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Determinants of Adhesive capsulitis of shoulder in patients with diabetics and non-diabetics' mellitus

Abstract

The purpose of this study was to find out of shoulder pain with functional disability among diabetes mellitus and non-diabetes patients in Bangladesh. To find out shoulder pain with functional disabilities among the subjects suffering with diabetes and non-diabetics patient ,to find out socio demographic characteristics of diabetic patient and non-diabetic patient, medical information of adhesive capsulitis of shoulder in patient with diabetic and non-diabetic mellitus, muscle strength of adhesive capsulitis of shoulder in patient with diabetic and non-diabetic mellitus, understand the severity of pain and to measure upgrading of range of movement (ROM) for patients with adhesive capsulitis. Cross sectional research with 100 participants among the patients with diabetes mellitus and non-diabetic mellitus were selected from Islami Bank Hospital, Dhaka, Bangladesh. The instruments used included direct interview, a standard questionnaire and shoulder pain and disability index (SPADI). Data were numerically coded and captured in Excel, using an SPSS 24.0 version. The findings of the study provide a baseline of information about find out of shoulder pain among the patients with diabetes mellitus. In this study, 35% (n=35) respondents were female and rests of 65% (n=65) were male. The mean age of the participant was 46.99 years. Study focuses in total 47% of the respondents were sufferings for diabetes mellitus for about long time, 53% of the respondents were suffering for of non-diabetes mellitus. Study found that majority cases 23.4% (n=11) participants were suffering from type-2 diabetes mellitus whereas 76.6% (n=36) respondents were suffering from type-1 diabetes mellitus. Study found that majority cases 57% participants were overweight BMI whereas 8% respondents were class I obesity. Range of motion found in abduction average range 100 degree and external rotation 25 degree. So that types of adhesive capsulitis vs ROM that degree was more significant.

Keywords: adhesive capsulitis, diabetes mellitus, non-diabetes mellitus, BMI

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Abbreviations: AAROM, active-assisted range of motion; BMRC, Bangladesh medical research council; DM, diabetes mellitus; GDM, gestational diabetes mellitus; MSC, musculoskeletal complain; NIDDM, non-insulin dependent diabetes mellitus; ROM, range of movement; SPADI, shoulder pain and disability index; URB, university review board; VAS, visual analog scale; WHO, world health organization

Introduction

Shoulder joint is a distinctive anatomical composition amid an astonishing range of motion (ROM) so as to consent to us to interrelate among our upbringing. A slaughter of mobility of this joint spirit basis noteworthy morbidity. The Shoulder capsulitis is an inadequately implicit musculoskeletal circumstance to facilitate container survive disability.[1] Conversely the accurate expected the past has moreover not been definitively conventional, creation appraisal of management effects tricky.[2]

The Adhesive capsulitis, as well notorious like frozen shoulder, is an incident exemplify by pain and noteworthy thrashing of in cooperation with active range of motion (AROM) and passive range of motion (PROM) of the shoulder.[3] Adhesive capsulitis is the majority frequent syndrome amid that musculoskeletal illness.[4] In 2009, Captuli stated illustrated by a sinister and progressive thrashing of active and passive movement in the glenohumeral joint apparently owing to capsular Contracture. He affirmed that mainly luggage determined in concerning two years devoid of management. This disarray is one of the mainly widespread musculoskeletal tribulations perceived in

orthopedics with a frequency of 3–5% in the wide-ranging inhabitants and up to 20% in those with diabetes. Around 2-3% of adults aged flanked by 40 and 70 years expand shoulder capsulitis with a superior incidence in women (Stam, 1994) and non overriding hand is more repeatedly affected.[5] It is frequently linked with other systemic and non-systemic circumstances. Statistics by nation state Adhesive Capsulitis (2005) asserted that in Bangladesh 3 to 5% people were pretentious by Adhesive Capsulitis. The pervasiveness of Adhesive Capsulitis is quickly escalating day by day.

The connection between shoulder capsulitis and diabetes mellitus is well predictable, with the frequency of shoulder capsulitis creature two to four eras advanced in diabetics than in the general population.[2] Shoulder capsulitis influences about 20% of people with diabetes and has been depicted as the most disability of the widespread musculoskeletal demonstration of diabetes mellitus.[6]

There is no comparative study regarding about the threat aspects of shoulder capsulitis in Bangladesh. Conversely a study was demeanor to discover out the pervasiveness of shoulder capsulitis among the patients enduring Cardiothoracic Surgery. Noteworthy shoulder pain and disability can influence tricks of daily living. Abridged mobility and pain in shoulder joint may reduce diabetic patient's aptitude to execute activities decisive for independent living.[7]

These are the Shoulder Pain and Disability Index (SPADI), The Shoulder Pain and Disability Index (SPADI) is a self-administered questionnaire that consists of two magnitudes, one for pain and the additional for efficient tricks.[8]

Materials and methods

Study design

This study was accomplished using cross sectional prospective survey under a quantitative study design. Cross sectional study design was preferred to convene the study intend as an efficient way to accumulate data.

Study area

Islami Bank Hospital Motijheel, Dhaka.

Study Population

The study populations were the patient with Diabetes Mellitus and non-diabetes who deliberated at Islami Bank Hospital Motijheel, Dhaka.

Sample size

Sample a cluster of subjects will be preferred from population, who are used in a quantity of do research (Hicks, 1999). A sample is a lesser cluster taken from the population. Occasionally the sample size may be large and sometimes it may be little, depending on the population and the uniqueness of the study (Bailey, 1997). The equation of sample size computation are prearranged beneath

$$n = \frac{\left\{Z(1-\frac{\alpha}{2})\right\}^2}{d} \times pq$$

Here,

$Z(1-\alpha/2) = 1.96$

P= 0.166 (here, p = prevalence and p=16.6%).[9]

q = 1-P

= 1- 0.166

= 0.834

d = 0.05

The genuine sample size for this study was deliberate as 212, but as the study achieved as a part of academic research project and there were some constraint, so that 100 adhesive capsulitis shoulder patients was acquired as the sample of this study from Islami Bank Hospital Motijheel, Dhaka.

Sampling method

Samples were chosen used convenience sampling technique.

Inclusion criteria

i. Age limitation 40-70 years

ii. Male and female was integrated

iii. Medically diagnosed Diabetes Mellitus patient

iv. Subjects who are cheerfully participate

v. Medically diagnosed frozen shoulder patient

Exclusion criteria

i. Unstable medical conditions

ii. Traumatic grievance around the shoulder joint

iii. Patients with rheumatological, neurological diseases and other orthopedics. circumstance akin to ankylosing spondylitis, septic arthritis, osteoarthritis

iv. Patient who were medically rickety

v. professions necessitate extreme endeavor of the anatomical apparatus of the upper limbs were debarred

vi. Mental disorder patients.

Data compilation instrument

Data was calm through a well prearranged questionnaire prepared by the interviewer and permitted by the examination board. There were eight close wrecked questions with visual analogue scale (VAS) with some purpose questions which were considered by examiner and each question was invented to discover out the modify of pain with each commotion. There was also used shoulder pain and disability index (SPADI) scale. It was developed by Williams et al.[10] to gauge present shoulder pain and disability. OXFORD muscle grading an appraisal of muscle strength is classically performed as part of a patient's objective assessment. Intra- class correlation coefficients (ICCs) for goniometric trials by one examiner.

Procedure of data collection

Researcher himself collected data by face to face interview. The interview was accomplished furtively as far as promising and before proceeding the data collection, the element of the study was explicated to each plenty respondent and conversant written consents were acquired from the respondents. Interview was taken in a calm place; no other person was acceptable to persuade the replying of the respondent. It took on standard 30 minutes to complete the interview of a single respondent.

Data analysis

Data were scrutinized Statistical Package for the Social Science (SPSS) version 24.0. Microsoft office Excel 2013 and version 15.0 was used to decorating the table, bar graph, pie charts etc. The results of this study were consisted of quantitative data. By this study a lot of information was collected.

Computation of Chi-Square

Chi square (x^2) is the sum of the square difference $(O - E)^2$ between observed (O) and the expected (E) data divided expected (E) in all probable data completing by the subsequent equation;

$$\frac{(Observed\ count\ -\ Expected\ count)^2}{Expected\ count}$$

$$(X^2) = \frac{(O - E)^2}{E}$$

The mathematical notation, the formula looks like this:

$$X^2 = \sum_{i=1}^{k} \frac{(O - E)^2}{E}$$

Ethical deliberation

The entire procedure of this thesis was done by subsequent the Bangladesh Medical Research Council (BMRC) guidelines and World Health Organization (WHO) Research guidelines. Authorization from Superintendent of Islami Bank Hospital Motijheel was taken to demeanor the study.

Conversant approval

Written permission addendum was given to all participants prior to completion of the questionnaire. The written consent was taken from every participants including signature. The participants were conversant evidently that their information would be reserved secretly.

Results

Cross-sectional type of quantitative study design was used to determinants of adhesive capsulitis of Shoulder in patients amid diabetics and non-diabetics mellitus attended at Islami Bank Hospital Motijheel, Dhaka.

Age of the participant

In this study, researcher shows that the mean age of the participant was 46.99 years (SD±12.164). The respondents age of participant minimum 21 years and maximum 80 years. The range of years 59 (Figure 1).
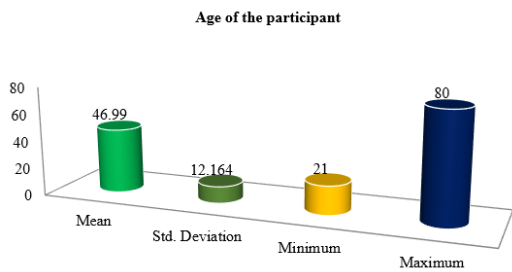

Figure 1 Age of participant.

Gender of the participant

This table demonstrated that DM the participants male were about 72.3%% (n=34) and rest of the participant were female that was about 27.7% (n=13) and Non DM the participants male were about 58.5%% (n=31) and rest of the participant were female that was about 41.5% (n=22) (Table 1)

Table 1 Gender of the participants

DM		Non DM	
Male	Female	Male	Female
34 (72.3%)	13 (27.7%)	31 (58.5%)	22 (41.5%)
Total= 47		Total=53	

Occupations

This figure illustrated that among the participants business were the highest rate that was about 34% (n=34). Service holder participants were second uppermost rate that was 27% (n=27). House wife participants were 20% (n= 20), others participants were 16% (n=16) and labor were less participant 3% (n=3) (Figure 2).
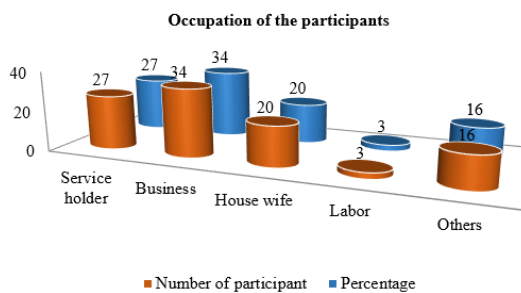

Figure 2 Occupation of the participants.

Level of Body mass index in diabetes mellitus and non diabetes mellitus in adhesive capsulitis

Study found that preponderance cases 57% participants were overweight BMI whereas 8% respondents were class I obesity (Figure 3) and 5% underweight also be 30% normal weight.
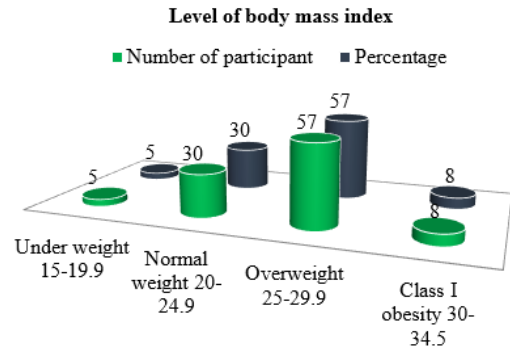

Figure 3 Level of body mass index.

Patients feel pain and disability according to shoulder pain and disability index (SPADI)

Study showed to facilitate, patient feel pain was at 1, severity of pain score 5, worst pain score 6, involved score 5, accomplishment for incredible on a high shelf score 6 and touching back your neck score 5 questionnaire is more pain in shoulder (Figure 4).
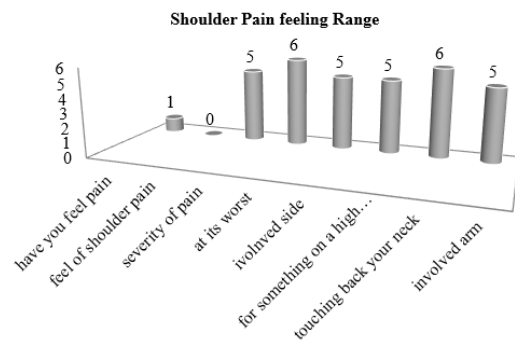

Figure 4 Shoulder pain scoring.

Visual analog scale

Study show that, total 53 persons of non diabetes mellitus for visual analog scoring were highest scoring of moderate pain that was level 6 with 23 person, mild pain 17 person of level 5 and lowest scorning 2 person in the level of 8 in worst pain (Figure 5.1).
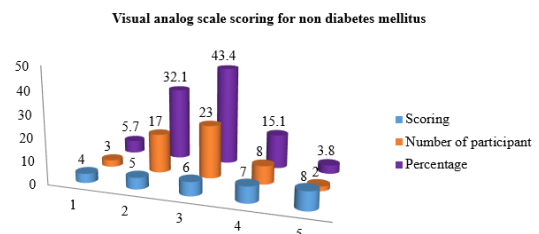

Figure 5.1 VAS scoring for non diabetes mellitus.

Study show that, total 47 persons of diabetes mellitus for visual analog scoring were highest scoring of moderate pain that was level 6 with 21 person, second scoring of 15 person at the level of 7 and lowest scoring 2 person in the level of 9 in worst pain (Figure 5.2).
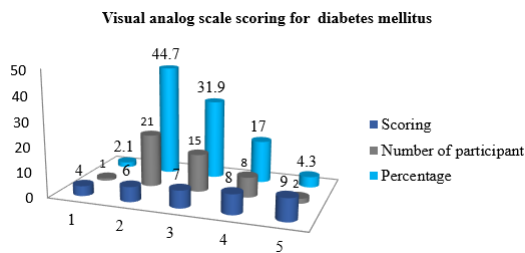
Figure 5.2 VAS scoring for non diabetes mellitus.

Range of motion analysis

Study focused among the shoulder pain patients for diabetes mellitus, flexion 95 degree. Extension 35 degrees. Abduction 110 degree, External rotation 50 degree and internal rotation 40 degree (Figure 6.1). Study focused among the shoulder pain patients for non diabetes mellitus, flexion 135 degree. Extension 55 degrees. Abduction 125 degree, External rotation 25 degree and internal rotation 30 degree (Figure 6.2).
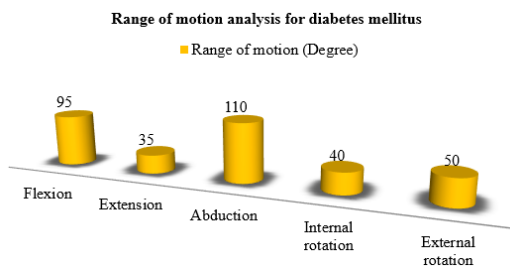

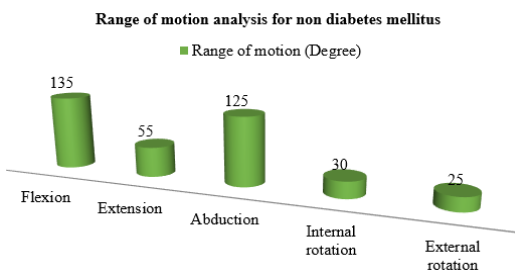**Figure 6.1** Range of motion analysis for diabetes mellitus.

Figure 6.2 Range of motion analysis for diabetes mellitus.

Muscle strength analysis (OXFORD scale)

Study found that for non diabetes mellitus patient's flexor strength of the shoulder at this point statistical scoring 3. Extensor strength of the shoulder range scoring 3, abductor strength of the analysis scoring 2. Adductor of the shoulder range scoring 2, internal rotator of the shoulder strength analysis minimum scoring 2 and external rotator of the shoulder strength analysis scoring 2 in Figure 7.1 showed.

Study found that for diabetes mellitus patient's flexor strength of the shoulder here statistical scoring 2. Extensor strength of the shoulder range scoring 2, abductor strength of the analysis scoring 2. Adductor of the shoulder range scoring 2, internal rotator of the shoulder strength analysis minimum scoring 2 and external rotator of the shoulder strength analysis scoring 2 in Figure 7.2 showed.
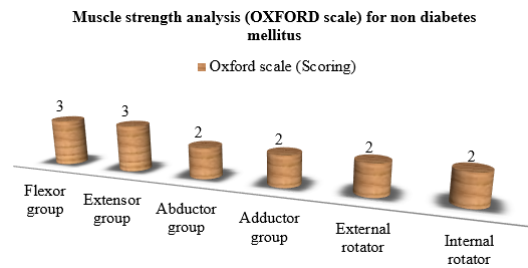

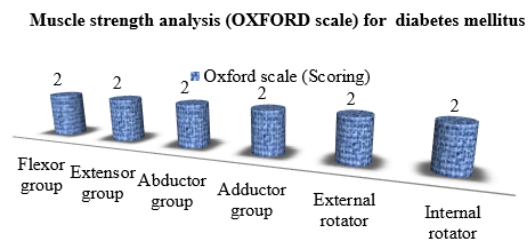**Figure 7.1** Muscle strength analysis (OXFORD scale) for non diabetes mellitus.

Figure 7.2 Muscle strength analysis (OXFORD scale) for diabetes mellitus.

Distribution of respondents with types of adhesive capsulitis Vs pain Intensity of shoulder (SPADI) Table 2

Table 2 Distribution of respondents with types of adhesive capsulitis Vs pain Intensity of shoulder (SPADI)

Types of adhesive Capsulitis	Pain intensity			
	Mild pain	Moderate pain	Severe pain	Total
Type-1	22	35	0	57
Type-2	0	30	3	33
Type-3	0	4	6	10
Total	22	69	9	100

Amongst the 100 participants those were in the 22 participant's mild pain and 35 participants were moderate pain with type-1 of adhesive capsulitis. Were 30 participants was moderate pain and 3 participants were severe pain with type-2 of adhesive capsulitis. Were 4 participants moderate pain and 6 participants were severe pain with type-3 of adhesive capsulitis.

Association between with types of adhesive capsulitis Vs pain intensity (SPADI) Table 3

Table 3 Association between with types of adhesive capsulitis Vs pain intensity (SPADI)

Types of adhesive capsulitis and pain intensity (SPADI)	Chi-Square	P-value
	63.51	0.001

This pragmatic Chi-square value was 63.51 and 5% level of significant state chi-square was 1.96 which is less than the observed chi-square value. That means Null-hypothesis was rejected with types of adhesive capsulitis Vs pain intensity (SPADI) and alternative hypothesis was accepted. So the result was exceedingly significant that designate there was association between with types of adhesive capsulitis Vs pain intensity (SPADI).

Distribution of respondents with types of adhesive capsulitis Vs muscle strength (OXFORD grade scale) Table 4

Table 4 Distribution of respondents with types of adhesive capsulitis Vs muscle strength (OXFORD grade scale)

Types of adhesive Capsulitis	Muscle strength (OXFORD grade scale-abductor group)			
	Muscle grade (1-3)	Muscle grade 4	Muscle grade 5	Total
Type-1	1	45	11	57
Type-2	6	22	5	33
Type-3	6	4	0	10
Total	13	71	16	100

Among the 100 participants those were in the 1 participant muscle grading 3, 45 participants were 4 muscle grading and 11 participants were 5 muscles grading with type-1 of adhesive capsulitis. Were in the 6 participant muscle grading 3, 22 participants were 4 muscle grading and 5 participants were 5 muscle grading with type-2 of adhesive capsulitis. Were in the 6 participant muscle grading 3 and 4 participants were 5 muscles grading with type-3 of adhesive capsulitis.

Association between with types of adhesive capsulitis Vs muscle strength (OXFORD grade scale) Table 5

Table 5 Association between with types of adhesive capsulitis Vs Muscle strength (OXFORD grade scale-abductor group)

Types of adhesive capsulitis Muscle strength (OXFORD grade scale-abductor group)	Chi-Square	P-value
	27.16	0.001

This pragmatic Chi-square value was 27.16 with 5% level of significant state chi-square was 1.96 which is less than the observed chi-square value. That means Null-hypothesis was rejected with types of adhesive capsulitis Vs Muscle strength (OXFORD grade scale-abductor group) and alternative hypothesis was accepted. So the consequence was exceedingly significant that designate there was association between with types of adhesive capsulitis Vs Muscle strength (OXFORD grade scale-abductor group).

Discussion

The aim of the study is to discover out shoulder pain with functional disabilities amid the subjects suffering with diabetes and non diabetic's patient attended at Islami Bank Hospital Motijheel. The study found that mean age of the participant was 46.99(±12.146) years and the majority of the participants were more than 59 years. The youngest participants in this study were 21 years old and oldest participants were 80 years old. Ardic et al. (2003) performed a cross-sectional study for these purpose 78 patients (mean age 57.8±11.9 years, 55 women and 23 men) were randomly selected for inclusion in the study. Another result has been reported by Chacon, et al. (2004) who accomplished that the mean age was 64±9 and their age range was 41-86 years. So above two studies, mean age was not similar to this study. So, this indicated that adhesive capsulitis of shoulder had pretentious the participants in this study earlier than others study. In this study, female participants were 35% and male participants were 65 adhesive capsulitis of shoulder usually affects patients aged 21-80, with females affected more than males, and no predilection for race (Arshad, et al., 2015). In this study 34% (n=44) participants were business man, 27% (n=27) participants were service holder, House wife participants were 20% (n= 20) and others 16% (n=16) and labor participants were 3% (n=3). By this study it was ensured that business

man were more vulnerable for adhesive capsulitis. Study found that majority cases 57% participants were overweight BMI whereas 8% respondents were class I obesity and 5% underweight also be 30% normal weight. Morrato et al. (2003) did a survey with 23,283 adults who responded when asked about whether they were physically active and information on socio-demographic uniqueness and health conditions were self-reported. A total of 39% of adults with diabetes were physically active versus 58% of adults without diabetes. The proportion of active adults without diabetes declined as the number of risk factors enlarged until dropping to similar rates as people with diabetes. After adjustment for socio-demographic and clinical factors, the strongest associated of being physically active were income level, confines in physical function, depression, and severe obesity (BMI ≥40 kg/m²). The majority of patients with diabetes or at highest risk for developing type 2 diabetes do not engage in regular physical activity. So far Morrato et.al found class III type of obesity and this study found class I obesity. Study showed that, the patient feel pain was at 1, severity of pain score 5, worst pain score 6, involved score 5, Reaching for something on a high shelf score 6 and touching back your neck score 5 questionnaire is more pain in shoulder Which were almost comparable with Uddin et al. (2014), they found that, the mean score of pain at SPADI 56.7% and disability score at SPADI 51%. They also found higher score of pain and disability among the diabetic patient than non-diabetic patients but no statistically significant distinction in pain and disability in frozen shoulder patients with or without diabetes were identify. Study explain that, the mean pain score at SPADI was at its worst (6.46%) and touching back your neck (6.09%) questionnaire is more pain in shoulder. Study show that, total 53 persons of non diabetes mellitus for visual analog scoring were highest scoring of moderate pain that was level 6 with 23 person, mild pain 17 person of level 5 and lowest scorning 2 person in the level of 8 in worst pain. Study show that, total 47 persons of diabetes mellitus for visual analog scoring were highest scoring of moderate pain that was level 6 with 21 person, second scoring of 15 person at the level of 7 and lowest scoring 2 person in the level of 9 in worst pain. Study focused among the shoulder pain patients for diabetes mellitus, flexion 95 degree. Extension 35 degrees. Abduction 110 degree, External rotation 50 degree and internal rotation 40 degree. Study found that for non diabetes mellitus patient's flexor strength of the shoulder here statistical scoring 3. Extensor strength of the shoulder range scoring 3, abductor strength of the analysis scoring 2. Adductor of the shoulder range scoring 2, internal rotator of the shoulder strength analysis minimum scoring 2 and external rotator of the shoulder strength analysis scoring 2. Study found that, respondent with types/stages of adhesive capsulitis vs pain intensity (SPADI) were more participant affected in moderate pain that was 69 participants. 22 participants were affected mild pain and 9 participants were affected severe pain. So that the result was significant that indicates were association types/stages of adhesive capsulitis vs pain intensity (SPADI). Mohammad Moin Uddin, (2014) conducted a study; he found were 5 scoring that is mild pain in diabetes mellitus and 7 scoring in non-diabetes mellitus. The differentiation in pain and disability level were not statistically significant (respectively *p*=0.24 and *p*=0.13 at 95% confidence interval). So that studies indicates difference in more significant and not significant of the SPADI vs types of adhesive capsulitis. Study was found that, respondent with types/stages of adhesive capsulitis vs muscle strength (OXFORD SCALE) of abductor group were more participant affected types-1 of adhesive capsulitis of shoulder in average grade 4. 22 participants were affected types-2 of adhesive capsulitis of shoulder in grade 4 and 6 participant were affected type-3 of adhesive capsulitis average grade 3. Arch Bone Jt Surg. (2016) conducted a study; enrolled 120 patients

(37 men and 83 women) with phase II type of adhesive capsulitis in cross sectional study. Demographic data were collected and shoulder muscle strength was measured in different track in both upper limbs. He found that less muscle grading in abductor group grade 3. So that studies indicate difference in more significant that's types of range of motion.

Conclusion

This study has found that shoulder joint pain with functional disabilities amid the subjects anguish with diabetes and non-diabetes patients. Shoulder pain and functional disability are significantly high in male and in older diabetes mellitus patients in Bangladesh. From this study it was concluded that male were more affected than female with adhesive capsulitis. Overhead activity and repetitive activity were aggravating factors for developing adhesive capsulitis and business man was more affected among all occupation. Adhesive capsulitis of shoulder joint was mostly responsible for impairment of physical function, physical role limitation. Adhesive capsulitis of shoulder joint affects the general health of the participants so; maximum participants have no diabetes mellitus and other DM. This study showed that patients with adhesive capsulitis of shoulder were attended at Islami Bank Hospital Motijheel have comparatively deprived eminence of life pertaining to the physical health components but there was comparatively less impact on mental health than physical health. Male and older ages were main two contributors for poor quality of life of adhesive capsulitis of shoulder patients. From this study founded majority participant suffering from type I diabetes mellitus and other type II and BMI level highest class I and average muscle strength scale 3.

Acknowledgements

Conflicts of interest

None.

Funding support

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