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TheraBand Exercises

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Effect of TheraBand Exercises on Rounded Shoulders Associated with Pulmonary Capacity in Young Adults: A Pre-Post Intervention Study

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Effect of TheraBand Exercises on Rounded Shoulders Associated with Pulmonary Capacity in Young Adults: A Pre-Post Intervention Study

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Abstract

Background: A Rounded Shoulder Posture (RSP) is characterized by physiological changes in the breathing pattern of individuals. This leads to an imbalance in scapular kinematics which is crucial for overall health. Thera band training helps to improve muscle strength and flexibility of muscle. This study aims to assess the effect of Thera band exercise training on rounded shoulders association with pulmonary capacity in young adults.

Methodology: Twenty-three participants with RSP, participated in three weeks of the Thera band training program with progression in protocol consisting of 4 sessions per week. The pulmonary capacity was assessed with the help of a Spirometer and the rounded shoulder was assessed by using inch tape. Descriptive statistics analyzed demographic data and pre/post-treatment measurements. Statistical analysis included the paired t-test.

Result: The results showed improvement in rounded shoulder posture and pulmonary capacity after 3 weeks of the exercise training program. For rounded shoulder Thera band exercises showed statistically significant values ($p < 0.001$). There's a slight increase in pulmonary capacity but statistically not significant ($p > 0.001$).

Conclusion: This study concludes that Thera band exercises can effectively improve rounded shoulder posture in young adults.

Keywords: Rounded shoulder posture, pulmonary capacity, Thera band, PFT.

Introduction

Rounded shoulder posture (RSP) is indicated by altered scapular kinematics (scapular protraction, downward rotation, and anterior tilt), as well as increased cervical lordosis and upper thoracic kyphosis.¹ With a frequency of about 60% in the

general population, it is regarded as an inherent risk factor in the population with shoulder discomfort. According to reports, 78% of persons who experience pain at work have extended shoulders.² The shoulder posture developed from a prolonged, anteriorly inclined, internally rotated scapula and the shortness

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of the pectoralis minor muscles shows RSP, which can be defined by the acromion forward displacement in respect to the 7th cervical spinous process.³ RSP can result in shoulder pain and dysfunction because of altered scapular kinematics and muscle activity, consequently placing increased stress on the shoulder.⁴ The habitual slouched posture which is seen in everyday tasks can lead to RSP, it has also been identified as a major factor that may lead to upper quarter pain. RSP is also linked to improper postural habits, repeated overhead motions, carrying a backpack, mouth breathing, computer use, and extended study sessions.⁵ Muscle imbalance and altered scapular kinematics put the shoulder under more strain, which can result in shoulder discomfort, dysfunction, and neuromuscular symptoms.² There are different techniques to evaluate posture such as using a plumb line, photography, radiography, Flexi curve, moiré topography, and electromagnetic tracking device. Electromyography is commonly used to study changes in muscle activity resulting from postural changes.⁶

The ideal respiratory function is made possible by the position of the neck and shoulder muscles, which directly support breathing.⁷ This relationship between vital capacity and posture has previously been explored. Due to the posture-related tasks of respiratory muscles, any variation from the norm makes it more difficult for these muscles to efficiently carry out their duties. Previous studies it, has shown that lung capacity might fluctuate somewhat with changes in position.⁸ The most often used objective functional respiratory assessments are pulmonary function tests (PFTs), which include spirometry, diffusion capacity, and lung volumes. The study of the features of the lung may be improved.⁹

Elastic resistance training (ERT) has gained popularity since the 1980s and is now widely used as a clinical tool. It provides several benefits, such as improved functional capacity, increased muscle activation, enhanced strength and endurance, better body composition, and improved quality of life. In ERT, elastic bands provide a combination of resistance and elasticity, allowing for adjustable

resistance velocity and intensity. They offer a safe and convenient way to boost muscular strength, flexibility, and balance in people of all ages and genders, individuals with or without disorders can benefit from exercising with elastic bands.^{10,11} However, there is a dearth of literature, and the effectiveness of Thera band training in improving pulmonary capacity remains unclear. Therefore, the study is to ascertain the effect of Thera Band exercises on rounded shoulders in pulmonary capacity in young adults.

In previous studies, Tae-Woon Kim investigates the effect of the elastic band exercise program on the posture of subjects with rounded shoulder and forward head postures. The findings of this study suggest that the elastic band exercise program is effective for lengthening the pectoralis major and correcting rounded shoulder and forward head posture.¹²

Materials and Methodology

The study was an experimental pre-post type of investigation for 2 months of the study duration, which was from May 2023 to July 2023, and was carried out at the Srinivas Institute of Physiotherapy in Pandeshwar, Mangalore. 23 young adults in this study, both male and female with ages varying between 18-23 years were included in this study. The three-week intervention for four days per week was the Thera band training program and pectoralis minor and major muscle stretching. Different resistance Thera bands were utilized for each week of the exercise program: red for the first week, green for the second, and blue for the third. Subjects who signed the consent forms were enrolled in this study. Approval for this study was given by an ethical committee of the Srinivas Institute of Physiotherapy, Pandeshwar, Mangalore.

History of cardiac surgeries, orthopedic conditions (Ex: shoulder impingement, rotator cuff injury), neuromuscular conditions (Ex: paresthesia, neuritis, nerve compression), respiratory conditions (Ex: asthma, pneumonia, dysphagia, breathlessness), recent fractures of rib, scapula, shoulder, clavicle

were part of the exclusion criteria of the study.

Participants were positioned in a supine (lying on their back) posture and asked to relax. The distance from the table to the highest point of their shoulder was measured. If this distance exceeded 2.5 centimeters, they were classified as having rounded shoulders. For the spirometry procedure, participants were seated, and a nose clip was applied. Using a portable spirometer (SP10 - RMS HELIOS 702 PFT) pulmonary capacity was assessed. The recorded pulmonary parameters included Forced Vital Capacity (FVC), Forced Expiratory Volume in one second (FEV1), and Peak Expiratory Flow Rate (PEFR). Before the actual measurement, participants were explained the procedure and instructed to take a few normal breaths, inhale deeply, and then exhale forcefully until their lungs were fully emptied.⁸ To ensure accuracy, three attempts were made to familiarize participants with the process, and the mean value of these attempts, all the pre/post-treatment data were measured and recorded with descriptive statistics used in the SPSS software 24.0 version for statistical analysis.

Results and Discussion

The study included 23 participants who met the inclusion criteria. The pre-assessment revealed that the arithmetic mean for the rounded shoulder was 12.461 for the right side and 12.096 for the left side. After the intervention, the arithmetic mean for the rounded shoulder decreased to 11.460 for the right side and 10.99 for the left side. The study demonstrated a significant improvement in rounded shoulder posture on both sides ($p < 0.01$) following the exercise protocol. The improvement in rounded shoulder posture is particularly important in alleviating shoulder pain, dysfunction, and neuromuscular symptoms that can arise from altered scapular kinematics and muscle activity. By restoring proper scapular positioning, the humeral head can be centered in the glenoid fossa, providing a stable foundation for shoulder motion and optimizing shoulder joint function.

Our study found a slight improvement in forced expiratory volume in one second (FEV1) and forced

vital capacity (FVC) after the three-week intervention, although the changes were not statistically significant ($p > 0.05$). However, the short duration of the intervention may not have been sufficient to produce significant changes in pulmonary capacity.

Previous research has explored the relationship between rounded shoulders and pulmonary capacity, and it has been suggested that any deviation from normal posture can affect the efficiency of respiratory muscles. In individuals with rounded shoulders, the respiratory muscles, particularly the diaphragm and intercostal muscles, may not function optimally. Various studies showed that stabilization exercises and stretching exercises help improve rounded shoulder posture¹². In general, respiration is an activity influenced by complex biomechanical factors and the stability of the cervical and thoracic regions of the spine is of great importance to smooth respiratory function¹³.

The study's important finding is that Thera Band exercises can effectively enhance muscular strength and flexibility in different populations. The elastic bands provide both resistance and elasticity, enabling adjustable intensity and velocity of resistance during exercise. Thera Bands are also convenient, affordable, and safe to use, making them an attractive exercise option. Therefore, incorporating Thera Band exercises into rehabilitation programs for individuals with rounded shoulders could be a valuable and accessible intervention.

Further research with larger and more diverse samples, equal gender distribution, longer follow-up periods, assessing functional outcomes beyond muscle strength and pulmonary capacity, determining optimal training protocols, and exploring the benefits of combining Thera band with other interventions is warranted to enhance our insight into the prolonged effects and optimal protocols of Thera band training. The outcome of this study contributes to the growing body of knowledge on effective interventions for rounded shoulder with decreased pulmonary capacity and provides a foundation for future investigations in this field.

Table 1: Comparison of pre & post-rounded shoulder.

	Mean	N	Std. Deviation	P value
ROUNDED SHOULDER -Right (Pre-test)	12.461	23	1.2883	.008
ROUNDED SHOULDER -Right (Post-test)	11.460870	23	1.2346288	
ROUNDED SHOULDER -Left (Pre-test)	12.096	23	1.3670	.002
ROUNDED SHOULDER -Left (Pos- test)	10.995652	23	1.2469885	

Table 1 represents the comparison of pre and post-test outcome measures among the study participants. It may be observed from the above table that the pre-test and post-test rounded shoulder (Right) scores are 12.4 ± 1.2 and 11.4 ± 1.2 respectively and the difference

is found to be statistically highly significant ($p < 0.01$). Further the pre-test and post-test rounded shoulder (Left) score is 12.09 ± 1.3 and 10.99 ± 1.24 respectively and using Paired-t test the difference is found to be statistically highly significant ($p < 0.01$).

Table 2: Comparison of pre & post-pulmonary function test

	Mean	N	Std. Deviation	P value
PFT FVC (Pre-test)	2.213043	23	.6757988	.001
PFT FVC (Post-test)	2.476087	23	.5905755	
PFT FEV1 (Pre-test)	2.166522	23	.8021313	.261
PFT FEV1(Post-test)	2.286087	23	.6304165	
PFT PEFr (Pre-test)	4.249565	23	1.7050793	.553
PFT PEFr(Post-test)	4.413478	23	1.7293026	

Table 2 represents the comparison of pre and post-test outcome measures among the study participants. It may be observed from the above table that the pre-test and post-test PFT FVC is 2.2 ± 0.67 and 2.47 ± 0.59 respectively and the difference is seen to be statistically highly significant ($p < 0.01$). The mean FEV1 pre-test and post-test values are found to be 2.16 ± 0.8 and 2.26 ± 0.63 respectively and the mean PEFr pre-test and post-test values were 4.24 ± 1.7 and 4.41 ± 1.7 respectively with $p > 0.05$.

Conclusion

Our study's findings suggest that Thera Band exercises can be an effective intervention for improving rounded shoulder posture in young adults. Although the changes in pulmonary capacity were not statistically significant in this short-term study, the exercises could still be considered a viable option for improving posture and potentially

enhancing shoulder function. Clinicians and physiotherapists may consider incorporating Thera Band exercises into rehabilitation programs for individuals with rounded shoulders to help achieve these goals.

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CONFLICT OF INTEREST: There is no conflict of interest.

FUNDING: Self-funded study.

ETHICAL CLEARANCE: This study was cleared by the Institutional Ethical Committee of Srinivas Institute of Physiotherapy, Pandeshwar, Mangalore, India. Ref no. SUIP/UG22/108/2023 on 11th May 2023.

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QUESTIONNAIRE

J1(26)

Effect of TheraBand Exercises on Rounded Shoulders Associated with Pulmonary Capacity in Young Adults: A Pre-Post Intervention Study

INSTRUCTIONS

- Read through the article and answer the multiple-choice questions provided below.
- **Some questions may have more than one correct answer;** in which case, you must mark **all** the correct answers.

Introduction

Question 1: Rounded shoulder posture (RSP) is indicated by which of the following? Select all correct options.

- A. Altered scapular kinematics
- B. Increased cervical lordosis
- C. Upper thoracic kyphosis
- D. Upper thoracic lordosis

Question 2: About 78% of persons who experience pain at work have extended shoulders. The shoulder posture developed from which of the following? Select **BOTH** correct options.

- A. Prolonged, anteriorly inclined, internally rotated scapula
- B. Shortness of the rhomboids
- C. Prolonged retracted scapula
- D. Shortness of the pectoralis minor muscles

Question 3: Rounded shoulder posture can be defined by the acromion forward displacement in respect to the 7th cervical spinous process.

- A. TRUE
- B. FALSE

Question 4: Muscle imbalance and altered scapular kinematics put the shoulder under more strain, which can result in all of the following, **EXCEPT**

- A. Shoulder discomfort
- B. Shoulder hypermobility
- C. Shoulder dysfunction
- D. Neuromuscular symptoms

Question 5: Neck muscle and shoulder muscles directly support breathing?

- A. TRUE
- B. FALSE

Methods and methodology

Question 6: In this study, the distance from the table to the highest point of their shoulder was measured. If this distance exceeded _____ centimeters, the participant was classified as having rounded shoulders.

- A. 5.2
- B. 4
- C. 3
- D. 2.5

Results and Discussion

Question 7: The study demonstrated _____ in rounded shoulder posture on both sides following the exercise protocol.

- A. A correlation
- B. A significant improvement
- C. No statistical difference

Question 8: This study found a slight improvement in which of the following after the three-week intervention, although the changes were not statistically significant ($p > 0.05$)? Select **BOTH** correct options.

- A. Forced expiratory volume in one second (FEV1)
- B. Forced vital capacity (FVC)
- C. FEV1/FVC ratio
- D. RER

Question 9: In individuals with rounded shoulders, the respiratory muscles, particularly the _____, may not function optimally.

- A. Pectoralis muscles
- B. Transversus abdominis.
- C. Diaphragm and intercostal muscles
- D. Rectus femoris

Question 10: All of the following are advantages of the elastic bands during exercise, **EXCEPT**

- A. Provide both resistance and elasticity
- B. Allows for adjustable intensity and velocity of resistance
- C. Convenient, affordable, and safe to use
- D. Provide an isometric force

THE END



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ANSWER SHEET

J1(26)

Effect of TheraBand Exercises on Rounded Shoulders Associated with Pulmonary Capacity in Young Adults/ A Pre-Post Intervention Study

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2						7					
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