Frozen Shoulder in Type 2 Diabetes Mellitus

* **Atheer Ahmed Matloub** *M.B.Ch.B., Ph.D.* ** **Khalid I. Hussein Al-Lehibi** *M.B..Ch.B., C.A.B.M.*
*** **Wathiq Kamal Abdul-Gafour** *M.B.Ch.B., D.M., C.A.B.M.*

Abstract

Background: Frozen shoulder affects 2-5% of the general population, and around 10-30% of diabetic patients. It affect mainly the non-dominant shoulder, and has more incidence in patients with poor glycemic control.

Objective: To detect the incidence of frozen shoulder in type 2 diabetic patients attending the Specialized Center for Endocrinology and Diabetes in Baghdad.Patients and methods: One hundred patients with frozen shoulder were included in the study from a total number of 580 type 2 diabetics over a period of six months. 70 patients were females and 30 patient were males. All were investigated for fasting blood glucose and HbA_1c.

Results: The non-dominant shoulder was involved in 60 patients (60%), the dominant shoulder in 35 patients (35%) and bilateral involvement in 5 patients (5%). 60 patients (60%) had poor glycemic control ($HbA_1c > 8\%$).

Conclusion Diabetes mellitus is one of the predisposing factors for the development of frozen shoulder which affect 17.2% of type 2 diabetic patients in our study, most of them were overweight- obese and had poor glycemic control.

Key words: Type 2 diabetes mellitus, Frozen shoulder, Glycated hemoglobin.

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Introduction

Adhesive capsulitis, often referred to as "frozen shoulder" is characterized by stiffness, pain and loss of motion in the shoulder. Approximately 10-30% of individuals with diabetes mellitus develop adhesive capsulitis and are usually less responsive to treatment. Other medical problems that are associated with increased risk of this condition include hypothyroidism,hyperthyroidism, Parkinson's disease, cardiac disease or surgery. It can develop post-traumatic, post-surgical, and after immobilization for a period of time[1]. It typically affect the non-dominant shoulder, twice mor common in women than men, at age 40-70years and it could be idiopathic[2,3,4,5]. The term frozen shoulder was used in 1934 by Codman, who described a clinical syndrome of slow pain onset, inability to sleep on the affected arm, and restriction of both active and passive elevation and external rotation[6]. True frozen shoulder has a protracted natural history that usually ends in resolution[7]. Effective treatment depends on recognition of the underlying pathologic disorder in each individual case[8]. A great number of therapeutic regimes have been advocated, but none have proved consistently successful. Lines of treatment include a course of oral analgesic drugs such as NSAIDs with physical therapy. It is believed that physical therapy is of little or no use during the freezing or frozen phases, but may help speed up recovery during the thawing phase[9]. The understanding of idiopathic frozen shoulder is further complicated by the observation that, diabetics with frozen shoulder behave clinically differently than non-diabetics[10]. Patients and methodsFrom a total of 580 type 2 diabetic patients attending The Specialized Center for Endocrinology and Diabetes Mellitus in Baghdad over a period of 6 months, one hundred patients with frozen shoulder were included in the study. Female patients outnumbered male patients (70 vs. 30). In addition to demographic data, the important investigations performed on these patients included : Fasting blood glucose (FBG), and Glycated hemoglobin (HbA_1c). On clinical examination of these patients the severity of frozen shoulder was assessed according to the degree of limitation of shoulder movement and was graded as mild, moderate or sever.

Department of Medicine, Al-Kindy College of Medicine, University of BaghdadConsultant Physician in the Specialized Center for Endocrinology and Diabetes / Baghdad

Corespondence Address to :Dr. Atheer Ahmed Matloub _ E- mail:

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The body mass index (BMI) was calculated
for all patients based on their weights (
kilograms) and heights (meters) and according to the following formula:
BMI (kg/m^2) = weight in kilograms / square of height in meters

Results

Out of 580 type 2 diabetic patients, 100 of them had frozen shoulder (17.2%) ; 30 males and 70 females (table 1). Most
of the patients (86%) fell in the age range 51-72year (table 2).

Table 1- Gender distribution among diabetics with frozen shoulder

Gender	Male	Female
Number of patients	30	70

Table 2- Age distribution among diabetics with frozen shoulder

Age (years)	35-50	51-72
Number of patients (%)	14 (14%)	86 (86%)

Clinical examination of the patients showed that 60% of the patients have frozen shoulder of the non-dominant arm
side, 35% in the dominant arm side, and in 5% both shoulders were affected (table 3)

Table 3- Side of involvement

Affected side	Non-dominant (Left)	Dominant (Right)	Bilateral
Number of patients (%)	60 (60%)	35 (35%)	5 (5%)

Table 4 shows that 82 patients have a duration of diabetes mellitus 5 years or more, while 18 patients have a duration less than 5 years.

Table 4- Duration of diabetes mellitus in affected patients

Duration	< 5 yr.s	5-10 yr.s	11-20 yr.s	> 20 yr.s
Number of patients (%)	18 (18%)	30 (30%)	36 (36%)	16 (16%)

Fifty-two patients have a duration of shoulder complain ranging from 7-12 months with a mean of 9.5 months (table 5).

Table 5- Duration of shoulder complain in affected patients

Duration (months)	1 - 6	7 - 12	> 12
Number of patients	28	52	20

Table 6 shows that 34 patients have a mild degree of frozen shoulder, 40 patients have a moderate one, while only 26 patients have sever form of frozen shoulder. Sever forms of frozen shoulder are more common in females than males (20% vs. 6%) (table 7)

Table 6- The severity of affection with frozen shoulder

Severity	Mild	Moderate	Sever
Number of patients (%)	34 (34%)	40 (40%)	26 (26%)

Table 7- The severity of frozen shoulder according to gender

Gender	Mild	Moderate	Sever
Male	8 patients (8%)	16 patient (16%)	6 patients (6%)
Female	26 patients (26%)	24 patients (24%)	20 patients (20%)

Table 8 shows that most patients (82%) are overweight to obese (BMI >25 kg/m^2), while only 18% have a BMI less than 25 kg/m^2.

Table 8- The relation between BMI and severity of frozen shoulder

BMI kg/m^2	Mild	Moderate	Sever	Total number of patients
< 25	6 (6%)	4 (4%)	8 (8%)	18 (18%)
25-29.9	18 (18%)	32 (32%)	12 (12%)	62 (62%)
≥ 30	8 (8%)	6 (6%)	6 (6%)	20 (20%)

Among the 26 patients with sever form of frozen shoulder; 24 (92.3%) have a duration of diabetes mellitus more than 5 years, while only 2 patients (7.7%) have a duration less than 5 years (table 9).

Table 9- The relation between duration of diabetes mellitus and sever form of frozen shoulder

Duration (years)	< 5	> 5	Total
Number of patients with sever frozen shoulder	2 (7.7%)	24 (92.3%)	26 (100%)

Table 10 shows the relation between the severity of frozen shoulder and the state of glycemic control using glycated hemoglobin (HbA_1c), in which most of the patients (60%) have HbA_1cmore than 8%, 34 patient have HbA_1c between 7 and 8%, while only 6 patients have HbA_1c less than 7%.

Table 10- The relation between the severity of frozen shoulder and glycemic control (HbA_1c)

HbA_1c %	Mild frozen shoulder	Moderate frozen shoulder	Sever frozen shoulder	Total
< 7(good)	6	0	0	6 (6%)
7 – 8(fair)	12	20	2	34 (34%)
> 8(poor)	16	20	24	60 (60%)

Eighteen patients (18%) were active smokers (16 males and 2 females), table 11 shows the relation between these active smokers and the severity of frozen shoulder.

Table 11- The number and gender of smokers and their relation to the severity of frozen shoulder

Severity of frozen shoulder	Male	Female
Mild	0	0
Moderate	12	2
Sever	4	0
Total	16 (16%)	2 (2%)

Discussion

Diabetic patients with frozen shoulder are more likely to have other diabetic complications like limited joint mobility, than diabetics without a frozen shoulder, although this may be explained by age[11]. In our study the incidence of frozen shoulder was 17.2%. This is similar to other studies which showed an incidence ranging from 11 – 30% with an average of around 20%[11 – 17]. The gender distribution of the cases was 30% males vs. 70% females, which is similar to another study by William N. Levine et al with an incidence of 69.4% in females and 30.6% in males[13]. The age range of 51 – 72 year is approximate to the finding by William N. Levine et al[13], this because degenerative changes are age-related and they increase with age. William N. Levine et al also found that the dominant shoulder was involved in 40% of cases, the non-dominant shoulder in 53% of cases and bilateral involvement in 7% of cases, while in our study the dominant right side was involved in 35% of patients, the non-dominant side in 60% of patients and bilateral involvement in 5% (table 3). Most patients with frozen shoulder (82%) have a duration of diabetes mellitus more than 5 years, and as the duration of diabetes becomes longer, the incidence of frozen shoulder becomes more. This agrees with the findings of Balci N[18] and Arkkila PE[19]. The average duration of shoulder complain in 52% of patients in our study was 9.5 months, while in another study it was 6.7 months[20]. In this study (table 6) we can see that two-third of the patients (66%) have moderate-sever forms of frozen shoulder, and one-third of them (34%) have mild frozen shoulder, and that the distribution of degree of severity of frozen shoulder according to gender (table 7) is more prominent in females compared to males in which the sever form of frozen shoulder affected 20 female patients and only 6 male patients, but this difference is probably not

significant due to the larger number of female patients affected with frozen shoulder when compared with the number of male patients[13]. Also this study showed that most of our patients (82%) are overweight to obese (table 8) and this relation may be explained by the fact that obesity and overweight through interfering with peripheral insulin action result in poor glycemic control and this has a direct impact on the incidence and severity of frozen shoulder in such patients . Of those 26 patients with sever form of frozen shoulder, 24 patients (92.3%) have a duration of diabetes mellitus more than 5 years, and only 2 patients (7.7%) have a duration of diabetes mellitus less than 5 years (table 9), which means that this severity is directly related to the duration of diabetes as shown by other studies[18,19]. In this study most of the patients (60%) have poor glycemic control (HbA_1c > 8%), 34% have fair glycemic control (HbA_1c = 7- 8%), and only 6% of the patients have good glycemic control (HbA_1c < 7%). This agree with another study[12] in which also most of the patients (82.7%) have HbA_1c > 10%.

Conclusion

From this study we can conclude that in type 2 diabetes mellitus, frozen shoulder can affect a significant proportion of patients, is more in female than male patients, it affects the non-dominant shoulder more than the dominant shoulder, it affects older age patients more than younger patients, is more common and more sever in overweight or obese than in normal weight diabetics, and its severity is directly related to the duration of diabetes and poor glycemic control. Therefore education of type 2 diabetic patients regarding the advantage of weight reduction and good glycemic control may play a role in preventing the development of frozen shoulder in such patients or at least accelerate its resolution with treatment.

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