

Original Research Article

Gender-based analysis of WOMAC scores in moderate and advanced knee osteoarthritis: evaluating pain, stiffness and functional impairment

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ABSTRACT

Background: Knee osteoarthritis (KOA) significantly impacts mobility and quality of life, with key issues being pain, stiffness, and functional restrictions. With possible differences in the course of the disease and the intensity of symptoms, gender differences in OA symptoms are still uncertain. Using the Western Ontario and McMaster Universities Arthritis Index (WOMAC), this study examined gender-based variations in the burden of OA symptoms between KL grade 2 and KL grade 3 KOA.

Methods: According to the EULAR classification, 108 patients with KOA were included in the study. Male and female patients with knee OA underwent WOMAC scores for pain, stiffness, function, and overall discomfort examined. Statistical significance was evaluated using 95% CI, mean differences, and independent t-tests. A p value of less than 0.05 has been considered significant.

Results: Across all WOMAC domains, no statistically significant gender differences were discovered, and all comparisons had p values greater than 0.05. In KL grade II, males scored slightly higher on pain and stiffness, but in KL grade III, these differences decreased. In both grades, the functional and total WOMAC scores were similar for both genders.

Conclusions: The results show that among those with knee OA, there are no appreciable differences in symptom load by gender. This highlights the necessity of tailored treatment plans as opposed to gender-specific approaches. Other factors affecting OA outcomes, such as biomechanics, hormonal effects, and lifestyle factors, should be investigated further.

Keywords: Osteoarthritis, Quality of life, WOMAC

INTRODUCTION

Knee osteoarthritis (OA) is a chronic and debilitating disorder that affects millions globally, significantly limiting mobility and quality of life.¹ A validated instrument for assessing pain, stiffness, and functional limitations in patients with osteoarthritis is the Western Ontario and McMaster Universities Arthritis Index (WOMAC).^{2,3} Research on gender affects symptom perception and disease burden is ongoing since it may help inform individualized treatment strategies.^{4,5} In this study, people with Kellgren-Lawrence (K/L) grades II

and III knee OA are evaluated for gender differences in their WOMAC scores (modified CRD Pune version) for pain, stiffness, function, and total score.

Aims and objective

The study aimed to determine whether gender significantly influences the symptomatic experience of knee OA; the study compares the pain, stiffness, function, and overall WOMAC scores of males and females. The results could help create more individualized treatment plans and advance knowledge of gender-based

differences in OA. The objective was to evaluate how gender differs in KOA symptoms using the WOMAC for various Kellgren-Lawrence (K/L) grades (K/L 2 and K/L 3).

METHODS

This cross-sectional study was conducted between March 2024- January 2025 after getting approved by the Institutional Ethics Committee. The study was conducted on 108 individuals, both men and women, aged 45 to 70 years, diagnosed with K/L grade 2 and K/L grade 3 knee osteoarthritis in the department of orthopedics at AIIMS Rishikesh's tertiary care centre. Pain, stiffness, function, and total score were used to assess WOMAC scores on 1, 2, or 3 intensities. Karnofsky's performance scores, ranging from 80 to 90%, were included in the study based on the inclusion criteria. Exclusion criteria included assisted ambulation devices- patients prescribed footwear modifications or intraarticular injections during the last three months. Gender-based differences were evaluated using mean values, standard deviations (SD), t-values, mean differences, 95% confidence intervals, and p values (p values <0.05 were considered significant).

Statistical analysis

SPSS version 21 software compared WOMAC scores for pain, stiffness, function, and total scores in males and females with KOA (K/L grades II and III). Score distributions were described using descriptive statistics such as mean and standard deviation. Gender-based differences were tested using independent t-tests, and effect sizes were quantified using mean differences and

95% CI. A p value <0.05 indicated statistical significance. The study evaluated whether gender significantly influenced OA symptom severity across disease stages.

RESULTS

The study reported a significant difference between the groups ($p < 0.05$); the mean age was 55.92 ± 0.8 . However, there were no significant differences (p value 0.20) in the mean BMI of 27.24 ± 0.4 and neither in gender difference found in WOMAC pain, stiffness, function, or total scores among patients with K/L grades II and III knee OA. In the pain sub-score, males scored slightly higher than females in K/L II (mean difference: 1.84, $p = 0.1028$), although this discrepancy decreased in K/L III (mean difference: 0.39, $p = 0.6408$).

Table 1: Demographics including K/L grades.

Variables	Mean $\pm$ SD	P value
Age in years	55.92 $\pm$ 0.8	<0.05
BMI	27.24 $\pm$ 0.4	0.20
Kl grade (%)		
II	39 (36.1)	0.869
III	62 (57.4)	

Males had slightly higher stiffness ratings for K/L II (mean functional limitation scores showed minor differences between genders in both grades, with mean differences near zero (K/L II: 0.03, $p = 0.9912$; K/L III: -0.25, $p = 0.8938$). Similarly, total WOMAC scores showed slight gender differences, although none were statistically significant (K/L II: mean difference 2.38, $p = 0.5273$; K/L III: mean difference 0.34, $p = 0.9006$).

Table 2: Differences in KOA K/L grade between genders.

WOMAC	K/L grade	Male (mean $\pm$ SD)	Female (mean $\pm$ SD)	t	Mean difference	95% CI	P value
Pain	II	6.13 $\pm$ 4.69	4.29 $\pm$ 2.81	1.66	1.84	-0.39 to 4.07	0.10
	III	4.6 $\pm$ 2.64	4.21 $\pm$ 3.19	0.46	0.39	-1.26 to 2.03	0.64
Stiffness	II	2.8 $\pm$ 1.52	2.29 $\pm$ 1.19	1.24	0.51	-0.32 to 1.34	0.22
	III	4.6 $\pm$ 2.64	4.21 $\pm$ 3.19	0.46	0.39	-1.26 to 2.03	0.64
Functionality	II	21.93 $\pm$ 9.91	21.9 $\pm$ 7.94	0.01	0.03	-5.43 to 5.49	0.99
	III	22.25 $\pm$ 5.48	22.5 $\pm$ 7.42	0.13	-0.25	-3.9 to 3.48	0.89
Total	II	30.87 $\pm$ 14.51	28.5 $\pm$ 10.45	06.63	2.38	-5.15 to 9.92	0.52
	III	29.7 $\pm$ 8.35	29.4 $\pm$ 10.77	0.12	0.34	-5.13 to 5.81	0.90

DISCUSSION

The results of this study are consistent with previous research, which found no significant gender differences in the burden of knee osteoarthritis as determined by WOMAC scores. Studies have revealed equivalent pain and functional limits between genders in OA, implying that while males and females may experience KOA differently in the early stages, these differences lessen as

the disease advances.^{6,7} In this study, males had higher pain and stiffness scores in K/L grade 2, but these differences were not statistically significant and almost equal in K/L grade 3. This could indicate that disease severity overshadows gender-specific variances.

The lack of substantial variations in functional scores was consistent with previous research in which it was found that functional restrictions are predominantly driven by

BMI, age, and comorbidities rather than gender. Similarly, the comparable total WOMAC scores across genders demonstrate the multifaceted character of OA symptomatology, which may involve psychosocial and cultural effects.⁸⁻¹⁰

Notably, earlier research has revealed that hormonal changes, particularly in postmenopausal women, may contribute to OA symptom severity.^{11,12} However, the outcomes of this study suggest that such hormonal impacts may not result in significant variations in WOMAC scores, especially in moderate to severe OA stages. Furthermore, the study's lack of significance could be attributed to sample size limits or unmeasured characteristics like coping mechanisms or access to healthcare.

Clinically, these findings highlight the necessity of looking beyond gender as a primary factor for diagnosing and managing knee osteoarthritis. Instead, personalized techniques focusing on each patient's specific qualities and needs may produce superior results. Further research with larger cohorts and more robust designs is recommended to corroborate these findings.

The limited sample size in this study may impact its statistical power. It focuses only on K/L grades 2 and 3, limiting its relevance to other OA stages. Important biomechanical characteristics such as muscle strength, joint alignment, and gait mechanics were neglected, and self-reported WOMAC values may have contributed to subjective bias. Furthermore, the cross-sectional design prevents the assessment of symptom progression. Future studies should use larger samples, longitudinal data, and more clinical parameters for a more complete review.

CONCLUSION

This study found no significant gender differences in WOMAC pain, stiffness, function, or total scores among patients with intermediate to advanced knee osteoarthritis. These findings encourage the implementation of gender-neutral treatment modalities while emphasizing the significance of customized treatment based on individual symptomatology. Further research is needed to investigate other factors influencing gender discrepancies in OA outcomes.

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