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ORIGINAL ARTICLE

EFFECT OF AXIOSCAPULAR MUSCLE ACTIVATION EXERCISE ON NECK ALIGNMENT, PAIN AND UPPER TRAPEZIUS MUSCLE ACTIVITY IN FEMALE COLLEGE STUDENTS WITH FORWARD HEAD POSTURE

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Anusha Prasanth[1], Sujith S[2], Preethu Mohanan K K[3], Deepu C B[4]

Corresponding Author:
[1]Physiotherapist, AKG Memorial Cooperative Hospital Kannur, Kerala, India
E-Mail: anushaprasanth31233@gmail.com
Co-Authors:
[2]Asst.Professor, Dept of Physiotherapy, School of Medical Education, Kottayam, Kerala, India
[3]Lecturer, Department of Physiotherapy, Akash Institute of Physiotherapy, Bangalore, Karnataka, India
[4]Professor, Dept of Physiotherapy, School of Medical Education, Angamaly, Kerala, India

ABSTRACT

Background of the study: Forward head posture (FHP) is characterized by increased flexion of the lower cervical spine and upper thoracic region and increased extension of the upper cervical spine. Bad posture is a serious health condition which causes more musculoskeletal disorders with aging. **Methods:** 40 subjects who fulfill the inclusion criteria are selected for the study with 20 subjects each Group A and Group B. Prior consent form will be obtained On the first day pre-test will be conducted using tragus to wall distance to measure neck alignment, visual analogue scale to measure pain, electromyography to measure upper trapezius muscle activity each groups. Then post-test score is obtained at after 3months from each group. **Result:** There was significant difference in visual analogue scale (t=3.228) tragus to wall distance (3.635) and muscle activity %MVC (9.008) between control and experimental group with level of significance p≤0.05. Experimental group shows greater improvement in tragus to wall distance visual analogue scale and muscle activity. **Conclusion:** The study concluded that axioscapular muscle activation exercise helps in improving neck alignment, reduce pain and reduce the over activity of upper trapezius muscle in female college students with forward head posture.

Keywords: Forward head posture, Axioscapular muscle activation exercise, Neck alignment, Trapezius muscle

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INTRODUCTION

Forward head posture (FHP) is the anterior positioning of the cervical spine. When the head changes its position from normal and moves forward from the cervical spine, it moves the center of gravity forward that puts abnormal stress on the cervical musculature causing muscle imbalance.[1] Forward head posture leads to shortening of the posterior neck extensors, tightening of the anterior neck and shoulder muscles, and it will affects scapular position and kinematics[2].

It is found that the forward head posture is quiet usual among college students with a prevalence of 63.96 percentage. College students working on the computer or smart phones for three or more hours, often adopt wrong postures due to lack of awareness of correct postures[3]. Studies report that females have two times more incidence of developing FHP than males due to anatomical changes[4].
The habit of repetitive use of computers, television, mobile phones and videogames, and also Bag packs forces the body to disclose bad posture[5]. With the association of muscle shortening and elongation due to muscular imbalance has leads to malfunctioning of various parts of the body[6].

Laptop use is becoming more common in a variety of fields, including education, business, publishing, banking, and even entertainment. The majority of laptops have a screen that is attached to the keyboard, making it impossible to adjust the screen height and distance individually. This causes prolonged flexion of the cervical spine, resulting in increased activation of the cervical erector spinae and upper trapezius muscles, which form a posture in which the trunk is slightly inclined backward, resulting in a persistent forward head and trunk flexion[7].

Gender differences in anthropometry and biomechanics may explain the disparity in musculoskeletal symptoms in the neck and shoulders. Women have been shown to have more neck flexion in the workplace[8]. Women have significantly higher normalized keyboard forces than men, as well as higher muscle activity and fewer neutral shoulder postures[9]. Muscle activities and shoulder postures were also higher for office workers of smaller stature and the female gender, which may predispose them to neck and shoulder symptoms during such use[9].

FHP reduces the distribution of the biomechanical load, which leads to degeneration of the neck muscles and structural changes. With the advancement of technology and the growing use of computers and smart phones, this situation has increased and exacerbated. Using a smartphone device for more than 10-30 minutes leads to muscle fatigue, notably in the upper trapezius and cervical erector spinae muscles[10].

The pressure on the spine might increase by every 15 degrees of cervical flexion. When using a smartphone, neck flexion of 15-60 degrees can cause a load of 5-27 kg on the cervical spine.In addition, forward head posture has an impact on the posterior and anterior necks, shoulder muscles, scapular position, and upper body kinematics.[11] Many research have been done to look into the link between forward head position and neck pain, and it has been discovered that reduced muscle fiber length and muscle ability cause stress in the forward head posture, which leads to severe neck pain[12].

This incorrect posture exposes the area to a variety of musculoskeletal problems by transferring enormous pressures to the neck and shoulders, weakening the soft tissues by reducing the area's biomechanical capabilities, and causing muscular stiffness and hypokinetics[13,14].

The key muscles that stabilise the scapula and regulate the force to control scapular mobility for functional tasks are the serratus anterior and upper trapezius. Correct scapular movements need appropriately coupled motions of these two muscles, including effective initiation and recruitment of the muscles. The trapezius muscles are important for scapula mobility, and the lower trapezius, in particularly, is important for scapula stabilization. Long-term upper trapezius hyper activation and shortening weakens the lower trapezius, resulting in muscular imbalance. Many studies have recommended therapeutic ways to improve postural alignment by strengthening weak muscles and lengthening shortened muscles[15,16].

Objectives:

1. To study the effect of axioscapular muscle activation exercise on neck alignment in female college students with forward head posture.
2. To study the effect of axioscapular muscle activation exercise on pain in female college students with forward head posture.
3. To study the effect of axioscapular muscle activation exercise on upper trapezius muscle activity in female college students with forward head posture.
4.

METHODOLOGY

Aim and Objectives: The aim of the study is to find out the effect of axioscapular muscle activation exercise on neck alignment, pain and upper trapezius muscle activity in female college students with forward head posture

1. To study the effect of axioscapular muscle activation exercise on neck alignment in female college students with forward head posture.
2. To study the effect of axioscapular muscle activation exercise on pain in female college students with forward head posture.
3. To study the effect of axioscapular muscle activation exercise on upper trapezius muscle activity in female college students with forward head posture.

Study Design: Experimental study design, pre-test, post-test with control group and experiment group.

Study setting: SME, CPAS, Gandhinagar, Kottayam, Kerala

Sample Size: 40 samples of the population who satisfied the inclusion and exclusion criteria were selected.

Study Duration: The study was conducted over a period of three month

Inclusion Criteria:

Age between 18 to 25, Targus to wall distance >9.5cm, Score 3 to 7 in visual analogue scale , Female college students using laptop or phone more than 3 hours or more per day.

Exclusion Criteria:

History of any spinal surgery, Recent fractures in their spine and extremities, Cervical radiculopathy Cervical spondylosis, Non cooperative individuals, Congenital deformities, Tumors, Pregnancy

Sampling Procedure: Purposive sampling method

Procedure:

Total of 40 subjects who fulfilled the inclusion criteria were selected purposively and randomly assigned into two groups of 20 each. Group A (control) and Group B (experimental) subjects were explained about the protocol and informed consent forms were signed and obtained from the subjects before the intervention starts. All outcome measures were assessed at baseline and after 4 weeks.

Participants were instructed to report any symptoms or feelings of falling during the exercise sessions. 40 participants were divided into two groups.

Group A, Control Group with 20 Participants was subjected to conventional treatment alone for 10 minutes, 3days per week for 4 weeks.

Group B, Experimental group with 20 participants were subjected to axioscapular muscle activation exercise along with conventional therapy for 20 minutes, 3 days per week for 4 weeks.

Pre-test assessment score was done using tragus to wall distance to measure neck alignment, visual analogue scale to measure pain, and surface electromyography of upper trapezius muscle to measure muscle activity in both groups.

Group A (Control Group):

Group A (Control group) received conventional therapy for 10 minutes which includes neck stabilization exercise that performed in a chin-in posture they performed isometric exercises in all sides of neck with the resistance given by the participant. They held all the movements for 10 seconds, 10 times for 3 sets, 3 days per week for 4 weeks.

Group B (Experimental Group):

Group B (experimental group) received axioscapular muscle activation exercise with conventional therapy for 20 minutes

Modified Prone Cobra: Participants were positioned on stomach, arms by side, and palms up toward ceiling. Then asked to retract and depress scapula. While maintaining scapular retraction and depression, the participant is instructed to slightly extend the thoracic spine and reach fingertips toward toes to assist with maintaining scapular depression. The position was maintained for 10 second, 10 times.

Prone Scapular Y: Participant was positioned on stomach on elevated surface. They were asked to elevate arm in scapular plane, thumb up, and elbow extended. The position was maintained for 10seconds, 10 times.

Supine punch: Participant was positioned on back, hand stacked on top of shoulder, and elbow extended. They were provide resistance by dumbbell and were asked to punch towards ceiling while maintaining elbow extension; and return back. The position was held for 10 seconds, 12 repetitions.

Punch Up Plus: Participant was positioned in push-up position, they were asked to retract scapula and then to protract scapula the position was maintained for 10 seconds 10 repetations.

Each exercise was performed for 3 sets, 3 times per week for 4 weeks.

Post-test assessment score was done using tragus to wall distance to measure neck alignment, visual analouge scale to measure pain, and surface electromyography of upper trapezius muscle to measure muscle activity in both groups after the rehabilitation program.

Outcome Measures: Targus to wall distance, Visual analogue scale, Surface EMG.

Targus to wall distance: The performer was standing with heels and buttocks against the wall (to prevent pivoting), knees extended and chin drawn in and the horizontal distance between the tragus, the auricular cartilaginous flap anterior to the external auditory meatus, and a wall were measured. The TWD can be measured on both the individual's right and left, and then an average can be calculated.

Visual Analogue Scale: Participants were asked to rate pain intensity by placing a mark on the VAS chart. The VAS was horizontally positioned with the extremes labeled''least possible pain'' and ''worst possible pain.'' One minute later, patients were asked to rate their pain severity again on a fresh VAS without reference to the first measurement.

Surface EMG: Surface EMG recording were taken of the upper trapezius muscle electrode was placed approximately 2 cm lateral to the midpoint between C7 and the acromion with the poles of the electrode parallel to the direction of the muscle fibers. After electrode placement, a 5-seconds rest recording was performed in order to eliminate basal noise from the recordings. Two series of isometric maximal and submaximal contractions were then randomly performed. Both series were composed of 3 contractions of 5 s each with an interval of 1 min between them. For the maximal series, manual resistance was applied and verbal encouragement was used. The submaximal series were performed while holding a halter of 1 kg. The subjects positioned arm at 90◦ abduction on the frontal plane, with hand facing down and the neck in neutral position

Materials Used : Pen, Pencil, Inch tape, Couch, EMG apparatus, Surface electrode, Gel, Consent form, Data collection sheet, VAS score sheet, Dumbell

Plan of Analysis: Paired T Test used to compare the pre and post test values of within the group on experimental and control group. Two Sample T Test used to compare the post test values of experimental to the control group.

Funding: Self-funding

RESULTS

Demographic Variables Distribution between Groups

Group	Age		Height		Weight	
	Mean	S.D	Mean	S.D	Mean	S.D
Experimental Group	20.75	1.71	159.20	5.00	52.55	5.21
Control Group	20.75	1.71	160.05	5.40	54.30	4.85

Table 1: Comparison of Mean and Standard Deviation of Demographic Variables of the Samples in the Experimental Group and Control Group**,** n = 40(20+20)

The above table shows that the mean age of samples in the Experimental Group was 20.75±1.71 and in the Control Group the means age of the samples was 20.75±1.71.

The mean height of samples in the Experimental Group was 159.20±5.0 and in the Control Group the means height of the samples was 160.05±5.40. The mean weight of samples in the Experimental Group was 52.55±5.21 and in the Control Group the means height of the samples was 54.30±4.85.

Gender Wise Distribution of Subjects between Groups

Group	Sex			
	Male		Female	
	F	%	F	%
Experimental Group	-	-	20	100.0
Control Group	-	-	20	100.0

Table 2: Frequency and Percentage Distribution of Gender of the Samples in the Experimental Group and Control Group n = 40(20+20)

The above table shows that the all 40 (100%) were female both in the experimental and control group.

Test	Pretest		Post test		Mean Difference Score	Paired „t" test & p-value
	Mean	S.D	Mean	S.D		
Experimental Group	5.95	1.23	3.15	1.27	2.80	t = 11.854, p = 0.0001 S***
Control Group	5.30	1.38	4.55	1.47	0.75	t = 7.550, p = 0.0001 S***
Mean Difference score	0.65		1.40		***p<0.001 S – Significant N.S – Not Significant	
Student Independent „t" test & p-value	t = 1.570 p = 0.125 N.S		t = 3.228 p = 0.003 S**			

Table 3: Comparison of Pre-Test and Post-Test VAS Scores Among the Samples within and between Experimental and Control Group , n = 40(20+20)

The above table shows the comparison of pre-test and post-test VAS scores within and between the experimental and Control group. Paired 't' test was computed to compare the pre-test and post-test VAS scores and student independent 't' test was computed to compare the pre-test and post-test VAS scores between the groups.

The pre-test mean score in the experimental group was 5.95±1.23 and the post-test mean score was 3.15±1.27. It was found that the calculated paired 't' test value for t=11.854 was found to be statistically significant p<0.001 level. This clearly infers that after the intervention among the samples significant reduction in the VAS pain scores was observed among the samples in the experimental group. The pretest mean score in the control group was 5.30±1.38 and the post-test mean score was 4.55±1.47. It was found that the calculated paired 't' test value for t=7.550 was found to be statistically significant p<0.001 level. This clearly infers that there was significant reduction in the VAS pain scores was observed among the samples in the control group.

The table also shows that the calculated student independent 't' test value for t=1.570 in the pre-test was not found to be statistically significant. This clearly infers that there was no significant difference in the level of VAS pain scores between the groups at the pre-test level.

Test	**Pretest**		**Post test**		**Mean Difference Score**	**Paired „t" test & p-value**
	Mean	S.D	Mean	S.D		
Experimental Group	12.24	1.24	10.17	1.18	2.07	t = 9.481 p = 0.0001, S***
Control Group	12.07	1.41	11.65	1.38	0.42	t = 11.672 p = 0.0001, S***
Mean Difference score	0.17		1.48		***p<0.001, S – Significant N.S – Not Significant	
Student Independent „t" test & p-value	t = 0.405 p = 0.688, N.S		**t = 3.635** **p= 0.001, S*** **			

Table 4: Comparison of Pre-Test and Post-Test Tragus to Wall Distance Within and between Experimental and Control Group, n = 40(20+20)

The above table shows the comparison of pre-test and post-test Tragus to Wall Distance within and between the experimental and Control group. Paired 't' test was computed to compare the pre-test and post-test Tragus to Wall Distance scores and student independent 't' test was computed to compare the pre-test and post-test Targus to Wall Distance scores between the groups.

The pre-test mean score in the experimental group was 12.24±1.24 and the post-test mean score was 10.17±1.18. It was found that the calculated paired 't' test value for t=9.481 was found to be statistically significant p<0.001 level. This clearly infers that after the intervention had significant reduction in the Tragus to wall distance scores was observed among the samples in the experimental group.

The pre-test mean score in the control group was 12.07±1.41 and the post- test mean score was 11.65±1.38. It was found that the calculated paired 't' test value for t=11.672

was found to be statistically significant p<0.001 level. This clearly infers that there was significant reduction in the Tragus to wall distance scores among the samples in the control group.

The table also shows that the calculated student independent 't' test value for t=0.405 in the pre-test was not found to be statistically significant. This clearly infers that there was no significant difference in the level of Tragus to wall distance scores between the groups at the pre-test level.

Test	Pre test		Post test		Mean Difference Score	Paired „t" test & p- value
	Mean	S.D	Mean	S.D		
Experimental Group	29.51	1.78	19.72	1.52	9.79	t = 26.715 p = 0.0001 S***
Control Group	29.41	1.73	24.30	1.69	5.11	t = 13.704 p = 0.0001 S***
Mean Difference score	0.10		4.58		*****p<0.001 S – Significant N.S – Not Significant**	
Student Independent „t" test & p-value	t = 0.182 p = 0.857 N.S		**t = 9.008 p = 0.0001 S*****			

Table 5: Comparison of Pre-Test and Post-Test Surface EMG (%MVC) Within and Between Experimental and Control Group, n = 40(20+20)

The above table shows the comparison of pre-test and post-test %MVC within and between the experimental and Control group. Paired 't' test was computed to compare the pre-test and post-test Tragus to Wall Distance scores and student independent 't' test was computed to compare the pre-test and post-test %MVC scores between the groups.

The pre-test mean score in the experimental group was 29.51±1.78 and the post-test mean score was 19.72±1.52. It was found that the calculated paired 't' test value for t=26.715 was found to be statistically significant p<0.001 level. This clearly infers that after the intervention had significant reduction in the %MVC scores was observed among the samples in the experimental group.

The pre-test mean score in the control group was 29.41±1.73 and the post- test mean score was 24.30±1.69. It was found that the calculated paired 't' test value for t=13.704 was found to be statistically significant p<0.001 level. This clearly infers that there was significant reduction in the %MVC scores among the samples in the control group.

The table also shows that the calculated student independent 't' test value for t=0.182 in the pre-test was not found to be statistically significant. This clearly infers that there was no significant difference in the level of %MVC scores between the groups at the pre-test level.

Post visual analogue scale	Number	Mean	S.D	Value of t statistic	d.f	Significance
Group A	20	4.55	1.47	3.228	38	0.003 **Significant**
Group B	20	3.15	1.27			

Table 6: Comparison of the Post Visual Analogue Scale Values of the Two Groups

The table shows that the calculated student independent 't' test value for t=3.228 in the post test was found to be statistically significant at p<0.01 level. This clearly infers that there was a significant difference in the level of VAS pain scores between the groups at the post test level in which the samples in the experimental group had significant reduction in the level of VAS pain scores than the samples in the control group.

Post tragus to wall distance	Number	Mean	S.D	Value of t statistic	d.f	Significance
Group A	20	11.65	1.38	3.635	38	0.001 **Significant**
Group B	20	10.17	1.18			

Table 7: Comparison of the Post Tragus to Wall Distance Value of the Two Groups

The table shows that the calculated student independent 't' test value for t=3.635 in the post test was found to be statistically significant at p<0.05 level. This clearly infers that there was a significant difference in the level of Tragus to wall distance scores between the groups at the post test level in which the samples in the experimental group had significant reduction than the samples in the control group.

Post surface EMG (%MVC)	Number	Mean	S.D	Value of t statistic	d.f	Significance
Group A	20	24.30	1.69	9.008	38	0.0001 **Significant**
Group B	20	19.72	1.52			

Table 8: Comparison of the Post Surface EMG (%MVC) Value of the Two Groups

The table shows that the calculated student independent 't' test value for t=9.008 in the post test was found to be statistically significant at p<0.05 level. This clearly infers that there was a significant difference in the level of %MVC scores between the groups at the post test level in which the samples in the experimental group had significant reduction than the samples in the control group.

DISCUSSION

The research was an experimental study which was conducted to investigate the effect of axioscapular muscle activation exercise on neck alignment, pain and upper trapezius muscle activity in female college students with forward head posture.

40 subjects those satisfying the inclusion criteria were received for the study. Subjects were then allocated to two groups. Group A (control) and Group B (experimental), 20 in each group, conducting subjects they do not know which group they belong to avoid bias in this study. Each group was well explained about the procedure of the intervention and the possible risk involved. A written informed consent from each subject was obtained. Subjects in Group A received conventional training neck stabilization exercise alone and subjects in Group B received axioscapular muscle activation along with conventional treatment. All subjects well tolerated the intervention given and no one was dropped out of the study. The outcome measurement was Tragus to wall distance, visual analogue scale and surface EMG [16].

All outcome measurements were collected before and after the intervention protocol. Statistical analysis was done using paired t test and two sample t test. The study result shows significant- difference in post-test group of experimental group and control group with 5% level of significance. So, there is statistically significant improvement in neck alignment pain upper trapezius muscle activity in female college students with forward head posture who received axioscapular stabilization exercise along with conventional treatment than control group who received conventional treatment alone. So, the null hypothesis is rejected and alternate hypothesis is accepted[17].

The anterior orientation of the cervical spine is known as forward head posture (FHP). When the head moves forward from the cervical spine from its typical position, it shifts the centre of gravity forward, putting inappropriate load on the cervical musculature and generating muscle imbalance. With a prevalence of 63.96 percent, it has been discovered that forward head position is quite common among college students. Due to a lack of understanding of proper postures, college students who spend three or more hours on the computer or on their phones typically assume incorrect postures[18].

According to studies, females are two times more likely than males to acquire FHP as a result of anatomical alterations. Neck flexion postures induce an increase in gravitational load moment on the cervical spine, which increases cervical extensor muscle activity and can cause muscle strain in the neck extensors if the posture is maintained for an extended period of time (Straker L et al). Younger and middle-aged students stretched their atlantoaxial joints and flexion of the lower cervical spine while using laptops, resulting in forward head position (Szeto et al 2002). The disparity in neck and shoulder musculoskeletal symptoms could be explained by gender differences in anthropometry and biomechanics. Neck flexion is more common in women at work, according to research[19].

The appropriate firing and recruitment of scapula stabilisers involving the serratus anterior and the upper, middle, and lower trapezius muscles, resulting in the normal mechanism of force couplings between muscles, is related with normal scapula mobility (Lindstrom et al 2011). It might be argued that because of the negative impact of this posture on head and neck biomechanics, and since the head moves ahead of its normal axis, the degree of torque on the posterior neck muscles increases for stabilisation (Haughie et al 1995). These muscles are then shortened over time as a result of maintaining this unfavourable posture for an extended period of time. As a result, greater stress on the neck's posterior muscles might result in myofascial pain[20].

When compared to normal subjects, patients with forward head posture had more anterior-tilted shoulder joints, lower serratus anterior muscle activity, and more scapular internal rotation during shoulder flexion (Wegner et al.2010). When the upper trapezius is shorted and the serratus anterior muscle is stretched as a result of forward head and rounded shoulder poature, it does not create enough upward rotation of the scapula during arm lifting, which increases the action of the anterior and middle deltoid muscles and puts more strain on the shoulder joints [21].

The trapezius muscles are necessary for scapula mobility, and the lower trapezius, in particular, is important for scapula stabilisation (Cools A et al 2007). Long-term upper trapezius hyper activation and shortening weakens the lower trapezius, resulting in muscular imbalance (Wright EF et al 2000). Selective activation of the weaker muscle sections with minimum activity in the hyperactive muscles is a key component in the correction of scapular muscle imbalances in patients. The balance ratios UT/LT, UT/MT, and UT/SA are particularly important since a lack of activity in the LT, middle trapezius (MT), and SA is usually paired with excessive usage of the UT (Cools AM et al 2007). Continuous muscle fibre contractions, which occur during repetitive work tasks, result in high local energy turnover and, as a result, an increase in intramuscular pressure around the fibres, reducing blood flow to the muscle fibres that require the most oxygen, lowering ATP production in the aerobic pathway, and causing inorganic phosphate accumulation. As blood flow diminishes, lactate outflow decreases, resulting in an increase in lactate level and acidity of the muscles. As a result, muscular contractility suffers, and muscle function suffers as a result [22].

After the intervention TWD, VAS and %MVC of upper trapezius muscle has been showed improvement in subjects of experimental group. (De Mey K et al 2013) in the study stated that axioscapular muscle activation exercise is a form scapular stabilization exercises which is effective in early rehabilitation and balance the movement of both trapezius muscles and scapula. It can also effectively increase the muscle activation of the serratus anterior and the lower trapezius, and reduces the muscle activation of upper trapezius thereby bringing down the compensatory movement caused by FHP. Scapular stability is assumed to have main role in reducing neck and shoulder pain and dysfunction. During scapular orientation, patients with MNP have altered dynamic scapular stability. Because of the intimate association between the neck and the scapula, scapular stabilization is becoming more popular among patients with NP[23].

Scapular stabilizing exercises target the muscles that attach to the scapula and arise from the skull and vertebrae, such as the trapezius rhomboid and serratus anterior. Scapular stabilization exercise is a recovery treatment for imbalanced scapular muscles caused by FHP[24].

Exercise of sufficient intensity and duration leads to release of peripheral and central beta-endorphins which have been associated with changes in pain sensitivity which in turn may be responsible for increase in pain pressure threshold. Scapular stabilization exercise can reduce the pressure applied to the shoulder joint by correcting the downwardly rotated scapula to its normal position and reducing the load of the upper trapezius and serratus anterior muscles. The upper trapezius muscle activity was higher in forward head and rounded shoulder posture than in the normal posture during isometric bending at 90° to 2 kg weight, and posture correction could reduce the muscle activity of the upper trapezius muscle[25,26].

Correction exercises for regions around the neck and scapula of patients with forward head posture help improve the recovery of positional distortion and muscle stiffness (Kim et al 2017). Activation of the lower trapezius muscle increases a tilt in the scapula occurs and reduces the upper rotation angle through scapula alignment (Lee JH et al2015). As activation of the serratus anterior increases it decreases the activation of the upper trapezius muscle and it is effective in raising of the scapula and stretching of the neck. Overall there is a positive effect on the improvement of the abnormal postures such as an opposite rotating movement[27-30].

Might be due to these effect axioscapular muscle activation exercise is effective in improving targus to wall distance, visual analogue scale and % MVC of upper trapezius muscle in female college students with forward head posture along with conventional therapy [31,32].

Limitations of the Study: Sample size was very small, Study duration was very short, Only females were undergone study.

Recommendations: Increase the number of subjects should be included in the study, EMG values of serratus anterior and lower trapezius muscle can be included to get the more accurate result, further studies can be conducted with other age group, Males participants can be included.

CONCLUSION

The study was to evaluate the effect of axioscapular muscle activation exercise on neck alignment, pain and upper trapezius muscle activity in female college students with forward head posture. The result of the study shows that there is statistically significant difference between experiment group and control group. After analyzing the study it can be concluded that axioscapular muscle activation exercise helps in improving neck alignment, reduce pain and reduce the over activity of upper trapezius muscle in female college students with forward head posture.

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