



Measurement of Scapular Asymmetry in Periarthritis Shoulder by Using Modified Scapular Slide Test

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KEYWORDS

Scapular asymmetry, PA shoulder, Scapular Alterations

ABSTRACT:

Aims and objectives: To evaluate the scapular asymmetry in participants with and without Periarthritis shoulder using modified scapular slide test.

Methods: Twenty participants with Periarthritis shoulder were enrolled in the study and informed consent was filled. They were suffering from unilateral shoulder pain at the dominant arm having pain with active shoulder elevation and pain in passive and active Range of Motion. Scapular asymmetry was measured using modified scapular slide test during shoulder elevation in sagittal plane analyzed at 0, 45, and 90 degrees of humero-thoracic elevation.

Result: Statistical comparisons indicated that there was no significant difference between mean of superior (0- 45-degree) Left and Right side ($p > 0.05$) and between mean of inferior (0- 45- degree) Left and Right side ($p < 0.05$).

However, we found a significant difference between mean of Superior (0-90 degree) Left and Right side ($p > 0.05$) and between mean of inferior (0-90 degree) Left and Right side ($p < 0.05$).

Conclusion: Restoring altered kinematics and managing scapular asymmetry may be accepted as one of the goals of shoulder rehabilitation in individual with Periarthritis shoulder. The findings of the study indicated the requirement of thorough assessment in terms of biomechanical alterations in patients with PA shoulder.

Introduction:

Periarthritis (PA) Shoulder also known as frozen shoulder an insidious painful condition of the shoulder persisting more than 3 months. The inflammatory condition that causes fibrosis of the Glenohumeral capsule is accompanied by gradually progressive stiffness and significant restriction of ROM, mainly external rotation.¹

PA Shoulder has been described to be either primary or

secondary. Primary (idiopathic) disease can occur spontaneously without any specific inciting event. Primarily, it is often associated with other conditions such as diabetes mellitus, thyroid dysfunction, dyslipidemia, Dupuytren's contractures, auto-immune disease. The secondary form of the disease usually follows trauma or direct injury to the shoulder such as surgical interventions, fractures, rotator cuff tears or other severe articular trauma.²⁻³



PA Shoulder involves an inflammatory process and subsequently a reactive fibroblastic proliferation of the joint capsule leading to thickening and contracture of the joint capsule. An initial release of inflammatory cytokines (Interleukins, TNF- α , COX-1&2) and cells (T cells, B cells, Mast cells) play a crucial role in the later fibrotic process of the disease. Histological features demonstrate a mix of type I and type II collagen and an imbalance between extracellular matrix tissue degradation, remodeling, and regeneration.^{4,5,6}

Scapula plays an important role in providing mobility and stability for the shoulder joint complex. During shoulder elevation, the scapula moves through upward rotation, posterior tilt, and internal or external rotation. Abnormal movement alterations in these scapular movements are known as scapular dyskinesis. Kinematic alterations and side-to-side kinematic asymmetry in the shoulder complex across symptomatic and symptomatic population have been previously reported.⁷

There are several factors that might affect scapular kinematics. Various research have shown that pectoralis minor and posterior capsule tightness may be potential mechanisms for development of kinematic alterations in the shoulder complex with movement dysfunctions, such as impingement symptoms. Tightness in the pectoralis minor muscle resulted in significantly less scapular posterior tilt and greater scapular internal rotation during arm elevation.⁸⁻⁹

Studies done previously to determine the scapular asymmetry patterns in patients with shoulder impingement syndrome demonstrated altered scapular kinematics in both involved and non-involved shoulders when compared to healthy controls.¹⁰

Restoring altered kinematics and managing scapular asymmetry may be accepted as one of the goals of shoulder rehabilitation in individuals with shoulder problems.

Therefore, in this study we intend to demonstrate the role of altered scapular kinematics in patients with Periarthritis shoulder. Since no other study has been done previously reporting the same.

Methodology:

This study was carried out with sample size of 20
1917

subjects.

Inclusion criteria:

- Age 30-60 years
- Both males and females
- Pain with active shoulder elevation
- Pain in passive and active ROM
- Pain with resisted isometric abduction.

Exclusion criteria:

- History of cervical or thoracic spine pathology
- Previous neck or shoulder surgery
- Previous shoulder injury in past 6 months
- Bilateral PA shoulder.

Instrumentation:

- Vernier Calipers.

Procedure:

Each subject was instructed to stand in an upright position looking straight ahead of him or her. Measurements were taken with the subject standing in 3 positions.

Position 1: Placement of shoulder with Glenohumeral joint neutral position.

Position 2: The humerus was placed in a position of medial rotation with 45 degrees of shoulder abduction in coronal plane.

Position 3: The upper extremity was placed in a position of maximal medial rotation, with 90 degrees of shoulder abduction in the coronal plane.

The following points were marked in each of the three positions:

- The point on the medial border of the scapula where the spine can be palpated.
- The inferior angle of the scapula
- The closest points on the vertebral column of each of the above-mentioned points (1) &(2).

The following measurements were made in each of the 3 positions:



- The first measurement was the direct distance between the medial border of the scapula at the base of the scapular spine and the vertebral column (distance A), which gave the indication of how the superior portion of the scapula moved medially or laterally.
- The second measurement was the direct distance between the inferior angle of the scapula and the vertebral column (distance B), which gave the indication of how the inferior portion of the scapula moved medially or laterally.
- The measurements between the superior and inferior scapula and the vertebral column were used to evaluate the lateral and medial displacement of the scapula during glenohumeral abduction in a specific plane.
- The distances obtained at the 45- & 90 degree positions were then subtracted from the distances obtained in the 0-degree position.

Therefore, the main outcome variable was the change in displacement (mm) between the inferior angle of the scapula and the reference point on the vertebral column between 0–45-degree arm abduction and 0–90-degree arm abduction, and the superior medial border of the scapula at the level of the spine and the reference point on the vertebral column between 0–45-degree arm abduction and 0–90-degree arm abduction.

Data Analysis and Results :

Statistical comparisons indicated that there was no significant difference between mean of superior (0- 45-degree) Left and Right side ($p > 0.05$) and between mean of inferior (0- 45-degree) Left and Right side ($p < 0.05$).

However, we found a significant difference between mean of Superior (0-90 degree) Left and Right side ($p > 0.05$) and between mean of inferior (0-90 degree) Left and Right side ($p < 0.05$).

❖ **Figure 1** shows the gender distribution among 20 subjects and the level of scapular displacement in males and females

❖ **Figure 2** shows the change in displacement between inferior angle of scapula

❖ **Figure 3** shows the change in displacement between superior angle of scapula

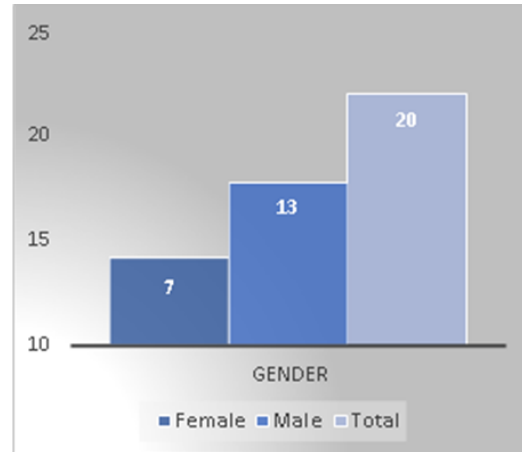


Fig:1 Gender distribution among 20 subjects

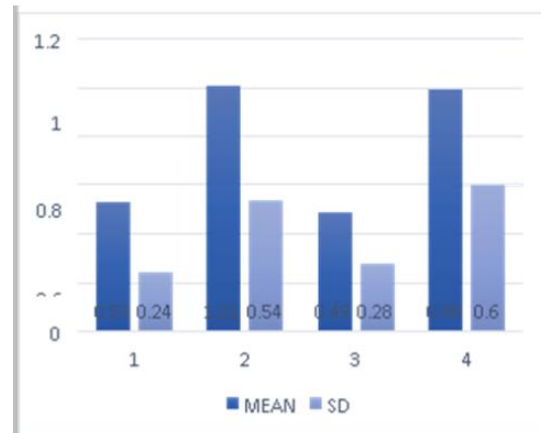


Fig: 2 Graph showing change in displacement between inferior angle of scapula

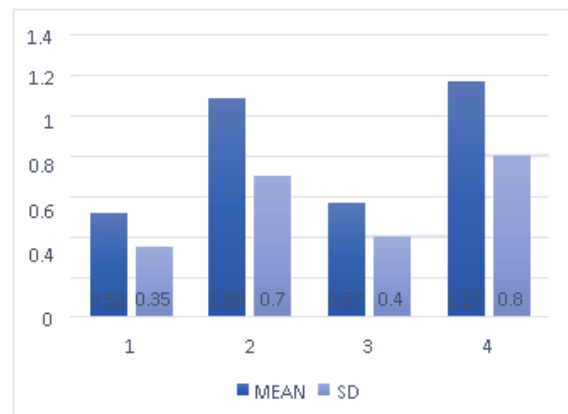


Fig: 3 Graph showing change in displacement between superior angle of scapula.



Conclusion:

In an individual with Periarthritis shoulder, the scapula demonstrated more asymmetry in superior and inferior 0-90 degree when compared to non-dominant side using modified scapular slide test.

Restoring altered kinematics and managing scapular asymmetry may be accepted as one of the goals of shoulder rehabilitation in individual with frozen shoulder.

The findings of the study indicated our knowledge and understanding of scapular alterations in participant with Periarthritis shoulder, creating biomechanical considerations for shoulder assessment and rehabilitation.

Discussion:

This study provides information about describing the scapular kinematic alterations and scapular asymmetry in participants with frozen shoulder who have been suffering from unilateral shoulder pain at their dominant arm.

We found that there were more asymmetries present in superior and inferior measurement (0-90 degree) of involved shoulder than the non-dominant side in participants with frozen shoulder.

There are several possible mechanisms that may result in scapular kinematic alterations, such as altered scapular muscle activation, soft tissue tightness, or posture (Ludewig and Reynolds, 2009).⁵

One or many of these factors may be involved in the Periarthritis shoulder. Kibler noted a difference of greater than 1.0 cm in side-to-side measurements of scapular distance associated with the presence of shoulder pathology or micro trauma, pain, and decreased shoulder function.⁸

If the scapula is abnormally mobile, the origin and insertion points of the muscles may be reserved so that the distal ends of the muscles are more stable and less force is developed.

In addition, the more the scapula slides laterally, the shorter the muscle fibers will become, thereby altering the length-tension curve and making muscles less efficient in the eccentric or concentric work situation.¹¹

Our findings proved that there were scapular alterations in superior and inferior portion of scapula between 0-90 degrees in dominant arm.

Limitations of the study:

The Limitation of this Study is a small sample size for a limited duration.

Future research:

Further studies can be done to determine their effects on recovery in patient with frozen shoulder based on the interventions used in this study.

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