

Prevalence of Upper Cross Syndrome among Delhi Higher Secondary School Students Due to Inadequate School

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ABSTRACT:

Background: Education is one of the most important components of social infrastructure and a well-educated manpower. Along with its importance in our society and life of children who spend major part of the day in school, seated for long periods of time in improper positions can lead to the weakening of muscles and place strain on to the spine. Among various reasons, inadequate furniture is one of the major factors for development of musculoskeletal disorder. **Methods and Measure:** 148 subjects were included in the study. There are three main variables, neck stabilization, posture assessment and scapular winging. **Results:** The Results showed that the Correlation of NDI score with knee-floor height had statistically significant negative correlation but it was not highly correlated with r value of 0.117, Correlation of Reedco score with knee-floor height had statistically insignificant negative correlation with r value of 0.069 and correlation of Wall Push Test with knee-floor height shows statistically significant negative correlation but not high correlation was seen with r value of 0.116. **Conclusion:** inadequate classroom furniture dimensions can lead to musculoskeletal disorders. Guidelines should be established for classroom furniture to consider anthropological measures of students of the school while designing the furniture.

Key words: Posture, Upper cross syndrome, school furniture, musculoskeletal disorder.

1. INTRODUCTION:

Education is that the most vital part out of varied parts of social infrastructure and in conjunction with its importance in our society and lifetime of kids WHO pay major a part of the day in faculties on daily for nearly fourteen years there comes several issues and problems in conjunction with it. in conjunction with psycho-social problems, students conjointly face contractile organ issues because of inadequate technology conditions, inappropriate college bag, poor posture, repetitive activities, inactive life-style, reduction of physical activity and lack of exercise, (A. town et al 2016) [13]. Studies have shown that faculty piece of furniture is major reason behind contractile organ connected problems as remaining sitting for long periods of your time in improper positions will cause the weakening of muscles within the rear dorsal and body part region and place strain on bone discs, inflicting harmful effects to the spine [4][5]. Higher cross syndrome is one such drawback that has important impact on a child's rachis. it's a standard bodily property dysfunctional pattern that describes the dysfunctional tone of the muscular structure of the shoulder girdle/cervicothoracic region of the body. Posture non inheritable because of prolonged sitting on inadequately designed college piece of furniture cause stress on cervico-cranial and cervico-thoracic junction and this results in development of forward head posture in conjunction with rounded shoulders because of hyperbolic hunchback in pectoral region. whereas sitting, forward head position includes flexion of lower cervical region, extension of higher cervical region, and rounded shoulders, that in average reduces the length of muscle fibres, leading to skeletal muscle force round the joints of higher cervical region. This abnormal state ends up in contractile organ abnormalities which has diminished scapular upward rotation, bigger internal rotation and anterior tilt, leading to issue to keep up upright sitting posture (M. IQRA et al, 2016) [1]. Studies concerning college piece of furniture being a big issue resulting in MSD in Delhi college students, are scarce. Also, there's a scarcity in literature concerning higher cross syndrome associated with long periods of sitting {at college|at college|in class|in school} and its relationship with school piece of furniture mate. The objectives of the current study were to seek out the connection between developments of higher cross syndrome in students as a result of victimization inadequate college piece of furniture in lecture rooms.

2. METHODOLOGY :

148 subjects from Delhi’s Govt. and private schools were chosen to take part in the study. Students with history of trauma, pre-existing musculoskeletal condition, history of mobile phone usage for >3 h/day (talking/ gaming /texting) [12] and Students carrying bag pack of weight more than 10% of their body weight were excluded from the study [11]. A standard school’s classroom was utilized where all selected subjects were made to sit on their desk and measurement of desk height was taken by measuring tape (cm) meanwhile, subjects were asked to fill Neck Disability Index (NDI). While Subjects were sitting, Knee to Floor height measurement was taken using measuring tape (cm) with their hip and knee in 90-90 degree position. After that, posture assessment was done using a plumb line technique, where head, shoulder and thoracic spine were assessed and score was given using Reedco scale. At last Students were then asked to perform wall push test in a separate room and results were recorded. All the Readings and data was recorded on data collection form following which a comparative analysis was done and data was analyzed using SPSS.

3. RESULTS:

148 higher secondary school students with mean age and BMI 16.07 years old and 19.97 + 1.50 kg/m2 respectively completed the procedure and were taken up for statistical analysis of their results. Purpose of this study was to establish correlation between NDI SCORE, REEDCO SCALE SCORE and WALL PUSH TEST and KNEE to FLOOR HEIGHT MEASUREMENT of the subjects. Analysis of the data showed that Difficulty in neck stabilization (NDI) and Scapular winging were correlated with knee to floor height of the student but they were not significantly correlated. Whereas, poor posture (REEDCO SCORE) did not show significant correlation with knee to floor height.

3.1 NDI & Knee to Floor Height

It was found that NDI score had statistically significant negative correlation with knee to floor height but was not highly correlated with r value of 0.117. Similarly, knee-floor height was correlated but was not highly correlated with difficulty in neck stabilization of the samples as the r value was found to be less than 0.5.

		Knee to floor height (cm)	NDI score
Mean		52.0101	8.6959
Std. Deviation (±)		3.43624	6.13860
K to F height	Pearson’s correlation	1	-0.117
	N	148	148
NDI score	Pearson’s correlation	-0.117	1
	N	148	148

Table No. 1:- NDI & Knee to floor height

3.2 REEDCO Score and Knee to Floor Height

According to result, Reedco score had statistically insignificant negative correlation with r value of 0.069. Likewise, knee-floor height was not highly correlated with posture of the samples as the r value was significantly less than 0.5.

		Knee to floor height(cm)	REECO score
Mean		52.0101	31.8919
Std. Deviation (±)		3.43624	6.18329
K to F height	Pearson’s correlation	1	-.069
	N	148	148
REEDCO score	Pearson’s correlation	-.069	1
	N	148	148

Table No. 2:- REEDCO Score and Knee to Floor Height

3.3 Wall Push Test and Knee to Floor Height

Correlation between wall push test and knee-floor height was statistically significant negative correlation but was not highly correlated with r value of 0.116. Similarly, knee-floor height was correlated but not highly correlated with wall push test as the r value was found to be less than 0.5.

	Knee to floor height (cm)	Wall push test
Mean	52.0101	1.55
Std. Deviation (±)	3.43624	0.499
K to F height	Pearson's correlation	1
	N	148
	Pearson's correlation	-0.116
	N	148

Table No. 3:- Wall Push Test and Knee to Floor Height

3.4 NDI with REEDCO SCORE and WALL PUSH TEST

NDI and Reedco score was having statistically insignificant negative correlation with r value 0.035. Also, correlation of NDI with wall push test was found to be statistically significant negative correlation with r value of 0.362

	Reedco score	Wall push test
Mean	31.8919	1.55
Std. Deviation (±)	6.18329	0.499
Neck disability Index (NDI)	Pearson's correlation	-0.035
	N	148
	Pearson's correlation	-0.362
	N	148

Table No. 4:- NDI with REEDCO SCORE and WALL PUSH TEST

3.5 REEDCO SCORE and WALLPUSH

Reedco score was having statistically significant positive correlation with wall push test and this also meant that wall push test had correlation with Reedco score but didn't significantly effect it.

	Reedco Score	Wall push test
Reedco Score	Pearson's correlation	1
	N	148
Wall Push test	Pearson's correlation	0.209
	N	148

Table No. 5:- REEDCO SCORE and WALLPUSH

4. DISCUSSION:

The purpose of this study was to establish relationship between prevalence of upper cross syndrome among higher secondary school students of Delhi & desk height in these schools. The study was concerned with three main predictor variables out of which the first variable, i.e. difficulty in neck stabilisation was measured with Neck disability

index (NDI) and second variable, i.e. Posture (Head, Shoulder and Thoracic spine) was measured with Reedco scale and last variable, i.e. Winging of scapula was checked with Wall push test. NDI, Reedco scale, Wall push test have been found to be reliable and valid for measurement of neck stabilization difficulty, posture analysis and winging of scapula respectively. Hence, these three variables were used to check prevalence of upper cross syndrome in students. On other hand, knee to floor height measurement was taken as criterion variable and measurement was taken while students were sitting on their desk in 90-90-degree position of both hip and knee joints.

One of the main findings was that NDI was having statistically significant negative correlation with Knee to floor height. Although they were not highly correlated (r value = - 0.117) but they were relevant to establish a relationship between the two variables. This result suggests that neck disability which is indicator of upper cross syndrome will increase if knee to floor height decreases or in the other words when knee angle becomes less than 90 degrees chances of neck disability increases. M. Junaid & S. Javid (2019) [2] in his study also found remaining in abnormal posture for prolonged duration as main risk factor for prevalence of Upper cross syndrome in laundry workers. In a study, focusing on prevalence of musculoskeletal pain and its association with inadequate school furniture in Brazil which was conducted by S. Mirelle de Oliveira et al (2015) [6], similar results were noticed as ours. He found significant association between inadequate desk and musculoskeletal pain (neck/cervical-12.6%; dorsal:15.1%) and similarly, with regards to inadequate chairs (neck/cervical: 17.5%; dorsal: 23.8%).

With respect to Reedco scale, Correlation with knee-floor height was statistically insignificant negative correlation with r value of 0.069 which means, Reedco scale used for posture analysis was not significantly correlated with knee to floor height. K. Shri Krushna and G. Sayali (2019) [4] conducted study to find prevalence of lower cross syndrome in school going children in the age group 11- 15 years. They found 21% of school going students of age 11 to 15 years had incidence of lower cross syndrome and 32% were at risk of having lower cross syndrome in near future. They correlated prolonged sitting on school desk with tightness of hip flexors and abdominal and gluteal muscle weakness. On the contrary, our results didn't show very high incidence of developing abnormal upper body posture due to prolonged sitting. This difference of outcomes highlights different variables used in both studies as we tried to establish relationship of knee to floor height with upper body abnormal posture development and secondly, sample size taken by us was much higher when compared which contributes towards higher precision in results. A study was conducted in order to find prevalence of UCS in medical students of university of Lahore using Reedco scale for posture analysis and various other instruments. In this study M. Iqra et al (2016) [1], found prevalence of upper cross syndrome to be 37.1% and further, Reedco scale scores revealed that 17.44%, 3.1%, 1.5 % had poor head, shoulder, spine postures respectively. While concluding he said that individuals suffering with upper cross syndrome were somehow related to bad posture or indulged in activities which made them to adopt a posture of high physiologic cost, thereby leading to muscular imbalance that will yield upper cross syndrome as a result. Similar results can be seen in our study when it comes to prevalence of poor posture among higher secondary school students despite the fact that Reedco score was not significantly correlating with knee to floor height. This can be due to other factors contributing to faulty posture like abnormal ergonomic postures at home or prolonged computer use as found out in various other researches.

While analysis results for wall push test, we found Correlation between wall push test and knee-floor height was statistically significant negative correlation but it was not highly correlated with r value of 0.116. Similarly, knee-floor height was correlated but not highly correlated with wall push test of the samples as the r value was found to be less than 0.5. So, wall push test which was done to check for scapular winging in students correlated with knee to floor height but not very highly which suggest, changes in knee angle while sitting on desk can lead to muscular imbalance in upper body further leading to scapular winging. These results are analogous with M. Iqra et al (2016) [1] study in which 1.6% of subjects had winging of scapula. Here, we also discovered correlation between bad posture due to inadequate desk height as a contributing factor towards muscular imbalance and further leading to winging of scapula in students. A. Abdullah et al (2019) [8] in Abha City, South-western Saudi Arabia, Dianat I et al (January 2013) [10] in Iran and Castellucci HII (July 2010) [9] in Chile did some research regarding mismatch between classroom furniture and anthropometric measures of students in their respective countries and found that classroom's furniture was inadequate in almost all the analysed cases and subjects. They highlighted possibility of high mismatch percentage found between furniture and student's anthropometry are often related to the very fact that the acquisition and selection of the furniture was made without any ergonomic concern or criteria. They also inferred that it was likely, some anatomical-functional changes or problems in the learning process may also occur in future. Likewise, our study provides certain validation to above observations as we also noticed association between inadequate school desk and its potential inadequate use leading to anatomical functional changes in form of UCS. However, this opens window for further research, connecting threads between various school furniture components and additional anthropometric variables such as elbow height, popliteal height, Buttock-popliteal along with knee to floor height of school students. Furthermore, wall push test and NDI score came out to be more reliable indicators for upper cross syndrome pertaining to our results which showed that Reedco scale was having statistically significant positive correlation with wall push test (r value = 0.209) and also, NDI showed statistically significant negative correlation with Wall push test (r value=0.362).

Our study shed some light on how inadequate school furniture can lead to musculoskeletal disorder like Upper cross syndrome. This invites further studies to be conducted involving various other postural components and different segments of school's furniture. This will further guide us in understanding various other musculoskeletal disorders associated with school students and their effect on student's education and health.

5. CONCLUSION:

In our study we found that neck disability and scapular winging were significantly correlated but not highly correlated with the knee to floor height in higher secondary school students while upper back posture did not significantly correlate with knee to floor height in higher secondary school students. In order to conclude, we may say that inadequate classroom furniture dimensions can lead to musculoskeletal disorders such as upper cross syndrome and guidelines should be established for classroom furniture designers to consider anthropological measures of school students while designing certain furniture for them.

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