



A STUDY OF RHEUMATOLOGICAL MANIFESTATIONS IN PATIENTS WITH TYPE 2 DIABETES MELLITUS AND ITS RELATION TO GLYCEMIC CONTROL

General Medicine

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ABSTRACT

Background: Type 2 Diabetes mellitus is usually associated with several rheumatological manifestations that cause significant morbidity. This study was conducted to find the prevalence of rheumatological manifestations in patients with type 2 diabetes and its relation to glycemic control.

Methods: This was a cross-sectional study done in 120 type 2 diabetic cases and 60 age and sex-matched non-diabetic controls in Katuri Medical College & Hospital for one year. Subjects were examined for various rheumatological manifestations and all the necessary investigations were done.

Results: Rheumatological manifestations were seen in 42.5% of patients with type 2 diabetes mellitus compared to 26.6% in non-diabetic subjects. Limited joint mobility was the most common manifestation seen in 29.4% of diabetic group followed by Periarthritis of shoulder (20.8%), Carpal tunnel syndrome (15.83%) and Dupuytren's contracture (14.16%). Majority of the patients had HbA1c levels between 8.1 to 10%.

Conclusion: Rheumatological manifestations are more prevalent in people with type 2 diabetes than those without diabetes. Limited joint mobility and periarthritis of shoulder are the most common rheumatological manifestations. Usually, poor glycemic control is associated with an increase in rheumatological manifestations.

KEYWORDS

Diabetes mellitus, Rheumatological manifestations, Periarthritis of shoulder.

INTRODUCTION

Diabetes mellitus is major health problem estimated to affect 84 million people globally by 2030¹. Musculoskeletal manifestations are usually under-recognized and poorly treated, unlike other complications. The National Health Interview Survey which was done in the United States in the year 2004, has shown that 58% of people with diabetes will develop functional disability.²

Although the exact etiology of diabetes-associated musculoskeletal disorders remains obscure, evidence indicate, hyperglycemia may accelerate nonenzymatic glycosylation and abnormal collagen deposition in connective tissues in the periarticular region, which in turn alter the structural matrix and mechanical properties of the musculoskeletal tissues leading to diffuse arthrofibrosis and stiffness.^{3,4}

These musculoskeletal manifestations of diabetes include limited joint mobility (LJM syndrome/diabetic cheiroarthropathy), periarthritis of shoulder, carpal tunnel syndrome, and other rare complications.⁵ When compared to the general population, patients with type 2 diabetes mellitus are five times more likely to develop frozen shoulder, and they have an increased risk for bilateral carpal tunnel syndrome.⁶ LJM is even associated with a higher risk for microvascular complications.⁷

In contrast to the life-threatening macro and microvascular complications of diabetes mellitus, rheumatological disorders cause considerable morbidity⁸ but are often missed and undertreated. Therefore, this study was taken up to study the prevalence of rheumatological manifestations in type 2 diabetes mellitus patients and to find their relationship with glycemic control.

AIMS AND OBJECTIVES

- To study the prevalence of various rheumatological manifestations in patients with Type 2 diabetes mellitus.
- To study the relationship between glycemic control and the prevalence of rheumatological manifestations.

MATERIALS AND METHODS

Source of data:

Both inpatients and outpatients with type 2 diabetes mellitus at Katuri Medical College and Hospital.

Sample size:

One hundred twenty patients with diabetes mellitus and sixty age and sex-matched non-diabetic controls were included in the study.

Design of the study:

Cross-sectional study.

Duration of study:

One year from January 2018 to January 2019.

Inclusion criteria:

The criteria for diagnosis of diabetes mellitus were according to the criteria laid down by the American Diabetes Association.

- Fasting blood glucose ≥ 126 mg/dl.
- Postprandial blood glucose ≥ 200 mg/dl.
- Symptoms of diabetes plus random blood glucose ≥ 200 mg/dl.

The control group included subjects without a family history of diabetes, fasting blood glucose values < 126 mg/dl, and postprandial blood glucose values < 200 mg/dl.

Exclusion criteria:

- Patients with a history of injury or fractures in the joint region.
- Patients with a history of chronic liver disease.
- Patients with a history of end-stage renal disease.
- Patients with rheumatoid arthritis, Systemic lupus erythematosus, and other connective tissue diseases.

METHODOLOGY:

One hundred twenty inpatients and outpatients patients with type 2 diabetes and sixty controls without diabetes at Katuri Medical College & Hospital were included in the study. Demographic features like age and sex were also noted.

Symptoms indicative of joint involvement such as pain, swelling of the joints, stiffness, restriction of joint movement with the duration of symptoms were recorded. History regarding the age of onset and duration of diabetes, mode of treatment, and family history of diabetes was also documented.

A detailed systemic and musculoskeletal examination were carried out.

Cheiroarthropathy or Limited Joint Mobility (LJM) was evaluated by the "prayer sign".⁹ Diagnostic criteria of periarthritis or frozen shoulder were patients with pain in the shoulder for at least one month, difficulty to lie down on the affected side, and restricted active and passive shoulder joint movements in at least three planes.^{10,11} A diagnosis of Dupuytren's contracture was based on one or more of the following features: 1) palmar or digital nodule, 2) tethering of palmar, or digital skin 3) a pre-tendinous band and a digital flexion contracture. Trigger finger was diagnosed by palpation of a nodule or thickened flexor tendon with locking phenomenon during extension or flexion of any finger.¹² Diffuse idiopathic skeletal hyperostosis (DISH) required radiographic finding of involvement of at least four contiguous thoracic vertebrae, preservation of the intervertebral disc space, and absence of apophyseal joints or sacroiliitis.¹³ Various other joints like hip, knee, ankle, wrist and small joints of the hand were examined for Charcot's joint, osteoarthritis. The palms were examined for flexor tenosynovitis and carpal tunnel syndrome.

Investigations:

Fasting, postprandial blood glucose and glycosylated hemoglobin (HbA1c) were done. Renal function tests include blood urea, serum creatinine, and uric acid. A complete urine analysis was done for sugars, ketone bodies, and protein. Hemogram, erythrocyte sedimentation rate, rheumatoid factor, and serum uric acid were also done. The rheumatoid factor up to 20IU/dl, and serum uric acid up to 7 mg/dl was taken as normal. X-rays of involved joints wherever necessary were taken.

Statistical analysis:

The prevalence rates were expressed in percent of total cases in each group and wherever applicable, prevalence between the two groups was compared using the Chi-square test. A p-value of less than 0.05 was considered significant.

RESULTS

This study was done between January 2018 to January 2019 in 120 patients with diabetes mellitus and 60 non-diabetic controls in Katuri Medical College & Hospital.

The following observations were made.

Table 1: Age Distribution of diabetics

Age group	Number of patients	Percentage
31-40	4	3.3
41-50	24	20
51-60	52	43.3
61-70	26	21.6
>70	14	11.6

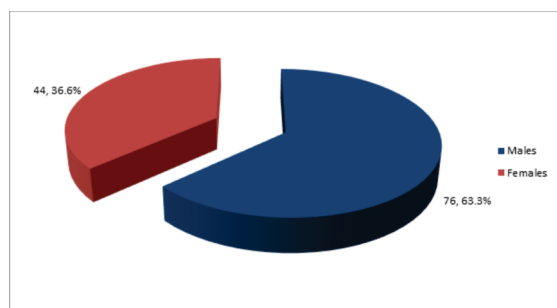
The majority of the study subjects with diabetes belonged to the age group of 51 to 60 years. The mean age of the people with diabetes was 58.29 ± 8.24 years.

Table 2: Sex Distribution

	Number of patients	Percentage
Males	76	63.33
Females	44	36.66
	120	100

In the 120 diabetic patients included in the study, about 76 patients (63.3%) were males, and 44 patients (36.6%) were females.

Figure 1: Sex Distribution



Duration of diabetes

Majority of the diabetic patients (35%) had 5-10 years of duration of the disease. The mean duration of disease was 8.6 ± 7.82 years.

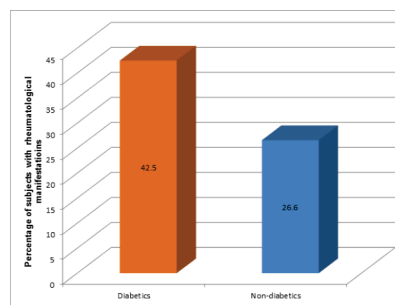
Table 3: Prevalence of Rheumatological manifestations in patients with and without diabetes mellitus

Rheumatological manifestations	Diabetic group	Non-Diabetics group
Present	51	16
Absent	69	44
Total	120	60

Chi-square = 8.901
P-Value = 0.0028

Rheumatological manifestations were seen in 51 patients (42.5%) with diabetes mellitus and 16 (26.6%) patients without diabetes. It was statistically significant with a p-value of 0.0028 calculated using chi-square test.

Figure 2: Prevalence of Rheumatological manifestations in patients with and without diabetes mellitus



Mode of treatment

In the 51 type 2 diabetic patients with rheumatological manifestations, 39 patients (77.54%) were on oral hypoglycaemic agents, and 12 patients (23.52%) were on insulin.

Table 4: Comparison of Prevalence of various Rheumatological manifestations in patients with diabetes mellitus and without diabetes mellitus.

Sl. No.	Musculoskeletal manifestation	Prevalence in diabetic group	Prevalence in non-diabetic group	P Value
1	Cheiroarthropathy	35(29.4%)	4(6.6%)	0.0005
2	Osteoarthritis	22(18.3%)	7(11.6%)	0.396
3.	Carpal tunnel Syndrome	19(15.83%)	3 (5%)	0.036
4.	Dupuytren's contracture	17(14.16%)	2(3.3%)	0.0257
5.	Periarthritis of shoulder	25(20.8%)	2(3.3%)	0.0019
6.	Neuropathic joint	9(7.5%)	1(1.6%)	0.107
7.	Flexor tenosynovitis	13(10%)	1(1.6%)	0.03
8.	Diffuse idiopathic skeletal hyperostosis	12(4.16%)	1(1.6%)	0.041

Among the 51 diabetic patients with rheumatological manifestations, 35 had Limited joint mobility or cheiroarthropathy, 22 had osteoarthritis of the knee, 5 had DISH, 17 had carpal tunnel syndrome and 9 had Charcot joint of the ankle. Both osteoarthritis of knee and periarthritis/frozen shoulder were seen in five people with diabetes.

Among 16 non-diabetic subjects with rheumatological manifestations, 8 had osteoarthritis of the knee, 4 had cheiroarthropathy, 3 had carpal tunnel syndrome, 2 had frozen shoulder, two had Dupuytren's contracture, and one person had flexor tenosynovitis.

A statistically significant association was found to be present for the prevalence of rheumatological manifestations between diabetic and non-diabetic groups.

Table 5: Correlation between HbA1c levels and rheumatological manifestations

HbA1c (%)	Present	Absent	Total
< 7	2	26	28
7.1-8	4	28	32
8.1-10	38	14	52
>10	7	1	8
Total patients	51	59	120

Chi-square = 52.6326

P < 0.05

It was found that rheumatological manifestations were increased with poor glycaemic control. This was statistically significant with a p-value < 0.05.

DISCUSSION

The current study was a cross-sectional study that was conducted for a period of one year from January 2018 to January 2019. It included 120 patients with type 2 diabetes mellitus and 60 non-diabetic controls in Katuri Medical College & Hospital, Chinakondrupadu, Guntur.

In this study, the prevalence of rheumatological manifestations were higher in patients with diabetes mellitus (42.5%) compared to the non-diabetic group (26.6%). It was consistent with the study done by Caglierio E¹⁴ in which 36% of the people with diabetes had rheumatological manifestations. Similarly, in Jacob Antony et.al¹⁵ it was 44% and in Gurinder Mohan et.al¹⁶ it was 49%. There was significant overlapping in the different rheumatological manifestations, and many of the patients had more than one musculoskeletal manifestation.

In this study, the most common rheumatological manifestation in people with diabetes was found to be limited joint mobility/cheiroarthropathy (29.4%), followed by peri-arthritis of shoulder (20.8%) and osteoarthritis (18.3%). There was a statistically significant association between diabetic and non-diabetic groups.

The prevalence of Limited joint mobility observed in the present study was similar to Gurinder Mohan et al. (32%)¹⁶, Sumesh Raj et al. (30.1%)¹⁷, and Tapas Kumar et al. (37.1%)¹⁸ studies.

In the present study, the prevalence of peri-arthritis of shoulder was found to be 20.8%, which was comparable to the studies done by Ramchurn et al.¹⁹ (25%) and Durga Prasad M.Kabade .et al²⁰ (23%). Aydeniz et al.²¹, Mathew AJ et al.²² and Sarkar et al.²³ found the prevalence of peri-arthritis of shoulder as 15%, 16.45%, and 20%, respectively. The prevalence was statistically significant between diabetic and non-diabetic groups. The mean age of patients with peri-arthritis of shoulder was 55.6 years. It was comparable to the studies done by Arkkila PE²⁴ and Balci N²⁵ which showed an increased prevalence of peri-arthritis/frozen shoulder after the age of fifty years. In the present study peri-arthritis of the shoulder was not associated with increased prevalence of other hand syndromes like carpal tunnel syndrome, Dupuytren's disease, and limited joint mobility.

The prevalence of osteoarthritis of knee in diabetic individuals was found to be 18.3%. The results were comparable to the studies conducted by Mathew AJ et al.²² and Sarkar et al²³ which showed the prevalence of osteoarthritis knee to be 20.4% and 22.5%, respectively. In the present study, the prevalence of osteoarthritis of the knee among controls was (11.6%). This was insignificant statistically (p=0.396). This was in line with the studies done by Sarkar et al.²³ and Sturmer et al.²⁶ who did not find a significant association between type 2 Diabetes mellitus and osteoarthritis of knee. Based on these studies, we cannot conclude that diabetes is an independent risk factor for osteoarthritis since many potential confounders may interfere with the results such as age and level of activity.

The prevalence of Dupuytren's contracture was found to be 14.16% in diabetic individuals. Ramchurn et al.¹⁹ reported a 13% prevalence of Dupuytren's contracture in their study. The difference between diabetic and non-diabetic groups was statistically significant. Similar results were also found in a study conducted by Aydeniz et al.²¹ in which the prevalence of Dupuytren's contracture was found to be 12.7%.

In this study, carpal tunnel syndrome was found in 15.83% of the type 2 diabetic patients and 5% of those without diabetes. This was found to be statistically significant. In Gurinder Mohan et al.¹⁶, it was 15%, and in Sumesh Raj et al.¹⁷, it was 10.1%. In and Durga Prasad M.Kabade .et al²⁰ the prevalence of carpal tunnel syndrome was found to be 17.5%, the difference being statistically significant in uncontrolled and controlled type 2 diabetes mellitus patients. The study by Renard et al.²⁷ reported that 15% of diabetic and 5% of nondiabetic subjects had carpal tunnel syndrome.

Diffuse idiopathic skeletal hyperostosis was seen only in 4.16% of the type 2 diabetic as compared to 1.6% of the non-diabetic subjects. It was found to be statistically significant. In Gurinder Mohan et al.¹⁶, it was present in 6% of the patients who have type 2 diabetes. Similar results were found in a study performed by Douloumpakas et al.²⁸ in which the prevalence of diffuse idiopathic skeletal hyperostosis was found to be 6%.

In this study, flexor tenosynovitis was found to have a prevalence of 10% in patients who have type 2 diabetes. Studies carried out by Mathew et al²² and Sarkar et al²³ and showed the prevalence of flexor tenosynovitis to be 4.4% and 5%, respectively, whereas the study carried out by Durgaprasad M. Kabade et al.²⁰ showed the prevalence

to be 9%. Prevalence of neuropathic joints was also found to be 7.5% in people with diabetes and 1.6% in those without diabetes. This was not statistically significant. A study done by Sarkar RN²⁷ showed that the neuroarthropathy of knee and foot was seen in 3.2% of the diabetic group as compared to 0.6% of the non-diabetic group. The difference could be ascribed to the difference in the occupation as well as the weight of the patients as obesity is regarded as a major factor in the pathogenesis of Charcot's joint.

People with diabetes with higher HbA1c levels had a higher prevalence of rheumatological complications (P < 0.05). There was an increase in joint complications when the duration of diabetes was more than five years.

CONCLUSION

This study has found that the prevalence of rheumatological manifestations is higher in patients with type 2 diabetes than in those without diabetes. These are more often seen in males as compared to females. Limited joint mobility is the most frequent rheumatological manifestation in type 2 diabetic patients, followed by peri-arthritis of shoulder. Poor glycemic control is usually associated with an increase in the prevalence of rheumatological manifestations. This study was done in a small group of patients with type 2 diabetes and hence would be beneficial to undertake the study by in a larger group. Early detection, good glycemic control, and treatment may reduce the morbidity associated with rheumatological manifestations and thus helps to improve the quality of life in patients with Type 2 Diabetes mellitus.

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