determined as the concurrence of at least 2 chronic diseases and polypharmacy of taking at least 4 drugs prescribed by a doctor per day.

QoL was assessed using the SF-36 generic tool with two general dimensions of physical health and mental health and each with 4 domains; respectively included physical function (PF), role physical (RP), bodily pain (BP), general health (GH), and vitality (VT), social function (SF), role emotional (RE), and mental health (MH). Scores range for every domain was from 0 (worst) to 100 (best) with higher scores indicating better health status.¹²

Self-reported disability was assessed using the WOMAC with 24 items on three domains: pain (5

items), stiffness (2 items), and physical function (17 items) and an overall score of 0-96 in a Likert form. A score of 0 represented the absence of symptoms and 4, the worst symptoms.¹³

The SF-MPQ consists of three parts (13). The first part evaluates 15 descriptive attributes (11 sensory and four affective) according to their intensity on a four-point scale from zero (0) to intense (3). The second part is VAS to describe the severity of pain from painless to worst pain in centimeters on a horizontal line. The third part is the verbal ranking of pain intensity from none (0) to very painful (5). The ethics committee of Babol University of Medical Sciences approved the study (NO.:MUBABOL.REC. 1394.350).

SPSS version 23 software (SPSS Inc., Chicago, IL) was used to analyze the data. Continuous variables were summarized as mean±SD and categorical variables as n (%). Comparison of continuous variables in two groups after checking normal distribution was done using the student t-test. The Chi-square test was designed to analyze categorical data. Pearson correlation coefficients were used to determine the relationships between variables. The level of significance was set at $p<0.05$.

RESULTS

The study sample consisted of 213 elderly women and 119 men. Table 1 shows the personal and clinical characteristics of the participants. 16% of patients reported having KOA in only one knee and 55% in both knees and the rest did not have accurate information. Of the participants, 51.5% did not use any medication for KOA, 22% used one

medicine, 16% used two medicines, and 10.5% used three medicines. Assessment of the QoL dimensions showed that the physical health dimension score was far lower than the mental health dimension score. The mean overall WOMAC score was 47.89 ± 15.63 (out of 15-90), indicating moderate disability severity.

Table 2 shows the mean scores of QoL and disability domains, SF-MPQ's principle components and VAS pain by gender. There was a significant statistical difference in six SF-36 domains between male and female patients. The overall physical health dimension score of QoL was significantly worse in women than men ($p<0.01$), while there was no difference in the mental health dimension score between them. WOMAC analysis showed that the pain and physical function domains score were higher in women than men ($p<0.001$); it means more disability in women. Figure 1 also confirms the above finding regarding the severity of pain based on SF-MPQ ($p<0.001$). Men reported more mild and uncomfortable pain, while more severe pain, such as disturbing, terrible and onerous was experienced by women.

Table 3 shows that all domains of QoL had a significant negative correlation with age, symptom duration, sedentary leisure, VAS pain, and WOMAC in all 3 domains pain, stiffness, and physical function ($p<0.001$). This means that with increasing age, disease duration, sedentary leisure time, VAS pain, and WOMAC score, the QoL decreased. BMI, comorbidity, and polypharmacy only showed a significant correlation with some domains of QoL.

Table 1: Personal and clinical characteristics of the participants

Age (year)	68.35±5.51
BMI	28.36±3.89
Symptom duration (years)	9.01±5.63
Gender	
Female	213 (64.2)
Male	119 (35.8)
Marital Status	
Married	270 (81.3)
widowed/divorced/single	62 (18.7)
Comorbidity	
< Three disease	259 (78.01)
≥Three disease	73 (21.99)
Polypharmacy	
≤ 3 drugs	237 (71.4)
>4 drugs	95 (28.6)
Diabetes	
Yes	77 (23.2)
No	255 (76.8)
Hypertension	
Yes	96 (28.9)
No	236 (71.1)
Cardiovascular disease	
Yes	89 (26.8)
No	243 (73.2)
Sedentary leisure (hours/d)	7.23±1.56
Exercise (30min/d)	
Yes	37 (11.1)
No	295 (88.9)
Walking aid devices	
Yes	46 (13.9)
No	286 (86.1)
Dependence	
Independent	300 (90.4)
Semi-independent	32 (9.6)
QoL dimensions	
physical health	186.71 ± 56.9
mental health	223.75 ± 47.6
WOMAC score	47.89 ± 15.6

-Numbers are mean±SD or frequency (%)

-Comorbid conditions were asthma, chronic bronchitis, chronic obstructive pulmonary disease, hypertension, diabetes, cardiovascular disease, migraine, chronic gastrointestinal condition, depression, rheumatoid arthritis, kidney disease.

Table 2: Comparison of mean scores of QoL and disability domains and VAS pain by gender

	Female	Male	P value
SF-36 domains			
Physical function(PF)	35.45±20.41	45.17±21.40	0.001
Role physical (RP)	60.18±27.59	51.86±33.57	0.025
Bodily pain (BP)	41.84±25.12	51.44±25.83	0.001
General health (GH)	32.23±22.56	39.43±22.47	0.006
Vitality (VT)	32.66±14.52	37.45±13.81	0.004
Social function (SF)	47.55±26.03	57.41±26.61	0.001
Role emotional (RE)	65.89±38.89	55.79±44.25	0.033
Mental health (MH)	65.26±11.18	67.93±10.56	0.035
Physical health dimension	180.89±55.60	197.19±58.33	0.014
Mental health dimension	221.45±47.58	227.83±47.88	0.250
WOMAC domains			
WOMAC-pain	10.75±3.23	9.66±3.66	0.006
WOMAC- stiffness	5.15±3.33	4.55±1.71	0.065
WOMAC-function	34.36±11.06	29.83±12.91	0.001
WOMAC-total	50.03±14.8	43.82±16.26	0.001
Principle component of SF-MPQ			
Sensory	11.23±2.45	10.89±2.31	0.784
Affective	2.12±0.012	2.23±0.010	0.868
VAS pain (0–10)	6.48±0.89	4.67±0.65	0.006

Figure 1: Percentage of pain intensity based on SF-MPQ in the participants by gender ($P < 0.001$)

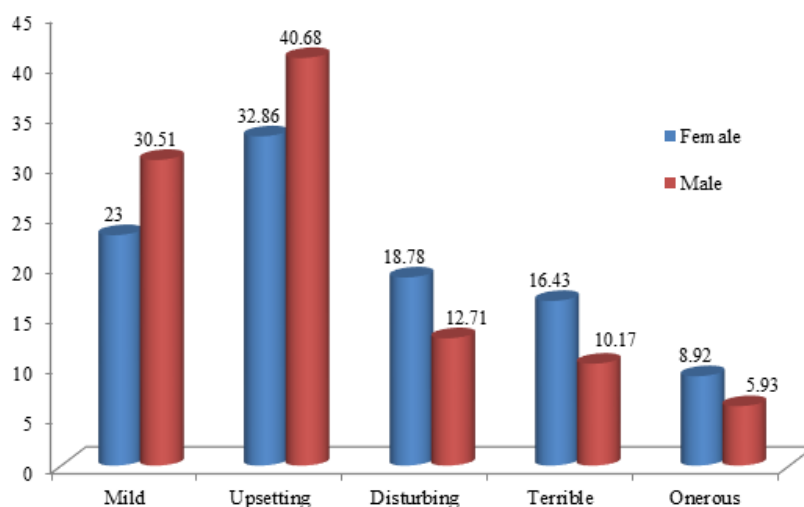


Table 3: Correlation between QoL domains with disability domains and personal data

	PF	RP	BP	GH	VT	SF	RE	MH
R value	-0.445***	-0.222***	-0.422***	-0.261***	-0.376***	-0.411***	-0.195***	-0.276***
Age, P value								
Symptom duration	-0.519***	-0.298***	-0.517***	-0.380***	-0.493***	-0.467***	-0.271***	-0.360***
						0.001		
BMI	-0.117*	-0.122*	-0.080	-0.106	-0.062	0.051	-0.128*	-0.093
Sedentary leisure	-0.215***	-0.184***	-0.259***	-0.446***	-0.176***	-0.371***	-0.382***	-0.521***
Comorbidity (diseases number)	-0.322***	-0.276***	-0.186*	-0.428***	-0.345	-0.268	-0.276	-0.189*
Polypharmacy (drug number)	-0.436***	0.296	-0.324	-0.338***	-0.188	-0.245	0.412**	-0.231
VAS pain	-0.536***	-0.436***	-0.478***	-0.238***	-0.256***	-0.382***	-0.179***	-0.321***
WOMAC-pain	-0.816***	-0.344***	-0.738***	-0.586***	-0.636***	-0.680***	-0.272***	-0.485***
WOMAC- stiffness	-0.318***	-0.126*	-0.327***	-0.281***	-0.261***	-0.332***	-0.110*	-0.261***
WOMAC-function	-0.852***	-0.351***	-0.794***	-0.622***	-0.668***	-0.741***	-0.276***	-0.495***
WOMAC total	-0.851***	-0.251***	-0.801***	-0.627***	-0.668***	-0.743***	-0.479***	-0.510***

* $p > 0.05$, ** $p > 0.01$, *** $p > 0.001$

DISCUSSION

The results showed that the QoL domains of the elderly with KOA were significantly associated with disability in all three domains of pain, stiffness, and function. A significant negative correlation was also found between the QoL domains and the VAS pain variable. In general, the physical health dimension of QoL showed a higher correlation with VAS pain than the mental health dimension. The lower scores in the physical health dimension compared with mental health are consistent with other studies.^{7,10-11,14-15} KOA is a chronic disease that can cause significant functional limitations associated with pain. As a result, these two elements can explain the reduction in QoL in patients with KOA.¹⁶ The majority of authors agree that pain and disability are the main predictors of QoL, regardless of the severity of OA radiographs.¹⁷⁻¹⁸ QoL has been linked to the impact of treatment decisions on patients with KOA. Relieving pain, restoring function, and improving QoL have been identified as indicators of efficiency and effectiveness in treating patients with severe illness, as part of the OA assessment.^{4,19}

A comparison of QoL and WOMAC domains by gender indicated that the QoL was lower and the disability was higher in women than in men. The severity of the pain was also shown to be more severe in women. Most studies have shown that women reported more severe pain, lower QoL, and more disability than men, even after controlling confounding variables.^{1,4,10-11,20-21} A possible explanation for the worse clinical symptoms in women compared to men is that women are inherently more likely to be more sensitive to pain and functional limitations than men. Other potential explanations include more prevalence of obesity in women and differences in daily physical activity between the gender groups. Finally, women in our society need kneeling and squatting postures in

daily activities more often than men. Such activities cause more discomfort in women.

In the present study, there was a significant negative correlation between all QoL domains and age. The highest correlation was observed with the physical function domain. Recent studies have shown that this domain worsens as patients get older.^{4,16} The link between aging and QoL was shown,^{16,22} however, Nobrega et al (2009) reported that the QoL mean did not reduce with age.²³ One of the reasons for this discrepancy may be that when older people define their health as good and reasonable, they do not see themselves as without disease; however, they believe that even with their illnesses, they can function well in their environment.¹⁶

In this study, some of the QoL domains did show a poor correlation with BMI. The Gomes-Neto study found no difference in QoL domains among overweight and normal people.²⁴ The association between increased BMI and KOA risk has also been described in other studies.^{6,16} Recent studies have shown that both underweight and overweight/obese individuals are more likely to experience function limitation, disability, and mortality, as compared to persons whose weight is in a healthy range.^{6,25} These findings identify a subgroup that may be at risk for poor outcomes and show the importance of targeting a healthy BMI.

Comorbidity and polypharmacy were associated with lower QoL scores in this study. This is consistent with some studies.^{2,12,26} Polypharmacy over a long time due to common chronic diseases and pain can endanger the health and QoL of the elderly. Therefore, non-pharmacological measures or the use of fewer drugs in low doses can reduce the adverse effects and maintain adequate pain control. Also, early detection of chronic diseases is

essential to develop prevention strategies to help improve their health.^{19,27-30}

Another finding of the present study was a significant negative correlation between QoL and sedentary leisure time. This is similar to other studies related to the elderly.³¹⁻³² These results can be explained by the fact that age is associated with reduced mobility and cognitive functions, which has a direct impact on sedentary and self-efficacy activities, and self-efficacy in turn can affect the psychological QoL.³¹ Accordingly, sedentary time should be integrated into the guidelines for older people's movement behavior, so that the elderly benefit from less sitting, breaking up their sitting time, and more movement.

The limitations of this study include the analysis of a single group that leads to problems in comparing the results in the study; The inability to assess patients soon after medical counseling, which would have enabled data analysis with less influence of drug treatment or non-pharmacological treatment by the physician; heterogeneity in disease time distribution among participants; and the inability to control conservative treatments previously performed by other health care providers. The strength of the study is the acceptable sample size, well-defined study design and implementation, and also taking into account many factors influencing knee-related QoL.

CONCLUSIONS

The results contained several important messages. Poorer knee-related QoL in women than men of the same age suggests that treatments should place a greater emphasis on pain management and improving function, particularly in women with KOA. Weak correlation between QoL and BMI also suggests that even underweight people may be at risk for KOA. This demonstrates the importance of targeting a healthy BMI in KOA management. Finally, comorbidity, polypharmacy, and sedentary lifestyle were among the factors affecting the reduction of KOA-related QoL in the elderly. Treatment planning for KOA in the elderly should focus on reducing the number of medications, treating chronic diseases, and improving mobility. In conclusion, individual differences in predictors of QoL and physical function suggest KOA management strategies should be individualized based on patient characteristics.

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