RESEARCH ARTICLE

Factors Associated with Pain, Disability and Quality of Life in Patients Suffering from Frozen Shoulder

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Received: 24 January 2016 *Accepted: 13 Jun 2016*

Abstract

Background: Frozen shoulder is resulting in limb disability and reduction of quality of life but the factors associated with patients' disability and quality of life is not clear. To assess pain, disability, the quality of life and factors associated with them in patients suffering from frozen shoulder.

Methods: We enrolled 120 patients (37 men and 83 women) with phase-II idiopathic frozen shoulder in our cross-sectional study. Demographic data were collected and shoulder range of motion was measured in four different directions (elevation, abduction, external and internal rotation) in both upper limbs. Patients were asked to fill out Visual Analog Scale for pain (VAS) and, Short-Form Health Survey questionnaire (SF-36) as well as Disabilities of the Arm, Shoulder and Hand (DASH) questionnaires. We asked the patients to fill out the Hamilton anxiety and depression questionnaires.

Results: The mean of VAS pain, DASH, PCS, and MCS scores were 69(18), 53(17), 35(8.0), and 42(10) respectively. All the domains of SF36 questionnaires where below the normal population except physical function. VAS pain score was correlated to Hamilton depression scores in both bivariate and mulivarilable analysis. DASH score were correlated to sex, age, ROM, and both Hamilton anxiety and depression scores; However, DASH score only impact with Hamilton anxiety and ROM independently. PCS is correlated to age and MCS to Hamilton depression.

Conclusion: Patient with frozen shoulder are more suffering from pain and disability secondary to psychiatric parameters such as depression and anxiety than demographic features or even restriction of range of motion.

Keywords: Adhesive capsulaitis, Disability, Frozen shoulder, Pain, Quality of life, Shoulder

Introduction

Frozen shoulder or adhesive capsulitis is a common disease affecting 2 to 5% of population andpresenting with pain and restriction of shoulder range of motion in all directions (1-3). Although this condition described from long years ago (Duplay in 1879) however it has remained a controversial topic (4-6). It was previously believed that this disease has a self-limiting nature. However recent studies revealed that the disease course might last as long as 10 years and up to 40% of the patients continue to suffer from it throughout their lives (5-8).

Frozen shoulder is significantly resulting in limb disability and reduction of quality of life (9,10). It is not clear what factors predict the severity of pain and disability as well as quality of life in patients suffering from frozen shoulder. Comorbidities are associated with more disability and less quality of life in these patients but not the severely of pain (5). Psychiatric disorders can be affect pain, disability and quality of life as well as patients characteristic and objective symptoms(11-17), but the effect of these parameters on frozen shoulder were not discussed so much.

In current study we were curious about the severity of pain, disability and the quality of life in patients suffering from frozen shoulder. Moreover, we tried to find which

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factors contribute with pain, disability and quality of life of those patients.

Materials and Methods

After approval of the study by the Research Ethical Board of our institute, we enrolled 120 patients with idiopathic frozen shoulder in our cross-sectional study. Adult patients with phase-II frozen shoulder, diagnosed upon their prior medical history, physical examination, and imaging (MRI and radiographs), were enrolled in our referral hospital. The minimum duration of shoulder pain was 3 months for all included individuals. Our exclusion criteria were: history of rotator cuff tear, previous shoulder surgery or fracture and, psychosis. Informed consent was obtained from all patients.

Demographic data were collected and shoulder range of motion was measured in four different directions (elevation, abduction, external and internal rotation) in both upper limbs. Patients were asked to fill out Visual Analog Scale for pain (VAS) and, Short-Form Health Survey questionnaire (SF-36) as well as Disabilities of the Arm, Shoulder and Hand (DASH) questionnaires (18). We asked the patients to fill out the Hamilton anxiety and depression questionnaires (19).

There were 37 men and 83 women, their ages ranging from 23to 88 years (mean 52 years).12 patients (10%) suffered from bilateral involvement [Table 1]. 24% of patients had the history of diabetes followed by hypothyroidism (7.5%) . According to Hamilton anxiety and depression questionnaires, the patients had normal anxiety and mild depression. Our demographic features were similar to previous studies (7, 8).

We used the Farsi validated version of SF-36. Internal rotation was specified by a six score scale [1 to 6] as the back of hand reached to inter scapular, thoracolumbar junction, mid lumbar, lumbosacral junction, buttock and lateral thigh respectively. Hamilton depression questionnaire scores interpreted as normal [0-7], mild [8-16], moderate [17-23], and severe [>24]. Severity of symptoms of anxiety, base on Hamilton anxiety questionnaire, was classified as normal [0-13], mild [14-17], moderate [18-24], and severe [>24] following the Hamilton anxiety questionnaire.

We used independent t-test and ANOVA test to compare two independent means of variables between different subgroups. String variable were assessed with Fisher's exact test and Chi-square test. We used multivariable linear analysis to find independent predictors explaining DASH and SF-36 variation. All the statistical analyses were carried out using SPSS version 16 (SPSS Inc., Chicago IL). A p-value of less than 0.05 was deemed to be significant. For interpretation of correlation we assumed coefficient as weak (<0.4), moderate (0.4 to 0.7), and strong (>0.7). Predictors with p-value of less than 0.1 were entered to multivariable linear analysis.

Results

The mean of VAS pain, DASH, PCS, and MCS scores were 69(18), 53(17), 35(8.0), and 42(10) respectively (Tale-1). All the domains of SF36 questionnaires where below the normal population except physical function [Table 2]

VAS pain score was correlated to Hamilton depression scores in both bivariate and multivariate analysis. DASH score were correlated to sex, age, ROM, and both Hamilton anxiety and depression scores; However, DASH score only impact with Hamilton anxiety and ROM independently. PCS is correlated to age and MCS to Hamilton depression [Table 3; 4]

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)
Dominante hand, n (%)	
Right	
Left	
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)
Hypothyrioidism	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)
Total ROM	
DASH Score, mean (SD)	53(17)
VAS Score, mean (SD)	69(18)
SF-36, mean (SD)	
physical function	61(20)
Role physical	26(23)
Body pain	35(20)
General health	51(16)
Vitality	49(13)
Social function	60(23)
Role emotion	48(37)
Mental health	55(18)
Physical component summary	35(8)
Mental component summary	42(10)
Anxiety, mean (SD)	11(5.5)
Depression, mean (SD)	13(6.3)

* 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 thigh respectively.
(DASH=Disadility of Arm, Shoulder, and Hand, VAS=Visual Analoge Scale, ROM=Range of Motion, SF-36= Short Form 36 Questionnaire)

Table 2. Correlation of severity of Symptoms with other factors in patients suffering from Idiopathic frozen shoulder

		DASH score		VAS score		SF-36 (PCS component)		SF-36 (MCS component)	
		Correlation	*P* value	Correlation	*P* value	Correlation	*P* value	Correlation	*P* value
Age		0.13	0.14	0.039	0.68	-0.24	0.008	0.13	0.15
	Education	-0.77	0.41	0.024	0.79	0.18	0.051	0.13	0.17
	Range of motion								
	Elevation	-0.34	<0.001	-0.15	0.12	0.11	0.25	0.16	0.11
	Abduction	-0.33	0.001	-0.16	0.11	0.10	0.29	0.14	0.16
	External rotation	-0.26	0.008	-0.13	0.18	0.13	0.19	0.55	0.57
	Internal rotation*	-0.37	<0.001	-0.15	0.13	-0.02	0.83	0.24	0.012
	Total ROM	0.38	<0.001	0.18	0.073	-0.093	0.34	-0.18	0.067
Anxiety		0.32	<0.001	0.11	0.24	-0.12	0.19	-0.51	<0.001
	Depression	0.38	<0.001	0.21	0.024	-0.14	0.12	-0.601	0.021
		Mean (SD)	*P* Value	Mean (SD)	*P* Value	Mean (SD)	*P* Value	Mean (SD)	*P* Value
Sex									
	Man	48 (19)	0.044	6.7 (1.7)	0.65	36 (7.6)	0.21	45 (12)	0.081
	Woman	55 (15)		6.9 (1.8)		34 (7.8)		41 (9.2)	
	Dominate hand								
	Right	53 (16)	0.79	6.8 (1.8)	0.99	35 (7.4)	0.61	42 (10)	0.29
	Left	54 (19)		6.8 (1.7)		34 (11)		45 (8.9)	
	Affected limb								
	Right	53 (17)	0.78	6.8 (1.7)	0.50	35 (6.5)	0.058	43 (11)	0.82
	Left	52 (17)		6.8 (1.9)		36 (8.8)		41 (10)	

* 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 thigh respectively.
(DASH=Disadility of Arm, Shoulder, and Hand, VAS=Visual Analoge Scale, ROM=Range of Motion, PCS=Physical Component Summery, MCS=Mental Component Summery, SF-36= Short Form 36 Questionnaire)

Discussion

In this study, patients suffering from frozen shoulder demonstrated high rate of pain and disability as well as low quality of life compare to normal population. Pain, disability and mental component of quality of life in these patients are more correlated to psychological factors (anxiety and depression) than physical or personal parameter (age, sex, education, or ROM). Pain and mental component of quality of life were more affected with depression, but disability of upper extremity more impact with anxiety. Physical component of quality of life was only affected with age.

Table 3. Comparison of SF-36 different domains scores in patients suffering from frozen shoulder with normal population

SF-36 domains	Mean	SD	Normal population mean	*P* value
physical function	60.6	20.3	55	0.003
Role physical	26.3	22.8	50	<0.001
Body pain	34.5	19.7	48	<0.001
General health	51.3	16.3	55	0.015
Vitality	48.9	12.7	63	<0.001
Social function	60.3	23.3	66	0.008
Role emotion	47.5	36.8	63	<0.001
Mental health	54.9	17.5	63	<0.001
Physical component summary	34.7	7.8	52	<0.001
Mental component summary	42.4	10.2	64	<0.001

There are some limitations to our study. The patients restricted to a certain referral hospital and may not reflect the whole population. Moreover, the nature of study cross sectional, which does not allowus to establish a causative relationship between pain, disability, and quality of life with our explanatory variables.

In a relevant phase-II frozen shoulder on one hundred patients with comparable age and sex, the mean of VAS, DASH, PCS. And MCS scores were 5.9, 76, 55, and 63 respectively which are highly compatible with our results (5). Other studies report high rate of pain, disability and lower quality of life compare to general public (10, 13,20, 21).

We found only depression as the factor contributing with severity of pain in patients suffering from frozen shoulder. In another study on rotator cuff repair, similar to ours, only depression, but not anxiety, was associated with increased VAS score (12). However, Ding et al. reported higher VAS scores correlation with both depression and anxiety (13). 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 (16).

Ding et el.demonstrated that Psychological disorders

Table 4. Multivariable analysis: Independent Factors Associated with Symptoms in Patients Suffering From Frozen Shoulder

Model	R2	Beta	Standard Error	*P* value	Partial R2	95% CI	
DASH score*	**0.24**						
Anxiety		0.98	0.28	0.001	0.11	0.43	1.5
Total ROM		0.29	0.085	0.001	0.10	0.13	0.47
VAS score	0.039						
Depression		0.055	0.027	0.044	0.039	0.002	0.109
SF-36 (PCS component)	0.056						
Age		-0.147	0.056	0.011	0.056	-0.259	-0.036
SF-36 (MCS component)*	0.36						
Depression		-0.98	0.13	<0.001	0.36	-1.2	-0.72

*Sex, total ROM, Anxiety, and Depression met the criterion for entry and were inserted in the model
** Total ROM, and Depression met the criterion for entry and were inserted in the model.
*** Age, Affected Hand, Education met the criterion for entry and were inserted in the model.
(DASH=Disability of Arm, Shoulder, and Hand, VAS=Visual Analoge Scale, ROM=Range of Motion, PCS=Physical Component Summery, MCS=Mental Component Summery, SF-36= Short Form 36 Questionnaire)

more affect on the disabilities than ROM in patients suffering from frozen shoulder (13). They found a significant correlation between both depression and anxiety with upper extremity disability but not ROM. Griggs et al. found no correlation between ROM and DASH score (20). However, in our study both anxiety and ROM impact the affected limb function.

Only mental component of the quality of life affected with psychiatric factor (depression) rather than the physical one. This is in agreement with the findings of Ding et al (13), and is further supported by our previous results, which indicated that subjective symptoms (pain and limb disability) were affected more than objective signs (range of motion) by depression and anxiety. The only domain in SF-36 questionnaire that was above the normal average was physical function. Wolf and Green studied the influence of comorbidities on quality of life in patients with frozen shoulder and found that physical function was inappropriately higher among PCS domains (8). They reported that except physical function, emotional role and mental health, other domains were lower than normal population range. Similarly, Hodkinson et al. have shown that depression and anxiety could decrease the quality of life of patients suffering from arthritic hand (14).

In conclusion, patient with frozen shoulder are more suffering from pain and disability secondary to psychiatric parameters such as depression and anxiety than demographic features or even restriction of range of motion. The physician should always consider those disorders to promote patient condition.

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