EFFECT OF CORRECTIVE EXERCISE PROTOCOL ON FORWARD HEAD POSTURE IN JUNIOR COLLEGE GIRLS.

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ABSTRACT

Background: With increased sedentary lifestyle and ever-growing hours spent in front of electronic media screen such as computers smart phones etc. seems to be causing development of forward head posture, which previously was visible primarily in older population. Now, however, is affecting even the younger population too. The purpose of this study is pointedly focused on age group of 16-19 years since the IT revolution has changed the nature of work and its requirement than that of previous generation. This study also aims to analyse the effect of corrective exercise protocol on forward head posture in girls belonging to the age group 16-19 years. Since, Forward head posture in girls can be attributed to two main causes that are breast hypertrophy and psychosocial burdens associated with breast hypertrophy. **Method-** Junior college girls within age group 16-19 years, participants willing to participate in study, Participants with forward head posture having craniovertebral angle less than 48^0.**Material-** Junior college girls with forward head posture, Data collection sheet, Consent form, Inch tape, Table, Tripod stand, Mobile camera, Marker for C7 spinous process, Pen, MB ruler software version: MB ruler Pro. **Result**-Craniovertebral angle (CVA)score before giving corrective exercises was 43.30±1.32 which is increased to 49.23±0.64. P value by paired t test is found to be 1.33E-58 which is considered significant. it shows there is significant difference seen between pre and post-tests. **Conclusion**- The CVA score which is the crucial parameter to assess the efficiency of the protocol, has increased significantly from 43.30±1.32 to 49.23±0.64 as well as P value by paired t test to 1.33E-58 which indicates significant improvement between pre and post-test. Therefore, on the basis of the scientific analysis done hereinabove, it is safe to conclude that corrective exercise protocol is effective in increasing craniovertebral angel leading to reduction of forward head posture in junior college girls.

Keywords: Corrective exercise protocol, Forward Head Posture, Junior College Girls, Craniovertebral angle.

INTRODUCTION

Musculoskeletal disorders are the most common reason for long-term incapability [(1)]. With the increased sedentary lifestyle and ever-growing hours spent in front of the screen, is being seen to be causing development of forward head posture. Previously it was visible primarily in older population. Now however is affecting even the younger population too. The purpose of this study is pointedly focused on age group of 16-19 years since the IT revolution has changed the nature of work and its requirement than that of previous generation [(2)].

This study also aims to analyse the development of forward head posture in the girls belonging to the age group 16-19 years, since Forward head posture in the girls belonging to, two main causes, Breast hypertrophy is common medical condition whose morbidity has increased over decades. While the exact definition of breast hypertrophy is unclear, it is characterized by an increase in the volume and weight of breast tissue beyond normal proportion [(3)].

Psychosocial burdens are also associated with Forward head posture. Unnatural and awkward posturing through forward bending, shoulder protraction, elevation and internal rotation of scapula in order to avoid unwanted attention and social annoyance[(3)].It is therefore is of utmost importance to analyse the effectiveness of corrective exercise protocol in younger age group of 16-19 years, if left untreated or without timely interventions which may lead to grave physical conditions affecting their personal and social life, resulting in low self-esteem and hampering the quality of life. Forward head posture is most prevalent with low back pain along with neck pain neck pain is the next disorder with a 1-year prevalence of around 37% (range: 17%-75%[(4)]. Several studies have shown that corrective exercise regimes can improve Forward head posture and potentially related symptoms. For example- exercise training protocols have resulted in improvement in craniovertebral angle, head tilt, cranial and cervical range of motion, neck disability and pain [(4)]. Early intervention with exercises can benefit the Patient. Also, awareness regarding same may help the patient. Forward head posture is characterised by head position in sagittal plane being forward relative to the neck. Forward head posture is associated with hyperextension of upper cervical spine (C1-C3) and flexion of lower cervical spine (C4- C7). Forward head posture is pathological when the craniovertebral angle i.e. CVA is less than 48° [(4)] Forward head posture it is associated with shortening of the upper trapezius, posterior cervical extensor muscles (sub-occipital, semispinalis, and splenii), sternocleidomastoid, and levator scapulae muscles [(2)]. It is suggested

that FHP leads to an increase in the compressive forces on the cervical apophyseal joints and posterior part of the vertebra and to changes in connective tissue length and strength resulting in pain [2]. External auditory meatus positioned anterior to the plumb line through Shoulder joint[5].in forward head posture the Height of the eye sight becomes low which causes Exaggerated anterior curve and exaggerated posterior Curve in the upper thoracic vertebra [5]. Forward head posture leads to lengthening and weakness of the anterior cervical muscles and Shortening of posterior cervical muscles [2]. It is frequently associated with a protracted, anteriorly tilted, and internally rotated scapula and with a tightness of the pectoralis minor muscle, shoulder modifications that can be associated with pain.

Affected Population- Forward head posture is common postural deviation in people of all ages, from childhood to old age (1-6). Forward head posture is becoming increasingly common in Leaning forward posture particularly with the Popularization of smart phone. Some 56% of the population of the United States use a smart phone, and the average time spent on a smartphone per day is 5.1 hours. Epidemiological studies have reported high prevalence of spinal postural deviation in children and adolescent girls [2].

Prevalence – Prevalence of forward neck posture occurring in young and older adults is 66% [5]. Kyphosis 38% Occurring in older adults and it leads to neck dysfunction [5]. Thoracic kyphosis affects indirectly on Cervical flexion in 70% of the population [5]. This Imbalance in cervical muscles result in postural Misalignment and excessive load in muscles and joints [5].

Cause – Because of increased use of electronic gadgets (smartphones, computer) in day to day activities at work place, breast hypertrophy, psychosocial burden in Junior College girl's, there are postural changes which Causes neck pain and reduction in craniovertebral angle. Smartphone users in Korea usually spend an average of 4.1 hours a day on their Smartphone[5]. Prevalence of Smartphone addiction is 84% the Smartphone penetration rate was greater in teenagers Than in older adults' groups [5]. Individuals who use Smart phones for an extended period of time are at Risk of developing cumulative trauma disorder, which Is produced by holding the same position for an Extended period of time. Because the head weighs One-seventh of one's body weight, sustaining a Position with the head leaning forward needs 3.6 Times more force than keeping the same position with straight standing posture [5].Breast hypertrophy. Psychosocial burdens are also associated with Forward head posture. Unnatural and awkward posturing through forward

bending, shoulder protraction, elevation and internal rotation of scapula, in order to avoid unwanted attention and social annoyance[3].

Signs and symptoms – Reduced craniovertebral angle, Neck pain, Reduced strength of cervical muscles.

Management - Corrective exercise is one of the interventional method that had been suggested for treatment of forward head posture[5].To correct Forward head posture, stretching of the shortened upper trapezius, sternocleidomastoid, and levator scapulae and strengthening of the deep cervical flexor muscles have been found to be effective, whereas PT treatment most often is based on strengthening of the scapular stabilizers and rotator cuff muscles and stretching of the anterior musculature, namely, the pectoralis minor[2].Including stretching, strengthening and movement control exercises, there may be advantages in exercising adjacent body segment to cervical spine, such as thoracic spine, to enhance effectiveness of exercise training on Forward head posture[5].

Outcome measure – Craniovertebral angle.

METHODOLOGY

The study protocol will be presented for approval in front of institutional ethical Committee and Protocol committee of D Y Patil University Kolhapur, after that Consulting subjects will be Approached and purpose of the study will be explained. Written consent will be taken for Subjects willing to participate. Participants with Forward head posture will be selected based on participants who are ready to give consent form, who are fulfilling inclusion criteria. This was experimental study, the sample size is calculated by using prevalence: Prevalence of Forwarded Head Posture is 66%. Using convenient sampling method for a period of 6 months at Rajarshi Chhatrapati Shahu Junior College, Kadamwadi, Kolhapur, method of collection data Primary data collection. Data analysis was done using Paired t test (Pre and Post).

Inclusion criteria- Age (16-19 years), participants with Forward head posture having craniovertebral angle less than 48°, participants who have given written consent form. Exclusion Criteria-Exercises performed in addition to other interventions or medications for participants with

Forward head posture, spine surgery in last 1 year**. Outcome measures- Craniovertebral angle.** 2 Tests are performed PRE-TEST – pre-test is taken before starting corrective exercise protocol. POST-TEST – post-test is taken after giving corrective exercise protocol for 3 months. TEST POSITION: Participant is in standing position while later aspect of her body facing towards camera. TEST: Photograph is taken from lateral aspect of participant. By using this photograph Craniovertebral angle is measured by using MB ruler Pro application. RESULTS: Craniovertebral angle 48^0-50^0 is considered as normal. Craniovertebral angle $<48^0$ indicates that, participant have forward head posture (FHP). Brief introduction will be given to the participants and then initial examination like demographic data such as Name, age, height, weight will be taken. Further, with the permission of the patient and by maintaining the privacy of the patient assessment will be done. Assessment will be taken in two phases i.e pre and post giving corrective exercise protocol. Here craniovertebral angle of patient is measured by using MB ruler software version: MB ruler pro. Digital imaging technique will be used to Evaluate head and neck posture in Standing position. A mobile will be paced at a distance of 150 cm on a Tripod stand and height will be adjusted According to the level of the subjects Shoulder. Adjust the camera parallel to the Ground The subject will be asked to stand in front of camera and ECG vacuum cup will be Placed on participant's C7 spinous Process, the participant will be asked to Face straight and lateral to camera. The photo will be clicked, and transferred to laptop and then opened in to jpg Format with the MB ruler software Placing the points of the MB ruler on the Photo on C7 spinous process where the marker will be placed. The line will be drawn from spinous Process to tragus of ear and the angle will be measured. measuring of the craniovertebral angle: intersection of a Horizontal line passing through C7 Spinous process and the line joining the Midpoint of the tragus of ear is identified as craniovertebral angle.) smaller the craniovertebral angle more is the forward head posture.

Data will be collected and inputted on an Excel spread sheet the data will be analysed Using appropriate test. Strengthening exercises and postural correction will be given as Conventional Physiotherapy management, such as follows: Chin tucks were performed while lying supine with the head in touch with the floor, which progressed to lifting the head off the floor in a tucked posture and holding it for varied periods of time (this was to progress by two-second holds starting at two Seconds, i.e., 2, 4, 6, and 8 s. During the session, patients completed five chin tuck

Repetitions and five to seven sets of five chin tucks with a 1-min rest between each presents this exercise. Chin drop while sitting to stretch cervical extensors (the progression of this exercise Was to drop the chin with hand assistance). The participants were instructed to flex the neck until a good stretch was felt at the base of the head and top of the neck. The participant held the final position for 5 s. This chin drop exercise was repeated a total of 10 times, or as tolerated. A modification of the chin tuck that further emphasizes strengthening of the deep neck flexor muscles is to apply resistance with a hand placed under the tucked chin and apply light downward pressure into the hand, or by adding manual resistance to the forehead using the 5-s hold time approach. demonstrates this exercise maneuver. Pulling the shoulders back using a resistance band while standing to strengthen the shoulder retractors. The participants were instructed to squeeze their scapulae together tightly for at least 6 s without elevating or extending their shoulder. The initial progression step was to use weights to do shoulder retraction from a prone posture. The second stage involved the use of elastic resistance and weights. Each progression was carried out by the participants for two weeks. At the consultation, they were moved to the second progression if they could complete three sets of 12 repetitions, with 2 min of rest in between, accurately for appropriate strengthening. demonstrates this Exercise maneuver. Every two weeks, participants alternated between unilateral and bilateral pectoralis stretches. The participant was seated comfortably with their hand behind their head for bilateral pectoralis stretching. From this posture, the participant's elbow was pushed up and out to the limit of its possible range. The arm at the affected location was shifted into abduction and external rotation for unilateral stretching. The end position was maintained for 20–30 s and repeated 3–5 times. For unilateral stretching, the participants were directed to bring their hands up such that their forearms and elbows rested on the side of the doorway. The elbow and shoulder should be at a 90-degree angle. the Participants were encouraged to move his or her body toward the opposite side away from the doorway until a stretch was felt anteriorly between the chest and shoulder. Each Stretch was performed with slow, steady movements without any bouncing. The same process was repeated on the opposite side. This posture was maintained for 20–30 s and repeated 3–5 times. Two sets of 3–5 repetitions of unilateral self-stretching with a 1-min rest were performed for each participant. Biofeedback by using mirror. Self-Myofascial release MFR) by using ball, patient in standing position, facing towards wall. Ball is placed between pectoralis muscle and wall. Upper limb is placed in 90°abducted position. Instruct the patient to not to let the ball, fall or slip downward. W,Y, T

stretch of pectoralis muscle. Upper trapezius stretching, Ergonomic advice- use pillow with appropriate height (4-6 inches).

RESULTS

TABLE 1. Demographic data of Junior College Girls.

Variables	Mean	SD
Age (in years)	17.09	0.73
Height (in cm)	155.72	6.60
Weight (in kg)	46.25	9.52

TABLE 2. Craniovertebral angle before and after giving corrective exercise protocol to Junior College Girls.

Craniovertebral Angle	Mean	SD	P Value
Before giving corrective exercises	43.30	1.32	1.33E-58
After giving corrective exercises	49.23	0.64	

GRAPH 1. Pre Post Comparison of Craniovertebral Angle

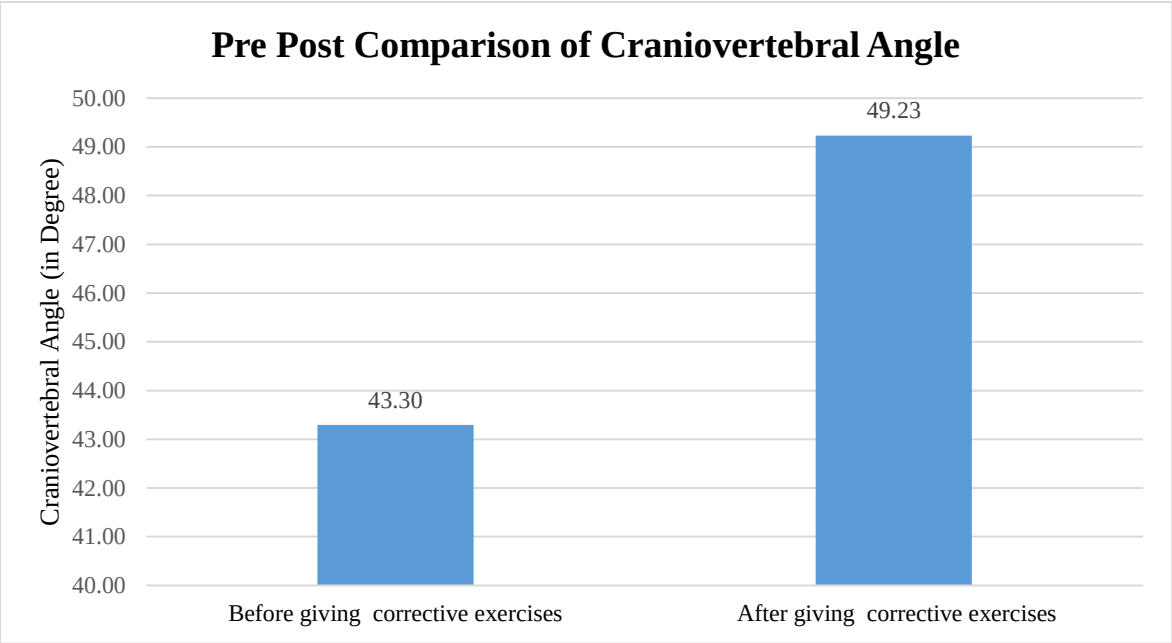

Table 2 and Graph 1 represents the improved values of Craniovertebral angle. pre intervention 43.30 ± 1.32 to post intervention 49.23 ± 0.64 (p value= 1.33E-58)

DISCUSSION-

Forward head posture is a type of postural abnormality where head is positioned Anteriorly in relation to vertical line passing from body's center of gravity. Forward head posture is common in teenager girls. It is being seen that, prevalence of forward head posture is increasing. According to Aisha Salim Suwaidi et al.[6] FHP has been shown to be a common postural displacement, with a conservative estimate of 66% of population. Due to late intervention it leads to postural abnormality, pain, poor lifestyle. Therefore, early management is important. Early and effective initiation of movement with stretching and strengthening exercises should be done in early days during growth period to avoid complication and better prognosis.

In present practice, patient with forward head posture left untreated without intervening and expected to recover itself which leads to poor quality of life. Therefore, early intervention

providing corrective exercise protocol is necessary. This study intended to find out, Effect of corrective exercise protocol on forward head posture in junior college girls. Annie Janet et al.[5] conducted study on prevalence of forward neck posture and influence of smartphone in physiotherapy students concluded that students with forward neck posture were found to have decreased craniovertebral angle and range of motion in comparison to student with normal neck posture while using smart phones for 5-6 hours per day. Whereas in present study the participants included have CVA less than $48^0$are included. Forward head posture in the girls belonging to, Breast hypertrophy and Psychosocial burdens associated with Forward head posture. This study mainly focuses on adolescent junior college girls. Previous studies were done on young and old adults, teenagers with specific group of exercises and for short time period. Adolescent girls are more prone to have forward head posture and related pain compared to same age group of boys. Michelle B. Sabick et al.[3] says thatpsychosocial burdens are associated with breast hypertrophy report feelings of embarrassment as a result, Unnatural and awkward posturing through forward bending, shoulder protraction, elevation and internal rotation of scapula, in order to avoid unwanted attention and social annoyance, corrective exercises were given to the participants with forward head posture for 3 months. Corrective exercise protocol consists of stretching exercises, Strengthening exercises, biofeedback by using mirror, Self MFR using ball, Ergonomic advice to use appropriate height of pillow. N. Yozbatiran et al.[9] reported in their study that physiotherapy protocol applied on neck or back pain patients had positive effect on weakness of erector spinae of upper Back and trapezius muscles It influence the postural malalignment. Similar to the present study. According to Aisha Salim Suwaidi et al.[6] mirror image refers to the reversal of spine and posture in opposite direction of present malalignment during the performance of rehabilitative procedures. It their study it shown statistically significant improvement ($P < 0.001$) similar to present study. Kim et al.[7] stated that McKenzie exercise, Kinesio taping, and myofascial release were effective in improving the CV angle contributing to the forward head posture. Katherine Harman et al.[12] performed study on Effectiveness of an Exercise Program to Improve Forward Head Posture in Normal Adults. He stated stretching exercises for the 10-week period are effective in improving CVA. There were significant differences and interactions ($p<0.05$) between pre and post-tests for range of motion.

In the present study physical therapy protocol was focused mainly on range of motion, flexibility of muscle and postural alignment. As mentioned above, nine kind of exercises applied to 87 participants with FHP for 12 weeks. Findings of this study shown reduction in FHP in adolescent girls. found statistically significant differences in CVA. Conventional exercises are given in combination with some new exercise technique such as Biofeedback using mirror, self MFR using ball, ergonomic advice to use proper height of pillow. Pre and post exercise measurements of FHP were obtained by measuring CVA. CVA is measured from sagittal plane using MB ruler pro app. However, this protocol shown good improvement in musculoskeletal dysfunctions. Findings of this study shown reduction in FHP in adolescent girls. CVA score before giving corrective exercises was 43.30±1.32 which is increased to 49.23±0.64. P value by paired t test is found to be 1.33E-58 which is considered significant. it shows there is significant difference seen between pre and post-tests. In this study an attempt was made to analyse the effect of corrective exercise protocol on forward head posture in Junior college girls. The results show significant improvement in post-test. It shows that, corrective exercise protocol has significant effect on increasing craniovertebral angle and reducing forward head posture.

CONCLUSION

The CVA score which is the crucial parameter to assess the efficiency of the protocol, has increased significantly from 43.30±1.32 to 49.23±0.64 as well as P value by paired t test to 1.33E-58 which indicates significant improvement between pre and post-test.

Therefore, on the basis of the scientific analysis done hereinabove, it is safe to conclude that corrective exercise protocol is effective in increasing craniovertebral angel leading to reduction of forward head posture in junior college girls.

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