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ABSTRACT:

Long standing uncontrolled diabetes is associated with many clinical problems and it frequently involves hands and shoulder causing stenosing tenosynovitis (trigger finger), Dupuytren's contracture, carpal tunnel syndrome, limited joint mobility and shoulder capsulitis. The prevalence of hand symptoms has been variable in different studies. Data from our part of world is scarce. Our study aimed at looking at frequency of these hand symptoms with duration of the diabetes.

KEY POINTS

Diabetes mellitus, duration, musculoskeletal problems.

INTRODUCTION

Diabetes mellitus (DM) is a chronic disease characterized by high blood glucose, either due to decrease/absent insulin production by pancreas or when body cannot utilize it as effectively as it is produced. Long standing uncontrolled diabetes is associated with many clinical problems as DM involves many body systems it may also affect musculoskeletal system in many ways probably due to periarticular changes¹. There is more prevalence of musculoskeletal (MSK) disorders of the shoulder and the hand in DM patients compared with the general population². Among the musculoskeletal manifestations, capsulitis and tendonitis are the commonest in shoulder and carpal tunnel syndrome (CTS), Dupuytren's contracture (DCT), trigger finger and limited joint mobility (LJM) were the commonest abnormalities in the hand³. The frequency of these features varies greatly approximately 10 to 50% in different studies^{2,4,5,6,7}.

Whether locomotor manifestations are result of uncontrolled diabetes or due to duration of disease is

controversial. Some studies have identified association of locomotor disabilities with uncontrolled diabetes or with its complications like neuropathy or retinopathy^{8,9,10,11} while other studies could not^{5,12}. Some study also found link with the duration of DM^{2,4,5,6,13,14}. The published studies are mostly from non Asian countries including USA², Australia⁶, Europe UK⁷, Poland¹⁵ and Greece¹⁶ the data from the Asian population is scarce¹⁷.

A similar study was conducted in Pakistan by Saera Suhail Kidwai group et al in a tertiary care hospital located in a low socioeconomic stratum in Karachi, Pakistan¹⁸. The aim of study was to look for the frequency of upper limb musculoskeletal abnormalities in Type 2 diabetes mellitus. In their study of , 210 subjects with Type 2 diabetics, the frequencies of hand region abnormalities were significantly higher in the diabetic subjects as compared to the controls (20.4%, p-value <0.001). The study could not find correlation between the frequencies of these abnormalities and control of diabetes. However they did note a weak but positive relationship between the age and duration of

diabetes. Several studies have found correlation with the durations^{1,21,22,24}. The aim of our study was to find this correlation between duration of diabetes and hand manifestations.

METHODS AND MATERIALS

Our study was conducted in Liaquat National Hospital one of the large hospital of city covering major areas of patients referrals. The study was a comparative cross sectional observational study and was conducted in collaboration of department of neurology and endocrinology.

We included randomly patients who attending the diabetic clinic of LNH hospital in one month. Patients were categorized as having diabetes for five years and above. Patients were screened for presence or absence of tenosynovitis (trigger finger), Dupuytren's contracture, carpal tunnel syndrome, limited joint mobility and shoulder capsulitis. These modalities were assessed clinically by a trained doctor. The data was compiled and analyzed on IBM SPSS statistics version 21. Exclusion criteria included patients with liver disease, rheumatologic diseases, any vasculitic diseases or any local injuries

The modalities were defined as following

Stenosing tenosynovitis (trigger finger): palpable nodule or thickened flexor tendon with locking phenomenon during flexion or extension of any finger of both hands.

Dupuytren's contracture: flexor deformity of 2nd, 3rd, 4th and 5th finger.

Carpal tunnel syndrome: labeled if has positive Tinnel sign, or Phalen test. Tinnel sign was defined as pain triggered by the percussion of the carpal tunnel along the course of the median nerve.

While Phalen test is positive if patient feels paresthesia on holding the hands against each other in full palmer flexion, (between 30 to 120 second in this position).

Limited joint mobility; hand stiffness resulting from flexion contractures of the fingers and by thickened, tight, waxy skin of the wrists Diagnosed clinically

by two simple clinical test

1) **Prayer sign**, if there is space between both hands when put together in a praying position with the fingers pressing together the palmar surfaces of the inter phalangeal joints and the palms¹⁹.

2) **The tabletop test** is considered positive if there is space between the hand and the table top when patient places his hands palms-down on a tabletop with the fingers spread²⁰.

SAMPLE AND SAMPLING TECHNIQUE

The sample size was calculated by formula using single population proportion, with assumption of 5% level of significance, marginal error of 5%, and 10% non response rate. On average around 35 patients visit the diabetic clinic per day. Therefore, during one months of data collection it will be 1050 diabetic patient. The required sample size was obtained by the following formula $n = z^2 p (1-p)/d^2$. The calculated number was 309.

(n=sample size, p=prevalence, d=margin of error):

RESULTS

Out of 309 patients only 86 patients had symptoms. Hand symptoms were significantly associated with the duration of diabetes mellitus ($p=0.0001$) as seen in table 1. Among hand symptoms significant association was found between carpal tunnel syndrome ($p=0.0001$) and limited joint mobility ($p= 0.053$) details in table 1. Our study found strong association between CTS and LJM; about 75% of patients with LJM had C T S with p - value 0 . 0 0 1 . However Trigger finger, Dupuytren's contracture and shoulder capsulitis were not significantly associated with duration of DM.

DISCUSSION

Our study showed significant association for presence of musculoskeletal abnormalities (P value<0.000), Among the different modalities Carpel tunnel syndrome, and limited joint mobility showed association with duration of diabetes (greater than 5 years). Our results are in concordance with the world literature.

However our results were different from world literature

in four main categories.

We could not find LJM as frequent as seen in Indian¹⁷ and UK⁷ studies where it was seen almost in 20 % of patients as compare to 6.5% in our cohort. While a similar study from turkey⁵ shows none of their diabetic had LJM. Our results seem to correlate with our sister study done in Karachi in 2011 by Sera et al. According to their study LJM was seen in 9.5 % patients, but in our study it was found to be significantly associated with the duration of diabetes, a finding that is consistent with world literature^{9,10,21}. Dupuytren's contracture (DC) was pretty high in other studies world wide ranging from 13% to 28%. While in our study it was only 0.6% and not significantly associated with DM. A similar finding noted by our colleagues SERA et al who also noted it to be 1% and study done in Saudi Arabia by Suzan Mattar (0.4%) We agree with their conclusion of this finding as it might have been high in world literature due to alcohol consumption. We can argue this by comparing with our neighbor Indian data where it was 28% as they have higher alcoholic consumption.

Our study failed to show significant association between shoulder capsulitis as compare to other studies. The reason of which is not clear. Different study shows high prevalence of shoulder capsulitis in diabetic patients ranging from 11 to 29%^{2,24}.

Trigger finger is also under diagnosed hand disorder seen frequently in diabetic patients. It has been

recorded in 10% of diabetic patients compare to general population where it is 2-3%. It was found to be associated with the duration of diabetes but not with glycemic control^{21,25,26}. However it was not significant in our study, only about 1%. Among musculoskeletal hand abnormalities, CTS was the most common finding in our study, approximately 22%. A study by Ramchurn⁷ and Chammaus²¹ et al showed similar results, 20 and 25% CTS respectively.

Several complications may occur at same time and may have association with each other. A study from Japan shows significant association between flexor tenosynovitis (Trigger finger) and limited joint mobility²⁷. Our study found strong association between CTS and LJM; about 75% of patients with LJM had CTS with p-value 0.001.

As the aim of our study was to see the relation between the duration of diabetes and onset of hand symptoms, our study showed that musculoskeletal manifestations were significantly associated with the duration of diabetes. Comparing with our sister study with Sera et al, which showed positive but weak relation with the duration of DM. However majority of studies in world literature show the involvement of musculoskeletal has significant association with the duration of diabetes, and not with the level of glycemic control^{9,10,16,22,28}. Table 2 shows an overall comparison between different studies all over the world and our study in a tabulated form.

Table 01: Showing association of duration of diabetes with hand symptoms.

	Duration of DM	Present	Absent	total	Fisher's Exact Test
Presence of hand symptoms					0.00
	<5 years	18	96	114	
	>5 years	68	127	195	
Carpal tunnel syndrome					0.002
	<5 years	9	105	114	
	>5 years	59	136	195	
Limited joint mobility					0.053
	<5 years	3	111	114	
	>5 years	17	178	195	
Duptryns contracture					0.397
	<5 years	0	114	114	
	>5 years	2	193	195	
Trigger Finger					0.693
	<5 years	1	113	114	
	>5 years	2	193	195	
Shoulder Capsulitis					0.381
	<5 years	5	109	114	
	>5 years	6	189	195	

Table 02 :

Musculoskeletal abnormalities in diabetic patients in upper limb comparison with international data:

	Britain Ramchurn et al. [17] (2009) n=96	Australia Smith et al. [20] (2003) Prevalence	America Cagliero et al. [16] 2002) n=96 =100	India Sarkar et al. [21] (2008) n= 80	Turkey Ardic et al. [15] 2003) n=78	Pakistan Saera et al. [6](2013) n=210	Pakistan Hazim et al. (2016) N=309
Trigger finger	29%	11%	3%	5%	3.8%	3.8%	1%
Dupuytren's contracture	13%	20-63%	16%	28.7%	21.8%	1%	0.6%
Carpal tunnel syndrome	20%	11-16%	12%	3.7%	1.3%	9%	22%
Limited joint mobility	28%	8-50%	NA	20%	0 %	9.5%	6.5%
Shoulder capsulitis	25%	11-30%	12%	23.7%	12.8%	11%	3.6%

CONCLUSION

The development of hand symptoms seems to have association with duration of diabetes mellitus. These symptoms need to be actively asked for as patients may not render this information .

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Author's contribution:

Hazim Brohi; concept, data collection, data analysis, manuscript writing, manuscript review
Rajesh Kumar; data collection, data analysis, manuscript writing, manuscript review
Aqiba Sarfaraz; data analysis, manuscript writing, manuscript review
Tahira Parveen Umer; data analysis, manuscript writing, manuscript review
Muhammad Usman; data collection, data analysis, manuscript writing
Syed Ijlal Ahmed; data analysis, manuscript writing, manuscript review