



**The comparison of outcome of scapular dyskinesis test  
between affected and unaffected sides in patients with lateral  
epicondylalgia: a control trial study in outpatient department of a  
pacific medical college**

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**Abstract**

Lateral Epicondylalgia (LE) is characterized by pain at the elbow joint along with tenderness at the lateral epicondyle which increases on gripping activity, passive wrist flexion and resisted wrist extension Scapular Dyskinesia can be defined as “a collective term that refers to the movement of the scapula that is dysfunctional and may create a possible impairment of overall shoulder function.

**Aim:** The comparison of outcome of scapular dyskinesis test between affected and unaffected sides in patients having elbow pain.

**Subjects and Method:** After the approval of the Institutional Ethics Committee (IEC), patients between the age group of 25-55 years having elbow pain and Scapular dyskinesia were selected for the study based on the inclusion and exclusion criteria. Pain was recorded on visual analogue scale and Scapular Dyskinesia Test was performed.

**Result:** Distribution of outcome of scapular dyskinesis test (Shoulder flexion/abduction) differs significantly between affected and unaffected sides (P-

value<0.05). Significantly higher proportion of cases had subtle or obvious shoulder flexion/abduction at the affected side compared to the unaffected side.

**Conclusion:** Scapular Dyskinesis Test is a test that can dynamically assess the position of scapula and can be used for the assessment of scapular dyskinesia. Significantly higher proportion of cases had subtle or obvious shoulder flexion/abduction at the affected side compared to the unaffected side.

**Keywords:** Lateral epicondylalgia, visual analogue scale, scapular dyskinesis test, lateral scapular slide test

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## **Introduction**

Lateral Epicondylalgia (LE) is characterized by pain at the elbow joint along with tenderness at the lateral epicondyle which increases on gripping activity, passive wrist flexion and resisted wrist extension. LE is associated with various occupations like meat cutting, plumbing, painting, weaving, typing, using screw driver, etc. which involves repeated use of wrist extension<sup>3, 7</sup>. Lateral epicondylalgia is caused due to overuse injury of Extensor Carpi Radialis Brevis (ECRB) and sometimes Extensor Digitorum Communis (EDC) muscles<sup>6</sup>. A histopathological study suggests the occurrence of reactive tendinopathy, tendon disrepair and degenerative tendinopathy. Reactive tendinopathy is defined as non-inflammatory proliferative cellular and matrix response due to overloads. The scapular motion consists of 3 rotational movements and 2 translatory movements. The rotational movements include Upward/downward rotation, Internal/external rotation and Anterior/posterior tipping. The translatory movements include Elevation/depression and Protraction/retraction<sup>7</sup>. During the normal overhead movement of the shoulder, the scapula is in setting during the first 30° of elevation followed by progressive increase in the upward rotation, maximum up to 15° along with minimal amount of protraction or elevation<sup>7</sup>. Scapular Dyskinesia can be defined as “a collective term that refers to the movement of the scapula that is dysfunctional and may create a possible impairment of overall shoulder function, although it may also represent the cause of persistent shoulder syndromes or may be manifestation of underlying structural shoulder pathology in many types of shoulder injury”<sup>7</sup>. The acronym ‘SICK’ is used to refer the findings in scapular dyskinesia.

S: Scapular malposition.

I: Inferior and medial border prominence.

C: Coracoid pain and malposition.

K: Dys Kinesis of scapular movement<sup>10</sup>.

Scapular dyskinesis test is a test used for visual assessment of the scapular movement during shoulder flexion and abduction movements. It grades the scapular Dyskinesia as ‘no’, ‘subtle’ and ‘obvious’<sup>12, 13, 14</sup>. The test is used to assess the scapular motion in all the planes. The shoulder, elbow and wrist are a part of upper limb kinetic chain. Sequenced muscle activation of the upper limb and lower limb is required to produce an integrated biomechanical task. This sequencing is called the kinetic chain hence, it

is important to assess other adjoining kinetic chain links while rehabilitating one of the chains of the link<sup>2, 17</sup>.

## **Methodology**

- 1. Study design:** Hospital Based Control trial Study.
- 2. Location of the study:** Out-patient department of a Pacific Medical College.
- 3. Study population:** Lateral Epicondylalgia patients and scapular dyskinesia patients.
- 4. Duration of study:** 18 months.
- 5. Sampling technique:** Convenient sampling.
- 6. Sample size:** 60.

## **Procedure**

Informed consent was taken and patient were included in the study with inclusion criteria.

After the approval of the Institutional Ethics Committee (IEC) no-PMU/PMCH/IEC/2022/226 dated 06/09/2022. All Participants completed information sheet and consent form at recruitment. Patients between the age group of 25-55 years having lateral epicondyle pain were selected for the study based on the inclusion and exclusion criteria. The intensity of pain was recorded using Visual Analogue Scale and graded as 'no pain', 'mild', 'moderate' and 'severe' and Scapular Dyskinesia Test was performed.

**Scapular Dyskinesia Test**<sup>12, 13, 14</sup>: The patient was asked to stand with the back exposed and back facing towards the examiner. The patient was then instructed to perform 5 repetitions of bilateral shoulder flexion and abduction movement. The test was performed with the participants actively doing movement. The movement of scapula was observed for any abnormalities which included inferior angle prominence, medial border prominence, and excessive superior border elevation or winging. Each test movement was classified and recorded as having 'no', 'subtle' and 'obvious' abnormality. Both, the affected and the unaffected upper limbs were observed using the two test movements. The final rating of scapular dyskinesia was given using the following criteria: No Scapular Dyskinesia-when both the test movements had no abnormality or one of the test movements had a subtle abnormality. Subtle Dyskinesia-when both the test movements had subtle abnormality. Obvious Dyskinesia-when any one or both the test movements were recorded to have obvious abnormality.

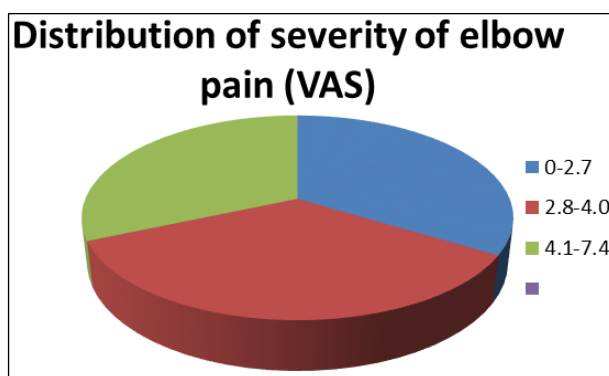
## **Statistical analysis and results**

The paired statistical comparisons of distribution of categorical variables were tested using Wilcoxon's signed rank test. The inter-group statistical comparisons of means of normally distributed continuous variables was done using analysis of variance (ANOVA). The underlying normality assumption was tested before subjecting the

study variables to ANOVA. All results are shown in tabular as well as graphical format to visualize the statistically significant difference more clearly.

**Table 1:** Visual analogue scale

Severity of pain (VAS) [Quartiles]	No. of cases	% of cases
0 – 2.8	20	33.3
2.9 – 4.0	21	35
4.1 – 7.4	19	31.6
Total	60	100.0

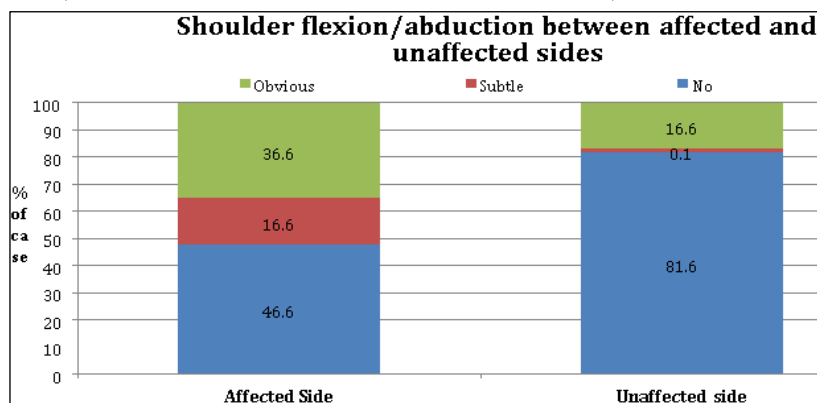


**Table 2:** Comparison of outcome of scapular dyskinesis test (Final rating) between affected and unaffected sides

Final rating	Affected Side		Unaffected side		P-value
	No. of cases	% of cases	No. of cases	% of cases	
No	28	46.6	49	81.6	0.001***
Subtle	10	16.6	1	0.16	
Obvious	22	36.6	10	16.6	
Total	60	100.0	60	100.0	

P-value by Wilcoxon's signed rank test. P-value<0.001 is considered to be statistically significant.

**Table 3:** Distribution of mean elbow pain (VAS) according to outcome of scapular dyskinesis test (Shoulder flexion/abduction – affected side).



**Results:** There is significantly higher proportion of cases had subtle or obvious shoulder flexion/abduction at the affected side compared to the unaffected side.

### **Discussion**

In this study, the pain was assessed using Visual Analogue scale (VAS) which is one of the most widely accepted pain rating scale.

The lateral epicondyle pain recorded in this study was in the range of 1-7.4 cm with the average score being  $3.6 \pm 1.5$  cm. It is evident that various factors such as the gender, the structural changes at the lateral epicondyle, the duration of injury, the degree of tendon degeneration, physiological response of the body to the tendon degeneration and many more can influence the severity of pain. The comparison of outcome of scapular dyskinesia test (Final rating) between affected and unaffected sides is shown. The P value was calculated using Wilcoxon's signed rank test and P-value  $<0.001$  was considered to be statistically significant. The scapular dyskinesia was assessed using Scapular Dyskinesia Test (SDT) using active shoulder flexion and abduction movement. The patient was graded as having no, subtle or obvious scapular dyskinesia during the test movements. The final rating was given based on the grading of shoulder flexion and abduction movements. P-value was calculated by Wilcoxon's signed rank test and P-value  $<0.001$  was considered to be statistically significant. There was a significantly higher proportion of cases who had subtle/obvious scapular dyskinesia on the affected side as compared to the unaffected ( $p = 0.001$ ). The kinetic chain theory provides a theoretical foundation for linking the importance of scapular musculature to muscle performance at the elbow.

### **Conclusion & clinical implication**

We can conclude from this study that in LE patients the pain intensity is influenced by various factors. The presence of scapular dyskinesia is one of the important components amongst the structural changes associated with LE. Scapular Dyskinesia Test is a test that can dynamically assess the position of scapula and can be used for the assessment of scapular dyskinesia. Significantly higher proportion of cases had subtle or obvious shoulder flexion/abduction at the affected side compared to the unaffected side.

The current study shows that there are a high proportion of lateral epicondylalgia patients who have underlying scapular dyskinesia which might be overlooked during the assessment of the patient. This may cause muscle imbalance and abnormal shoulder movement patterns which can later lead shoulder pain. Hence, evaluation of the scapular position and scapular stabilizer muscles strength, especially the trapezius and serratus anterior should be included in the assessment.

### **Scope & Limitation**

**Scope:** Study should be concluded with larger sample size and duration. Study also aims to assess strength of rotator cuff muscles to have a better insights.

**Limitation:** Sample size was small.

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