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The Impact of Osteoarthritis on the Quality of Life of the Patient in the Kingdom of Bahrain

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Abstract

Osteoarthritis (OA) is a leading cause of disability and a decline in health-related quality of life (HRQoL). Healthcare professionals should prioritize the optimal measurement of HRQoL in patients with OA. To examine and assess the influence of Osteoarthritis on patients' quality of life in the Kingdom of Bahrain. In this cross-sectional study, a cohort of 149 individuals diagnosed with Osteoarthritis was included. Data related to QoL was collected by using Mini-Osteoarthritis Knee and Hip Quality of Life (Mini-OAKHQOL) and Western Ontario &McMaster Osteoarthritis Index (WOMAC). The Spearman rank correlation test was used to assess the correlation between assessments on different instruments used in osteoarthritis patients. The study involved participants with a mean age of 56.7 ± 11.7 years. Most of the patients experienced extreme pain during prostrating in prayer time (45.6%), sitting (32.2%), and while doing heavy domestic duties (30.9%). The Cronbach alpha coefficients for Mini-OAKHQOL and WOMAC ranged from 0.83 to 0.89 and 0.85 to 0.96 respectively. Only a few demographic factors significantly and positively correlated with Mini-OAKHQoL. This study concludes that OA has a substantial impact on HRQoL. This study can benefit healthcare professionals and policymakers to develop specific interventions and public health initiatives to address the multifaceted nature of osteoarthritis and improve the lives of those affected.

Keywords: Health-related quality of life, Mini-OAKHQOL, Osteoarthritis, Quality of life, WOMAC

1. Introduction

Osteoarthritis (OA) is a degenerative disease of the joints that is characterized pathologically by areas of focal damage and loss of articular cartilage. It is one of the most common chronic diseases that can lead to a decrease in quality of life (Shalhoub et al., 2022). Osteoarthritis affects 7% of the worldwide population, or more than 500 million people, with women being disproportionately affected (Hunter et al., 2020). Several reports have shown that physical activity is lower in the Middle East region than the global average. Also, there is increased obesity and low levels of Vitamin D which tend to increase osteoporosis. According to a recent study the prevalence, incidence, and years lived with disability (YLD) counts in Bahrain were 72,697; 7,927, and 2505 respectively (Shamekh, 2022).

The clinical features of OA such as pain and stiffness cause disability and loss of function with negative impact on patients' quality of life (QoL) (Savvari et al., 2023). Therefore, assessment of QoL becomes the primary imperative step in evaluating well-being, disease progression, and intervention efficacy (Vitaloni, 2019). To evaluate QoL practitioner needs to ask the patients questions about the mental psychosocial and physical aspects of the disease (AlAjmiand Al-Ghamdi, 2021). There are various self-assessment questionnaires or tools available for assessing pain, disability, and quality of life in people with OA (Alghadir, 2017).

The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) is widely used to measure symptoms and physical disability that originally developed for people with OA of the hip and/or knee (McConnell

et al., 2001). Mini-OAKHQOL is used for the measurement of quality of life in subjects with osteoarthritis of the lower limbs (Guillemin et al., 2016). Both these scales have been used to assess the quality of life in osteoarthritis patients (McConnell et al., 2001; Guillemin et al., 2016). There is a paucity of literature that assessed the impact of OA on the quality of life in the Kingdom of Bahrain. Therefore, with this background, the current study aimed to examine and assess the effect of Osteoarthritis on patients' quality of life in the Kingdom of Bahrain.

2. Methods

The present cross-sectional observational study was conducted at the Orthopedic Outpatient Department of the Salmanyia Medical Center (SMC) from the year 2021-2022. SMC is Bahrain's main hospital, providing secondary and tertiary care to citizens and residents through 1200 inpatient beds and outpatient multi-specialist care.

2.1 Selection Criteria

Patients who were Arab, literate, fluent in Arabic or English language and was clinical and radiological diagnosed with Osteoarthritis of one or more joints; knee hip, shoulder, vertebrae, and proximal interphalangeal joints were included in the study. Patients who had severe visual disease precludes filling in the questionnaire, lacking mental/psychological capacity, secondary Osteoarthritis, significant co-morbidities that could affect the quality of life, and previous history of acute unwell condition, and knee, hip joint replacement/surgery were excluded from the study.

2.2 Diagnosis and Assessment of Patients

The American College of Rheumatology (ACR) provides classification criteria for the clinical, radiological diagnosis and assessment of risk factors OA (Altman et al., 1986; Kellgren and Lawrence, 1957):

- *Clinical Criteria for OA Diagnosis:* Clinical criteria for diagnosing general OA typically include joint pain that worsens with activity and is relieved by rest, while joint stiffness worsens in the morning or after inactivity and lasts less than 30 minutes in the morning. Upon physical examination the presence of c**r**epitus (e.g., crackling, or grating sensation during joint movement), limited range of joint motion, existence of joint tenderness, and bony enlargement or swelling around the joint (Altman et al., 1986).
- *Assessment of Risk Factors:* Assess risk factors such as age (OA is more common in older adults), family history, obesity, joint injuries, and occupations that place stress on the joints (Altman et al., 1986).
- *Radiological Criteria for OA Diagnosis (General):* Many imaging modalities were used to diagnose OA such as X-rays, Magnetic Resonance Imaging (MRI), Ultrasound (US), and Computed tomography scans (CT scans) (Kellgren and Lawrence, 1957).

2.3 Ethical Approval

The study was approved by the secondary care research and ethical committee in Salmanyia medical complex (Research approval serial no.:41040422) and written informed consent to participate in the study was obtained from all participants before commencement of the study. Patient confidentiality and privacy were rigorously maintained throughout the study through secure data storage, anonymization of personal identifiers, restricted access, and adherence to ethical guidelines and privacy laws. Comprehensive measures were in place to prevent unauthorized access and promptly address any potential breaches.

2.4 Sample Size Calculation

The formula used for sample size calculation is (Gonzalez et al., 2017),

$$n = \left(\frac{Z_{\alpha/2} * \sigma}{d}\right)^2$$

Where,

σ is the expected standard deviation of the population

d is acceptable margin of error and for 95% confidence level,

$Z_{\alpha/2}$ value is 1.96.

The social activities dimension of Mini-OAKHQOL used in patients with osteoarthritis had a mean of 53.47 and Standard deviation of 28.51. Considering similar results at 95% confidence level and 5% maximum error, the sample size is given by,

$$n = \left(\frac{1.96 * 28.51}{5}\right)^2$$

$$n = 124.9012 \approx 125$$

Hence, the minimum sample size required is 125. As the sample size increases, the accuracy of result also increases. Therefore, in this study, we included 149 samples.

2.5 Data Collection

The participants of the survey were evaluated by data collection from medical records and questionnaires by specific instruments such as Mini-Osteoarthritis Knee and Hip Quality of Life (Mini-OAKHQOL)(Gonzalez et al., 2017), Western Ontario &McMaster Osteoarthritis Index (WOMAC) (Valamparampil, 2021). Multisite Pain and Comorbidities of the patients were also noted. The participants were asked to fill in the questionnaire independently in a private area and researchers prompted them to provide answers to missing items by rephrasing the question or offering clarification. This helped ensure that responses were as complete as possible.

General and clinical data were collected through a questionnaire with socio-demographic data such as such as age, BMI, sex, educational level, occupation, Site of Osteoarthritis, History of trauma/rheumatism. The weight was measured with the patient wearing light clothing and no shoes. Heights were measured using a standard height board with the participant wearing no shoes. BMI was calculated as weight in kg divided by height in meters squared. BMI was categorized as normal (19–25 kg/m^2), overweight (26–30 kg/m^2), and obese (≥30 kg/m^2) (Nuttall FQ, 2015).

2.5.1 QoL Analysis

Health-related quality of life (HRQoL) is a multidimensional and subjective concept that includes physical, psychological, and social functioning related to a health condition. HRQoL is important not only for quantifying the effects of disease and treatment but also for making informed decisions about the allocation of restricted healthcare resources. In this study, QoL among OA patients was measured by using the following tools:

1. Mini-OAKHQOL (Gonzalez et al., 2017): Mini-OAKHQOL, has been developed and has shown to have strong properties of validity and reproducibility. This tool consists of 20 items of the original instrument and maintains the same structure with five domains- physical activities (seven items), mental health (three items), pain (three items), social support (two items), and social functioning (two items) and independent items (3 items) addressing sexual life, professional life, and fear of being dependent. The Likert response scales for all items range from 0 (worst) to 10 (best). In our study we included 24 items, additional items were added for mental health (four items), social functioning (three items), and independent items (four items). Participants rated themselves on a scale ranging from 0 to 5 where, 5 = Severe, 4 = Moderate, 3 = Mild, 2 = Very Mild, 1 = None. Further, the mean score was calculated for the items in each dimension, yielding a set of sub-scores. The scores were then standardized on a scale from 0 (worst quality of life) to 100 (best quality of life). Reliability was analyzed via internal consistency, measured by Cronbach's alpha where Cronbach alpha 0.88 was considered as good reliability.
2. WOMAC (Valamparampil, 2021): WOMAC measures status after osteoarthritis treatment relating to the hip and knee. The questionnaire includes three domains: pain, stiffness, and physical functioning. The three domains with 24 questions are primarily used to assess the impact of OA on a patient's daily life activities (ADL), functionality, gait, overall health, and QOL. Each question is rated on a scale between 0 and 4 (0 – none, 1 - slight, 2 – moderate, 3 – severe, and 4 – extreme), resulting in scores for each domain which are then added together to compute a final total WOMAC score. In this study, 26 items were included: pain (7), stiffness (2), and difficulty (17). Participants rated themselves on a scale ranging from 0 to 4 where, 0 = None; 1 = Mild; 2 = Moderate; 3 = Severe; 4 = Extreme pain. Total scores range from 0-96 points. The scores for each subscale were collected with a score range from 0-20 for pain, 0-8 for Stiffness, and 0-68 for Physical Function. The sum of these scores for all three subscales results in the total WOMAC score. Higher scores on the WOMAC indicated worse pain, stiffness, and functional limitations. Reliability was analyzed via internal consistency, measured by Cronbach's alpha where Cronbach alpha 0.92 was considered as good reliability.

2.5.2 Multisite Pain and Comorbidities

Lastly a questionnaire regarding the site of the OA such as the neck, lower back, hands, shoulder, knee, hip, and other site of pain along with the intensity of pain was noted. Comorbidities such as depression, high lipid levels, hypertension, heart disease, asthma, renal sufficiency, cancer, osteoporosis etc. were also recorded.

2.6 Statistical Analysis

The data was analyzed using SPSS software version 20.0. Categorical variables are presented in a frequency table.

Continuous variables are presented in Mean ± SD/ Median (Min, Max) form. Spearman rank correlation test was applied to assess the correlation between assessments on different instruments used in osteoarthritis patients. The normality of data was assessed using the Kolmogorov–Smirnov test. Independent t-test or Mann-Whitney U test used to assess the effect between two groups and one-way analysis of variance (ANOVA), or Kruskal-Wallis Test used to assess the effect between more two groups. The $p < 0.05$ was considered statistically significant.

3. Results

This study included 149 patients (male 46.3% and 53.7%) with mean ± SD age of 56.7 ± 11.7 years. Patient's mean ± SD weight, height, and BMI were 87.0 ± 22.1, 1.6 ± 0.1, and 32.7 ± 8.0, respectively. The majority of the participants were educated up to Primary/ Intermediate/Secondary (40.3%) and Higher education (36.9%). Most of the patients were unemployed (66.4%). While the site of osteoarthritis was maximum in the knee part (87.9%). Only a few patients had a history of trauma (16.8%) and rheumatism (12.1%).

For the distribution of patient's rate for MINI-OAKHQOL questionnaire, the majority of the mean score was noted in Social Support (Feel support from people close to me:7.3 ± 3.1; Feel others understand arthritis problems: (6.6 ± 3.3) and followed by Social Functioning (Able to plan for the future: 7.1 ± 3.1; Going out whenever would like: 6.9 ± 3.3; Have friends in whenever would like: 7.2 ± 3.2**)** (Table 1).

Table 1. Distribution of Patient's rate for MINI-OAKHQOL questionnaire

Variables	Sub-Category	Number of Subjects (%)
Physical Activities		
Walking	Mean ± SD	5.2± 3.2
Bending or straightening	Mean ± SD	5.4± 3.1
Climbing chairs	Mean ± SD	4.6 ± 3.2
Dressing	Mean ± SD	5.9 ± 3.0
Getting in and out of a car	Mean ± SD	5.3 ± 3.1
Take longer doing things	Mean ± SD	5.1 ± 3.0
Staying for a long time in the same position	Mean ± SD	4.9 ± 2.9
Mental Health		
Feel depressed because of pain	Mean ± SD	5.1 ± 3.7
Been afraid of being dependent on others	Mean ± SD	4.9 ± 3.8
Feel aggressive and irritable	Mean ± SD	5.0 ± 4.0
Wonder what is going to happen	Mean ± SD	5.0 ± 3.6
Worried about the side -effects of treatment	Mean ± SD	4.9 ± 3.6
Pain		
Frequency of pain	Mean ± SD	4.6 ± 3.2
Intensity of pain	Mean ± SD	4.8 ± 3.1
Wake up at night because of pain	Mean ± SD	4.7 ± 3.5
Social Support		
Feel others understand arthritis problems	Mean ± SD	6.6 ± 3.3
Feel support from people close to me	Mean ± SD	7.3 ± 3.1
Social Functioning		
Able to plan for the future	Mean ± SD	7.1 ± 3.1
Going out whenever would like	Mean ± SD	6.9 ± 3.3
Have friends in whenever would like	Mean ± SD	7.2 ± 3.2

Independent Items		
Hindered in professional activity	Mean ± SD	4.9 ± 3.3
Hindered in life with a partner	Mean ± SD	5.5 ± 3.5
Having regular sex recently	No	44 (33.1)
	Yes	89 (66.9%)
Restricted sex life	Mean ± SD	5.6± 3.5

Most of the patients experienced extreme pain during prostrating in prayer time (45.6%), sitting (32.2%), and while doing heavy domestic duties (30.9%) (Table 2).

Table 2. Distribution of Patient's rate for WOMAC

Variables	**Sub-Category**	**Number of Subjects (%)**
Rate your pain When		
Walking on a flat surface	None	31 (20.8%)
	Mild	38 (25.5%)
	Moderate	60 (40.3%)
	Severe	12 (8.1%)
	Extreme pain	8 (5.4%)
Climbing (going up or downstairs) stairs	None	10 (6.7%)
	Mild	15 (10.1%)
	Moderate	53 (35.6%)
	Severe	39 (26.2%)
	Extreme pain	32 (21.5%)
Sleeping at night while in bed	None	37 (24.8%)
	Mild	44 (29.5%)
	Moderate	34 (22.8%)
	Severe	26 (17.4%)
	Extreme pain	8 (5.4%)
Resting (sitting or lying)	None	35 (23.5%)
	Mild	44 (29.5%)
	Moderate	42 (28.2%)
	Severe	18 (12.1%)
	Extreme pain	10 (6.7%)
Standing upright	None	18 (12.1%)
	Mild	39 (26.2%)
	Moderate	40 (26.8%)
	Severe	33 (22.1%)
	Extreme pain	19 (12.8%)
Knelling in prayer time	None	28 (18.8%)
	Mild	38 (25.5%)
	Moderate	24 (16.1%)

	Severe	8 (5.4%)
	Extreme pain	51 (34.2%)
Prostrating in prayer time	None	16 (10.7%)
	Mild	27 (18.1%)
	Moderate	26 (17.4%)
	Severe	12 (8.1%)
	Extreme pain	68 (45.6%)
Rate your stiffness in the		
After first wakening in the morning	None	37 (24.8%)
	Mild	30 (20.1%)
	Moderate	45 (30.2%)
	Severe	22 (14.8%)
	Extreme pain	15 (10.1%)
After sitting, lying, or resting later in the day	None	20 (13.4%)
	Mild	40 (26.8%)
	Moderate	47 (31.5%)
	Severe	31 (20.8%)
	Extreme pain	11 (7.4%)
Rate your Difficulty in the		
Descending stairs	None	21 (14.1%)
	Mild	32 (21.5%)
	Moderate	46 (30.9%)
	Severe	30 (20.1%)
	Extreme pain	20 (13.4%)
Ascending stairs	None	11 (7.4%)
	Mild	22 (14.8%)
	Moderate	47 (31.5%)
	Severe	36 (24.2%)
	Extreme pain	33 (22.1%)
Rising from sitting	None	13 (8.7%)
	Mild	30 (20.1%)
	Moderate	50 (33.6%)
	Severe	35 (23.5%)
	Extreme pain	21(14.1%)
Standing	None	19 (12.8%)
	Mild	33 (22.1%)
	Moderate	47 (31.5%)
	Severe	36 (24.2%)
	Extreme pain	14 (9.4%)
Bending to floor	None	22 (14.8%)
	Mild	38 (25.5%)

	Moderate	47 (31.5%)
	Severe	27 (18.1%)
	Extreme pain	15 (10.1%)
Walking on a flat floor	None	31 (20.8%)
	Mild	49 (32.9%)
	Moderate	43 (28.9%)
	Severe	21 (14.1%)
	Extreme pain	5 (3.4%)
Getting in/out of the car	None	17 (11.4%)
	Mild	36 (24.2%)
	Moderate	57 (38.3%)
	Severe	26 (17.4%)
	Extreme pain	13 (8.7%)
Going shopping	None	20 (13.4%)
	Mild	30 (20.1%)
	Moderate	50 (33.6%)
	Severe	33 (22.1%)
	Extreme pain	16 (10.7%)
Putting on socks	None	28 (18.8%)
	Mild	36 (24.2%)
	Moderate	48 (32.2%)
	Severe	22 (14.8%)
	Extreme pain	15 (10.1%)
Taking off socks	None	32 (21.5%)
	Mild	38 (25.5%)
	Moderate	47 (31.5%)
	Severe	19 (12.8%)
	Extreme pain	13 (8.7%)
Rising from bed	None	27 (18.1%)
	Mild	36 (24.2%)
	Moderate	53 (35.6%)
	Severe	22 (14.8%)
	Extreme pain	11 (7.4%)
Lying in bed	None	44 (29.5%)
	Mild	48 (32.2%)
	Moderate	34 (22.8%)
	Severe	18 (12.1%)
	Extreme pain	5 (3.4%)
Getting in/out of the bathtub	None	31 (20.8%)
	Mild	50 (33.6%)
	Moderate	42 (28.2%)

	Severe	19 (12.8%)
	Extreme pain	7 (4.7%)
Sitting	None	13 (8.7%)
	Mild	30 (20.1%)
	Moderate	34 (22.8%)
	Severe	24 (16.1%)
	Extreme pain	48 (32.2%)
Getting on/off the toilet	None	21 (14.1%)
	Mild	40 (26.8%)
	Moderate	40 (26.8%)
	Severe	32 (21.5%)
	Extreme pain	16 (10.7%)
Doing light domestic duties (cooking, dusting)	None	15 (10.1%)
	Mild	38 (25.5%)
	Moderate	47 (31.5%)
	Severe	36 (24.2%)
	Extreme pain	13 (8.7%)
Doing heavy domestic duties (moving furniture)	None	14 (9.4%)
	Mild	22 (14.8%)
	Moderate	35 (23.5%)
	Severe	32 (21.5%)
	Extreme pain	46 (30.9%)

Table 3 illustrates which part the patient experiences maximum pain. Most of the patients did not experience any pain in the neck (40.9%), hands (47.7%) shoulders (32.9%), or any other pain (75.3%).

Table 3. Distribution of Patient's experiencing of the pain

Variables	**Sub-Category**	**Number of Subjects (%)**
ARE YOU EXPERIENCING PAIN IN THE – Neck	No pain	61 (40.9%)
	Little pain	36 (24.2%)
	Moderate pain	29 (19.5%)
	Heavy pain	13 (8.7%)
	Extreme pain	9 (6.0%)
	Intolerable pain	1 (0.7%)
ARE YOU EXPERIENCING PAIN IN THE - Lower back	No pain	30 (20.1%)
	Little pain	30 (20.1%)
	Moderate pain	37 (24.8%)
	Heavy pain	28 (18.8%)
	Extreme pain	20 (13.4%)
	Intolerable pain	4 (2.7%)
ARE YOU EXPERIENCING PAIN IN THE – Hands	No pain	71 (47.7%)

	Little pain	27 (18.1%)
	Moderate pain	27 (18.1%)
	Heavy pain	15 (10.1%)
	Extreme pain	6 (4.0%)
	Intolerable pain	3 (2.0%)
ARE YOU EXPERIENCING PAIN IN THE – Shoulders	No pain	49 (32.9%)
	Little pain	31 (20.8%)
	Moderate pain	36 (24.2%)
	Heavy pain	19 (12.8%)
	Extreme pain	11 (7.4%)
	Intolerable pain	3 (2.0%)
ARE YOU EXPERIENCING PAIN IN THE – Others	No pain	52 (75.3%)
	Little pain	4 (5.8%)
	Moderate pain	7 (10.1%)
	Heavy pain	4 (5.8%)
	Extreme pain	2(3.0%)
	Intolerable pain	-

To examine the relationship between hypertension and multisite pain rate, we employed the Mann-Whitney U test. Bivariate testing, specifically Spearman correlation analysis, was conducted to explore interrelations among pain scales. In this study, most of the patients had a high percentage of lipid levels (45.0%), hypertension (40.3%) and diabetes (30.9%). It was noted that hypertension ($p = 0.021$), heart disease ($p = 0.003$), other chronic heart diseases ($p = 0.033$), ulcer of gastritis ($p = 0.001$), diabetes ($p = 0.021$) and rheumatism ($p = 0.031$) significantly correlated co-primary comorbidity outcomes with multisite pain rate (Table 4). The mean ± SD noted for 'Multisite Pain scales' was 23.73 ± 17.38.

Table 4. Distribution of Patient's responses for comorbidities and correlation of co-primary comorbidity outcomes with Multisite Pain rate

Variables	**Sub-Category**	**Number of Subjects (%)**	**Correlation Coefficient**	**p-Value[s]**
Depression	No	138 (92.6%)	0.129	0.117
	Yes	11 (7.4%)		
High lipid levels	No	82 (55.0%)	0.154	0.061
	Yes	67 (45.0%)		
Hypertension	No	89 (59.7%)	0.188	**0.021**
	Yes	60 (40.3%)		
Heart disease	No	131 (87.9%)	0.246	**0.003**
	Yes	18 (12.1%)		
Asthma	No	130 (87.2%)	0.135	0.102
	Yes	19 (12.8%)		
Renal sufficiency	No	134 (89.9%)	0.136	0.099
	Yes	15 (10.1%)		
Cancer	No	146 (98.0%)	0.021	0.803
	Yes	3 (2.0%)		

Osteoporosis	No	124 (83.2%)	0.143	0.082
	Yes	25 (16.8%)		
Other chronic heart diseases	No	138 (92.6%)	0.175	**0.033**
	Yes	11 (7.4%)		
Chronic Brain diseases	No	145 (97.3%)	0.071	0.388
	Yes	4 (2.7%)		
Respiratory system diseases	No	127 (85.2%)	0.097	0.239
	Yes	22 (14.8%)		
Ulcer of gastritis	No	109 (73.2%)	0.277	**0.001**
	Yes	40 (26.8%)		
Gout or Hyperuricemia	No	124 (83.2%)	0.096	0.244
	Yes	25 (16.8%)		
Thyroid diseases	No	131 (87.9%)	0.108	0.188
	Yes	18 (12.1%)		
Diabetes	No	103 (69.1%)	0.189	**0.021**
	Yes	46 (30.9%)		
Rheumatism	No	123 (82.6%)	0.177	**0.031**
	Yes	26 (17.4%)		

S – Spearman rank correlation. indicates statistically Significant at p<0.05.*

Table 5 depicts the reliability of Mini-Osteoarthritis Knee and Hip Quality of Life (Mini-OAKHQOL) and Western Ontario & McMaster Osteoarthritis Index (WOMAC) scales used in this study. The mean score and Cronbach alpha for Mini-OAKHQOL scales were 53.8 and 0.83 respectively. The mean score and Cronbach alpha for WOMAC scales were 47.4 and 0.85 respectively.

Table 5. Reliability of Mini-Osteoarthritis Knee and Hip Quality of Life (Mini-OAKHQOL) and Western Ontario &McMaster Osteoarthritis Index (WOMAC) scales used in this study

	Mean	**Standard deviation**	**Median (Min, Max)**	**Cronbach Alpha**
Mini-OAKHQOL scales	53.8	21.8	52.4 (7.8, 99.1)	0.83
Physical activities scale	52.0	24.6	51.4 (4.3, 100)	0.86
Mental health scale	49.8	32.4	50 (0, 100)	0.86
Pain scale	46.7	28.9	46.7 (0, 100)	0.86
Social support scale	69.5	29.6	80 (0, 100)	0.89
Social functioning scale	70.6	28.4	80 (0,100)	0.88
Independent Items scale	45.3	28.0	45.2 (0,100)	0.86
WOMAC scales	47.4	20.9	49.0 (0, 98.1)	0.85
Pain scale	48.7	22.7	50 (0, 96.4)	0.88
Stiffness scale	43.4	26.8	37.5 (0, 100)	0.96
Difficulty scale	47.3	21.9	50 (0, 98.5)	0.89

Note. All were standardized on a 0 to 100 scale. If participants responded to at least half of the scale items, we imputed missing items to complete the scale. Otherwise, the scale was considered missing. Mini-OAKHQOL: Cronbach alpha is 0.88 which is considered good reliability; WOMAC: Cronbach alpha 0.92 is considered good reliability.

The correlation of WOMAC scales and patient demographic factors reported that Age positively and significantly correlated with the Physical Function scale; BMI and Occupation positively correlated with all the scales. However, height and education level negatively and significantly correlated with all the scales (Table 6).

Table 6. Correlation of WOMAC scales and patient demographic factors

	Correlation Coefficient (p-value)^S			
	WOMAC scales	pain scale	Stiffness scale	Physical Function scale
Age	0.143 (0.082)	0.113 (0.172)	0.058 (0.483)	0.168 **(0.041)***
Weight	0.155 (0.058)	0.135 (0.102)	0.125 (0.128)	0.150 (0.068)
Height	-0.273 **(0.001)***	-0.243 **(0.003)***	-0.244 **(0.003)***	-0.260 (**0.001)***
BMI	0.285 **(0.001)***	0.251 **(0.002)***	0.241 **(0.003)***	0.274 **(0.001)***
Gender	-0.066 (0.426)	-0.116 (0.159)	0.021 (0.798)	-0.072 (0.384)
Education Level	-0.325 **(0.001)***	-0.277 **(0.001)***	-0.328 **(0.001)***	-0.303 **(0.001)***
Occupation	0.298 **(0.001)***	0.199 (**0.015)***	0.237(**0.004**)*	0.312 **(0.001)***
History of trauma	0.008 (0.923)	0.009 (0.909)	0.038 (0.648)	0.001 (0.990)
History of rheumatism	-0.057 (0.488)	-0.104 (0.208)	-0.066 (0.421)	-0.034 (0.676)

BMI, Body mass index, S – Spearman rank correlation. indicates statistically Significant at p<0.05.*

Correlation of Mini-OAKHQOL scales and patient demographic factors reported that height was positively and significantly correlated with all Mini-OAKHQOL scales except the social support scale. Education level positively and significantly correlated with physical activities scale and independent items scale. However, BMI negatively correlated with Mini-OAKHQOL scale, mental health scale, and pain scale; history of rheumatism negatively correlated with the physical activities scale (Table 7).

Table 7. Correlation of Mini-OAKHQOL scales and patient demographic factors

	Correlation Coefficient (p-value)^S						
	Mini-OAKHQOL scale	physical activities scale	Mental health scale	Pain scale	social support scale	social functioning scale	Independent Items scale
Age	-0.043 (0.601)	-0.133 (0.105)	0.030 (0.715)	-0.064 (0.438)	0.116 (0.158)	0.020 (0.808)	-0.137 (0.095)
Weight	-0.083 (0.316)	-0.066 (0.426)	-0.112 (0.172)	-0.152 (0.065)	0.034 (0.677)	0.067 (0.414)	-0.023 (0.784)
Height	0.272 (**0.001)***	0.261 **(0.001)***	0.180 **(0.028)***	0.260 **(0.001)***	0.030 (0.713)	0.262 **(0.001)***	0.202 **(0.013)***
BMI	-0.183 **(0.026)***	-0.161 (0.050)	-0.167 **(0.042)***	-0.252 **(0.002)***	0.019 (0.815)	-0.051 (0.533)	-0.101 (0.219)
Gender	-0.041 (0.621)	-0.020 (0.810)	0.007 (0.937)	-0.073 (0.378)	-0.040 (0.627)	0.035 (0.669)	-0.111 (0.176)
Education Level	0.156 (0.058)	0.188 **(0.022)***	0.089 (0.281)	0.084 (0.306)	-0.081 (0.327)	0.155 (0.059)	0.193 **(0.018)***
Occupation	-0.138 (0.092)	-0.189 **(0.021)***	-0.053 (0.522)	-0.136 (0.098)	0.004 (0.964)	-0.061 (0.456)	-0.222 **(0.006)***
History of trauma	0.070 (0.399)	0.024 (0.767)	0.031 (0.708)	0.100 (0.226)	0.018 (0.832)	0.158 (0.055)	0.028 (0.737)

History of rheumatism	-0.155 (0.059)	-0.229 **(0.005)***	-0.136 (0.099)	-0.115 (0.163)	-0.045 (0.589)	0.004 (0.960)	-0.120 (0.146)

*Abbreviation: BMI, Body mass index; S – Spearman rank correlation, * indicates statistical significance.*

The current study also noted that occupation (p = 0.001) and history of trauma (p = 0.002) were significantly positively correlated with Multisite Pain scales. However, other demographic factors correlations were insignificant with Mini-OAKHQOL scales.

4. Discussion

People with OA are more likely to have comorbidities and lower HRQoL than people without OA (Zhao et al., 2022). There is an increase in the prevalence of OA in the Middle East region (Shamekh et al., 2022) and to the best of our knowledge till date, no study has been conducted in Bahrain to estimate the impact of OA on QoL. Therefore, this study aims to fill the major evidence gap by investigating the impact of OA on QoL in the Kingdom of Bahrain.

In this study patients 'mean ± SD age and BMI was 56.7 ± 11.7 years and 32.7 ± 8.0 respectively. The majority of the patients were female (53.7%). These findings are consistent with Savvari et al., (2023) where the mean (SD) of age and BMI was 70.5 ± 10.2 years and 28.2 ± 4.9 kg/m^2 respectively and the majority of the patients were female (78.7%). A possible explanation for this could be that age, BMI, and physical activity are strongly associated with OA. Women and the elderly are known to be more susceptible to OA due to their thinner cartilage, tendency to varus malalignment, joint instability, and uneven mechanical loading. In women, OA can also be triggered by the steep decline of sex hormone levels in menopause (Shane & Loeser, 2010; Peshkova et al., 2022).

Most of the patients were educated up to Primary/Intermediate/Secondary level (40.3%). Also, the majority of the patients were unemployed (66.4%). This data coincides with several previous data that reported that lower education, lower income level, and non-managerial or no job were associated with a higher prevalence of OA (Kawano et al., 2015; Lee et al., 2021). This could be associated with low education who tend to have more annual occupational activities or repetitive physical labor which may contribute to OA.

The site of the OA was mostly in the knee (87.9%) this data corresponds to the observations of Savvari et al., (2023) (51%) and Zhao et al., (2022) (56.1%). This is due to higher knee adduction moment (KAM) which eventually increases the load on the medial compartment of the knee thus leading to a greater risk of developing OA in the knee (Peshkova et al., 2022).

The majority of our OA patients experienced extreme pain while prostrating in prayer (45.6%) time, sitting (32.2%), and doing heavy domestic duties (30.9%). These findings align with Brown et al., (2023) who reported that OA patients (75%–91%) have mobility issues of crouching, standing, sitting, and getting around at work. Chan, KK, and Chan, LW (2011) also reported that the majority of patients (65%) described the pain as sharp and usually precipitated by knee movement after prolonged inactivity; for example, getting up after sitting still for a long time. The possible rationale for this is the Muslim-majority areas and those who practice Islam pray five times a day, which involves transitioning between heel sitting, prostration, and standing and thus impacts on knee OA (Al-Khlaifat et al., 2020).

The distribution of patient responses regarding comorbidities in this study sheds light on the prevalence of various health conditions among individuals with osteoarthritis. In our study, most of the patients had high lipid levels (45.0%), hypertension (40.3%), and diabetes (30.9%). The study also reported that hypertension, heart disease, other chronic heart diseases, ulcer of gastritis, diabetes (p = 0.021), and rheumatism significantly correlated co-primary comorbidity outcomes with multisite pain rate. These findings slightly aligned with the study conducted by Swain et al., (2020) who reported that hypertension (50%), dyslipidemia (48%), and back pain (33%) were leading chronic conditions among individuals with OA. A study conducted by Leite et al., (2011) concluded that OA patients had a high prevalence of depression (61.3%), metabolic syndrome (54.9%), and its components, which can have an impact on pain and physical function. This could be justified by common risk factors which are shared between OA and other diseases, and the presence of multiple comorbidities may be due to aging (Swain et al., 2020).

As per the current study findings, both Mini-OAKHQoL (Cronbach alpha coefficients ranged from: 0.83 to 0.89) and WOMAC scales (Cronbach alpha coefficients ranged from: 0.85 to 0.96) demonstrated adequate reliability, with very low random measurement error for scale. Similar reliability analysis has been demonstrated in various studies conducted by Tuncay Duruoz et al., (2021) (Cronbach alpha coefficients ranged from 0.676 to 0.927) and

Stuck, et al., (1998) (Cronbach alpha coefficients ranged from 0.81–0.96). In the current study, age positively correlated with physical function scale, while BMI and Occupation positively correlated with all the scales of WOMAC. Similar findings were reported by Zhou G et al., (2023) who concluded that advanced age, overweight or obesity, a moderate-to-heavy manual labor job had significantly higher WOMAC. For the correlation of Mini-OAKHQOL scales and patient demographic factors only height significantly correlated with Mini-OAKHQOL scale, physical activities scale, mental health scale, pain scale, social functioning scale, and independent items scale. Tuncay Duruöz et al., (2021) also reported that subscales of Mini-OAKHQoL did not correlate with some non-QoL parameters such. However, these results should not be interpreted as insufficient validity of the scale, but rather as demonstrating the comprehensiveness and advantages of Mini-OAKHQoL.

The study emphasizes the significant impact of osteoarthritis on people's quality of life as well as the wide range of pain experiences they face. Healthcare professionals and policymakers of Bahrain can implement this information to develop more tailored interventions and public health initiatives to address the multifaceted nature of osteoarthritis and improve the lives of affected individuals. When developing treatment plans, healthcare professionals should be aware of the multifaceted nature of osteoarthritis and consider comorbidities, demographics, and pain distribution. The study's limitations include the study design that limits its ability to establish causal relationships between comorbidities, demographics, and pain, as well as the sample size that may not fully represent the Bahraini population. However, the use of widely accepted and reliable assessment scales, such as the Mini-OAKHQOL and WOMAC scales, strengthens the validity of the study's findings.

5. Conclusion

In conclusion, this study provides valuable insights into the complex relationships between comorbidities, patient demographics, and osteoarthritis-related pain in a Bahraini population. It emphasizes the significant impact of osteoarthritis on individuals' quality of life, physical function, and psychological well-being. Mini-OAKHQoL and WOMAC both have strong reliability and good validity. These instruments are short, practical, completable, and useful to assess the QoL among osteoarthritis patients in Bahrain.

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Data Availability Statement

The data that support the findings of this study are available on request.

Competing Interests Statement

The authors declare that there are no competing or potential conflicts of interest.

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