

# A Study on the Effectiveness of Scapular Retraction Exercises on Forward Head Posture

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## Abstract

**Objective:** The aim of the study is to find out the effectiveness of scapular retraction exercise for forward head posture.

**Background of the Study:** • Forward head posture is a condition often seen in person who were using computer and laptops for long hours. Forward head posture is the anterior positioning of the cervical spine. This posture is sometime called “text neck”.

- It is a posture problem that is caused by several factor including sleeping with head elevated to high. Due to forward head posture the deep flexor muscle gets overstretched and weak thus resulting tightness of pectoralis muscle and over stretched to weak the rhomboid muscle.
- The purpose of this study was to investigate the effect of scapular retraction exercise on neck posture, muscle activity, pain and quality of life in individuals with neck pain and forward head posture.

**Methodology:** The study is experimental study with study set up at outpatient physiotherapy department of ACS Medical College and Hospital. 30 subjects are randomly selected with inclusion criteria of patient of both male and female, 18 to 30 years of age groups, IT job workers, often indulging in TV, Computer, Texting-neck, Driver’s neck and exclusion criteria with Systemic illness, subject undergone surgeries, patient with congenital cervical deformities, Cervical fractures and the material used is adhesive skin marker, Measuring tape and Thera band and the outcome measures is VAS scale, Craniovertebral Angle (tragus right ear & midpoint of the C7) and NDI (neck disability index).

**Procedure:** 30 subjects with forward head posture were, included in this study. The Craniovertebral angle of all the subjects and were measured by using inch tape. The Craniovertebral angle was measured by angle between midpoint of the adhesive marker at tragus of right ear and midpoint of the reflective marker at C7. All the 30 subjects were received scapular retraction exercises as a common intervention

**Result:** There is significant effect of Scapular Retraction Exercises in reducing Forward Head Posture.

**Keywords:** Forward head posture, Scapular Retraction Exercise, Neck pain, Postural Exercise.

## Introduction

One of the most common postural problems is the forward head posture(FHP) <sup>(1)</sup>. Forward head posture is the anterior positioning of the cervical spine occurring when the lower neck bone is bent and there is an extension of the upper neck bone and the head. This condition has increased and is exacerbated with the advancement in technology and the increasing use of computers and smartphones for extended periods of time. This posture

reduces the dispersion of biomechanical loading and therefore causes degeneration of the neck muscles and structural changes in addition, compensatory actions, such as spinal actions, such as spinal curve changes, rounded shoulders and abnormal muscle activity can be observed<sup>(2)</sup>. This posture is associated with weakness in the deep cervical short flexor muscles and mid-thoracic scapular retractor (i.e., rhomboids, serratus anterior, middle and lower fibres of the trapezius) and shortening of

the opposing cervical extensor and pectoralis muscles<sup>(3)</sup>. Forward head posture frequently appear in the patient with neck disorder. Most of the patient with forward head posture spend all day in prolonged sitting such as computer based work, industry related tasks and Bus drivers. Previous studies have shown that forward head posture leads to shortening of posterior neck extensor, tightening of the anterior neck and shoulder muscles and affects scapular position<sup>(4)</sup>. There is an incidence of 66% for forward head posture among people in age group of 20 to 50 years<sup>(5)</sup>.

Neck pain is one of the most common musculoskeletal disorders, next to back pain. Many people seek medical centres for the treatment at least once in their life time. A review of different observational studies of neck pain around the world showed that is 1-year prevalence range from 16.7 to 75.1 percent for the entire adult population (aged 17 -70 years) with a mean of 37.2 percent<sup>(6)</sup>.

Scapular retraction is an integral component of good trunk posture. Completing simple scapula retraction exercises can strengthen your muscles and improve your posture. These retractors are responsible for squeezing your shoulder blades together and pulling your shoulders back into upright positioning<sup>(7)</sup>. The two major scapular retractors are the middle trapezius and the rhomboids, but these two muscles vary somewhat in their actions. The middle fibres of the trapezius function as pure scapula and to rotate it to depress the glenoid fossa<sup>(8)</sup>. If imbalance in cervical muscle resulting from postural misalignment are prolonged an excessive load is imposed on the joint and muscle, thereby making the problem caused forward head posture chronic<sup>(9)</sup>. There are frequent occurrences of functional movement limitations or non-specific pain in the head and neck region in patient with FHP<sup>(10)</sup>.

The smart phones have small monitors that are typically held downwards near the laps, users must bend their heads to see the screens, increasing activity in the neck extensor muscles overloading the neck and shoulders increases muscle fatigue, decreases work capacity and affects the musculoskeletal system<sup>(11)</sup>. There have also been concerns raised that the increasing use of computers may put children at higher risk of neck/shoulder problems -such as those commonly seen in adult computer users<sup>(12)</sup>. The craniovertebral angle is identified as the intersection of a horizontal line passing through the C7 spinous process and a line joining the midpoint of the tragus of the ear to the skin overlying

the C7 spinous process<sup>(13)</sup>. There are several exercises to engage the muscles used in retracting your scapula, and many of these exercise are almost strictly scapular retractions<sup>(14)</sup>.

## Methodology

The study is experimental study with study set up at outpatient physiotherapy department of ACS Medical College and Hospital. 30 subjects are randomly selected with inclusion criteria of patient of both male and female, 18 to 30 years of age groups, IT job workers, often indulging in TV, Computer, Texting-neck, Driver's neck and exclusion criteria with Systemic illness, subject undergone surgeries, patient with congenital cervical deformities, Cervical fractures and the material used is adhesive skin marker, Measuring tape and Thera band and the outcome measures is VAS scale, Craniovertebral Angle (tragus right ear & midpoint of the C7) and NDI (neck disability index).

## Procedure:

Participants who reported to A.C.S medical college and hospital in outpatient physiotherapy department with forward head posture were screened for their eligibility depending on inclusion and exclusion criteria to participate in this study. Then the purpose of the study was explained and an informed consent was obtained. A standardized demographic information including age, gender, height, weight was collected.

All the subjects were asked to sit comfortably on back supported armless chair with both feet flat on floor, hip and knees positioned at 90-degree angle and buttock positioned against the back chair. The subjects were asked to rest their hands on their lap and to keep their shoulder against the back of the chair. Adequate exposure of neck up to shoulder level to clearly define anatomical landmark was done. The most prominent spinous process at the base of cervical spine was palpated. After it was identified, the cervical spine was passively flexed and extended to verify which one moved first, C6 vertebra should be more mobile whereas C7 should demonstrate less motion. Skin over the anatomical landmark was wiped with cotton soaked in spirit to remove skin secretions for proper fixation of adhesive markers. Anatomical landmarks were marked with marker pen; thereafter adhesive marker were fixed over the anatomical landmark. Then taken the measurement of the height between ground and C7 in sitting position of each subject was done with measuring

tape. The craniovertebral angle was measured by angle between mid-point of the adhesive marker at tragus of right ear and midpoint of the reflective marker at C7. After that all subject were asked to sit comfortably on back supported armless chair with feet flat on floor, hips and knees positioned at 90-degree angle hands on their lap.

**Measurement of forward head posture:** The method for finding the forward head posture, this is done with a tape measure or ruler (scale), ask the patient to lean on the wall in the relaxed position and measures the length between the wall and the head. A total of 30 volunteers meeting the inclusion criteria were selected and performed forward head correction program to 30 min. Forward head posture correction program, the exercises were done 3 weeks per day 2 sessions and 12 repetitions for each session.

**Seated row-** long sitting position, the patient is asked to take the Thera band to pull the lower sole of feet and grasping the Thera band end with hand, maintaining the shoulder level and head raise and pull the Thera band backward hold it for 2 secs and then relaxed.

**Elbow push back-** crook lying position, the shoulder kept 90° abduction, external rotation, the elbow

push back against the floor and head is raised, both the shoulder retracted and maintain the position for 3 to 5 sec and the relaxed.

**Scapular retraction activation-** prone lying position, head raised, chintucked, both the arm abducted raising the shoulder from the floor maintain this for few seconds.

**Arm slides** – crook lying position the shoulder kept 90° abduction and external rotation, the arm slides upward and downward.

**Lower trap row exercise** - standing position, the Theraband wrapped the window pull the end of Thera band and then relaxed.

### Data Analysis

The collected data were tabulated and analyzed using both descriptive and inferential statistics. All the parameters were assessed using statistical package for social science (SPSS) version 24. Paired t-test was adopted to find the statistical difference within the groups.

**Table - 1: Comparison of neck disability index score within group between pre & post test values**

#NDI	Pre Test		Post Test		T - Test	Significance
	Mean	S.D	Mean	S.D		
GROUP	20.76	2.22	8.93	1.48	42.27	.000***

(\*\*\*- P ≤ 0.001)

The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value between pre-test and post-test within Group. There is a statistically highly significant difference between the pre-test and post-test values within Group (\*\*\*- P ≤ 0.001).

**Table – 2: Comparison of visual analog scale within group between pre & post test values**

#VAS	PRE TEST		POST TEST		t - TEST	SIGNIFICANCE
	MEAN	S.D	MEAN	S.D		
GROUP	3.76	.430	1.53	.507	28.43	.000***

(\*\*\*- P ≤ 0.001)

The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value between pre-test and post-test within Group. There is a statistically highly significant difference between the pretest and posttest values within Group (\*\*\*- P ≤ 0.001).

**Table – 3 Comparison Of Craniovertebral Angle Within Group Between Pre & Post Test Values**

#CVA	PRE TEST		POST TEST		t - TEST	SIGNIFICANCE
	MEAN	S.D	MEAN	S.D		
GROUP	47.11	.937	52.62	1.47	-25.59	.000***

(\*\*\*- P ≤ 0.001)

The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value between pre-test and post-test within Group. There is a statistically highly significant difference between the pretest and posttest values within Group (\*\*\*- P ≤ 0.001).

**TABLE - 4: Pearson Correlation of Coefficient between Neck Disability Index and Craniovertebral Angle(CVA)**

Parameters	Pearson correlation	
	'r' value	P value
NDI & CVA	-.147	>0.05

The above table reveals the Pearson Correlation of coefficient 'r' value and p-value between Neck Disability Index and Craniovertebral Angle(CVA)

The value of R is -.147 Although technically a Negative Association and correlation between Neck Disability Index and Craniovertebral Angle(CVA)

### Result

On comparing Neck Disability Index Score Pre test **20.76** and Posttest**8.93** Mean values within Group (Scapular Retraction Exercises) shows highly significant difference between Pretest & and Posttest Mean values at **P ≤ 0.001**

On comparing Visual Analog Scale Pre test **3.76** and Posttest**1.53** Mean values within Group (Scapular Retraction Exercises) shows highly significant difference

between Pretest & and Posttest Mean values at **P ≤ 0.001**

On comparing Craniovertebral Angle Pre test **47.11** and Posttest**52.62** Mean values within Group (Scapular Retraction Exercises) shows highly significant difference between Pretest & and Posttest Mean values at **P ≤ 0.001**

The value of R is -.147 Although technically a Negative Association and correlation between Neck Disability Index and Craniovertebral Angle(CVA). The decrease in the values of Craniovertebral angle is associated with the greater level of Neck Disability.

### Conclusion

In this study on comparing the values of Neck Disability Index Questionnaire, Visual Analogue Scale and Craniovertebral Angle within group, we conclude that Scapular Retraction Exercises are more effective in

reducing Forward Head Posture.

## Discussion

The present study was to determine the effectiveness of scapular retraction exercises and forward head posture. This study was conducted on 30 subjects with forward head posture. Patients with forward head posture have rounded shoulders or poor back posture. Therefore, the scapula retraction exercise is applied to patients with forward head posture. Craniovertebral angle of all the subjects were measured using inch tape to assess the forward head posture. The scapular retraction exercises or Seated rows, Elbow push back, Scapular retraction activation, Arm slides and Lower trap row exercise. The outcome parameter is Visual Analogue Scale, Neck Disability Index Questionnaire and craniovertebral angle.

This study supports the findings of MELISSA SABO showed that completing simple scapular retraction exercises can strengthen your muscles and improve your posture. The posture, which is typically caused by weakness in the shoulder blade muscles, can lead to pain in the neck or shoulders if not addressed. Fortunately, shoulder retraction exercises can be helpful for strengthening these weak muscles and improving posture. Forward head posture is the anterior positioning of the cervical spine occurring when the lower neck bone is bent and there is an extension of the upper neck bone and the head. This condition has increased and is exacerbated with the advancement in technology and the increasing use of computers and smart phones for extended periods of time. This posture is associated with weakness in the deep cervical short flexor muscles and mid-thoracic scapular retractor (i.e., rhomboids, serratus anterior, middle and lower fibres of the trapezius) and shortening of the opposing cervical extensor and pectoralis muscles. The purpose of this study was to investigate the effects of scapular retraction exercise on neck posture, muscle activity, neck pain and quality of life in the patients with neck pain and forward head posture in the patient with forward head posture.

On comparing the mean values of Neck Disability Index Score Pre-test 20.76 and Post-test 8.93 within group (Scapular Retraction Exercises) shows highly significant difference. On comparing the mean values of Visual Analogue Scale Pre-test 3.76 and Post-test 1.53 within group (Scapular Retraction Exercises) shows highly significant difference. On comparing the mean

values of Craniovertebral Angle Pre-test 47.11 and Post-test 52.62 within group (Scapular Retraction Exercises) shows highly significant difference.

Therefore, by comparing the statistical values Scapular Retraction Exercises are effective in reducing Craniovertebral Angle and hence also reduces Forward Head Posture. Our data supports alternate hypothesis. Hence, null hypothesis is rejected.

**Ethical Clearance** - *Institutional Review Board (IRB), Dr.M.G.R Educational & Research*

*Institute, Deemed to be University*

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**Conflict of Interest** - *Nil*

## References

1. Won-GyuYoo : Effect of the neck retraction taping(NRT) on forward head posture and the upper trapezius muscle during computer work. *Journal of Physical Therapy Science*, 2013, 25: 581-582.
2. Jeong-II Kang,PT, PhD, et al : Effect of scapular stabilization exercise on neck alignment and muscle activity in patients with forward head posture. *Journal of Physical Therapy Science*, 2018, 30(6): 804-808.
3. Katherine Harman, PT, PhD, et al: Effectiveness of an exercise program to improve forward head posture in normal adults: A randomized, controlled 10-week trial. *The Journal of Manual and Manipulative Therapy*, 2005, vol.13 No.3: 163-176.
4. BoyoungIm, MSc, PT, et al: Effects of scapular stabilization exercise on neck posture and muscle activation in individuals with neck pain and forward. *The Journal of Physical Therapy Science*, 2016, 28:951-955.
5. Deepmala Thakur, et al: Forward head posture correction versus shoulder stabilization exercises effect on scapular dyskinesia and shoulder proprioception in athletes: An experimental study. *International Journal of Physiotherapy*, 2016, 3(2), 197-203.
- 6.Herman Mun Cheung Lau, PgD, MPhil, et al: Measurement of craniovertebral angle with electronic head posture instrument: Criterion validity. *Journal of Rehabilitation Research and Development*, 2010, 47, 911-918.

7. Melissa Sabo: Scapular Retraction Exercises for Posture, 2009.
8. Jeremy Fennell, MD, PT, et al : Shoulder Retractor strengthening exercise to minimize rhomboid muscle activity and subacromial impingement. University of Toronto Press and the Canadian Physiotherapy Association, 2016, 68(1): 24-28.
9. Kyeong-Jin Lee, et al: The effect of forward head posture on muscle activity during neck protraction and retraction. *Journal of Physical Therapy Science*, 2015, 27: 977-979.
10. Dae-Hyun Kim, et al: Neck pain in adults with forward head posture: Effects of Craniovertebral Angle and Cervical Range of Motion. *Osong Public Health and Research perspectives*, 2018,9(6): 309-313.
11. Seong- Yeol Kim, et al: Effect of duration of smartphone use on muscle fatigue and pain caused by forward head posture in adults. *The Journal of Physical Therapy Science*, 2016, 28:1669-1672.
12. Leon M Straker , et al : IT kids: exposure to computers and adolescents, neck posture and pain, 2014.
13. Wilmart et al, craniovertebral angle, 2002
14. Cole Matthews : Scapular Retraction: Exercise, Benefits, and proper form, 2018.
15. Burt HA-, Effects of faulty posture; President's Address . *Proc R Soc Med*.1950; 43(3):187-194, 2019.