



FROZEN SHOULDER AND THEIR RISK FACTORS IN DIABETIC POPULATION- PREVALENCE STUDY FROM NORTH-WEST INDIA

General Medicine

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ABSTRACT

Background- The incidence of frozen shoulder has been found to be two to four times higher in diabetics than in the general population. The estimated prevalence is 11–30% in diabetic patients and 2–10% in non-diabetics.

Methodology - Study was conducted for 2 year in diabetic care and research center, S.P. Medical College & Associated Group of P.B.M. Hospitals, Bikaner to find out prevalence of rheumatological manifestation in diabetic patients and to assess relationship between glycemic control and other complications of diabetes.

Results- The study was conducted over 5732 cases out of which 3216(56.1%) were male and 2516(43.9%) were females. Frozen shoulder was present in total 1146(20.0%) patients out of them 32(3.9%) had type 1 diabetes while 1114(22.6%) had type 2 diabetes. The association of age, duration of diabetes, systolic & diastolic blood pressure, Fasting Blood Sugar, HbA1C, BMI, Serum cholesterol, Serum HDL, Serum Triglyceride, Serum LDL and Serum VLDL with Frozen Shoulder was done with regression analysis and among these factors BMI, Duration of diabetes, Age and Systolic BP were strongest association with regression coefficient (B) 7.429, 5.127, 2.631 and 2.195 respectively. The association of frozen shoulder with macro vascular and micro vascular changes by logistic regression analysis was found as with Retinopathy [odds ratio 0.940(CI 0.810-1.092)], Nephropathy [odds ratio 1.116(CI 0.973-1.280)], Neuropathy [odds ratio 2.546(CI 2.230-2.906)], CAD [odds ratio 1.661(CI 1.458-1.892)], PVD [odds ratio 0.979(CI 0.851-1.125)].

Conclusion- In this study there is high prevalence of frozen shoulder and associated complications in diabetic population of North West. Much of which can be avoided if proper care is taken since the first step towards treating a disability in the community warrant a survey to assess its load and risk factor, and effort has been made to elucidate prevalence of rheumatological manifestation in diabetic cohort.

KEYWORDS

Diabetes Mellitus, Frozen Shoulder, Rheumatological Complications

Introduction:

Diabetes mellitus (DM) is associated with several musculoskeletal manifestations. The development of musculoskeletal disorders depends on age and on the duration of DM; however, it has been difficult to show a direct correlation with the metabolic control of DM. Most of these disorders can be diagnosed clinically, but some radiological examination may help, especially in differential diagnosis.

Rheumatological disorder share as with microvascular disease and change of collagen results in Adhesive capsulitis or frozen shoulder, this term refers to a stiffened glenohumeral joint.

It usually caused by thickening and contraction of the joint capsule which results in a substantial decrease in capsular volume capacity. Patients usually presented with shoulder stiffness, along with decreased range of motion and pain. The incidence of adhesive capsulitis has been found to be two to four times higher in diabetics than in the general population.¹ The estimated prevalence is 11–30% in diabetic patients and 2–10% in non-diabetics. Adhesive capsulitis appears at an earlier age in patients with diabetes.² Therapy is largely conservative and involves minimizing progress of the adhesions, mobilization of the shoulder including gentle stretching and range of motion exercises, and the use of analgesics and/or intra-articular injections³

Methodology:

Present study was conducted for a period of 2 year in diabetic care and research center, S.P. Medical College & Associated Group of P.B.M. Hospitals, Bikaner. Rationale behind this study is to find out prevalence of rheumatological manifestation in diabetic patients and to assess relationship between glycemic control and other complications of diabetes. The study was planned to enroll maximum number of diabetic patients whether type 1 or type 2 attending medical outdoor, diabetic care and research center and admitted in hospital. Before enrolment details about nature and utility of present study was explained to all patients and informed consent was taken. After enrolment all patients were subjected detailed clinical examination and relevant investigation. Categorization of diabetes mellitus into type 1 and type 2 diabetics were done mainly on clinical criteria viz age of onset, body habitus & response to treatment.

Special emphasis was given to a thorough musculoskeletal system

examination. Patients with pain in the shoulder for at least 1 month, an inability to lie on the affected shoulder, and restricted active and passive shoulder joint movements in at least three planes were diagnosed as having a frozen shoulder, according to the criteria described by Pal et al⁴. Skiagram of shoulder, CT scan or MRI of involved joint was done if needed.

Anthropometric measurement was taken as standing height in meter, weight in kilogram; hip and waist circumference in centimeters and body mass index was calculated by using formula weight in kilogram/height in meter square.

Statistical Analysis:

Data was assessed using statistical program SPSS V 20. Regression analysis was done to evaluate the association of rheumatological manifestation and other complications in diabetic patients. Multiple regression analysis values of correlation coefficients were calculated and the significance of correlation was assessed. P value of <0.05 was considered significant.

Inclusion criteria

1. All the patients who have diabetes attending the diabetic care and research center.

Exclusion criteria

1. Patients with collagen vascular disorder were excluded.
2. Patient with history of trauma-related musculoskeletal morbidities was excluded.

Observations:

The study was conducted over 5732 cases out of which 3216(56.1%) were male and 2516(43.9%) were females. Frozen shoulder was present in total 1146(20.0%) patients out of them 32(3.9%) had type 1 diabetes while 1114(22.6%) had type 2 diabetes.

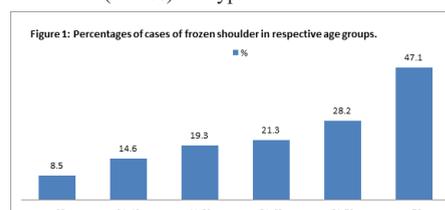


Figure 1 Shows distribution of cases of frozen shoulder in respective age groups.

Table 1: Results of multiple logistic regression analysis showing association of various risk factors with Frozen Shoulder.

Variable	Odds Ratio	95% CI	Regression coefficient β
Age	1.573	1.383-1.789	2.631
Duration of Diabetes	2.572	2.082-3.178	5.127
Systolic BP	2.106	1.795-2.471	2.195
Diastolic BP	1.205	1.061-1.370	1.272
Fasting Blood Sugar	1.546	1.254-1.905	1.693
HbA1C	1.301	1.128-1.500	1.837
BMI	4.076	2.855-5.812	7.429
Serum Cholesterol	1.158	0.985-1.362	1.063
Serum HDL	0.565	0.491-0.651	0.297
Serum Triglyceride	1.012	0.862-1.187	1.039
Serum LDL	1.310	1.111-1.544	1.222
Serum VLDL	1.089	0.957-1.240	1.001

Table 1 Shows the association of age, duration of diabetes, systolic & diastolic blood pressure, Fasting Blood Sugar, HbA1C, BMI, Serum cholesterol, Serum HDL, Serum Triglyceride, Serum LDL and Serum VLDL with Frozen Shoulder and among these factors BMI, Duration of diabetes, Age and Systolic BP were strongest association with regression coefficient (β) 7.429, 5.127, 2.631 and 2.195 respectively.

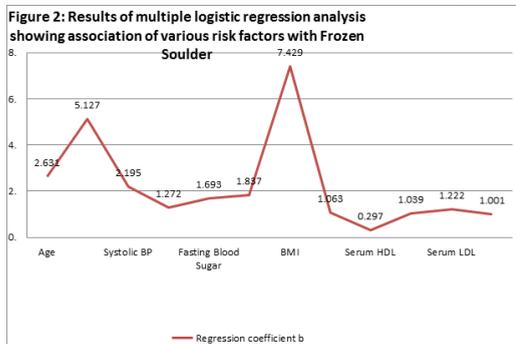


Table 2: Association of frozen shoulder with macro vascular and micro vascular changes.

Macro vascular & Micro vascular changes	Odds Ratio	95% CI
Retinopathy	0.940	0.810-1.092
Nephropathy	1.116	0.973-1.280
Neuropathy	2.546	2.230-2.906
CAD	1.661	1.458-1.892
PVD	0.979	0.851-1.125

Table 2: Shows association of frozen shoulder with macro vascular and micro vascular changes by logistic regression analysis, Retinopathy [odds ratio 0.940(CI 0.810-1.092)], Nephropathy [odds ratio 1.116(CI 0.973-1.280)], Neuropathy [odds ratio 2.546(CI 2.230-2.906)], CAD [odds ratio 1.661(CI 1.458-1.892)], PVD [odds ratio 0.979(CI 0.851-1.125)].

Discussion:

Diabetes mellitus associated with several rheumatological manifestations which have been generally ignored and poorly treated. In diabetes, shoulder problems have been described as the most disabling manifestation of musculoskeletal disorders.¹ Prevalence of frozen shoulder is one of the commonest long term complication of diabetes mellitus. In our study 1146 patients (20%) out of 5732 were having these complications. While 3.6% in Non- diabetics and 13.1% in diabetics in study done on Kashmiri Population by Bhat et al⁵ was quite low. Study done by Ray et al⁶ reported that prevalence of frozen shoulder was 18% in diabetic patients which were compatible with our results. A higher prevalence 25% was found in study conducted by Ramchurn et al⁷, this higher results may be because of small sample size and more sophisticated techniques to diagnose even in subclinical cases. Sarkar et al⁸ also reported prevalence 17.9% in their study while in our study 3.9% with frozen shoulder had type 1 diabetes while

22.6% had type 2 diabetes. Musculoskeletal disorders are common in type 1 and 2 diabetic subjects, and examination of shoulders as well as the skeleton, should be included in the evaluation of patients with Diabetes mellitus^{9,10}.

On applying multiple regression analysis for Frozen Shoulder among diabetics, there was positive association of age of patients [odds ratio 1.573 (CI 1.383-1.789)] Duration of Diabetes 2.572 (CI 2.082-3.178), Systolic Blood Pressure 2.106 (CI 1.795-2.471), Diastolic Blood Pressure 1.205 (CI 1.061-1.370), Fasting Blood Sugar 1.546 (CI 1.254-1.905), HbA_{1c} 1.301 (CI 1.128-1.500), BMI 4.076 (CI 2.855-5.812) and Serum Cholesterol 1.158 (CI 0.985-1.362), Serum Triglyceride 1.012 (CI 0.862-1.187). Neurologic factors may contribute to the generation of pain (e.g., sympathetic autonomic hyperactivity, alpha-adrenoreceptor hyper-responsiveness, and central nervous system factors). Inadequate blood supply (ischemia) to soft tissue is also found in adhesive capsulitis, indicating a possible microvascular connection between neurologically mediated pain and connective tissue contracture, as well as a link between frozen shoulder and the microvascular aspects of diabetes.

The presence of shoulder pain can also lead to DM diagnosis. In a study of 88 patients initially diagnosed with adhesive capsulitis, 38% were found to be diabetic, and 32.9% were pre-diabetic as reported by Tighe et al¹. This data shows the importance of recognizing the association between the two disorders, enabling early DM diagnosis.

Salek et al¹¹ reported that diabetic patients presented with frozen shoulder had higher level of serum triglyceride level (p<0.001). There is also strong association between Nephropathy 1.116 (CI 0.973-1.280, Neuropathy 2.546 (2.230-2.906) and CAD 1.661 (1.458-1.892) as found in our study. No significant association with Retinopathy [odds ratio 0.940(CI 0.810-1.092)] and PVD [odds ratio 0.979(CI 0.851-1.125)]. Laslett and cols¹² found an association between shoulder involvements with diabetic retinopathy. Others associated it with autonomic neuropathy and myocardial infarction^{13,14} which are known complications of longstanding diabetes^{15,16}.

Conclusion:

In this study there is high prevalence of frozen shoulder and associated complications in diabetic population of North east. The understanding of the association between diabetes and the type of joint involvement is important for improving the quality of life of patients. The rheumatological manifestations in diabetics exert great health care burden on society. Much of which can be avoided if proper care is taken since the first step towards treating a disability in the community warrant a survey to assess its load and risk factor, and effort has been made to elucidate prevalence of rheumatological manifestation in diabetic cohort. Therefore examination of the shoulder should be carefully addressed by health care providers.

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