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EFFICACY OF STRETCH TRAINING CORRECTIVE EXERCISE ON CERVICAL CURVATURE ANGLE IN HIGH SCHOOL STUDENTS

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Abstract
Nowadays many people have head forward posture that causes serious problem on neck injuries. Forward head posture is a clinical entity that has been identified by multiple authors as a significant factor in a variety of musculoskeletal pain syndromes. This can cause headaches, muscle pain, bad posture and more. Therefore, this study tries to help and train high school students about forward head effects for prevention of neck injuries, they might face in future. The main aim was to study the effect of stretch training program along with corrective exercise on cervical curvature angle on secondary high school students. 10 CBSE schools in Mysore were approached out of which 7 schools agreed for the study to be conducted. The sample size was 100 students selected from these schools studying in class 8, 9 and 10. The ruler measurement method and Craniovertebral angle measurement technique was used to measure Forward Head Posture in the respondents. The hypothesis was tested through one-way ANOVA and paired sample t-test using SPSS and desired results were obtained.
Keywords: Neck Pain, Forward Head Posture, Cervical Curvature Angle, Stretching exercise

Introduction
Posture is the position assumed by the body either with support during muscular inactivity, or by means of the coordinated action of many muscles working (i.e. during muscular activity) to maintain stability or to form an essential basis which is being adapted constantly to the movement which is superimposed upon it. In an ideal erect posture, the body segments are aligned so that the torques and stresses are minimized and standing can be made with minimum energy expenditure. Other postural variants include Sway Back Posture and Hyperlordosis Lumbar spine. A forward head posture (FHP) or poking chin involves increased flexion of lower cervical vertebrae and the upper thoracic regions, increased extensions of upper cervical vertebrae and extension of the occiput on C1. The FHP is considered to co-exist with hyper-extension of the upper cervical spine, flattening of lower cervical spine, rounding of upper back, and elevation and protraction of shoulders. FHP may result in craniofascial pain, headache, neck ache and shoulder pain together with decreased range of cervical motion, muscle stiffness and tenderness. The causes of FHP were effect of gravity such as slouching, poor ergonomic alignment and occupational posture such as forward or backward leaning of head for long durations, slouched or relaxed sitting, faulty sitting posture while using computer or screen. FHP is also found to be a result of other faulty posture like pelvic and lumber spine posture. Sleeping with the head elevated too high and bending posture in order to write, read or text maintained for long durations leads to FHP and lack of development of back muscle strength. The spine, or backbone, is made up of small bones (vertebrae) stacked -- along with discs -- one on top of another. A healthy spine when viewed from the side has gentle curves to it. The curves help the spine absorb stress from body movement and gravity. The normal spine is structurally balanced for optimal flexibility and support of the body's weight. When viewed from the side, it has three gentle curves. The lumbar (lower) spine has an inward curve called lordosis. The thoracic (middle) spine has an outward curve called kyphosis. The cervical spine (spine in the neck) also has a lordosis. These curves work in harmony to keep the body's center of gravity aligned over the hips and pelvis. When viewed from behind, the normal spine is straight. Abnormal curvature in the spine can put it out of alignment. Abnormal curvature seen from the side is called sagittal imbalance. Types of sagittal imbalance include kyphosis, flatback syndrome, and chin-on-chest syndrome. Abnormal curvature of the spine

seen from the back is called scoliosis. To improve the motion of cervical curvature, stretching training provided which is a form of physical exercise. A specific muscle or tendon (or muscle group) is deliberately flexed or stretched in order to improve the muscle's felt elasticity and achieve comfortable muscle tone. The result is a feeling of increased muscle control, flexibility, and range of motion. Stretching is also used therapeutically to alleviate cramps.

Methodology

One hundred school going children of the age group 13–16 years from 7 CBSE schools in Mysuru, Karnataka were included in this cross-sectional survey study. After obtaining a voluntary signed assent, the neck was exposed and colored markers were placed on C7 vertebrae and the tragus of the ear. A photograph was taken, which was then digitized to calculate the cranio-vertebral angle (CVA) which is used to measure FHP. In all 200 male students who were screened, out of them 150 males (75%) had FHP. Mean CVA was found to be 42.9° ± 7.43°.

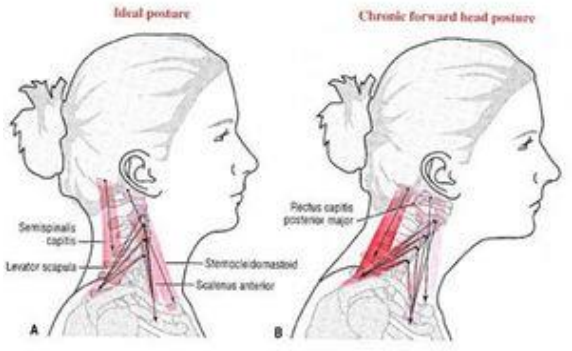


Figure 1: Showing Ideal posture and Chronic Forward Head Posture

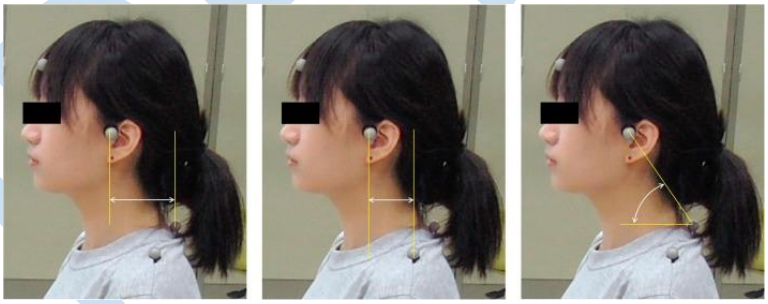


Figure 2: Measurement of Cranio Vertebral Angle

The study was undertaken with the purpose to collect the information regarding the effect of training program on cervical spine disorder. The methodology informs about the whole procedure of the study in detail as well as the tools used for this study, their reliability, validity etc. This also deals with the proper method of the study, which is experimental in nature, on the basis of the objectives of the study and as per the formulated hypotheses. The methodology adopted by the researcher, for collecting the data required for the study, includes the following:In carrying out the study, primary sources of information were through observation and questionnaire. The reference period in carrying out the present study was identified as 12 weeks. The population decided for the investigation was 14 to 16 years old, male students of top ranking CBSE high schools in Mysuru city who were suffering with head forward disorder. The researcher listed out around 100 students from among the schools is divided to 3 groups as: 50 student stretch training and 50 student

for controlThe selected subjects were randomly assigned into the McKenzie exercise group (MEG), the self-stretch exercise group (SSEG), The selection criteria were 0 to 53% or lower according to cranio vertebral angle (CVA). 12-week intervention was applied after a pre-test and post-test. To compare the forward head posture, CVA was used. To measure the RSP, the scapular index was used. Sufficient explanation was given to the subjects to follow the correct method. The exercise manual and the exercise logbook was distributed to the subjects to follow the correct exercise program and to record the exercises once they were done. The subjects were observed periodically to check whether they have conducted the exercises.

Measurement procedure

The cervical curvature angle was measured using a CHEK Forward Head Caliper. This measurement was to assess head deviation from a neutral position. Faulty posture of the head was a contributing factor to the onset and continuation of many postural imbalances. The force of gravity caused an increase in neck tension, deformations with teeth, TMJ disorders, headaches and premature degeneration at the base of the spine. Poor posture is a faulty relationship which induces strain and is less efficient in balancing the body over its base of support.

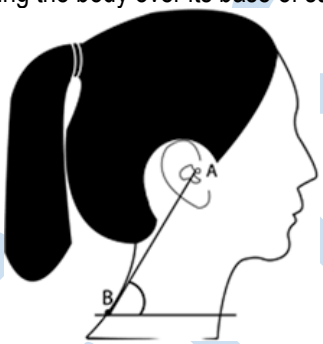


Figure 3: Method of measurement of CVA

Results

TABLE 1
OVERALL DESCRIPTIVE STATISTICS FOR ALL RESPONDENTS

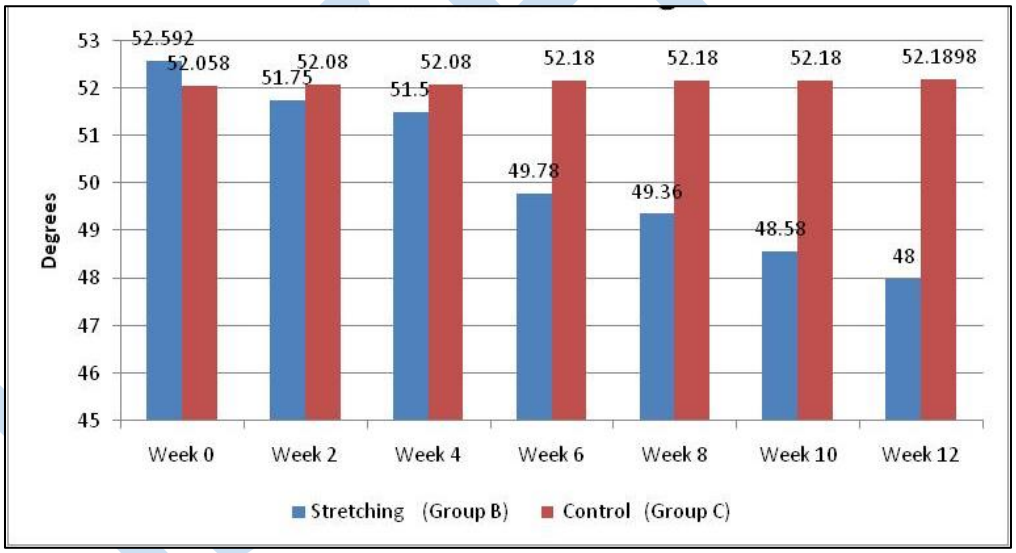
	N	Minimum	Maximum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
Age (years)	100	13	16	14.07	0.06	0.748
Height (cms)	100	148.00	178.00	161.90	0.55	6.85
Weight (Kgs	100	31.80	67.00	48.89	0.64	7.89
BMI (Kg/m2)	100	11.82	28.44	18.69	0.25	3.13
CVA (at Start)	100	47.00	61.00	52.20	0.27	3.40

The above table 1 gives the descriptive statistics of the subjects of study. 100 respondents were chosen from 7 different CBSE schools who belonged to the Stretch Exercise Group and Control Group (No Execrcise). The mean age of was fund to be 14.07 years with mean std. error of 0.061 and standard deviation of 0.748. The value of SD for age is 0.748 which is low indicates that the values are close to mean. The SEM is always smaller than the SD. Smaller means more precise / accurate data. The value of SEM is 0.061 which is small. The mean height of the 100 respondents was found

to be 161.9067 cms with minimum height 148.00 cms and maximum height 178.00 cms, SD = 6.85257 and Std. mean error = 0.55951. The mean weight of the 100 respondents was found to be 48.8927 kgs with minimum weight 31.80 kgs and maximum weight 67kgs, SD = 7.89437 and Std. mean error = 0.64457. The mean BMI of the respondents was found to be 18.6952 kgs/m2 with minimum BMI 11.82 kgs/m2 and maximum BMI 28.44 kgs/m2, SD = 3.13471 and Std. mean error = 0.25595. Reports show that a BMI between 25 to 29.9 is considered overweight. Anything over 30 is considered obese. Normal BMI is between 18.5 and 24.9. The mean study value of BMI was calculated to be 18.6952 kgs/m2 which shows that majority of the respondents were healthy except in a few cases were the BMI was 28.44 kgs/m2. The mean CVA (cranio-vertebral angle) of the respondents was found to be 52.20930 with minimum CVA 470 and maximum CVA 610, SD = 3.40606 and Std. mean error = 0.27810.

TABLE 2
MEAN CVA FOR 12 WEEKS FOR GROUP B (STRETCH EXERCISE) AND GROUP C
(CONTROL GROUP – NO EXERCISE)

Type of Exercise	Week 0	Week 2	Week 4	Week 6	Week 8	Week 10	Week 12
Stretching (Group B)	52.592	51.75	51.5	49.78	49.36	48.58	48
Control (Group C)	52.058	52.08	52.08	52.18	52.18	52.18	52.1898



Graph 1: Cervical Curvature Angle – Group B (Stretch Exercise) & Group C (Control Group)

As can be seen from the above table the CVA was measured before the start of the training that is week 0. 1o0 high school students were taken as the subjects for the study grouped into Group B who were asked to perform Stretching exercise shown as per the exercise chart for 12 weeks. Different exercises and duration of each exercise was given in the form of a chart to the subjects. Group C the Control Group were not asked to perform any exercise.

Each week the CVA was measured and recorded for each respondent in each group. Above table shows the mean CVA for the respondents (50) measured bi-weekly for 12 weeks. As can be seen from the above table mean CVA for Group B was found to be 52.592, 51.75, 51.5, 49.78, 49.36, 48.58, 48.0. It can be noted that the stretching exercise

which did not involve movement of the muscles was not as effective as the strengthening exercise. Group C the control group who were the passive group showed no improvement in the CVA measurements and in some cases the mean CVA had increased. The mean values for Control group over 12 weeks were 52.058, 52.08, 52.08, 52.18, 52.18, 52.18, 52.1898. There is no significant effect of stretch training corrective exercise on cervical curvature angle of secondary high school students.

To test the hypothesis paired sample t test is used. The measured values of CCA at the start of the study (week 0) pre test values are compared with the measured values of CCA at the end of the study(week 12) post values after the students were put on an Stretch Training exercise for 12 weeks . The results of the paired sample t-test are shown in the table below:

TABLE 3(A)
PRE AND POST GROUP B (STRETCHING EXERCISE)

	Pre	Post
Mean	52.592	48
Variance	13.545649	11.71429
Observations	50	50
Pearson Correlation	0.79580097	
Hypothesized Mean Difference	0	
df	49	
t Stat	14.224212	
P(T<=t) one-tail	2.5266E-19	
t Critical one-tail	1.67655089	
P(T<=t) two-tail	5.0533E-19	
t Critical two-tail	2.0095752	

The mean value of CCA pre exercise is 52.592 and post strength exercise is 48

The variance of the sample is 13.545648 pre exercise and 11.71429 post exercise

The value of Pearson Correlation is 0.79580097 which indicates the two data set pre and post strength exercise are highly negatively correlated

P(T <= t) two tail (0.000000) gives the probability that the absolute value of the t-Statistic (14.224212) observed is larger in absolute value than the Critical t value (2.00957). Since the p – value is less than our alpha, 0.05, we reject the null hypothesis that there is no significant effect of stretch training corrective exercise on Cervical Curvature Angle of Secondary High School students.

TABLE 3(B)
ONE-WAY ANOVA (STRETCHING EXERCISE)

Source of Variation	**SS**	**df**	**MS**	**F**	**P-value**	**F crit**
Between Groups	2952.52	6	492.08	3.06	0.048	2.12
Within Groups	158869.64	343	463.17			
Total	161822.16	349				

From the above One-way ANOVA Table the F calculated value (3.0624) is greater than the F critical (2.125037) and also p value is (0.048624) is less than p<.05. Hence it is concluded that there is a significant effect of stretch training exercise on CCA of secondary High School students.

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Hence, Alternative Hypothesis that there is significant effect of stretch training corrective exercise on Cervical Curvature Angle of Secondary High School students is accepted.

TABLE (4)
GROUP C (CONTROL GROUP) DATA PRE AND POST TRAINING

	Variable 1	**Variable 2**
Mean	52.05	52.18
Variance	11.30	11.33
Observations	50	50
Pearson Correlation	0.97	
Hypothesized Mean Difference	0	
df	49	
t Stat	0.31	
P(T<=t) one-tail	0.37	
t Critical one-tail	1.67	
P(T<=t) two-tail	0.75	
t Critical two-tail	2.00	

The mean value of CCA pre exercise is 52.05 and post strength exercise is 52.18
The variance of the sample is 11.30 at the start of study and 11.33 at the end of 12 weeks
The value of Pearson Correlation is 0.97 which indicates the two data set at start and at the end of 12 weeks are strongly positively correlated
P(T <= t) two tail (0.37) gives the probability that the absolute value of the t-Statistic (0.31) observed is smaller in absolute value than the Critical t value (2.00). Since the p – value is greater than our alpha, 0.05, we accept the null hypothesis that there is no significant change in Cervical Curvature Angle of Secondary High School students for the Control group.

Conclusion

Sitting posture during writing matters for a child and it is a cause to worry if a child has hunched over his desk with his upper body held up by one bent elbow, legs stretched out under the desk in front of him, and his face almost touching the paper as his writing arm's elbow is spread way out across the desk. Poor posture while sitting can put stress on your muscles, joints and ligaments. When children have unstable posture, they end up using excess energy to maintain their stability and balance. This can affect how they function and decrease their ability to complete fine motor tasks, school work and even to listen. When it is observed, it should be ensured that the child is sitting up straight as it has large impact on a child's fine motor skills and abilities.Poor posture is identified if the child has a forward head position in relation to upper body, Hunched upper back, winging-sticking out shoulder blades, Arched lower back and sticking out belly, inward knee ankle position and in-toeing / pigeon walk. Thoracic hunching in students requires flexing of the thoracic facet joints. After sufficient time and load, they can freeze and lock in this position. The collagen of the surrounding ligaments, fascia and joint capsules will shorten down around the immobile joints, reinforcing the hunched hypomobile section of spine. The most effective solution for a hunched back is exercises such as stretching and strengthening. The hypothesis was tested through one-way ANOVA and paired sample t-test using SPSS which found that there was an effect of stretch training program along with corrective exercise on cervical curvature angle on secondary high school students. The study found that while the lower cervical spine may experience greater loads with forward head posture, it should also be noted that compressive forces are increased on all of the discs and joints throughout the cervical spine. Furthermore, the specific cervical levels that experience the largest increase in

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compressive loads can vary from person to person. Degenerative changes to the cervical intervertebral discs are commonly accompanied by degenerative changes to the cervical facet joints.

References:

Lee et al, "The Relationship Between Forward Head Posture and Temporomandibular Disorders", Journal of Orofacial Pain, Vclutiieg, Number2, 1995

Amr Almaz Abdel-aziem, Amira Hussin Draz, "Efficacy of deep neck flexor exercise for neck pain: a randomized controlled study", Turk J Phys Med Rehab 2016;62(2):107-115 DOI: 10.5606/tftrd.2016.84565 ©Copyright 2016 by Turkish Society of Physical Medicine and Rehabilitation

Kage, Vijay., Patel, Nishita Y. and Mangala P. Pai, "To compare the effects of deep neck flexors strenghtning exercise and mckenzie neck exercise in subjects with forward neck posture: a randomised clinical trial", Int J Physiother Res 2016;4(2):1451-1458. DOI: 10.16965/ijpr.2016.117

Thakur, Deepmala & Motimath, Basavraj & Raghavendra, M.. (2016). Forward Head Posture Correction Versus Shoulder Stabilization Exercises Effect on Scapular Dyskinesia and Shoulder Proprioception in Athletes an Experimental Study. International Journal of Physiotherapy. 3. 10.15621/ijphy/2016/v3i2/94887.

https://www.physio-pedia.com/Forward_Head_Posture

https://www.spine-health.com/conditions/neck-pain/forward-head-postures-effect-neck-muscles

https://www.ncbi.nlm.nih.gov/pubmed/7488986

https://clinicaltrials.gov/ct2/show/NCT04216862

https://www.verywellhealth.com/neck-exercise-for-forward-head-posture-296838