

SCAPULAR STABILIZATION EXERCISE AND TAPPING FOR SCAPULAR DYSKINESIA FOR AMATEUR SWIMMERS- AN EXPERIMENTAL DESIGN

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Abstract

Background: Overhead athletes are more likely to develop scapular dyskinesia (SD). Scapular dyskinesia is altered scapular position and motion, it's found to be to reason for shoulder injuries although swimming is considered an overhead activity, effectiveness of physiotherapy interventions on these athletes is limited. **Aim:** The intention of this study was to see how scapular stabilization exercises and tap affected amateur swimmers with scapular dyskinesia. **Methodology:** It's a quasi- experimental study involving 30 amateur swimmers who had scapular dyskinesia, were selected by using the lateral scapular slide test. They were divided into two groups, Group A (Experimental Group) and Group B (Control Group). Group A received a Scapular Stabilization exercise and tapping, while Group B received strengthening exercises for a 4-week duration. **Outcome measures:** Range of Motion (ROM), Shoulder Pain and Disability Index (SPADI). **Statistical analysis& Results:** The collected data was recorded and tabulated. The statistical package for social science (SPSS) version 21.7 was used to analysis the data. There was a significant improvement was noted in Group A when it was compared with Group B in terms of Range of Motion (ROM), Shoulder Pain and Disability Index (SPADI). **Conclusion:** Introducing Scapular Stabilization exercises and tapping as a treatment option will reduce scapular dyskinesia in amateur swimmers.

Keyword: Scapular dyskinesia, amateur swimmers, lateral scapular slide test, SPADI.

INTRODUCTION

Scapular dyskinesia is characterised as a shift in scapular posture and motion. A variety of factors can contribute to it, including bones (thoracic kyphosis or clavicle diseases), joint (instability or arthrosis), nervous system (cervical radiculopathy or nerve palsy), connective tissue (tightness or stiffness of the pectoralis minor and posterior capsule), and imbalances in muscles (ranging from the upper trapezius and serratus anterior). According to the standard classification, SD is divided into three categories: (Longo et al., 2020). Despite the fact that the data is in contradiction,

Scapular dyskinesia is defined as a change in the position and motion of the scapula. It can be caused by several factors: bone (thoracic kyphosis or clavicle diseases), joint (instability or arthrosis), nervous system (cervical radiculopathy or nerve palsy), soft tissue (tightness or stiffness of the pectoralis minor and posterior capsule), and muscular imbalance (between the upper trapezius and serratus anterior). SD is classified into three types based on the standard classification: posterior displacement from the posterior thorax of the inferior medial angle (type I), posterior displacement from the posterior thorax of the entire medial border of the scapula (type II), and early scapular elevation or excessive/insufficient scapular upward rotation (dysrhythmia) during dynamic observation (type III)¹ (Longo et al., 2020). Although the data is conflicting, Scapular dyskinesia could restrict subacromial space. Scapular dyskinesia

can also reduce rotator cuff strength, increase strain, and cause apoptotic changes in rotator cuff tenocytes. Rotator cuff weakness may impair motor control, leading to superior humeral head translation and additional mechanical erosion of the subacromial space structures² (Hickey et al., 2017).

Scapular dyskinesia occurs in 61% of overhead athletes, 33% of non-overhead athletes, and 67% - 100% of athletes with a shoulder injury or no symptoms. Swimming is an extremely competitive sport. Swimming is a popular sport among children and teenagers, and it needs repeated motions that put a strain on the shoulder complex. SD is an asymptomatic syndrome that affects 8.5% of elite young swimmers. Because swimming is repeated, changes in scapular kinematics and muscle activity might occur, predisposing the swimmer to shoulder discomfort.³ (Burn et al., 2016). Amateur swimmers may be more tolerant of discomfort when doing swimming exercises and are more likely to acquire shoulder problems due to overuse. Swimmers with SD have a different scapular orientation: they have more activation in the serratus anterior, middle, and lower trapezius muscles during arm elevation, abduction, and external rotation (ER)⁴ (Standoli et al., 2018).

Scapular dyskinesia is widely treated by physiotherapy treatment methods which includes variety of exercise therapy methods and electrotherapy also used reduce the pain which predisposed Scapular Dyskinesia. Exercise therapy – strengthening exercises, stretching exercises, resistance

exercises and theraband exercises etc. Maintaining and stabilizing the scapular position during the movement and in static position is a very important aspect of the rehabilitation program. According to the previous study, scapular stabilization exercises should be included in the therapy program since they improve mobility and functional gain in patients with scapular dyskinesia. Correcting scapular dyskinesia and the soft tissue alterations that accompany it is advised as an effective technique to injury prevention in overhead athletes (Tang et al., 2021). Previous studies are stating that tapping therapy had positive effects on scapular kinematics and it will improve scapular motions in both asymptomatic and symptomatic participants⁵ (Ozer et al., 2018). Previous research has shown that scapular stabilisation exercise or tapping therapy may improve scapular dyskinesia in overhead athletes, but there has been little data on the effects of scapular stabilisation exercise and tapping therapy on scapular dyskinesia in amateur swimmers, so this study was carried out. The study's goal is to determine the efficacy of scapular stabilization exercises and tapping therapy in amateur swimmers with scapular dyskinesia.

METHODOLOGY

This is the Quasi-experimental study design, Pre-test and Post-test type study. Cluster Sampling method was used to collect data. This study was conducted on Amateur swimmers with Scapula Dyskinesia in various Swimming schools in and around Puducherry. The inclusion criteria were Amateur swimmers in age between 18-25, both male and females & those who were selected in this study. Amateur with Scapular dyskinesia were added in this study confirmed by using Lateral Scapular Slide Test. The exclusion criteria were Swimmers who had a previous history of fracture around shoulder, recent soft tissue injuries around shoulder & who underwent recent surgeries around shoulder. Before starting the study the ethical approval was obtained from the institutional ethical committee. 30 participants were selected based upon the inclusion and exclusion criteria and they were allocated into two groups by convenience sampling method. Before the commencement of the study aim and procedure were explained and informed consent was obtained. The participants were then randomly allocated to two groups, i.e., Group A (Experimental group) and Group B (Control group).

OUTCOME MEASURES

1. Shoulder pain and disability index: The Self-Administered Shoulder Pain and Disability Index (SPADI) is a self-administered questionnaire with two dimensions: pain and functional activities. The pain dimension consists of five questions on a person's level of suffering. Functional activities are assessed using eight questions designed to determine an individual's level of difficulty with various daily activities requiring upper-extremity use.

2. Goniometry: Goniometry is a valid tool for assessing the Range of Motion. Here universal goniometer was used to measure the shoulder ROM.

INTERVENTION

In this study 30 participants were selected based upon the inclusion and exclusion criteria and they were allocated into two

groups by convenience sampling method. Before the commencement of the study aim and procedure were explained and informed consent was obtained. The participants were then randomly allocated to two groups, i.e., Group A (Experimental group) and Group B (Control group). Group A received a scapular stabilization exercise and Tapping, Group B received shoulder strengthening exercises.

Group A (experimental group):

Group A received a scapular stabilization exercise program and tapping therapy, which includes serratus anterior, middle and lower trapezius strengthening and pectoralis minor stretching exercise. Total duration of treatment was 30 minutes.

a. Serratus anterior strengthening

It started with active shoulder flexion up to 90 degrees then the participants ask to perform a scapular protraction and retraction exercises for 12 rep of 3 sets. This it was progressed into holding a elastic band in shoulder flexed position then ask the patient to perform a shoulder protraction and retraction training program.

b. Middle and lower trapezius strengthening

It started with participants in prone lying position then ask the participants to perform a prone "T" exercise for strengthening the middle trapezius and prone "Y" exercise to strengthening the lower trapezius muscles, then it was progressed into adding resistance in the hand. Both the exercise was performed 12 reps of 3 sets per session

c. Pectoralis minor stretching

It was performed in standing position, the affected arm positioned at wall with elbow flexion into 90°. Subject performs stretching with leaning forward then maintaining the position for 30 seconds. Intensity- It depends on the subjective feeling of the patient—the patient feels slightly tired and slightly shortness of breath. It was repeated for a 3 to 5 times.

d. Tapping for Scapular dyskinesia

In this study kinesio tape was used to maintaining the proper position and produces a sensory awareness. One strip was placed from the coracoid process, passing through the upper trapezius to the inferior angle of scapula, placed in the thoracic spine of scapula. Another one from the thoracic spine to the inferior border of the scapula, applying maximum tension from the inferior border of the scapula to the lateral area to improve the scapular upward rotation.

Group B (Control group):

Group B received a conventional strengthening exercise to scapular and shoulder musculature for 30 minutes duration. Which includes shoulder strengthening exercises and scapular strengthening exercises.

STATISTICAL ANALYSIS AND INTERPRETATION

Statistical package for Social Sciences (SPSS) was used to analyzing the data. Paired 't' test was used to analyze the Pre-test and Post-test values of each group and Unpaired 't' test was used to compare the Post-test values between the groups.

Table1: Comparison of Pre- test and Post-test values of group A (Experimental Group)

Variables		Pre- test		Post test		't' value	'p' value
		Mean	S.D	Mean	S.D		
Shoulder ROM	External Rotation	57.67	2.58	73.00	2.54	-46.00	0.000
	Internal rotation	51.67	4.88	76.00	4.71	-36.50	0.000
	Abduction	133.67	9.54	154.00	4.71	-9.70	0.000
SPADI		67.21	6.32	36.21	2.55	14.49	0.000

Table1-Shows that there was increasing in shoulder ROM in post-test of group A when its was compared with pre-test ($p < 0.05$). And there was reduction in Shoulder and Pain Disability Index in Post-test values when it was compared with Pre- test ($p < 0.05$).

Table 2: Comparison of Pre- test and Post-test values of group B (Control Group)

Variables		Pre- test		Post test		't' value	'p' value
		Mean	S.D	Mean	S.D		
Shoulder ROM	External Rotation	55.00	5.00	59.67	4.42	-14.00	0.000
	Internal rotation	49.00	3.87	53.33	3.09	-6.50	0.000
	Abduction	138.67	6.11	143.33	6.17	-6.09	0.000
SPADI		79.24	3.28	65.43	4.47	9.33	0.000

Table2-Shows that there was increasing in shoulder ROM in post-test of group B when its was compared with pre-test ($p < 0.05$) . And there was reduction in Shoulder and Pain Disability Index in Post-test values when it was compared with Pre- test ($p < 0.05$).

Table 3: Comparison of Post-test values of Group A 5(Experimental group) & Group B (Control Group).

Variables		Post- test Group A		Post-test Group B		't' value	'p' value
		Mean	S.D	Mean	S.D		
Shoulder ROM	External Rotation	73.00	2.54	59.67	4.42	22.63	0.000
	Internal rotation	76.00	4.71	53.33	3.09	21.21	0.000
	Abduction	154.00	4.71	143.33	6.17	7.02	0.000
SPADI		36.21	2.55	65.43	4.47	-11.90	0.000

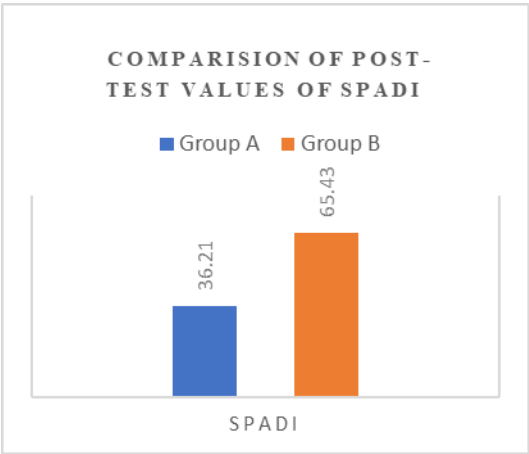
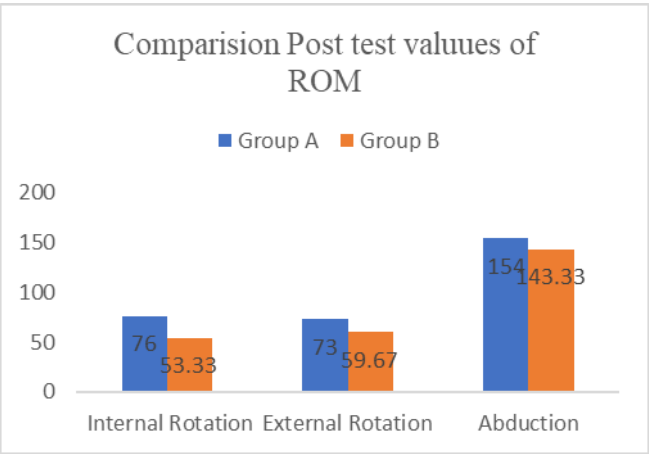


Table 3 & Graph shows that there was significant improvement in ROM (Internal Rotation, External Rotation, and Abduction) in Post- test of Group A when it was compared with Post-test values of Group B. Table 3 & Graph shows that there was significant reduction in Pain and Disability of group A than

Group B, it was observed in Shoulder Pain and Disability Index questionnaire.

DISCUSSION

The results of this study demonstrate a noteworthy reduction in pain and disability, coupled with an improvement in range of motion (ROM) for both groups. However, the study specifically highlights the efficacy of scapular stabilization exercises and taping for amateur swimmers with scapular dyskinesia, revealing that Treatment A (Experimental Group) is significantly more effective than Treatment B (Control Group) in terms of the mean reduction in the Shoulder Pain and Disability Index (SPADI) and ROM.

The study underscores the significance of addressing weaknesses in the scapulothoracic muscles, which can lead to abnormal scapular positioning, disturbances in scapula-humeral rhythm, and overall dysfunction in the shoulder complex. Notably, the serratus anterior and lower trapezius muscles, commonly weakened in scapulothoracic joint issues, play a crucial role in acromial elevation. Alterations in the force couple of these muscles can result in abnormal movement patterns.

The findings align with previous research by Ozdemir et al.,⁷ suggesting that incorporating scapular stabilization exercises into physiotherapy can effectively improve pain and functional outcomes in chronic shoulder pain with scapular dyskinesia. Addressing scapular dyskinesia requires a holistic approach to correct overall body biomechanics rather than focusing solely on the localized pain.

Moreover, the study draws attention to the benefits of tape application in reducing pain and expediting recovery in rotator cuff injuries. The tape not only aids in pain reduction but also contributes to enhanced shoulder movement recovery, increased functionality, and decreased disability.

In conclusion, the present study emphasizes the positive impact of a comprehensive approach involving scapular stabilization exercises and taping for managing scapular dyskinesia in amateur swimmers. The combined treatment demonstrates substantial benefits in reducing pain and disability while improving shoulder ROM. Implementing such interventions in routine exercise programs not only aids in preventing shoulder injuries but also mitigates the progression of scapular dyskinesia in this specific population.^{8,9} This holistic strategy offers a promising avenue for enhancing the well-being and performance of amateur swimmers dealing with scapular dyskinesia.

LIMITATION AND RECOMMENDATION

This study was only conducted among small sample size and samples was only selected from city. Further studies are recommended to determine the effectiveness of program in various sports group people. Any other manual therapy techniques are not added in this study, so adding the manual therapy technique along with this program may be beneficial. So it's give the future direction for further research

CONCLUSION

Result of this study shows that combined intervention of stabilization exercises and tapping therapy will produces the significant effect in scapular dyskinesia in amateur swimmers than conventional treatment. So adding this intervention in rehabilitation protocol will provide positive effect on scapular dyskinesia and prevent further shoulder injuries.

All authors have contributed significantly towards the article
Financial aid – no external sources

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Ethical approval – Yes

Patient consent – Yes