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EFFECTS OF MUSCLE ENERGY TECHNIQUE ON SHOULDER DYSFUNCTION AMONG THE COLLEGIATE SWIMMERS WITH SCAPULAR DYSKINESIA

S. Karthikeyan MPT
(Ph.D.) Research Scholar, School of physiotherapy, VISTAS

D. Roshini Pretshia
MPT 2nd year, School of Physiotherapy, VISTAS

Dr. P. Senthilselvam
Ph.D. Head of the department, School of physiotherapy, VISTAS

Dr. M S Sundaram
Ph. D, Professor, School of physiotherapy, VISTAS

Dr. P AppaRao
Ph.D., Professor and Head of the department, Swatantara institute of Physiotherapy and Rehabilitation.

Dr. C Siva Kumar
Ph.D. Professor and principal, PPG College of Physiotherapy

ABSTRACT

BACKGROUND OF THE STUDY: Scapular Dyskinesia is one of the common problem in overhead athletes. Among swimmers scapular dyskinesis is the common risk factor causing shoulder pain. This is due to altered kinematics from the normal resting or active position of scapula during coupled Scapulohumeral movements. Scapula dyskinesia is associated with impingement syndrome among swimmers. Swimmers with scapular dyskinesia presents shoulder dysfunction and muscle imbalance resulting in decreased performance. Muscle energy technique is a manual therapy approach involves increase in the muscle length thereby promoting mobility in the joint.

METHODS: The study included 40 subjects with all types of scapula dyskinesia and randomly allocated into Group A and Group B. In Group A (n=20) swimmers were applied muscle energy technique for 6 weeks and Group B (n=20) swimmers were treated with conventional therapy for 6 weeks. The outcome measure used in this study were Pectoralis minor index, range of motion and shoulder pain and disability index.

RESULTS: The results of the present study were analysed using Mann Whitney U Test and Wilcoxon signed rank test. The result shows statistically significant improvement 'p' value < 0.05. Statistical analysis of the data revealed that among the group comparison the muscle energy

technique group shows statistically significant difference in pain, range of motion and shoulder pain and disability index.

CONCLUSION: The present study concluded that Muscle energy technique shows significant improvement on pain, range of motion and shoulder function among collegiate swimmers with scapula dyskinesia.

KEY WORDS: Muscle energy technique, Scapular dyskinesia, Shoulder pain disability Index, Pectoralis minor index, goniometer.

INTRODUCTION

The Glenohumeral joint is one of the complex joints which contributes more amount of mobility and the joint act as a bridge between axial skeleton and the upper extremity. The stability of the joint depends on the bony shapes, soft tissue surrounding the joint and contribution from the muscles. Swimming is a sport which is unique in its mechanism and there are different types of swim strokes like freestyle, butterfly, breast stroke and backstroke. In each type of swimming the shoulders are used to propel the weight of the body, against the resistance of water. Free style stroke is the common and the fastest stroke practised among swimmers in India. Maximal mobility and flexibility are required for the most efficient swimming performance. Swimmers performs repeated revolutions of the Glenohumeral joint which causes stress to the joint and the structures surrounding it. Majority of the swimmers with shoulder pain has been reported and the underlying cause of pain and loss of function may be also from the scapula dysfunction.

Most of the population

Scapula mobility is one of the prerequisites for proper shoulder motions and function. Scapula plays an important role in Glenohumeral kinematics and if any altered scapula motion may lead to Glenohumeral dysfunction. The altered position and the affected kinematics of the scapula will be termed as Scapula dyskinesis. Scapula dyskinesis can be of various types. The dorsal prominence observed over the inferior angle of scapula that is known as Type –1 scapula dyskinesis. The dorsal prominence of the entire medial border is known as Type -2 scapula dyskinesis. The elevated superior border of scapula represents Type – 3 scapular dyskinesis. The symmetrical position of the bilateral scapula is known as Type – 4 scapula dyskinesis. The prevalence of scapular dyskinesis was significantly higher in overhead athletes (61%) compared with non-overhead athletes (33%). The scapular muscle group consisting of the Trapezius, Serratus anterior (SA), Pectoralis minor (PM), Pectoralis major, Levator scapulae (LS), Rhomboid muscle (RM), and Teres major (TM), is mainly responsible for scapular movement and dynamic stabilization of the scapula. An optimal interaction between these muscles is needed to provide stability and mobility of the scapula both at rest and during shoulder movements. These altered muscle activation patterns are associated with altered scapular kinematics, including reduced scapular upward rotation, external rotation and posterior tilt. The previous studies shows that scapular dyskinesis are more common among overhead athletes.

The swimming is a recreational and therapeutic sport which involves more amount of overhead activities. Swimmers undergoes more amount of shoulder revolutions in which glenohumeral joint is undergoing repeated stress. The anterior Glenohumeral muscles are prone to tightness and one of the common muscle goes for shorteningwill be pectoralis minor as this is the only muscle that has attachments with scapula and the ribs. The pectoralis minor length can be measured by inch tape and the pectoralis minor index can be calculated based on the swimmer's height. This is used as a common outcome measure for pectoralis minor length.

Muscle energy technique is a manual therapy intervention which incorporates stretch and a counter force from the patient when the therapist applies resistance. Here the range of motion is increased from the restricted barrier into a new joint range thereby increases mobility in the joint. This technique is used to lengthen the tight fascia and the muscle which in turn increases the joint range of motion. The extensibility of the muscles can be increased by two concepts which is known as post isometric relaxation and reciprocal inhibition.

The present study focused on the collegiate swimmers whose muscle imbalance are addressed and lengthen the tight anterior musculature thereby increasing the mobility of scapula and Glenohumeral joint which improves shoulder function among the swimmers.

METHODOLOGY

The study was conducted in the School of physiotherapy, Vels institute of science technology and advanced studies. The study followed a Quasi-experimental design with 40 samples and informed consent obtained from each participant. The ethical approval obtained from the university campus and the college students who met the inclusion criteria were taken for the study. The study included the male students who participate in district level competitions or undergo swimming training regularly as a recreational activity. Also scapula slide test have been performed and the sample who are positive for the test and type-1 scapula dyskinesis swimmers alone were taken for the study. The swimmers with recent fractures, injuries and any other abnormalities in shoulder were excluded.

MUSCLE ENERGY TECHNIQUE - SHORT PECTORALIS MINOR

GROUP A EXPERIMENTAL GROUP

The swimmers are positioned in side lying position on the table. For a short pectoralis minor muscle the patient arm are lightly folded across the lower thorax, with the side to be treated uppermost and the therapist standing behind the patient, close to the edge of the table The therapist threads his caudal arm anterior to the patient's elbow so that his caudal hand rests on pectoralis minor, with his other hand on the scapula. Posteriorly directed pressure is gradually applied to the shoulder to induce retraction, coupled with a guiding effort from the hand on the scapula. If the shoulder cannot be easily placed in its correct anatomical position the patient is asked to lightly push the shoulder anteriorly against the retraining hand of the therapist for 90 seconds. After this slack is taken out of the muscle and a small degree of stretch is induced for between 5 and 30 seconds. Repeat once for twice more. Along with Muscle energy technique application posterior

muscle strengthening given to the scapular muscles. The intervention was applied 3 times a week for 4 weeks duration.

GROUP B CONTROL GROUP

Group B received conventional therapy for 3 times for a week for 4 weeks.

- Upper trapezius stretches
- Posterior shoulder stretch
- Pectoralis minor stretch
- Lateral rotation strengthening exercise
- Scapular retraction strengthening exercise
- Serratus anterior strengthening exercise
- Abduction strengthening exercise

FIGURE: 01

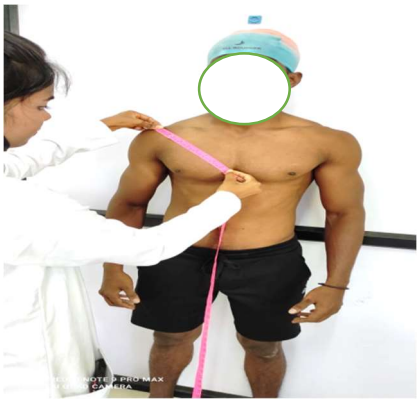


FIGURE: 02

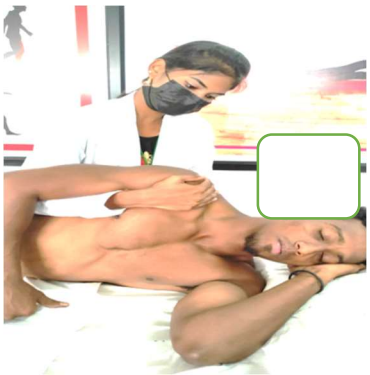


FIGURE: 03

FIGURE: 04

DATA ANALYSIS

Descriptive statistical analysis was carried out for the present study using Mann Whitney U test and Wilcoxon Signed rank test. The mean and standard deviation are represented in the tables.

Significance assessed at 5% of confidence interval with p value was set at alpha =0.05 (p value <0.05).

T-Test

EXPERIMENTAL GROUP

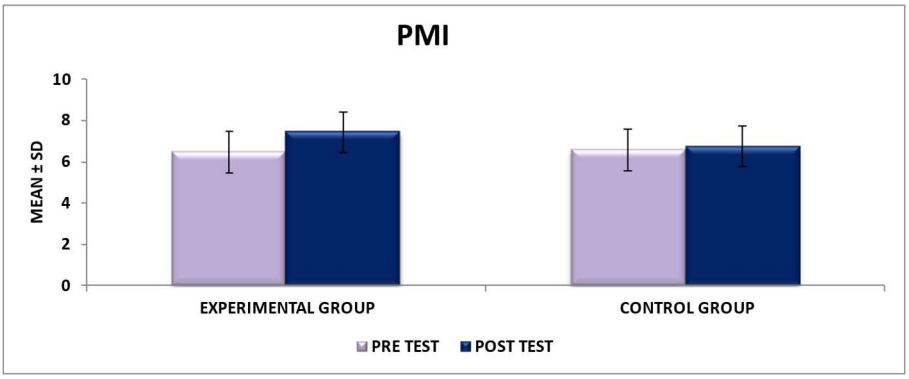
GROUP A	MEAN	STANDARD DEVIATION	T VALUE	P VALUE
PMI PRE TEST POST TEST	0.9765	0.299	14.604	0.000
ABDUCTION PRE TEST POST TEST	16.500	7.797	9.464	0.000
ER PRE TEST POST TEST	26.500	5.643	21.002	0.000
SPADI (%) PRE TEST POST TEST	47.050	4.224	49.818	0.000

CONTROL GROUP

GROUP B	MEAN	STANDARD DEVIATION	T VALUE	P VALUE
PMI PRE TEST POST TEST	0.1740	0.524	1.483	0.154
ABDUCTION PRE TEST POST TEST	7.250	3.432	9.448	0.000
ER PRE TEST POST TEST	11.500	3.285	15.657	0.000
SPADI(%) PRE TEST POST TEST	28.850	3.990	32.332	0.000

Graph: 01

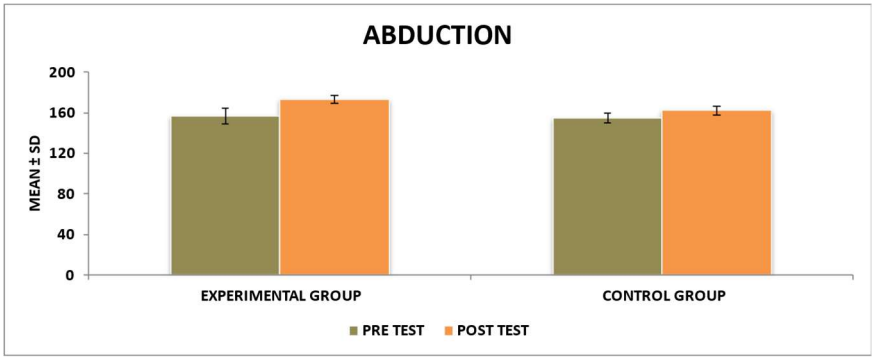
PMI-PECTORALIS MINOR INDEX PRE &POST TEST



	Pre test Mean	Post test Mean	Pre test S.D	Post test S.D
Experimental group	6.456	7.4325	0.3140	0.0441
Control group	6.5785	6.7525	40.371	0.3931

Graph: 02

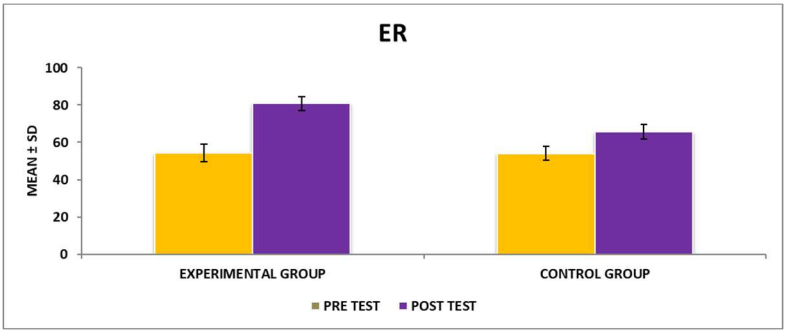
ABDUCTION PRE &POST TEST



	Pre test Mean	Post test Mean	Pre test S.D	Post test S.D
Experimental group	156.75	173.25	7.993	3.726
Control group	155.00	162.25	4.588	4.128

Graph: 03

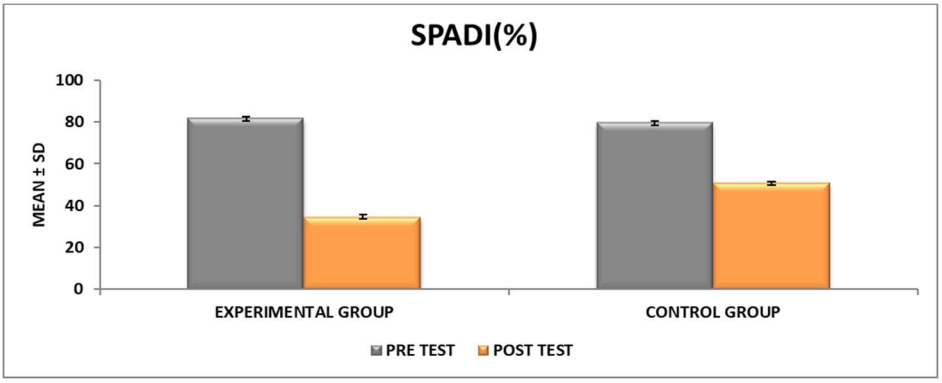
EXTERNAL ROTATION PRE AND POST



	Pre test Mean	Post test Mean	Pre test S.D	Post test S.D
Experimental group	54.25	80.75	4.667	3.726
Control group	54	65.5	3.839	3.94

Graph: 04

SPADI PRE AND POST TEST



	Pre test Mean	Post test Mean	Pre test S.D	Post test S.D
Experimental group	54.25	80.75	4.667	3.726
Control group	54	65.5	3.839	3.94

RESULTS

The results of the present study were analysed using Mann Whitney U Test and Wilcoxon signed rank test. The result shows statistically significant improvement 'p' value < 0.05. Statistical analysis of the data revealed that group comparison shows statistically significant difference in Pectoralis minor index, range of motion and shoulder pain and disability index.

PMI – PECTORALIS MINOR INDEX

The mean and standard deviation of Pectoralis minor index were 0.976 and 0.299 with 'p' value 0.000 which shows significant improvement in length of Pectoralis minor from inter group analysis 'p' value <0.005.

ABDUCTION

The mean and standard deviation of abduction were 16.500 and 7.797 with 'p' value 0.000 which shows significant improvement in abduction range of motion from inter group analysis 'p' value <0.005.

EXTERNAL ROTATION

The mean and standard deviation of external rotation were 26.500 and 5.643 with 'p' value 0.000 which shows significant improvement in increasing range of motion from inter group analysis 'p' value <0.005.

SPADI

The mean and standard deviation of Pectoralis minor index were 47.050 and 4.224 with 'p' value 0.000 which shows significant improvement in shoulder function group analysis 'p' value <0.005.

DISCUSSION

The present study included 40 samples and the purpose of research is to identify the effectiveness of muscle energy technique on shoulder dysfunction among the collegiate swimmers with type I scapular dyskinesis.

Scapula play a vital role in dynamic stability on Glenohumeral joint during shoulder movements. The upward rotation movement of the scapula completes the Glenohumeral abduction and flexion. Once there is muscle imbalance in the anterior musculature the scapula mobility is markedly affected. There will be asymmetry in the motion of scapula and that reduces the stability of scapula with Glenohumeral motions. Dyskinesia of scapula leads to loss of stability and altered kinematics during shoulder motions.

Swimmers are at high prevalence of overuse injuries and that causes anterior musculature hypertrophy in turn leading to shortening of the anterior muscles. The Pectoralis minor muscle is one of the short muscle that connects the scapula and thorax which usually goes for tightness among competitive swimmers. This study deals with scapular positioning which is measured by using the Lateral Scapular Slide Test (LSST) which is tested in three positions with arms in resting position, arms on waist and arms abducted. Thomas Curtis et al in his study concluded that the lateral scapula slide test is highly reliable test to identify the scapula dyskinesis.

The previous study done by Kevin G. et al., (2015) identified that tightness of the anterior musculature like Pectoralis minor muscle has been associated with the development of shoulder pain among competitive female swimmers and can lead to forward shoulder posture.

Applying Muscle energy technique may assist in preventingand treating various shoulder injuries associated with forward shoulder posture and Pectoralis minor tightness among swimmers.
Muscle energy technique is a form of soft tissue or joint mobilization technique that works on the musculoskeletal dysfunction. Post isometric relaxation was applied to the Pectoralis minor muscle and the muscle works on the principle of contract-relax where the muscle is to be stretched is contracted and then relaxed where this contraction of agonist actively moves the joint into increased range of motion. This lengthening of the muscle will directly increase the scapular mobility and improves the upward rotation along with Glenohumeral joint.
The results of the present study shows increased in the Glenohumeral range of motion through scapular mobility on increasing the extensibility of Pectoralis minor muscle. The swimmers shown reduction in pain and also decreased functional disability. This in turn increases the performance of the swimmers. In the present study muscle energy technique along with posterior scapular strengthening was found to be effective than the conventional method treatment. Muscle energy technique received by group A shows significant effect by improving shoulder Function and shortened Pectoralis minor length.

CONCLUSION

Weakness of the scapulothoracic muscles potentially leads to abnormal positioning of the scapula disturbances in scapulohumeral rhythm and generalized shoulder complex dysfunction. The serratus anterior and lower trapezius are commonly weak or inhibited muscles of the scapulothoracic joint that may lead to abnormal movement. The serratus anterior and lower trapezius contributes to the acromial elevation. When the force couple is altered, movement (16)
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