



## Prevalence Of Upper Cross Syndrome Among Students

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### Abstract

**Background:** Muscular imbalances between the tonic and weak muscles causes upper cross syndrome. Mostly postural muscles pectoralis major, sternocleidomastoid, and upper trapezius goes for tightness and phasic muscles lower trapezius, middle trapezius and deep-neck flexors goes for weakness. Rounded shoulder, forward head posture, scapular winging, elevated and protracted shoulders, and hyperkyphosis were the characteristics features of upper cross syndrome.

**Objective Of The Study:** To determine the prevalence of upper cross syndrome among students and to find the characteristics feature using Reedco posture assessment tool in individual present with upper cross syndrome.

**Materials and Methods:** A cross sectional study with total of 96 students, aged between 18 to 25 years was included in the study. The participants were assessed for postural changes using Reedco posture assessment score and were asked to fill out the Oswestry neck disability index questionnaire and pectoralis major tightness test and MMT of middle and lower trapezius test was performed to assess for tightness and weakness of muscles respectively.

**Result:** Result showed Out of 96 students 39. 58 % presented with neck pain, 4.16 % presented pectoralis major tightness and 100 % presented with weakness of lower and middle trapezius. Hence 4.16 % found to have prevalence of UCS with 100 % of fair postural changes in neck and shoulder, 75 % of fair postural changes in head and 25 % of fair postural changes in Upper back.

**Conclusion:** Prevalence of UCS showed lesser significance among college students and found significant postural changes among the individual present with UCS

**Keywords:** Upper Cross Syndrome, Reedco posture score, Muscular imbalance

### Introduction

Muscular imbalances may cause definite problem in the body. Muscular imbalance is classified into three, Upper cross syndrome, Lower cross syndrome, and layered syndrome based on Janda muscular imbalance patterns and it occurs in the scapula and neck regions.<sup>1</sup>

Upper cross syndrome usually occurs due to muscular imbalance between the postural and phasic

muscles. Mostly postural muscles go for tightening and phasic muscles develop weakness. The characteristic features of upper cross syndrome in an individual are rounded shoulder, forward head posture, scapular winging, elevated and protracted shoulders, and hyperkyphosis.<sup>2</sup>

Upper cross syndrome is referred as “middle and lower trapezius, rhomboids, deep neck flexors and serrator anterior, especially the scalene muscles

weaknesses and tightness of the pectoralis major, upper trapezius, and levator scapulae.<sup>3</sup>

Upper cross syndrome can be caused by continual poor postures, disability and weakness, aging, and female gender, long surgeries.<sup>4</sup> When there is a stress to the joint increases it is termed as faulty posture. Mostly an individual adapt different studying posture during their study. As they adapt poor posture, may have the risk to develop upper cross syndrome.<sup>5</sup> According to Vladimir Janda's (2013) observations made him to think that poor posture leads to faulty patterns of movements which contribute to isolated joints habitual overuse, while reducing normal movements, hence leading to dysfunction and injury.<sup>6</sup> As an individual tend to sit in poor posture with increased kyphosis in thoracic region the individual may develop forward head posture with rounded shoulders.<sup>7</sup>

Shahid.S. et al., 2013 conducted a cross-sectional study among DPT students to evaluate the prevalence of UCS and the associated risk factors which concluded that about 30 to 40 participants were presented with neck pain, rounded shoulder with thoracic pain, flexed posture, thus they are more prone to Upper Cross Syndrome.<sup>8</sup> Altered biomechanics of upper back posture created by the deformed muscles that are associated with UCS which creates stress on the surrounding muscles, bones, tendons and joints.<sup>9</sup> Another Previous study by Rizmi Naseer and colleague in 2021 conducted a prevalence study of UCS on different occupations which concluded 32.4 % of desk workers, 24.3 % of drivers, 27 % of housewife's, 16.2 % of teachers have UCS.<sup>10</sup> As the previous study shows there is high prevalence of upper cross syndrome in population and mostly students adapt different positions and use different modes of studying such reading books in various position, using laptop or phones in poor posture, they may be prone to develop upper cross syndrome.<sup>11</sup>

As per our knowledge only few studies have been done on UCS so we would like to focus and find the prevalence of upper cross syndrome among student population. These groups of population are more prone and are at high risk to adapt a typical posture during their study hours and other related activities. So we found that there is a need of selection of this group of population and to analyze the postural

changes on them is the most needed and important one. Hence the knowledge and prevalence of UCS among students will help in preventing the postural changes and further complications. Thus, the purpose of the study is to find the prevalence of UCS among students and to find the postural changes present in individuals with Upper cross syndrome using Reedco posture assessment score.

## Materials and Methods

A cross sectional study with sample size of 96 normal healthy students, both male & female with sound mental and physical health with age group of 18 – 25 years were included in the study. Convenience sampling technique was used for the selection of participants. The study was conducted in a private university in Mangalore. Individuals with congenital shoulder deformities, any serious underlying pathology that may interfere with mobility of upper limb, recent surgeries to upper limb, cervical spine, any malignancy related to soft tissue and joints, recent fractures to related joints were excluded in the study.

## Procedure

Prior to participation the participants received an explanation about the study and the written informed consents were obtained from the participants. The participants were selected based on the inclusion and exclusion criteria. Each participant was taken into room privately to respect their privacy. Each participant was in standing position with back exposed to observe for the posture using Reed co posture assessment (for head, shoulder, spine, neck and upper back) and scored using Reed co scale to check for the Postural changes in individual. The Oswestry neck disability index questionnaire was given to the participant to fill and rule out the neck pain. Then the participants were asked to follow the instruction and was tested for pectoralis major contracture test<sup>17</sup> to assess the tightness and tested for MMT of middle and lower trapezius muscle to assess for presence of weakness.<sup>18</sup> The individual present with neck pain, pectoralis major muscle tightness and weakness of lower and middle trapezius are considered as presence of upper cross syndrome in individual.

## Outcome measures

### Oswestry neck disability index questionnaire:

Oswestry NDI questionnaire were given to the participants to fill and rule out the neck pain which has 10 items concerning pain and activities of daily living including pain intensity, personal care, lifting, reading, headaches, concentration, work, driving, sleeping and recreation. Each item is scored out of 5 giving a total score for the questionnaire out of 50. The total value of 0-4 indicates no disability, 5-14 indicates mild disability, 15-24 indicates moderate disability, 25-34 indicates severe disability and greater than or equal to 35 indicates complete disability. Higher scores represent greater disability.

#### **Reed co posture assessment score:**

Reedco's posture score (REEDCO,1974) is a standard tool which is administered by visual examination of 10 postural traits viewed laterally (Sagittal view including neck, upperback, trunk, abdomen and lowerback) or from behind (coronal view including head, shoulders, spine, hip and ankles). As upper cross syndrome doesn't involve trunk, abdomen, lower back, hip and ankles therefore these traits were excluded in this study. Hence, 5 postural traits were assessed in this study which includes neck and upper back in sagittal view and head, shoulders and spine in coronal view. The scores are marked as follows: a value of 10 equals to good posture or normal alignment, value of 5 equals to fair posture or minimal or moderate deviation, value of 0 equals to poor posture or severe deviation. Inter-rater reliability (alpha coefficient = 0.899-0.915) was good according to Healthcare Therapy Services, (2009) and have a good test-retest reliability (ICC = 0.81-0.95) (Nuanlaor and kannikar, 2019).

#### **Pectoralis major contracture test:**

The participants were asked to lie in supine position with hands clasped together behind the head. The arms are then lowered until the elbow touches the examining table. The test is considered positive if the elbows does not touch the table and indicates the pectoralis major muscle tightness.<sup>17</sup>

#### **Trapezius manual muscle testing:**

MMT of middle and lower trapezius of each participant on both upper limbs were tested and graded according to the Daniels & Worthingham's Manual Muscle Testing grading.<sup>18</sup> Grade less than 5 considered as weakness present.

#### **Statistical Analysis**

Sample data were analysed with SPSS version 20.0. Variables are described as mean and standard deviation (SD) for age. Descriptive statics like frequency and percentage was calculated.

#### **Results**

Out of 96 participants 50 % of male and 50 % of female with age group of mean  $\pm$  SD = 23.48  $\pm$  1.20 ( Table 1) were assessed for postural changes, neck pain, tightness of pectoralis major and weakness of lower and middle trapezius and the percentage of each were shown in below tables and figures.

The NDI Score result showed about 60.41 % shows no disability and 37.5 % present with mild disability and 2.08 % present with moderate disability (Table 2).

Reedco posture score result for 96 participants showed in head 61.45 % have good posture ie., head erect gravity line passes directly through centre and 38.54 % shows fair posture, ie., head turned to one side slightly, In shoulder 11.45 % shows good posture, ie., shoulder level is equal and 87.5 % shows fair posture ie., one shoulder slightly higher than the other whereas 1.04 % shows poor posture ie., one shoulder markedly higher than the other, In spine 97.91 % shows good posture ie., spine straight and 2.08 % shows fair posture ie., spine slightly curved laterally, In neck 14.58 % shows good posture ie., neck is erect and 85.41 % shows fair posture ie., Neck slightly forward, In upper back 80.20 % shows good posture ie., upper back is normally rounded and 19.71% shows fair posture ie., Upper back slightly more rounded (Table 3, Figure 1).

MMT of Middle trapezius showed 3.12 % grade 2 (Poor strength), 70.83 % shows grade 3 (Fair strength) and 26.04 % shows grade 4 (Good Strength) and Lower Trapezius showed 5.20 % grade 2 (Poor strength) , 83.33 % shows grade 3 ( Fair strength) and 11.45 shows grade 4 (Good Strength) (Table 4). Pectoralis major tightness was present in 4.16 % (Table 5). Hence the result showed 4.16 % of individuals present with UCS (Table 5, figure 2).

In individuals present with UCS about 100% showed neck and shoulder fair postural changes and about 75 % showed Fair head posture and about 25 % showed

fair upper back changes which were assessed using Reedco posture assessment score (Table 6, figure 3).

**Table 1: DEMOGRAPHIC CHARACTERISTICS**

Characteristics	Values
Age (Mean ±SD)	23.48 ± 1.20
Sex (No., Percentage)	
Male	48, 50%
Female	48, 50%

Data represents with 50 % of male and 50 % of female with age mean + SD is 23.48 + 1.20., SD = Standard Deviation

**Table 2: PERCENTAGE OF NDI SCORE:**

NDI Scores	Frequency	Percentage (%)
0-4 : No Disability	58	60.41
5-14: Mild Disability	36	37.5
15-24: Moderate Disability	2	2.08
25-34: Severe Disability	0	0
>35: Complete Disability	0	0
Total	96	100

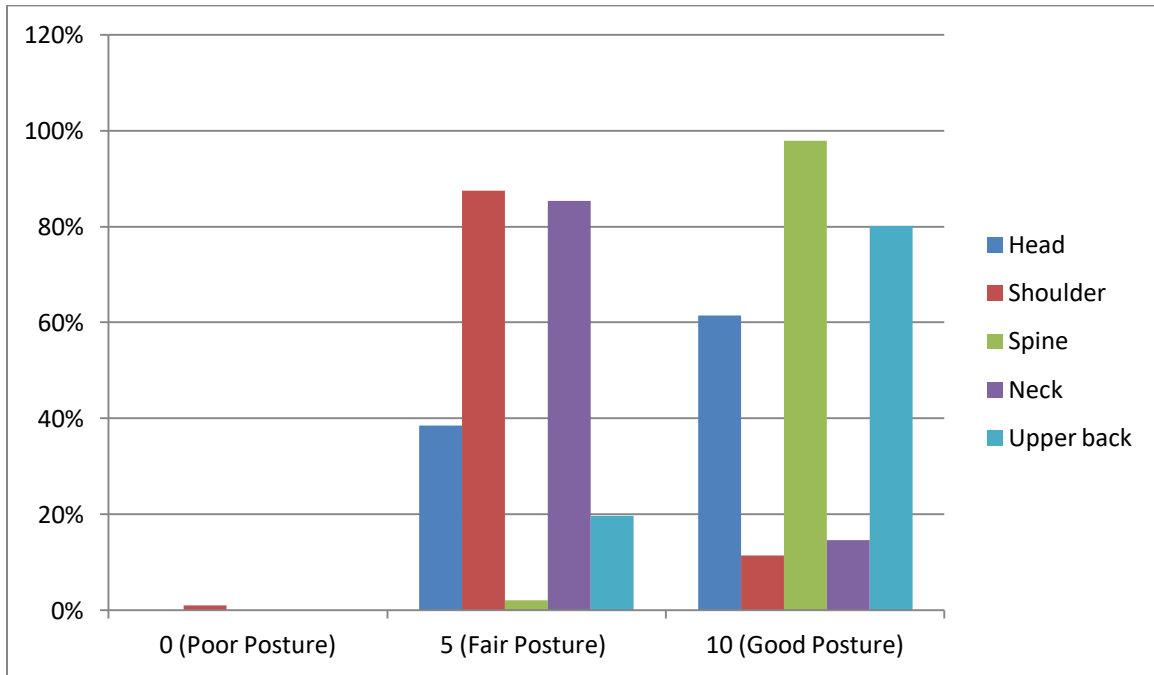
Data represents 60.41 % have no disability whereas 37.5% shows mild disability and 2.08% shows moderate disability

**Table 3: PERCENTAGE OF REEDCO POSTURE SCORE**

Posture	Frequency				Percentage			
	Score 10	Score 5	Score 0	Total	Score 10	Score 5	Score 0	Total
Head	59	37	0	96	61.45 %	38.54 %	0 %	100 %
Shoulder	11	84	1	96	11.45 %	87.5 %	1.04 %	100 %
Spine	94	2	0	96	97.91 %	2.08 %	0 %	100 %
Neck	14	82	0	96	14.58 %	85.41 %	0 %	100 %
Upper back	77	19	0	96	80.20 %	19.71 %	0 %	100 %

\*Data represents in head 61.45 % have good posture and 38.54 % shows fair posture, in shoulder 11.45 % shows good posture and 87.5 % shows fair posture whereas 1.04 % shows poor posture, in spine 97.91 % shows good posture and 2.08 % shows fair posture, in neck 14.58 % shows good posture and 85.41 % shows fair posture, in upper back 80.20 % shows good posture and 19.71% shows fair posture.

**Figure 1: Percentage of Reed co posture assessment score**



**Table 4: PERCENTAGE OF MMT OF MIDDLE AND LOWER TRAPEZIUS**

MMT	Frequency (out of 96)						Percentage (%) (out of 100)					
	Grades											
	0	1	2	3	4	5	0	1	2	3	4	5
Middle Trapezius (Right & Left)	0	0	3	68	25	0	0	0	3.12	70.83	26.04	0
Lower Trapezius (Right & Left)	0	0	5	80	11	0	0	0	5.20	83.33	11.45	0

\*3.12 % shows grade 2, 70.83 % shows grade 3 and 26.04 % shows grade 4 in MMT of middle trapezius and 5.20 % shows grade 2, 83.33 % shows grade 3 and 11.45 shows grade 4 in MMT of lower trapezius.

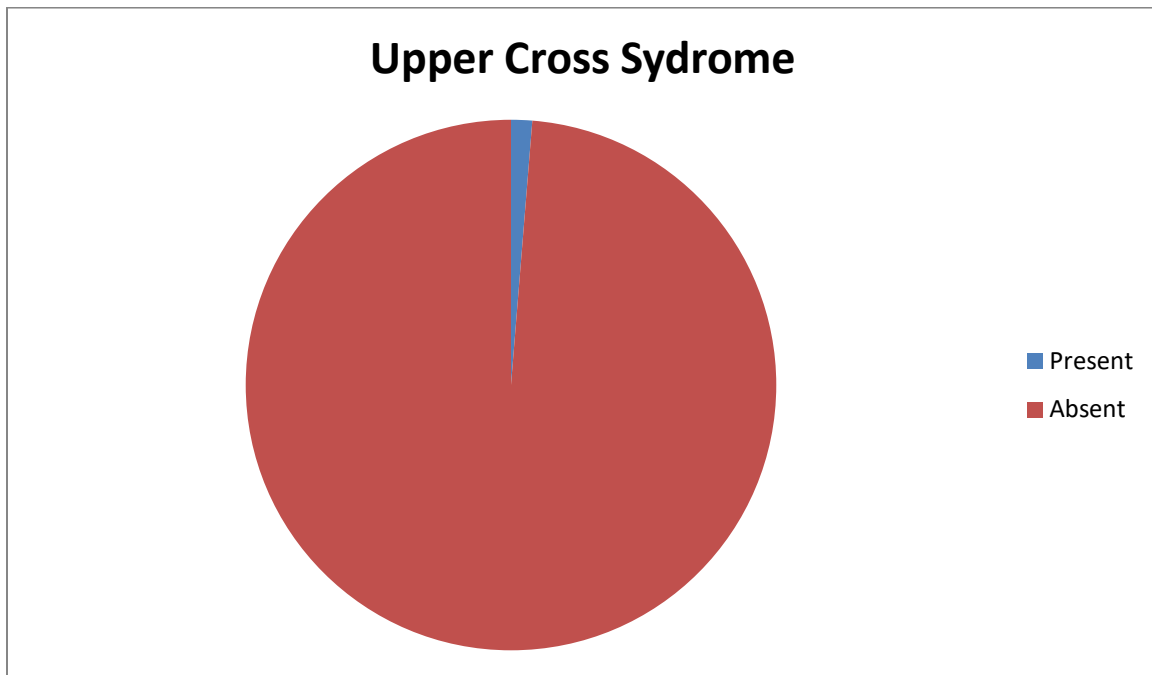


**Table 5: PERCENTAGE OF UPPER CROSS SYNDROME**

Variables	Present		Absent	
	Frequency ( out of 96)	Percentage (%) (out of 100)	Frequency (out of 96)	Percentage (%) (out of 100)
Neck pain	38	39.58	58	60.41
Pectoralis major tightness	4	4.16	92	95.83
Middle trapezius weakness	96	100	0	0
Lower trapezius Weakness	96	100	0	0
Upper cross syndrome	4	4.16	92	95.83

\*Data represents 39.58 % present with neck pain, 4.16 % present with pectoralis major tightness, and 100 % present with middle and lower trapezius weakness. Hence 4.16 % present with upper cross syndrome.

**Figure 2: Percentage of Upper Cross Syndrome**

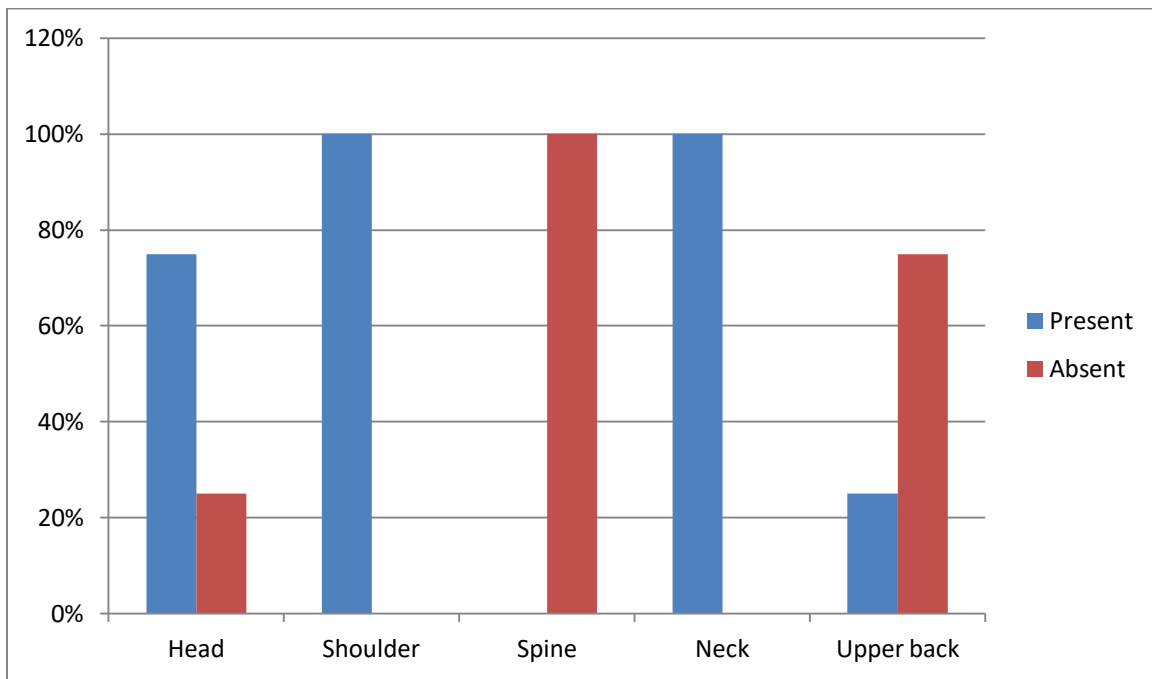


**Table 6: POSTURAL CHANGES PRESENT IN UPPER CROSS SYNDROME USING REEDCO POSTURE ASSESSMENT.**

Posture	Present		Absent	
	Frequency ( out of 4)	Percentage (%) (out of 100)	Frequency ( out of 4)	Percentage (%) (out of 100)
Head	3	75	1	25
Shoulder	4	100	0	0
Spine	0	0	4	100
Neck	4	100	0	0
Upper back	1	25	3	75

\*Data represents 75 % with head twisted slightly to one side and 100 % with one shoulder slightly higher than the other and 100 % with neck slightly forward and 25 % with upper back slightly more rounded.

**Figure 3: Symptoms present in Upper cross Syndrome using Reedco posture assessment**



**Discussion**

This present study was to find the prevalence of UCS among students and it also tried to find the postural changes present in individual with upper cross syndrome using Reedco posture assessment and this study found that out of 96 students 4.16% have upper cross syndrome and remaining 95.83 % doesn't have upper cross syndrome as their pectoralis major muscles doesn't shows tightness and revealing lesser significance of UCS among students.

This present study is in contrast with previous studies done by Mubeen I et al., 2016 which revealed that out of 384 medical college students 37.1 % had upper cross syndrome and concluded having high prevalence of UCS in medical college students.<sup>7</sup> It may be either due to the variation in the population size as they had done in larger population compared to my study. Another study done by Dr. Pooja Dhage and colleague in 2019 among physiotherapy students which was also in contrast with this study found that there is a high prevalence UCS ie., 30.43% and bad



posture is the predisposing factor.<sup>9</sup> And Mujawar J C and colleague in 2019 found that in laundry workers there is significant prevalence of UCS i.e., out of 50 laundry workers there is 28% prevalence and he justified that it was due to inappropriate position i.e., the task of washing was done in bent static posture for prolonged period and repeating the same action throughout their work.<sup>2</sup> This study was in contrast with present study which showed lesser significance of upper cross syndrome among students it may be due to changes in the work posture among both populations. Previous studies showed significant prevalence of UCS among working physiotherapist,<sup>12</sup> Desk workers, Drivers, Housewife<sup>10</sup> and another study in teachers showed significant prevalence in teachers<sup>13</sup>

This study assessed for neck pain using NDI questionnaire, pectoralis major tightness and middle and lower trapezius weakness out of this all were present then it is considered as the individual present with UCS which was in similar with the study done by Mujawar J C and colleague.<sup>2</sup>

About 39.58 % of students showed prevalence of neck pain which was in line up with the previous studies done by Behera P et al., 2020 which concluded 58.3 % showed neck pain and neck pain was common among undergraduate medical students.<sup>23</sup> And another study done by Paracha M S et al., 2019 showed 38 % neck pain among undergraduate students and concluded that neck pain is common and justified that there is a stronger association with posture and mode of the study in students with neck pain which can be the risk factor that lead to neck pain among students.<sup>11</sup>

Majority of them doesn't shows tightness of pectoralis major muscle only 4.16 % showed tightness of pectoralis major muscle. Previous study by Choi S A et al in 2017 states that pectoralis major tightness leads to forward head posture and it pulls the humeral head anteriorly<sup>24</sup> which may be the reason why upper cross syndrome individual shows postural changes in the shoulder and forward neck posture which had been identified using Reedco posture assessment.

100 % participants shows weakness of middle and lower trapezius in which majority shows fair strength about 70.83%, 83.33 % respectively and 3.12 % and 5.20 % shows poor strength and remaining shows

good strength for middle and lower trapezius respectively. Previous studies done by Shannon M. Petersen and colleague in 2011<sup>25</sup> and Choudhari R et al., 2012<sup>26</sup> concluded that individual with unilateral neck pain exhibit lesser strength in lower trapezius muscle and then in middle trapezius muscle than in upper trapezius muscles.

In this present study we found that there is lesser significance of UCS among students which is in contrast with several other studies which has revealed higher significance of UCS among different occupations. It can be either due to the small sample size or differences in the postures adapted by individuals.

### Conclusion

The prevalence UCS was found to be 4.16 % revealing lesser significance of UCS among students and study found that individual with UCS showed postural changes in which majority showed high prevalence of fair posture in neck, shoulder, head and Upper back respectively.

### Limitations

This current study has numerous limitations, Firstly, The sample size was small and secondly, This outcome might not be conclude to other university students who may adapt different body postures as this study was done at a single Private university in Dakshina Kannada.

### Future scope

Further research is recommended with larger sample sizes and any other assessment tools and scales which can be used for Upper cross syndrome.

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