SHOULDER ACTIVITY LEVEL AND ITS ASSOCIATION WITH PAIN, DISABIITY AND QUALITY OF SLEEP IN PATIENTS WTH CHRONIC SHOULDER PAIN

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ABSTRACT

BACKGROUND:

According to International study of association of pain "Shoulder pain is characterized by symptoms in various joints, tendons, bursa, muscles involved in shoulder motion". If the pain is present for more than three months it is defined as chronic. Common chronic shoulder disorders include rotator cuff disorders, adhesive capsulitis, glenohumoral arthritis and instability. Chronic pain at shoulder is prevalent in working and general public. The third most common orthopedic disorder after low back pain and neck pain, is shoulder pain.. The occurrence and socioeconomic impact is high which ranges from 1%-67% in general population. Pain, insomnia and disability are common in chronic shoulder pain patients. Painful shoulders pose a substantial socioeconomic burden. Shoulder pain is commonly responsible for causing disability and loss of work days.

Long term disability, higher pain intensity and loss of employment are associated with poor outcome. Literature suggests that patients with shoulder pain have reduced quality of life and health status assessed through (SF-36 and WHO BREF). Shoulder pain results into significant burden to the health care system. Physical Activity plays a key role in decreasing pain, maintaining and improving mobility of Shoulder Joint and thereby improving the quality of sleep in patients suffering from chronic shoulder pain.

AIM AND OBJECTIVES:

- To determine shoulder activity level in patients with chronic shoulder pain.
- To determine the association of shoulder activity level with pain, disability and quality of sleep in patients with chronic shoulder pain.

METHODOLOGY:

The scales were handed over to the patients suffering from chronic shoulder pain consisting of all the 4 questionnaires. Shoulder Disability Level was assessed by SPADI – Shoulder Pain And Disability Index, Quality of Sleep was assessed by PSQI – Pittsburgh Sleep Quality Index, Shoulder Activity Level was measured by SAS – Shoulder Activity Score and Pain was measured by NPRS –Numerical Pain Rating Scale. The consent was taken from the patients and the details of the study were also explained to them initially. All the data were analyzed. ($p<0.05$)

OUTCOME MEASURES:

Shoulder activity level, Pain, Quality of sleep, Shoulder disability Level.

RESULTS:

A total of 105 responses were analyzed and out of that 56% were females and 44% were males. 9.5% participants had high activity level, 62% participants had an average activity level and 28.5% had low activity level. For the association of Pain at rest and Shoulder activity level, there was no statistical association. For the association of Pain during activity and Shoulder activity level, there was a statistical association. Thus, it was proved that with an increase in pain, the activity level reduces. For the comparison of shoulder activity with disability (SPADI), there was a significant association. For the comparison of shoulder activity with quality of sleep (PSQI), there was no statistical association.

CONCLUSION:

There is reduction in shoulder activity level in individuals with chronic shoulder pain. With increase in age there is more reduction in shoulder activity level. Shoulder activity level also has a negative correlation with pain, disability and quality of sleep. So treatment focus should be on restoring the activity of the patient and outcome measure should be designed to accurately measure the shoulder activity level.

KEYWORDS: Chronic Shoulder Pain, Pain and Disability

INTRODUCTION

According to International Study of Association of Pain "Typically Shoulder Pain is characterized by symptoms in various joints, tendons, bursa, muscles involved in shoulder motion".[1] If the shoulder pain is present for more than three months it is defined as Chronic.[1] Common chronic shoulder disorders include rotator cuff disorders, adhesive capsulitis, glenohumoral arthritis and instability. Chronic pain at shoulder is prevalent in working and general public. After low back pain and neck pain, it is shoulder pain that is a common orthopedic disorder (Bhawan et al 2016)[2]. The life time prevalence of shoulder pain is 67 %.[1]

The occurrence and socioeconomic impact is high which ranges from 1%-67% in general population. There is pain, insomnia and disability in patients having chronic shoulder pain. Painful shoulders pose a substantial socioeconomic burden. Shoulder pain is commonly responsible for causing disability and loss work days. Long term disability, higher pain intensity and loss of employment are associated with poor outcome.[1]Literature suggests that patients with shoulder pain have reduced quality of life and health status, reduced shoulder

functions, assessed through (SF-36 and WHO BREF). Shoulder pain results into significant burden to the health care system. The costs for sick leave contributed to 84% of the total costs. The mean annual total cost was €4139 per patient.[1]

The signs and symptoms associated with chronic shoulder pain include pain in shoulder and radiating to arm, difficulty in moving shoulder in different planes, stiffness in shoulder and difficulty in performing movement related activities, severe night pain affecting sleep. Studies have shown that psychological and social functioning may also be affected by shoulder pain; additionally, environmental factors may contribute to the development or persistence of the condition. Chronic shoulder pain may results into greater disability and longer recovery period.

Kinesiophobia, an extreme form of fear of movement, is defined as an excessive, irrational, and debilitating fear to execute a determined movement or activity owing to a feeling of vulnerability to a painful injury or reinjury. Kinesiophobia is often associated with escape behaviors such as hypervigilance or avoidance. Kinesiophobia is associated with less range of movement (ROM) in people with chronic musculoskeletal pain, and ROM also has been related to greater levels of shoulder pain and disability. Many literatures have stated that kinesiophobia is cross-sectionally associated with and longitudinally predicts greater pain intensity, disability, and poor quality of life over time. This factor may lead to avoidance of movement even with good or proper medical or physiotherapy treatment. This may result into greater activity limitation and impair the prognosis of the patients and the viscous cycle continues[4].

Measurement tools for evaluating patient function have become more common in orthopedics. Most tools are designed to quantify patient symptoms or functional disability or

both because other traditional objective measures do not capture these data. Function typically reflects how well a patient does certain tasks and activity level measures how much a patient does. Two patients with different levels of activity may have similar levels of pain (symptoms) and limitations of function after an identical injury. First, patient level of activity may influence the biologic success of treatment. For example, an overhead painter will stress a rotator cuff repair more heavily than a sedentary retiree. Second, level of activity may influence patient perception of treatment success. If treatment relieves night pain for a patient with low activity, they may be satisfied with the outcome. However, a more active patient expects restoration of previous activity level to attain a similar level of satisfaction. Therefore, patient activity level could be an important prognostic variable relating to outcome[5].

For patients with shoulder pain, one of the most important consequences in terms of their health is "activity limitations. Reduction in Pain and increase in movements of shoulder are one of the most common expectations of patients with chronic shoulder pain and the indicators of successful treatment outcomes. Activity level has been identified as a potential prognostic and outcome variable in orthopedic surgery. As opposed to what tasks a patient is able to perform, activity level measures how often a patient engages in specific tasks.[5]

It has been seen that the symptoms worsen sometimes, or the course of the disease is very long and there occurs a progressive limitations of movements which may affect the activity level of patients with chronic shoulder pain. But many factors may determine this fact. Till The best of my knowledge very few studies have stated about the activity level of shoulder in case of chronic shoulder pain. But it is also important to know the magnitude of the shoulder activity level in the chronic stage and its association with pain, disability and quality of sleep.

From various literatures it has been seen that there is a big burden of chronic shoulder pain on the health care system. Millions of money is been spend on it either in form of surgery or in form of rehabilitation. Many disorders of shoulder are long term course and the limitation of movements may persist for a longer time. Measuring the activity level is the most common indicator for the outcome of shoulder diorders as it is one of the most common complain the patient presents with. Many few studies have used shoulder activity level as their outcome. So the purpose of the study is to determine shoulder activity level and its association with pain, disability and quality of sleep in patients with chronic shoulder pain. The Aim of the study is to determine the shoulder activity level in patients with chronic shoulder pain. The objective of the study is to determine the association of shoulder activity level with pain, disability and quality of sleep in patients with chronic shoulder pain.

METHODOLOGY

It was a cross-sectional study design and the sample size was 100 with use of convenient sampling. The samples were taken from various hospital and outpatients clinics of Vadodara City, Gujarat. The inclusion criteria included pain at shoulder joint complex or more than 3 months. Age - 20-60 years. Both Males and Females. Participants referred to Physiotherapy diagnosed with the following conditions;

- Adhesive capsulitis
- Rotator cuff disorders, including tendinosis, or Calcific tendinitis;
- Glenohumeral instability after proper reduction.
- Gleno humeral arthritis
- Acromio clavicular pathology
- Post traumatic stiffness.

The exclusion criteria included not willing to participate and acute shoulder pain or disorder.

PROCEDURE

After getting approval from the ethical committee of the concerned institution participants were recruited from various hospitals and out patient's clinics of Vadodara. Participants diagnosed with any chronic shoulder disorder by the surgeon, was included in the study. He/she was explained about the study and informed consent was taken. Then the participants were asked to fill up the questionnaire of shoulder activity scale, SPADI (Shoulder pain and Disability index) quality of sleep questionnaire. The outcome measure included Pain, Shoulder activity level, quality of sleep and shoulder disability level.

DATA ANALYSIS

Data analysis was done using SPSS version 23.0. Descriptive analysis was done to analyze the demographic and Sociodemographic variables. Shapiro-Wilk test was used to determine Normality of data. Correlation was used to determine the association of shoulder activity scale with pain, Spearmans disability and quality of sleep. 95% confidence interval was taken, significance level $p<0.05$.

RESULTS

- A total of 105 data were collected. The demographic and Sociodemographic characteristics of participants are mentioned in table 1.

Table 1: Demographic and Socio- Demographic characteristics of Participants

Variables		**N (%)**	**Mean ± SD**
Gender	Males	46 (44)	
	Females	59 (56)	
Age	20-30	10 (10)	27.1 ± 2.8
	31-50	29 (28)	42.48 ±6.2
	51-60	66 (62)	57.25 ± 5.1
BMI	<18.5	0 (0)	
	18.5-24.9	29 (27)	
	25-29.9	50 (47)	

	>30	26 (26)	
Occupation	Working	49 (47)	
	Non- Working	56 (53)	
Duration			7.95 ± 7.90

(N- No of Participants, SD- Standard deviation, BMI- Body mass Index, % Frequency)

- In age group we have classified it as **20-30 as young adults**

  31-50 as middle age adults

  And 51-60 as old adults.[17]

- Analysis was done accordingly to the age group also.
- The **minimum age** participants from our study was of **22 years** and **maximum age was 60 years.**
- The **minimum BMI was 19.9** and the **maximum BMI was 35.5 kg/m^2 .**
- The **minimum duration of symptoms was 3 months** and the **maximum duration was 5 years.**

Graph 1: Gender distribution

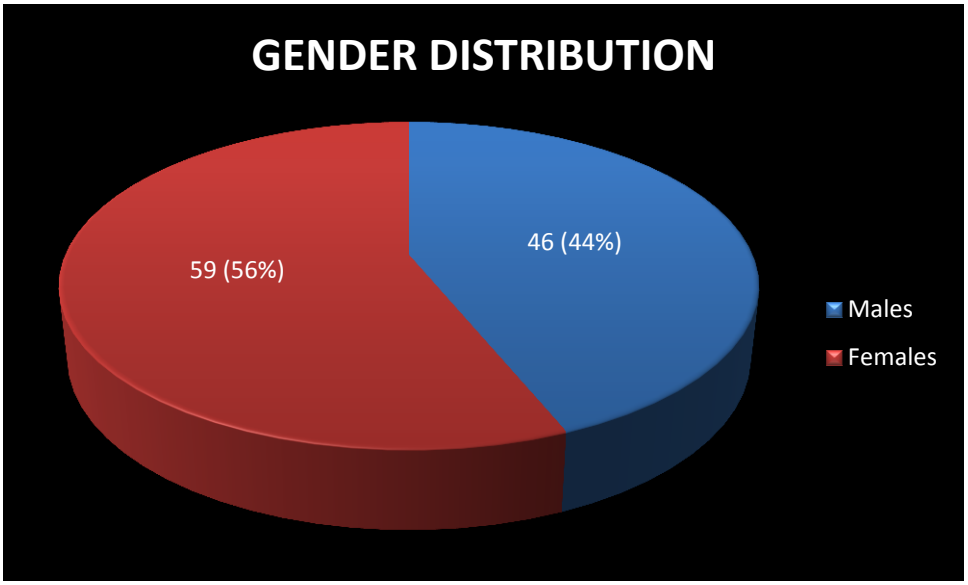


Table 2: Characteristics of Participants in the study

Variables		Frequency	Percentage
Hand Dominance	**Right**	23	22 %
	Left	82	78 %
Affected Extremity	**Right**	61	58 %
	Left	39	37 %
	Both	5	5 %
Dominancy Affected	**Right**	40	38 %
	Left	65	62 %

Table 3: Different shoulder conditions and Number of participants in each Condition.

Categories	Frequency	Percentage

Adhesive Capsulitis	26	25%
Post traumatic stiffness	24	23%
Rotator cuff tear	20	19 %
Periarthritic	27	26 %
Glenohumeral instability	8	7%

Table 4: Analysis of outcome measures

Variables	Min	Max	Mean $\pm$ SD
NPRS at Rest	0	5	3.24 ± 1.06
NPRS on Activity	6	10	8.88 ± 0.84
SPADI	33.84	99.23	84.53 ± 7.99
PSQI	4	17	11.78 ± 2.40
SAS	0	19	9.65 ± 4.72

(NPRS- Numerical pain rating Scale, SPADI- Shoulder pain and disability index, PSQI- Pittsburgh Sleep questionnaire index, SAS- Shoulder activity scale).

- In NPRS, higher the score worse is the pain of the patient.
- In SPADI, higher the score percentage, more the disability and pain and wore the condition of patient.

- In PSQI, higher the score worse is the quality of sleep in patients.
- In SAS, higher the score, better the activity of the patient.
- The aim of the study is to determine the shoulder activity level in patients with chronic shoulder pain.
- In case of Shoulder activity scale a score of

  ≥ 16 indicates high activity level

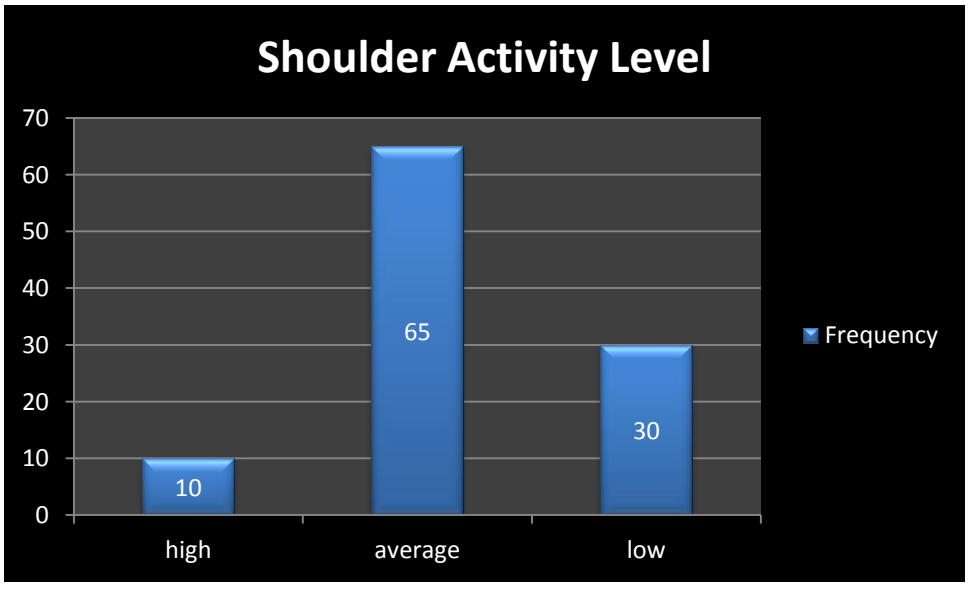
  7-15 indicates average activity level

  ≤6 indicates low activity level

- It was seen that out of 105 data collected, 10 participants had high activity level, 65 participants had average activity level and 30 had low activity level.

Graph 2: Shoulder activity level of Participants

Shoulder Activity Scale (SAS)	N (%)



High	10 (9.5)
Average	65 (62)
Low	30 (28.5)

Table 5: Shoulder Activity level of Participants

(N- Frequency and % Percentage).

- By using Shapiro-Wilk test it was confirmed that the data are not normally distributed. There is Skewness in its distribution.
- So to determine the association of shoulder activity with pain, spearmans correlation analysis to be used.

- The objective of the study is to compare the shoulder activity with pain, disability and quality of sleep.

- In comparison between Pain (NPRS) and Shoulder activity level (SAS), it was seen that there is a strong negative correlation between them, and also they were statistically significant.

Table 6: Spearmans Correlation of Shoulder activity level with Pain at Activity (NPRS).

Spearmans correlations		
		NPRS During activity
Shoulder activity scale	**Correlation coefficient**	**-0.88**
	Significance Value	**0.02***

(P<0.05) *

- Table 5 shows that there is a strong negative correlation between pain at movement and shoulder activity status. Thus it proves that with increase in pain the activity level reduces.
- In comparison between Pain (NPRS) at rest and Shoulder activity level (SAS), it was seen that there is a weak negative correlation between them, and also the data were not statistically significant.

Table 7: Spearmans Correlation of Shoulder activity level with Pain at Rest (NPRS).

Spearmans correlations		
		NPRS at Rest
Shoulder activity scale	**Correlation coefficient**	**-0.010**
	Significance Value	**0.921**

(P>0.05)

- Even though there is negative correlation between them but the data are not statistically significant.
- For comparison of shoulder activity with disability (SPADI), there was a strong negative correlation was seen and the data were statistically significant.

Table 8: Spearmans Correlation of Shoulder activity level with Disability (SPADI).

Spearmans correlations		
		Disability (SPADI)
Shoulder activity scale	**Correlation coefficient** **Significance Value**	**-0.90** **0.01**

(P<0.05) *

- For comparison of shoulder activity with quality of sleep (PSQI), there was a moderate negative correlation was seen and the data were not statistically significant.

Table 9: Spearmans Correlation of Shoulder activity level with Quality of sleep (PSQI).

Spearmans correlations		
		Quality of sleep (PSQI).
Shoulder activity scale	**Correlation coefficient** **Significance Value**	**-0.50** **0.476**

(P>0.05)

- The shoulder activity scale when was correlated with age there was a strong negative correlation obtained and the data were statistically significant also.

Table 10: Spearmans Correlation of Shoulder activity level with Age of Participants.

Spearmans correlations		
		Age of Participants
Shoulder activity scale	**Correlation coefficient**	**-0.88**
	Significance Value	**0.00**

(P<0.05) *

- Shoulder activity level according to the different age group of participants.

Table 11: Shoulder activity level in different age groups

Age Group	**Min**	**Max**	**Mean $\pm$ SD**
20-30	6	19	12.7 $\pm$ 2.98
31-50	0	17	12.18 $\pm$ 4.64

51-60	0	17	7.93 ± 4.37

Table 12: Shoulder activity level in different age groups and its association with pain, disability and quality of sleep.

Variable	**NPRS (Rest) (21-30)**	**NPRS (Activity) (21-30)**	**SPADI (21-30)**	**PSQI (21-30)**

Shoulder Activity Scale				
Correlation coefficient	-0.302	-0.307	-0.451	-0.27
Significance Value	0.3960	0.387	0.191	0.442
	NPRS (Rest) (31-50)	**NPRS (Activity) (31-50)**	**SPADI (31-50)**	**PSQI (31-50)**
Shoulder Activity Scale				
Correlation coefficient	-0.186	-0.82	-0.75	-0.78
Significance Value	0.396	0.04*	0.03*	0.19*
	NPRS (Rest) (51-60)	**NPRS (Activity) (51-60)**	**SPADI (51-60)**	**PSQI (51-60)**
Shoulder Activity Scale				
Correlation coefficient	-0.108	-0.95	-0.75	-0.62
Significance Value	0.458	0.00*	0.04*	0.10

(P<0.05)*

DISCUSSION

The aim of the study was to determine shoulder activity level in individuals with chronic shoulder pain (> 3 months of duration). The objective was to determine the association of shoulder activity level with pain, disability and quality of sleep. A

total of 105 data were collected of participants having various chronic shoulder disorders.

It was seen that out of 105 participants, 10 individuals (9.5%) had high activity level, 65 individuals (62%) had average/medium activity level and 30 individuals (28.5%) had low activity level. It was seen that with age groups there is an inverse relationship of shoulder activity level with age i.e. with increase in age there is reduction in shoulder activity level. The minimum shoulder activity level in this study is 0 which is seen in age groups of middle age adults (31-50) and older adults (51-60) and the highest was seen in young adult age group (20-30) is 19.According to a study done by Amelia Lorensia[18] et al which states that activity level declines with age which supports the results of our study. Hepper[19] et al demonstrated a strong negative correlation of shoulder activity level with increasing age in asymptomatic males and also in female controls without shoulder symptoms. Brophy[20] et al demonstrated a strong negative correlation of shoulder activity level with increased age independent of diagnosis. The authors commented that shoulder activity level varied by age in a sensible pattern, because younger patients had a higher activity level and older patients tended to be less active.

Shoulder activity level when compared with pain (NPRS during activity), there was a strong negative correlation and the data were statistically significant.Pain and stiffness which are common in chronic shoulder disorders, there is always reduction in activity level. Also there presence of kinesiophobia in individuals with chronic pain and in chronic shoulder disorders creates a barrier for the individuals to perform movement.[21] Shoulder pain is associated with functionality. An increase in pain level decreases functionality. Shoulder range which is required for various shoulder functional activities of day to day life. Over a long period of time, hypervigilance, and

avoidance of movement cause to immobilization complications such as deconditioning which provokes more pain and functional impairment. As pain level increase there is reduction in range of motion and thus there is reduction in shoulder activity level.[22]

Shoulder activity level when compared with pain (NPRS at rest), there was a weak negative correlation and the data were not statistically significant. The possible explanation could be individuals with any chronic pain or chronic shoulder disorder experience pain only during activity or movement.

Shoulder activity level when compared with disability (SPADI), it was observed that there was strong negative correlation and the data were statistically significant. In SPADI, there are items regarding pain and activities of shoulder which are commonly used in day to day life. As the SPADI scores increases i.e. more is the problem with the patients then definitely the activity level will reduce. Shoulder pain reduces functionality and thereby limits the patients to perform movements required in day to day life activities.[22]

When shoulder activity level was compared with quality of sleep (PSQI), there was a moderate negative correlation, but the data were not statistically significant. A study done by Topark M[23] et al, which concluded that patients with adhesive capsulitis had poor quality of sleep. But there was a different outcome in our study, which may be due to any intake of medications which was not assessed in this study. Also if the patients are taking any form of medical or Physiotherapy treatment was also not assessed in this study. On factor which could explain this would be pain only occurs during movement and at rest there is very less pain, so no activity no pain or less pain.

The shoulder activity level when compared to pain, Disability and quality of sleep among the age groups, there was weak to moderate negative correlation in the young adult group and the data were not statistically significant. The possible

explanation could be young individuals has higher activity level and better tolerance of pain when compared to middle and older adult's age group. The healing process is faster in young age group when compared to the other two. This could results into more activity level. Another factor could be there was in equal distribution of participants in all the age groups.[24]

Shoulder activity level in middle (31-50) and old age group (51-60) comparison showed that there is a strong negative correlation and the data were statistically significant except for pain at rest (NPRS) and quality of sleep (PSQI). The possible explanation could be the age factor. With increase in age reduces the physical activity level and the pain tolerance limit and the presence of comorbidities which was not assessed in this present study could have in role in limiting the shoulder activity level.[22] But one factor which is very important to know is the unequal distribution of participants in all the age groups. The nature of their occupation, position of shelf, way of working, any comorbidity, past history of any injury to shoulder, any intake of medications were not assessed in the present study. It's because all this factors will have an important role in the chronic shoulder disorder.

CONCLUSION

There is reduction in shoulder activity level in individuals with chronic shoulder pain. With increase in age there is more reduction in shoulder activity level. Shoulder activity level also has a negative correlation with pain, disability and quality of sleep. So treatment focus should be on the restoring the activity of the patient and outcome measure should be designed to accurately measuring the shoulder activity level.

LIMITATIONS

- Sample size was small.

- Detail analysis of occupation, any comorbidity, analysis of home environment could be taken.

FUTURE RECOMMENDATIONS

- Study with larger sample size could be taken.
- Detail analysis of other variables like occupation, medications could be taken.

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