



Effect Of Muscle Energy Technique On Shoulder Pain, Upper And Lower Trapezius And Serratus Anterior Muscle Strength Along With Scapular Position In Elite Lawn Tennis Players With Scapular Dyskinesia

-AN EXPERIMENTAL STUDY

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ABSTRACT

Introduction: The structure of a racquet sport lawn tennis is defined by quick, high intensity movement. The scapular dyskinesia, or modification in powerful scapular control is seen in 61% of the above competitors. Scapular dyskinesia is mostly seen in overhead or throwing athletes due to their heavy demand of work on unilateral upper extremity function. Over 50% of top lawn tennis players report having experienced shoulder pain at some point, with 20% indicating that the issue is still present. In this study it has been also demonstrated that muscle energy technique shows effect on shoulder pain, scapular muscle strength and in scapular position.

Aim: To investigate the effect of muscle energy technique on shoulder pain, scapular muscle strength and scapular position Sangli district.

Objective: The shoulder pain is assessed using VAS scale, MMT has been used to assess scapular muscle strength and LSST for scapular position.

Study Design: Experimental study.

Materials and Methods : 42 Elite players both males and females playing, Lawn tennis are included in this study after taking their consent and evaluating them according to the inclusion criteria. The shoulder pain is

assessed using VAS scale, MMT has been used to assess scapular muscle strength and LSST for scapular position.

Results: The MET group demonstrated significant improvements in shoulder pain reduction ($p < 0.001$), increased muscle strength ($p < 0.001$), and better scapular positioning ($p < 0.001$).

Conclusion: The results concluded that Muscle energy technique appears to be effective for reducing shoulder pain, improving muscle strength and scapular position in elite lawn tennis player with scapular dyskinesia.

INTRODUCTION:

Scapular dyskinesia, commonly known as sick scapula syndrome, is characterized by a change or deviation from the scapula's typical resting or active position during shoulder movement. Most people's repetitive use of the shoulder causes aberrant movements of the scapula. Scapular Dyskinesia is defined as a non-specific response to a painful shoulder condition[1]

Scapular dyskinesia can also be classified as: Type 1 or inferior angle prominence, which is associated with excessive anterior tilt due to weakness of lower trapezius and serratus anterior; Type 2 or medial border prominence, which is associated with excessive scapular internal rotation due to weakness of trapezius and rhomboids; and Type 3 or superior border prominence, which is associated with elevated scapula [2]

The muscles Involved in Scapular dyskinesia are serratus anterior, trapezius and rhomboids. In type 1 there is weakness of lower trapezius and serratus anterior and in type 2 is present due to weakness of trapezius and rhomboids.[3]

Scapular dyskinesia is associated with modifications in interscapular muscle activation. Patients with impingement and shoulder pain have reduced activation and strength of the serratus anterior, which contributes to the loss of posterior tilt and upward rotation that results in dyskinesia. Furthermore, there may be a change in the upper trapezius/lower trapezius force couple. The lower trapezius may activate later, changing the scapular upward rotation and posterior tilt.[2]

The structure of the racquet sport lawn tennis Is defined by quick, high-intensity movements. Scapular dyskinesia, which is linked to shoulder injuries because of a functional impairment, modifies the normal scapular role during coupled scapulohumeral motions. One aspect that may be the only cause of SD is muscle imbalance brought on by overuse and instability. Top athletes complain of shoulder pain that interferes with competitiveness and training.[2]

Scapular Dyskinesia, or modifications in powerful scapular control is seen in 61% of the above competitors. Scapular Dyskinesia is mostly seen in overhead or throwing athletes due to their heavy demand of work on unilateral upper extremity function.[1]

Over 50% of top lawn tennis players report having experienced shoulder pain at some point, with 20% indicating that the issue is still present. The majority still do play through the discomfort, but note how it affects daily routines, competition, and training. Various shoulder kinematics were observed for both the non-dominant and dominant shoulders.[1]

It has been demonstrated that muscle energy method (MET) is beneficial in improving the upper extremity's range of motion (ROM) and posture, as well as the cervical and thoracic further and more, in those without symptoms, the lumbar spine and those with symptoms.

It has been also demonstrated that muscle energy technique shows effect on pain, scapular muscle strength and in scapular position.

NEED FOR STUDY:

- Previous articles have also shown the prevalence of scapular dyskinesia in lawn tennis players, which is 43% among 100 participants.
- Previous studies have shown that there is significant effect of MET on muscle strength and range of motion in young swimmers with sick scapular syndrome.
- According to previous studies done on overhead athletes, Scapular dyskinesia can affect the players performance as leads to increase in pain by 43% and also cause further complication if not treated.
- Lawn tennis is a unilateral overhead sport which is not deeply evaluated yet and there are very less/ no studies done to see the effect of MET technique on shoulder pain, muscle strength and scapular position in elite lawn tennis player with scapular dyskinesia.
- Hence the need of study is to find out the effect of MET technique on shoulder pain, muscle strength and scapular position in elite lawn tennis player with scapular dyskinesia.

Methods:

This experimental study included 42 elite lawn tennis players (aged 18-29 years) from Sangli and Miraj districts. Participants met the following inclusion criteria:

Shoulder pain ranging from mild to moderate (VAS: 1-6).

Reduced trapezius and serratus anterior muscle strength (MRC scale: 2-3).

Medial scapular border prominence (>1.5 cm on LSST).

Regular training sessions (≥ 4 times per week).

Exclusion criteria included musculoskeletal injuries (SLAP tears, fractures), neurological conditions, and comorbidities (diabetes, hypertension).

OUTCOME MEASURES:

1. Visual Analog Scale (VAS): Used to assess shoulder pain (0=no pain, 10=worst pain).

2. Manual Muscle Test (MMT): Assessed strength of upper trapezius, lower trapezius, and serratus anterior muscles.

3. Lateral Scapular Slide Test (LSST): Evaluated scapular positioning in three arm positions.

a. Arms relaxed at the sides

b. Arms medially rotated and abducted to 45°

c. Arms medially rotated and abducted to 90°

MATERIALS:

- Consent form
- Evaluation sheet
- Vas scale
- Measuring tape
- Plinth/Mat
- Stationary Material

PROTOCOL:

Participants underwent MET intervention for two weeks, with three sessions per week. Each session focused on muscle activation and stretching of the upper trapezius, lower trapezius, and serratus anterior muscles. The intervention included the following steps:

1.MET for Upper Trapezius:

Participants lay on their back (supine position).

The therapist applied resistance to shoulder elevation, and the participant contracted the upper trapezius for 10 seconds.

After the contraction, the participant relaxed for 30 seconds, and the therapist gently stretched the muscle further.

2.MET for Lower Trapezius:

Participants lay on their stomach (prone position) with their arms abducted to 120°.

They performed horizontal abduction against resistance for 5 seconds.

After relaxation, the therapist applied a passive scapular retraction stretch.

3.MET for Serratus Anterior:

Participants lay on their back (supine position) with the affected arm flexed to 90°.

The therapist applied pressure at the rib angle, while the participant performed resisted protraction for 5 seconds.

The therapist then guided the scapula into a corrected position during relaxation.



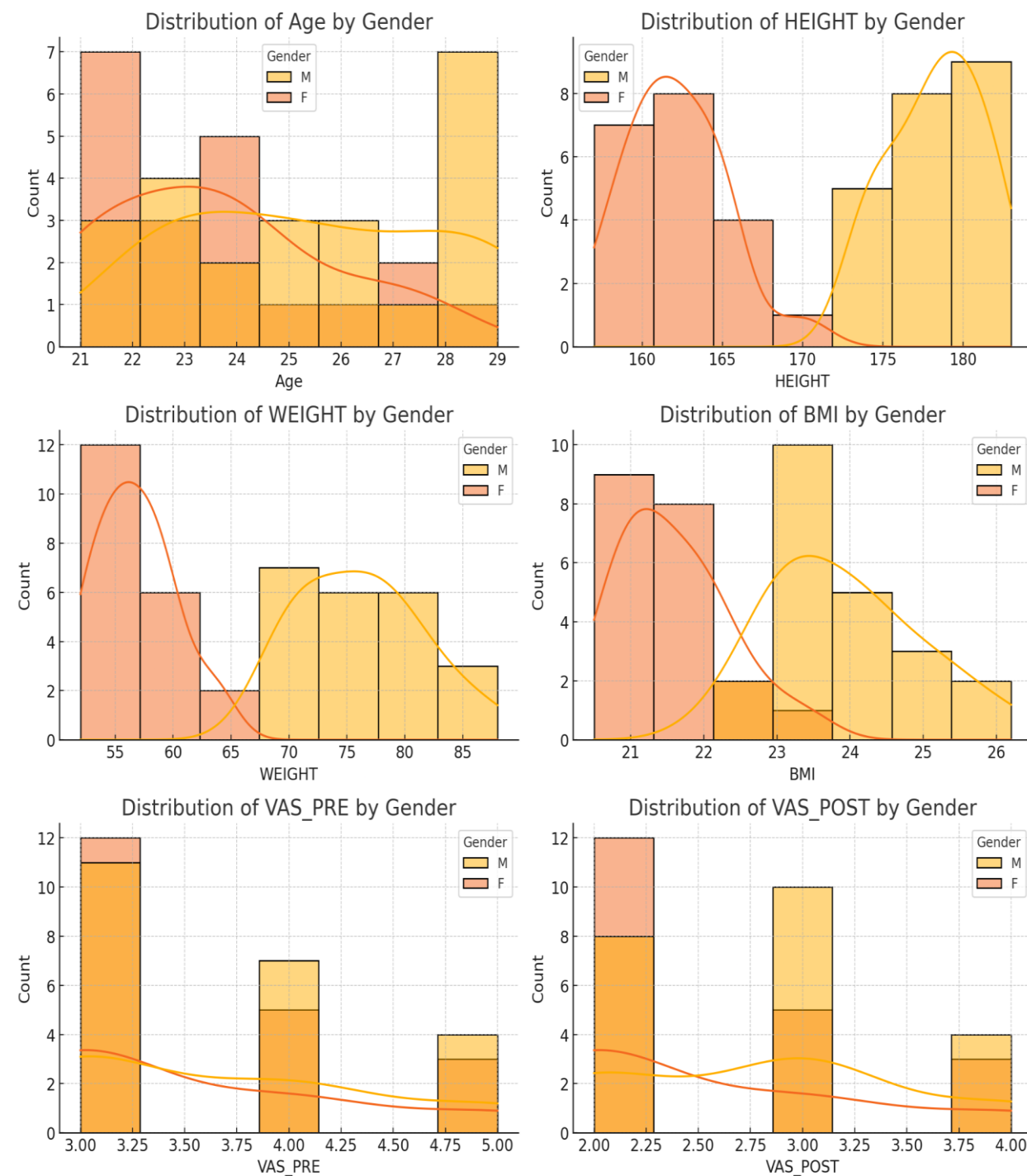
MET FOR UPPER TRAPEZIUS MUSCLE



MET FOR LOWER TRAPEZUS MUSCLE



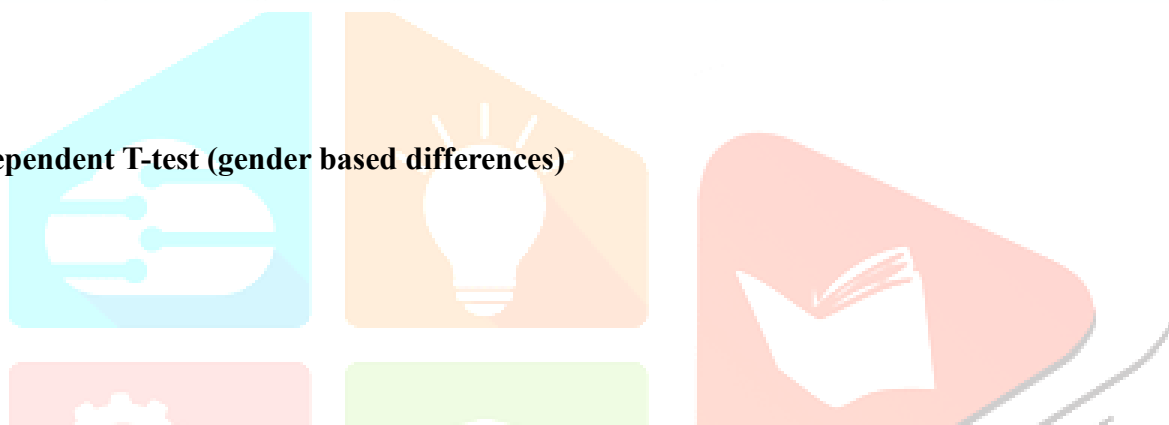
MET FOR SERRATUS ANTERIOR MUSCLE

STATISTICAL ANALYSIS:**1. Distribution of plots of variables**

2.Descriptive statistics

Variable	Count	Mean	Std Dev	Min	25%	50%	75%	Max
HEIGHT	42	170.6	8.7	157	162.0	173.5	178.8	183
WEIGHT	42	67.0	10.8	52	57.0	68.5	76.0	88
BMI	42	22.8	1.5	20.5	21.5	22.9	23.7	26.2
MMT_Pre	35	2.0	0.0	2	2.0	2	2.0	2
MMT_POST	42	3.0	0.0	3	3.0	3	3.0	3
VAS_PRE	42	3.6	0.8	3	3.0	3	4.0	5
VAS_POST	42	2.7	0.7	2	2.0	3	3.0	4
LSST_PRE	43	1.6	0.1	1.5	1.5	1.5	1.5	1.8
LSST_POST	43	1.1	0.2	1	1.0	1	1.1	1.5
Age	43	24.6	2.5	21	23.0	24	26.5	29

3.Independent T-test (gender based differences)

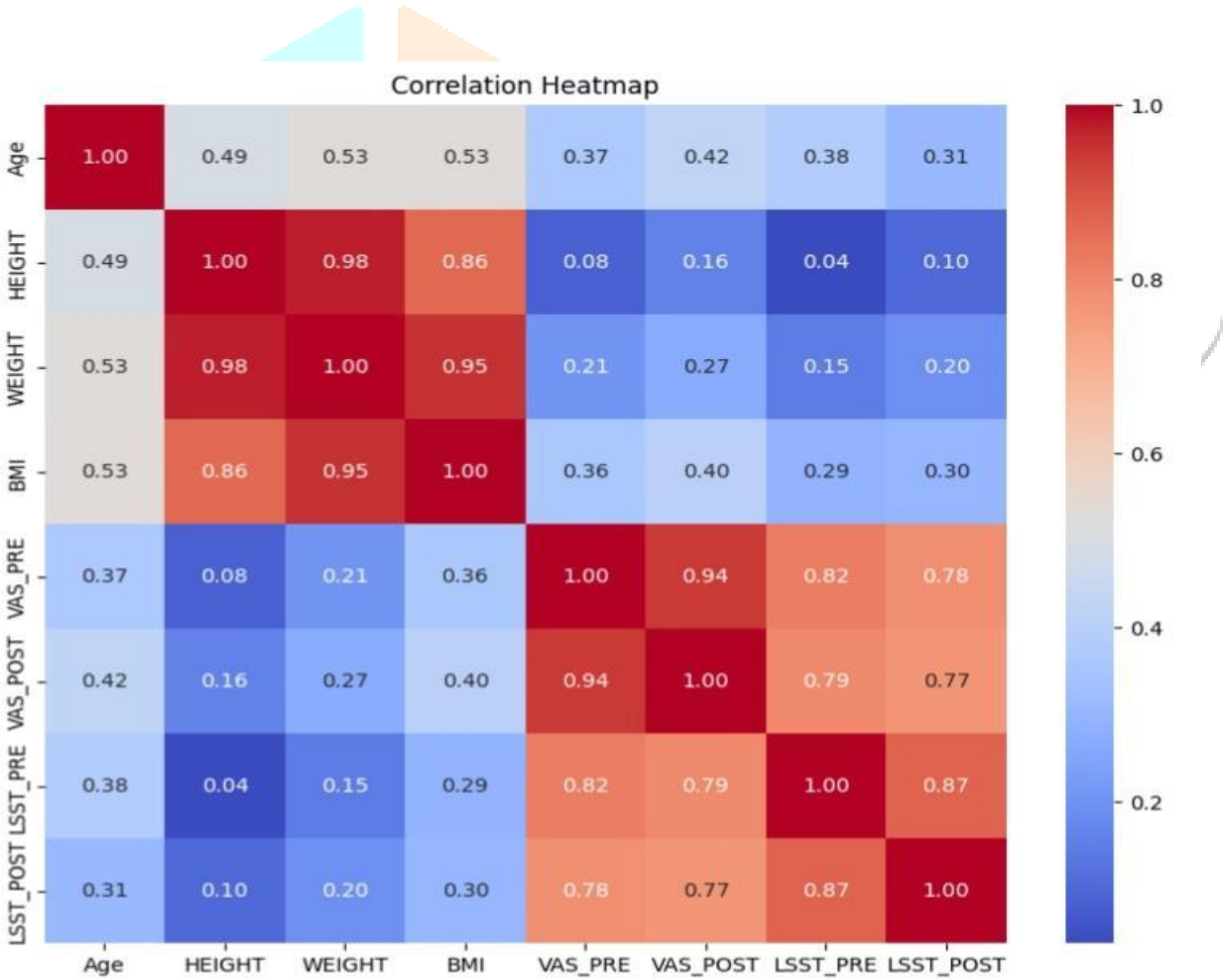


Variable	T-Statistic	P-Value	Interpretation
HEIGHT	17.5	0.00	Males significantly taller than females
WEIGHT	14.0	0.00	Males significantly heavier than females
BMI	8.4	0.00	Males have significantly higher BMI
VAS_PRE	0.6	0.58	No significant difference in pre-treatment pain
VAS_POST	1.2	0.25	No significant difference in post-treatment pain
LSST_PRE	0.5	0.64	No significant difference in pre-treatment stability
LSST_POST	0.6	0.54	No significant difference in post-treatment stability

4.Paired T-test(pre vs post comparison)

Comparison	T-Statistic	P-Value	Interpretation
MMT_Pre vs. MMT_POST	-∞	0.00	Significant improvement, but potential data issue (identical values)
VAS_PRE vs. VAS_POST	23.09	0.00	Significant reduction in pain
LSST_PRE vs. LSST_POST	37.48	0.00	Significant improvement in LSST

5.CORRELATION ANALYSIS



RESULT:

The study analyzed the effectiveness of Muscle Energy Technique (MET) in improving shoulder pain, muscle strength, and scapular positioning among elite lawn tennis players with scapular dyskinesia. The results were obtained by comparing pre- and post-intervention values using Visual Analog Scale (VAS), Manual Muscle Test (MMT), and Lateral Scapular Slide Test (LSST).

The Visual Analog Scale (VAS) was used to measure pain intensity before and after the intervention. The pre-treatment VAS score was 3.6 ± 0.8 , indicating mild to moderate pain. After two weeks of MET intervention, the post-treatment VAS score decreased to 2.7 ± 0.7 , showing a significant reduction in pain levels ($p < 0.001$).

This reduction suggests that MET effectively alleviated muscle tension and improved scapular mechanics, leading to decreased stress on the shoulder joint. Participants reported improved comfort during training sessions, and many experienced greater ease in overhead movements, which are crucial in lawn tennis.

The Manual Muscle Test (MMT) was performed to assess the strength of the upper trapezius, lower trapezius, and serratus anterior muscles. The pre-treatment MMT score was 2.0 ± 0.0 , which indicated muscle weakness in the affected muscles. After the MET intervention, the MMT score improved to 3.0 ± 0.0 ($p < 0.001$).

This improvement suggests that MET effectively enhanced neuromuscular activation and strength in the scapular stabilizers. Increased muscle strength contributes to better control of scapular movement, preventing excessive stress on the shoulder joint and reducing the risk of further injuries.

The Lateral Scapular Slide Test (LSST) was used to assess changes in scapular position in three different arm positions. The pre-treatment LSST score was 1.6 ± 0.1 cm, indicating scapular asymmetry and dysfunction. After the MET intervention, the post-treatment LSST score improved to 1.1 ± 0.2 cm ($p < 0.001$), reflecting significant correction in scapular alignment.

This suggests that MET contributed to improved scapular control and stability, which is critical for optimal shoulder biomechanics in overhead sports. Participants showed better postural alignment and smoother scapular movement during functional activities such as serving and volleying in lawn tennis.

CONCLUSION:

The results concluded that Muscle energy technique appears to be effective for reducing shoulder pain, improving muscle strength and scapular position in elite lawn tennis player with scapular dyskinesia.

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