

Musculoskeletal manifestations among diabetic patients in Saudi Arabia

Laura I. AlOayan^{1,2,3}, Alia H. Zawawi^{1,2,3}

¹Department of Family Medicine, King Abdulaziz Medical City, ²Department of Family Medicine, King Saud Bin Abdulaziz University for Health Sciences, ³King Abdullah International Medical Research Centre, Riyadh, Saudi Arabia

ABSTRACT

Context: Diabetes mellitus (DM) is one of the most common diseases worldwide. Patients with DM are prone to develop multiple musculoskeletal (MSK) manifestations, which may lead to disability and an impact on patients' quality of life. These manifestations include but not limited to, adhesive capsulitis, shoulder hand syndrome, diabetic hand syndrome, diffuse idiopathic skeletal hyperostosis, Dupuytren's contracture. **Aims:** The aim of this study is to assess the prevalence of MSK manifestations in diabetic patients in Saudi Arabia. **Settings and Design:** The study was carried out in NGH hospital and PHC in Saudi Arabia. **Methods and Materials:** This is a retrospective study carried out between 2015 and 2019 where all patients with DM type II between the age of 18 and 65 and were diagnosed with MSK manifestations included in the study. **Statistical Analysis Used:** Statistical Package for the Social Sciences (IBM-SPSS) software (Version 23). **Results:** A total of 208 patients were found to have MSK manifestations. The average age of patients was 53 years old ranging from (31-63). The mean reading of A1C was 8%. A total of 34.1% were controlled and 65.9% were uncontrolled. Carpal tunnel syndrome (CTS) was found in 10%. Adhesive capsulitis in 2.4%. Septic arthritis in 1%. Trigger finger was found in 7.2%. Osteomyelitis was found in 0.5%. Plantar fasciitis was found in 4.8%. Osteoarthritis (OA) was found in 149 subjects (71.3%). Two subjects had ankle OA, one hand OA, nine shoulder OA, one hip arthritis. The rest had knee OA. Rotator cuff tendonitis was found in 1%. No significant correlation between age, A1c and all the MSK manifestations that were mentioned above (P value >0.05). **Conclusions:** MSK manifestations are common among diabetic patients. OA was the most frequently seen disorder. Physicians should be aware of the high prevalence and the huge impact on patients when treating patients with type II DM.

Keywords: Adult, diabetes, Musculoskeletal, type 2

Introduction

Diabetes mellitus (DM) is one of the most common diseases worldwide. The prevalence of diabetes has been increasing over the past years, from 4.7% in 1980 to 8.5% in 2014.^[1] In 2017, it is estimated that more than 425 million adults around the world have diabetes.^[2]

DM carries a risk of a wide range of complications including renal diseases, neuropathy, retinopathy and musculoskeletal (MSK) manifestations.^[3] Although the prevalence of disability among diabetic patients is high, it is usually under looked by physicians as a major complication in diabetic patients. A study done in 2004 in the United States found that 58% of adult diabetic patients are at high risk of developing a disability.^[4]

Patients with DM are prone to develop multiple MSK manifestations, which may lead to disability and a huge impact on patients' quality of life. These manifestations include but not limited to, adhesive capsulitis (frozen shoulder), shoulder hand syndrome (SHS), diabetic hand syndrome (DHS),

Address for correspondence: Dr. Laura I. AlOayan,
Riyadh, Saudi Arabia.
E-mail: lauraolayan@gmail.com

Received: 18-04-2020

Revised: 10-06-2020

Accepted: 17-06-2020

Published: 30-11-2020

Access this article online

Quick Response Code:



Website:
www.jfmpc.com

DOI:
10.4103/jfmpc.jfmpc_654_20

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: AlOayan LI, Zawawi AH. Musculoskeletal manifestations among diabetic patients in Saudi Arabia. J Family Med Prim Care 2020;9:5597-600.

diffuse idiopathic skeletal hyperostosis (DISH), Dupuytren's contracture (DC) and neuroarthropathy.^[2,5-7] Deshmukh DP *et al.*, conducted a study in 2017 in India found that 42% of diabetic patients included in the study had MSK manifestation. Adhesive capsulitis, tendonitis, limited joint mobility and diabetic chiero-arthropathy, were commonest MSK manifestations observed.^[6] Another study conducted by Majjad *et al.* in 2018 found that the prevalence of MSK complications in DM patients is 34.4%. The most common MSK manifestation was osteoarthritis (OA) and hand manifestations including carpal tunnel syndrome, trigger finger and Dupuytren's contracture.^[7-9]

Previous studies linked MSK complications to multiple factors, such as duration of the disease, female gender^[10,11] and poor glycemic control. In 2009 a British cohort study found a strong correlation between MSK manifestations and poor glycemic control.^[10] Body mass index (BMI) is also found to be a risk factor. It has been found that diabetic patients with a BMI higher than 25 kg/m² are at a higher risk of developing MSK manifestations.^[6,11] Age above 50 was observed in different studies as a major risk factor to develop complications.^[7] A study done by Bhat TA *et al.* in 2019 concluded that there was a significant correlation between the duration of the disease and MSK manifestations. They observed that who had DM for more than 10 years were more likely to develop these manifestations.^[12]

In controversy, multiple studies reported no association between high Hg A1C, BMI and MSK manifestation.^[7,13,14]

This study aims to explore the most common MSK manifestation among type 2 diabetic patients and the most important factors for developing such a manifestation.

Subjects and Methods

This is a retrospective study, carried out in all National guard hospitals and primary health clinics in Saudi Arabia, between 2015 and 2019. The electronic files of all patients with DM type II between the age of 18 and 65 and were diagnosed with MSK manifestations were included.

The electronic chart review including: demographic of the patients (age, gender and city) Hgb A1c readings: Three readings were taken from the last 3 visits and the average was calculated and based on the average the patients were categorized into two groups; controlled and uncontrolled. The cut off on Hgb A1C was based on ADA guidelines 2019.

Treatment modalities that have been used for treating diabetes are based on the last three visits for the patients. It was categorized into 3 different categories; A- oral only, which included all types of oral hypoglycemic agents, B-insulin only, which includes all types of insulin; C, a combination of both oral and insulin.

The MSK manifestations, which included all the manifestations that were entered as "visit diagnosis" in the electronic files system used in national guard hospitals. We excluded patients who have MSK manifestations of traumatic origin.

Ethical approval was obtained from the Institutional Review Board (IRB) of King Abdulla International Medical Research Center (KAIMRC) before conducting the study. All patients' files were kept confidential at all time and No names were used.

Statistical analysis

Data collection was executed via specially designed data collection form and entered into Statistical Package for the Social Sciences (SPSS).

Data management and statistical analysis were carried out using the latest available version of IBM-SPSS software (version 23).

Descriptive statistical analysis was used to present data. For continuous variables, mean and standard deviations were obtained. While for categorical variables, data were presented as frequencies and percentages. Median and interquartile range was used in continuous data that are not normally distributed.

Student's t-test was used for comparison of the mean for continuous variables for subgroup analysis. Chi-square (χ^2) test was used for comparison of clinical outcomes among any categorical predictor variables.

Odds ratios (ORs), 95% confidence intervals (CIs) and *P* values reported for significant predictors. *P* value of ≤ 0.05 was considered statistically significant.

Results

A total of 10045 files were reviewed and a total of 208 patients were included in the study after they met the inclusion criteria.

All diabetic patients following in NGHA were found to have MSK manifestations were included. The patients were as follows; 165 (78.6%) patients were from Riyadh and 44 (21.1%) patients were from outside Riyadh, 5.3% were from Jeddah, 5.7% were from medina, 7.2% were from Al ahsa, the rest were from Qassim, Taif and Arar.

The average age of patients was 53 years old ranging from (31-63). All patients in the study had a history of type II diabetes of at least 1 year. Patients with MSK manifestations of traumatic origin were excluded from the study.

A total of 49 (23.4%) males and 160 (76.6%) females were included in the study. All patients were receiving treatment. A total of 74 (35.4%) patients were receiving both oral antihyperglycemic agents and insulin. While 119 (56.9%) were receiving oral antihyperglycemic agents. And 16 (7.7) patients received insulin only [Figure 1].

Glycemic control

Three readings of HbA1c were recorded. The overall mean of all three readings was 8%. The subjects were categorized to be controlled and non-controlled based on ADA 2019 criteria. A total of 34.1% were controlled and 65.9% were uncontrolled.

Musculoskeletal manifestations

OA was found in 149 (71.3%) subjects. Two subjects had ankle OA, one hand OA, nine shoulder OA, one hip arthritis. The rest had knee OA. Carpal tunnel syndrome (CTS) was found in 21 (10%) subjects. Trigger fingers were found in 15 (7.2%) subjects. Plantar fasciitis was found in 10 (4.8%) subjects. Adhesive capsulitis was in 5 (2.4%) subjects. Septic arthritis was found in 2 (1%) subjects. Osteomyelitis was found in 1 (0.5%) subject. Rotator cuff tendonitis was found in 2 (1%) subjects. No significant correlation between HgbA1c and all the MSK manifestations are mentioned (P value >0.05) in Table 1.

An association between treatment modality and CTS, adhesive capsulitis and OA is shown in Table 2.

Discussion

In this study, we looked at the incidence of MSK manifestations among diabetic patients in all national guard hospitals and primary care centers in Saudi Arabia between 2015 and 2019. It is

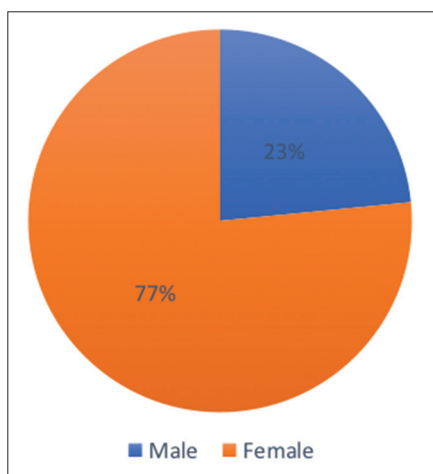


Figure 1: Gender distribution

crucial for family physicians to be aware of these manifestations to prevent disability and chronic pain.

The most common MSK manifestation was OA with a prevalence of 71.3%. OA was more common among patients with poor glycemic control and the difference was statically significant (P value 0.05). Many studies have reported OA as a common manifestation among patients with diabetes. A study conducted by Mathew AJ *et al.* in India found the prevalence of knee OA is 20.4%.^[15] they concluded that OA is highly linked to glycemic control. Another study done by Sarkar *et al.* did not found any association between glycemic control and OA prevalence among patients with diabetes.^[16]

The second most common observed manifestation was CTS. CTS was reported by many studies as expected complications of DM. The prevalence reported in the literature was between 10–15%.^[17,18] In this study, we found a prevalence of 8.4%.

Trigger finger was also seen in our study. Multiple studies have found increasing incidence of trigger finger among patients with DM. Different studies reported that the incidence of trigger finger among the general population is between 1.7–2.6%^[19-21] compared to 10-20% in the diabetic population.^[22,23] In our study, we found that the incidence of trigger finger is 6.7%, which is less than the incidence that was reported in the literature. The association between glycemic control and trigger finger was not statically significant (P value >0.05). Adhesive capsulitis was reported to be 2.2% in our study. The reported prevalence in the literature was between 11–30%.^[24,25]

The rest of MSK manifestations we looked at in our study were reported as following; rotator cuff tendonitis (1.1%), septic arthritis (1.1%) and osteomyelitis (0.6%). No association between these manifestations and diabetes control (P value <0.05) was observed.

The limitations of the study were first, lack of proper entry of the main diagnosis in the electronic system has led to missing a lot of patients. Second, there were important factors according to the literature that might play a role in developing these manifestations, however, we couldn't obtain these factors from the hospital system.

Table 1: Number of cases and the correlation with A1c control

Diagnosis	Uncontrolled A1C	Controlled A1C	Total number	Percentage	P
Carpal tunnel syndrome	5	10	15	8.4%	1
Adhesive capsulitis	4	0	4	2.2%	0.3
Septic arthritis	2	0	2	1.1%	0.5
Trigger finger	10	2	12	6.7%	0.2
Osteomyelitis	0	1	1	0.6%	0.3
Plantar fasciitis	7	3	10	5.6%	1
Osteoarthritis	80	49	129	72.1%	0.05
Rotator cuff tendonitis	2	0	2	1.1%	0.5

Table 2: Correlation between diagnosis and treatment modality

Diagnosis	Treatment modality			P
	Oral	Insulin	Both	
Carpal tunnel syndrome	8.4%	0%	14.9%	0.05
Adhesive capsulitis	0%	5.4%	6.3%	0.001
Septic arthritis	0%	0%	2.7%	
Trigger finger	4.2%	12.5%	10.8%	0.1
Osteomyelitis	0%	6.3%	0%	0.07
Plantar fasciitis	6.7%	0%	2.7%	0.2
Osteoarthritis	77.3%	81.3%	59.5%	0.02
Rotator cuff tendonitis	0.8%	0%	1.4%	0.8

Conclusion

Diabetic patients could present with multiple MSK complaints. And it may be related to age, glycemic control or duration of disease. Family physicians should be aware of possible MSK complications and manage them early to prevent the disability and the poor impact of patients' quality of life.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

- World Health Organization. Global report on diabetes. 2016.
- International Diabetes Federation. IDF Diabetes Atlas. 8th ed. Brussels, Belgium: International Diabetes Federation; 2017.
- Foster DW. Diabetes mellitus. In: Fauci AS, Braunwald E, Isselbacher KJ, *et al.* Harrison's Principles of Internal Medicine. 14th ed. p. 2061-81.
- Egede LE. Diabetes, major depression, and functional disability among U.S. adults. *Diabetes Care*. 2004;27:421-8.
- Kroop SF, Lee SS. Joint and Bone Manifestations of Diabetes Mellitus in Joslin's Diabetes Mellitus. In: Kahn CR, Weir GC, editors. 13th ed. Pennsylvania: Lea & Febiger; 1994. p. 912-7.
- Deshmukh DP, Akarte AG. Musculoskeletal manifestations in type 2 diabetes mellitus. *Int J Res Med Sci* 2017;5:398-402.
- Majjad A, Errahali Y, Toufik H, H Djossou J, Ghassem MA, Kasouati J, *et al.* Musculoskeletal Disorders in Patients with Diabetes Mellitus: A Cross-Sectional Study. *Int J Rheumatol* 2018;2018:3839872. doi: 10.1155/2018/3839872.
- Cohen SE, Mahul O, Meir R, Rubinow A. Anserine bursitis and non-insulin dependent diabetes mellitus. *J Rheumatol* 1997;24:2162-5.
- Cagliero E, Apruzzese W, Perlmutter GS, Nathan DM. Musculoskeletal disorders of the hand and shoulder in patients with diabetes mellitus. *Am J Med* 2002;112:487-90.
- Ramchurn N, Mashamba C, Leitch E, Arutchelvam V,

Narayanan K, Weaver J, *et al.* Upper limb musculoskeletal abnormalities and poor metabolic control in diabetes. *Eur J Intern Med* 2009;20:718-21.

- Agrawal RP, Gothwal S, Tantia P, Agrawal R, Rijhwani P, Sirohi P, *et al.* Prevalence of rheumatological manifestations in diabetic population from North-West India. *JAPI* 2014;62:788-91.
- Bhat TA, Jalalie U, Kashyap S. An observational study on musculoskeletal manifestations in type 2 Diabetes mellitus in rural population of Himachal Pradesh, India. *Int J Res Med Sci* 2019;7:4237-42.
- Attar SM. Musculoskeletal manifestations in diabetic patients at a tertiary center. *Libyan J Med* 2012;7. doi: 10.3402/ljm.v7i0.19162.
- Thomas SJ, McDougall C, Brown ID, Jaber MC, Stearns A, Ashraf R, *et al.* Prevalence of symptoms and signs of shoulder problems in people with diabetes mellitus. *J Shoulder Elbow Surg* 2007;16:748-51.
- Mathew AJ, Nair JB, Pillai SS. Rheumatic musculoskeletal manifestations in type 2 diabetes mellitus patients in South India. *Int J Rheum Dis* 2011;14:55-60.
- Sarkar P, Pain S, Sarkar RN, Ghosal R, Mandal SK, Banerjee R. Rheumatological manifestations in diabetes mellitus. *J Indian Med Assoc* 2008;106:593-5.
- Mohan G, Bhalla N, Kaur R, Kohli JK. Rheumatological manifestations of type 2 diabetes mellitus. *J Evol Med Dent Sci* 2014;3:582-8.
- Raj S, Rajan GV, Vijayan R, Sugathan R. Rheumatological manifestations of type 2 diabetes and its relationship to glycemic control and duration of diabetes. *Sahel Med J* 2014;17:12-4.
- Cagliero E, Apruzzese W, Perlmutter GS, Nathan DM. Musculoskeletal disorders of the hand and shoulder in patients with diabetes mellitus. *Am J Med* 2002;112:487-90.
- Chammas M, Bousquet P, Renard E, Poirier JL, Jaffiol C, Allieu Y. Dupuytren's disease, carpal tunnel syndrome, trigger finger, and diabetes mellitus. *J Hand Surg [Am]* 1995;20:10914.
- Renard E, Jacques D, Chammas M, Poirier JL, Bonifacj C, Jaffiol C, *et al.* Increased prevalence of soft tissue hand lesions in type 1 and type 2 diabetes mellitus: Various entities and associated significance. *Diabetes Metab* 1994;20:513-21.
- Gamstedt A, Holm-Glad J, Ohlson CG, Sundstrom M. Hand abnormalities are strongly associated with the duration of diabetes mellitus. *J Intern Med* 1993;234:184-93.
- Leden I, Schersten B, Svensson B, Svensson M. Locomotor system disorders in diabetes mellitus: Increased prevalence of palmar flexor tenosynovitis. *Scand J Rheumatol* 1983;12:260-62.
- Balci N, Balci MK, Tuzuner S. Shoulder adhesive capsulitis and shoulder range of motion in type II diabetes mellitus: Association with diabetic complications. *J Diabetes Complications* 1999;13:135-40.
- Arkkila PE, Kantola IM, Viikari JS, Rönnemaa T. Shoulder capsulitis in type I and II diabetic patients: Association with diabetic complications and related diseases. *Ann Rheum Dis* 1996;55:907-14.