



AN EXPERIMENTAL STUDY TO FIND OUT THE EFFECTIVENESS OF SCAPULAR RETRACTOR STRENGTHENING EXERCISE ALONG WITH PECTORAL MUSCLE STRETCHING FOR SLOUCHED POSTURE AMONG COLLEGE STUDENTS.

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I. INTRODUCTION :

Posture is defined by the relative positioning of the body parts within a space, and it is an essential element for normal balance⁽¹⁾. Television, video games, motorized transportation, fast food, and lack of regular physical activity all contribute to poor physical condition, leading to anatomical and biomechanical modification in body alignment⁽²⁾. In modern society, musculoskeletal abnormality and pain are increasing due to repetitive work and bad work posture⁽³⁾. The long-term effect of prolonged sitting while watching or playing games and using phones and computers has been detected as a significant risk factor of altered posture alignment⁽⁴⁾. Prolonged poor positioning results in a pressure build up in the surrounding structures⁽⁵⁾. Staying in the same position for prolonged periods can result in tightening of the agonist muscles and weakening of the antagonist muscles; hence posture appears cramped⁽⁶⁾. Consequences of these imbalances are forward head posture, thoracic kyphosis, pronated

foot, excessive pelvic tilt, rounded shoulder, and abnormal scapulohumeral rhythm⁽⁵⁾. Slouched posture is defined as a relaxed sitting posture with a flexed thoracic and lumbar spine. Such a posture is commonly encountered in our daily activities⁽⁷⁾. Slouched sitting posture may induce inappropriate activation patterns of key muscles for scapular stabilization such as serratus anterior, mid-trapezius and low trapezius⁽⁸⁾. Slouched posture is commonly seen in college girls, they adopt poor posture while writing and using laptops. Slouched posture is defined as a posture in which the shoulder bent forward that results from pectoral muscle tightness⁽⁷⁾. Tightness of pectoralis muscles leads to poor posture which identifies as forward shoulder or rounded shoulder posture with weak posterior scapular stabilizers. Stretching of tight pectoral muscles in proper manner results in correction of the faulty posture as stretching⁽⁸⁾. In forward head posture, the pectoralis major and pectoralis minor contract, and the rhomboid muscles weaken⁽⁸⁾. If subscapular muscles cannot create an appropriate muscular counterbalance, the head of the humerus can glide anteriorly, the shoulder girdle can descend, or lifting of the scapula can become difficult, leading to functional problems in the pectoralis major⁽⁶⁾

Retraction is accomplished by the actions of the trapezius, rhomboids, and latissimus dorsi muscles. Strengthening exercise include an elastic band exercises and stretching exercises are performed⁽¹⁰⁾. Stretching of the pectoralis muscles is used to correct abnormal postures⁽¹¹⁾. Scapular Retraction exercise that selectively strengthens the rhomboid and lower trapezius muscles may be appropriate for patients with slouched posture⁽¹¹⁾.

Although many studies have compared conditions of Forward shoulder posture patients before and after muscle strengthening exercise and stretching and concluded that muscle strengthening exercise is effective compared to stretching^(12,13), few reports have compared effects of stretching for shortened muscles and strengthening exercise for weakened muscles on Forward shoulder posture patients^(16,17). Some studies have examined the effect of Muscle energy technique on pectoral muscle tightness and concluded that muscle energy technique is helpful to reduce pectoralis muscle tightness⁽¹⁵⁾. So, The purpose of this study is to find out the effectiveness of scapular retractor strengthening exercise along with pectoral muscle stretching for slouched posture among college students.

1.1 AIM & OBJECTIVE OF THE STUDY :

AIM:

To find out the effectiveness of scapular retractor strengthening exercise along with pectoral muscle stretching for slouched posture among college students.

OBJECTIVE :

- To evaluate the effectiveness of scapular retractor strengthening exercise programme for pectoral muscle tightness among college students having slouched posture.
- To evaluate the effectiveness of pectoral muscle stretching exercise programme for pectoral muscle tightness among college students having slouched posture.
- To compare the effectiveness of scapular retractor strengthening exercise along with pectoral muscle stretching for slouched posture among college students.

1.2 HYPOTHESIS :

- It is hypothesized that there may be significant difference in slouched posture following scapular retractor strengthening exercise among college pectoral muscle tightness college students.
- It is hypothesized that there may be significant difference in slouched posture following pectoral muscle stretching among pectoral muscle tightness college students.
- It is hypothesized that there may be no significant difference between scapular retractor strengthening exercise and pectoral muscle stretching in the management of slouched posture among pectoral muscle tightness college students.

1.3 CLINICAL SIGNIFICANCE :

Pectoral muscle tightness develop with jobs or activities that cause rounded shoulder such as typing, writing and painting. The upper back stiffness is often a consequence of less than the perfect neck, shoulder and upper back postures. The more we slouch the more these areas have to react to the constant gravitational pull. Muscle tightness restricts movement and creates consequences for the surrounding tissue. Tight pectoral muscle pull the shoulder into a bad posture. Correct posture puts the least among of strain on muscles and joints. Slouching causes muscle tension, as well as back pain, reduced circulation. The proper alignment of spine allows to move easily so that body supports weight without strain. Poor posture can place stress on tendons, muscles and ligaments. By giving these stretching and strengthening exercise will relieve the pectoral muscle tightness and correct slouched posture.

1.4 OPERATIONAL DEFINITION :

SLOUCHED POSTURE⁽¹²⁾ :

A slouched posture is often characterized as a combination of a forward head posture, an increased thoracic. kyphosis with rounded shoulders and an increase in the. scapular protraction angle of the shoulder.:

I. REVIEW OF LITERATURE :

- **Mi-kyoung kim, Jung chul lee, Kyung- tae et.al(2018)** conducted a study on the effects of shoulder stabilization exercises and pectoralis minor stretching on balance and maximal shoulder muscle strength of healthy young adults with round shoulder posture. This study included 20 students with round shoulder posture. This study concluded that the stabilization and stretching exercises are not only thought to improve RSP, but to improve balance and maximal shoulder muscle strength as well.
- **Won-gyu-yoo et al,(2018)** conducted a comparison study on the effects of pectoralis muscle stretching exercise and scapular retraction strengthening exercise on forward shoulder. The study included 20 subjects with forward shoulder posture. The subjects were divided into a group of

pectoralis muscle stretching and a group of muscle strength exercise for scapular retraction. The study concluded that the forward shoulder posture of the group of scapular retraction exercise was significantly decreased when compared.

- **Jeremy fennell et al.(2016)** conducted a study on shoulder retractor strengthening exercise to maximize trapezius activity and minimize Rhomboid muscle activity. The study included 12 subjects with no history of shoulder pain. The study concluded that maximize middle trapezius activity and minimizing rhomboid activity may be shoulder rotation with elbow extended.

- **Seok Tae Lee et al(2016)** conducted a study on changes in activation of serratus anterior, trapezius and latissimus dorsi with slouched posture. The study included ten healthy males. This study concluded that activities of middle trapezius and lower trapezius increased significantly more in the slouched sitting posture than in the erect one.

- **Tae-woon kim et al.(2016)** conducted a study on the effects of elastic band exercise on subjects with rounded shoulder posture and forward head posture. This study included 12 subjects with rounded shoulder and forward head posture. This study concluded that the length of the pectoralis major muscle showed a statistically significant change.

- **Doris E. coppock et al,(2013)** conducted a study on relationship of tightness of pectoral muscles to round shoulders in college women. The study included 124 college women. The study concluded that there was no correlation found to exist between round shoulders and tightness of the pectoral muscles in college women.

- **Toni S. Roddey, Sharon L.olson & susan E. grant et al(2013)** conducted a study on the effect of pectoralis muscle stretching on the resting position of the scapula in persons with varying degrees of forward head/rounded shoulder posture. This study included 38 subjects with varying degree of

forward head/rounded shoulder posture. This study concluded that resting scapular position improves following a two week pectoralis stretching programme.

- **Eva maj Malmstrom et al.,(2015)** conducted a study on A slouched body posture decreases arm mobility and changes muscle recruitment in the neck and shoulder region. This study included 12 male subjects. This study concluded that slouched posture affects the biomechanical conditions by decreasing arm elevation.
- **Hrysomallis et al (2010)** conducted a Effectiveness of strengthening and stretching exercises for the Postural correction of abducted scapulae. This study included 60 subjects. This study concluded that short clavicles would present with an abducted scapulae posture, and the resting length of pectoralis minor would be short but not the cause of the posture.



- **H.Lohne seiler, E, kolle, S.A.Anderson & B.H.Hansen et at,(2016)** conducted a study on Musculoskeletal fitness and balance in older individuals and its association with steps per day. This study included 85 women and 76 men. Balance and MSF were assessed using one leg standing, handgrip strength, static back extension, sit and reach, back scratch test. Study concluded that youngest (65 to 69 years) had better static balance and muscle endurance compared with older participants. This study stated that Back scratch test has 0.96 reliability.
- **Debo ra Soccac Schwertner et at., (2018)** conducted a study on Questionnaire on body awareness of postural habits in young people : construction and validation. This study included 679 students. This study stated that the questionnaire was considered suitable, quick and easy to fill in. This study concluded that the questionnaire on body awareness and postural habits on young people is a valid.

II. MATERIALS & METHODOLOGY :

3.1 STUDY DESIGN :

Quasi experimental study design.

3.2 CRITERIA FOR SELECTION :

3.2.1 INCLUSION CRITERIA :

- Age criteria 18 – 25
- Both male and female students
- College students who are attending more than 4 hours online class during covid period.
- Who are maintaining sitting posture more than 4 hours.

3.2.2 EXCLUSION CRITERIA:

- Recent trauma
- Subjects with fever
- Females with primary dysmenorrhea.
- Previous history of upper limb fracture.

3.3 SAMPLE SIZE & METHOD OF SELECTION :

SAMPLE SIZE :

Forty subjects were selected for the study.

METHOD OF SELECTION :

This study was conducted among subjects who fulfilled the inclusion. The subjects were divided into two groups: Group A and Group B

Group A – Scapular retractor strengthening exercise after Pectoral muscle stretching.

Group B – Pectoral muscle stretching.

3.4 STUDY SETTING :

The study was conducted in School of physiotherapy, Aarupadai veedu medical college and Hospital, Pondicherry.

3.5 STUDY DURATION : 1 month.

3.6 VARIABLES OF STUDY :

3.6.1 INDEPENDENT VARIABLES :

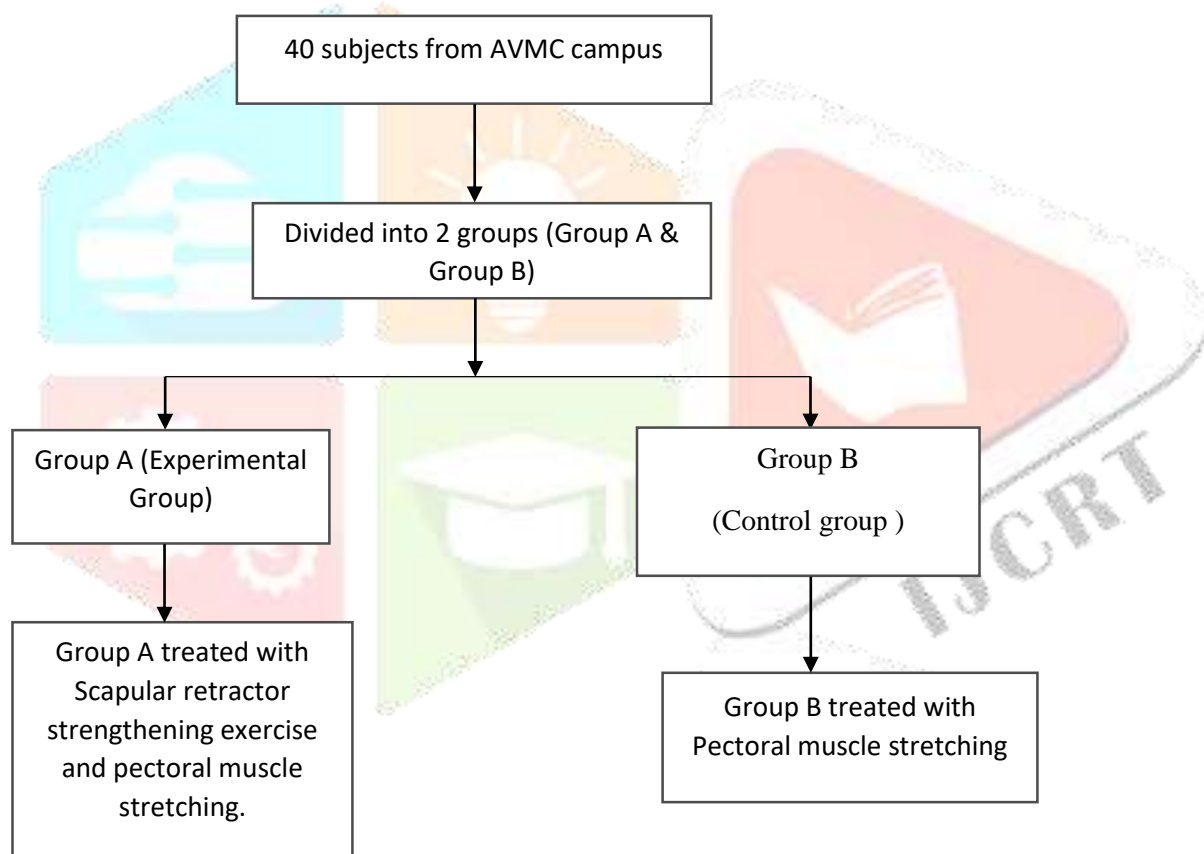
- Scapular retractor strengthening exercise
- Pectoral muscle stretching

3.6.2 DEPENDENT VARIABLES :

- Pectoral muscle tightness
- Slouched posture

3.7 PROCEDURE :

A total of 40 samples were taken from the physiotherapy department college students, AVMC. Prior to the study, the objectives and the guidelines were explained to all the participants and written informed consent form was signed by the participants. Questionnaire on body awareness and postural habits of young people and Back scratch test had taken for all subjects and the pre test score values are documented. Then, the further procedure continued; samples were divided randomly into two groups – Group A and Group B. In Group A, 20 subjects received Scapular retractor strengthening exercise after pectoral muscle stretching. The exercise were repeated for 3 sessions per week for the period of 4 weeks. In Group B, 20 subjects received Pectoral muscle stretching for the same period.



Flow chart 1 : Shows representation of procedure and group details.

TREATMENT PROTOCOL:

**Group A : Scapular retractor strengthening exercise and Pectoral muscle stretching
(3 sessions per week , 4 week)**

Pectoral muscle stretching :

The subject assumed a standing position in front of open doorway and raise their each arm up to the side. Therapist stands in front of the patient. Subject then bent at 90 degree angle. Then subject is instructed to slowly step forward with one foot. Subject instructed to hold the stretch position for 30 seconds and then step back and relax for 10 seconds. This exercise repeated 3 times. Then the posture is measured by Back scratch test. The pectoral muscle stretch were done for 3 days per week for 4 weeks.

Scapular retractor strengthening exercise : (3 sessions per week, 4 weeks)

The strengthening exercise is done after pectoral muscle stretching. The subject assumed in standing position in front of the therapist. Therapist ask the subject to grasp the thera band between their hands with slight tension and keep their elbows bent 90 degree. The subject asked to pinch their shoulder blades together for 30 seconds and then slowly return. The subject is relaxed at this point for 10 seconds. This exercise repeated 3 sets of 10 repetitions. Then measured with the help of Back scratch test. The strengthening exercise were done for 3 days per week for 4 weeks.



Figure 1(a) : Shows theraband holding position for Scapular retractor strengthening exercise.



Figure 1(b) : Shows Scapular retractor strengthening exercise using Theraband

Group B – Pectoral muscle stretching (3sessions/week)

Pectoral muscle stretching :

The subject assumed a standing position in front of open doorway and raise their each arm up to the side. Therapist stands in front of the patient. Subject then bent at 90 degree angle. Then subject is instructed to slowly step forward with one foot. Subject instructed to hold the stretch position for 30 seconds and then step back and relax for 10 seconds. This exercise repeated 3 times. Then the posture is measured is measured by Back scratch test. The pectoral muscle stretch were done for 3 days per week for 4 weeks.

TOOLS :

- Theraband.
- Measuring tape.

3.8 OUTCOME MEASURE :

- **Back scratch test :** ⁽¹⁸⁾

Purpose : This test measures general range shoulder range of motion.

Procedure : This test is done in the standing position. Place one hand behind the head and back over the shoulder and reach as far as possible down the middle of your back, your palm touching your body and fingers directed downwards. Place the other arm behind your back, palm facing outward and fingers upward and reach up as far as possible attempting to touch or overlap the middle fingers of both hands. As assistant is requested to direct the subject so that the fingers are aligned to measure the distance between the tip of the middle fingers.

If finger tip touch, score zero. If they do not touch, measure the distance between the fingertip (negative score). If they overlap measure, how much (positive score). Practice two times. Stop the test if the subject experiences pain.

Scoring : Record the best score to the nearest cm or ½ inch. Higher the score better result.

Table 1 : Shows Rate and description of Back scratch test.

Rate	Description
Good	Fingers are touching.
Fair	Fingers not touch but less than 2 inch(5cm) apart.
Poor	Fingers greater than two inch (5cm) apart.

**Figure 2(a) : Shows positioning for Back scratch test****Figure 2(b) : Shows measurement of pectoral muscle tightness using inch tape in Back scratch test.**

➤ **Questionnaire on body awareness and postural habits of young people:**⁽¹⁹⁾

The objective of this Questionnaire was to identify the self-perception of young people concerning their postural habits in some environments (dimensions): in the classroom; at home during leisure activities (such as using the computer or something similar, watching TV) and resting. The questionnaire divided into four dimensions for the perception of posture : in the classroom (11 questions), at home (17 questions), picking up objects (4 questions) and teacher's attitude (3 questions).

The answers for each item had 5 alternatives :

Table 2 : Shows values and description of Questionnaire of body awareness and postural habits of young people.

Values	Description
1	Never
2	Rarely
3	Frequently
4	Always
5	Don't remember

This chapter deals with the systemic presentation of the analysed data followed by the interpretation of the data.

a) Paired 't' test

$$\bar{d} = \frac{\sum d}{n}$$

$$s = \sqrt{\frac{\sum d^2 - \frac{(\sum d)^2}{n}}{n-1}}$$

$$t = \frac{\bar{d}\sqrt{n}}{s}$$

Where, d - Difference between pre-test and post-test values

$$\bar{d} = \frac{\sum d}{n} \text{ Mean difference between pre-test and post-test values}$$

n - Total no. of subjects

S-Standard deviation

b) Un-paired 't' test

$$S = \sqrt{\frac{\sum(x_1 - \bar{x}_1)^2 + \sum(x_2 - \bar{x}_2)^2}{n_1 + n_2 - 2}}$$

$$T = \frac{\bar{x}_1 - \bar{x}_2}{S} \sqrt{\frac{n_1 n_2}{n_1 + n_2}}$$

Where, S = Standard deviation

n_1 = Number of subjects in Group A

n_2 = Number of subjects in Group B

\bar{x}_1 = Mean of the difference in values between pre and post-test in Group A

\bar{x}_2 = Mean of the difference in values between pre-test and post-test in Group B

V. RESULT :

The results of this study were analyzed in terms of Questionnaire on Postural awareness and habits of young people and Back scratch test. The collected data was analyzed using SPSS software.

The mean of post test Questionnaire on postural awareness and habits of young people scores was 3.11 ± 0.05 in Group A and 3.1 ± 0.23 in Group B. The difference between Group A and Group B Questionnaire on body awareness and postural habits on young people score was found to be statistically significant ($p = 0.0001$). The results suggest that there was significant difference with experimental group showing greater reduction in Questionnaire on postural awareness and habits on young people as compared to control group.

The mean of post test of back scratch test scores was 1.25 ± 0.91 in Group A and 1.2 ± 0.77 in Group B. The difference between Group A and Group B Back scratch test score was found to be statistically significant ($p = 0.0001$). The results suggest that there was significant difference with experimental group showing greater reduction in Back scratch test as compared to control group.

VI. DISCUSSION :

This study was selected for the purpose of finding the effectiveness of scapular retractor strengthening exercise along with pectoral muscle stretching in management of slouched posture among pectoral muscle tightness in college students.

This present study is based on Won gyu yoo et al., who did study on “Comparison on the effects of pectoralis muscles stretching exercise and scapular retractor strengthening exercise on forward shoulder “ in which they included patients with forward scapular posture. The study concluded that forward scapular posture of the muscle strength exercise group was significantly reduced when compared to that of the stretching group.

In this study, we analyzed pectoral muscle tightness and slouched posture in 40 college students. Posture and tightness of the students was measured by using the Back scratch test and Questionnaire on body awareness and postural habits of young people.

The retraction exercise evaluated in this study aim to strengthen scapular retractor muscles and restore normal scapular movement.

In this study, comparison of scapular retractor strengthening exercise and pectoral muscle stretching between two groups showed that there is statistically significant ($p < 0.0001$) reduction in pectoral muscle tightness and slouched posture in college students.

It concluded that scapular retractor strengthening exercise group was more effective than pectoral muscle stretching group in improving posture of pectoral muscle tightness students. Thus the results of the present study accepts the first and second hypothesis and rejects the third hypothesis. The Group A is found more effective than Group B.

VII. CONCLUSION :

In the study it have been concluded that Group A treated with Scapular retractor strengthening exercise along with pectoral muscle stretching shows a significant improvement in the slouched posture and reduction in pectoral muscle tightness than Group B treated with pectoral muscle stretching, which means Group A shows better results than Group B.

VIII. LIMITATIONS

- Subjects daily routine lifestyle was not controlled.
- Limited sample size.
- This study was time bound study.
- Only college students were included in this study

RECOMMENDATIONS :

- Similar study can be carried out for larger sample size.
- The study can be done on IT professions.
- This study can do on long term period of 6 months.

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