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PREVALENCE AND IDENTIFICATION OF FROZEN SHOULDER PATIENTS WITH DIABETES MELLITUS - AN EMPIRICAL STUDY

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Abstract:

Frozen shoulder is a constellation of symptoms like un-controlled pain. It is one of the musculoskeletal complications in patients with type 1 and type 2 diabetes that can be particularly debilitating. Researcher carried out this cross-sectional study on 579 patients with both type 1 and type 2 diabetes who had registered at the Diabetes Care Center Kadapa district, Andhra Pradesh, India. The study was conducted from January 2023 to December 2023. A structured questionnaire was designed and the responses of patients were recorded after informed verbal and written consent. The questionnaire outlined the key factors that can lead to a higher frequency of Frozen shoulder in patients with type 1 and type 2 diabetes. Among the 579 patients who attended the Diabetic care centre, Kadapa district, Andhra Pradesh, 216 individuals (37.3%) suffered from frozen shoulder. Females (n=126) were more commonly affected than males (n = 90). The present study shows that the prevalence of frozen shoulder is higher in patients with diabetes residing in Kadapa district. It can be attributed to socioeconomic status, lack of awareness, and poor blood glycemic control. Mass awareness campaigns, especially for male and female patients with type 1 and type 2 diabetes, are required to be initiated to create awareness about the disease and to facilitate early diagnosis and appropriate management. In-depth studies are needed to further explore the association between frozen shoulder and type 1 and type 2 diabetic patients.

Key Words: Frozen Shoulder, Type-1 and Type-2 Diabetes Patients, Diabetic Care Centers

Introduction:

Frozen shoulder is a disabling and severely painful shoulder condition that is commonly managed in a primary care setting in hospital population.[1] Patients with diabetes mellitus have high risk of developing pain or other symptoms from their shoulders.[1] Patients are often diagnosed with diabetes mellitus years after its onset,[2] which has led some authors to conclude that this diagnostic delay, which is associated with a long period of poor glycemic control, may influence the risk of acquiring a musculoskeletal disorder of the shoulder.[3,4]

A recent review in The Lancet showed that physical activity interventions based in primary care can generate larger health gains than other interventions, with favorable cost effectiveness [10]. For the past decade there have been numerous efforts to use general practitioners (GPs) as professionals to promote physical activity (Smith, van der Ploeg, Buffart, & Bauman, 2008). Promoting a physically active lifestyle in the rehabilitation setting provided an opportunity for engaging with patients around overall disease risk reduction. A large multi-centre trial in the Netherlands showed that people with a range of health conditions (including stroke, orthopaedic conditions, and back disorders) significantly increased their physical activity after receiving a physical activity lifestyle intervention during their rehabilitation [11]. The Active after Rehabilitation (AaR) intervention, which was provided by a physical activity counselor, improved physical activity behaviour such that participants in the intervention group were twice as likely to meet the physical activity recommendation than the control group at 6 weeks and 12 months after the end of rehabilitation [13, 15].

Carette S., et al. concluded that the accepted theory is that high blood glucose levels cause excessive glycosylation [5]. Early diagnosis of diabetes mellitus. may reduce the risk of long-term chronic disability of the shoulder as well as other complications.[6,7] Some authors have reported an association with duration and disease control (as measured by hemoglobin test for HbA1C and fasting glucose), [8] while others did not repeat these findings. [9-11] Clinically, patients' first experience is a phase of pain, which progresses into a freezing phase when glenohumeral motion is lost, followed by a thawing phase in which pain gradually subsides and most of the lost motion returns.[12] In the freezing phase, the patient often compensates for decreased gleno - humeral motion by increased scapulothoracic motion and thus masking the limitations in motion.[13, 14].

The aim of this study was to identify and evaluate some demographic features of diabetes mellitus patients and analyze prevalence of frozen shoulder among diabetic patients in Diabetes care Center at Kadapa district, Andhra Pradesh, India.

Method:

The study included the diabetes mellitus patients who attended the Diabetes Care Center at Kadapa district, Andhra Pradesh, India from January 2023 to December 2023. All these patients were routinely attending to the hospital for treatment, screening, evaluation, and/ or follow-up. All patients gave their written consent before taking part in the study. Detailed descriptive data were taken from patients, including age, gender, affected side, dominant side, body mass index, duration of diabetes mellitus, frozen shoulder onset, and any other advanced medical diseases or history of joint problems or trauma.

Physical Diagnosis: Scratch test was used to diagnose frozen shoulder by instructing a patient to scratch his medial side of the opposite scapula in three-step direction: from above the same side, from above and across the neck, and lastly from below, and patients unable to complete any of these steps (i.e., with limitation in all directions of movements), with 50% limitation of movement including active and passive external rotation of the involved shoulder in comparison to the other shoulder, or > 30° limitation in movement in cases of bilateral frozen shoulder.

Blood Investigations: Diagnosis of diabetes mellitus was confirmed by analysis of HbA1C, which was measured for all patients by Hb electrophoresis using an Hb-variant device with 1 ml of blood with ethylene diamine tetra acetic acid. An HbA1C level above 6.5%, or 48 mmol/mol according to the International Federation of Clinical Chemistry standard, was set as the cutoff point for diagnosing diabetes mellitus. Patients with an HbA1C level above 6.0% were defined as having a high risk of developing diabetes mellitus.15 Patients with slow onset of shoulder pain, unable to complete any of the steps of the scratch test, were included in the study. Patients with all other potential causes of frozen shoulder other than diabetes mellitus were excluded (i.e., history or local trauma, stroke, advanced pulmonary diseases, advanced cardiovascular diseases, thyroid diseases, and Parkinson's diseases, presence of other coexisting pathology such as glenohumeral osteoarthritis, rotator cuff pathology, calcifying tendinitis, post-surgical stiffness).[16] Other causes of shoulder pain and stiffness were ruled out by X-rays and magnetic resonance imaging.[17-19]

Results:

Among the 579 patients who attended the Diabetic care centre, Kadapa district, Andhra Pradesh, 216 individuals (37.3%) suffered from frozen shoulder. Females (n=126) were more commonly afflicted than males (n = 90). Regarding age, the most common rate of occurrence was between 60 and 70 years old at 35.6%, and lowest in the age group below 30 years at 2.3% (Table 1). The right side most commonly exhibited shoulder joint disorder at 73.6%, while the left side presented with 26.4%. The frequency in the dominant joints (81.9%) was higher than within non dominant (18.1%). Regarding the prevalence of frozen shoulder according to the duration of Diabetes Mellitus, the highest frequencies were observed within the chronic phase of the disease at 20.8% and 28.2% for durations of 1 to 5 and 5 to 10 years, respectively (Table 2). A normal distribution was observed for prevalence of frozen shoulder according to BMI (Table 3). Descriptive data were analyzed using standard deviation, standard error, mean, and confidence interval at 95%.

Table 1: Prevalence of Frozen Shoulder in Relation to Different Age Groups

S.No	Different Age Groups of Patients	Number Frozen Shoulder Positive	% of Frozen Shoulder From Diabetic Mellitus
01	<30	5	2.3%
02	30-40	8	3.7%
03	40-50	55	25.5%
04	50-60	71	32.9%
05	60-70	77	35.6%
	Total	216	

Table 2: Prevalence of Frozen Shoulder According to the Duration of Diabetes Mellitus

S.No	Duration of Diabetes Mellitus (years)[a]	Number Frozen Shoulder	% of Frozen Shoulder
01	<1	3	1.3%
02	1-5	45	20.8%
03	5-10	61	28.2%
04	10-15	51	23.6%
05	15-20	25	11.6%
06	>20	31	14.5%
	Total	216	100%

Table 3 Prevalence of Frozen Shoulder in Relation to BMI

S.No	Body Mass Index (BMI (kg/m^2)[a]	Number Frozen Shoulder in Related to BMI	% Frozen Shoulder in Related to BMI
01	20-22	00	00
02	22-24	18	8.3

03	24-26	44	20.4
04	26-28	50	23.1
05	28-30	20	9.3
06	30-32	36	16.7
07	32-34	24	11.1
08	34-36	18	8.3
09	36-38	6	2.8
	Total	216	100%

Discussion:

Regarding most events obtained during analytical processing, shoulder disorders represent a high percentage of joint problems in rheumatology despite it being a nonbearing weight joint. Particularly, frozen shoulder represented 11.5% of all patients that attended this branch of the hospital. Months or years did not affect the occurrence rate of shoulder disorder presentation. According to the methods used in the diagnosis of frozen shoulder, the scratch test was reported having high sensitivity and specificity in the diagnosis of frozen shoulder. [2, 20, 21] In the present study, frozen shoulder affected women more than men. The explanation might be that the patients analyzed in our sample were users of the public health system. As these patients are generally from low socioeconomic levels, one can assume that they may have less control over their conditions, which could justify the high prevalence rate. Arkkila and Gautier demonstrated that the greater prevalence of shoulder involvement in females and the elderly can be explained by the association between old age and adhesive capsulitis. [7] The preponderance of shoulder complaints in females' patients was also noted by Laslett and Cagliero were concluded [3,4] Because human collagen undergoes progressive changes with age that are characterized by changes in color (yellowing), insolubilization, and resistance to digestion by proteolytic enzymes, these age-related changes are accelerated with time. 20 frozen shoulder was also more common in the dominant side, probably due to increased levels of exercises and usage. [13, 14].

Diabetes mellitus is a systematic disease and a secondary cause of frozen shoulder in a variety of ways; the metabolic perturbations in diabetes (e.g., glycosylation of proteins, microvascular abnormalities, damage to blood vessels and nerves, and collagen accumulation in skin and periarticular structures) result in changes in connective tissue.[21] Approximately 10 to 30% of individuals with diabetes mellitus develop adhesive capsulitis and are usually less responsive to treatment.2,4,9 Limited joint mobility, which is common for most patients with shoulder symptoms, normally only occurs after years with high glucose levels, which might explain why there was a high prevalence of patients with diagnosed diabetes.9 Therefore, it is of great importance to be aware of the higher observed prevalence of diabetes within the treatment of patients with frozen shoulder symptoms and to recommend the implementation of standard testing for diabetes of all of these patients.

In diabetes mellitus with frozen shoulder problems have been described as the most disabling manifestation of musculoskeletal disorders.21 Its mechanism is known to be persistently high levels of glucose that lead to accumulation of advanced glycosylation end products, which form cross-links with collagen, making it inelastic and more subject to degenerative processes. It is estimated that a diabetic patient has at least twice the amount of this type of human collagen than the non diabetic population of a similar age, and undergo progressive changes affected joint elasticity.

Conclusion:

The present study shows that the prevalence of frozen shoulder is higher in patients with diabetes residing in Kadapa district than in comparable foreign hospital populations with type 1 and type 2 diabetes. It can be attributed to socioeconomic status, lack of awareness, and poor blood glycemic control. Mass awareness campaigns, especially for male and female patients with type 1 and type 2 diabetes, are required to be initiated to create awareness about the disease and to facilitate early diagnosis and appropriate management. In-depth studies are needed to further explore the association between frozen shoulder and type 1 and type 2 diabetic patients.

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