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Upper Limb Musculosketal Disorder in Type 2 Diabetes Mellitus: A Cross Sectional Study

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ABSTRACT

Introduction: Type 2 Diabetes mellitus (T2 DM) is common metabolic, chronic, multisystem disease involves joints, soft tissues and periarticular structures. The aim of our study was to investigate the type of upper limb musculoskeletal disorders (from shoulder to hand) in patients with type 2 diabetes mellitus.

Materials and Method: Cross-sectional study at Department of Physical Medicine & Rehabilitation (PMR) in tertiary care setting.221 patients with T2DMaged between 35 to 70 years of age of either sex were included. Hand trauma, Physical labourer, Inflammatory arthritis, hypothyroidism, central or peripheral nervous system disease which includes cervical radiculopathy, and alcohol intake, were excluded from the study.

Results: Out of 355 patients, 221 patients were selected and 134 patients were excluded. 58 patients of inflammatory arthritis, 23 cervical radiculopathy, 20 patient had disease duration of less than 2years, 15 had hypothyroidism, 7 was alcohol addicted, 6 labour worker, 4 had history of hand trauma and 1 had seizure. Out of 221 patients, 119 males and 102 females. Mean age was 52.45 years Mean duration of diabetes 8.9 yrs. ranged (1-24 years). The mean HbA1c was 7.3%. 42.6% of patients were overweight, 51.2% were obese & and 72.6% had hypertension. Shoulder involvement (48.86%) was the most common followed by hand (38.91%) followed by elbow in 12.16%). Adhesive capsulitis is the most frequent encountered problem found in about one third of patient, then Carpal Tunnel Syndrome in one seventh of cases, Loose Joint Mobility in one ninth& Flexor Tenosynovitis in one tenth of patient.

Conclusion: Shoulder is involved in about half of the total upper limb involvement. Adhesive capsulitis is the most common manifestation of shoulder or overall upper limb musculoskeletal involvement. Carpal tunnel syndrome is the 2nd most common followed by limited joint mobility and flexor tenosynovitis.

Keywords: *Type 2 Diabetes Mellitus, Adhesive Capsulitis, Carpal Tunnel Syndrome, Flexor Tenosynovitis, Limited Joint Mobility*

INTRODUCTION

Type 2 Diabetes mellitus (T2 DM) is continuously increasing in all section of society in India. It is a common metabolic, chronic, multisystem disease characterised by persistent hyperglycaemia that lead to a wide range of connective tissue complications by alterations in and muscle–tendon and periarticular part. [1]Musculoskeletal complications have been reported in about 36–75% of diabetic patients can also lead sometimes to severe disability. [2,3,4] These complications are heterogeneous, involving not only joints, but bones, soft tissues and periarticular structures. These musculoskeletal disorders can be divided into three categories:

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Due to intrinsic complications of diabetes, such as limited joint mobility or diabetic cheiroarthropathy, stiff hand syndrome and diabetic muscular infarction.

Increased incidence among diabetics, such as Dupuytren's contracture (DC), shoulder capsulitis, neuropathic arthropathy, flexor tenosynovitis (FTS), proximal motor neuropathy, pyomyositis and the diffuse idiopathic skeletal hyperostosis (DISH) syndrome.

Possible association with diabetes has been proposed but not proven yet, such as osteoarthritis and the carpal tunnel syndrome (CTS). [5]It is the most common entrapment disorder, characterized by combinations of specific clinical presentations. [6]Although these are seen more frequently with diabetes, but they do also occur in other non-endocrine conditions.[7]

There is paucity of literature about Diabetes & its neuromusculoskeletal involvement of upper limb in our country. Most of the searched literature were from western world. These literatures are mainly focusing either on diabetic hand or shoulder. The aim of our study was to investigate the type of upper limb musculoskeletal disorders (from shoulder to hand) in patients with type 2 diabetes mellitus followed up at the Department of Physical Medicine & Rehabilitation (PMR).

MATERIALS AND METHOD

This cross-sectional study was conducted on 221 patients with T2DM aged between 35 to 70 years of age of either sex and disease duration of more than 2 years included in the study. Patients with a history of hand trauma, had or doing strenuous work, inflammatory arthritis, epilepsy, hypothyroidism, family history of DC, central or peripheral nervous system disease which includes cervical radicular pain (radiculopathy), thoracic outlet syndrome, symptoms suggestive of diabetic neuropathy in the lower limb, and alcohol intake, were excluded from the study. Ethical Approval was obtained from Institute.

T2DM patients complaining of Pain, stiffness or neuromusculoskeletal problems in upper limb attending either directly to PMR OPD or referred from Endocrinology OPD were taken in this study. Study duration was 15 months from January 2017 to March 2018. All patients were evaluated by a single Physiatrist (PMR specialist). Demographic & other clinical parameter like age, sex, height, weight, body mass index, blood pressure, duration of diabetes, glycaemic control (HbA1c) of patients were noted. The diagnosis was made clinically as defined below and also supported by Neuromuscular Ultrasound if required.

Rotator cuff tendinitis is diagnosed as history of (h/o) pain in the deltoid region and pain on resisted active movement (abduction– supraspinatus; external rotation – infraspinatus; internal rotation – subscapularis).

Shoulder capsulitis (frozen shoulder) h/o pain in the deltoid area and equal restriction of active and passive glenohumeral movement with capsular movement (external rotation > abduction >internal rotation)

Lateral epicondylitis: lateral epicondylar pain and tenderness and pain on resisted extension of the wrist.

Medial epicondylitis: Medial epicondylar pain and tenderness and pain on resisted flexion of the wrist.

Limited joint mobility was considered present if one or more interphalangeal or metacarpophalangeal joints failed to make a contact when the patient was asked to oppose the palmar surfaces of the fingers in a praying position with the wrist maximally flexed 'Prayer sign'. [8]

Dupuytren's contracture was diagnosed if there was a palpable nodule along flexor tendons, tethering of the palmar or digital skin, a pretendinous band or a digital flexion contracture.

Trigger finger or flexor tenosynovitis was diagnosed if there was locking upon flexion in extension of any finger, or there was thickened flexor tendon over the metacarpophalangeal joint. [9]

Carpal tunnel syndrome was considered if there was a dull, aching discomfort in the hand, forearm or upper arm, paraesthesia in the hand, dryness of the hand, increase in symptoms during sleep and improvement by shaking the wrist. Tinel's and Phalen's signs with pin prick test were also performed on each patient who had symptoms suggestive of CTS. [10] Electromyographic nerve conduction studies were not part of the required criteria for the diagnosis of CTS in our study but Ultrasound (US) was to see the thickness of median nerve & any dynamic causes resulting in CTS symptoms to exclude.

RESULTS

Out of 355 patients, 221 patients were selected for

study. 134 patients were excluded from study in which 58 patients of inflammatory arthritis, 23 cervical radicular pain or radiculopathy, 20 patient had disease duration of less than 2years, 15 had hypothyroidism, 7 was alcohol addicted, 6 labour worker, 4 had history of hand trauma and 1 had seizure.

Out of 221 patients, 119 males and 102 females were evaluated in detail as described. Mean age was 52.45 (range 35-70) years. The duration of diabetes ranged between 2-24 years (mean 8.9 yrs). The mean HbA1c was 7.3%. 62.5 % of the patients had HBA1c levels of 7% or more. About 42.6% of patients were overweight, 51.2% were obese & and 72.6% had hypertension.

Shoulder involvement (48.86%) was the most common followed by hand (38.91%) followed by elbow in 12.16% (see fig 1for detail). Adhesive capsulitis (Frozen shoulder is the most frequent encountered problem found in about one third of patient, then CTS in one seventh of cases, LJM in one ninth and FTS in one tenth of patient. (Table 1)

Few patients had both Adhesive capsulitis and RC tendinitis, and some had both RC tendinitis and shoulder OA.36 epicondylitis cases were diagnosed in which 18 patients had only lateral epicondylitis while 9 has both medial and lateral epicondylitis. Similarly, some patient had two or more diagnosis of hand.

Table 1: Upper extremity musculoskeletal disorders cases. RC- rotator cuff, LJM- Limited joint mobility, DC-Dupuytren's contracture, FTS-Flexor tenosynovitis (Trigger finger), CTS- Carpal tunnel syndrome.

Diagnosis	No. of Cases in Males %	No. of Cases in Female %	Total No. %
Adhesive Capsulitis	48 (33.3%)	43 (30.93%)	91 (32.15%)
RC tendinitis	21 (14.58%)	18 (12.94%)	39 (13.78%)
Shoulder OA	7 (4.86%)	7 (5.03%)	14 (4.98%)
Epicondylitis	17 (11.80%)	19 (13.66%)	36 (12.72%)
L J M	17 (11.80%)	15 (10.79%)	32 (11.30%)
DC	2 (1.38%)	1 (.71%)	3 (01.06%)
FTS	14 (9.7%)	16 (11.51%)	30 (10.60%)
CTS	18 (12.5%)	20 (14.3%)	38 (13.42%)
Total diagnosis	144	139	283 (100%)

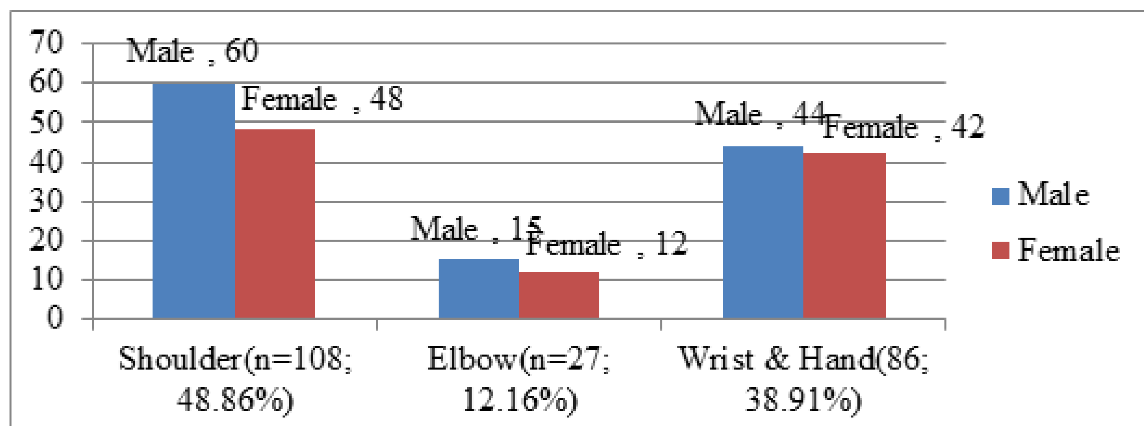

Fig1: Upper limb musculoskeletal diagnosis at Shoulder in either sex (Adhesive Capsulitis, RC tendinitis, shoulder OA), Elbow (epicondylitis), Hand (LJM, DC, FTS, CTS)

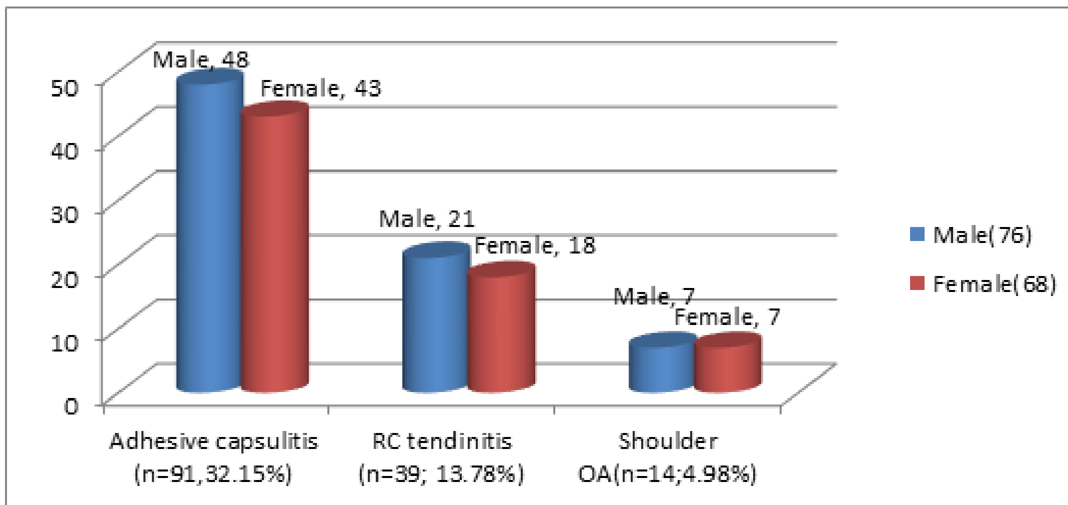

Fig 2: Comparative diagnosis at shoulder for 60 males with 76 diagnosis&48 females with 68 diagnoses (RC- Rotator cuff, OA – Osteoarthritis)

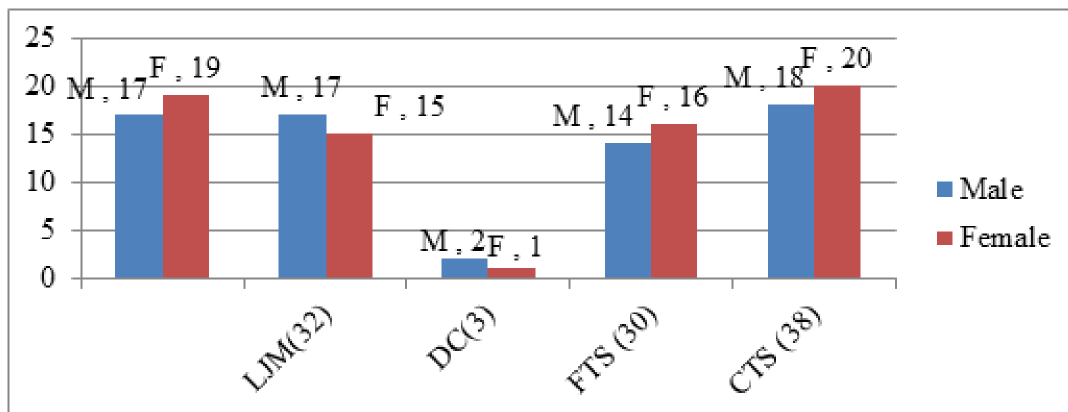

Fig 3: Comparative Diagnosis at elbow and Hand, LJM- Limited joint mobility, DC-Dupuytren's contracture, FTS-Flexor tenosynovitis (Trigger finger), CTS- Carpal tunnel syndrome.

DISCUSSION

Musculoculoskeletal disorders are common as well as linked toT2DM. Some seems to be due to duration of the disease or may be related to poor glycaemic control of the disease. Few disorders may not cause very severe pain or disability yet could be marker of microvasculation complication. These things are not very clear till now. Most of the Epidemiological studies are done on diabetic hand and some on diabetic shoulder.

Our study includes musculoskeletal disorder of upper limb from shoulder to hand including elbow. Shoulder disorder were the most common, seen in about half of the patients. Although we have not come across in other studies as such. But frozen shoulder (adhesive capsulitis) was found in four- fifth of the shoulder case which is nearly similar to previous findings.[11] Other common condition leading to pain are calcific periarthritis, shoulder hand syndrome, amyotrophy of shoulder girdle, shoulder OA, & shoulder joint infection. Some patients were detected to have T2DM when came for treatment of adhesive capsulitis. But these patients are not included in study. So, we observed more than 50% T2DM patients had shoulder pain and disability as upper limb musculoskeletal complaint. So, we suggest any patient coming with shoulder pain and stiffness, screening of T2 DM should be warranted.

Epicondylitis is relatively common among working-age individuals in the general population. Physical load factors, smoking, and obesity are strong determinants of epicondylitis.[12]A higher incidence of upper extremity tendinitis found with obesity.[13]We excluded the physical load factor from our study & found that in T2DM combined lateral and medial epicondylitis was more common in women similar to other epidemiological study. [13]A Japanese study on 1777 diabetic -Subjects with definite chronic hyperglycaemia (HbA1c $\geq$ 6.5) showed a 3.37-times higher risk of lateral epicondylitis than

those with favourable glycaemic control (HbA1c < 5.5).[14] So Chronic hyperglycaemia might be one of the risk factors for lateral epicondylitis.

In diabetic Hand, CTS was most common (38%), LJM & FTS 30% each and DC (3%) only in our study. In a study by Al Matubsi et al they (Diabeteic Nurses) diagnosed nearly similar CTS & LJM % but FTS was found in only 10.7% & DD was 17.6%. [15] We have also utilized High frequency ultrasound for FTS. In another Taiwan based population study found CTS was the frequently followed by FTS, LJM and DC almost like our study. [16] Diagnosis of diabetic hand Limited joint mobility (LJM) is simple and non-invasive, and thus is a useful method for assessment of subclinical atherosclerosis in patients with type 2 diabetes. [17]

In addition to CTS diagnosis, sonographic measurement of Cross sectional area (CSA) could also give additional information about severity of median nerve involvement. We have measured CSA of median nerve at distal forearm crease ranging from 10 to 14.5 mm2 verses normal side ranging 7.8 to 10.2 mm2.Using of US may cost-effectively reduce the number of NCS in patients with suspected CTS.[18] However, US did not reveal any statistically significant relationship between CTS and DM. DM patients showed increased CSA and Wrist Forearm Ratio values compared to patients without DM. [19] For independent US assessment for CTS distinct cut-off values for patients with DM are necessary. [20]In mild cases of CTS, US did not detect more anomalies than NCV and vice versa, and no anomalies were detected with either diagnostic instrument in 23.5% of mild cases.[21] It seems symptoms of CTS in patients with T2DM are related to CSA of the median nerve, which is consistent with swelling of the nerve.[22]

There is some limitation of the study like control arm is not taken for comparison. Patient attending to PMR OPD were only taken. Antidiabetic medications are not evaluated. Diagnosis were made clinically. However, in doubt to confirm or exclude US was performed.

CONCLUSION

Shoulder is involved in about half of the total upper limb involvement. Adhesive capsulitis is the most common manifestation of shoulder or overall upper limb musculoskeletal involvement. Carpal tunnel syndrome is the 2nd most common followed by limited joint mobility and flexor tenosynovitis.

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Conflict of Interest: None

Ethical Clearance: Taken

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