

Prevalence of Frozen Shoulder in Diabetic Patients

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Abstract

Background : Diabetes mellitus (DM) is a primary cause of frozen shoulder (FS) .

Aim of study : to identify the prevalence of FS in diabetic patients and its relation to age, gender, duration and control of DM .

Patients and method : 198 randomly selected diabetic patients from the attendants of Al-Hakem center of endocrinology at Al-Sader teaching hospital in Al-Najaf city during the period from July 2008-October 2009, each patient subjected to scratch test , BMI calculation and HbA1c measurement.

Results : prevalence of FS in DM was 17.2% . There was significant relationship between FS and age of patients , duration of DM and control of DM at p value <0.05 .

Conclusion : FS is a common complication of DM in Al-Najaf city . It is directly related to age of patient , duration of DM and inversely related to control of DM .

الخلاصة

198 من مرضى السكري اختيروا بشكل عشوائي من مراجعي مركز الحكيم لأمراض الغدد الصماء في مستشفى الصدر التعليمي في النجف لبيان نسبة تجمد الكتف لديهم بواسطة الفحص السريري . تبين أن نسبة تجمد الكتف عند مرضى السكري هي 17.2% , وأن العلاقة بين تجمد الكتف مع عمر المرضى , وطول فترة الإصابة بداء السكري هي علاقة طردية , و السيطرة على السكري هي علاقة عكسية .

Abbreviations

FS : frozen shoulder

DM : diabetes mellitus

EDTA : Ethylene Diamine Tetra Acetic acid

BMI : body mass index

HbA1c : Hemoglobin A1c

WHO : World Health Organization

Introduction

Frozen shoulder (FS) is a disabling and sometimes severely painful shoulder condition that is commonly managed in the primary care setting. True frozen shoulder has a protracted natural history that usually ends in resolution . The term "frozen shoulder" was first introduced by Codman in 1934 . Long before Codman, in 1872, the same condition had already been labelled "peri-arthritis" by Duplay. In 1945, Naviesar coined the term "adhesive capsulitis. "Although still in use, this more recent term is unfortunate since, although a frozen shoulder is associated with synovitis and capsule contracture, it is not associated with capsular adhesions [1] .

Frozen shoulder patients usually present in the sixth decade of life, and an onset before the age of 40 is very uncommon[2]. The peak age is 56, and the condition occurs slightly more often in women than men [3]. In 6-17% of patients, the other shoulder becomes affected, usually within five years, and after the first has resolved . The non-dominant shoulder is slightly more likely to be affected [5,4].

Three phases of clinical presentation of FS :

1.Painful freezing phase: Duration 10-36 weeks. Pain and stiffness around the shoulder with no history of injury. A nagging constant pain is worse at night, with little response to non-steroidal anti-inflammatory drugs .

2.Adhesive phase: Occurs at 4-12 months. The pain gradually subsides but stiffness remains. Pain is apparent only at the extremes of movement. Gross reduction of glenohumeral movements, with near total obliteration of external rotation.

3.Resolution phase: Takes 12-42 months. Follows the adhesive phase with spontaneous improvement in the range of movement. Mean duration from onset of FS to the greatest resolution is over 30 months [6] .

Frozen shoulder can be a primary or idiopathic problem or it may be associated with another systemic illness. By far the most common association of a secondary frozen shoulder is diabetes mellitus [7] . The prevalence of FS in diabetes patients is reported to be 10%-36% [8,9] .The prevalence in type 1 and type 2 diabetes is similar [10]. Unfortunately, frozen shoulder in diabetes is often more severe and is more resistant to treatment[8] . Bunker et al have shown an association with Dupuytren's disease in the hand, proposing that the contracting shoulder tissue itself represents a form of fibromatosis[11,12]. Much more rarely, secondary frozen shoulder may be associated with conditions such as hyperthyroidism, and hypothyroidism, additional associations include Parkinson's disease, cardiac disease, pulmonary disease, and stroke, although the pathological condition here may be different from idiopathic frozen shoulder. Clearly, in the case of stroke, shoulder stiffness may be

simply the result of muscle spasticity in the shoulder region.

Frozen shoulder has also been reported subsequent to non-shoulder surgical procedures, such as cardiac surgery, cardiac catheterization through the brachial artery, neurosurgery, and radical neck dissection [13].

Arthrography shows characteristic findings of limitation of capacity of the shoulder joint (5-10 ml compared with 25-30 ml in the normal joint) and a small or non-existent dependent axillary fold [14]. However, in most units, arthrography is a historical investigation in FS. Magnetic resonance imaging may show a slight thickening in the joint capsule and the coracohumeral ligament [15].

Diabetes may affect the musculoskeletal system in a variety of ways. Musculoskeletal complications are most commonly seen in patients with a longstanding history of type 1 diabetes, but they are also seen in patients with type 2 diabetes. Some of the complications have a known direct association with diabetes, whereas others have a suggested but unproven association. frozen shoulder has been reported in 19% of diabetic patients. This term refers to a stiffened glenohumeral joint usually caused by a reversible contraction of the joint capsule. Patients report shoulder stiffness, along with decreased range of motion [14].

DM is associated with several musculoskeletal disorders. The incidence of DM and the life expectancy of the diabetic patient have both increased, resulting in the increased prevalence and clinical importance of musculoskeletal alterations in diabetic subjects.

The exact pathophysiology of most of these musculoskeletal disorders

remains obscure. Connective tissue disorders, neuropathy, vasculopathy or combinations of these problems, may underlie the increased incidence of musculoskeletal disorders in DM. Most of these disorders can be diagnosed clinically, but some radiological examination may help, especially in differential diagnosis [16].

The aim of this study is to identify FS in diabetic patients as a common complication .

Patients and Method

198 patients randomly taken from the diabetic patients attending Al-Hakem center of endocrinology at Al-Sadder teaching hospital in Al-Najaf city during the period from July 2008-October 2009.

Detailed history was taken including the age of patients (11-72 years), duration of diabetes mellitus (DM), any other advanced medical diseases or any history of joint problem or trauma.

Any patient with shoulder pain was asked about the lateralization of pain and if the pain is in the dominant hand side, limitation of shoulder movements and its duration was also asked about .

FS Diagnosed clinically by scratch test which is a clinical test use for the diagnosis of FS in which we ask the patient to scratch his medial side of opposite scapula in three directions ,one from above same side, then from above across the neck, lastly from bellow. In FS patient un able to complete any of these steps (limitation of all direction of movements), 50% limitation of movement in comparison to other shoulder consider positive test, or more than 30° limitation in movement in case of bilateral FS [17].

Sensitivity and specificity of scratch test in the diagnosis of FS are 89%, 92% respectively [18]

For every patient with positive Scratch Test , X-ray was taken to exclude other causes of shoulder pain other than FS, also all rare causes of FS other than DM were excluded (these include : local trauma , stroke , advanced pulmonary diseases{ APD}, advanced cardiovascular diseases {ACVD} [17], thyroid diseases and Parkinson diseases [1]) .

Therefore 8 patient were excluded as follow (3 ; trauma , 2 ; ACVD , 1; APD , 1 ;thyroid disease , 1 ; stroke) .

BMI was measured for all the patients using the following equation:

$BMI = \text{Weight(Kg)} / (\text{height(M)})^2$, and according to WHO criteria the

definition of obesity is $BMI \geq 30 \text{ kg/m}^2$ [19].

HbA1c was measured for all patients by Hemoglobin electrophoresis using Hb- variant device by taken 1ml of blood with EDTA, and according to WHO criteria for controlling of DM ; HbA1c should be $\leq 7\%$ ⁽³⁾.

Statistical study : The data was analyzed using chi square test at level of significance $p \leq 0.05$.

Results

198 diabetic patients , 120 (60.6%) are female and 78 (39.4%) are male. Out of 198 , 34 patient (17.2%) had FS , 24 (70.6%) of them are female and 10 (29.4%) are male .in patients with FS ,19 (55.8%) had FS in the non dominant hand side .

Side of FS	FS	Hand dominancy Rt	Lt
Rt	32	14	18
Lt	2	1	1
Total	34	15	19

The difference between male and female in the prevalence of FS was statistically insignificant (p value >0.05) as shown in table 1 and figure 1.

Table 1 Relationship between gender and FS in DM patients.

Gender	No FS	FS	Total
Female	96 (58.5%)	24 (70.6%)	120
Male	68 (41.5%)	10 (29.4%)	78
Total	164 (100%)	34 (100%)	198

P >0.05

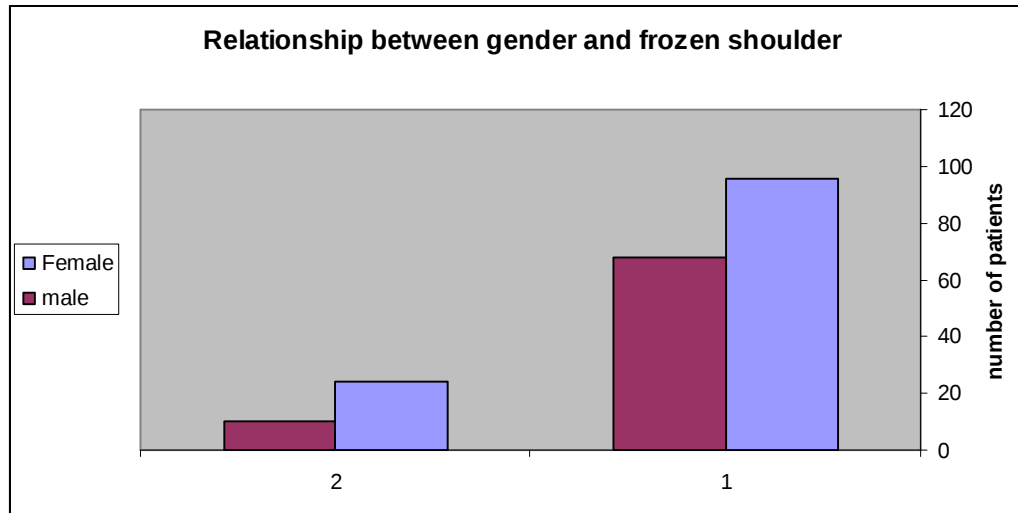


Figure 1 Relationship between gender and FS in DM patient .

1= DM patient without FS. 2= DM patient with FS.

Out of 198 patients , 89 patients had BMI ≥ 30 kg/m² , 109 patients had BMI <30 kg/m² . From 34 patients with FS , 15 patients (44%) had BMI ≥ 30 kg/m² , 19 patients (56%) had BMI <30 kg/m² .

The relationship between obesity and FS was statistically insignificant

(p > 0.05) , as in table (2) and figure (2) :

Table 2 Relationship between BMI and FS in diabetic patients:

BMI	No FS	FS	Total
≥ 30	74(45%)	15(44%)	89
<30	90(55%)	19(56%)	109
Total	164(100%)	34(100%)	198

P >0.05

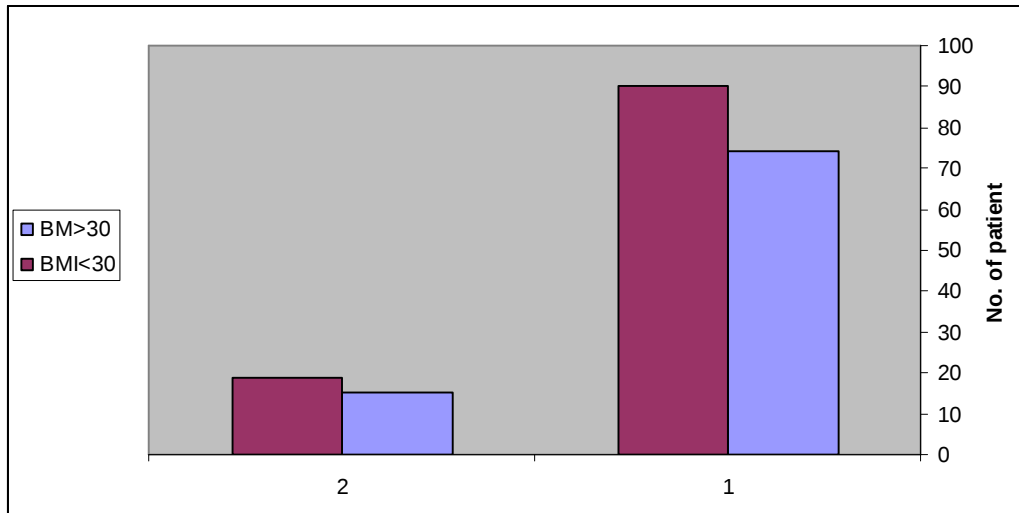


Figure 2 Relationship between BMI and FS in diabetic patients .

1=DM patient without FS , 2=DM patient with FS.

The relationship between control of DM and FS was statistically significant ($p < 0.05$) , as in table (3) and figure (3)

Out of 198 patients , 131 patients had HbA1c $> 7\%$, 67 patients had HbA1c $\leq 7\%$. From 34 patients with FS , 28 patients (82%) had HbA1c $> 7\%$, 6 patients (18%) had HbA1c $\leq 7\%$.

Table 3: Relationship between control of DM and FS in diabetic patients.

HbA1c	No FS	FS	Total
$> 7\%$	103(63%)	28(82%)	131
$\leq 7\%$	61(37%)	6(18%)	67
Total	164(100%)	34(100%)	198

P < 0.05

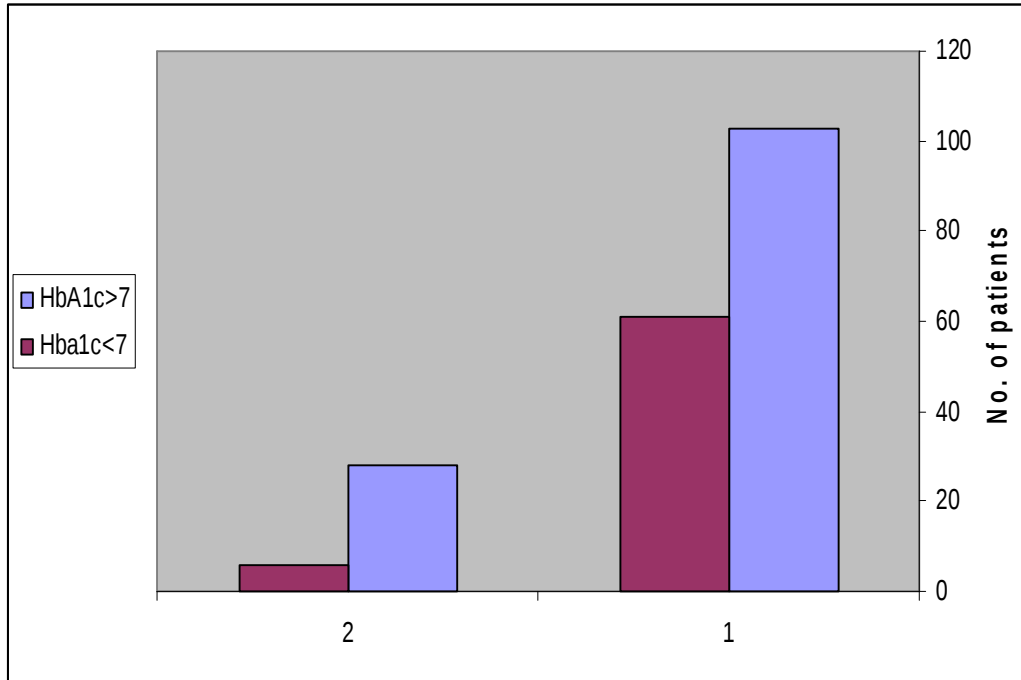


Figure 3 Relationship between control of DM and FS in diabetic patient . 1= DM patient without FS. 2= DM patient with FS.

FS was found more in patient with longer duration of DM which was statistically significant ($p < 0.05$) as shown in table (4) and figure (4) :

Table 4 The relationship between duration of DM and FS in diabetic patients .

Duration of DM (years)	No FS	FS	Total
1-5	57(34.7%)	5(14.7%)	62
6-10	44(26.8%)	10(29.4%)	54
11-15	42(25.5%)	10(29.4%)	52
>15	21(13%)	9(26.5%)	30
Total	164(100%)	34(100%)	198

P < 0.0

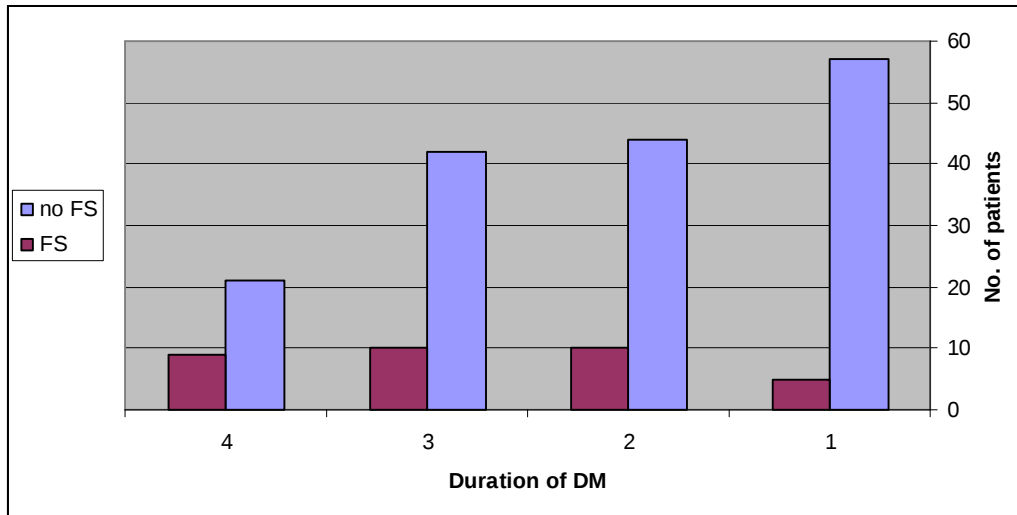


Figure 4 The relationship between duration of DM and FS in diabetic patients.

1=duration of DM 1-5years , 2= duration of DM 6-10years ,

3= duration of DM 11-15years , 4= duration of DM >15years.

Elderly patient show higher prevalence of FS was statistically significant ($p < 0.05$) as shown in table (5) and figure (5) :

Table 5 The relationship between the age of diabetic patient and FS:

Age of patient (years)	No FS	FS	Total
≤ 20	12(7.3%)	0(0%)	12
21-40	40(24.4%)	3(8.8%)	43
41-60	78(47.6%)	15(44%)	93
>60	34(20.7%)	16(47.2%)	50
Total	164(100%)	34(100%)	198

P < 0.05

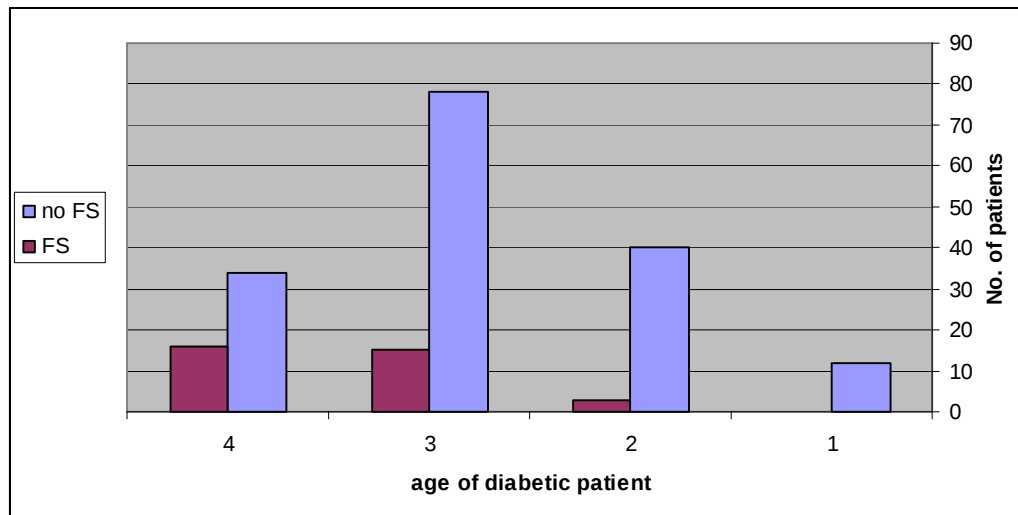


Figure-5 The relationship between the age of diabetic patient and FS :

1=age of patient ≤ 20 years , 2= age of patient 21-40 years,

3= age of patient 41-60 years, 4= age of patient >60 years.

Discussion

Diabetes may affect the musculoskeletal system in a variety of ways, the metabolic perturbations in diabetes (including glycosylation of proteins; microvascular abnormalities ;damage to blood vessels and nerves; and collagen accumulation in skin and periarticular structures) result in changes in the connective tissue [14] .

In this study, the prevalence of F S in diabetic patients was 17.2% , and these results was similar to study done by Gary S. et al who showed that the prevalence was 12% [20] and Nilüfer et al who showed that the prevalence was 24% [21] and Richard et al who found that the prevalence was 19% [1] , so that FS is a common complication of DM .

FS in this study was more common among female, this result was in agreement with Richard et al results [3] .

There was no correlation between obesity and FS in our study as in Kim

et al study [14], and this can be explained by the fact that shoulder joint not a weight bearing joint .

The duration of DM and the age of diabetic patient in relation with FS was statistically significant , that agree with results of Perttu et al [15] , this result explained as others complications of DM (eg. retinopathy ,nephropathy, neuropathy and peripheral arterial disease) these become more prevalent with duration of DM [2] .

Neither Perttu et al , Richard et al nor Nilüfer et al can correlate between FS and diabetic control via measuring the level of HbA1. In our study there was statistically significant correlation between HbA1c level and FS ,and those well controlled diabetic patients were at lower risk to develop FS .

This result supported by the results of Stephen et al who found that after 7 years well control of DM (follow up by using HbA1c) there was 60% reduction in chronic complications [16] .

As in Richard et al , we found that FS is more common in non dominant hand side , this result may explained by lack of exercises in the non dominant hand.

Conclusion

FS in diabetic patients is common and it's more prevalent in elderly and un controlled DM with long duration of disease .

Recommendation

For future study FS can be used as predictor for the presence or absence of other complications of DM (microvascular and macrovascular) , and to confirm the possible preventive role of strict glycemic control and exercises in the development of FS .

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