Original Article

Comparison of Functional Performance in Knee Osteoarthritis Patient with Diabetes Mellitus and Without Diabetes Mellitus-A Comparative Study

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Abstract

Background: The presence of Diabetes Mellitus is associated with a worsening of knee pain and greater physical and mental issues in Osteoarthritis patients. The pain in the patients with knee Osteoarthritis leads to functional limitations. It has been proved that the patient with diabetes mellitus demonstrate the higher intensity of pain.

Aim: The aim of the study to compare of functional performance in knee osteoarthritis patients with diabetes mellitus and without diabetes mellitus

Settings and Design: A cross-sectional study (comparative study) was conducted at tertiary care hospital.

Subjects and Methods: The present study included 50 patients 25 in each group. The patients were grouped into 2 groups. Group A included patients with Diabetes Mellitus and Knee Osteoarthritis and group B included Knee Osteoarthritis patients without Diabetes Mellitus. To assess the functional limitation **Western Ontario and McMaster Osteoarthritis Index** (WOMAC), and **Time Up Go** (TUG) test was used. ACR criteria was used to diagnose Osteoarthritis. The patients of 40-55 age group and Grade 2 Osteoarthritis were included in the present study, patients with knee surgery and history of trauma were excluded.

Statistical Analysis Used: The data was analyzed using a Graph-pad version 3.06.Appropriate test of statistical significance was applied test (for normally distributed) and **Mann whitney** (for not normally distributed)

Results: The mean NPRS Was Group -A was 6.560 ($\pm$1.261) and Group -B was 6.560 ($\pm$1.466).Therewas nosignificance difference in the WOMAC score between the two groups. The mean of TUG test was group -A 18.48($\pm$2.220) and group -B was 18.96($\pm$2.791) there was no significant difference between two groups (p- >0.527)

Conclusions: The present study concludes that though the NPRS and functional limitation is greater in Knee Osteoarthritispatients with Diabetes Mellituswhen compared to patient with Knee Osteoarthritis patients without Diabetes Mellitus but the difference is not statistically significant.

Keywords: Diabetes Mellitus, WOMAC, TUG, Knee Osteoarthritis.

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Introduction

The most common and incapacitating joint disease in adults is osteoarthritis (OA) [1]. The chronic metabolic disease known as diabetes mellitus is typified by hyperglycemia,the two broad etiopathogenetic categories of type 1 and type 2 DM, Type 1 DM is due to an absolute lack of insulin and has an autoimmune basis. An immune mediated destruction of β cells is the hallmark of the disorder, and hyperglycemia only ensues when ~ 90% of β cells are lost. Type 2 DM is the commonest form of diabetes and accounts for ~ 90–95% of cases. The Type is commonly found in Diabetes is linked to more severe OA and is a risk factor for the disease. Osteoarthritis (OA) and diabetes mellitus (DM) are both common and progressive disorders with rising incidence [1,2]. OA is the leading cause of chronic disability in the field of musculoskeletal diseases and the primary cause of disability in the elderly [3]. The main characteristics of OA, gradual irreversible loss of articular cartilage accompanied by degeneration of other joint tissues, interfere with quality of life [4] and result in pain and motion restriction. DM is a metabolic disorder characterized by high blood glucose levels that originates either from peripheral insulin resistance with subsequent failure of the pancreatic β-cell to adequately compensate for the insulin resistance (type 2) [5] or the T-cell mediated destruction of insulin-producing cells in the pancreas (type 1) [6]. The incidence and prevalence of the more common DM type (DM type 2) has nearly doubled within the last two decades [7], and its presence is reported in a high proportion of knee OA cases[8,9]. Both diseases share many risk factors [10,11], which may explain the increased prevalence of musculoskeletal diseases in diabetics [12] however, the underlying pathophysiology and biologic relationship between these two diseases is not yet completely understood.

Subjects and Methods

A comparative study was conducted involving a total of 50 individuals, divided into two equal groups of 25 participants each. Group A consisted of patients diagnosed with both Diabetes Mellitus and Knee Osteoarthritis, while Group B included patients with Knee Osteoarthritis but without Diabetes Mellitus. The study included patients between the ages of 40 and 55 years who had been clinically diagnosed with knee osteoarthritis. All participants were selected based on the American College of Rheumatology (ACR) classification criteria. Group A included individuals who had been diagnosed with Diabetes Mellitus for at least two years and had a random blood sugar level greater than 126 mg/dL. Group B consisted of patients with Grade 2 knee osteoarthritis who did not have Diabetes Mellitus and had a random blood sugar level less than 100 mg/dL.

Participants who were able to walk independently without the use of assistive devices were considered for inclusion in the study. Individuals with a history of cardiovascular, neurological, or other orthopedic conditions that could affect functional performance were excluded. Additionally, patients who had undergone previous knee surgery, those who had received injectable steroids for knee pain within the past three months, or those who used assistive devices for walking were not included in the study. Ethical approval for the study was obtained from the research committee at Dr.VithalraoVikhePatil College of Physiotherapy.

The study was conducted over a period of six months. Demographic data of all participants were recorded. Each participant was provided with a detailed explanation of the assessment tools used in the study, including the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) questionnaire and the Timed Up and Go (TUG) test. Participants completed the WOMAC questionnaire, which assessed pain, stiffness, and physical function related to knee osteoarthritis. The TUG test was used to evaluate functional mobility, and the average time taken by each participant to complete the test was documented for analysis.

Figure 1: WOMAC SCALE DATA COLLECTION

Figure 2: TUG test (Starting Position)

Figure 3: TUG

Results

The mean Numeric Pain Rating Scale (NPRS) score for Group A was 6.56 (±1.261), and for Group B, it was 6.56 (±1.466). There was no statistically significant difference between the two groups, with a p-value of 0.9689. The mean WOMAC score for Group A was 47.16 (±15.762), while for Group B, it was 48.8 (±8.13). This difference was also not statistically significant, with a p-value greater than 0.527. For the Timed Up and Go (TUG) test, the mean time recorded for Group A was 18.48 seconds (±2.220), and for Group B, it was 18.96 seconds (±2.791). Again, the difference between the two groups was not statistically significant, with a p-value greater than 0.527.

Table 1. Pain Assessment (NPRS) of Group A and B

NPRS	Mean (SD)	Median	Mann whitney test 'U'	P value
Group-A	6.560(±1.446)	7	310	0.9689
Group-B	6.560 (±1.261)	7		

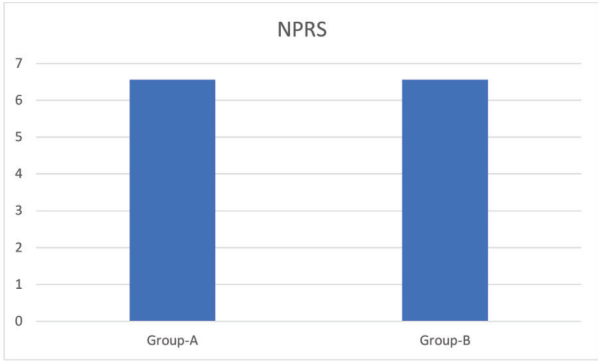


Table 2. Physical Function Assessment (WOMAC) of Group A and B

Womac	Mean (SD)	Median	Mann whitney test	P value
Group-A	47.16(±15.762)	47	293	0.527
Group-B	48.8(±8.813)	49		

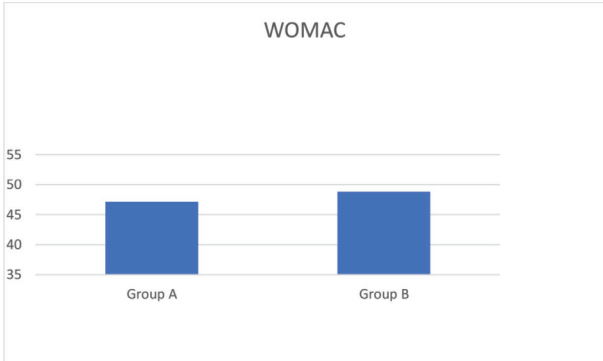
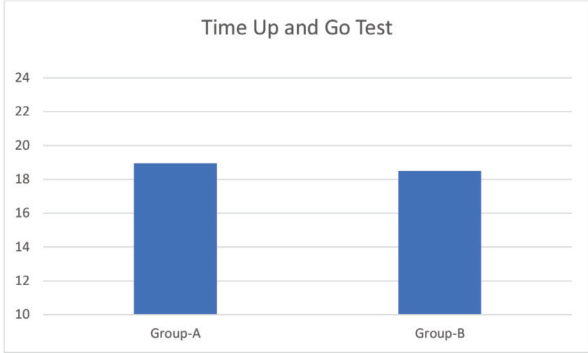


Table 3: Balance Assessment (TUG) of all Group A and Group B

TUG	Mean (SD)	Median	Mann whitney test	P value
Group-A	18.96(±2.791)	19	293	0.527
Group-B	18.48(±2.220)	19		



Discussion

The present study evaluated the functional performance of patients with knee Osteoarthritis. The Knee Osteoarthritis patients were divided into 2 groups. Group A included Knee Osteoarthritis patients with Diabetes mellitus and Group included Knee Osteoarthritis patients without Diabetes mellitus. The mean age of group A patients was 50.92 and of group B was 51.24. In group A 20% were male and 80% were female, in group B 40 % were male and 60 % were female. The mean BMI of group A was 25.084 ± 3.23 and of group B was 24.092 ± 2.33.

We aimed to compare the functional performance of the diabetic and non-diabetic knee Osteoarthritis patients. **WOMAC** and **TIME UP GO TEST** was used to assess the functional performance**.** The mean WOMAC of Group A was 47.16 ±15.77 and of Group B was. 48.8 ± 8.813 this demonstrates that functional performance of knee patients without diabetes mellitus is greater. The difference between the functional performance between the two groups was not found to be statistically significant with a p value of 0.527. In the previous study by Shi Ruiet. al. the muscle strength and balance was compared between the Diabetes mellitus and non- Diabetes mellitus knee Osteoarthritis patients, they found that Knee osteoarthritis had a significantly different physical and psychosocial profile in com parison with groups with diabetes or knee osteoarthritis alone [2]. Louati et al. (2015) also reported a strong association between Diabetes mellitus and Osteoarthritis severity, supporting the idea that diabetic patients may experience greater functional impairment.[5] The finding of the present study is Contrary to previous, the studies as the present study revealed **no statistically significant difference** in functional performance between the two groups.

NPRS of groups A was 6.560 1±47 whereas of group was 6.560 1±27. There was no difference between the two groups.

TIME UP GO TEST is most extensively used to assess functional performance and balance in elderly knee Osteoarthritis patients. In current study the mean TIME UP GOTEST of Group A was 18.48 ± 2.220 and of group B was 18.96 ± 2.79. There was no difference in the TIME UP GO TEST of both the groups with a p value of 0.627. The study done Elboim-Gabyzon et al.in 2012 that Diabetes mellitus contributes to peripheral neuropathy and muscle weakness, which may impair balance and gait [8]. This finding is similar to other study by Debi R, Mor A they found that diabetic patients have increased time of TIME UP GO TEST test results showed a slight increase in time for diabetic patients compared to non-diabetic patients [10]. Debi et al. 2012 also found that metabolic factors in Diabetes mellitus could lead to altered biomechanics, further worsening mobility in Osteoarthritis patients. The result of the previous studies are contrary to finding of the present study.

These findings suggest that the presence of diabetes may not necessarily worsen self-reported symptoms or physical mobility in individuals with Knee Osteoarthritis,

First, it is possible that the diabetes in the sample was relatively well-controlled, thereby minimizing its potential impact on physical performance. Poor glycemic control and long-term complications such as peripheral neuropathy, muscle weakness, and reduced proprioception are known to influence mobility and joint health. In the present majority of patients were on oral medication, no patients were of uncontrolled Diabetes mellitus this can influence the performance.

Second, both groups in this study may have had comparable levels of physical inactivity, joint degeneration, or pain coping strategies, leading to similar WOMAC and TIME UP GO TEST scores regardless of diabetic status. It is also worth considering that other factors such as BMI, age, and overall physical function may have had a stronger influence on functional outcomes than diabetes alone, potentially overshadowing any isolated effect of the condition.

The findings of this study are in contrast with some previous reports that have demonstrated poorer functional outcomes in Knee Osteoarthritis

patients with comorbid diabetes. However, other studies have also failed to find significant differences, suggesting that the relationship between diabetes and functional performance in Osteoarthritis may be more complex and influenced by multiple interacting variables.

Limitation

The sample size was smaller. Diabetes-related variables such as duration of disease, glycaemic control, and presence of complications were not assessed. Other confounding factors like physical activity levels, medication use, and psychosocial factors were not controlled.

Conclusion

The present study concludes that though the NPRS and functional limitation is greater in Knee Osteoarthritispatients with Diabetes Mellituswhen compared to patient with Knee Osteoarthritis patients without Diabetes Mellitus but the difference is not statistically significant.

Ethical Clearence: Ethicalcommittee(institutional ethics committee college of physiotherapy Ahilyanagar) approval was obtained on 21/10/2024 (Reference no:625). Written informed consent was obtained from all participants prior to data collection

Conflicts of Interest: There was no conflict of interest reported among all authors of this clinical research.

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