Research Square

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Evaluation of EQ-5D-5L and WOMAC Instruments in Assessing Health-Related Quality of Life Among Women Over 40 with Knee Osteoarthritis and Obesity

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Research Article

Keywords: Knee-osteoarthritis, Health-related, quality-of-life, EQ-5D-5L, WOMAC, SDG-3, SDG-5, India

Posted Date: September 4th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10798137/v1

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Additional Declarations: No competing interests reported.

Abstract

Introduction: In India, knee osteoarthritis (KOA) is more common in women. Because of their sedentary lives, middle-aged and older women in metropolitan areas have significant reductions in their Health-Related Quality of Life (HRQoL) as a result of KOA.

Objective: The major goal was to evaluate the relationship between obesity and KOA on the health-related quality of life (QoL) of women in Chennai who were over 40 by using generic and disease-specific instruments EQ-5D-5L and WOMAC. This study is based on SDG 3(Target 3.4) and SDG 5(Target 5.6).

Methods: 62 female patients with KOA who had been diagnosed by physicians at the orthopedic outpatient clinic of a tertiary care hospital in the Chennai district's urban region participated in this cross-sectional study. Three tools were employed in this study: the WOMAC scale, the EQ-5D-5L (Descriptive system and EQ-VAS) scale, and the General Information Questionnaire (GIQ).

Results: The mean age of women was 63.32 ± 10.02 years. The WOMAC total mean ± SD was 65.4 ±10.6. Higher scores of the WOMAC indicate worse condition of KOA. The total mean of the EQ-5D-5L description system was 14.87 ± 3.53 and EQ-VAS was 51.46 ± 9.19. Women participants in Obesity class II had a higher rate (76.87%) of suffering in KOA and had poor quality of life.

Conclusion: The study revealed that many variables have a significant negative impact on HRQoL among women patients with KOA. Providing social support and clinical support may be crucial to improve their HRQoL.

Introduction

One prevalent musculoskeletal condition is osteoarthritis. Both the healthcare system and the patients are bearing a great deal of the strain. Osteoarthritis affected around 528 million individuals globally in 2019—a 113% rise since 1990. Sixty percent of those with osteoarthritis are women, and about 73% of those with the condition are older than 55 (1). The condition causes significant pain and functional impairment in the knee, particularly in women. Research has shown that women with knee osteoarthritis (KOA) had a worse survival rate when compared to women in good health. Patients with KOA frequently experience joint discomfort, stiffness, and reduced mobility for self-care (2). In large cities, the overall incidence of primary KOA was 33.2%, whereas in villages, it was 29.2%. In India, the corresponding rates for obesity and abdominal obesity were 13.85% and 57.71%, respectively (5, 6). Few researches have examined the influence of KOA among women patients in India on HRQoL and its factors thus far (7, 8, 9). The purpose of this study was to characterize the relationship between HRQoL, BMI, and KOA among Chennai city women over 40.

Materials And Methods

Participants and study design

This study, which was cross-sectional, was conducted among women patients diagnosed by doctors, with KOA in the orthopedic outpatient clinic of a tertiary care hospital in the urban area of Chennai district, India, between September 2025 to January 2026.

Sample selection: A total of 121 patients were initially assessed for eligibility. Among them, 59 patients were excluded. The **inclusion criteria** were; women patients, aged above 40 years, and clinically doctor-diagnosed patients with KOA. Aged under 41 years, other types of OA, psychiatric disorders, and bilateral total knee replacement were

excluded from the study. After the exclusion process, 62 patients met the eligibility criteria and were enrolled in the study. The proportion of eligible participants was 51.2% (95% CI: 42.3%–60.1%).

Each subject provided verbal agreement to participate in the study after being told about the protocol. Agreed participants were given general information questionnaires, EQ-5D-5L, and WOMAC Index. They had enough time to fill out the questionnaire and ask their questions. The researcher filled the questions, only to the illiterate women (3) participants. For the study, data for only women with > 18.5 kg/m2 were retained for analysis.

Ethical Clearance

The study protocol was approved by the Institutional Scientific Review Board under Saveetha college of Nursing, (007/08/2025/ISRB/SCON) Thandalam, Chennai, India.

Study instrument and valuation process

In this study, three instruments were used. They are 1) the General information questionnaire, 2) the EQ-5D-5L-descriptive system and EQ-VAS, and 3) WOMAC scale. **Instrument 1**: The General Information Questionnaire was used to gather clinical information and sociodemographic details about female patients. The survey contentment included age, marital status, educational status, occupation, height and weight, family income, number of affected joints, duration of the disease, number of comorbidities, and dependent members in the household. An Asia-specific cut-off was used for BMI categorization: underweight (< 18.5 kg/m^2); normal weight (18.5 kg/m^2 ≤24.9 kg/m^2); overweight (25.0 kg/m^2 ≤ 29.9 kg/m^2); obesity class I(30.0 kg/m^2 ≤ 34.9 kg/m^2), and obesity class II (> 34.9 kg/m^2).

Instrument 2: The EQ-5D-5L, which comprises of the EQ visual analog scale (EQ VAS) and the EQ-5D-5L descriptive system, is a widely used tool in 150 languages to assess the health-related quality of life of individuals with chronic conditions. The EuroQol group produced this standardized tool in 2009 (10, 11). a) The EQ-5D-5L descriptive system comprises five dimensions: Mobility, Self-care, Usual activities, Pain/Discomfort, and Anxiety/depression. b) The EQ VAS records the patient's self-rated health on a vertical visual analogue scale where the endpoints are labeled 'The best health you can imagine' and 'The worst health you can imagine'. The score, which varies from 0 to 100, is a record of the patient's self-related health state. The highest scores represent better health status (16).

Instrument 3: The Western Ontario and McMaster Universities Arthritis Index (WOMAC), was created in 1982 and is frequently used to assess hip and knee osteoarthritis (12, 13). It is available in over 65 languages. The self-administered questionnaire has 24 items in total, which are divided into 3 subscales: [1] Physical Function (17 items), [2] Stiffness (2 Items), and [3] Pain (5 Items). The questions are rated from 0 to 4, where 0 represents none, 1 is mild, 2 is moderate, 3 is severe, and 4 represents extreme. Usually, a sum of the scores for all three subscales gives a total WOMAC score. Higher scores on the WOMAC indicate worse pain, stiffness, and functional limitations (14, 15).

Statistical analysis

For the qualitative variables in this study, the researchers employed means and standard deviations, and for the categorical variables, frequencies and percentages. Standard body height and weight measures were used to derive a BMI. The four BMI groups were compared with the socio-economic characteristics of the participants. KOA was evaluated by using the scale WOMAC. Self-reported health-related quality of life of the women evaluated by using EQ-5D-5L Utility score (17). The Association of EQ-5D-5L with socio-demographic factors was evaluated by mean, and standard deviation.

Results

Results revealed that the average age of the participants was 63.32 ± 10.02 years. Table 1 shows that participants were mostly in the age group of 61–80 (59.7%), obesity class I (51.6%), married (51.6%), higher secondary studied (45.2%), unemployed (64.5%) and affected by unilateral knee (59.7%). The average duration of KOA was 5 to 10 years (51.6%). The majority of women patients (32) had two comorbidities with KOA. The average income of the participant's family was one lac. In 50% of Families, 3 to 4 members depend on the participants in household activities. Detailed information is presented in Table 1.

Table 1
Association of Socio-demographic characteristics of women with their Body Mass Index

Variables	Body Mass Index (kg/m^2)				N-62 (%)
	Normal weight	Over weight	Obesity – class I	Obesity – class II	
Age group					
41–60	6(31.6)	6(31.6)	7(36.8)	0(0.0)	19
61–80	0(0.0)	13(35.1)	20(54.1)	4(10.8)	37
> 80	0(0.0)	0(0.0)	5(83.3)	1(16.7)	06
Marital status					
Single	4(57.1)	0(0.0)	3(42.9)	0(0.0)	07
Married	1(3.1)	15(46.9)	16(50.0)	0(0.0)	32
Divorced	1(33.3)	1(33.3)	1(33.4)	0(0.0)	03
Widowed	0(0.0)	3(15.0)	12(60.0)	5(25.0)	20
Educational status					
Illiterate	0(0.0)	0(0.0)	2(66.7)	1(33.3)	03
Primary	1(12.5)	3(37.5)	3(37.5)	1(12.5)	08
Higher sec	3(10.7)	6(21.4)	18(64.3)	1(3.6)	28
Graduate	2(8.7)	10(43.5)	9(39.1)	2(8.7)	23
Occupation					
Employed	5(22.7)	10(45.5)	7(31.8)	0(0.0)	22
Unemployed	(2.5)	9(22.5)	25(62.5)	5(12.5)	40
Affected knees					
Unilateral	4(10.8)	15(40.5)	18(48.7)	0(0.0)	37
Bilateral	2(8.0)	4(16.0)	14(56.0)	5(20.0)	25
Duration of the Disease (Years)					
< 5	6(23.0)	10(38.5)	10(38.5)	0(0.0)	26
5–10	0(0.0)	9(28.1)	18(56.3)	5(15.6)	32
> 10	0(0.0)	0(0.0)	4(100)	0(0.0)	04
Number of comorbidities					
0	1(100)	0(0.0)	0(0.0)	0(0.0)	01
1	5(25.0)	10(50.0)	5(25.0)	0(0.0)	20

Note : Table compiled by the author

Variables	Body Mass Index (kg/m^2)				N-62 (%)
	Normal weight	Over weight	Obesity – class I	Obesity – class II	
Age group					
2	0(0.0)	9(28.1)	19(59.4)	4(12.5)	32
> 2	0(0.0)	0(0.0)	8(88.9)	1(11.1)	09
Family income (Per month - Rs)					
< 50000	4(57.1)	0(0.0)	3(42.9)	0(0.0)	07
50001-1 Lac	2(9.1)	6(27.3)	9(40.9)	5(22.7)	22
> 1Lac-2 Lac	0(0.0)	6(27.3)	16(72.7)	0(0.0)	22
> 2 Lac	0(0.0)	7(63.6)	4(36.4)	0(0.0)	11
Dependent member in household					
0	2(40.0)	1(20.0)	2(40.0)	0(0.0)	05
1–2	3(12.0)	6(24.0)	13(52.0)	3(12.0)	25
3–4	1(3.2)	11(35.5)	17(54.8)	2(6.5)	31
> 4	0(0.0)	1(100)	0(0.0)	0(0.0)	01
Note : Table compiled by the author					

Table 2 shows the scores of 24 items on the WOMAC scale. Out of 5 items in the pain subscale, the highest score was observed in the case of item no, 5 (Standing upright). Out of 2 items in the Stiffness subscale, item no, 6(Awakening in the morning) secured the highest mean value. In the physical activity subscale, items no, 9,16, and 23 secured the highest scores (Ascending stairs, putting on your socks, and performing heavy domestic work). Higher scores on the WOMAC indicate worse condition of KOA. The total mean of WOMAC shows (67.1 scores) for physical disability of women with KOA and obesity. Descriptive statistics were summarized as frequencies, percentages, means, and standard deviations. Where appropriate, 95% confidence intervals were calculated for proportions and mean estimates.

Table 2
Evaluation of Knee Osteoarthritis by using the scales WOMAC

Items	WOMAC Index	Mean	SD
A	**Pain (5 Items – 20 scores)**		
1	Walking on a flat surface	2.3	0.7
2	Going up and down stairs	2.6	0.6
3	Pain disturbs your sleep	2.8	0.8
4	Sitting or lying	2.7	0.6
5	Standing upright	3.0	0.9
	WOMAC Pain Mean ± SD	13.3	2.7
B	**Stiffness (2 Items – 8 scores)**		
6	Awakening in the morning	2.6	0.7
7	Resting in the day	2.4	0.6
	WOMAC Stiffness Mean ± SD	5.0	1.0
C	**Physical activity (17 Items – 68 scores)**		
8	Descending stairs	2.4	0.7
9	Ascending stairs	3.3	0.8
10	Rising from sitting	2.8	0.8
11	Standing	2.6	0.7
12	Bending to the floor	2.7	0.8
13	Walking on flat surface	2.7	0.7
14	Getting in and out of vehicle	2.5	0.9
15	Going shopping	2.5	0.8
16	Putting on your socks	3.0	0.7
17	Rising from the bed	2.7	0.7
18	Taking off your socks	2.7	0.7
19	Lying in bed	2.4	0.8
20	Getting in or out of the bath	2.6	0.7
21	Sitting	2.7	0.6
22	Getting on or off the toilet	2.3	0.8
23	Perform heavy domestic work	3.3	0.9
24	Perform light domestic work	2.8	0.7
	WOMAC Physical activity Mean ± SD	46.1	8.5

Items	WOMAC Index	Mean	SD
A	**Pain (5 Items – 20 scores)**		
	WOMAC Index score:		
	WOMAC Total Mean ± SD	64.4	10.6

Table 3 highlights that the mean of the EQ-5D-5L descriptive system is 14.87 ± 3.53 and EQ VAS is 51.46 ± 9.19. The lower EQ-VAS score indicates the participants' poor health-related quality of life. This closely resembles findings from other research conducted in China, Hungary, the USA, and Spain. The HRQol of female patients with KOA was related to several parameters, which supported the results of the other research. The EQ VAS offers a vivid picture of women patients' inadequate HRQoL. Most participants stated ‘Moderate problem’ with all the dimensions in EQ-5D-5L.

The Table 4 shows the correlation of HRQoL and KAO with the BMI of the participants. Women participants with normal weight have secured a lower percentage of (51.2%) suffering in KOA and have better quality of life scores. Majority of women secured the mean value of 67.15 by WOMAC score. Women participants in Obesity class II have a higher rate (76.87%) of suffering in KOA and have poor quality of life.

Table 3
The women's self-reported health status using the EQ-5D-5L descriptive system

EQ-5D-5L Descriptive system	Mobility (%)	Self-care (%)	Usual activity (%)	Pain/ Discomfort (%)	Anxiety/ Depression (%)
No problem	0 (0.0)	1 (1.6)	2 (3.2)	0 (0.0)	0 (0.0)
Slight problem	17 (27.4)	22 (35.5)	17 (27.4)	19 (30.6)	20 (32.2)
Moderate problem	32 (51.6)	24 (38.7)	30 (48.4)	29 (46.8)	25 (40.3)
Severe problem	10 (16.1)	11 (17.7)	9 (14.5)	11 (17.7)	14 (22.6)
Extreme problem	3 (4.9)	4 (6.5)	4 (6.5)	3 (4.9)	3 (4.9)
Total	62 (100)	62 (100)	62 (100)	62 (100)	62 (100)
Mean	3.0	2.9	2.9	3.0	3.0
SD	0.7	1.4	0.7	0.0	0.7
EQ-5D-5L descriptive system mean ± SD: 14.87 ± 3.53					
EQ (VAS) mean ± SD: 51.46 ± 9.19					

Table 4: Relationship between obesity and knee osteoarthritis in women over 40 and their health-related quality of life

Body Mass Index (BMI)	**N=62**	Level of HRQoL **EQ-5D-5L (Descriptive system) Max score – 20** (Less score shows better quality of life)		Level of suffering by KOA **WOMAC Scale Max score – 96** (Less score shows a low level of suffering)	
		Mean	Percentage	Mean	Percentage
Normal	6	12.66	63.3 %	49.16	51.2%
Overweight	19	13.79	68.95%	62.05	64.63%
Obese class I	32	15.63	78.15%	67.15	69.95%
Obese class II	5	16.80	84.0%	73.80	76.87%

Note: Table compiled by the author.

Discussion

This study investigated the health related QoL of women with KOA and their BMI. KOA imposes a severe burden on women aged above 40 years which limits mobility, and self-care ability and also reduces health-related quality of life (18, 19). The results of this study highlight the association of HRQoL of KOA of women with many factors such as age, educational status, occupation, number of comorbidities, BMI, and dependent members in the household. In this study, only 4.8% of women reported ‘no problem’ in three dimensions, consistent with previous studies (20, 21). Particularly, women with KOA had greater problems with self-care, pain/Discomfort, and depression.

The associations between the BMI, WOMAC scale, EQ-VAS score, and EQ-5D-5L descriptive system of women patients with KOA were found in the study's results. Numerous researches examine the connection between patients' obesity and HRQoL (22). Compared to women of normal weight, obese women in this study had considerably lower EQ-5D-5L scores. Therefore, women patients with KOA must focus on physical activities and a balanced diet (14). Furthermore, this study found that the pain scores (WOMAC) and BMI level were strongly correlated with HRQoL scores (EQ-5D-5L) of women patients with KOA.

The findings are consistent with previous Indian studies that reported a significant decline in quality of life among women with knee osteoarthritis. An Indian study evaluating HRQoL using the EQ-5D-5L found that pain/discomfort was the most frequently reported problem and that quality of life decreased with increasing age and comorbidities. Women generally reported poorer health states than men, highlighting the vulnerability of middle-aged and older women to functional disability and reduced well-being.

In a nutshell, the findings demonstrate that both EQ-5D-5L and WOMAC are valuable tools for assessing health-related quality of life among women with KOA and obesity. While WOMAC offers greater detail regarding osteoarthritis-specific symptoms and functional limitations, EQ-5D-5L provides a broader assessment of overall health status. The complementary strengths of these instruments support their use in both clinical practice and research aimed at improving the quality of life of women affected by KOA and obesity.

Conclusion

The 5-level EQ-5D-5L was introduced by the Euro Qol Group in 2009 to improve the instrument's sensitivity as compared to the EQ-5D-3L. The Indian EQ-5D-5L value set has been used in this study for Indian population. This study was based on a small number of participants and limited information was available. Further research is recommended to this particular group of patients. This study revealed that the level of obesity directly associated with some socio-demographic factors and clinical factors of KOA. High physical activity level was associated with better BMI and contributed to better quality of life of women patients with KOA.

Declarations

Acknowledgement: Authors would like to thank all the women participants and clinical team for their valuable time and support.

Conflict of interest: All authors declare no conflict of interest.

Funding Declaration: There was no Funding to this article.

Clinical Trial Number: Not applicable.

Declarations

Data availability statement: The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Ethical approval & Accordance: The study was conducted in-accordance with university grands commissions (UGC), India guidelines and regulations followed in the study. The study protocol was approved by the Institutional Scientific Review Board under Saveetha college of Nursing, (007/08/2025/ISRB/SCON) Thandalam, Chennai, India.

Consent to participate: Detailed procedure was clearly explained to the participant by providing information sheet and verbal informed consent was taken from all the participants.

Consent to publish: All authors of this article declare the acceptance to publish this article.

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Figures

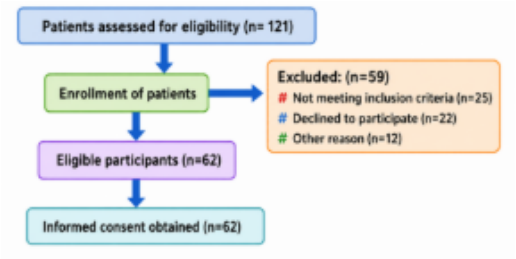

Figure 1

Unnumbered image in the Materials & Methods section.