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FREQUENCY OF ADHESIVE CAPSULITIS IN TYPE TWO DIABETES MELLITUS ON CLINICAL BASIS

[*1]Dr. Raed Attallah Shahatha, [2]Dr. Fakhir Yousef Hussein

[1]M.B.CH.B-HD.R.MR/Al-Mosul General Hospital.
[2]Professor of Medicine-Department of medicine-College of Medicine/ University of Mosul.

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***Corresponding Author: Dr. Raed Attallah Shahatha**

M.B.CH.B-HD.R.MR/Al-Mosul General Hospital.

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ABSTRACT

Background: Adhesive capsulitis is a condition marked by limitation of active and passive joint movement in all directions. The condition is a common musculoskeletal complication of diabetes mellitus begins with pain all over the shoulder, night pain and pain when lying on the affected side. The condition is common among women about 40 to 50 years of age. **Objective:** The aim of the study is to assess the frequency of adhesive capsulitis in patients with type 2 diabetes mellitus on clinical bases. **Patients and methods:** A case control study was performed during the period between January 1st, 2021 and April 1st, 2021 in AL-Wafaa Medical Center for diabetes management, and in the rheumatology out-patient department in Ibn-Sina Teaching Hospital. This study involved 60 patients with type 2 diabetes mellitus, their mean age is 55 years old, 26 males and 34 females. (group 1). Another group consist of 60 non-diabetics, matched for age and gender with the patients group, 28 males and 32 females. (group 2). Both groups were subjected to physical examination of the shoulder to assess for any limitation of movement. **Results:** The data obtained from the study revealed that there is significant difference between type 2 diabetic patients and healthy controls regarding frequency of adhesive capsulitis. Although the occurrence of adhesive capsulitis is more in females than males, but there are no statistically significant difference in this study. **Conclusion:** The present study clearly indicates that adhesive capsulitis is more common among type 2 diabetes.

KEYWORDS: Adhesive Capsulitis, Type 2 Diabetes.

INTRODUCTION

Diabetes mellitus is a metabolic disease presents with hyper hyperglycemia due to defects in insulin secretion, insulin action or both.[1] Type 2 diabetes mellitus which is more common than type 1 and presented by hyperglycemia due to insulin resistance or insulin deficiency.[2] There are many medical diseases is associated with type 2 diabetes mellitus, these include obesity, hypertension, elevated cholesterol which is called metabolic syndrome.[3]

It has been suggested that an increase in connective tissue stiffness in diabetes mellitus may be the result of non-enzymatic oxidative process reactions between glucose and collagen result in the formation of advanced glycation end products.[4,5]

People with type 2 diabetes mellitus have many complications which can lead to early death and this is partly because of its insidious onset and delayed diagnosis.[2]

Type 2 diabetes mellitus has environmental and genetic components, the environmental factors include immobility, smoking, drinking alcohol and obesity which is a very important life style factor.[3] Regarding the genetic factors, the prevalence increase in first degree relatives to patients with type 2 diabetes mellitus and in monozycotic twins the consonance rate is about 100%.[4,5]

This lead to structural organization of collagen fibers which can lead to biomechanical properties of tendons.[6,7] Musculo skeletal system is one of the organs

adversely affected by diabetes. Diabetes mellitus is associated with osteoporosis, DISH, neuropathies like (C.T.S., diabetic amyotrophy and reflex sympathetic dystrophy), diabetic muscle infarction and limited joint mobility like diabetic cheiroarthropathy, dupuytren's contracture, trigger finger and adhesive capsulitis.[8,9]

Adhesive capsulitis is a condition that represents with limited joint movement due to thickening and fibrosis of the capsule which result in decrease in joint volume. The exact cause is not known, but it is associated with number of conditions like trauma, stroke, M.I., thyroid disease, lung tumor, tuberculosis and Parkinson's disease.[10] Adhesive capsulitis is more common in women aged 40 to 50 years. There are three stages of the disease. Stage I is the inflammatory or freezing phase which last 2 to 9 months and characterized by severe pain. Stage II is the adhesive phase which last 4 to 12 months in which there is less pain but limitation of movement. Stage III which is the thawing phase in which there is gradual improvement in pain and motion which last from 5 to 26 months.[11]

There is some evidence that there is inflammation of the synovium followed by fibrosis where there is deposition of type 2 and 3 collagen with tissue contraction.[12] Frozen shoulder is diagnosed clinically based on history and physical examination, it is a diagnosis of exclusion, so other causes that cause limitation in the range of motion must be excluded like rotator cuff tendenitis, glenohumeral joint osteoarthritis and cervical spine disease.[13]

Magnetic resonance imaging and magnetic resonance angiography can show thickening of the capsule and peri capsular tissue with gleno humeral joint contraction.[14] Early recognition of adhesive capsulitis and other diabetic complications decrease the chance of irreversible damage.[15] Studies have shown that there is elevation of inflammatory cytokines like IL-1,TNF, COX1 and COX2 in the capsular tissue of patients with adhesive capsulitis compared with normal subjects, so it is an inflammatory process at the beginning and later lead to fibrotic process.[16] There is evidence that non-enzymatic glycosylation of collagen type 2 fibers lead to increase cross linking in collagen molecules making them more resistant to degradation by enzymes which can lead to contracture syndromes like dupuytren's contractutre and adhesive capsulitis.[17,18]

The aim of the study

To assess the frequency of adhesive capsulitis in type 2 diabetic patients.

Patients, Materials and Methods

The present study had approval from regional research committee of Mosul Health Administration, and the scientific research committee of Collage of Medicine, University of Mosul, Mosul, Iraq. The study was performed during the period between January, 1st, 2021 and April, 1st, 2021 in AL-Wafaa Health Center diabetic research and management, and in the rheumatology outpatient department in Ibn-Sina Teaching Hospital.

Study design: Case control study.

Subjects

Diabetic patients

Sixty male and female patients who are known to have type 2 diabetes mellitus (according to American diabetes association criteria: F.B.S. 5-7 mmol/L, 90-126 mg/dl. R.B.S. 4-8 mmol/L,72-144 mg/dl) registered in AL – Wafaa Medical Center for diabetes management whose mean age is 55 years old were randomly enrolled in the study.

Inclusion criteria

Diabetic female and male patients whose mean age is 55 years old.

Exclusion criteria

1. History of trauma
2. Cardiovascular disease like myocardial infarction
3. Stroke
4. Thyroid disease
5. Fracture or gleno humeral dislocation
6. Neoplastic conditions in the shoulder

Control group: Sixty normal individuals, 32 females and 28 males, non-diabetics are matched for age and gender with the patients group, were enrolled in this study as (control group).

Data collection

The main source of data was obtained directly from all the studied subjects by the investigator himself during an interview with them. A questionnaire form was designed to record the subject's information. It include name, age, gender, duration of disease for diabetics, type of therapy, history of associated diseases and the results of physical examination.

Instruments and equipments

Imaging (X-ray or ultrasound) if needed, and data about the case was used when there is suspicion about the presence of adhesive capsulitus like fracture or dislocation in the shoulder joint, neoplastic condition or infection in the shoulder

Statistical analysis

The 2x2 contingency table was constructed to study the association between adhesive capsulitis and diabetic status. The significance of difference was assessed by the use of CHI squire test. The table was also uses to calculate the odd ratio with its 95% confidence interval. A P value of <0.05 was considered significant.

RESULTS

Table (1) shows the frequency of adhesive capsulitis in diabetic patients is 13.3% and in non-diabetics is 3.3%.

Table 1: The association between adhesive capsulitis and diabetic patient.

Adhesion	DM N=60	Control N=60	χ2	P-value
	No. (%)	No. (%)		
Present	8 (13.3%)	2 (3.3%)	3.93	**0.04**
Absent	52 (86.7%)	58 (96.7%)		
*Chi square test				

Table (2) shows the frequency of adhesive capsulitis in females (diabetics and non-diabetics) is 10.6% and in males is 5.6%.

Table 2: The association between adhesive capsulitis and gender.

Adhesion	Females N=66	Males N=54	χ2	P-value*
	No. (%)	No. (%)		
Present	7 (10.6%)	3 (5.6%)	0.99	0.2
Absent	59 (89.4%)	51 (94.4%)		
*Chi square test				

Table (3) shows the frequency of adhesive capsulitis in diabetic females is 14.7% and in males is 7.7%.

Table 3: the association between adhesive capsulitis in diabetic patients and gender.

Adhesive capsulitis in diabetic patients	Females N=34	Males N=26	χ2	P-value
	No. (%)	No. (%)		
Present	5(14.7%)	2(7.7%)	0.70	0.4
Absent	29(85.3%)	24(92.3%)		
*Chi square test				

Table (4) shows the frequency of adhesive capsulitis in non-diabetic females is 6.3% and in males is 3.6%.

Table 4: the association between adhesive capsulitis in non-diabetic patients and gender.

Adhesive capsulitis in non-diabetic patients	Females N=32	Males N=28	χ2	P-value
	No. (%)	No. (%)		
Present	2(6.3%)	1(3.6)	0.22	0.6
Absent	30(93.7%)	27(96.4)		
*Chi square test				

Table 5: The relation between adhesive capsulitis in D.M. patients and duration of disease.

D.M. patients with adhesive capsulitis	Duration of disease
1 female	10 years
2 male	10 years
3 female	13 years
4 female	3 years
5 female	8 years
6 male	20 years
7 female	16 years

A logistic regression was performed to ascertain the effects of duration of DM on the likelihood that participants have adhesive capsulitis. The logistic regression model was statistically significant, $\chi2(4) = 8.67$, $p < .05$. The model explained 31.4% (Nagelkerke *R2*) of the variance in adhesive capsulitis and correctly classified 42.2% of cases. Increasing duration of DM was associated with an increased likelihood of exhibiting adhesive capsulitis, as shown in table (6).

Logistic regression

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Duration of DM	0.370	0.216	2.923	1	0.050	1.68
	Constant	-3.075-	1.829	2.828	1	0.093	.046
a. Variable(s) entered on step 1: Duration of DM.							

Table (7) shows that there is no relation between adhesive capsulitis and type of therapy.

Table 7: the relation between adhesive capsulitis in D.M. patients and type of therapy.

D.M. patients with adhesive capsulitis	Type of therapy
1 female	Insulin + glucophage
2 male	Insulin + glucophage
3 female	Insulin + glucophage
4 female	Insulin
5 female	Insulin
6 male	Insulin+ glimax
7 female	Daonil + glucophage

Table (8) demonstrates that adhesive capsulitis can occur in the right, left and bilateral sides of the shoulder.

Table 8: the relation between adhesive capsulitis and the side of shoulder involvement.

Side of shoulder involvement	Number of patients	Frequency
Right	6	5%
Left	3	2%
Bilateral	1	0,008
Non	110	91%
Total	120	100%

DISCUSSION

In this study the frequency of adhesive capsulitis is 4 times more common in diabetic that non diabetic patients as in table (1) which demonstrates the association between adhesive capsulitis and diabetic patients.

Adhesive capsulitis is a chronic disabling condition characterized by pain and limitation of movement which need long term treatment in the form of physiotherapy and repeated injections. The treatment is prolonged in D.M. patients and surgery id needed if the condition is not treated adequately.[19]

Although the occurrence of adhesive capsulitis is more common in females than males, but there is no statistically significant difference as shown in table (2) which illustrate the association between adhesive capsulitis (in diabetic and healthy control) and gender.

Table (3) shows the association between adhesive capsulitis in diabetic patients and gender. The frequency of adhesive capsulitis in diabetic females is 14.7% while in diabetic males is 7.7%, as a result it is twice more frequent.

In table (4) the frequency of adhesive capsulitis in non-diabetic females is 6.3% and in non-diabetic males is 3.6%.

Musculoskeletal disorders are common in type 1 and 2 diabetic patients and examination of the shoulder should be included in the evaluation of the patients with D.M.[20,21]

A logistic regression was performed to ascertain the relation between adhesive capsulitis and duration of disease and there was a positive relation between them which means that increasing duration of D.M. associated with the increasing incidence of adhesive capsulitis.

The patients in this study took different medications for D.M. for instance: insulin, glucophage, daonil, glimax…etc. No relation was found between adhesive capsulitis and type of therapy.

A study performed in U.S. conformed that the incidence of adhesive capsulitis is 2 to 4 times higher in diabetics than non-diabetics, the prevalence of diabetes in patients with adhesive capsulitis is 38.6% and the frequency of adhesive capsulitis in diabetic patients was 12% which is comparable to our study with a frequency of 13.3%. In both studies the rheumatic complications are more common in females than males. In Australia and India the frequency is much higher, range between 20-30%.[22,23] This study revealed the frequency of shoulder involvement concerning the side, whether right, left or bilateral. The right shoulder involvement was in 6 patient, left shoulder involvement in 3 and bilateral in 1.
The results in this study may be explained by an increase in an inflammatory and fibrotic presses which occur in patients with diabetes mellitus.[24]

The fibrotic process is due to accumulation of advanced glycation end products result in changes in the microstructural organization in the collagen fibers.[25,26]

CONCLUSION

From the results obtained from the present study, we concluded that there is significant difference regarding adhesive capsulitis between diabetic patients and healthy controls. moreover, there is no relation between type of therapy given to diabetic patients and the occurrence of adhesive capsulitis. A positive relation between duration

of disease in D.M. patients and the occurrence of adhesive capsulitis was also found.

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