Original Article

Age, Gender and Side Distribution of Adhesive Capsulitis of Shoulder Among Diabetic Patients

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Abstract

Background: *Diabetes mellitus is a heterogeneous condition characterized by hyperglycaemia because of defects in insulin secretion, insulin resistance/action or combination of both of these factors. Many population-based studies established the association of shoulder pain and/or stiffness with diabetes mellitus. Adhesive capsulitis (AC) is the progressive painful restriction in range of movement and can reduce function and quality of life.* ***Materials and Methods:*** *This cross-sectional observational study was carried out in the outpatient department of Physical Medicine and Rehabilitation, Dhaka Medical College & Hospital (DMCH), Dhaka from July 2021 to June 2022 with ethical clearance from respective IERB. A total of 122 diabetic patients with adhesive capsulitis attending the study place were selected by purposive sampling. The patient's pain was recorded using the visual analogue scale (VAS). Movements of the affected shoulder joint were measured by using a goniometer. The validated Bangla version of Shoulder Pain and Disability Index (SPADI) was used to assess functional status. Variables were expressed as mean ± standard deviation (SD), frequency and percentage.* ***Results:*** *In this cross-sectional observational study, a total of 122 diabetic patients with adhesive capsulitis were included in which, 60 patients (49.2%) were male and the rests 62 (50.8%) were female. The mean age of the patients was 51.9 ± 8.6 years. Among the patients, 47 (38.5%) were from the 45-54 years age group and 41 (33.6%) were from 55-64 years age group. In this study 74 patients (60.7%) had adhesive capsulitis on their right shoulder and the rests 48 (39.3%) had adhesive capsulitis on their left shoulder in this study.* ***Conclusion:*** *Adhesive capsulitis is one of the most common musculoskeletal disorders in patients with diabetes mellitus. It is recommended that diabetic patients should always be screened for the presence of rheumatic complications since early recognition lessens the chances of irreversible damage.*

Keywords: Adhesive Capsulitis, Shoulder Joint, Diabetes Mellitus.
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Introduction

Diabetes Mellitus (DM) is a chronic, multifaceted metabolic disorder with a complex pathogenesis. It is marked by elevated blood glucose levels or hyperglycemia, due to abnormalities in insulin secretion, insulin action or both[1]. Currently, DM affects 240 million people worldwide and this number is projected to increase to 380 million by 2025. Alarmingly, 80% of this burden will affect the low and middle income countries[2]. There are two main forms of diabetes: type-1 diabetes and type-2 diabetes mellitus in which type-2 accounts for 90-95% of all diabetic cases[3,4]. The long-term effects of type 2 diabetes mellitus negatively impact nearly all the body's organs. The most common of these are-macroangiopathy, retinopathy, nephropathy, neuropathy, and foot disease[5]. In addition, some musculoskeletal conditions are also reported to be common in people with diabetes mellitus. These include diabetic cheiropathy, flexor tenosynovitis, Dupuytren's contracture, carpal tunnel syndrome, adhesive capsulitis and calcific periarthritis of the shoulder, reflex sympathetic dystrophy, diabetic osteoarthropathy, diabetic muscle infarction, and diffuse idiopathic skeletal hyperostosis[6].

The most reported shoulder problem in diabetes mellitus is frozen shoulder, also known as adhesive capsulitis[7-10]. Adhesive capsulitis is a soft tissue disorder characterized by pain, rigidity and progressive loss of active and passive range of motion in the glenohumeral joint[11]. The disorder was first described by Dupley in 1896, who termed it 'periarthritis scapulohumerale'[12]. In 1945 Neviaser introduced the 'adhesive capsulitis' and described the pathologic changes in the synovium and subsynovium[13]. The current explanation of a frozen shoulder by the American Shoulder and Elbow Surgeons is "a condition of uncertain

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etiology characterized by significant restriction of both active and passive shoulder motion that occurs in the absence of a known intrinsic shoulder disorder"[12].

Adhesive capsulitis has been divided into four stages[14]: stage-1: 1-3 months painful shoulder movement, minimal restriction in motion, stage-2: 3-9 months painful shoulder movement, progressive loss of glenohumeral joint motion, stage-3: 9-15 months- Reduced pain with shoulder movement, severely restricted glenohumeral joint motion and stage-4: 15-24 months minimal pain, progressive normalization of glenohumeral joint motion. Fisher, et al.[15] showed an association between shoulder adhesive capsulitis and limited joint mobility in diabetic patients. The estimated prevalence of adhesive capsulitis is 11-30% in diabetic patients and 2-10% in non-diabetic peopple[16].

Considering such a high incidence of diabetes mellitus in our area and that it is strongly correlated with musculoskeletal abnormalities globally, it is important to know the magnitude of this relationship in our local population and the factors which are associated.

Materials and Methods

This cross-sectional observational study was carried out in the outpatient department of Physical Medicine and Rehabilitation, Dhaka Medical College and Hospital (DMCH), Dhaka from July 2021 to June 2022. A total of 122 diabetic patients with adhesive capsulitis attending the study place were selected by purposive sampling and data were collected by face-to-face interview using a semi-structured questionnaire containing all the variables of interest and fulfilling the exclusion & inclusion criteria for the study population. Patients with a history of trauma, surgery, neurological conditions affecting shoulder, rheumatoid arthritis, thyroid disorders, pain or disorders of cervical spine, elbow, wrist or hand and rotator cuff rupture and tendon calcification. were excluded from the study. Ethical approval of the study was taken from the Ethical Review Board (ERB) of DMCH (ref: DMC/ECC/2021/278). After taking verbal and written consent from each subject a complete physical examination including general physical examination, examination of shoulder joints and neck was done by the investigator.

Shoulder pain intensity was measured using the Visual Analogue Scale (VAS) (scored on a 10-point visual analogue scale). The shoulder disability was measured using the Bangla version of Shoulder Pain and Disability Index (SPADI)[17]. Active painful joint ROM for shoulder flexion, extension, abduction and external and internal rotation were measured using a goniometer. All the data was processed and analyzed using Microsoft Excel and IBM-SPSS v26.0 for Windows. Statistical inference was based on 95% confidence interval and p-value <0.05 was considered statistically significant. Variables were expressed as mean ± standard deviation (SD), frequency and percentage. The summarized data were presented in the form of tables and figures.

Results

In this cross-sectional observational study, a total of 122 diabetic patients with adhesive capsulitis were included in which, 60 patients (49.2%) were male and the rests 62 (50.8%) were female (figure-1).

Table-I: Blood glucose level of the patients (n=122)

Blood glucose	Mean ± SD	Range (min-max)
FPG (in mmol/L)	9.6±2.9	5-18
2 HPG (mmol/L)	15.4±3.9	8.9-23.2

Table-I shows the mean fasting plasma glucose level of the patients was 9.6±2.9 mmol/L and the mean 2h after plasma glucose was 15.4±3.9 mmol/L. Table-II shows that, out of the 122 patients, most patients 60 (49.2%) were housewives, 17 (13.9%) were service holder, 18 (14.8%) were businessman and 15 (12.3%) were retired person.

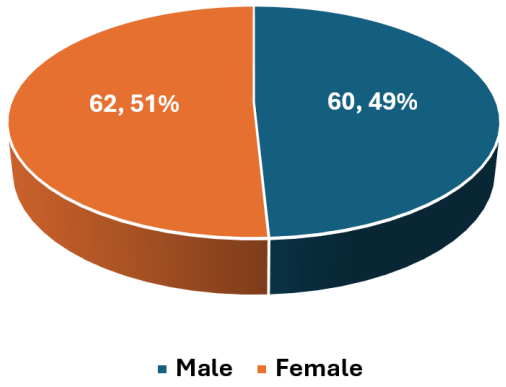

Figure-1: Distribution of gender in the study cases (n=122)

Table-II: Distribution of patients by their occupational status (n=122)

Occupational status	Frequency (n)	Percentage (%)
Housewife	60	49.2
Service holder	17	13.9
Businessman	18	14.8
Retired person	15	12.3
Others	12	9.8
Total	**122**	**100.0**

Table-II shows that, out of the 122 patients, most patients 60 (49.2%) were housewives, 17 (13.9%) were service holder, 18 (14.8%) were businessman and 15 (12.3%) were retired person.

Table-III: Distribution of patients by their age (n=122)

Age (years)	Frequency (n)	Percentage (%)
35-44	24	19.7
45-54	47	38.5
55-64	41	33.6
≥ 65	10	8.2
Total	122	100.0
Mean ± SD	**51.9 ± 8.6**	
Range	**35.0-77.0**	

Table-III shows that among the patients, 47 (38.5%) were from 45-54 years age group and 41 (33.6%) were from 55-64 years age group. The mean age of the patients was 51.9 ± 8.6 years where minimum age was 35 years and maximum age was 77 years.

Table-IV demonstrates that 74 patients (60.7%) had adhesive capsulitis on their right shoulder and the rests 48 (39.3%) had adhesive capsulitis on their left shoulder in this study.

Table-IV: Distribution of patients by side involvement of adhesive capsulitis (n=122)

Side involvement	Frequency (n)	Percentage (%)
Right Shoulder	74	60.7
Left Shoulder	48	39.3

Discussion

Adhesive Capsulitis (AC) of the shoulder is a painful, often idiopathic condition commonly seen by orthopaedic surgeons treating shoulder problems[18]. The pathology of adhesive capsulitis involves chronic inflammation of the sub-synovial layer of the shoulder capsule, even though the cause is frequently unknown (apart from the onset following trauma or surgery) leading to loss of elasticity, thickening, fibrosis, and adherence of the capsule to the humeral neck[19]. Some risk factors of adhesive capsulitis have been identified, such as obesity, hypothyroidism, and diabetes[20,21]. The prevalence of adhesive capsulitis is two to four times higher in diabetic subjects than in the general population[22].

In this study most of the subjects with adhesive capsulitis were in the age group of 45-54 years (38.5%) followed by the age group of 55-64 years (33.6%). The mean age of the patients was 51.9 ± 8.6 years. In a study by Alabdali, et al.[23] found their study that adhesive capsulitis was more commonly observed in men and women with an age of 40-50 years or above. In this study gender distribution was near equal, 60 patients (49.2%) were male and the rests 62 (50.8%) were female. Hmigthanmawii, et al.[24] conducted a cross-sectional study to measure the pain and disability in patients suffering from adhesive capsulitis of shoulder and its relationship with the stages of adhesive capsulitis. A total of 56 patients diagnosed with adhesive capsulitis of the shoulder were included in that study. The study population's mean age was 56.30 ± 8.17 (range: 40-70 years), with males making up 57.1% and females 42.9%. Pandita, et al.[25] conducted a multicenter cross-sectional study among 250 patients with diabetes mellitus that were included in this study. In that study AC was observed in 29.45% females and 24.03% males. Based on the SPADI score the diabetic patients with AC were classified into three categories Mild (1-33), Moderate (34-66) and Severe (67-100) depending upon the severity of AC. Total SPADI Score was comparatively greater in females for all the three categories.

Our study showed that 74 patients (60.7%) had adhesive capsulitis on their right shoulder and the rests 48 (39.3%) had adhesive capsulitis on their left shoulder. Ahmad, et al[26] performed a cross-sectional study of 81 diabetic patients and showed that twenty-one patients were having right, forty-five were left and fifteen were having bilateral shoulder involvement.

Conclusion

Adhesive capsulitis is one of the most commonly occurring musculoskeletal disorders in patients with diabetes mellitus. It is recommended that diabetic patients should always be screened for the presence of rheumatic complications since early recognition lessens the chances of irreversible damage. Regular physiotherapy program should be the cornerstone of diabetic management along with diet and pharmacotherapy.

Conflict of interest

The authors declared that they have no conflict of interests.

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