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Quality of Life in Osteoarthritis: Relationship with Demographic and Clinical Variables

Osteoartritte Yaşam Kalitesi: Demografik ve Klinik Değişkenlerle İlişkisi

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Abstract

Objective: To investigate the relationship of quality of life (QoL) with demographic and clinical variables in osteoarthritis (OA).
Materials and Methods: QoL of 156 patients (79.5% female) with the knee, hip, foot, and/or hand OA was assessed by the OAQoL scale. Zero-10 numeric rating scale (NRS) for pain severity, Health Assessment Questionnaire (HAQ) for general physical disability, Western Ontario and McMaster Universities Index of Osteoarthritis (WOMAC) for knee/hip disability, and the Nottingham Health Profile (NHP) for health status were also completed by patients.
Results: Mean age was 56±10 and mean disease duration 7.2±6.4 years. There were moderate-to-strong significant correlations (r=0.50-0.70) between QoL and HAQ, WOMAC-pain, WOMAC-function, WOMAC-stiffness, NHP-physical mobility, and NHP-energy. QoL was not related to the number of joints affected by osteoarthritis. A linear regression model was performed to determine the factors that together explain the variability in QoL. Potential variables which found statistically significant in univariate linear regression analyses were used in a stepwise regression procedure to select the final multivariate model. The final model included pain (NRS), HAQ, NHP-energy, and NHP-social isolation with an adjusted R2 of 0.645.
Conclusion: Pain, physical function, fatigue, and social isolation have been found to be the predictors of QoL in this osteoarthritis patient group, explaining 64.5% of the variance.
Keywords: Osteoarthritis, quality of life, pain, physical function, physical disability

Öz

Amaç: Osteoartritte (OA) yaşam kalitesinin (QoL) demografik ve klinik değişkenlerle ilişkisini araştırmaktır.
Gereç ve Yöntem: Diz, kalça, ayak ve/veya el OA'sı olan 156 hastanın (%79,5'i kadın) yaşam kalitesi OAQoL skalası ile değerlendirildi. Ağrı şiddeti için 0-10 sayısal derecelendirme ölçeği (NRS), genel fiziksel disabilite için Sağlık Değerlendirme Anketi (HAQ), diz/kalça disabilitesi için Western Ontario ve McMaster Üniversiteleri Osteoartrit İndeksi (WOMAC) ve genel sağlık durumu için Nottingham Sağlık Profili (NHP) kullanıldı.
Bulgular: Ortalama yaş 56±10 ve ortalama hastalık süresi 7,2±6,4 yıl idi. Yaşam kalitesi ile HAQ, WOMAC-ağrı, WOMAC-fonksiyon, WOMAC-tutukluk, NHP-fiziksel mobilite ve NHP-enerji arasında orta ila güçlü anlamlı korelasyon (r=0,50-0,70) saptandı. QoL, OA'dan etkilenen eklem sayısı ile ilişkili değildi. QoL'deki değişkenliği birlikte açıklayan faktörleri belirlemek için doğrusal regresyon modeli uygulandı. Tek değişkenli doğrusal regresyon analizlerinde istatistiksel olarak anlamlı bulunan potansiyel faktörler, son çok değişkenli modeli seçmek için aşamalı regresyon prosedüründe kullanıldı. Nihai model, 0,645'lik bir ayarlanmış R2 ile ağrı (NRS), HAQ, NHP-enerji ve NHP-sosyal izolasyonu içeriyordu.
Sonuç: Bu OA hasta grubunda ağrı, fiziksel fonksiyon, yorgunluk ve sosyal izolasyon varyansın %64,5'ini açıklayarak yaşam kalitesinin belirleyicileri olarak bulunmuşlardır.
Anahtar kelimeler: Osteoartrit, yaşam kalitesi, ağrı, fiziksel fonksiyon, fiziksel disabilite

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Introduction

Osteoarthritis (OA) is a degenerative disease of the synovial joint involving structural changes in the articular cartilage, subchondral bone, joint capsule, synovial membrane, and periarticular muscles (1). It usually affects the weight-bearing joints and the most frequently affected joint is the knee, followed by the hands and the hips (2). The most common symptoms are pain, joint stiffness, loss of physical function, fatigue, sleep disturbances, and social isolation which are disabling and lead to a reduced ability to perform activities of daily living (3). It is estimated that 80% of people with OA have movement restrictions and 25% are unable to perform basic activities of daily living (4) which may deteriorate the health-related quality of life (QoL).

The goals in OA management are to control pain, maintain and enhance joint function, and improve functioning and QoL (5). To achieve optimal QoL in patients with OA, it is important to determine which demographic and clinical variables are associated with QoL. Pain, functioning, and health status of patients can be determined by patient-reported outcome instruments which focus on the impairments of body functions as well as activity limitations and participation restrictions caused by the disease. While these outcomes are important for professionals in patient assessment, it has been shown that they do not always have a large impact on QoL (6). This study aims to investigate the predictors of QoL in patients with OA.

Materials and Methods

This study includes the secondary analysis of the Turkish data collected for the adaptation of the OAQoL scale across Europe (7). Adult individuals who were diagnosed as knee, hip, hand OA according to the American College of Rheumatology criteria (8-10) as well as symptomatic foot OA confirmed by X-ray were included in the study. The exclusion criteria were comorbidity determined by the clinician as likely to affect QoL, presence of failed joint arthroplasty for OA, history of arthroplasty in the previous 6 months, and illiteracy. The study protocol was approved by the Ethics Committee of the Ankara University Faculty of Medicine (decision no: 02-53-13, date: 28.01.2013). All patients gave informed consent and the study was conducted in compliance with the principles of the Declaration of Helsinki.

Health-related QoL was assessed by the Turkish validated OAQoL scale (7,11). It is a 22-item needs-based measure that provides a unidimensional index of OA-specific QoL. Higher scores indicate poor QoL (11). The severity of pain was assessed by a numeric rating scale (NRS) where scores ranged from 0 (no pain) to 10 (most severe pain) (12). Functional limitations in activities of daily living (dressing, arising, eating, walking, hygiene, reach, grip, and activities) were evaluated by the Health Assessment Questionnaire (HAQ) which is a generic physical disability index. Scoring is from 0 (without any difficulty) to 3 (unable to do) (13). The Western Ontario and McMaster Universities Index of OA (WOMAC), 3.0 Likert version, was also used as a knee and hip OA-specific disability measure (14). It includes 3 subscales evaluating pain (score 0-20), stiffness (score 0-8), and physical functioning (score 0-68), with higher scores indicating more symptoms and limitations. The health status of the patients was evaluated with the Nottingham Health Profile (NHP) (15). It consists of 38 questions in 6 subscales: sleep, physical activity, energy, pain, emotional reactions, and social isolation. Subscale scores range between 0 and 100, with higher scores representing worse health status.

Statistical Analysis

Statistical analyses were performed using R v.3.6.3 statistical programming language (R Foundation for Statistical Computing, Vienna, Austria). Quantitative data were summarized as mean ± standard deviation along with median (25^{th}-75^{th} percentiles), whereas frequency and percentage were used for qualitative data. Spearman correlation coefficient was used to assess the strength of the relationship between OAQoL and demographic or clinical parameters. A linear regression model was performed to determine the predictors that together explain the variability in OAQoL. The potential factors which are found to be statistically significant in univariate linear regression analyses were selected in a stepwise variable selection procedure to select the final multivariate model. Post hoc power analysis was performed based on the test of R2 deviation from zero resulting in 99% observed power with 156 patients and 4 predictors, for type I error rate of α=0.05 and a calculated effect size of f2=0.38 [which is large according to Cohen (16) 1988]. G*Power v.3.1 was used to calculate post hoc power analysis.

Results

A total of 156 patients with knee, hip, foot, and/or hand OA were evaluated. The demographic and clinical characteristics of the patient group are presented in Table 1. The mean age was 56.02±10.05 years (range 33-88 years), and the mean disease duration was 7.2±6.4 years. The median pain intensity was 6, reflecting a moderate level. Most of the patients were female (79.5%). OA-related symptoms were most common in the knee, where 261 knees of 156 patients were symptomatic. Patients had minimal to moderate disability in activities of daily living, as reflected by a median HAQ score of 1. QoL levels was also moderately affected with a median OAQoL score of 10.5.

There were moderate-to-strong (17) significant correlations (Spearman r: 0.50-0.70) between QoL and HAQ, WOMAC-pain, WOMAC-function, WOMAC-stiffness, NHP-physical mobility, and NHP-energy (Table 2). QoL was not related to the number of joints affected by OA. A linear regression model was performed to determine the factors, which together explain the variability in QoL. Potential factors, found to be statistically significant in univariate linear regression analyses were used in stepwise regression procedure to select the final multivariate model. The final model included pain (NRS), HAQ, NHP energy, and NHP social isolation with an R square of 0.654 and an adjusted R square of 0.645 (Table 3).

Table 1. Demographic and clinical characteristics of patients (n=156)

Age (years)	**56±10 (33-88)**
Male/female, n (%)	32 (20.5)/124 (79.5)
Symptoms related to OA (number of joints)	
Knee/hand/hip/foot/ thumb	261/77/72/55/40
Marital status, n (%)	
Married	137 (88)
Divorced/single/widow(er)	19 (12)
Working status, n (%)	
Full time working	23 (14.7)
Retired	41 (26.3)
Housewife	86 (55.1)
Not working/other	6 (3.9)
Disease duration (years)	7.24±6.38 5 (2-10)
Number of affected joints	3.24±2.02 2 (2-4)
Pain severity (0-10)	6.09±2.27 6 (4-8)
OAQoL (0-22)	10.42±7.19 10.5 (3-17)
HAQ (0-3)	0.95±0.68 1 (0.3-1.4)
WOMAC	
Pain (0-20)	8.77±4.81 9 (5-12)
Stiffness (0-8)	3.34±2.09 3 (2-5)
Function (0-68)	29.71±15.43 30 (17-42)
NHP	
Energy (0-100)	61.75±39.13 66.7 (33.3-100)
Pain (0-100)	61.94±33.64 62.5 (37.5-100)
Emotional (0-100)	33.12±32.51 22.2 (0-63.9)
Sleep (0-100)	38.85±33.10 40 (5-60)

Quantitative data were summarized as mean ± standard deviation along with median (25^{th}-75^{th} percentiles), whereas frequency and percentage n (%), were used for qualitative data. HAQ: Health Assessment Questionnaire, NHP: Nottingham Health Profile, WOMAC: Western Ontario and McMaster Universities Index of Osteoarthritis, OAQoL: Osteoarthritis Quality of Life scale

Table 2. Correlations of QoL with demographic clinical variables

	OAQoL
Age	0.294***
Disease duration	0.326***
Number of affected joints	0.151
Pain severity (NRS)	0.541***
HAQ	0.687***
WOMAC-pain	0.622***
WOMAC-stiffness	0.453***
WOMAC-function	0.674***
NHP-energy	0.684***
NHP-pain	0.663***
NHP-emotional	0.569***
NHP-sleep	0.473***
NHP-social isolation	0.604***
NHP-physical mobility	0.687***

HAQ: Health Assessment Questionnaire, NHP: Nottingham Health Profile, NRS: Numeric rating scale, WOMAC: Western Ontario and McMaster Universities Index of Osteoarthritis, OAQoL: Osteoarthritis Quality of Life scale
***p<0.001

Discussion

The results of this study revealed that pain, functional limitations in activities of daily living, fatigue, and social isolation are the predictors of the QoL in patients with OA.

The ability to effectively measure the QoL is central to describing the impacts of disease, treatment, or other insults upon the patient. There are some studies evaluating the QoL in OA (18-22). However, these studies have generally evaluated the QoL with generic QoL instruments, which are generated to measure the QoL in any disease or condition. The disadvantages of generic instruments are that, because they contain various constructs and are so general, they are often less sensitive to change in evaluating a particular condition state compared with the disease-specific ones (23). The strength of this study is that QoL was evaluated with an OA-specific QoL instrument, which is a needs-based scale, providing a unidimensional index of OA-specific QoL. The application of the needs-based model in OA is important as it provides valuable information on the global impact of the disease from the patient's perspective (10).

Pain is usually the predominant symptom in patients with symptomatic OA and it is accepted as one of the most important determinants of QoL (23-25). The previously published studies have shown that the presence of pain reduces health-related QoL in patients with OA (21,22). In our study, the pain was in multiple joints, most commonly seen in the knee, hand, hip, foot, and thumb, respectively, consistent with the literature findings (2). Contrary to what we expected, the number of joints affected by OA was not related to QoL. Similar to our results, Montero et al. (26) evaluated the pain, disability, and health-related QoL in patients with self-reported OA and showed that pain severity

Table 3. Factors explaining quality of life in regression analyses

	Univariate linear regression			Multivariate linear regression		
	R-squared	**Beta (SE)**	**p**	**Beta (SE)**	**Standardized beta**	**p**
Age	0.081	0.204 (0.055)	<0.001	-	-	-
Female sex	0.071	4.739 (1.379)	<0.001	-	-	-
Duration	0.114	0.381 (0.086)	<0.001	-	-	-
Number of affected joints	0.027	0.584 (0.283)	0.040	-	-	-
Pain severity (NRS)	0.294	1.721 (0.215)	<0.001	0.536 (0.194)	0.169	0.006
WOMAC-pain	0.393	0.938 (0.094)	<0.001	-	-	-
NHP-pain	0.427	0.140 (0.013)	<0.001	-	-	-
HAQ	0.472	7.219 (0.615)	<0.001	3.143 (0.714)	0.299	<0.01
WOMAC-function	0.449	0.312 (0.028)	<0.001	-	-	-
NHP-sleep	0.226	0.103 (0.015)	<0.001	-	-	-
NHP-energy	0.459	0.125 (0.011)	<0.001	0.046 (0.012)	0.253	<0.01
NHP-emotional	0.326	0.126 (0.015)	<0.001	-	-	-
NHP-social isolation	0.364	0.142 (0.015)	<0.001	0.072 (0.013)	0.307	<0.01

HAQ: Health Assessment Questionnaire, NHP: Nottingham Health Profile, NRS: Numeric rating scale, WOMAC: Western Ontario and McMaster Universities Index of Osteoarthritis, OAQoL: Osteoarthritis Quality of Life scale, Beta: Regression coefficient, SE: standard error of beta, Standardized beta: Helps to understand the relative importance of factors. Final multivariate model has an R-square of 0.654 and an adjusted R-square of 0.645

was associated with functional limitations, disability, and poor health-related QoL. However, the authors stated that the impact of location of OA on QoL was lower than that of pain severity (26). These findings confirm our results that the severity of joint pain rather than the number of painful joints has an impact on the QoL of OA patients.

Most of the participants had a mild-to-moderate disability in terms of performing daily activities including dressing, arising, eating, walking, hygiene, reach, grip, and activities in this study. One study evaluating the prevalence of symptomatic hand OA and its impact on functional status among the elderly (27) found that patients with hand OA experienced functional limitations, including writing, gripping, and manipulating small objects compared to those who did not have hand OA. Another study showed that knee OA was among the most disabling conditions with limitations in walking and climbing stairs (28). In addition to these findings, our study showed that an increase in functional limitations in daily activities was related to poor QoL in OA. Kwok et al. (29) evaluated the impact of limitations in activities of daily living on QoL in patients with the majority having hand OA (95%). The authors stated that limitations in daily activities were the major determinants of reduced health-related QoL similar to our results.

Fatigue is a subjective feeling of generalized tiredness or exhaustion (30) and is defined as one of the most important and challenging aspects of any chronic disease, including many types of arthritis (31). One study showed that individuals with OA described a significant amount of fatigue and stated that it had a substantial impact on their lives (32). Cross et al. (31) evaluated the relation between measures of fatigue and health-related QoL in rheumatoid arthritis and OA. The authors found that fatigue was significantly correlated with most measures of health-related QoL, particularly with the vitality, physical function, and bodily pain domains of the short form-36 (31). Jakobsson and Hallberg (33) investigated the factors that explain the variance in QoL among older adults with OA. They found that QoL was related to pain, functional limitations, and depressed mood. Similar to these findings emotional part of the NHP was related to QoL in our study and it was found that the QoL of the patients was related to social isolation. Our results suggest that, in addition to pain and functional limitations, the fatigue (energy) and social isolation levels of patients are also important predictors of QoL.

There are some limitations of this study. Firstly, the majority of the participants were female. However, studies showed that OA is more common in women than men (2,19,20) and in most of the studies conducted in this field, the patient population consists of mostly females. Secondly, the participants who were referred to the outpatient clinic of physical medicine and rehabilitation department of a university hospital were evaluated, and thus all participants had a symptom regarding their OA. Therefore, the results cannot be generalized to all populations with OA where most of the affected individuals may not have any symptoms (34). Finally, we did not make a power analysis for the sample

size before the study. However, post-hoc power analysis has revealed that our study has a strong power as explained in the statistics section above.

Conclusion

The results of this study show that pain, functional limitations in activities of daily living, fatigue, and social isolation are the predictors of the QoL in patients with OA. As there is no way to totally cure OA, decreasing pain, fatigue and improving the physical function may increase the QoL of individuals with OA.

Ethics

Ethics Committee Approval: The study protocol was approved by the Ethics Committee of the Ankara University Faculty of Medicine (decision no: 02-53-13, date: 28.01.2013).

Informed Consent: All patients gave informed consent and the study was conducted in compliance with the principles of the Declaration of Helsinki.

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Authorship Contributions

Concept: A.A.K., Ş.K., Design: A.A.K., Ş.K., Data Collection or Processing: S.G., Analysis or Interpretation: A.A.K., Ş.K., S.G., B.D.E., Literature Search: S.G., A.A.K., Writing: S.G., A.A.K.

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