IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 15, Issue 6 Ver. IX (June 2016), PP 51-54
www.iosrjournals.org

Rheumatological Manifestations in Diabetes Mellitus: Distribution And Associated Factors

Tapas Kumar[1], Adwitiya Das[2*]
[1](Assissant Professor, Department Of General Medicine, IQ City College And Hospital, Durgapur, India)
[2](Demonstrator, Department Of Community Medicine, Medical College Kolkata, India)

Abstract: *Rheumatological manifestations are frequently observed in diabetes. The present study aims at estimating the prevalence of rheumatological conditions associated with diabetes, and finding out the covariates of increased prevalence of these manifestations. Out of 120 diabetics, 64(53.33%) had some form of rheumatological problem. Osteoarthritis was the most commonly encountered condition (50% of all patients with rheumatological problems), followed by adhesive capsulitis and limited joint mobility. Presence of rheumatological manifestations was associated with increasing age, greater body mass index and poor glycemic control.*
Keywords: *Adhesive Capsulitis, Diabetes mellitus, Glycemic control, Osteoarthritis, Rheumatological manifestations*

I. Introduction

India, the second most populous country of the world, boasts the second highest population of Diabetics (65.1 million), after China (98.4 million), as per the International Diabetes Federation (2013). [1] The conventional risk factors of urbanization, unhealthy dietary practices as well as physical inactivity, coupled with inherent genetic attributes and differences in body composition are propelling the increase in prevalence of diabetes. Accordingly, diabetes related complications are also on the rise and contribute significantly to the overall morbidity and mortality. The major complications of diabetes are classified as micro-vascular and macro-vascular. But the long-term and often infrequently addressed complications like those involving the musculo-skeletal system can be more debilitating by causing limitation of movement, thereby creating a vicious cycle of poor glycemic control and reduced quality of life. [2] Although the precise etiology of diabetes-associated musculoskeletal disorders remains elusive, evidence indicate, hyperglycemia may accelerate non-enzymatic glycosylation and abnormal collagen deposition in periarticular connective tissues, which in turn alter the structural matrix and mechanical properties of the musculo-skeletal tissues leading to diffuse arthrofibrosis and stiffness. [3,4]

Although researchers have occasionally dealt with the prevalence and types of various musculoskeletal manifestations, studies exploring the factors associated with the coexistence of rheumatological manifestations and diabetes mellitus are scarce. Studies from India are fewer and mostly non-analytical. The present study was undertaken to find out the distribution of different musculoskeletal problems in Indian diabetic population and the factors associated with this occurrence.

II. Methodology

This cross-sectional study was carried out on 120 randomly selected individuals with documented type 1 or type 2 diabetes mellitus(DM) attending the Medicine OPD of MGM Medical College & LSK Hospital, Kishanganj for a period of November 2012 to July 2013. After obtaining informed written consent, each and every person was subjected to a thorough medical history with special emphasis regarding time since diagnosis of Diabetes and presence of complications, if any. A detailed clinical examination was undertaken on each patient with special emphasis on the examination of musculoskeletal system. Patients with other forms of diabetes (Cushing's), documented diabetic nephropathy and those primarily diagnosed as having rheumatoid arthritis, systemic lupus erythromatosis and other connective tissue disorders, those with non-rheumatological causes having rheumatological manifestations in association with diabetes mellitus (eg, cerebro-vascular accident with frozen shoulder, Dupuytren's contracture due to alcoholism) as well as those with end stage renal disease were excluded. Data collected included age, sex, body mass index and duration of diabetes, musculoskeletal problems encountered, if any. Routine investigations including complete blood count, urine analysis, fasting and post-prandial plasma glucose, serum uric acid and urea, creatinine, calcium and lipid profile were done. Long-term glycemic control was assessed by hemoglobinA1c (HbA1c) levels. Only those patients with normal renal parameters, uric acid and calcium were considered for inclusion in the study. X ray of the involved joints were done. Blood glucose level estimation was done by glucose-oxidase method in venous blood. HbA1C estimation was done by ion exchange chromatography. Musculoskeletal complications

assessment was done by clinical examinations and X-ray. A trained physician proficient in Rheumatology made the clinical diagnosis of the musculoskeletal problems. Diagnosis of Dupuytren's contracture was based on one or more of the following features: palmar or digital nodule; tethering of palmar or digital skin; a pre-tendinous band and a digital flexion contracture. Trigger finger was diagnosed by palpating a nodule or thickened flexor tendon with locking phenomenon during extension or flexion of any finger.[5] Diagnostic criteria of adhesive capsulitis (AC) was patients with pain in the shoulder for at least 1 month, inability to lie on the affected shoulder, and restricted active and passive shoulder joint movements in at least three planes.[6,7] Cheiroarthropathy or Limited Joint Mobility (LJM) was evaluated by the "prayer sign".[8] Diffuse idiopathic skeletal hyperostosis (DISH) required radiographic finding of involvement of at least 4 contiguous vertebrae of the thoracic spine, preservation of the intervertebral disc space, and absence of apophyseal joints or sacroilitis.[9] Statistical analysis was done in SPSS version 16.0. Data are presented as mean, standard deviation (S.D.) for continuous variables, and in absolute numbers and percentages for the discrete variables. The data was checked for normality and independence, following which, a bivariate analysis was done to ascertain the association presence of rheumatological manifestations(dependent variable) in diabetic subjects with selected variables. Only those found to be significant, were entered into a multiple logistic model (LINK FUNCTION= LOGISTIC) by ENTER method. Diagnostic tests were done after modeling to assess goodness-of-fit and assumptions pertaining to logistic regression. A 'p' value < 0.05 was considered statistically significant. The study obtained clearance from the Institutional Ethics Committee.

III. Results

A total of 120 study subjects were recruited, out of which 64 had various rheumatological manifestations, details shown in Table 1 and 2. There was also significant overlapping in the different rheumatological manifestations. OA was the most commonly encountered rheumatological condition in our study population (50%), followed by adhesive capsulitis (45.31%). All four patients with type 1 DM had LJM involving both hands, but did not have any other rheumatological problem. On multivariate analysis, age $\geq$ 50 years [1.73(1.08-7.86)], BMI $\geq$ 25Kg/metre^2 [2.04(1.72-6.03)], HbA1C level [2.16(1.40-13.53)] were associated with higher odd's of having rheumatological manifestations in diabetic study subjects. (Table 3)

IV. Tables

Table 1: Baseline characteristics of the study population (n=120)

Variables	Mean ± Standard Deviation	Range
Age (years)	55.43 ± 9.86	14-73
Time since diagnosis (years)	6.04 ± 2.27	1-12
Body Mass Index(kg/metre^2)	28.12 ± 3.84	16.56-33.25
Glycosylated haemoglobin (HbA1C)	7.46 ± 0.93	6.7-9.9
Male : Female	69:51	
Type 1 DM : Type 2 DM	4:116	
Rheumatological problems Present : Absent	64:56	

Table 2: Distribution of the study population according to their rheumatological manifestations. (n=64)*

Rheumatological manifestations	Male Number(%)	Female Number(%)	Total Number(%)
Limited joint mobility	10(26.32)	14(53.85)	24(37.5)
Adhesive capsulitis	21(55.26)	8(30.77)	29(45.31)
Dupuytren contracture	6(15.79)	2(7.69)	8(12.5)
Carpal tunnel Syndrome	4(10.53)	9(34.62)	13(20.31)
Algodystrophy	1(2.63)	0	1(1.56)
Osteoarthritis	20(52.63)	12(46.15)	32(50)
DISH	2(5.26)	0	2(3.12)
Trigger Finger	1(2.63)	2(7.69)	3(4.69)

* Not mutually exclusive. Numbers in the parentheses indicate percentage.

Table 3: Factors associated with rheumatological manifestations in diabetic study subjects. (n=120)

Factors	Patients with Rheumatological manifestations/ Total patients in the group	Odds ratio (95% CI)	Adjusted odds ratio (95% CI)
Age (years)	<50 years(22/54)	Ref	Ref
	≥ 50 years(42/66)	**2.55(1.22-5.33)**	**1.73(1.08-7.86)**

Gender	Male(38/69)	Ref	
	Female(26/51)	0.85(0.41-1.35)	-----
Duration of diabetes diagnosis (years)	<5 years(28/58)	Ref	
	≥ 5 years(36/62)	1.48(0.72-3.05)	-----
Body Mass Index (kg/metre^2)	<25(13/48)	Ref	Ref
	≥ 25(51/72)	**6.53(2.90-14.77)**	**2.04(1.72-6.03)**
HbA1C level	<7(10/38)	Ref	Ref
	≥7(54/82)	**5.4(2.30-12.69)**	**2.16(1.40-13.53)**

V. Discussion

Our study revealed that 53.33% of the study subjects had some rheumatological manifestations along with diabetes, higher than similar other studies [10, 11] but lower than the prevalence found by Agrawal et al. [12] OA (50%), adhesive capsulitis (45.31%) and LJM (37.5%) were among the most common rheumatological manifestations in the present study. There was significant overlapping in the different rheumatological manifestations, and many of the patients had more than one musculoskeletal manifestation. The prevalence of OA in other similar studies was reported to be around 29% (Sarkar et al), however, a recent study undertaken in Morocco showed prevalence of OA similar to our study. [13, 14] OA knee was universally present in all OA patients in our study, and 9 patients with OA knee had co-existent OA hip. All of them had BMI more than 30. Adhesive capsulitis was also frequently observed in our study population. Studies have reported prevalence of 20-30% among DM patientsthough we found a somewhat higher prevalence of 45.31%.[12, 13] LJM or chieroarthropathy was present in 37.5% patients. First described by Jung et al. in adult diabetics, LJM is a condition of stiffness principally involving the hands but may occasionally extends to the proximal upper extremities and spine.[15] Agarwal reported LJM in 22.6% patients, while Raj et al found LJM in 30.1%.[12, 16] We found lower incidence of Dupuytren's contracture compared to Sarkar et al, who found it to be the most common rheumatological manifestation in their study population.[13] Charcot's neuroarthropathy was not observed in any patient, though we encountered rare entities like algodystrophy and DISH in a few patients. On multivariate analysis, presence of rheumatological problems was strongly associated with age of the patient, BMI and glycemic control, similar to the observations of Agarwal et al.[12] Mathew et al observed that duration (OR: 1.467; 95% CI: 1.210-1.779) and severity of Type 2 DM were identified as the risk factors for rheumatological manifestations.[17] However, similar study from Morocco showed increased association of diabetic neuropathy, diabetic retinopathy, poor adherence to medication and lack of physical activity with different musculoskeletal problems in diabetics.[14] It is well established that the most important risk factor for future rheumatologic manifestations in diabetes is poor glycemic control. [18-22] Our observations conform to this fact.

In spite of limitations like small sample size and unicenter model, this study takes an important step towards exploring the inter-relationship of various predictors for development of rheumatological manifestations.

VI. Conclusion

The present study clearly points out that rheumatological manifestations are common in patients with DM, and development of these manifestations is associated with glycemic status, age and BMI. Future studies with larger sample size are required to substantiate this observation.

Acknowledgements

Patients, who gave us their valuable time and shared their medical and clinical information

References

[1]. Guariguatl L., Whiting D.R., Hambleton I., et al. Global estimates of the prevalence of diabetes for 2013 and projections for 2035 for the IDF Diabetes Atlas. Diabetes research and clinical practice. February 2014,Volume 103, Issue 2, Pages 137–149.
[2]. Singla R, Gupta Y, Kalra S. Musculoskeletal effects of diabetes mellitus. J Pak Med Assoc. 2015 Sep;65(9):1024-7.
[3]. Stahl S, Kanter Y, Karnielli E. Outcome of trigger finger treatment in diabetes. J Diabetes Complications 1997;11:287-90.
[4]. Bridgman JF. Periarthritis of the shoulder and diabetes mellitus. Ann Rheum Dis 1972;31:69-71.
[5]. Fitzgibbons PG, Weiss AP. Hand manifestations of diabetes mellitus. J Hand Surg Am 2008;33:771-5.
[6]. Rosenbloom AL, Silverstein JH. Connective tissue and joint disease in diabetes mellitus. Endocrinol Metab Clin North Am 1996;25:473-83.
[7]. Goldberg BA, Scarlat MM, Harryman DT 2nd. Management of the stiff shoulder. J Orthop Sci 1999;4:462-71.
[8]. S Coley, RD Situnayake, MJ Allen.Compartment syndrome, stiff joints, and diabetic cheiroarthropathy. Ann Rheum Dis. 1993 Nov; 52(11): 840.
[9]. Resnick D, Niwayama G. Diagnosis of bone and joint disorders. 2nd ed. Philadelphia: WB Saunders; 1988:1563-615.
[10]. Bridgman JF. Periarthritis of the shoulder and diabetes mellitus. Ann Rheum Dis 1972;31:69-71.

[11]. Raj S, Rajan G V, 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
[12]. Agrawal RP, Gothwal S, Tantia P, Agrawal R, Rijhwani P, Sirohi P, Meel JK. Prevalence of Rheumatological Manifestations in Diabetic Population from North-West India. J Assoc Physicians India. 2014 Sep;62(9):788-92.
[13]. Sarkar P, Pain S, Sarkar RN, Ghosal R, Mandal SK, Banerjee R. Rheumatological manifestations in diabetes mellitus. J Indian Med Assoc. 2008 Sep;106(9):593-4.
[14]. Abourazzak FE, Akasbi1 N, Houssaini GS, et al. Articular and abarticular manifestations in type 2 diabetes mellitus. Eur J Rheumatol 2014; 4: 132-4.
[15]. Jung Y, Hohmann TC, Gerneth JA, Novak J, Wasserman RC, D'Andrea BJ, et al. Diabetic hand syndrome. Metabolism 1971;20:1008-15.
[16]. Raj S, Rajan G V, 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.
[17]. Mathew AJ, Nair JB, Pillai SS. Rheumatic-musculoskeletal manifestations in type 2 diabetes mellitus patients in south India. Int J Rheum Dis. 2011 Feb;14(1):55-60.
[18]. Savaş S, Köroğlu BK, Koyuncuoğlu HR, Uzar E, Celik H, Tamer NM. The effects of the diabetes related soft tissue hand lesions and the reduced hand strength on functional disability of hand in type 2 diabetic patients. Diabetes Res Clin Pract 2007; 77: 77-83.
[19]. Geoghegan J, Clark D, Bainbridge L, Smith C, Hubbard R. Risk factors in carpal tunnel syndrome. J Hand Surg Br 2004; 29: 315-20.
[20]. Kameyama M, Meguro S, Funae O, Atsumi Y, Ikegami H. The presence of limited joint mobility is significantly associated with multiple digit involvement by stenosing flexor tenosynovitis in diabetics. J Rheumatol 2009; 36: 1686-90.
[21]. Monnier VM, Bautista O, Kenny D, Sell DR, Fogarty J, Dahms W, et al. Skin collagen glycation, glycoxidation, and crosslinking are lower in subjects with longterm intensive versus conventional therapy of type 1 diabetes. Diabetes 1999; 48: 870-80.
[22]. Thomas SJ, McDougall C, Brown ID, Jaberoo 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.