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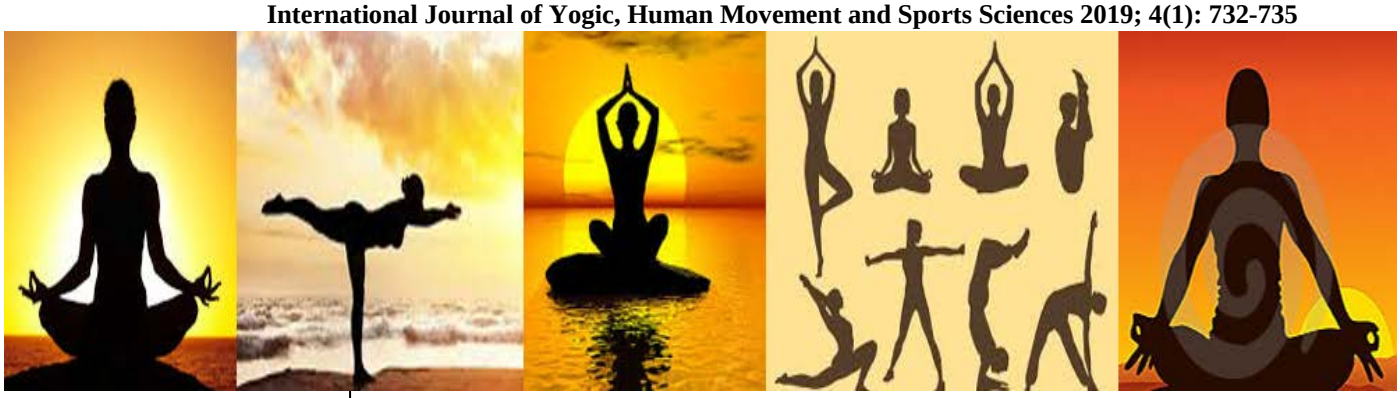

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Effect of scapular position on text neck syndrome in undergraduate college students

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Abstract
Introduction- Text neck syndrome is twenty first century coined term which mostly occurs due to repeated stress and appears with neck pain predominantly. It occurs primarily due to excessive screen time primarily hand-held devices for prolonged period of time. Present study was performed to find out effect of text neck syndrome of posture of undergraduate college students, since text neck syndrome is most commonly observed among adolescent population.
Methodology present research has adapted cross sectional study design among 500 undergraduate students. Males and females who fulfilled the inclusion criteria were included in the study. Further subjects were divided into two different groups. Scapula position was examined at three different positions.
Statistical methods Descriptive statistical analysis was performed in the present study. mean value, standard deviation, confidence interval, t value and p value were obtained.
Result The result exhibits statistically significant changes in scapula position among undergraduate students as compared to those who were not having neck pain having p value <0.005 Conclusion In the present study, it was seen that scapular position is altered in undergraduate students who are suffering from text neck syndrome.

Keywords: Text neck, Neck Pain, scapula position, musculoskeletal Disorder, poor posture, smart phone addiction

Introduction
Text neck is a modern age term which was coined to explain persistent stress related pathology. Text neck syndrome is now a days considered to be a serious pathology due to continuous and extensive use of smartphone among students. Since in present work culture where most of communication is managed on mobile phones such as emails, making payments on daily basis, social media communication etc which is commonly being made by smart phones hence continuous working on smart phone put enormous stress on cervical spine musculature. Text neck also leads to development of forward head posture and in severe cases gives appearance of turtle neck. Mechanical neck pain is also most common pathology observed among collegiate students [1, 2]. Mechanical neck pain not only affected activities of daily living but also executes serious effect on overall quality of life among text neck patients.[1]
Neck pain most commonly occur due to various other co-founding factors which involves work posture, since students have to sit for long hours while attending classes, most of the time it was observed that due to poor ergonomics musculoskeletal disorders arises. In students where due to recent time assignments, notes and other academic activities involves excessive utilization of computers, laptops and smartphones primarily which put excessive pressure on the cervical spine musculature and if not corrected then may lead to development of pathologies in other associated joints and musculotendinous structures [2, 3].
Also among undergraduate population several other associate factors are present which may have significant effect such as ergonomically poor study space, adaptation of awkward posture, poor work environment, smoking, and emotional problems etc are associated with neck pain [3].
Since cervical pain/ neck pain is common link for presence of disability, very little is known about its incidence and course of action on health status of the person. It is condition which

shows severe episodes of exacerbations under stressful conditions. Also, as evidence suggest women are more affected than males and exhibits severe health issues [4].

Musculoskeletal disorders are very common pathology and among students is commonly observed. It has ability to affect soft tissues such as tendons, nerves, muscles and over all human body structure. Cervical spine pain is predominantly observed in younger population. Evidence on risk factors and other predictive factors are not known [4]. Hence it is important to identify the risk factors and other associated co-founding factors which are responsible for development of cervical spine pain especially in younger population [5, 6].

Neck pain also known as cervical spine pain most commonly affects majority of younger population consisting 14- 71 % of adults in their lifetime. Which is a serious health problem and must be corrected on earlier stage to prevent serious health hazard which may affect health on serious note [6].

Latest evidence suggests a high prevalence of musculoskeletal disorders especially in the neck region and upper extremity among undergraduate students. As per research performed among undergraduate students of Sweden, results suggest 15% of undergraduate students had neck and upper back pain. Neck pain is supposed to be multifaceted which appears due to various factors like psychosocial factors, physical and ergonomics [6].

Though neck pain occurs due to various factors but in adult population especially collegiate students' occurrence of neck pain and text neck syndrome is due to certain specific reasons which is majorly related with poor posture, since students tend to work or utilized smartphone for academics as well as for extensive social media activity where they have to look down over smart phone for continuously long hours [7].

A study performed by Sophia Berolo among hand held device users have suggested that most common clinical features are associated with musculoskeletal disorders, majority of participants reported pain in cervical spine and upper back region along with pain at the base of thumb of dominant hand. Positive relationship exists in number of hours spent during internet browsing with dominant thumb which holds smart phone. Further a survey performed in Finland on prevalence of text neck syndrome, results suggested text neck disorder affects 26% of young population having age group of 14-18 years old [8, 9].

Since position of scapula plays very important role in maintenance of upper back posture along with smooth cervical spine movement. Scapula normally lie two inches from the midline of thoracic spine posteriorly [10, 11]. Smooth functioning of scapula is very important for proper shoulder joint movement, since musculature responsible for scapula movement is also responsible for shoulder and cervical spine movement hence any pathology to anyone may have some effect on the other [11]. The primary intent of present study was to study the effect of text neck syndrome on scapular position among collegiate students since they spent majority of their time on smart phone also results if display significant effect preventive measures and posture correction exercises may be put forth in the regular academic activities and students shall be made aware about harmful effects of extensive usage of smartphone in abnormal posture.

Methodology

Present research adapted cross- sectional study design. 500 undergraduate students (including male and female) who fulfilled the inclusion criteria and exclusion criteria also gave their consent to participate in the research work were included in the study and details were recorded. 500 undergraduate students were made part of the study from various colleges/ universities of Delhi and NCR. Randomized selection of the subjects was done. Subjects were appraised about the objective of the research work and procedure followed for the assessment was also explained very well prior to data collection. Further participants were divided into two groups. First group consist of students who were suffering from text neck syndrome and second group consist of participants who were not having any symptoms of text neck syndrome. *Inclusion criteria*: Undergraduate students from colleges/ universities of Delhi and National Capital region NCR, Students who were having text neck (students often complains of stiff neck, soreness in upper back musculature, shrugged shoulder, poking chin), Students of Age between 18-25, Both male and female students were included in the study, students who use mobile Phones continuously for more than 0ne hour daily, students who use mobile phone for more than 10 hours daily, and VAS between 4-8 were included. *Exclusion criteria:* students who are having any history of vascular/ cardiopulmonary or vestibular, visual or neurological disorders [12].

Demographic data was recorded which includes number of hours spent on smart phone/ laptop/ computer/ screen, presence of cervical spine stiffness, age, gender, duration of cervical spine pain, duration of cervical spine stiffness in years/months, medical history, dominant hand, presence of base of thumb pain, number of hours spent on screen for academic activity, pain intensity using visual analog scale for neck/ cervical spine pain, involvement in any sporting activity, and physical activity level those who exercise regularly (yes/no). Demographic details were collected for second group as well who are not having any symptom of text neck syndrome.

Scapula protraction was assessed using lateral scapula slide test where scapula measurements were obtained at three different positions. Inferior border of scapula was palpated and marked followed by marking of its respective spinous process of thoracic spine. Measurements were made and recorded, similarly for other position i.e at hand son hip and ninety-degree glenohumeral abduction was recorded [13, 14].

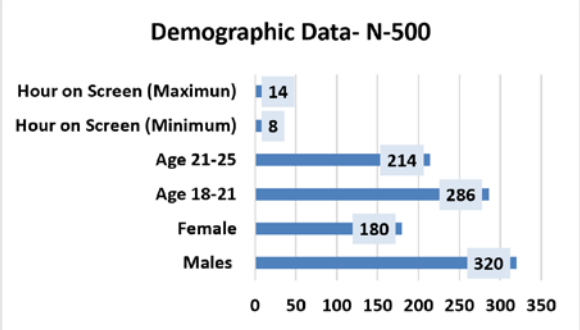
Data Analysis SPSS software version 13 was used mean value, standard deviation, confidence interval, t value and p value were obtained. Independent t test was utilized further for comparative analysis at all three positions of scapula assessed between first group and second group.

Results

Table 1 and Table 2 exhibits frequency distribution of study variables which includes demographic data and variables commonly associated with text neck syndrome. Results from present research work suggest that undergraduate students spent a lot of time on smartphone which puts lot of pressure on their posture, since younger population spent more time on social media activities (10 Hours per day) apart from other academic activity. Table 3 and table 4 describes effect of such posture over scapula position where statistically significant p value <0.005 were observed among undergraduate students having text neck syndrome.

Table 1: Demographic data undergraduate students N-500

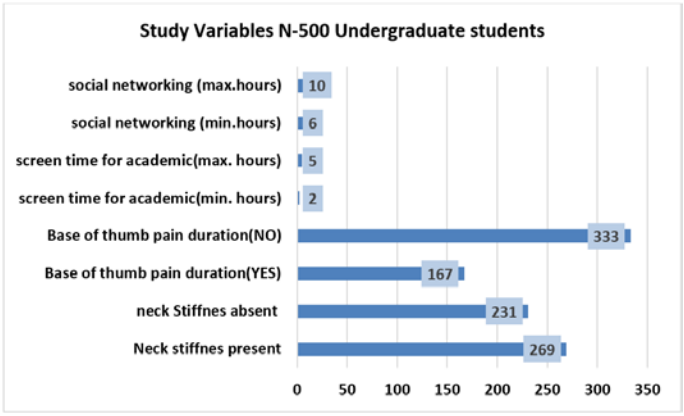
Variable	N	%
Males	320	64%
Female	180	36
Age 18-21	286	57.2
Age 21-25	214	42.8
Hour on Screen (Minimum)	8	33.33%
Hour on Screen (Maximum)	14	58.33%



Graph 1: Demographic variables with frequency distribution

Table 2: Study variables (text neck syndrome) among undergraduate students N-500

Variable	N	%
Neck stiffness present	269	53.80%
Neck Stiffness absent	231	46.20%
Base of thumb pain duration (YES)	167	33.40%
Base of thumb pain duration (NO)	333	66.60%
screen time for academic (min. hours)	2	8.33%
screen time for academic (max. hours)	5	20.83%
social networking (min. hours)	6	25%
social networking (max. hours)	10	42%
Physical Activity (Involvement regular)	169	33.8%
Physical Activity (not on regular basis)	331	66.2%



Graph 2: Study variables (text neck syndrome) of undergraduate students N-500

The result shows there is no significant difference between right and left side in all three positions

Table 3: Scapular position in undergraduate students without Neck pain

Position	Right	Left	p-value
	Mean	Mean	
At rest(cm)	10.54	10.68	0.684
Mean difference	0.14		
Handson hip(cm)	12.32	12.15	0.589
Mean difference	0.17		
90^0abduction(cm)	13.30	13.15	0.534
Mean difference	0.15		

Table 4: Scapular position in Undergraduate students with Neck pain

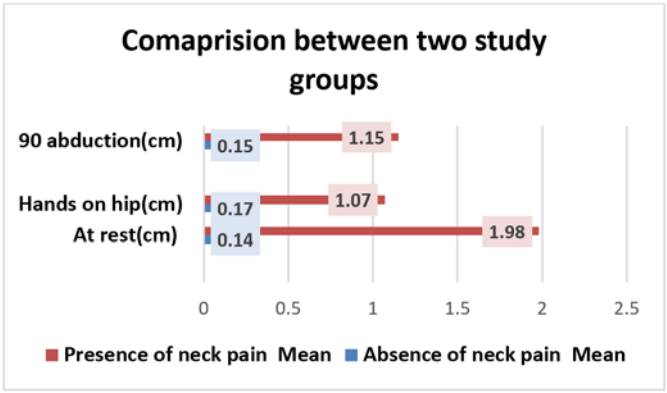
Position	Right	Left	p-value
	Mean	Mean	
At rest(cm)	12.00	10.02	0.000
Mean difference	1.98		
Hands on hip(cm)	12.50	11.43	0.000
Mean difference	1.07		
90^0abduction(cm)	13.60	12.45	0.000
Mean difference	1.15		

The result shows there is a significant difference between the right and left side in all three positions table 5: gives details of scapular position of study and control group the results shows there is significant difference of scapular position among study and control group

Table 5: Comparison between study and control group

Position	Control	Cases	p-value
	Mean	Mean	
At rest(cm)	0.14	1.98	0.000
Hands on hip(cm)	0.17	1.07	0.000
90^0abduction(cm)	0.15	1.15	0.000

The result shows there is significant difference of scapular position among study and control group in all three positions.



Graph 3: Comparison between Group A and Group B control

Discussion

Effect of text neck syndrome was studied among undergraduate students in three different positions. Results exhibits significant effect on the scapula position in all examined position of undergraduate students. (Table 3 & Table 4). Inference made from results suggest students who spent long hours on smart phone may gradually develop poor posture especially upper back and cervical spine which further results in alteration of musculoskeletal orientation. Balikci, K. et al studied several psychosocial patterns which are related with usage of smartphone, and further exhibits that majority of participants experienced finger and base of thumb pain while texting continuously also their respiratory was affected to a greater extent hence observations are suggestive of significant effect on physiological and musculoskeletal system [15]. During working or using smartphone a specific position is mostly adopted which involves cervical spine in flexion position, which places cervical spine in not a stable position and gradually if this position continues to be adapted it will executes tremendous pressure on associated structures and finally lead to development of several musculoskeletal disorder [16].

Vate-U-Lan P observed that text neck syndrome has

significantly affected younger population to greater extent, since it involves maintenance of cervical spine in specific position which executes pressure specifically in lower cervical vertebrae and muscles supporting hence due to muscular imbalance soft tissues supporting scapula in its anatomic orientation may no longer be able to hold and finally lead to alterations in static positioning of scapula [17, 18, 19]. Further evidence suggest faulty posture is capable to affect anatomic orientation to an extent which will further lead to pathological disorder [20].

While using smart phone downward gaze is maintained continuously for prolonged period of time which will further reduces lordosis and promotes thoracic kyphosis and such posture will lead to imbalance in cervical and thoracic spine curvature and ultimately results in turtle neck position among students and affects static scapula position [21, 22].

Conclusion

In the present study, it was seen that scapular position is altered in undergraduate students who are suffering from text neck syndrome.

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