

Prevalence and determinants of frozen shoulder in patients with diabetes: An original research

Bijoy Chirayath^{1*}, Manesh Kumar², Joy Dennis Joseph³, Suchita Chandrabhan Dake⁴, Mylesh Ravisankar Dakshinamurthy⁵, Parvesh Kaliramna⁶, Rahul VC Tiwari⁷

¹Assistant Professor, Anesthesiology and Pain Medicine, Dept. of Anesthesiology, Jubilee Mission Medical College Hospital & Research Institute, Thrissur, Kerala, India

²Assistant Professor, Department of Orthopaedics, Pacific Medical College and Hospital, Udaipur, Rajasthan, India

³CMO at Taluk Headquarters Hospital Chavakkad, Thrissur, Kerala, India

⁴Private Practitioner, Aurangabad, Sarswati Dhanwantari Dental College, Parbhani, Maharashtra, India

⁵1st year MPH Student, American University of Armenia, Yerevan, Armenia

⁶Orthopedic Surgeon, Civil Hospital, Bahadurgarh, Haryana, Punjab, India

⁷MHA Student, IJHMR University, Jaipur, Rajasthan, India

Received: 20-11-2021 / Revised: 27-12-2021 / Accepted: 13-01-2022

Abstract

Introduction: Adhesive capsulitis is a group of symptoms involving the glenohumeral joint which is a musculoskeletal problem that can affect the diabetics. The goal of this study is to determine the prevalence of FS and compare the disease's factors in a diabetic community. **Materials and Methods:** We piloted an observational cross-sectional study among 100 diabetics of both genders. The study was done for a period of 2 years, at a territory care center. We designed a questionnaire that collected the patients' responses. These questions were formulated considering the important factors that may cause the Adhesive capsulitis among diabetics with an increased rate. **Results:** We observed that nearly 40% of the subject complained of the Adhesive capsulitis. The prevalence was at the department was 52.1%. The factors that were there were seen more associated among these cases of the Adhesive capsulitis were positive family history, uncontrolled blood glucose, insulin dependence and females. Greater number of the subjects had unilateral Adhesive capsulitis and was at stage 1 for the Adhesive capsulitis. **Conclusion:** Within the limitations of our study we observed a greater incidence of the Adhesive capsulitis among diabetics. This greater occurrence may be attributed to the poor glycemic control, lack of facilities, awareness, socio economic levels. Awareness camps are suggested to create education about these conditions targeting the female diabetics. Early intervention may alter the disease course and may favor a good prognosis. Further studies are suggested to find association of the diabetes and the Adhesive capsulitis.

Keywords: Adhesive capsulitis, diabetes mellitus, frozen shoulder, determinants, prevalence.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

The slow development of restricted motion at the shoulder joint with nonspecific radiographic findings is defined by frozen shoulder (FS), adhesive capsulitis, or periartthritis. As the disease advances, patients typically complain of significant shoulder pain and an inability to sleep on the affected side. Frozen shoulder can be classified into three clinical stages: freezing, frozen, and thawing. With moderate to severe shoulder pain and stiffness, the freezing period usually lasts two to nine months[1-5]. The stiffness of the frozen stage grows. The component of pain is reduced throughout this stage, which lasts on average 4 to 14 months. The thawing stage lasts around 5 to 24 months and results in gradual symptom reduction and range of motion restoration. There is a well-established link between adhesive capsulitis and diabetes mellitus (DM). Diabetics have a 2-4 times greater rate of adhesive capsulitis than the general population[6-8]. Patients with diabetes have a higher risk of FS, with an incidence of 10% to 20%, and patients with insulin dependent have an even higher risk, with an incidence of 36%.

*Correspondence

Dr. Bijoy Chirayath

Assistant Professor, Anesthesiology and Pain Medicine, Department of Anesthesiology, Jubilee Mission Medical College Hospital & Research Institute, Thrissur, Kerala, India.

E-mail: drbijoychirayath@yahoo.com

The likelihood of microvascular complications and organ involvement is reduced when diabetes is diagnosed early and treated effectively. In general, FS affects roughly 11 percent -30 percent of diabetics compared to 2 percent -10 percent of non-diabetics[9-10]. FS can occur in patients who have had a shoulder injury or who have had shoulder surgery. The risk of developing FS is higher when the injury is followed by extended joint immobilisation. In 2007, a study in Southern California looked into the impact of glycemic management on FS. This retrospective study looked at the records of 201,513 diabetic individuals, 1150 of whom had FS. It concluded that there was no link between HbA1c levels and the prevalence of FS[10]. The goal of this study is to determine the prevalence of FS and compare the disease's factors in a diabetic community.

Materials and methods

We piloted an observational cross sectional study among 100 diabetics at the territory care center. The ethical clearance was obtained for the study. The study design was obtained for the patients, and written consent was taken for the study. The study was conducted for 2 years. We included the subjects who were aged 18 and above and were diabetics. The patients with all the other medical conditions were excluded. The detailed case history was taken and recorded. We designed a questionnaire that collected the patients' responses. These questions were formulated considering the important factors that may cause the Adhesive capsulitis among diabetics with an increased rate. The obtained data was analyzed using the IBM SPSS ver 20. The

comparison was done using the chi square test while deliberating $p < 0.05$ as significant.

Results

We observed that of the 100 subjects, the mean age was 45 ± 0.2 years. The male to female ratio was 68:32. Most of the subjects were diabetic for over than 10 years. Over 60% of the subjects were on insulin. Other used the oral medications. The subjects affected with the FS were 31%. Pain was seen in 30 and was unilateral in 21

patients. The restricted movement was seen in 10, of whom the Degree of restriction was up to shoulder in 15 and above shoulder in 14 patients. Family history was seen in 60 patients. Stage of FS in diagnosed cases was 1 in 21 and 2 in 8. Table 1 When the chi-square test was applied we observed that a significant variation between gender, mode of treatment, family history and control of the diabetes. Table 2

Table 1: Comparison of the various clinical features among subjects

Parameters		N
Age	18-40-year old	14
	41-60-year old	70
	61-80-year old	16
Sex	Males	32
	Females	68
Time of diabetes	Less than 1 year	10
	1-5 years	18
	6-10 years	30
	More than 10 years	42
Medication	Oral	63
	Insulin	37
Controlled diabetics	Controlled	58
	Uncontrolled	42
Shoulder pain	Present	30
	Absent	70
Location	Unilateral	21
	Bilateral	10
Restriction of movement	Present	10
	Absent	19
Degree of restriction	Up to shoulder	15
	Above shoulder	14
Regular exercise	Practiced	40
	Not practiced	32
Family history	Present	60
	Absent	40
Stage of FS in diagnosed cases	Stage 1	21
	Stage 2	8
Number of frozen shoulder		31

Table 2: Comparison between the various parameters for the FS

Parameters compared to FS		Pain	N	p-value
Age	18-40-year old	present	5	.287
		absent	8	
	41-60-year old	present	30	
		absent	35	
	61-80-year old	present	5	
		absent	12	
Sex	Males	present	10	.002
		absent	30	
	Females	present	25	
		absent	20	
Duration of diabetes	Less than 1 year	present	2	.063
		absent	10	
	1-5 years	present	20	
		absent	15	
	6-10 years	present	15	
		absent	20	
More than 10 years	present	21	.008	
	absent	15		
	Oral	present		20
		absent		30
Mode of treatment	Insulin	present	present	.008
		absent	absent	
	Controlled	present	present	
		absent	absent	
		present	present	

Glucose control	Uncontrolled	absent	absent	.031
		present	present	
Regular exercise	Practiced	absent	absent	.172
		present	present	
	Not practiced	absent	absent	
		present	present	
Family history	Present	absent	absent	.011
		present	present	
	Absent	absent	absent	
		present	present	
Number of frozen shoulder				31

Discussion

Our research looks at how FS is linked to demographic factors like age and gender, as well as non-demographic factors including glucose levels, time since diabetes began, anti-diabetic medication use, activity, and family history. One hundred percent of the 31 diabetic patients with shoulder discomfort exhibited shoulder movement restriction, and they were all diagnosed with FS after consistent radiologic results. Female diabetics had a greater FS in our study, which is higher than the internationally published values[11-15]. Poor socioeconomic position, late diagnosis, unawareness, lack of screening measures, poor glycemic control, and/or inadequate clinical management of FS can all contribute to a higher prevalence, especially in women. Previous research has found that the way anti-diabetic drugs are taken has an impact on the occurrence of FS. When the results were adjusted for HbA1c level, insulin-dependent individuals more likely to have FS than non-insulin-dependent patients with diabetes[16,17]. Patients who used oral hypoglycemic medicines were 1.5 times more likely than those who did not use insulin or oral hypoglycemic drugs to develop FS[15-18]. However, a recent meta-analysis found no significant difference in the prevalence of FS in insulin-dependent diabetic mellitus or insulin-treated patients compared to non-insulin-dependent diabetes patients[2,19,20]. Patients on insulin with or without oral hypoglycemic medications had a 1.2 times greater rate of FS, according to our findings. Sugar control was found to have a marginally significant relationship with the development of FS. A 1.5-fold greater rate of FS was detected in those who had uncontrolled glucose levels in the previous three months. As a result, more research is needed to confirm the link between glycemic control and FS. It is reported in the literature that FS is mostly unilateral; however, 42% of the patients with bilateral FS had diabetes[16-20]. Although FS is not linked to hereditary factors, its prevalence is higher in diabetic patients, and diabetes has a hereditary component in its multifactorial inheritance. Some researchers have proposed a relationship between genetic variables and the genesis of FS, but others have been unable to validate these findings. Although exercise has little influence on the occurrence of FS, it does play a role in its management. Although patients who were treated with exercise approaches on a regular basis had a slightly better prognosis, there was no substantial link between regular exercise and a better prognosis. Oral or injection steroid therapy is more successful in people with a reasonably acute condition, and a significant improvement in motion can be accomplished. As a result, steroid therapy can be used for a limited time[5,15,20]. Our study has limitations due to the limited sample size. Similarly, our findings revealed a lack of correlation with age. Therefore, further population-based studies are suggested to corroborate our findings.

Conclusions

In diabetic patients, effective glucose control and early FS treatment can lead to increased productivity. At regular intervals, awareness programs targeting diabetic communities, particularly women, should be initiated to provide information on the rising prevalence, symptoms, and risk factors of FS. Patients with diabetes who have a suspicion of FS should have an initial screening and shoulder radiographs done, as early detection leads to a better cure and late detection leads to worse clinical results. Furthermore, physicians should keep up to speed on this association's clinical implications, as it is critical in the diagnosis and management of FS in diabetic patients. To learn more about FS in these populations, larger,

multicenter investigations are needed.

References

1. Moren-Hybbinette I, Moritz U, Schersten B: The clinical picture of the painful diabetic shoulder--natural history, social consequences, and analysis of concomitant hand syndrome. *Acta Med Scand.* 1987; 221:73-82.
2. Stam H: Frozen shoulder: a review of current concepts . *Physiotherapy.* 1994, 80:588-598. Lequesne M, Dang N, Bensasson M, et al.: Increased association of diabetes mellitus with capsulitis of the shoulder and shoulder-hand syndrome. *Scand J Rheumatol.* 1977;6:53-56.
3. Pal B, Anderson J, Dick WC, et al.: Limitation of joint mobility and shoulder capsulitis in insulin- and non-insulin-dependent diabetes mellitus. *Rheumatology.* 1986; 25:147-151.
4. Wohlgethan J: Frozen shoulder in hyperthyroidism. *Arthritis Rheum.* 1987;30:936-939.
5. Bunker TD: Frozen shoulder: unravelling the enigma. *Ann R Coll Surg Engl.* 1997; 79:210-213.
6. Hand C, Clipsham K, Rees JL, et al.: Long-term outcome of frozen shoulder. *J Shoulder Elbow Surg.* 2008; 17:231-236.
7. Lundberg BJ: Glycosaminoglycans of the normal and frozen shoulder-joint capsule. *Clin Orthop Relat Res.* 1970;69:279-284.
8. Rodeo SA, Hannafin JA, Tom J, et al.: Immunolocalization of cytokines and their receptors in adhesive capsulitis of the shoulder. *J Orthop Res.* 1997, 15:427-436. Le HV, Lee SJ, Nazarian A, et al.: Adhesive capsulitis of the shoulder: review of pathophysiology and current clinical treatments. *Shoulder Elbow.* 2017; 9:75-84.
9. Bunker TD, Anthony PP: The pathology of frozen shoulder. *A Dupuytren-like disease . J Bone Joint Surg Br.* 1995; 77:677-683.
10. Bulgen D, Hazleman B, Ward M, et al.: Immunological studies in frozen shoulder. *Ann Rheum Dis.* 1978; 37:135-138.
11. Tighe CB, Oakley WS Jr: The prevalence of a diabetic condition and adhesive capsulitis of the shoulder. *South Med J.* 2008; 101:591-595.
12. Uddin MM, Khan AA, Haig AJ, et al.: Presentation of frozen shoulder among diabetic and non- diabetic patients. *J Clin Orthop Trauma.* 2014; 5:193-198.
13. Yian EH, Contreras R, Sodl JF: Effects of glycemic control on prevalence of diabetic frozen shoulder. *J Bone Joint Surg Am.* 2012;94:919-923.
14. Zreik NH, Malik RA, Charalambous CP: Adhesive capsulitis of the shoulder and diabetes: a meta-analysis of prevalence. *Muscles Ligaments Tendons J.* 2016; 6:26-34.
15. Seignalet J, Sany J, Caillens JP, et al.: Lack of association between HLA-B27 and frozen shoulder. *Tissue Antigens.* 1981; 18:364.
16. Favejee MM, Huisstede BM, Koes BW: Frozen shoulder: the effectiveness of conservative and surgical interventions - systematic review. *Br J Sports Med.* 2011; 45:49-56.
17. Buchbinder R, Green S, Youd JM, et al.: Oral steroids for adhesive capsulitis . *Cochrane Database Syst Rev.* 2006, 4:CD006189.
18. Lorbach O, Anagnostakos K, Scherf C, et al.: Nonoperative management of adhesive capsulitis of the shoulder: oral cortisone application versus intra-articular cortisone injections. *J Shoulder Elbow Surg.* 2010;19:172-179.

Conflict of Interest: Nil Source of support: Nil