P-ISSN: 2394-1685
E-ISSN: 2394-1693
Impact Factor (ISRA): 5.38
IJPESH 2021; 8(5): 11-16

www.kheljournal.com
Received: 07-07-2021
Accepted: 09-08-2021

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A study to assess the effectiveness of muscle energy technique with sleeper stretch on posterior shoulder tightness in tennis players

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DOI: https://doi.org/10.22271/kheljournal.2021.v8.i5a.2213

Abstract
The objective of this study was to assess the effectiveness of muscle energy technique with sleeper stretch on posterior shoulder tightness in tennis players. The study was conducted on 50 tennis players with posterior shoulder tightness by using GIRD (Gleno-humeral internal rotation deficit) criteria and the subjects fulfilling the inclusion and exclusion criteria were included in the study. All subjects were evaluated for the range of motion of shoulder joint using a goniometer and SPADI scale was used to measure pain and disability index of the shoulder joint. The results showed the statistically significant ($p < 0.001$) improvement in range of motion of the shoulder joint and SPADI scores from pre to post intervention in tennis players. This study provides insight into the effectiveness of muscle energy technique and sleeper stretch for increasing shoulder range of motion and decreasing pain and disability in the shoulder joint. More specifically, the muscle energy technique and sleeper stretch resulted in significant increase in shoulder internal rotation in the dominant arm of tennis players.

Keywords: posterior shoulder tightness, shoulder range of motion, muscle energy technique, sleeper stretch

1. Introduction
The overhead throwing is an extremely challenging situation in sports medicine due to the high forces, repetitive nature, and extreme ranges of motion observed during the throwing motion. The cumulative micro traumatic stresses placed on the athlete's shoulder joint complex challenges the physiologic limits of the surrounding tissues and often compromises the static stabilizers of the joint, leading to shoulder instability in these athletes [1]. Overhead activities can be termed as movements that require repetitive motions with the arm in at least 90 degrees of forward flexion or abduction or a combination of the two. Athletes participating in activities such as swimming, tennis or throwing sports are likely to have repetitive trauma to the shoulder based on the frequency related to the age of the athlete and level of competition. They usually present with hyperlaxity of the glenohumeral joint due to an increased anterior laxity of shoulder capsule, required for performance of overhead actions in the sports leading to compensatory tightness of the posterior capsule [2].
Athletes who participate in overhead sports activities requiring ballistic shoulder rotation like in the baseball, softball, tennis, volleyball present with posterior shoulder tightness.[3] Also in an individual, non-contact sport like badminton requires a combination of jumps, lunges, quick changes in direction and rapid arm movements from a wide variety of postural positions. During such movements, the body may be exposed to various forms of injuries [4].
Tennis is considered a low risk sport compared with many other sports. Shoulder pain and impingement of the rotator cuff caused by anterior instability of the shoulder joint are frequent problems for the athletes engaged in overhead motion. Painful shoulder conditions have been studied in tennis, baseball and swimming [5].
Research and clinical observations have shown that posterior shoulder tightness leads to various kinematic alterations, like decreased shoulder internal rotation, horizontal adduction, abduction, flexion and increased external rotation.

These alterations is linked to bony and soft tissue adaptations resulting from the large rotational and distractive forces acting on the glenohumeral joint during the throwing motion. These vulnerability of the shoulder during repetitive overhead motions results in soft tissue microtrauma leading to shoulder lesions [6].

Posterior shoulder tightness of the shoulder has been suggested as one of the causative factor for shoulder impingement syndrome, labral lesions & cuff pathology. The abnormal humeral head motion can result in a decrease in the subacromial space during overhead activities leading to compression of tissues in that region which can ultimately manifest as a SICK scapula (scapular malposition, inferio-medial angle scapular winging, coracoid tenderness & scapular dyskinesis). It is also suggested that contracture of the posterior- inferior glenohumeral capsule, evidenced by a lack of internal rotation with the arm abducted to 90°, is an essential cause of superior labral lesions [7].

In order to rehabilitate athletes with disorders associated with posterior shoulder tightness, lengthening of soft tissues in the posterior aspect of the shoulder is essential to ensure proper shoulder range of motion, kinematics and kinetics [3].

Stretching exercises are regularly included in warm up and cool down of all physical activities as a standard practice for all levels of competitive or recreational sports [8]. Physicians, physiotherapists and trainers recommend stretching in order to enhance performance and prevent injuries as stretching are believed to improve flexibility. The neuromuscular mechanisms of reflex inhibition of the Golgi tendon organ and lengthening of the musculotendinous unit is believed to increase overall performance in a desired sport or activity [3].

The sleeper stretches can be performed as self-stretching by the athlete, but when the athletes perform these stretches independently on the field as a warm-up or cool-down routine, the stretch will not be effective because the scapula is not stabilized and therefore the stretch is imparted to the scapula-thoracic tissues as well as tissues crossing the gleno-humeral joint [7].

Muscle Energy Technique (MET) is a form of a manual therapy which uses a muscles own energy in the form of gentle isometric contractions to relax the muscles via autogenic or reciprocal inhibition, to lengthen the muscle. As compared to static passive stretching, MET is based on the two concepts of autogenic inhibition and reciprocal inhibition. If a sub-maximal contraction of the muscle is followed by stretching of the same muscle it is known as autogenic inhibition MET, and if a submaximal contraction of a muscle is followed by stretching of the opposite muscle it is known as reciprocal inhibition MET [9].

Literature has established the efficacy of sleeper stretch and Muscle Energy Technique independently over the routinely used techniques like cross body stretch and towel stretch. However, this study is done to assess the effect of sleeper stretch and MET on improving shoulder range of motion in posterior shoulder tightness in tennis players.

2. Materials and Methods

- Goniometer
- Treatment table

2.1 Intervention

Group consists of 50 tennis players from various tennis academies in Bangalore. Subjects fulfilling GIRD (Glenohumeral internal rotation deficit) criteria were included in the study. The subjects were treated with Muscle Energy Technique and sleeper stretch for 3 days per week for 4 weeks.

2.2 Treatment Procedure

Muscle energy technique for glenohumeral joint horizontal abductors: Subject is positioned in supine lying therapist stabilizes the lateral border of the scapula then passively adduct the arm until the first barrier to motion is felt by applying pressure to the distal humerus and stretch is applied for 3 seconds. Subject is then instructed to horizontally adduct the arm at 25% of their maximal effort while the examiner applies manual resistance at the distal humerus in order to create an isometric contraction that lasts for upto 5 seconds. The examiner then brings the subjects arm in the position of horizontal adduction in order to provide an active assistive stretch for 3 seconds. This protocol was performed for a total of 3 repetitions [9].

Muscle energy technique for gleno-humeral joint external rotators: Subject is positioned in supine lying with the humerus supported and the shoulder and elbow in 90 degrees of abduction and flexion, then the humerus is passively moved into internal rotation till the first barrier of motion is reached. The participant was then instructed to perform a 5 second isometric contraction of approximately 25%maximal effort in the direction of external rotation against an opposing force provided by the examiner at the distal forearm. Then subject was instructed to internally rotate the arm towards the ground for a 30 second active assisted stretch. This protocol was performed for a total of 3 repetitions [9].

Sleeper stretch: The subjects were instructed to perform sleeper stretches as demonstrated by therapist. Subject is positioned in side lying on the throwing side with stabilization of scapula against the treatment table. The sleeper stretch performed by lying on the side to be stretched by elevating the humerus to 90 degrees on the supported surface with the lateral border of the scapula positioned firmly against the treatment table then passively internally rotating the humerus with the opposite arm. Stretch will be performed for 3 to 5 repetitions. Each repetition was held for 30 second with 30 seconds of rest period between trials [7].

2.3 Outcome Measures

The outcomes of this study were assessed with shoulder range of motion for adduction and internal rotation using a goniometer and Shoulder pain and disability index. The Shoulder Pain and Disability Index (SPADI) is a reliable and valid shoulder-specific measure that consists of two dimensions, one for the pain consisting of five questions regarding the severity of an individual's pain and the other for functional activities assessed with eight questions designed to measure the degree of difficulty an individual has with various activities of daily living that require upper-extremity use [10]

The outcome measures like Range of motion and Shoulder pain and disability index were taken pre - intervention on 1st day of 1st week and post intervention on 3rd day of 3rd week

3. Results and Discussion

Data was analyzed using the statistical package SPSS19.0 (SPSS Inc., Chicago, IL) and level of significance was set at $p < 0.05$. Descriptive statistics was used to find out the mean and standard deviation and for analysis within the groups t-test and Chi squared test was used.

Table 1: Change in Shoulder Adduction

Descriptive statistics	Change in shoulder adduction
Mean	11.34
S.D.	2.847
Number	50
Maximum	20
Minimum	6
Range	14

Table 1 shows the change in shoulder adduction with a mean of 11.34 and standard deviation of 2.84 and graphically represented in the below Figure 1.

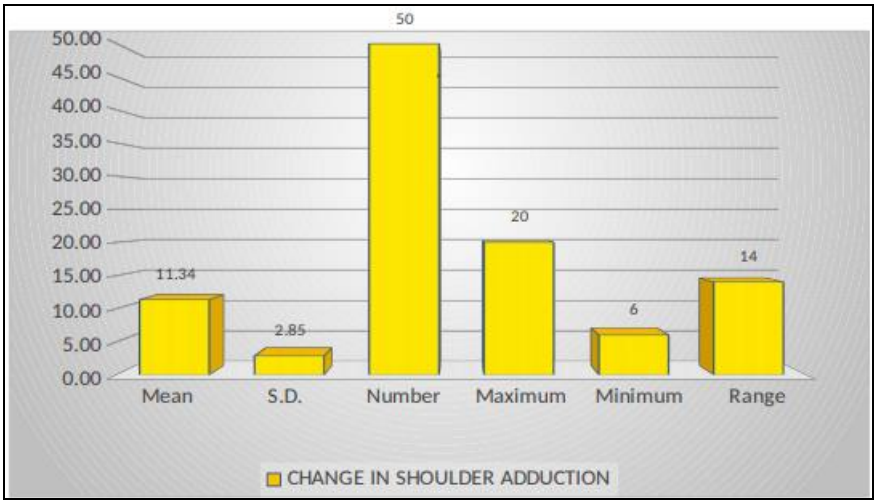

Fig 1: Graphical Representation of Change in Shoulder Adduction

Table 2: Change in Shoulder Internal Rotation

Descriptive statistics	Change in shoulder internal rotation
Mean	13.30
S.D.	4.215
Number	50
Maximum	26
Minimum	5
Range	21

Table 2 shows the change in shoulder internal rotation with a mean of 13.30 and standard deviation of 4.215 and graphically represented in the below Figure 2

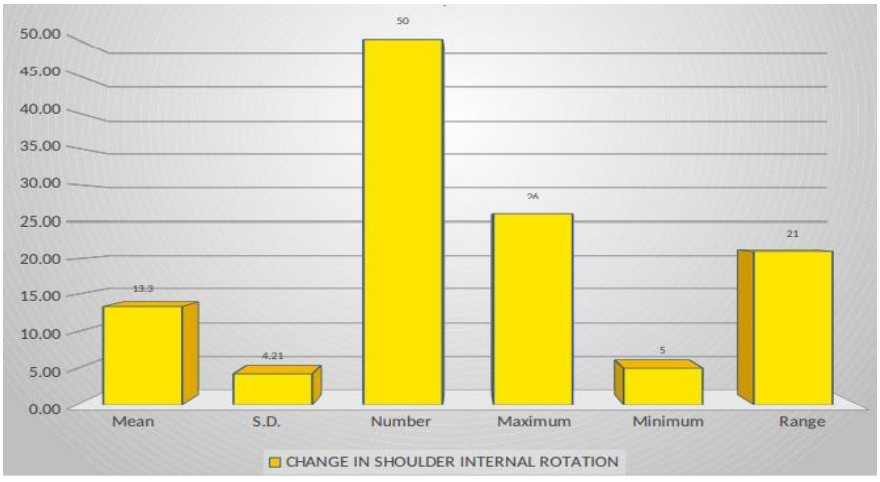

Fig 2: Graphical Representation of Change in Shoulder Internal Rotation

Table 3: Within Group - Shoulder Adduction

Paired T Test	Within Group Shoulder adduction	
.	PRE	POST
Mean	162.90	174.26
S.D.	5.839	3.795
Number	50	50
Maximum	173	179
Minimum	150	165
Range	23	14
Mean Difference	11.36	
SE	0.405	
CI Upper	12.174	
CI Lower	10.546	
Paired T Test	28.061	
P value	0.0000	
Table Value at 0.05	2.01	
Result	**Significant**	

Table 3 shows within the group pre and post intervention Shoulder Adduction with a mean of 162.90 pre and 174.20 post with a standard deviation of 5.839 pre and 3.795 post, hence showing significant improvements in Shoulder adduction within the group. The same is graphically represented in the below Figure 4

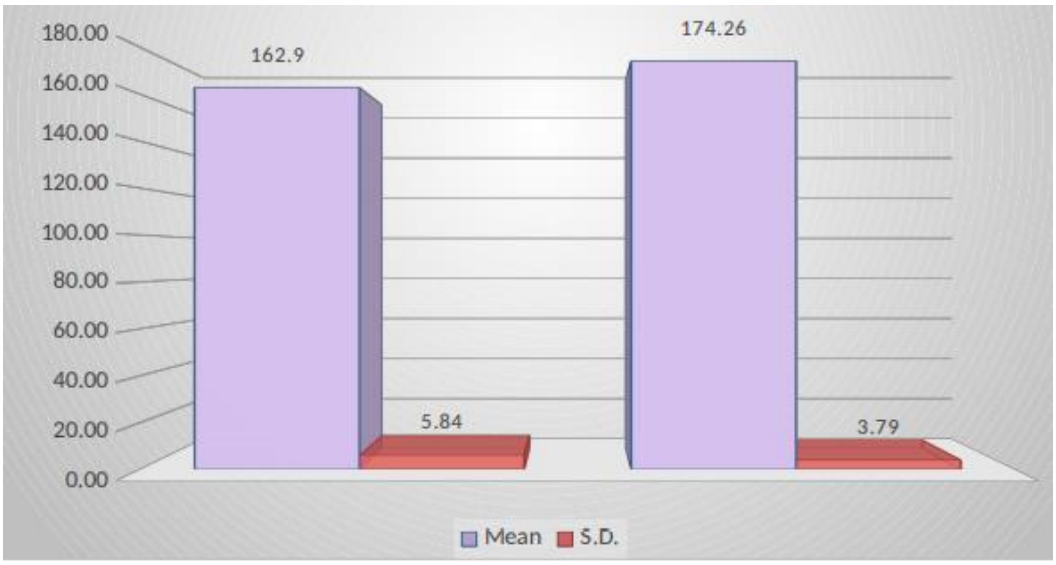

Fig 4: Graphical Representation of Pre and Post intervention within Group - Shoulder Adduction

Table 4: Pre and Post Intervention within Group - Shoulder Internal Rotation

Paired T Test	Within Group Shoulder internal rotation	
	PRE	POST
Mean	64.42	77.94
S.D.	5.566	4.783
Number	50	50
Maximum	77	89
Minimum	50	69
Range	27	20
Mean Difference	13.52	
SE	0.531	
CI Upper	14.587	
CI Lower	12.453	
Paired T Test	25.467	
P value	0.0000	
Table Value at 0.05	2.01	
Result	Significant	

Table 4 shows within the group pre and post intervention Shoulder Internal Rotation with a mean of 64.42 pre and 77.94 post with a standard deviation of 5.566 pre and 4.783 post, hence showing significant improvements in Shoulder abduction within the group. The same is graphically represented in the below Figure 5

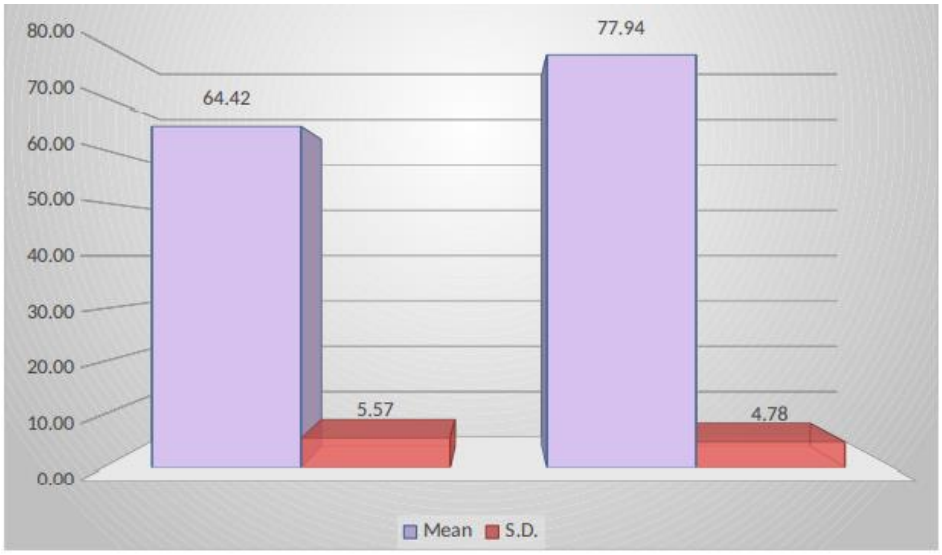

Fig 5: Graphical Representation of Pre and Post intervention within Group- Shoulder Internal Rotation

Table 5: Pre and Post Intervention within Group- SPADI

Paired T Test	Within Group SPADI	
.	PRE	POST
Mean	80.32	54.48
S.D.	6.867	7.662
Number	50	50
Maximum	93	70
Minimum	63	30
Range	30	40
Mean Difference	25.84	
SE	0.684	
CI Upper	27.215	
CI Lower	24.465	
Paired T Test	37.770	
P value	0.0000	
Table Value at 0.05	2.01	
Result	**Significant**	

Table 5 shows significant difference regarding SPADI within a group pre and post intervention with a mean of 80.32 pre and 54.48 post with a standard deviation of 6.87 pre and 7.66 post, hence showing significant improvements in reducing the pain. The same is graphically represented in the below Figure 6

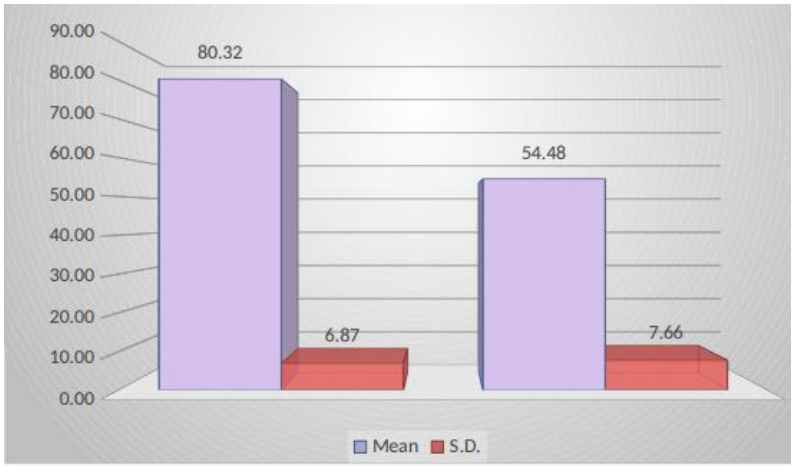

Fig 6: Graphical Representation of Pre and Post Intervention within Group- SPADI

4. Discussion

The present study was conducted to analyze the effect of muscle energy technique with sleeper stretch on posterior shoulder tightness in tennis players. Research and clinical observations have shown that posterior shoulder tightness results in various kinematic alterations and due to the vulnerability of the shoulder during repetitive overhead motions, such as throwing, even small changes in range of motion may lead to soft tissue microtrauma resulting in shoulder injuries.

The result of this study conducted on 50 tennis players, depicts the importance of techniques like muscle energy technique and sleeper stretch to reduce pain and also to improve the shoulder range of motion as the aim of this study was to assess the effect of sleeper stretch and muscle energy technique in improving the internal rotation of shoulder joint leading to posterior shoulder tightness among tennis players.

The results showed significant improvement of shoulder internal rotation and adduction in the group, as the mean of internal rotation range of motion in group was 64.42 and post intervention it was 77.94 and the mean of adduction range of motion in group prior to intervention was 162.90 and post-intervention it was 174.26.

Although there are studies to support the merits of sleeper stretch used in throwing athletes, there is no much information regarding the combined effects of sleeper stretching technique and muscle energy technique on tennis players. As stated earlier, the athletes can independently apply sleeper stretch and may produce positive results. Therefore, clinicians should teach their subjects and athletes proper motion, stabilization, and force application for optimal benefits. However, as this is a 3 week study it does not confirm whether these stretches produce a long-term effect. Also further studies should focus on measuring posterior shoulder motion in a variety of populations, of various performance levels and ages including overhead athletes and nonathletic populations

5. Conclusion

This was a single group study conducted on 50 tennis players at various tennis academies in Bangalore to assess the immediate effect of sleeper stretch with muscle energy technique in improving the internal rotation and adduction range of motion in players with posterior shoulder tightness. Study subjects were evaluated before undertaking their assigned stretching sessions for their shoulder adduction and internal rotation ROM. Post intervention measurements of shoulder adduction and internal rotation were done immediately following the stretching sessions of 3 days per week for three weeks. The results showed the statistically significant ($p < 0.001$) improvement in range of motion of the shoulder joint and SPADI scores from pre to post intervention in tennis players

This study provides insight into the effectiveness of muscle energy technique with sleeper stretch for increasing shoulder range of motion and in reducing pain and disability of the shoulder because of the large forces and repetition of the throwing motion, posterior shoulder tightness is a common trait in tennis players. These stretching techniques may prevent or limit the posterior capsule tightness and the combined muscle energy technique with sleeper stretch resulted in significant increase in shoulder internal rotation in the dominant arm of tennis players.

6. References

1. Michael M Reinold, Alan S Curtis. Micro instability of the shoulder in the overhead athlete. The International Journal of Sports Physical Therapy 2013;8(5):601-616.
2. Brentz Brotzman S. Shoulder injuries. In: Kevin E. Wilk (ed.). Clinical Orthopaedic Rehabilitation. 2nd Edition, Philadelphia: Mosby– An Affiliate of Elsevier Science; 2003, 159-161.
3. Michael Williams, LanisaHarveson, Jason Melton, Ashley Delobel, Emilio J Puentedura. The Acute Effects of Upper Extremity Stretching on Throwing Velocity in Baseball Throwers. Journal of Sports Medicine 2013, 1-7
4. Shariff AH, George J, Ramlan AA. Musculoskeletal injuries among Malaysian badminton players. Singapore Med J. 2009;50(11):1095-1097.
5. Fahlström M, Yeap JS, Alfredson H, Söderman K. Shoulder pain – a common problem in world-class badminton players. Scandinavian Journal of Medicine &Science in Sports 2006;16(3):168-173.
6. Kevin G Laudner, Robert C Sipes, James T Wilson. The Acute Effects of Sleeper Stretches on Shoulder Range of Motion. Journal of Athletic Training 2008;43(4):359-363.
7. Jakson K Joseph, Sunish AV. The immediate effect of sleeper stretches on shoulder range of motion in volleyball players. Innovative Journal of Medical and Health Science 2013;3(4):171-176
8. Muttalib A, Zaidi M, Kho C. A Survey on Common Injuries in Recreational Badminton Players. Malaysian Orthopaedic Journal 2009;3(2):8-10.
9. Reed ML, Begalle RL, Laudner KG. Acute effects of muscle energy technique and joint mobilization on shoulder tightness in youth throwing athletes: a randomized controlled trial. International journal of sports physical therapy 2018;13(6):1024.
10. Breckenridge JD, McAuley JH. Shoulder Pain and Disability Index (SPADI). J Physiotherapy 2011;57(3):197.