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Original Article

Association of Upper Cross Syndrome with Prolonged Sitting Among Young Adults

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ABSTRACT

Musculoskeletal complaints are mostly linked with the muscular imbalance and usually in a long run cause joint dysfunction. These muscular imbalances are mostly due to postural position in both sedentary lives or with repetitive work. One of the muscular imbalances is called "proximal cross syndrome" or "upper cross syndrome" (UCS), which involves neck, shoulder girdle and upper thoracic region. **Objective:** To determine the frequency of upper cross syndrome and its association with prolonged sitting postures and to determine the functional status of upper extremities affected by prolonged sitting among the young population. **Methods:** It was an analytical cross-sectional study, conducted in Fatima Memorial College of Medicine and Dentistry, Lahore from 18 October, 2017 to 30 January, 2018. Reed co postural assessment scale score was used for the postural assessment, upper limb functional index (ULFI) was used to inquire about the participant current upper extremity functional status in a variety of activities. **Results:** Out of 165 participants who had 6 to 8 of sitting 15.75% had a moderate level of difficulty and out of 150 participants who had 8 to 10 hours of sitting 26.66% had a moderate level of difficulty, so a significant association was found between sitting hours and upper extremity functional status with p=0.00. Postural analysis of head position, neck position, and upper back has also shown that there is a significant association with p-value =.000 (< 0.05) between sitting hours and postural changes, as increasing sitting hours cause increased postural changes. **Conclusions:** It is concluded that prolonged sitting hours are associated with UCS and change in upper extremity functional status, so certain strategies could be suggested for the workstations or the individuals, involves in prolonged sitting.

INTRODUCTION

Musculoskeletal complaints are mostly linked with muscular imbalance and usually in a long run cause joint dysfunction. Janda describes different types of muscular imbalance in which some muscles of body become weakened or inhibited and some muscles become tightened. These muscular imbalances are mostly due to postural position in both sedentary lives or with repetitive work. One of the muscular imbalances is called "proximal cross syndrome" or "upper cross syndrome" (UCS), which involves neck, shoulder girdle and upper thoracic region. The prevalence of UCS in medical students of Lahore was found to be 37.1% There are different risk factors for UCS including, poor body posture, sitting or standing with FHP for prolong period of time during activities as computer and laptop use, driving, watching TV, excessive cell phone use , reading and biking . Clinical presentations of a person suffering from UCS include, forward head posture, increased cervical lordosis, increased thoracic kyphosis, elevated and protected scapulae, rounded shoulder, scapular winging. These postural abnormalities cause undue stretch on joints and surrounding structures. These changes eventually predispose a person to headache, neck pain, chest tightness and pain, pain in the jaws, which may affect the function of upper extremity and cause difficulty in sitting, reading and maintaining a certain posture. Students and adults spend most of their time on computers and desk, and start to develop FHP. This posture cause stress to the neck, in turn producing muscular imbalance,

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leads to vicious cycle, including bent and raised shoulders. This in long run produces muscular weakness below the neck as rhomboids, lower trapezius and hardening of opposite muscles such as pectorals, upper trapezius, and levator scapulae. Research says that sitting for a prolong period of time is a major risk for muscular imbalances and dysfunction especially in the areas of cervical, shoulder and lumbar regions. An investigation was led to inspect the relationship of workplace neck posture with muscle dysfunction; presumed that there was a critical fixed upper trapezius causing modified scapular position alongside neck and shoulder dysfunction. There was a strong association between upper limb musculoskeletal disorders with repetitive work as repetitive work in a constant posture can cause upper limb discomfort but further research was required in reference to duration and type of work and upper extremity functional status. The rationale of present study was to observe the frequency of UCS among young adults, how it is associated with prolonged sitting posture and affect upper extremity functional status so that we can later address this condition to educating the postural correction to decrease its prevalence. The objective of this study was to determine the association of UCS to prolonged sitting and to determine the functional status of upper extremities affected by prolonged sitting among young adults.

METHODS

An analytical cross-sectional that was conducted in Fatima Memorial Hospital and Fatima Memorial College of Medicine and Dentistry, Lahore from 18 October, 2017 to 30 January, 2018. Keeping the confidence level 95%, anticipated population proportion 0.48 and Absolute precision 0.05, the calculated sample size was 384. A convenient non-probability sampling technique was used to collect the data. Individuals between the ages of 18 to 35, both male and female and with sitting duration of at least 6 hours per day either for study or at work were included in the study. Individuals suffering from any rheumatic or arthritic diseases, having history of any recent traumatic injuries of neck or upper back area, suffering from any serious respiratory disorder, any history of spinal surgery, having any visual problems or any factor that may cause muscular imbalance other than prolong sitting were excluded from the study. Approval was given by the respective authorized body of Fatima Memorial Hospital, Lahore, before the data collection procedure. Informed consent was obtained from the participants for including their data in the present study. A questionnaire including upper limb functional index [9] and Reed co postural assessment scale was used [3,4]. A detailed socio-demographic data was obtained enquiring about their sitting habits. The severity and duration of the condition were measured. All patients went through the same procedure, postural assessment, deep neck flexors endurance test for which 29.4 seconds were considered normal for females and 38.9 seconds were considered normal for males, participant ability to hold less than this timing was considered positive for reducing endurance of deep neck flexors and palpation of bony landmarks to make judgments on alignment was done to make a diagnosis of UCS. Reed co postural assessment scale including head, neck, shoulder, and upper back position score was used to quantify the postural measurement, upper limb functional index (ULFI) was used to inquire about the participant current upper extremity functional status in a variety of activities. Upper limb functional index (ULFI-20) is a 20 question based valid tool to assess the functional status of upper extremity, with a minimum score of 0 and a maximum score of 80, severe to no difficulty in function was categorized with 0 to 20 as severe difficulty, 21 to 40 moderate difficulty, 41 to 60 mild difficulty and 61 to 80 as minimum to no difficulty. Statistical Package for Social Sciences (SPSS 22.0) was used to analyze data. Descriptive statistics including frequencies and percentages were extracted for demographics. Association between was sought through Chi-Square for categorical variables i.e. sitting hours, upper extremity functional scale questionnaire score and Reed co Postural analysis scale categories.

RESULTS

Three hundred and eighty five subjects participated in the study, out of which 204 (53.0%) participants were in age group 18 to 20 year of age and 136 (35.3%) were in age group 20 to 25 years of age, the socio-demographic characteristics of the participants are shown in (Table I). Results regarding the occupation of subjects showed that out of 385 (100%), 243 (63.1%) were students, 113 (29.4%) were office workers, 16 (4.2%) were drivers and 13 (3.4%) were gamers. When participants were enquire about types of sitting activity other than work or studies, 66(17.1%) reported that they usually sit for gaming activity, 117(30.4%) for laptop use, 51(13.2%) for driving and 151(39.2%) for reading. Daily sitting hours in 385(100%) individuals, 165(42.9%) subjects' daily sitting hours were 6 to 8, 150(39.0%) subjects sit 8 to 10 hours daily and 70(18.2%) individuals sit more than 10 hours. When upper extremity functional status was measured through upper extremity functional index questionnaire, subjects showed moderate difficulty (21 to 40) in 86(22.3%) individuals, mild difficulty (41 to 60) in 253(65.7%) subjects and minimum difficulty (61 to 80) in 46(11.9%) subjects. While total score of UEFI was 80. Postural analysis of neck position showed that the head

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was markedly forward in 42(10.9%) individuals, while in 293(76.1%) subjects it was slightly forward. Postural analysis of the upper back has shown that there was markedly curved upper back in 61(15.8%) subjects, slightly curved in 247(64.2%) subjects and normally curved in 77(20.0%) subjects. The results of deep neck flexor test showed that out of total 385(100%) subjects, 87(22.6%) subjects showed normal time (negative) and 298(77.4%) showed less than normal time(positive results). (Table II) Relationship between sitting hours and postural changes in upper quadrant of body and how it affects the function of upper extremity was sought through chi-square, results showed that there was a significant association with p-value =.000 (< 0.05) between sitting hours and postural changes in head position in frontal plane, as increasing sitting hours cause increased postural changes. Out of 150 participants who had 8 to 10 hours of sitting 81 (54%) had an alteration in their normal head position and as the sitting hour increases to more than 10 hours frequency of alteration also increase, out of 70 participants who had more than 10 hours of sitting 59 (84.2%) had postural changes in head position. Postural changes in neck position in sagittal plane in reference to sitting hours have also shown that there is significant association with p-value =.000 (< 0.05) between sitting hours and postural changes in neck position, as the sitting hours were increasing postural changes were more marked. Out of 150 participants who had 8 to 10 hours of sitting 19 (12.6 %) had markedly forward and 117 (78%) had slightly forward head posture as the sitting hour increases to more than 10 hours frequency of alteration also increases, out of 70 participants who had more than 10 hours of sitting 14 (20%) had marked and 55(78.5) had slight forward head posture. The result of sitting hours and postural changes in upper back in sagittal plane showed that there is significant association with p value =.000 (< 0.05) between sitting hours and postural changes in upper back, as the sitting hours were increasing postural changes were more marked. Out of 150 participants who had 8 to 10 hours of sitting 10 (6.6 %) had markedly forward and 113 (75.3%) had slightly forward head posture and as the sitting hour increases to more than 10 hours frequency of alteration also increases, out of 70 participants who had more than 10 hours of sitting 17 (24.2%) had marked and 45(64.2%) had slight forward head posture. Effect of prolonged sitting on upper extremity functional index showed that there is a significant association with p value =.000 (< 0.05) between sitting hours and upper extremity functional status, as the sitting hours were increasing frequency of difficulty level in performing an activity with upper extremity were also increasing. Out of 150 participants who had 8 to 10 hours of sitting 143 (95.3%) had mild to moderate levels of difficulty in performing activities with upper extremities. (Table III)

Serial No.	Variable	n (%)
1.	Age (21.22±3.39)	
	18 to 20	204 (53.0%)
	21 to 25	136 (35.3%)
	26 to 30	30 (7.8%)
	31 to 35	15 (3.9%)
2.	Gender	
	female	289 (75.1%)
	males	96 (24.9%)
3.	Occupation	
	Student	243 (63.1%)
	Office worker	113 (29.4%)
	Driver	16 (4.2%)
	Gamers	13 (3.4%)
4.	Sitting hours per day	
	6 to 8	165 (42.9%)
	8 to 10	150 (39.0%)
	above 10	70 (18.2%)
5.	Sitting surface (most of the time)	
	student chair	257 (66.8%)
	executive chair	52 (13.5%)
	stool	14 (3.6%)
	sofa	62 (16.1%)

Table 1: Sociodemographic characteristics of the participants

Variable	n (%)
Upper extremity functional index (UEFI-20)	
Severe difficulty (0 to 20)	0 (0%)
moderate difficulty (21 to 40)	86 (22.3%)
mild difficulty (41 to 60)	253 (65.7%)
minimum to no difficulty (61 to 80)	46 (11.9%)
Postural analysis (head position)	
head turned to one side slightly	212 (55.1%)
head erect	173 (44.9%)
Postural analysis (shoulder level)	
one shoulder markedly higher than other	26 (6.8%)
one shoulder slightly higher than other	287 (74.5%)
shoulders level horizontally	72 (18.7%)
Postural analysis (neck position)	
head markedly forward	42 (10.9%)
head slightly forward	293 (76.1%)
neck erect	50 (13.0%)
Postural analysis (Upper back)	
markedly curved	61 (15.8%)
slightly curved	247 (64.2%)
normally curved	77 (20.0%)
Deep neck flexor endurance test	
Normal time	87 (22.6%)
Less than normal	298 (77.4%)

Table 2: Frequency of postural deviation presented as UCS and upper extremity functional status

6 to 8 h.		8 to 10 h.	Above 10 h.	P-value
Head position				
Head turn to one side	72 (43.63%)	81(54%)	59(84.28%)	0.000
Head erect	93(56.36%)	69(46%)	11(15.71%)	
Shoulder level				
One shoulder markedly higher than	6(3.63%)	8(5.33%)	12(17.14%)	0.001
other	126(76.36%)	110(73.33%)	51(72.85%)	
One shoulder markedly higher than	33(20%)	32(21.33%)	7(10%)	
other				
Shoulder level horizontal				
Neck position				
Head markedly forward	9(5.45%)	19(12.66%)	14(20%)	0.000
Head slightly forward	121(73.33%)	117(78%)	55(78.57%)	
Neck erect	35(21.21%)	14(9.33%)	1(1.42%)	
Upper back				
Markedly curve	34(20.60%)	10(6.66%)	17(24.28%)	0.000
Slightly curve	89(53.93%)	113(75.33%)	45(64.28%)	
Normal curve	42(25.45%)	27(18%)	8(11.42%)	
Upper extremity functional index (UEFI)				
Moderate difficulty (21 to 40)	26(15.75%)	40(26.66%)	20(28.57%)	0.000
Mild difficulty (41 to 60)	105(63.63%)	103(68.67%)	45(64.28%)	
Minimum to no difficulty (61 to 80)	34(20.60%)	7(4.67%)	5(7.14%)	

Table 3: Chi-square test of association between sitting hours and postural deviations in upper quadrant and upper extremity functional status

DISCUSSION

Upper cross syndrome (UCS) is one of the common postural dysfunction mostly left unnoticed, resulting from muscular

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imbalance. The main focus of the present study was to find out the association of prolonged sitting with UCS, as the previous study was done in the United States and Iran, showed that prolonged sitting is a major factor in developing muscular imbalance in the cervical and shoulder region. Forward head (FHP) and slouched posture are associated with UCS. A study done in 2016 shows that relaxed sitting for a prolonged time and sustained FHP are causative factors of UCS. In present study detailed upper quadrant including neck and upper back posture in sagittal and frontal plane was analyzed and out of 385 subjects, 76.1% population were with slight forward head posture and 64.2% population were with slightly increased upper back cure (kyphotic posture) and postural deformity showed increasing tendency with increasing sitting hours. In a study conducted in 2016 on the prevalence of UCS among university students in Lahore, showed 66.8% population with poor studying or sitting posture are more prone to develop UCS.

This study showed a strong association of postural mal-alignment with prolonged sitting, between sitting hours and postural changes in head position, neck position, and upper back has shown that there is a significant association with p-value =.000 (< 0.05) between sitting hours and postural changes, as increasing sitting hours cause increased postural changes. As in UCS, postural changes occur due to muscular weakness and tightness, pectoralis major and minors, as well as upper trapezius, become tightened. It causes protected and raised shoulders that correlate with present study as when shoulder levels were assessed, 74.5% population showed raised shoulders.

Weakness of the deep neck flexor is also one of clinical manifestations of UCS that can be accessed via deep neck flexors endurance test, when the integrity of deep neck flexors was checked in present study, 77.4% of total population showed the weakness of deep neck flexors. UCS in long run may cause disabling effects on upper extremity, a previous study says that these postural changes can cause neck pain, chest pain as well as difficulty in sitting, reading, or even assuming a certain posture. Another systematic review done in 2010, reported that there was higher disability rate with increased sitting time that correlates with present as 65.7%population fall into mild difficulty level and 22.3% fall into moderate level of difficulty and association was present between prolonged sitting hours and upper extremity functional status, as the sitting hours were increasing frequency of difficulty level in performing activity with upper extremity were also increasing. Though seems mild muscular imbalance can affect enormously the economy of a country due to absentees from work so it is advised that strong steps should be taken to improve sitting posture and avoid prolonged unnecessary sitting.

CONCLUSIONS

It is concluded that prolonged sitting hours are associated with UCS and change in upper extremity functional status, so certain strategies could be suggested for the workstations or the individuals, involves in prolonged sitting.

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