

Prevalence of Rotator Cuff Diseases in Type II Diabetes Mellitus – A one year Hospital Based Cross Sectional Study

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Abstract

Objectives:To determine whether shoulder pain is common and whether it affects individuals with uncontrolled diabetes mellitus' ability to do daily activities (DM).

Methods: All patients with uncontrolled DM (HbA1c > 9) who visited the diabetes clinic throughout the study period were included in this cross-sectional study, which was carried out over a period of four months from October 2021 to January 2022. A doctor from the Family Medicine Department conducted telephone interviews using the American Shoulder and Elbow Surgeons Assessment Form, a previously validated questionnaire.

Results: The study involved 285 patients in all; 156 (54.7%) of them were women, and 129 (45.3%) were men. Most of the patients (51.1%) were in the 45-64 age range. 41.1% of the patients had type I DM, while 58.9% of the patients had type II DM. 10.56 was the mean HbA1c value. 42.5% of the patients (109; 38.2%) who reported shoulder pain were between the ages of 45 and 64, and 44.1% were between the ages of 65 and

96. In contrast to the 176 (61.8%) participants who reported no pain at all, 70% of men and 54% of women had no shoulder pain ($p < 0.001$). According to various age groups, the average shoulder pain intensity for all patients was 5.81 (SD=3.21), ranging from 4.71 (SD=3.15) to 6.13 (SD=3.29) and showed a significant correlation ($p < 0.05$).

Conclusions: Physicians are becoming more concerned about early identification and treatment of shoulder dysfunction due to its rising prevalence. In order to enhance the patients' daily lives, it should be obligatory for diabetes care programmes to include screening, preventive, and rehabilitation measures for shoulder dysfunction.

Keywords:

Diabetes, shoulder discomfort, and ascs

Introduction:

Diabetes mellitus (DM) is a chronic condition that has recently increased the risk to people's health. It has a wide range of side effects, including nephropathy, retinopathy, heart disease, and stroke. One of the key signs of diabetes is musculoskeletal disease, which manifests as Dupuytren's contracture, stiff hands syndrome, tendinitis, adhesive capsulitis (frozen shoulder), and shoulder peri-arthritis^[1-2]. The most prevalent symptom of all of them is shoulder pain, which is characterised by pain and limited range of motion^[3]. Shoulder pain can cause limitations in daily activities, which can either directly or indirectly damage our body's metabolic processes and lower our quality of life^[4]. In the year 2000, there were 151 to 171 million people with DM; by the year 2050, that number is predicted to increase by three times^[5]. According to a 2011 study by Alqurashi et al^[6] on the population of Saudi Arabia, the prevalence rate of diabetic patients was over 30%, with 34.1% men and 27.6% women affected. According to several research, patients with diabetes (27.5%) had shoulder issues more frequently than those with other medical illnesses (5%)^[6-7]. Frozen shoulder, commonly referred to as "adhesive capsulitis," and rotator cuff disease are the most frequently seen shoulder conditions in individuals^[6]. It has been noted that capsular inflammation following fibrosis is one of the pathophysiological processes underpinning shoulder pain. Several mediators, including growth factors, enzymes, inflammatory cytokines, and matrix metalloproteinases (MMPs), regulate this appearance^[8-9].

The shoulder joint is primarily responsible for the upper limb's functionality. There is a clear correlation between blood sugar control and how long DM-related shoulder pain lasts, according to earlier studies. Furthermore, social, genetic, and environmental factors have been linked to this condition observed in many studies^[10-11]. Since years, there has been a lack of knowledge regarding shoulder involvement in diabetic patients^[12]. So, the purpose of this study was to identify the prevalence of shoulder pain and related functional limits in individuals with type II diabetes.

Methodology:

This four-month, quantitative cross-sectional survey was place from October 2021 to

January 2022. By entering their phone numbers, we enrolled all patients with uncontrolled DM (HbA1c > 9) who visited the diabetes clinic during the study period. Also, we disqualified those patients who had gestational diabetes mellitus, were medically unstable, had psychiatric disease and were unable or unwilling to respond to questionnaires. Then, doctor from the Family Medicine Department conducted telephone interviews utilising the ASES Assessment Form. The Committee of American Shoulder and Elbow Surgeons created the ASES Assessment Form to make it easier to evaluate shoulder issues. It is a tool for measuring shoulder pain and associated functional limits; the maximum score is 100 points; half of the score (50%) is determined by the severity of the shoulder pain, and the other half is determined by a cumulative score based on 10 questions regarding daily activities. Every question is capable of receiving an ordinal score (from 0 to 3 points). Better function and less pain are correlated with higher ASES scores.

Statistical Analysis:

The Statistical Package for the Social Sciences (SPSS) was used to evaluate the data after entering into a Microsoft Excel spreadsheet. The frequency and percentage values for all categorical factors, such as gender, marital status, smoking status, and educational level, were compiled. The mean and standard deviation were used to summarise the continuous variables. Statistics were considered significant at p-values less than 0.05.

Ethical consideration:

The hospital's ethics committee gave their approval for this study. All participants gave their verbal agreement after being briefed on the purpose of the study and the details of this telephone interview. The patients' identities and the raw data, which include personal data, were kept a secret.

Results:

The study covered 285 patients in total. Just 7% of the patients (51.1%) were under 18, while the majority (51.1%) were in the 45-64 age range. The majority (67.4%) of the patients—156 (54.7%) women and 129 (45.3%) men—were married, while just 16.5% were single, and only 1.8% were divorced. Most patients (79.3%) had only a secondary education or less, which is a poor level of education. In addition, only 3.2% of people worked in the private sector, 9.8% were homemakers, and 43.9% were unemployed. Overall, 12.3% of the patients were presently smoking, and 77.9% had never smoked. The mean HbA1c level was 10.56, with type II D predominating in 58.9% of cases and typed I DM in 41.1%. A total of 82.1% of participants had diabetes for more than ten years, and 71.9% were receiving therapy with insulin injections. We observed that 109 (38.2%) of the 285 patients reported shoulder pain, and the remaining 176 (61.8%) reported no pain. Regarding shoulder pain, 56.9% of patients between the ages of 45 and 64 and 23.9% between the ages of 65 and 96 reported having it ($p > 0.05$). Shoulder

pain was present in 34.9% of men and 65.1% of women, respectively ($p < 0.001$). Most patients with academic levels above high school did not experience shoulder pain ($p > 0.05$). 75.2 percent of patients with shoulder discomfort had never smoked ($p < 0.05$). Most (61.5%) of those with shoulder pain have type II DM, while 38.5% have type I DM. Most patients with shoulder pain among the participants (59.6%) were frequent exercisers (Table 1). According to different age groups, the mean shoulder pain intensity for all patients was 2.22 (SD=3.45), ranging from 1.65 (SD=2.90) to 2.60 (SD=3.71), and there was a significant correlation ($p < 0.05$). Moreover, it was 1.46 (SD=2.61) for males and 2.85 (SD=3.91) for females across the board ($p < 0.001$). The range of pain severity for various smoking statuses was 1.20 (SD=2.31) to 3.04 (SD=2.98), and for various DM periods, it was 1.20 (SD=1.98) to 2.39 (SD=3.52). In type I DM, the intensity was 1.93 (SD=3.25), and in type II DM, it was 2.42 (SD=3.58) (Table 2). Table 3 lists the participants' responses to several issues linked to shoulder pain. 10.1% of the patients could not toss a ball overhand, 36.7% had no issue doing so, and 26.6% struggled with it only slightly to moderately. Also, 20.2% of the patients had trouble sleeping on their shoulders, compared to 29.4% who had no trouble doing so and 4.6% who had trouble putting their coats on alone, while 67.9% did. In addition, 4.6% of patients reported difficulty washing their backs, compared to 63.3% who had no trouble doing so. A very tiny percentage (1.8%) needed help using toilet paper, whereas 70.6% were able to do so. Moreover, just 4.6% of the cases reported difficulty brushing or washing their hair, compared to 69.7% who had no trouble. In terms of weight lifting, 17.4% of the patients could raise 10 kg above their shoulder, compared to 45.9% of the patients who were unable to do so; 17.4% of the patients were unable to reach a shelf above their head, compared to 44% of the patients who were. 25.7% of the cases could not carry out their normal activities or work a full-time job due to shoulder pain and movement restrictions. In comparison, 39.4% had no trouble doing their jobs or everyday activities. In addition, 34.9% could participate in regular sports, compared to 29.4%. The average shoulder ASES score for all patients, broken down by age groups, was 82.18 (SD=27.20), ranging from 77.82 (SD=31.08) to 92 (SD=16.55), with males scoring 87.88 (SD=21.71) and women scoring 77.46 (SD=30.28). ($p < 0.001$). It varied from 75.83 (SD=23.58) to 89.66 (SD=19.39) in terms of smoking status and from 80.54 (SD=28.12) to 90.66 (SD=15.53) in terms of DM duration, with type I DM being 83.93 (SD=25.87) and type II DM being 80.96 (SD=28.09). The mean shoulder ASES score for all patients was substantially linked with age, gender, and DM duration ($p < 0.05$), but no other demographic characteristics were ($p > 0.05$). (Table 4).

Table 1: Demographic information

Parameters	Participants without shoulder pain N= 176 (%)	Participants with shoulder pain N= 109 (%)	All participants N= 285	p-value
Age in years				0.054
65 to 96	33 (18.8%)	26 (23.9%)	59 (20.7%)	
45 to 64	84 (47.7%)	62 (56.9%)	146 (51.2%)	
18 to 44	46 (26.1%)	14 (12.8%)	60 (21.1%)	
0 to 17	13 (7.4%)	7 (6.4%)	20 (7%)	
Gender				0.007
Female	85 (48.3%)	71 (65.1%)	156 (54.7%)	
Male	91 (51.7%)	38 (34.9%)	129 (45.3%)	
Educational status				0.135
Bachelors	32 (18.2%)	12 (11%)	44 (15.4%)	
Diploma	11 (6.3%)	4 (6.3%)	15 (5.3%)	
Secondary education or lower	133 (75.6%)	93 (85.3%)	226 (79.3%)	
Marital status				0.0001
Single	41 (23.3%)	6 (5.5%)	47 (16.5%)	
Married	117 (66.5%)	75 (68.8%)	192 (67.4%)	
Divorced	3 (1.7%)	2 (1.8%)	5 (1.8%)	
Smoking Status				0.005
Currently smoking	26 (14.8%)	9 (8.3%)	35 (12.3%)	
Former smokers	10 (5.7%)	18 (16.5%)	28 (19.8%)	
Never smoking	140 (79.5%)	82 (75.2%)	222 (77.9%)	
Regular exercise status				0.658
Yes	76 (43.2%)	44 (40.4%)	120 (42.1%)	
No	100 (56.8%)	65 (59.6%)	165 (57.9%)	
HbA1c, mean and SD	10.56 ± 1.36			0.498
Type of diabetes				0.495
Type I	75 (42.6%)	42 (38.5%)	117 (41.1%)	
Type II	101 (57.4%)	67 (61.5%)	168 (58.9%)	
Duration of DM				0.113

More than 10 years	138 (78.4%)	96 (88.1%)	234 (82.1%)	
6 to 10 years	31 (17.6%)	10 (9.2%)	41 (14.4%)	
Less than one year	7 (4%)	3 (2.8%)	10 (3.5%)	
Treatment				0.235
Insulin	131 (74.4%)	74 (67.9%)	205 (71.9%)	
Oral medication	45 (25.6%)	35 (32.1%)	80 (28.1%)	

Table 2: Shoulder pain intensity and correlation with demographic characteristics

Parameters	Mean \pm Standard deviation	p-value
All participants	2.22 \pm 3.45	0.025
Age in years		0.024
65 to 96	2.58 \pm 3.75	
45 to 64	2.6 \pm 3.71	
18 to 44	1.13 \pm 2.25	
0 to 17	1.65 \pm 2.9	
Gender		0.002
Female	2.85 \pm 3.91	
Male	1.46 \pm 2.61	
Smoking Status		0.226
Currently smoking	1.21 \pm 2.3	
Former smokers	3.04 \pm 2.98	
Never smoking	2.28 \pm 3.62	
Type of diabetes		0.184
Type I	1.93 \pm 3.25	
Type II	2.42 \pm 3.58	
Duration of DM		0.246
More than 10 years	2.39 \pm 3.52	
6 to 10 years	1.51 \pm 3.21	
Less than one year	1.2 \pm 1.98	

Table 3: Questions related to pain and outcomes

	Yes (N, %)	Mild (N, %)	Moderate (N, %)	No (N, %)
Does your shoulder allow	38 (34.9%)	18 (14.7%)	23 (21.1%)	32 (29.4%)

you to do your regular sports				
Can you throw a ball overhand?	40 (36.7%)	29 (26.6%)	29 (26.6%)	11 (10.1%)
Does your shoulder allow you to work full time or perform regular activities?	43 (39.4%)	19 (17.4%)	19 (17.4%)	28 (25.7%)
Can you sleep on your shoulder comfortably?	32 (29.4%)	24 (22%)	31 (28.4%)	22 (20.2%)
Can you reach a shelf over your head?	48 (44%)	18 (16.5%)	24 (22%)	19 (17.4%)
Can you put on your coat unassisted?	74 (67.9%)	17 (15.6%)	13 (11.9%)	5 (4.6%)
Can you lift 10 kg above the level of your shoulder?	19 (17.4%)	12 (11%)	28 (25.7%)	50 (45.9%)
Can you wash your back?	69 (63.3%)	15 (13.8%)	20 (18.3%)	5 (4.6%)
Can you comb or wash your hair?	76 (69.7%)	13 (11.9%)	15 (13.8%)	5 (4.6%)
Can you use toilet tissue	77 (70.6%)	16 (14.7%)	14 (12.8%)	2 (1.8%)

Table 4: Mean American Shoulder and Elbow score with demographic characteristics

Parameters	Mean \pm Standard deviation	p-value
All participants	82.18 \pm 27.20	
Age in years		0.009

65 to 96	77.82 ± 31.08	
45 to 64	79.38 ± 28.62	
18 to 44	92 ± 16.55	
0 to 17	86 ± 23.82	
Gender		0.002
Female	77.46 ± 30.28	
Male	87.88 ± 21.7	
Smoking Status		0.285
Currently smoking	89.66 ± 19.39	
Former smokers	75.83 ± 23.58	
Never smoking	81.8 ± 28.47	
Type of diabetes		0.378
Type I	83.93 ± 26.87	
Type II	80.96 ± 28.09	
Duration of DM		0.058
More than 10 years	80.54 ± 28.12	
6 to 10 years	89.43 ± 22.48	
Less than one year	90.66 ± 15.53	

Discussion:

One of the most typical problems for DM patients is the musculoskeletal illness. In adults (aged over 18) worldwide, the prevalence of DM increased from 4.7% in 1980 to 9.5% in 2018^[14]. The glenohumeral joint, often known as the shoulder, is a triaxial joint that joins the glenoid fossa of the scapula to the head of the humerus. More than any other joint in the body, this joint is highly mobile^[15]. One of the most prevalent symptoms among DM patients is shoulder discomfort, one of the numerous musculoskeletal illnesses. Generally, one or both shoulders may experience pain and a restricted range of motion. In addition to lowering the quality of life, shoulder pain can make it difficult to perform everyday tasks and may even interfere, directly or indirectly, with regulating metabolic processes^[16]. The precise mechanism causing shoulder pain in diabetes people have not been identified. The two situations^[7] that share DM-like processes are microcirculation impairment and (ii) the non-enzymatic glycosylation process. It has been noted that hyperglycemia causes the creation of advanced glycosylation end-products and non-enzymatic glycosylation products (AGEs). AGEs increase the cross-linking of collagen, tendons, and ligaments, making them stiffer and less flexible. Moreover, they interact with tenocyte and fibroblast receptors, resulting in inflammatory alterations^[17].

Moreover, the shoulder joint is also affected by the poor microvascular condition that

hyperglycemia causes. Impaired circulation leads to an excess of free radical generation and tissue hypoxia, which may result in apoptosis. This damage harms the joint's tissues and generates several degenerative changes. Joint stiffness is brought on by the cross-linking collagen accumulated in the shoulder capsule. Chronic inflammation brought on by hyperglycemia exacerbates the synovium's inflammatory response. The shoulder joint develops capsular fibrosis due to all these variables ^[18]. In Saudi Arabia, 42% of rheumatology patients were found to have chronic pain patterns related to the musculoskeletal system. With a frequency of 52%, 41%, and 26%, respectively, low back pain, neck pain, and shoulder pain were the most prevalent sites ^[19].

While previous studies ^[20-21] revealed that the prevalence of shoulder pain in the general population was just 2-5%, this study found that 38.2% of diabetic patients experienced shoulder discomfort, with 71% of them being female and particularly prevalent in the 45–64 age range. Moreover, 68.8% of the married participants may be harmed since post-marriage stress levels are higher for them than for divorced, widowed, or single people.

Prior research has demonstrated that anti-diabetic medication mode also influences the frequency of shoulder pain. The results were consistent with earlier research ^[22-23] and showed that non-insulin-dependent patients (type II) had 1.59 times higher shoulder pain than type I patients.

HbA1c levels were more significant in diabetes patients with soft shoulder tissue musculoskeletal problems to Cagliero et al ^[18]. Moreover, Arkkila et al. ^[11] discovered that type 2 DM patients with shoulder capsulitis had poorer glycemic control (HbA1c greater than 9%). Similar findings were reported in our study, where the HbA1c levels were 10.561.36; however, no connection between HbA1c and shoulder pain was discovered. According to Wong et al ^[24], the existence of DM-related shoulder pain was substantially correlated with chronic illness, advancing age, marital strife, the presence of anxiety and depression, lack of exercise, and poor quality of life. Similar findings were seen in our study, where we found that 65% of patients did not regularly exercise and that most patients led demanding lives due to the demands of their studies. In our study, there was no correlation between smoking behavior and the prevalence of shoulder pain in the participants ($p=0.05$). Only 36.7% of patients reported having no difficulties throwing the ball overhand, which raises questions about the overall impact of shoulder pain on daily living. In addition, 67.9% of patients reported being able to wear their coats without assistance, and 29.4% of patients said they could sleep comfortably on their affected shoulders. When asked whether they would wash their backs while bathing and using toilet paper, 63.3% and 70.6% of patients, respectively, said they would.

Additionally, 69.7% of patients with DM-related shoulder issues said they could wash and comb their hair independently, and 45.9% refused to lift 10 kg of weight above their

shoulders because doing so would cause excruciating shoulder pain and decreased mobility in the affected shoulder. Just 44% of the patients could comfortably reach a shelf over their heads. With shoulder pain associated with DM, most patients (60.6%) felt unable to work full-time or engage in regular activities; nevertheless, 65.1% said they could engage in their usual sporting activities. These replies demonstrated how chronic shoulder discomfort significantly harmed health outcomes, including physical activity and eating habits, and that these lifestyle changes may worsen type 2 DM in these patients. Other earlier research concurred with the findings [25]. The study's fundamental flaw is that, due to the small sample size, no correlation between the outcomes and DM duration was discovered. It might also be argued that reporting bias may have affected the smoking-related questions. This study's cross-sectional design prevents an analysis of the role played by previous glycemic management in the development of discomfort and shoulder dysfunction.

To confirm the causality of the findings of this study, we encourage future interventional trials or prospective cohort studies to be carried out. These results could aid in creating new tactics to lessen the suffering of diabetic people and enhance their quality of life. This current study fills the present gap in the literature of the day.

Conclusion:

Clinical professionals should check and recognize musculoskeletal symptoms in diabetic patients due to the high prevalence of shoulder dysfunction in diabetics. Diabetic patients' ability to carry out their daily activities without difficulty might be hindered by shoulder pain, which can be prevented by early diagnosis and treatment of DM. Early detection of musculoskeletal problems can be an important discovery in managing diabetes patients. Physicians are becoming more concerned about the early identification and treatment of shoulder dysfunction due to the rising prevalence of the condition. To enhance the patients' daily lives, it should be obligatory for diabetes care programs to include screening, preventive, and rehabilitation measures for shoulder dysfunction.

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