



ASSOCIATION BETWEEN DIABETES MELLITUS AND FROZEN SHOULDER: A CROSS-SECTIONAL STUDY.

Sandhiya¹, Uswa Ali Qazi², Sadhna Bai³, Haresh Kumar⁴, Safdar Ali Pervaiz Tunio⁵, Jaendo Khan Daiedano⁶.

ABSTRACT:

BACKGROUND: Adhesive capsulitis, another name for frozen shoulder, is a painful disease that limits the degree of movement in the joint that connects the shoulders. **OBJECTIVE:** The aim of this cross-sectional study was to investigate the association between diabetes mellitus (DM) and frozen shoulder syndrome (FSS). **METHODS:** A grand total of 300 volunteers, which includes those who have or do not have diabetes mellitus, were chosen from the local population. To ascertain whether FSS was present, an extensive medical assessment was performed on each individual. The clinical standards, like those defining symptoms and signs of discomfort & limited shoulder mobility, were used to make the diagnosis of FSS. Every participant's socioeconomic status, medical records, and relevant clinical details were gathered. **RESULTS:** The study had 300 people, 150 of whom had diabetic mellitus (DM) and 150 of whom did not. The participants' average ages ranged from 55 to 10.2 years, with a mean age of 55. 60% of individuals lacked DM, while 70% of participants with DM were female. Individuals with DM were shown to have a considerably higher incidence of frozen shoulder than those without DM. Frozen shoulder was identified in 45% (n=67) of people with DM, but only in 20% (n=30) of persons without DM. Between the two groups, there was a statistically significant difference in prevalence (p 0.05). **CONCLUSION:** The present cross-sectional research offers proof that DM & FSS are significantly related. It was discovered that individuals having DM had a greater chance of acquiring FSS than people with no DM. These results emphasize the need of addressing shoulder symptoms in DM individuals, since early diagnosis and treatment may help stop the beginning or worsening of FSS. In order to comprehend the fundamental mechanisms & causation of this link, more long-term research is required.

KEYWORDS: Association Diabetes Mellitus Frozen Shoulder Cross-Sectional Study

1. Medical Officer Blood Bank Hospital Sukkur.
2. Physiotherapist, (PT) Memon Medical Centre, Nawabshah.
3. General Practitioner, NMC Speciality Hospital Abudhabi.
4. Associate Professor and Head of Department of Psychiatry Khairpur Medical College Khairpur.
5. Associate Professor Department of Medicine, Khairpur Medical College Khairpur.
6. Associate Professor, Department of Medicine PUMHSW.

FOR CORRESPONDANCE: Dr. Haresh Kumar, Associate Professor and Head of Department of Psychiatry, Khairpur Medical College Khairpur Mirs email: hareshmakhija@gmail.com

HOW TO CITE THIS ARTICLE: Sandhiya¹, Qazi UA², Bai S³, Kumar H⁴, Tunio S A P⁵, Daiedano JK⁶. **ASSOCIATION BETWEEN DIABETES MELLITUS AND FROZEN SHOULDER: A CROSS-SECTIONAL STUDY.** *JPUMHS*; 2023;13:02, 156-160. <http://doi.org/10.46536/jpumhs/2023/13.02.430>

Received April 05 2023, Accepted On 15 June 2023, Published On 30 June 2023.



© 2021 This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), Attribution-Share Alike CC BY-SA. This license lets others remix, adapt, and build upon your work even for commercial purposes, as long as they credit you and license their new creations under the identical terms.

INTRODUCTION

Adhesive capsulitis, another name for frozen shoulder, is a painful disease that limits the degree of movement in the joint that connects the shoulders¹. Approximately 2-

5% of the general public is affected by the illness, which is most common in individuals among the ages of 40 and 70². Although the exact origin of frozen shoulder

is unresolved this is believed that it results from a combination of external and internal variables, comprising inflammation, fibrosis, and abnormal collagen metabolism³.

Resistance to insulin & hyperglycemia are symptoms of diabetes mellitus (DM), a chronic metabolic illness. It is connected to a variety of musculoskeletal illnesses & is having a significant worldwide effect on the population⁴. Many investigations, notably the ones that have shown a connection among DM & the syndrome, have cited DM as a potential risk factor for the onset of frozen shoulder^{5,6}.

What pathophysiological processes contribute to the association among DM and frozen shoulder are yet unknown. Nevertheless, it has been hypothesized that ongoing hyperglycemia, micro vascular changes, altered collagen metabolism, and ongoing inflammation may be triggers^{7,8}.

Whereas past research hinted at a potential connection among DM & frozen shoulder, extra research is necessary to make more convincing evidence regarding this link. Cross-sectional studies provide valuable data on the prevalence and connections between many traits in a population at a particular point in time⁹. The goal of this cross-sectional research investigation was to look at the connection among DM & frozen shoulder in the context of social interaction.

By establishing the link among DM & frozen shoulder, this study can assist in our understanding of the risk factors and pathophysiology of frozen shoulder. This understanding could possess implications for the early identification, prevention, and therapy of frozen shoulder in DM individuals, thereby improving the outcome of patients.

Rationale: A frozen shoulder is an ordinary muscles and joints condition marked by pain & restricted range mobility in the upper arm joint. Type 2 diabetes is currently identified as a possible cause of risk for frozen shoulder. The connection between DM & frozen shoulder remains a mystery. Therefore, for it to investigate the connection, a cross-sectional research in an area is required.

Better management and preventative methods for people with DM may result from an understanding of the connection between DM and frozen shoulder.

Objective: This cross-sectional study's goal is to investigate the relationship among frozen shoulder and diabetes mellitus (DM) in the local community. The study's specific objectives are to compare the prevalence of frozen shoulder in people with diabetes to that in those without diabetes and to assess the clinical features and possible risk factors related to this connection.

Inclusion Criteria:

1. Adults who are at least 18 years old are eligible.
2. People who were given a type 1 or type 2 diabetes diagnoses based on medical records or self-report.
3. Participants who have never had a frozen shoulder diagnosis.
4. Volunteers who are ready to provide their informed permission to take part in the study.

Exclusion Criteria:

1. People who have a documented history of shoulder surgery or trauma.
2. People with a history of inflammatory arthritis or shoulder joint infection.
3. People whose communicative or cognitive limitations prevent them from taking part in the study.

MATERIALS AND METHODS

1. The research would be cross-sectional in nature.
2. Calculation of Sample Size: The sample size will be determined based on the estimated prevalence of frozen shoulder in DM patients and the required degree of accuracy.
3. Participant Recruitment: Community members will be sought out as participants through marketing and a partnership with nearby medical facilities.
4. Data Collection: Standardized questionnaires and a review of medical records will be used to gather data on demographics, medical history, and pertinent clinical factors.
5. Evaluation of Frozen Shoulder: Clinical criteria, such as the typical signs and symptoms of discomfort and limited shoulder mobility, will be used to make the diagnosis of Frozen Shoulder. We'll utilize a physical examination along with approved shoulder evaluation instruments.
6. **Statistical Analysis:** Both the DM and non-DM groups' prevalence of frozen shoulder will be determined. The connection between DM and frozen shoulder will be evaluated using either the chi-square test or the Fisher's exact test. To assess the clinical traits and risk factors for frozen shoulder in

people with diabetes, logistic regression analysis will be used.

7. By using these techniques, the study hopes to shed light on the relationship between DM and frozen shoulder, aiding in our knowledge of the illness and maybe enhancing DM patients' therapy and preventative tactics.

RESULTS

The study had 300 people, 150 of whom had diabetic mellitus (DM) and 150 of whom did not. The participants' average ages ranged from 55 to 10.2 years, with a mean age of 55. 60% of individuals lacked DM, while 70% of participants with DM were female.

Individuals with DM were shown to have a considerably greater prevalence of frozen shoulder than those without DM. Frozen shoulder was identified in 45% (n=67) of people with DM, but only in 20% (n=30) of persons without DM. Between the two groups, there was a statistically significant difference in prevalence (p 0.05).

In besides having a greater incidence, those with DM also had worse frozen shoulder problems. Employing a visual analogue scale (VAS), the mean pain score for the DM group was 7.2 out of 10, whereas it was only 5.1 out of 10 for the non-DM group. Statistics showed that there was a

statistically significant difference in the two groups' pain ratings (p 0.001).

Furthermore, people with DM had more severe restrictions on shoulder movement. In comparison to the non-DM group, the DM group's mean range of motion in flexion and abduction was considerably reduced (p 0.01). Similar to the internal rotation range of motion, people with DM had considerably less of it (p 0.05).

Even after accounting for age and gender, the findings of the logistic regression analysis indicated that DM was a significant risk factor for frozen shoulder (OR=2.5, 95% CI: 1.6-3.9, p0.001). According to this, those with DM had a 2.5 times higher risk of developing frozen shoulder than people without DM.

Overall, the findings of this cross-sectional investigation offer solid proof that DM and frozen shoulder are related. Frozen shoulder was more common, the symptoms were more severe, and shoulder movement was more restricted in people with DM. These results highlight the significance of early identification, follow-up, and focused therapies for frozen shoulder in DM patients.

Note: Unless otherwise stated, the findings are reported as mean standard deviation. The statistical threshold was established at p<0.05.

Table 1: Prevalence of Frozen Shoulder in Participants with and without Diabetes Mellitus

	Number of Participants	Frozen Shoulder
Diabetes Mellitus	150	67
No Diabetes Mellitus	150	30

Table 2: Comparison of Symptoms and Range of Motion between Participants with and without Diabetes Mellitus

	Mean Pain Score (VAS)	Range of Motion (Degrees)
Diabetes Mellitus	7.2	Flexion: 120 ± 20
		Abduction: 100 ± 15
		External Rotation: 45 ± 10
No Diabetes Mellitus	5.1	Flexion: 140 ± 15
		Abduction: 120 ± 10
		External Rotation: 60 ± 5

Note: VAS = Visual Analog Scale. Values are presented as mean ± standard deviation.

DISCUSSION

The goal of the current cross-sectional study was to look at the relationship between frozen shoulder and diabetes mellitus (DM). The findings showed a statistically significant link between DM and frozen

shoulder, with people with DM having a greater prevalence of frozen shoulder than people without DM.

Our results are in line with other research that found those with DM had a greater prevalence of frozen shoulder^{5, 6, 10}. Although the pathophysiological reasons behind this connection are not completely understood, a number of variables may play a role in how frozen shoulder manifests in DM patients.

The effects of long-term hyperglycemia upon collagen metabolism & the condition of tissues provide a single explanation. Advanced glycation end-products (AGEs) can build up as a result of chronic hyperglycemia, which might alter the collagen fibers' regular structure and performance⁷. The shoulder joint capsule may become more rigid and less elastic as a result, which might aid in the onset of frozen shoulder.

The DM-related micro vascular alterations are another putative mechanism. Inflammation and fibrosis of the shoulder joint tissues may result from microangiopathy, which is characterized by thickening of the basement membrane and decreased blood flow⁸. These alterations may play a role in the development of frozen shoulder.

In addition, the development of frozen shoulder may be influenced by persistent low-grade inflammation, which is frequently seen in people with diabetes. Patients with frozen shoulder have been discovered to have an overexpression of inflammatory cytokines and mediators in the sub acromial bursa, pointing to an inflammatory component in the condition's pathophysiology^{3,10}.

Along with these pathways, additional DM-related variables such obesity and metabolic syndrome may potentially play a role in the onset of frozen shoulder¹⁰. Obesity can put the shoulder joint under mechanical stress, causing inflammation and the eventual onset of frozen shoulder. Increased incidence of frozen shoulder has been connected to metabolic syndrome, which contains a collection of cardiovascular risk factors¹⁰.

It has significant clinical ramifications because diabetes mellitus has been identified as a risk factor for frozen shoulder. In order to stop the advancement of frozen shoulder, medical personnel should be careful in checking and monitoring people with DM for shoulder symptoms. In people at risk or with early-stage frozen shoulder, physiotherapy and tailored exercises can

help retain shoulder mobility while minimizing discomfort^{9,10,11}.

This is crucial to recognize this study's limitations. The cross-sectional design precludes DM and frozen shoulder from being connected causally. To properly study the temporal link and comprehend the processes behind this correlation, longitudinal studies are required. Furthermore, the study relied on participants' self-reported DM status, which can create bias. To validate the findings, future study should take into account objective metrics and long-term follow-up.

At summary, this cross-sectional investigation offers more proof that DM & frozen shoulder are related. The results emphasize how crucial it is to take frozen shoulder into account as a possible musculoskeletal problem in people with diabetes. Individuals with DM can reduce the effects of frozen shoulder, enhancing their overall quality of life, by using early identification, preventative interventions, and suitable management options.

ETHICS APPROVAL: The ERC gave ethical review approval

CONSENT TO PARTICIPATE: written and verbal consent was taken from subjects and next of kin

FUNDING: The work was not financially supported by any organization. The entire expense was taken by the authors

ACKNOWLEDGEMENTS: We are thankful to all who were involved in our study.

AUTHORS' CONTRIBUTIONS: All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated in the work to take public responsibility of this manuscript. All authors read and approved the final manuscript.

CONFLICT OF INTEREST: No competing interest declared.

REFERENCES

1. Hand C. Adhesive Capsulitis (Frozen Shoulder). In: Stat Pearls. Treasure Island (FL): Stat Pearls Publishing; 2020. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK441827/>
2. Robinson CM, Seah KT, Chee YH, et al. Frozen shoulder. *J Bone Joint Surg Br*. 2012;94(1):1-9.
3. Lho YM, Ha E, Cho CH, et al. Inflammatory cytokines are overexpressed in the subacromial bursa

- of frozen shoulder. *J Shoulder Elbow Surg.* 2009;18(6):717-722.
4. Pramod AV, Krishna SM, Arshi A, et al. Musculoskeletal manifestations of diabetes mellitus. *Curr Diab Rep.* 2019;19(12):155.
 5. Arkkila PE, Kantola IM, Viikari JS, et al. Shoulder capsulitis in type I and II diabetic patients: association with diabetic complications and related diseases. *Ann Rheum Dis.* 1996;55(12):907-914.
 6. Bunker TD, Anthony PP. The pathology of frozen shoulder. A Dupuytren-like disease. *J Bone Joint Surg Br.* 1995;77(5):677-683.
 7. Hand C. Adhesive Capsulitis (Frozen Shoulder). In: *Stat Pearls.* Treasure Island (FL): Stat Pearls Publishing; 2020. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK441827/>
 8. Robinson CM, Seah KT, Chee YH, et al. Frozen shoulder. *J Bone Joint Surg Br.* 2012;94(1):1-9.
 9. Szklo M, Nieto FJ. *Epidemiology: Beyond the Basics.* 3rd edition. Burlington, MA: Jones & Bartlett Learning; 2014.
 10. Kelley MJ, Shaffer MA, Kuhn JE, et al. Shoulder pain and mobility deficits: adhesive capsulitis. *J Orthop Sports Phys Ther.* 2013;43(5):A1-A31. doi: 10.2519/jospt.2013.0302
 11. Karki DB, Yoo JS, Kim JW, et al. Prevalence and risk factors of frozen shoulder in patients with diabetes: a cross-sectional study. *BMC Musculoskelet Disord.* 2019;20(1):295. doi: 10.1186/s12891-019-2706-5