



ORIGINAL RESEARCH PAPER

General Medicine

STUDY OF MUSCULOSKELETAL MANIFESTATIONS IN DIABETES MELLITUS PATIENTS

KEY WORDS:

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INTRODUCTION

Diabetes mellitus refers to a group of common metabolic disorders that share the phenotype of hyperglycemia. The two broad categories are type 1 and type 2 diabetes mellitus. In type 1 diabetes mellitus, there is absolute or near total deficiency of insulin due to autoimmunity against beta cells of pancreas. Type 2 diabetes is a heterogenous group of disorder characterized by variable degree of insulin resistance, impaired insulin secretion and increased hepatic glucose production. Diabetes-related complications affect many organ systems and are responsible for majority of morbidity and mortality.¹

Diabetes is associated with macrovascular and microvascular complications. Patients with macrovascular complications of diabetes present with stroke, cardiovascular disease and peripheral vascular disease. Microvascular complications include retinopathy, neuropathy and nephropathy.¹ Although the cardiovascular, renal, and ocular complications of diabetes are the most severe, many rheumatic syndromes occur more frequently in patients with diabetes than in the general population.² In contrast to various vascular complications of diabetes mellitus which are life threatening, rheumatological manifestations can lead to considerable morbidity.³

Musculoskeletal complaints account for multiple outpatient visits per year. Musculoskeletal manifestations of diabetes mellitus are usually unrecognized and poorly treated as compared microvascular and macrovascular complications. Very often, the presentation of musculoskeletal manifestations is the initial presentation of diabetes mellitus.³

The musculoskeletal manifestations of diabetes mellitus includes adhesive capsulitis of shoulder (frozen shoulder), limited joint movement, osteoarthritis, carpal tunnel syndrome, Dupuytren's contracture, diffuse idiopathic skeletal hyperostosis (DISH) and neuroarthropathy. The risk of developing these disorders is correlated to the duration and control of diabetes.³

Certain musculoskeletal complications such as limited joint mobility, trigger finger, charcot's arthropathy are seen in patients with diabetes mellitus than otherwise.³ These complications are often accompanied by other complications of diabetes mellitus. An increased glycation of proteins induces structural changes of the tissues .i.e. collagen modification might be an important component. Other than this, fibroblastic proliferation and increased expression of cytokines can be other mechanisms.⁴

MATERIALS AND METHODS

This was a hospital based prospective study conducted in Dr.D Y Patil hospital, Navi Mumbai. Patients recognized as diabetics based on their previous and recent documented reports were screened for the study. Only those above 18 years of age were screened. Both type 1 and type 2 diabetic patients were included in study. A detailed history was

obtained regarding the onset and duration of diabetes. Treatment details were noted. Other comorbidities and complications were noted. Family history was noted. However, patients with gestational diabetes were excluded. Those who had known malignancy, acute illness, connective tissue disorder like rheumatoid arthritis and spondyloarthropathies were excluded. Patients with trauma and congenital joint disorders were excluded.

A total of 200 patients were the participants in the study.

Specific complains related to muscle or various joint involvement in the upper limb, back and lower limb was enquired in each patient in detail. History of swelling and restriction of movement in any joint was elicited. Detailed systemic examination was done for all patients. All patients were examined for musculoskeletal involvement such as frozen shoulder, osteoarthritis, carpal tunnel syndrome, limited joint mobility, Dupuytren's contracture, flexor tenosynovitis, trigger finger, forefoot osteolysis. Local examination of each joints was performed which included shoulder, elbow, wrist, small joints of the hands. i.e metacarpophalangeal joint and interphalangeal joints in the upper extremity and hip, knee, ankle, tarsal, tarsometatarsal, metatarsophalangeal and interphalangeal joints in the lower extremity. Examination of spine was done to look for deformities, swelling, tenderness, range of movement, straight leg raising test. Orthopaedic evaluation was done for all the patients. Radiological investigation was carried out as indicated. Laboratory investigations were carried out which included glycated hemoglobin (HbA1c), fasting blood sugar, postprandial blood sugar, urine routine, complete hemogram, creatinine, electrolytes, uric acid, urea, ESR.

Patients were advised physiotherapy, analgesics and anti-inflammatory agents. Diet and lifestyle modification was explained to the patients. Oral hypoglycemic agents and/or insulin was advised as indicated to achieve good glycemic control. Patients were asked to follow up routinely.

RESULT

- Musculoskeletal disorders among cases

In this study, 76 cases (38%) out of 200 had musculoskeletal disorders which was diagnosed based on clinical and radiological grounds.

Gender	Musculoskeletal disorder	
	Yes	%
Female	42	55.26
Male	34	44.73

Musculoskeletal manifestations were seen in 44.68% females and 32.07% males. The various musculoskeletal manifestations are shown in the table below.

- Different musculoskeletal disorders in subjects:

Musculoskeletal disorder	No.	%
Frozen shoulder	39	19.5%
OA knee	33	16.5%

Carpel tunnel syndrome	3	1.5%
Dupuytren's contracture	1	0.5%

The most common musculoskeletal manifestation observed in diabetic patients in this study was frozen shoulder (19.5%). This was followed by osteoarthritis knee (16.5%). The other two manifestations included carpal tunnel syndrome (1.5%) and Dupuytren's contracture (0.5%).

- Duration of diabetes in patients with musculoskeletal disorder

	Frozen shoulder	Osteoarthritis	Carpal tunnel syndrome	Dupuytren's contracture
<5 yrs	15	4	2	0
5-10 yrs	7	12	0	0
>10 yrs	17	17	1	1

Out of 76 diabetic patients with musculoskeletal manifestations, 35 patients (46.05%) had diabetes mellitus for more than 10 years, 19 patients (25%) had diabetes for 5-10 years duration and 21 patients (27.63%) had diabetes for less than 5 years of duration.

Out of 24 females with frozen shoulder, 12 females had duration of diabetes less than 5 years, out of which 4 were newly diagnosed diabetes mellitus. Out of 15 males with frozen shoulder, 9 males had diabetes mellitus for more than 10 years which was statistically significant (p value-0.003)

Osteoarthritis was more commonly seen in both males and females with diabetes mellitus for more than 10 years duration followed by duration of 5 to 10 years. There was a statistically significant correlation (p value- <0.01) of osteoarthritis with duration of diabetes for more than 10 years followed by 5 to 10 years

DISCUSSION

This was a hospital based cross sectional study in patients of diabetes mellitus to evaluate musculoskeletal manifestations.

Diabetes mellitus is a constellation of metabolic abnormalities that lead to chronic irreversible damage in organ systems.⁶ Long standing diabetes mellitus may lead to microvascular complications such as retinopathy, nephropathy and neuropathy and macrovascular complications which includes stroke, coronary artery disease and peripheral vascular disease.³ Diabetes mellitus also predisposes to other complications which include infections, gastrointestinal complications and musculoskeletal complications.⁵

Limited attention has been paid to musculoskeletal complications of diabetes mellitus, even though they can occur commonly in patients with diabetes and can account for multiple outpatient visits per year.³

The musculoskeletal manifestations of diabetes mellitus involving the upper extremity include frozen shoulder, carpal tunnel syndrome, Dupuytren's contracture, limited joint mobility, flexor tenosynovitis, trigger finger. In the lower extremity, the disorders include osteoarthritis and Charcot's arthropathy.

In this study 200 patients of diabetes mellitus were the participants who were analysed for musculoskeletal manifestations of diabetes mellitus. Patients with congenital anomalies, trauma, gestational diabetes mellitus, malignancy, acute illness, on steroids and rheumatoid arthritis were excluded.

Out of 200 diabetic patients, 197 patients had type 2 diabetes mellitus and 3 patients had type 1 diabetes mellitus. This study included 106 males and 94 females who were diagnosed cases of diabetes mellitus. 44.68% females and 32.07% males had musculoskeletal manifestations.

It was observed in this study, that 38% of the patients overall had some musculoskeletal involvement.

The most common musculoskeletal manifestation observed in this study was frozen shoulder (19.5%) followed by osteoarthritis knee (16.5%).

Adhesive capsulitis was the most common musculoskeletal manifestation (35%). Shoulder hand syndrome and limited joint mobility was present in 15.3% and 5.3% of the patients respectively. Dupuytren's contracture (1.3%) and Charcot's joint (0.7%) were infrequent. [108] Shoulder hand syndrome also known as complex regional pain syndrome is condition characterized by continuous regional pain and has distal predominance of abnormal sensory and/or motor involvement in the upper limb.

In the present study it was observed that 61.84% patients who had musculoskeletal manifestations were in the age group of 51-70 years and 46.05% patients had diabetes for more than 10 years.

Frozen shoulder is manifested by diffuse shoulder pain with loss of range of movement with little or no evidence of intra articular disease. There is thickening of the joint capsule and adherence of the joint capsule to head of humerus which may be sometimes appreciated on radiograph of the shoulder joint. Frozen shoulder may be accompanied by or may lead to shoulder hand syndrome.⁷

It was observed in this study that frozen shoulder was more common in females and in the age group of 51 to 60 years in both males and females. Majority patients who had frozen shoulder were highly uncontrolled as noted by their HbA1c. It was also noted in patients who were overweight and obese.

It was noted in the study that majority of the females had diabetes mellitus for more than 10 years or were recently diagnosed presenting with frozen shoulder. Majority males had diabetes mellitus for more than 10 years. Frozen shoulder was more common in both males and females with HbA1c more than 10%.

Osteoarthritis is a degenerative joint disease characterized by structural abnormality of the joint leading to clinical features such as pain, swelling and joint deformity. The structural changes in osteoarthritis include loss of joint space, sclerosis of the cartilage and osteophyte formation which is well appreciated in the radiograph.⁸

Osteoarthritis was equally seen in both females (51.51%) and males (48.48%) and was most common in age group of 61 to 70 years in this study. Majority of the patients were overweight and obese. 56.25% males and 47.05% female patients with osteoarthritis had duration of diabetes mellitus for more than 10 years. Mean HbA1c was 8.75% for osteoarthritis.

Carpal tunnel syndrome results from compression of the median nerve within the carpal tunnel at the wrist leading to paraesthesia of the thumb, index finger, and little finger. [108] Tinel's sign and Phalen's sign assist in diagnosis of carpal tunnel syndrome which is confirmed by nerve conduction study.⁹

In this study, 3 males who had carpal tunnel syndrome were in the age group of 40-70 years. Two patients had diabetes for less than 2 years and one patient had prolonged duration of diabetes. Out of the 3 patients with carpal tunnel syndrome, two were poorly controlled diabetics.

Dupuytren's contracture a myofibroblastic disease in which there is fibrosis of the palmar aponeurotic space with contractures of the fourth and fifth digits leading to thickening of the subcutaneous tissue in the palms. It occurs in more than one-third patients with diabetes especially with long

standing poorly controlled long standing diabetes mellitus.⁵

One female who had Dupuytren's contracture in this study had diabetes for 10 years and fair glycaemic control.

However, there was no correlation of carpal tunnel syndrome and Dupuytren's contracture with duration of diabetes and glycaemic control in this study.

CONCLUSION

Thorough musculoskeletal examination should be included as an integral part of care in diabetic patients. Many of these musculoskeletal disorders are treatable especially if diagnosed early and can improve quality of life by reducing morbidity associated with it.

DM is associated with several musculoskeletal manifestations. The musculoskeletal manifestations of DM are more common in females. The most common musculoskeletal manifestation in DM is frozen shoulder. There is significant correlation of musculoskeletal manifestation with duration of diabetes mellitus and glycaemic control.

REFERENCES

[1] Alvin C Powers; Chp. 396: Diabetes Mellitus: Diagnosis, classification, and pathophysiology; Harrison's Principles of Internal Medicine. 20th edition, Jameson JL, Kasper DL, Fauci AS, Hauser SL ;New York: McGrawHill (2018);2850-8

[2] Amit Bhaskar, Study of Rheumatological manifestations in type2 Diabetes mellitus, International journal of medical research professionals. 2018 ;4 (4) :332-35.

[3] Kavita Krishna, Rheumatic manifestations in Diabetes Mellitus, Current medical journal of India 2018;5:31-40

[4] Buckingham B and Reiser KM. Relationship between the content of lysyl oxidase dependant cross-links in skin collagen, non enzymatic glycosylation and long term complications in type 1 diabetes mellitus. J ClinInvest 1990;86 :1046-1054.

[5] Jacob Antony et al, Musculoskeletal Complications of Diabetes and Relation to Glycaemic Control;JMSCR Volume 05 Issue 10 October 2017;29073-29079

[6] Ravi Kumar C et al ; Clinical Study of Rheumatological Manifestations in Type 2 Diabetes Mellitus Patients; JMSCR Volume 03 Issue 10 October 2015; 8086-8101

[7] Kingston K, Curry EJ, Galvin JW, Li X. Shoulder adhesive capsulitis: epidemiology and predictors of surgery. J Shoulder Elbow Surg. 2018 Aug;27(8):1437-1443. doi: 10.1016/j.jse.2018.04.004. Epub 2018 May 25. PMID:29807717.

[8] Weinfeld RM,Olson PN,Maki DD,Griffiths HJ, The prevalence of diffuse idiopathic skeletal hyperostosis (DISH) in two large American Midwest metropolitan hospital populations.Skeletal radiology.1997 Apr

[9] Hegmann KT,Merryweather A,Thiese MS,Kendall R,Garg A,Kapellusch J,Foster J,Drury D,Wood EM,Melhorn JM, Median Nerve Symptoms, Signs, and Electrodiagnostic Abnormalities Among Working Adults. The Journal of the American Academy of Orthopaedic Surgeons. 2018 Aug 15 [PubMed PMID:30028751]