

## Evaluation and Symptoms Related Diagnosis of Posterior Capsule Tightness on Various Shoulder Issues

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### ABSTRACT

**Background:** Evidence based study shown that posterior capsule flexibility is a precursor to shoulder problems. However, no study thus far has shown the influence of the flexibility of posterior capsule in different shoulder pathologies. The objective of the study to compare the role of posterior capsule tightness in different shoulder problems. Methodology which is used one-hundred-seventeen patients diagnosed with shoulder subacromial impingement syndrome (n=39), partial rotator cuff tear (n=26) or frozen shoulder (n=31) and 21 asymptomatic peers participated in the study. Horizontal adduction was assessed in side-lying position for posterior capsule tightness. Pain was measured via the visual analogue scale and shoulder range of motion and active total elevation was assessed with goniometer. Active internal rotation was determined by measuring the distance between T5 and the thumb. Results: It was found that the affected side of the posterior capsules of the patients with subacromial impingement syndrome ( $p<0.001$ ), partial rotator cuff tear ( $p<0.001$ ) and frozen shoulder ( $p<0.001$ ) was stiffer than their healthy side. There were significant differences among groups in the level of tightness in the posterior capsule between the affected and the healthy sides ( $p<0.001$ ). This present study which emphasized that the posterior capsule's susceptibility to tightness is most evident in frozen shoulder among various shoulder issues.

**Keywords:** Posterior capsule; Frozen shoulder; Subacromial impingement syndrome; Partial rotator cuff tear

### INTRODUCTION

Posterior capsule tightness is a problem frequently seen in shoulder disorders. The tightness in the posterior capsule is defined as a shortening of the capsule or shortening in the dynamic structures attached to this area such as the

posterior part of the deltoid, infraspinatus, teres minor and latissimus dorsi muscle.<sup>[1]</sup> Because of the dynamic structures attached to the scapula, the tightness in the posterior capsule affects the movement of the scapula on three planes and can potentially be the cause of its dyskinesia.<sup>[2]</sup>

The aims of this study were to (a) analyze posterior capsule tightness in different shoulder problems, (b) evaluate the relationship of posterior capsule tightness with shoulder range of motion and pain intensity in different shoulder problems.

## METHODOLOGY

One hundred twenty five patients were diagnosed with subacromial impingement syndrome, partial rotator cuff tear and/or frozen shoulder by an orthopaedic surgeon and 30 asymptomatic peers were included in this study. All shoulder patients referred to the Physiotherapy and Rehabilitation Unit were included in the study.

Inclusion criteria in this study was specified as those:(a) having been diagnosed by an orthopaedic surgeon with subacromial impingement syndrome, partial rotator cuff tear and/or frozen shoulder; (b) having no neurological problems, and (c) having no systemic problems such as diabetes mellitus. The study was explained in detail to all of the participants and their approval was obtained.

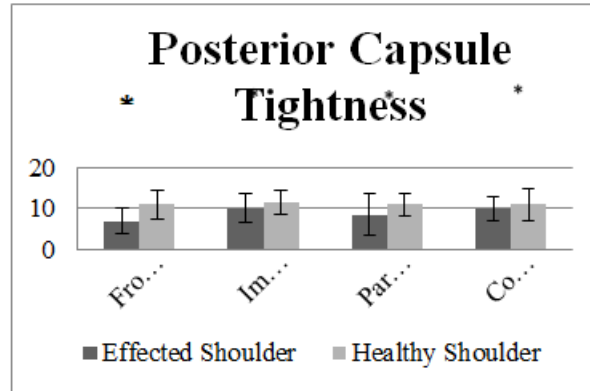
**Table 1: The physical characteristics of the patients are shown in.**

	Frozen Shoulder (n=42) X±SD (min-max)	Impingement Syndrome (n=52) X±SD (min-max)	Partial Rotator Cuff Tear (n=31) X±SD (min-max)	Control (n=30) X±SD (min-max)
Age (year)	49±9.1 (23-67)	50.4±10.7 (25-62)	58.2±10.5 (43-70)	37.4±12.5 (23-66)
BMI (kg/m <sup>2</sup> )	26.9±4.4 (19-43)	27.6±5.5 (21.6-47.7)	28.7±4.4 (21.6-47.7)	24.8±4.4 (18.3±33.7)

The patients participating in the study were divided into 3 groups according to their pathologies. Group 1 consisted of 52 patients with secondary subacromial impingement syndrome. Group 2 consisted of 31 patients with partial rotator cuff tear. Group 3 consisted of 42 patients with primary frozen shoulder in Phase 3 and Group 4 consisted of 30 asymptomatic peers as a control group without any shoulder complaints.

## RESULTS

The intrarater reliability of posterior capsule tightness measurement was found to be good (ICCs: 0.85). As a result of the statistical analysis carried out, the posterior capsule of the affected side in patients with subacromial impingement syndrome ( $p < 0.001$ ,  $d = 2.0$ ), partial rotator cuff tear ( $p < 0.001$ ,  $d = 1.17$ ) and frozen shoulder ( $p < 0.001$ ,  $d = 1.33$ ) was tighter than the healthy side. Also there were significant differences between the dominant and non-dominant sides in the control group ( $p = 0.021$ ,  $d = 0.5$ ).



**Figure 1:** Differences of the posterior capsule tightness among groups.

The correlation between posterior capsule tightness and range of motion including all patients was shown in [Table 2](#). All range of motion of the shoulder and the posterior capsule tightness of the affected side are found to be correlated ( $p < 0.05$ ). Correlation between posterior capsule tightness and range of motion with regard to diagnosis is shown in.

**Table 2:** Correlation between posterior capsule tightness and range of motion in all cases

	Flexion		Abduction		ER		IR		ATE		HBB
	r	p	r	p	r	p	r	p	r	p	r
Effected Shoulder	.39	<.001*	0.39	<.001*	0.36	<.001*	0.27	.005*	<.001*	0.33	.001*
Healthy Shoulder	.01	.91	0.8	0.4	0.01	0.86	0.78	0.08	0.4	0.01	0.85

\* $p < 0.05$

ER: External Rotation

IR: Internal Rotation

ATE: Active Total Elevation

HBB: Hand-behind-back tes

**Table 3:** Correlation between posterior capsule tightness and range of motion regarding to diagnose in affected shoulders.

\* $p < 0.05$

s	Flexion		Abduction		ER		IR		ATE		HBB	
	r	p	r	p	r	p	r	p	r	p	r	
Frozen Shoulder	0.45	.01*	0.55	.001*	0.53	.006*	0.37	.002*	0.55	.002*	0.36	0.07
Impingement Syndrome	0.25	0.12	0.08	0.6	0.19	0.25	0.21	0.2	0.31	0.06	0.34	0.06
Partial Rotator Cuff Tear	-0.09	0.69	0.05	0.82	-0.15	0.57	-0.11	0.67	-0.17	0.49	-0.21	0.41
Control Group	0.35	0.11	0	1	0.26	0.24	-0.43	0.0503	-0.26	0.23	-0.4	0.07

ER: External Rotation

IR: Internal Rotation

ATE: Active Total Elevation

HBB: Hand-behind-back test

Posterior capsule tightness is correlated with resting pain intensity level ( $r=-.27$ ,  $p=0.01$ ) and activity pain level ( $r=-.24$ ,  $p=.02$ ) when analysis was done with including all affected shoulders.

**Table 4:** Correlation between posterior capsule tightness and pain regarding to diagnose in affected shoulders

	Pain (VAS)					
	At Rest		During Activity		At Night	
	r	p	r	p	r	p
<b>Frozen shoulder</b>	-0.432	<b>.017*</b>	-0.249	<.19	-0.193	0.308
<b>Impingement syndrome</b>	-0.189	0.256	-0.362	<b>.026*</b>	-0.231	0.175
<b>Rotator cuff tear</b>	-0.008	0.975	-0.02	0.94	-0.083	0.769

\* $p<0.05$

## DISCUSSION

The findings reveal that the affected side of the posterior capsules of the patients with subacromial impingement syndrome, partial rotator cuff tear and frozen shoulder were stiffer than their healthy side. Furthermore, the tightness in the posterior capsule is correlated with all shoulder range of motion and pain level at rest and during activity.<sup>[3]</sup>

The present study has shown that the posterior capsule is stiff in frozen shoulder, subacromial impingement syndrome and partial rotator cuff tear. However, the greatest tightness appeared in frozen shoulder.<sup>[4]</sup> It is concluded in the previous studies that, the posterior capsule is affected in shoulder pathologies.<sup>[5]</sup> In our study, we compared the role of the posterior capsules in different shoulder pathologies and it can be a reference for other studies.

## CONCLUSION

This study newly added the literature that frozen shoulder and impingement patients has more posterior capsule tightness in affected side when compared with healthy side than rotator cuff tear patients. The quantity of posterior capsule tightness was bigger in adhesive capsulitis and rotator cuff tear patients than in impingement patients. Tightness is related with activity pain in impingement syndrome, with resting pain in frozen shoulder. The relationship of posterior capsule tightness with passive range of motion was seen in all directions in adhesive capsulitis patients, no relation was seen in other pathologies.

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