Original Article

The Relationship between Depression or Anxiety Symptoms and Objective and Subjective Symptoms of Patients with Frozen Shoulder

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Abstract

Background: the aim of this study is to evaluate the prevalence and effect of depression and anxiety on the shoulder range of motion, as well as the objective and subjective symptoms in patients suffering from frozen shoulder. **Methods:** Between 2013 and 2014, in a cross-sectional study, we evaluated 120 patients with idiopathic frozen shoulder. We collected the demographic data for each patient and measured shoulder range of motion in four directions in both limbs. All patients filled out visual analog scale (VAS) for pain and the disabilities of the arm, shoulder, and hand (DASH) questionnaires. Both Hamilton anxiety and depression questionnaires were filled out for each patient. **Results:** A total of 92 patients (77%) with idiopathic frozen shoulder showed symptoms of depression, while only 32 (27%) of them experienced anxiety. Thirty-two patients (27%) showed symptoms of both depression and anxiety. Although elevation and abduction were not affected by depression, internal and external rotations were more restricted among patients who had symptoms of depression. DASH and VAS scores were higher in patients with symptoms of depression. In terms of anxiety, only VAS and DASH were different between two groups. In multivariable analysis, DASH score was correlated with severity of both anxiety and depression symptoms. **Conclusion:** While there is no definitive relationship between symptoms of depression or anxiety and shoulder range of motion in patients suffering from frozen shoulder, patients who suffer from depression or anxiety experienced increased pain and limb disability.

Keywords: *Adhesive capsulitis, anxiety, DASH, depression, frozen shoulder*

Introduction

Frozen shoulder for the first time was described by Duplay in 1879 as "humeroscapular periarthritis," and since then, it has remained a controversial topic.[1] The exact etiology of frozen shoulder is unknown; however, diabetes mellitus is one of the major risk factors associated with this disease.[2]

During the recent decades, a scientist has noticed psychological disorders as probable risk factors to explain the musculoskeletal diseases etiology.[3-6] Regarding the association between psychological parameters and frozen shoulder, the researchers at first focused on personality disorders with the well-known expression of "'frozen' shoulder in a 'frozen' personality."[7-9] However, the effect of depression and anxiety on frozen shoulder has not been studied in detail.[10]

In the current study, we tried to evaluate the prevalence and the possible effects of depression and anxiety symptoms on patients suffering from frozen shoulder. Our goal was to find if there is any association between depression and anxiety with range of motion, pain, and disability in these patients.

Methods

Between 2013 and 2014, in a cross-sectional study, we enrolled 120 patients with idiopathic frozen shoulder, who were visited in our referral shoulder clinic in Ghaem Hospital, Mashhad, Iran. All patients were in phase-II of frozen shoulder, which was diagnosed based on history and clinical examination. All patients had shoulder pain for at least 3 months. We excluded patients with a history of psychosis, rotator cuff tear, and previous shoulder surgery or fracture. All patients signed informed consent. The study was approved by the Mashhad University Ethical Board.

We collected demographic data for each patient and measured shoulder range of

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motion in four directions (elevation, abduction, external and internal rotation) in both limbs. All patients filled out visual analog scale for pain (VAS) and the disabilities of the arm, shoulder, and hand (DASH) questionnaires. Both Hamilton anxiety and depression questionnaires were filled out for each patient individually by a psychiatrist. Internal rotation was defined with a six score scale as the back of hand reached to inter scapular, thoracolumbar junction, mid lumbar, lumbosacral junction, buttock, and lateral thigh, respectively. Hamilton depression questionnaire score was interpreted as normal, mild, moderate, and severe if the scores were 0–7, 8–16, 17–23, and >24, respectively. Anxiety severity was classified as normal, mild, moderate, and severe, according to Hamilton anxiety questionnaire, if the scores were 0–13, 14–17, 18–24, and >24, respectively.

The average age of the patients was 52-year-old (23–88 years) and 69% were women. Twelve patients had bilateral involvement [Table 1]. The most common diseases associated with frozen shoulder were diabetes (24%) and hypothyroidism (7.5%), respectively.

We used SPSS version 16 (SPSS Inc., Chicago IL, USA) for descriptive and statistical analysis. We used independent *t*-test and ANOVA test to compare two independent means of variables between different subgroups. Nonparametric variables were assessed with Fisher's exact test and Chi-square test. $P < 0.05$ was deemed to be statistically significant. For interpretation of correlation, we assumed coefficient of <0.4, 0.4–0.7, and >0.7 as weak, moderate, and strong, respectively.

Results

A total of 28 patients (23.3%) did not show any symptoms of depression, 59 (49.2%) showed mild symptoms, 27 (22.5%) showed moderate symptoms, and only six (5%) patients showed sym ptoms of severe depression. Eighty-eight patients (73.3%) had no anxiety, 22 (18.3%) had mild anxiety, eight (6.7%) had moderate anxiety, and two (1.7%) had severe anxiety. Thirty-two patients (27%) experienced symptoms of both depression and anxiety. Pearson's correlation was 0.73 between severity of symptoms of anxiety and depression ($P < 0.001$).

We divided the patients into two groups based on the presence or absence of symptoms of depression [Table 2]. Although elevation and abduction were not affected by depression, internal and external rotations were more restricted in patients who experienced symptoms of depression. DASH and VAS scores were higher among patients with symptoms of depression. Regarding anxiety, only VAS and DASH differed in two groups [Table 2].

We found weak correlations between severity of depression and all four directions of range of motion, education, VAS, and DASH scores. The correlations between anxiety and range of motion, and DASH were weak [Table 3].

Table 1: Demographic data in patients suffering from idiopathic frozen shoulder (*n*=120)

Sex, *n* (%)	
Men	37 (31)
Women	83 (69)
Age, mean (SD) (year)	52 (17)
Affected limb, *n* (%)	
Right	65 (54)
Left	43 (36)
Bilateral	12 (10)
Education, *n* (%)	
No education	17 (14)
High school	63 (52)
Bachelor	29 (24)
Master and more	11 (9.2)
Disease history, *n* (%)	
Diabetes	29 (24)
Hypothyroidism	9 (7.5)
Cervical disk herniation	8 (6.8)
Heart disease	6 (5.0)
Breast surgery	4 (3.3)
Seizure	3 (2.5)
Hyperthyroidism	2 (1.7)
Range of motion, mean (SD) (degree)	
Elevation	121 (42)
Abduction	122 (41)
External rotation	45 (20)
Internal rotation*	3.2 (1.2)
DASH score, mean (SD)	53 (17)
VAS score, mean (SD)	69 (18)
Anxiety, mean (SD)	11 (5.5)
Depression, mean (SD)	13 (6.3)
Anxiety, *n* (%)	
No	88 (73)
Mild	22 (18)
Moderate	8 (6.7)
Severe	2 (1.7)
Depression, *n* (%)	
No	28 (23)
Mild	59 (49)
Moderate	27 (22)
Severe	6 (5.0)

*Internal rotation was defined with a six score scale as the back of hand reached to inter scapular, thoracolumbar junction, mid lumbar, lumbosacral junction, buttock and lateral of the thigh, respectively. SD=Standard deviation, DASH=Disabilities of the arm, shoulder, and hand, VAS=Visual Analog Scale

In multivariable analysis, DASH score was correlated with severity of both anxiety and depression symptoms. Education and internal rotation had only relation with depression [Table 4].

Discussion

In this study, more than three-fourth of the patients with idiopathic frozen shoulder showed symptoms of depression,

Table 2: Comparison of patients suffering from depression or anxiety signs with normal ones in patients with idiopathic frozen shoulder

Variable	Depression, mean (SD)			Anxiety, mean (SD)		
	Yes	No	*P*	Yes	No	*P*
Age	52 (11)	52 (17)	0.746	50 (12)	53 (13)	0.266
Education	2.6 (1.2)	3.5 (1.7)	0.013	2.8 (1.3)	2.8 (1.4)	0.944
Range of motion						
Elevation	116 (43)	136 (36)	0.26	118 (34)	122 (45)	0.711
Abduction	117 (41)	137 (36)	0.301	121 (30)	122 (44)	0.838
External rotation	42 (20)	56 (13)	<0.001	45 (15)	45 (21)	0.623
Internal rotation*	3.0 (1.2)	3.9 (1.1)	<0.001	2.9 (0.72)	3.3 (1.4)	0.051
DASH score	56 (17)	44 (14)	<0.001	59 (13)	51 (17)	0.006
VAS score	71 (17)	61 (18)	0.011	73 (15)	67 (18)	0.067

*Internal rotation was defined with a six score scale as the back of hand reached to inter scapular, thoracolumbar junction, mid lumbar, lumbosacral junction, buttock and lateral of the thigh, respectively. SD=Standard deviation, DASH=Disabilities of the arm, shoulder, and hand, VAS=Visual Analog Scale

Table 3: Correlation of severity of depression and anxiety with other factors in patients suffering from idiopathic frozen shoulder

	Depression		Anxiety	
	Correlation	*P*	Correlation	*P*
Age	0.02	0.814	−0.058	0.531
Education	−0.3	<0.001	−0.123	0.182
Range of motion				
Elevation	−0.3	<0.001	−0.29	0.002
Abduction	−0.3	0.001	−0.29	<0.001
External rotation	−0.37	<0.001	−0.29	0.002
Internal rotation*	−0.35	<0.001	−0.36	<0.001
DASH score	0.37	<0.001	0.35	<0.001
VAS score	0.21	0.02	0.11	0.23

*Internal rotation was defined with a six score scale as the back of hand reached to inter scapular, thoracolumbar junction, mid lumbar, lumbosacral junction, buttock and lateral of the thigh, respectively. DASH=Disabilities of the arm, shoulder, and hand; VAS=Visual Analog Scale

while only a little over one-fourth of them experienced anxiety. Patients with symptoms of depression suffered from more limited internal and external rotations of the shoulder joint, while those who suffered from anxiety experienced more pain and disability in the affected limb. However, multivariable analysis revealed that depression and anxiety have more correlation to subjective symptoms than objective signs.

There are some limitations to this study. We did not have a control group to compare our demographics with them. Furthermore, our study had a cross-sectional design, which prevented us from establishing a causative relationship between frozen shoulder and depression or anxiety.

In contrast with range of motion, which was not affected by anxiety, DASH score was higher in patients who suffered from anxiety. It seems that anxiety aggravates upper extremity disability but not the objective signs such as range of motion. Depression had similar effects; however, unlike anxiety, rotational range of motion, especially internal rotation, was also decreased in patients exhibiting symptoms of depression. Ding *et al*. in a prospective study, evaluated the effect of anxiety and depression on patients suffering from frozen shoulder.[4] According to their results, patients with symptoms of anxiety and depression experienced more pain and upper limb disabilities compared to patients without those symptoms.[4] Range of motion was similar in both groups; however,[4] Alizadehkhaiyat *et al*. showed the importance of the depression and anxiety on tennis elbow disability regarding pain and disability.[11] Similarly, Ring *et al*. have shown that anxiety and depression aggravate disability in different upper extremities diseases.[12]

In our study, patients with symptoms of depression experienced increased shoulder pain. However, we could not find a similar relationship between anxiety and shoulder pain. Cho *et al*. used Hospital Anxiety and Depression Scale for patients before rotator cuff repair, and they found similar results; namely, in their study, only depression, but not anxiety, was associated with increased VAS score.[10] However, Ding *et al*. reported higher VAS scores in both groups.[4] Bair *et al*. evaluated the relationship of pain experience with depression and anxiety in patients with musculoskeletal pain and reported that both depression and anxiety were associated with increased pain.[3]

Depression is a common finding in patients suffering from frozen shoulder.[13,14] Although depression and anxiety do not have a significant relationship with objective shoulder function in patients suffering from frozen shoulder, it seems that they are associated with increased pain experience and limb disability. Therefore, when managing such patients, not only we should consider physical function but also we should focus on psychological factors as well.

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Table 4: Multivariable analysis: Independent factors associated with depression and anxiety in patients suffering from frozen shoulder

Model	R^2	β	SE	*P*	Partial R^2	95% CI	
Depression*							
DASH score	0.28	0.107	0.034	0.002	0.089	0.039	0.17
Education		−1.46	0.39	<0.001	0.12	−2.22	−0.69
Internal rotation		−0.99	0.47	0.039	0.042	−1.93	−0.052
Anxiety*							
DASH score	0.15	0.12	0.029	<0.001	0.15	0.065	0.18

*DASH score, education, VAS score, internal and external rotations, abduction, and elevation met the criterion for entry and were inserted in the model. DASH=Disability of arm, shoulder, and hand, VAS=Visual Analog Scale, SE=Standard error, CI=Confidence interval

Conflicts of interest

There are no conflicts of interest.

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