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## Original Article

# Gender Comparison of Severity of Pain, Stiffness, and Functional Limitation Among Second Stage Knee Osteoarthritis Patients with Diabetes

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## ABSTRACT

Osteoarthritis (OA) and diabetes mellitus (DM) are two medical conditions that frequently exist together and cause poor consequences. OA is described as joint pain and is one of the main reasons for impairment. Diabetes is high levels of glucose in blood because of disruption in insulin metabolism. **Objective:** To compare gender variations of severity of pain, stiffness and difficulty in functional performance among patients of second stage knee OA with diabetes.

**Methods:** Data were collected from 360 individuals with mean age  $52.32 \pm 4.989$  years for males and  $50.73 \pm 4.763$  years for females. Individuals with definite osteophytes in knee joint and clinically diagnosed DM were included in the study. The severity of stiffness and functional limitation was calculated using WOMAC questionnaire. **Results:** The mean of pain score was  $9.0833 \pm 3.04322$ , stiffness score was  $4.3389 \pm 1.12446$  and the mean of physical function score was  $34.0944 \pm 8.65135$ . Overall, 109 patients had less severe symptoms while 71 had more severe symptoms. Among 180 female participants, n=15 had mild, n=139 had moderate and n=26 had severe pain on NPRS. The mean of the pain score was  $9.8778 \pm 2.90762$ . The mean of stiffness score was  $4.5167 \pm 1.28365$  and the mean of physical function score was  $37.1611 \pm 7.98963$ .

**Conclusion:** Our findings concluded that the gender difference of severity of pain and physical function limitation was statistically significant, but no significant difference was found in severity of stiffness. Also, females with diabetes had more severe symptoms than males with diabetes.

## INTRODUCTION

Osteoarthritis (OA) is a long-standing disorder of the joints, in which there is wear down of the bone and joint cartilage. In the aged population worldwide, it is the most frequent type of joint disease with huge problems for fitness and day-to-day activities. Pain, stiffness, weakness, and considerable impairment are symptoms of OA. It affects an

individual's overall health and causes problems for people with carrying out daily activities like walking, scrooching, and climbing stairs. According to literature, 10-20% of the older population is affected by osteoarthritis with the incidence increasing continuously. Females and older humans are affected more frequently than men with the

age of 45–65. According to a study, osteoarthritis of the knee is more frequent than hip OA. Generally, 14.7% of female and 10.5% of male population are affected by knee OA. It is hastily becoming a substantial medical and economic burden to the world [1]. The actual reason of OA is not known but the disease is considered to have several imbricating conditions which may be the result of different factors like family history, age, metabolic elements, physical elements, and environmental elements [2]. According to American College of Rheumatology, knee osteoarthritis is a group of disorders that causes joint inflammation due to changes in articular cartilage and bone [3]. 7% of males and 11% of females are affected by KOA. Trauma, malnutrition, knee bending for long periods of time, and ligamentous damage are the most important causes of knee OA among young adults of age 25–35 while bilateral knee OA is mainly caused by obesity [4]. Advancing age, increased weight, increased blood pressure, high blood glucose, female sex, history of knee injury, compromised strength of quadriceps muscle, and increased physical burden are the risk factors of knee OA [5]. Knee osteoarthritis (KOA) is a chronic, devolutionating disorder that advances with age. It is a progressive disorder that causes pain and limits functional activities. Persistent systemic inflammation occurs due to increased blood glucose levels that results in changes of body organs along with joints. Another outcome of high blood glucose is the formation of advanced glycation end products (AGE) that causes amplification of cartilage stiffness and bone delicacy by accumulating anywhere in the body [6]. Systemic inflammation can cause persistent conditions like diabetes that is linked up with outcomes which promote inflammation and degradation [7]. Diabetes is an independent risk factor for OA prevalence and progression. Proof is increasing on the affiliation of type II diabetes mellitus with osteoarthritis [8]. The purpose of the current study was to compare the gender differences in severity of pain, stiffness and functional limitation among second stage knee osteoarthritic patients with diabetes. We hypothesized that significant difference of severity of pain, stiffness and functional limitation would be found between both genders in second stage of KOA with diabetes.

## METHODS

The data were collected from 360 patients, 180 males and 180 females of second stage knee osteoarthritis and clinically diagnosed diabetes from Sadiq Physiotherapy Clinic, Minhaj Physiotherapy Clinic, Services Hospital, Ganga Ram Hospital, Ghurki Trust Teaching Hospital and Sheikh Zayed Hospital. The sample size was calculated using online software named RaoSoft with 95% CI and 5% margin of error. Approval from the ethical committee of the

hospital and to conduct this study was obtained. Before taking the data, written consent was taken from the patients. The whole procedure was explained to the participants. Inclusion criteria were patients aged from 45–62 years, Diabetic patients who were clinically diagnosed and KOA. Patients were excluded if they had Knee injections or Lower limb surgery in the past 6 months. The western ontario and mcmaster universities arthritis index (WOMAC) was used to measure the severity of pain, stiffness, and functional limitation in second stage KOA patients with diabetes. WOMAC has a total score range of 0 to 96 where 0 is the best health status while 96 is the worst health status. For the better understanding of the scoring and for better division of results, we took the mean of WOMAC total scoring which was 48. So, the scores ranging from 0–48 were considered good health status and scores ranging from 49–96 were considered poor health status which meant the patients scoring more than 48 were considered to have increased pain, stiffness and functional limitation [9]. Data were entered and analyzed by SPSS 25.0. All the quantitative variables were presented by mean  $\pm$  SD and qualitative with frequency and percentages, Independent sample t-test was applied to see the gender-based difference among study variables. p-value < 0.05 was considered as significant.

## RESULTS

Among 360 total participants, the mean age of male participants (n=180) was  $52.32 \pm 4.989$  years. The mean age of female participants (n=180) was  $50.73 \pm 4.763$  years. The minimum age was 45 years while maximum age was 62 years for both genders. n=180 (50%) were males and n=180 (50%) were females. Mean duration of diabetes was  $9.99 \pm 7.299$  years for male participants and  $7.22 \pm 5.109$  years for female participants. Minimum duration was 1 year for both genders while maximum duration was 32 years for male participants and 29 years for female participants as shown in the table 1.

Variables	Male	Female
Age (Mean $\pm$ SD/Range)	$52.32 \pm 4.98$ (45-62)	$50.73 \pm 4.763$ (45-62)
Diabetes Mellitus	$9.99 \pm 7.299$	$7.22 \pm 5.109$

**Table 1:** Descriptive Statistics for Age and diabetes mellitus (Years)

Among 180 male participants, n=13 (7.2%) had mild, n=152 (84.4%) had moderate and n=15 (8.3%) had severe pain. The mean of pain score was  $9.0833 \pm 3.04322$ . The minimum pain score was 3 while maximum score was 16 out of 20. The mean stiffness score was  $4.3389 \pm 1.12446$ . The minimum stiffness score was 2 while maximum score was 7 out of 8. The mean of physical function score was  $34.0944 \pm 8.65135$ . The minimum physical function score was 17 while maximum score was 58 out of 68. Among 180 female

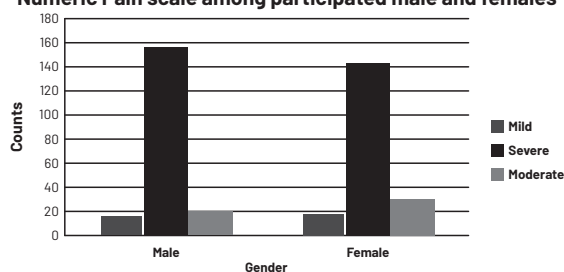
participants, n=15 (8.3%) had mild, n=139 (77.2%) had moderate and n=26 (14.4%) had severe pain. The mean of the pain score was  $9.8778 \pm 2.90762$ . The minimum pain score was 3 while maximum score was 17 out of 20. The mean of stiffness score was  $4.5167 \pm 1.28365$ . The minimum stiffness score was 0 while maximum score was 8 out of 8. The mean of physical function score was  $37.1611 \pm 7.98963$ . The minimum physical function score was 21 while maximum score was 58 out of 68. There was significant difference among pain and functional outcome among gender (p-value < 0.05) as shown in table 2.

Variables	Male	Female	p-value
Pain (Mean $\pm$ SD /Range)	9.08 $\pm$ 3.04 (3-16)	9.877 $\pm$ 2.90 (3-17)	0.003
Total stiffness	4.33 $\pm$ 1.12 (2-7)	4.51 $\pm$ 1.2 (0-8)	0.14
Severity of Functional limitation	34.09 $\pm$ 8.65 (17-58)	37.16 $\pm$ 7.98 (21-58)	0.000

**Table 2:** Gender-based difference in Pain Stiffness and Severity of functional Limitations

Among 180 male participants, n=13 (7.2%) had mild, n=152 (84.4%) had moderate and n=15 (8.3%) had severe pain. Among 180 female participants, n=15 (8.3%) had mild, n=139 (77.2%) had moderate and n=26 (14.4%) had severe pain (Figure 1).

**Numeric Pain scale among participated male and females**



**Figure 1:** Numeric pain rating scale (NPRS) among both genders

## DISCUSSION

The incidence of co-morbidities in patients was investigated with end-stage KOA and their effects on pain and physical function. Stair-climbing test (SCT), 6-minute walk test (6MWT), timed Up and Go (TUG) test, gait analysis and WOMAC was used for physical function examination. Pain was measured using VAS. Their results confirmed associations of comorbidities with higher WOMAC pain scores, physical functions, and QOL in patients with end-stage knee OA. Patients with degenerative bone disease had significantly higher WOMAC pain score (p=.017) and lower gait speed (p=.031) than those without. Patients with diabetes had significantly higher scores for SCT ascent (p=.033) than those without, and patients with hypertension had significantly lower scores for the 6MWT (p=.037) than those without [9]. Likewise, our study investigated the effects of diabetes on pain, stiffness and

physical function in patients with second stage knee osteoarthritis. WOMAC index and NPRS was used for measuring pain, stiffness and physical function score. One-way Anova was applied to find the differences between both genders. The difference of total pain score was statistically significant with (p=.012). The difference of total stiffness score was statistically non-significant with (p=.163) and the difference of total physical function score was statistically significant with (p=.001) between both genders. A previous study by Wen et al., investigated the gender variations of knee pain severity and its distribution in diabetic vs non-diabetic patients with advanced stage osteoarthritis. They also investigated the effects of diabetes medicine on these factors. They had total 489 subjects with 30% males and 28% females (p=0.03). Among 188 male participants and 301 female participants, mean of NPRS score was  $7.5 \pm 0.17$  and  $7.9 \pm 0.13$  with p=0.04. Conclusion of the study was that males with diabetes had more severe joint pain and took more medication for pain than males without diabetes [10]. The current study aimed at comparing the gender differences of severity of pain, stiffness, and functional limitation between second stage knee osteoarthritic patients with diabetes which was not previously researched. Our total participants were 360 out of which 50% were males and 50% were females. Among 180 male participants, 7.2% had mild, 84.4% had moderate and 8.3% had severe pain. Among 180 female participants, 8.3% had mild, 77.2% had moderate and 14.4% had severe pain. Our study concluded that diabetic females had more severe knee osteoarthritis symptoms as compared to diabetic males [11]. Comorbidities including diabetes mellitus (DM) must be investigated in patients with OA to determine who is at higher risk for experiencing pain and numerous joint distributions and who would benefit most from preventative measures. Increasing data suggests that those with OA and DM have more severe pain [12-14]. Higher pain severity in those with knee OA who also have DM may be explained by the fact that people with DM tend to have more systemic inflammation than those without DM [15]. Those with diabetes and advanced knee OA have been shown to have a greater concentration of inflammatory markers including interleukin-6 (IL-6) in their synovial fluid, as well as higher synovitis scores [16]. Previous research by Schett et al., however, focused on patients with advanced, severe OA who were slated to have arthroplasty [12]. Recent research by Alenazi et al., has shown that elevated levels of the blood sugar marker hemoglobin A1c are associated with higher pain severity in patients with localized OA, even when medicines are taken into account [17]. Previous studies by Frilander et al., tended to ignore the effects of other metabolic illnesses, such as DM, and instead concentrated on one aspect of metabolic

syndrome, such as obesity and its association with unilateral or bilateral knee pain [18]. A previous cross-sectional study by Majjad *et al.*, investigated the association between diabetes and msk disorders. A total of 376 subjects with type I and type II diabetes mellitus were included. The mean age of participants was 54 years, ranging from 45–62 years. The mean duration of diabetes was 8 years with minimum 4 years and maximum 13 years duration [19]. Similarly, the current study compared the effects of diabetes on knee osteoarthritis symptoms between both genders. 360 diabetic participants were included with mean age  $52.32 \pm 4.989$  and  $50.73 \pm 4.763$  years for male and female patients, respectively. The mean of diabetes duration for males was 9.99 (7.299) years and it was 7.22 (5.109) years for females [20].

## CONCLUSIONS

There was statistically significant gender difference of severity of pain and physical function limitation, but no significant difference was found in severity of stiffness between both genders. The study also concluded that females with diabetes had more severe symptoms of knee osteoarthritis as compared to males with diabetes.

## Conflicts of Interest

The authors declare no conflict of interest

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