FREQUENCY OF FROZEN SHOULDER AMONGST T2 DM PATIENTS.

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Abstract

Introduction: There is a strong relationship amid Frozen Shoulder andType 2 Diabetes Mellitus.

Aim; The target of current study was to assess the frequency ofFS (frozen shoulder) amongst subjects suffering from type 2 diabetes Mellitus. **Methods:** The current analytical and observational research randomly included 250 subjects suffering from type 2 diabetes mellitus (T2 DM). This study was conducted for two years from March 2018 to February 2020 at PMCH Nawabshah. A thorough medical history was taken from all subjects. To confirm the diagnosis of FS and DM, scratch test and hemoglobin A_{1C} were performed respectively. **Results:** There were majority of subjects married, 166 male and 88 females. Most of Females were house wife by occupation, while 39.6% male subjects were having no occupation. 87.6% of study population was educated from primary to graduation and rest of were un-educated. In majority of subjects 57.6% duration of DM was less than 5 years, while 68.4 were on OHA, 59.6% subjects DM control was at unsatisfactory level and 61.2% had negative family history of DM. In current study the dominant side of frozen shoulder was right 94.8% cases, while the rest were on left side. **Conclusion:** There is affirming relationship among T2DM and FS. The current research demonstrates that the rate of FS is high in subjects with T2DM. Elderly subjects have higher shoulder ailment with leading side being involved commonly.

Keywords: Shoulder Joint, T2DM, frozen shoulder, scratch test.

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INTRODUCTION

Shoulder issues are the most important musculoskeletal disabling manifestation of T2DM. [1]

The insistently raised levels of glucose are the known mechanism.The buildup of radical glycosylation end products forming the cross-links using collagen. This makes it inelastic and leads to augment the degenerative processes. [1.2.3]

This type of human collagen is estimated to be at least two times higher in DM subjects in comparison to non diabetic subjects of the same age, and experience advanced alterations affecting the elasticity of joint. [1]

Usually it is disabling and occasionally rigorously painful shoulder disorder.It is commonly managed atprimary health care settings. [4] In subjects with Diabetes mellitus (DM) there is increased risk ofhaving pain and other symptoms in shoulder joints.[4] Subjects with DM are diagnosed many years later after onset of disease.[5] This delayed diagnosis is ultimately related prolonged periods of the poor glycemic control. This may impact the risk of developing the musculoskeletal ailment of the shoulder joints.[6 7] Unduehigh glycosylation levels are caused by persistently high glucose levels.[8] Chronic disability of the shoulder as well as other long-term complications could be reduced with early diagnosis and management of diabetes.[9, 10] The relationship with timeinterval and illness control as measured HbA_{1C} and fasting levels of glucose remains controversial, few authors reported,[11] and others not.[12,13,14]

Pain is the first clinical evidence experienced by subjects.Thepain phase advances to loss of gleno-humeral motion known as freezing phase.This phase results in a defrosting phase in that pain subsides slowly and utmost the lost motion is retained. [15] The patients in freezing phase often compensate for reducedgleno-humeral motions by increasing scapula-thoracic motions and consequently hiding the confines of the motion.[16,17]

The study was aimed to isolatethe occurrence of Frozen Shoulderin subjects suffering from T2DM.The assumptions of the current study are that a solidrelationship remains between subjects suffering from FS and T2DM and with particular demographic features.

Methods

Current observational research was conducted atdepartment of orthopedics and department of medicine PMCH Nawabshah during the period

from March 2018 to February 2020. 250 subjects were randomly recruited with diagnosis of T2DM. All patients routinely attended to the hospital for management of type 2 diabetes mellitus and their complications. Written consent was taken from all the subjects before participating in the research.

All the subjects were analysed for descriptive data such as, age in years, sex, BMI (body mass index), duration of diabetes mellitus, onset of frozen shoulder, affected side, dominance, and any other progressive medical ailments or any joint complaints or history of trauma.

Standard deviation (SD), standard error, mean, and confidence interval at 95% were analyzed for descriptive data.

Frozen shoulder was diagnosed by Scratch test.Subjects were instructed to scratch their medial side of the opposite scapula.Three-step direction were given as; from above the same side, from above and across the neck, and lastly from below.Subjectsnot capable to perform any of the stepi.e., with limitation of movements in all directions were noted. FS was labeled with 50% restrictionin active and passive external rotation of the involved shoulder in contrastwith their other shoulder, orlimitation in movements $> 30°$ incase of bilateral Frozen Shoulder.

HbA1c was used to confirm the diagnosis of Diabetes Mellitus. HBA1c was measured in all subjects by Hb electrophoresis.Hb-variant device with 1 mL of blood with ethylene diamine tetra acetic acid was used. The level of HbA_{1C} should be $\leq 07.0\%$ in accordance to World Health Organization (WHO) criterion for control of DM.[18] According to the International Federation of Clinical Chemistry standard (IFCC), the cutoff point for diagnoses of diabetes mellitus was HbA_{1C} levels above 6.5%, or ≥ 48 mmol/mol and subjects with HbA_{1C} levels above 06.0% (IFCC $\geq$42 mmol/mol) were demarcated as at increased risk of emerging Diabetes Mellitus.[18]

Inclusion criteria: Subjects with history ofprogressive onset of pain in shoulder, and incapable to perform any of the step of the scratch test, were recruited in the research.

Exclusion criteria: Frozen shoulder secondary to other causes except DM was excluded. X-rays of shoulders were performed to rule out other causes of shoulder pain and stiffness.

Data was collected on predesigned proforma and analysed thru SPPS.The responses of subjects were noted on the structured designed questionnaire, following learned verbal and written agreement. The most important factors were outlined in the questionnaire that couldguide to anincreased incidence of frozen shoulder in diabetic subjects.

Results:

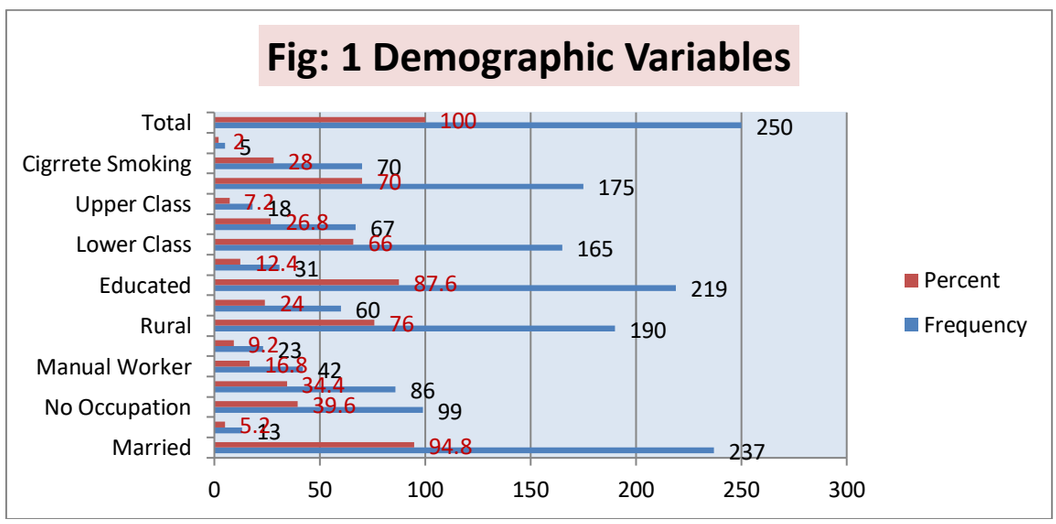
A total of 1200 type 2 DM patients were included there were 850 males and 350 females. Out of them 250 were with frozen shoulder. There was dominant ratio predominant in total count of diabetics reported here.

Descriptive Statistics

The descriptive statistics of current study including age, Heamoglobin A1c Level, Fasting Blood Sugar and Random Blood Sugar are given in table 1 with minimum, maximum, mean and standard deviations below.

Table 1: Descriptive Statistics

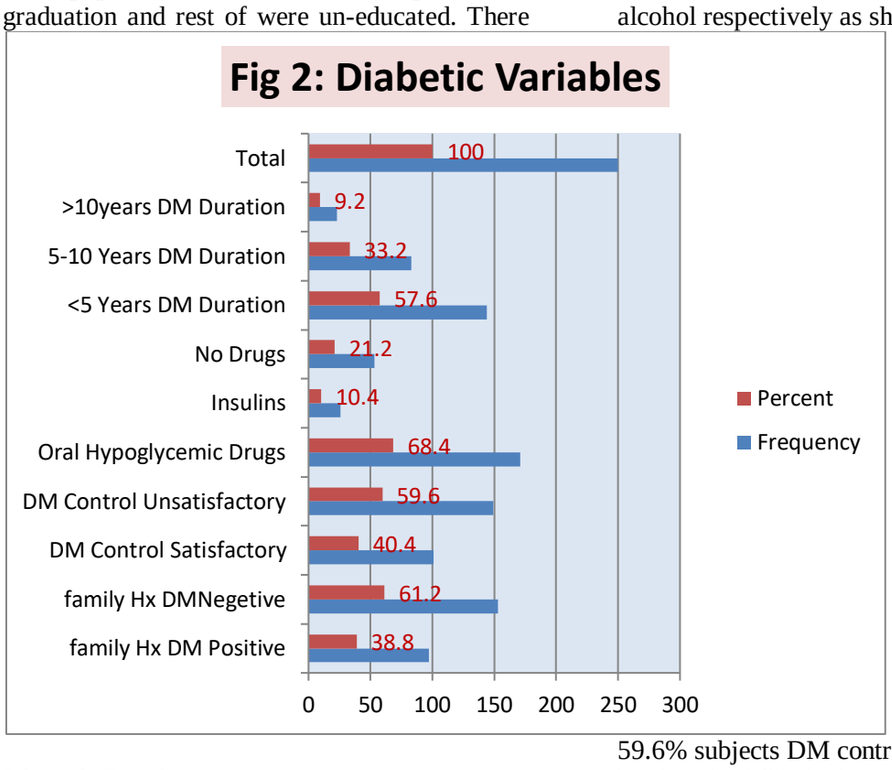
	N	Range	Minimum	Maximum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
Age In Years	250	30.00	45.00	75.00	57.0680	.39883	6.30606	39.766
HemoglobinA1c Level	250	8.50	3.90	12.40	7.1128	.15656	2.47542	6.128
Fasting Blood Sugar	250	145.00	85.00	230.00	137.2000	2.30089	36.38030	1323.526
Random Blood Sugar	250	334.00	76.00	410.00	257.1480	4.96550	78.51144	6164.046



Demographic variables of study

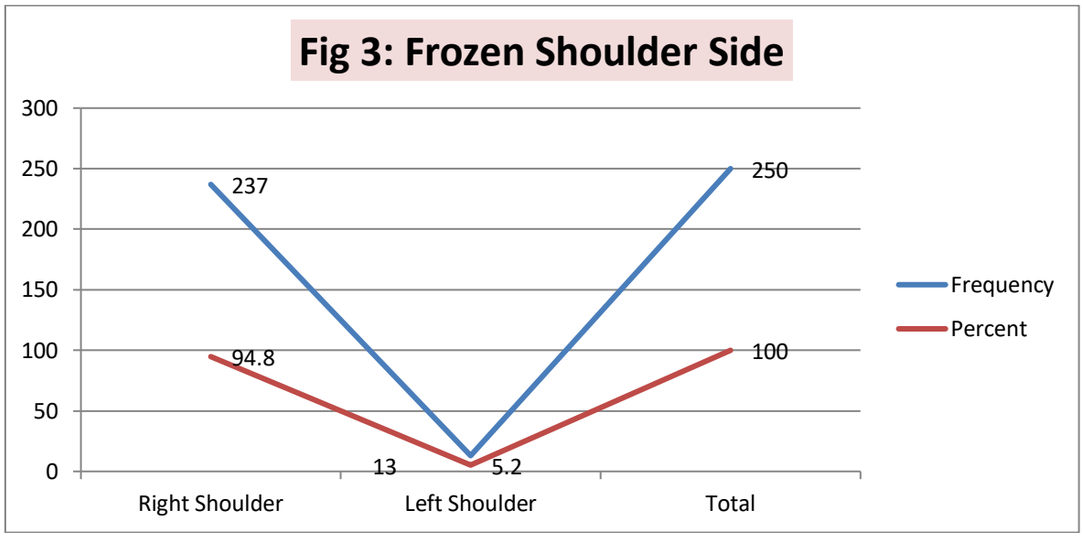
There were majority of subjects married, 166 male and 88 females. Most of Females were

house wife by occupation, while 39.6% male subjects were having no occupation. 87.6% of study population was educated from primary to graduation and rest of were un-educated. There was majority of subjects belonging to lower class. 70% of study population was not addicted, while rests were addicted to cigarette and alcohol respectively as shown in figure 1.



Diabetic Details:

In majority of subjects 57.6% duration of DM was less than 5 years, while 68.4 were on OHA, 59.6% subjects DM control was at unsatisfactory level and 61.2% had negative family history of DM as shown in figure 2..



Frozen Shoulder Side

In current study the dominant side of frozen shoulder was right 94.8% cases, while the rest were on left side as shown in figure 3.

Body Mass Index Gender& Shoulder Side Crosstab

The Body Mass Index Gender**&**Shoulder Side cross tabulation was assessed in terms of frequency and percentages, as the normal was constant, the overweight Gender **&** Shoulder Side showed the statistically no significance p=0.027. While obesity Gender **& Shoulder** Side was statistically significant p=0.000. The overall in total Body Mass Index Gender **& Shoulder** Side was statistically significant p=0.000 as shown in table 2.

Table 2: Body Mass Index Gender & Shoulder Side Crosstab							
Body Mass Index				Shoulder Side		Total	Pearson Chi-Square
				Right Shoulder	Left Shoulder		Asymp. Sig. (2-Sided)
Normal	Gender	Male	Count	130		130	c
			% Of Total	87.8%		87.8%	
		Female	Count	18		18	
			% Of Total	12.2%		12.2%	
	Total		Count	148		148	
			% Of Total	100.0%		100.0%	
Over Weight	Gender	Male	Count	25	0	25	.027
			% Of Total	28.1%	0.0%	28.1%	
		Female	Count	53	11	64	
			% Of Total	59.6%	12.4%	71.9%	
	Total		Count	78	11	89	
			% Of Total	87.6%	12.4%	100.0%	
Obese	Gender	Male	Count	11	0	11	.000
			% Of Total	84.6%	0.0%	84.6%	
		Female	Count	0	2	2	
			% Of Total	0.0%	15.4%	15.4%	
	Total		Count	11	2	13	
			% Of Total	84.6%	15.4%	100.0%	
Total	Gender	Male	Count	166	0	166	.000
			% Of Total	66.4%	0.0%	66.4%	
		Female	Count	71	13	84	
			% Of Total	28.4%	5.2%	33.6%	
	Total		Count	237	13	250	
			% Of Total	94.8%	5.2%	100.0%	

Duration of Diabetes Gender & Shoulder Side Crosstab

The Duration of Diabetes Gender & Shoulder Side cross tabulation was assessed in terms of frequency and percentages, the Duration of Diabetes 5 Years Gender & Shoulder Side showed the statistically significance p=0.000. While Duration of Diabetes 5-10 Years Gender& Shoulder Side was statistically significant p=0.000. The Duration of Diabetes>10years Gender& Shoulder Side was statistically significant p=0.000 as shown in table 3.

Table 3: Duration Of Diabetes Gender & Shoulder Side Crosstab							
Duration Of Diabetes				Shoulder Side		Total	Pearson Chi-Square
				Right Shoulder	Left Shoulder		Asymp. Sig. (2-Sided)
<5 Years DM Duration	Gender	Male	Count	93	0	93	.000
			% Of Total	64.6%	0.0%	64.6%	
		Female	Count	38	13	51	
			% Of Total	26.4%	9.0%	35.4%	
	Total		Count	131	13	144	
			% Of Total	91.0%	9.0%	100.0%	
5-10 Years DM Duration	Gender	Male	Count	56		56	.000
			% Of Total	67.5%		67.5%	
		Female	Count	27		27	
			% Of Total	32.5%		32.5%	
	Total		Count	83		83	
			% Of Total	100.0%		100.0%	
>10years DM Duration	Gender	Male	Count	17		17	.000
			% Of Total	73.9%		73.9%	
		Female	Count	6		6	
			% Of Total	26.1%		26.1%	
	Total		Count	23		23	
			% Of Total	100.0%		100.0%	
Total	Gender	Male	Count	166	0	166	.000
			% Of Total	66.4%	0.0%	66.4%	
		Female	Count	71	13	84	
			% Of Total	28.4%	5.2%	33.6%	
	Total		Count	237	13	250	
			% Of Total	94.8%	5.2%	100.0%	

Discussion:

Agroup of symptoms such as pain, stiffness, and/or functional insufficiency at the gleno-humeral joint is called frozen shoulder (FS) or adhesive capsulitis. Frozen shoulder is one of the musculoskeletal problems in subjects with T2DM that can be principally devastating. This study was aimed to assess the frequency of Frozen Shoulder and to equate the factors of this ailment in the peoples with diabetes mellitus from Nawabshah, Pakistan.

Three bony structures including the clavicle, scapula, and humors compose the shoulder complex.These are attached to form three synovial joints as, gleno-humeral, acromioclavicular, and sternoclavicular and two functional joints scapula-thoracic and sub-acromial[19.] Musculoskeletal problems disturbing shoulder joints mayconsists of either restricted mobility (hypo-mobility) or excess mobility (hypermobility) of the joint. Arthritis [either rheumatoid arthritis (RA) or osteoarthritis (OA)], frozen shoulder (FS)/ adhesive capsulitis, and rotator cuff tendinopathy (RC)/impingement syndrome, these are the common pathologies that restrict the movements of the shoulders [19.]

Joint instability is caused by hypermobility of the shoulder joint and it is either atraumatic or traumatic. Inherent generalized connective tissue laxity or repetitive micro-trauma are the causes of the atraumatic joint hypermobility. On the other hand large forces applied direct or indirect to the shoulder joint frequently leads to joint dislocation (complete separation of the articular surfaces) and soft tissue damage leading to traumatic instability. Furthermore, integralin consistency might be aninfluencing agent to traumatic dislocation, particularly by repetitive hectic overhead happenings. The painful shoulder syndrome is another secondary consequence of joint hypermobility [19.]

The elderpeople, especially with female preponderance are mainly targets of frozen shoulder. The accurate prevalence of this ailment is still unidentified.The data of 02.00%–05.00% prevalence is noted in the overall residents as described by authors.[20] The subjects with conditions like; minor upper limb trauma, overuse injury, surgery, and/or neurosurgery or systemic diseases like diabetes, thyroid disorders, osteoporosis, Dupuytren's contracture, cardiovascular disease, and stroke leading toprolonged shoulder immobility are at a higher risk for developing FS [21-22.] In present study the male population was dominant this is not matched able to other studies available due to our social, cultural and religious issues and due to male dominant society of this local setup.

In adhesive capsulitis and diabetes mellitus (DM) there is well-known correlation. Diabetic subjects in the common populace have 2-4 times higher incidence of adhesive capsulitis (FS)[23-24]. Subjects with diabetes mellitus are at a greater risk of frozen shoulder. An incidence of 10.00%-20.00% is noted in diabetics, and in diabetic insulin dependent subject's had a raised occurrence of up to 36.00% [25.] One of the utmost common disabling musculoskeletal manifestations of diabetics has been described as FS. In the year 2005 the occurrence of freshly diagnosed diabetics aged 20 years or elder was 01.3 million in the USA as reported by NDIC (National Diabetes Information Clearing house). Arise in frequency of musculoskeletal complications has noted with increase in the number of diabetic cases and increased life expectancy. The risk of microvascular complications and organ involvement has been reduced greatly due to the early diagnosis and effective management of diabetic subjects.

In subjects with FS the prevalence of diabetesis still not well addressed. In frozen shoulder usually there is unilateral involvement and the ability of the shoulder movement is greatly affected. More over approximately one in five subjects with FS there is involvement other than shoulder joint [25.] It is tremendously infrequent amongst young persons. FS is most frequently noted in subjects between the ages of 40 to 60 years. Female subjects have about 1.6 times increased risk of developing frozen shoulder [26.]

Thirty-three of the total 80 respondents included in the study were diagnosed with FS. In a study from Lahore (an urban region of Pakistan having inhabitants more than 07.00 million) the frequency of frozen shoulder (stage 1 of the disease and had unilateral involvement) was noted as 41.30% in diabetic subjects.which is. Insulin dependent female subjects with a positive family history and uncontrolled levels of blood glucosewere related with a considerably greater frequency of frozen shoulder[27.]

In another study a strong relationship was noted amongsubjects with diabetes and frozen shoulder. Female genders were generally affected more than male gender. Aging increased Shoulder ailment distribution increases with aging with principal side commonly involved. Diabetic subjects with prolonged and un-controlled disease usually developed the consequences of FS [28].

In subjects with type 1 diabetes with longer durations the point prevalence of frozen shoulder was 59.00%, and the life-time frequency was 76.00%. Diabetic subjects have increased risk of shoulder disability in comparison to non-diabetic patients. The increased levels of HbA1c were related with greater disability of shoulder [29].

An independent risk factor for frozen shoulder is diabetes mellitus. The diabetic subjects develop frozen shoulder 05 times more in comparison to non-diabetic controls.Overall the mean occurrence of frozen shoulder in diabetic subjectswas reported a 13.40%. In a people with frozen shoulder the mean prevalence of diabetes mellitus was 30.00%. There was no significant dissimilarity in the occurrence of the frozen shoulderin subjects with type 1 comparison to type 2 diabetic subjects, also no difference among subjects treated with oral hypoglycemic drugs and in subjects on insulin therapy as reported by Zreik. An increasedoccurrence of adhesive capsulitis/FS occurs in diabetic subjects and correspondingly an increased

occurrence of diabetes mellitus is present in subjects with adhesive capsulitis/FS. In all subjects suffering from adhesive capsulitis/FS must be screened for diabetes mellitus [30].

There is a need to conduct more studies on pain in shoulders, functions, and range of movements for management of frozen shoulder in diabetic subjects.To scrutinize the effect of these therapeutic interferences on function of shoulder in diabetic subjects in comparison non-diabetic subjects, further clinical researches are needed. Additionally, further researches are necessary to scrutinize the influence of diabetics on pain, function, and abnormalities in range of movements of shoulder as well as muscle power in subjects who experienced shoulder arthroplasty. Finally, additional studies are suggested to inspect whether agents like; co-morbidities and demographic predicts patient reported consequences comprising shoulder ache and functions as well as clinical reimbursements succeeding shoulder arthroplasty.

Shoulder ailments, such as frozen shoulder are frequently noted in diabetic subjects. To observe the efficiency of various invasive and non-invasive interferences in the management of shoulder ailments especially FS in diabetic subjects further studies are required. Further studies are requisite to scrutinize the effect of diabetes mellitus on shoulder rescue, and agents forecasting functional status of shoulder subsequent to shoulder arthroplasty.

Limitations

Current research has some restrictions. This research strategy is of restricted value for to conclude the consequences to the common populace. Consequently, outcomes related with this study mirror only region of research, not all areas or further republics.

Conclusion

A strong relationshipis noted among diabetes mellitus and frozen shoulder. The incidence of frozen shoulder is high in diabetic subjects as concluded in current study. Shoulder disorders dissemination with the predominant side most commonly involved is related with increasing aging process.

One of the commonest musculoskeletal malfunctions is frozen shoulder. Diabetic subjects have increased risk of suffering from this problem. Aging alters the shoulder disorders distribution in the inhabitants. Predominant and right sides remained commonly involved by the frozen shoulder. In diabetes mellitus and frozen shoulder there is a strong relationship.Timely diagnosis of frozen shoulder and diabetes is aimed to help in future management schemes.

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Conflict of Interest None declared.

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Authors contributions: Akhuand MA designed the study, Lohano AK gathered the Data, Jamali AA analyses the Data.

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