

## Association between Pain and Level of Disability in Patients with Degenerative Supraspinatus Tendinopathy

Rida Rasheed, Ashfaq Ahmad, Fariha Khalid, Syed Amir Gillani, Faiza Sharif, Abeera Babur

Physical Therapist, University Institute of Physical Therapy, Lahore Pakistan

### ABSTRACT

**Objective:** To determine the association between pain and level of disability in participants with degenerative supraspinatus tendinopathy.

**Study Design:** Cross-sectional study

**Place and Duration of Study:** Outpatient Departments of Jinnah Hospital and Lahore General Hospital, Lahore Pakistan, from Jun 2019 to Feb 2020.

**Methodology:** A total of 168 diagnosed participants of degenerative supraspinatus tendinopathy with age range of 30 to 60 years were included through consecutive sampling and questioned using Quick Disabilities of Arm, Shoulder and Hand (DASH) and Numeric pain rating scale. The categorical data like age and Quick Disabilities of Arm, Shoulder and Hand scores were recorded as mean and standard deviation while numerical data like gender and Numeric Pain Rating Scale readings were described as frequencies and percentages, using SPSS version 25.0. Linear relationship of association between pain and level of disability was found through Pearson coefficient (r).

**Results:** Quick Disabilities of Arm, Shoulder and Hand (DASH) showed a mean of 3.55 and standard deviation of 0.94, while with Numeric Pain Rating Scale 7 participants (4.2%) described their level of pain as "hurts little bit", 31(18.5%) "Hurts little more", 63(37.5%) "Hurts even more", 55(32.7%) "Hurts whole lot" and 12(7.1%) "Hurts worst". Results of the study showed that level of disability was significantly correlated with pain and there was a moderate positive correlation between them.

**Conclusion:** This study concluded that intensity of pain can cause disability in participants with degenerative supraspinatus tendinopathy and impairs the Quality of Life in such patients.

**Keywords:** Level of disability, Numeric pain rating scale, pain, Quick DASH (Disabilities of arm, shoulder and hand), Supraspinatus tendinopathy.

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### INTRODUCTION

Rotator cuff tendinopathy is said to be causing an uncomfortable sensation of pain, mostly during overhead reaching activities, by extravagant forces on the rotator cuff tissues that may lead to exhaustion of the affected area in a shorter time.<sup>1</sup> The anomalies of rotator cuff or the subacromial bursa are significant for causing discomfort and weakness at the affected site, originating from the Glenohumeral joint. The significant morbidity caused by rotator cuff pathology indicates an absence about proper knowledge of the pathoetiology, a complete ignorance of the diagnostic accuracy during the assessment process and an incomplete range of interventional techniques. The individual study of the supraspinatus tendinopathy has been far away from the interest of the researchers for quite a long time and it is usually studied as a part of the Rotator cuff tendons.<sup>2</sup> Many studies support that the commonest upper limb complaint is Rotator cuff-

related shoulder pain (RCRSP).<sup>3</sup> However, this study has tried to explain if pain severity cause disability in subjects with degenerative supraspinatus tendinopathy and activities of daily living in such patients can be impaired.

Supraspinatus tendinopathy is believed to be caused by many factors including intrinsic/extrinsic, pathomechanical or postural changes. Structural and biological changes happen when tendinopathy develops. Among many predisposing and causative factors of tendinopathy, diabetes mellitus is an important risk/causative factor in adult age.<sup>4</sup> The malfunctions of the supraspinatus tendon have been depicted as deteriorative processes which start from an early acute condition of "tendonitis", later leading to "tendinosis" and finally reaching towards "partial or full thickness tendon rupture". However, currently the terms tendonitis and tendinosis should be avoided and the word tendinopathy should be preferred.<sup>5,6</sup> Local tenderness to touch, pain/swelling and restriction of activity are present on affected tendon. A considerable amount of features occur with tissue degradation, the pain is

**Correspondence:** Dr Rida Rasheed, House No. 478, Block E-1, Wapda Town, Lahore, Pakistan

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persistent, localized and associated with tendon loading, whereas investigations never always respond to symptoms and asymptomatic or painless tendons can be disastrously degenerated.<sup>7</sup>

In males and females, the prevalence rates for shoulder joint pain were around 27% and 30%, whether for that of rotator cuff pathologies, 7% and 9% respectively.<sup>8</sup> Significant risk factors for development of rotator cuff syndrome (RCS) were prolonged shoulder flexion or forceful exertion (pen holding position) at work. Increased age was strongly related to slow recovery of the damaged tendons. The interrelation between the shoulder pain and rotator cuff pathologies was caused by predictors like increased age and excessive usage of arm in terms of prolonged arm abduction, increased age, and repetition of movements.<sup>9</sup> A wider assessment of function was required when a persistent shoulder pain resulted in multi-dimensional disability. The QuickDASH (Quick version of Disabilities of arm, shoulder and hand), a health measure stated by the patients, is commonly used to perform assessment of the impairments due to pain and limitations of the upper extremity that consists of a major part with 11 questions regarding ADLs (Activities of daily living), an optional part of Work module and another optional part regarding sports performance of the individual, if any.<sup>10</sup>

In this study, through the use of some tools and questionnaires, it is described if pain can cause disability in participants with degenerative supraspinatus tendinopathy and how activities of daily living (ADLs) can be compromised through pain; caused by this anomaly. As Supraspinatus tendon is a part of the Rotator cuff tendons; majorly formed by four tendons and helps to secure the position of the shoulder joint, enabling a person to perform his physical upper limb activities efficiently and effectively.

## METHODOLOGY

The cross-sectional study was conducted from outpatient departments of Jinnah Hospital and Lahore General Hospital from June 2019 till February 2020. The sample size was calculated by using WHO sample size calculator ([epitools.ausvat.com](http://epitools.ausvat.com)).<sup>11</sup>

**Inclusion Criteria:** Patients of degenerative supraspinatus tendinopathy, with previous history of excessive workload or degenerative changes in tendons owing to age with a minimum history of eight weeks of being affected by symptoms were included.

**Exclusion Criteria:** Subjects with any history of systemic diseases e.g. fatal cardiac, hepatic or endocrine

disorder or concomitant serious illness e.g. cancer or stroke and musculoskeletal conditions e.g. fractures, Subluxations and dislocations, generalized body pains and recent joint replacement surgeries were excluded. Patients with constructive repair of torn tendons, bleeding disorders or immunocompromised health were also excluded.

Patients were previously assessed completely through Shoulder Magnetic resonance imaging (MRI) and diagnosed by Orthopedicians of the respective hospital wards and were referred for evaluation of both the sound and affected limb using QuickDASH and Numeric pain rating scale (NPRS). Numeric pain rating scale consisted of a number line with points from 0-10; patients marked the points on the number line corresponding to their severity of pain. The Quick version of DASH scoring was used because of its high sensitivity and specificity, 79% and 75% respectively, as compared to the complete version of DASH scoring.<sup>12</sup> Participants were categorized based on their markings on QuickDASH as being minimally disabled (0-20%), moderately disabled (21-40%), severely disabled (41-60%), crippled (61-80%) and Symptoms exaggeration or bedbound (81-100%). Informed consent was taken from all the participants and study purpose was also explained to them. Patients' confidentiality was maintained throughout the research. Institutional review board of the university also approved this research for data collection, and there was no conflict of interest throughout the time span of research. The IRB letter number for article publication was 717, dated 6-03-20. Statistical analysis in respective research was done using SPSS version 25.0 with frequencies and graphs recorded for the numerical data, while variables like QuickDASH scoring and age, were represented in the form of Standard deviation and mean.

Linear association was found through Pearson correlation coefficient between two variables, Pain and level of disability. And the result showed significant and moderate positive correlation between two variables, such that if pain increases; it can also increase degree of disability and vice versa.

## RESULTS

One hundred and sixty eight participants were recruited after diagnosis by the orthopedic physicians, 87(51.8%) out of them were males and 81(48.2%) were females, frequency and percentages of Numeric Pain Rating Scale were as follows; 7(4.2%) participants described their level of pain as "hurts little bit", 31(18.5%) as "hurts little more", 63(37.5%) as "hurts even more",

55(32.7%) as "hurts whole lot" and 12(7.1%) as "hurts worst". Mean for age and QuickDASH scoring were 46.14±9.56 and 3.55±0.94, respectively.

**Table I: Characteristics of Study Participants (n=168)**

Variables	Frequency (n)	Percentage (%)
<b>Gender</b>		
Male	87	51.8
Female	81	48.2
<b>Numeric pain rating scale</b>		
Hurts little bit	7	4.2
Hurts little more	31	18.5
Hurts even more	63	37.5
Hurts whole lot	55	32.7
Hurts worst	12	7.1
<b>Total</b>		
No. of participants	168	100

**Table-II: Demographics of Study Participants (n=168)**

Variable	Mean± S.D	Minimum	Maximum	Total no. of participants
Age	46.14± 9.56	30	60	168
DASH categorical	3.55± 0.94	1	5	

**Table-III: Relationship between two variables (NPRS and QuickDASH) (n=168)**

Variables	No. of participants (n)	correlation coefficient (r)	p-value
Numeric Pain Rating scale and QuickDASH	168	0.373	0.00

**DISCUSSION**

In this study, we assessed a population of Degenerative supraspinatus tendinopathy (age 30-60 years) with history of repetitive workload on shoulder joint and those with degenerative weakening of the tendon with a minimum of eight symptomatic weeks; with no subjects included with any presence of Rotator cuff lesions, systemic diseases or any musculoskeletal disorders e.g. fractures, dislocations, Subluxations etc and the subjects showed manifestations (pain/swelling/limitation of movement in elevation and abduction at the glenohumeral joint with profound difficulty in sleeping due to pain), so significant linear association was found between pain and level of disability in patients with degenerative supraspinatus tendinopathy with a p-value (0.00) and (r) as 0.373 with moderate positive correlation. This study negated any absolute presence of a tear or lesion to cause symptoms including degrees of pain and disability in contrast to a study conducted by Krief, Olivier, where it was concluded that no significant association was found between the severity of discomfort, level of disability

and impairment of functions as reported on L'Insalata Self Assessment Questionnaire along with the position and measure of the lesion when observed on Magnetic resonance imaging. In participants with supraspinatus tendon lesions, pain and disability were significantly associated to the injury along with subsequent inflammation of the adjacent bursa, contributing a little to the symptoms.<sup>13</sup> So it's observed here that no degree of any tear is essential for provoking symptoms and sole pain due to tendinopathy can cause disability in affected persons too.

In this study, Shoulder pain caused moderate to high difficulty during performance of activities of daily living and sufferers of Glenohumeral joint pain above 30 years of age, reported disability. A Systematic review by Tran *et al.* concluded that the major contributor to disability and morbidity and the commonest musculoskeletal condition was shoulder pain.<sup>14</sup> A systematic review by Martinez *et al.* suggested that pain beliefs triggered the pain intensity, duration and incapacity in participants with glenohumeral joint anomalies.<sup>15</sup> In this study, Patients with most obvious symptoms were those with the least severity of the tendon involvement in initial stages of the pathology during first six weeks of complaints, while disability was caused in later stages of disease, with least pain perception due to central desensitization of the affected area. A study conducted by Rio *et al.* concluded that participants with asymptomatic tendon pathology have usually higher pain thresholds due to central desensitization of the affected area.<sup>16</sup>

This present study also inquired some athletes above 30 years of age and didn't notice any apparent muscle atrophy in the affected limb when observed by Orthopedicians. While JC Benitez reached to a conclusion that muscle atrophy existed in the presence of pain in individuals suffering from tendinopathies when seen on radiological findings e.g. Magnetic resonance imaging (MRI). However, in active overhead athletes, the AHD (acromio humeral distance) is not clearly reduced with shoulder pain. This study has used the Quick version of DASH with sensitivity of 79% and specificity of 75% to evaluate the disabilities of arm, shoulder and hand in participants with involvement of affected limb due to degenerative supraspinatus tendinopathy. DH Christianssen, in a research inferred that DASH and WORC had no significant differences when a comparison was done on patients (both symptomatic and asymptomatic on their dominant limbs). And the existence of the prominent manifestations impressed item scores on DASH question-

naire more than they did on WORC index.<sup>17</sup> DASH was also found to be effective in evaluation of nerve injuries of the upper quarter of the body.<sup>18</sup>

A very limited research was done on this topic and the results reported in past literature had mixed results.<sup>13</sup> So, this study supported the literature that showed that pain and level of disability are the two linked variables, irrespective of any lesion or tear in the rotator cuff tendons, degenerative supraspinatus tendinopathy can also hamper an individual's activities of daily living and pain caused by an affected tendon can disturb QOL (Quality of life) in both sexes.

#### LIMITATION OF STUDY

The study was conducted on the participants of degenerative tendinopathy of supraspinatus, so its results cannot be acceptable for any tendon rupture/injured areas. Also, this was a cross-sectional study, so in future; more tools and investigations should be used to evaluate patients in order to avoid any chance of recall bias, which may occur due to a series of closed chain question.

#### CONCLUSION

Intensity of pain causes disability in participants with degenerative supraspinatus tendinopathy and impairs Quality of Life in such patients.

**Conflict of interest:** None.

#### Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

AA & FK: Critical review, concept, drafting the manuscript, approval of the final version to be published.

RR & SAG: Data acquisition, data analysis, approval of the final version to be published.

FA & AB: Study design, drafting the manuscript, data interpretation, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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