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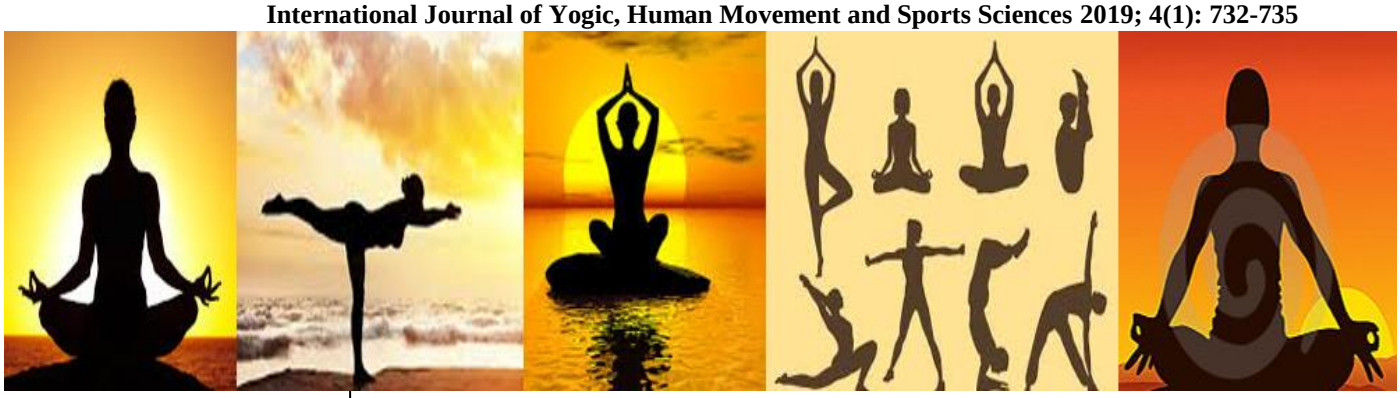

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Effect of scapular position on text neck syndrome in undergraduate college students

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Abstract
Introduction: Text neck is a Modern age term coined to describe repeated stress injury and pain in the neck resulting from excessive watching or texting on hand held devices over a sustained period of time [1, 12]. The study is done to find out relation of position of scapular position in undergraduate students suffering from text neck Syndrome which is found to be very common musculoskeletal disorder in adolescent population.
Methodology: Present research is a case control research. A total number of 500 undergraduate students (including male and female) who fulfilled the inclusion criteria were included in the study. Subjects were divided in to two groups. Scapular Position was assessed in three different Positions i.e. at rest, Hands on hip and 90^0 Glen humeral Abduction.
Statistical methods: Descriptive statistical analysis has been carried out in the present study. After using descriptive statistics mean value, standard deviation, confidence interval, t value and p value were obtained.
Result: The result shows there is significant difference of scapular position among study and control group in all three positions.
Conclusion: In the present study, it was seen that scapular position is altered in undergraduate students who are suffering from text neck syndrome in all three positions that is at rest, hands on hip, and 90 degree Glen humeral abduction.

Keywords: Text neck, neck pain, scapula position musculoskeletal disorder

Introduction
Text neck is a Modern age term coined to describe repeated stress injury and pain in the neck resulting from excessive watching or texting on hand held devices over a sustained period of time [1, 12]. It is also often known as Turtle Neck posture. Mechanical neck pain is a common condition associated with substantial morbidity and cost [1]. Neck disorders are a significant source of pain and activity limitations in workers. Most neck pain results from complex relationships between individual and workplace risk factors[3]. We found preliminary evidence that gender, occupation, headaches, emotional problems, smoking, poor job satisfaction, awkward work postures, poor physical work environment, and workers' ethnicity may be associated with neck pain [2, 3].
Although neck pain is a common source of disability, little is known about its incidence and course. Neck pain is a disabling condition with a course marked by periods of remission and exacerbation6. Neck pain is a common musculoskeletal disorder. The incidence of neck pain in the Netherlands has been estimated as 23.1 per 1,000 person years. In general, women have more neck pain than men [4].
The Musculoskeletal disorder is a common condition where a part of the musculoskeletal System is injured over time. It affects tendons, muscles, nerves and joints of the neck, back, chest and hand [5] although neck pain is common in young adulthood, studies on predictive factors for its onset and persistence are scarce. It is therefore important to identify possible risk factors among young adults so as to prevent the development of neck pain later in life [6].
Neck pain is common among adults, affecting 14-71% of adults at some point in their lives. Its 1-year prevalence in adults ranges at 16-75%. A substantial 19-37% proportion of neck pain Patients will develop chronic neck pain. Neck pain causes considerable personal discomfort due to pain, disability, and impaired quality of life, and may affect work [6].

Increasing evidence suggests a high prevalence of musculoskeletal symptoms in the neck and upper trinity among undergraduate students, ranging at 48-78%. In a Swedish cohort of university students 15% developed neck or upper back pain during 1-year follow-up. Neck pain is assumed of multi-factorial origin, indicating that individual, physical, and psychosocial factors can contribute to its onset and persistence [6].

variety of causes of neck pain have been described and include osteoarthritis, disco genic disorders, trauma, tumors, infection, myofascial pain syndrome, torticollis, and whiplash. Because most patients with neck pain usually lack an identifiable path anatomic cause for their problem, the majority are classified as having mechanical neck disorders [7].

A study done by Sophia Berolo on musculoskeletal symptoms among mobile hand-held device users have found that most participants (84%) reported pain in at least one body part. Right hand pain was most common at the base of the thumb. Significant associations found included time spent internet browsing and pain in the base of the right thumb (odds ratio 2.21, 95% confidence interval 1.02–4.78), and total time spent using a mobile device and pain in the right shoulder (2.55, 1.25–5.21) and neck (2.72, 1.24–5.96) [8].

Many studies have shown that the prevalence of text neck disorder and LBP is high among adolescents. A survey in Finland showed that text neck disorder occurred at least once a week in approximately 26% of 14- to 18-year-olds [9].

The position of scapula is the key contributor to normal and abnormal scapular motion and control [11, 13]. Normally scapula rests at a position on the posterior thorax approximately two inches from the midline, between the second and seventh ribs. The scapula also is internally rotated from vertical, and is upwardly rotated 10 to 20 degrees from vertical [10]. Scapular position on the thorax and control during motion is a critical component of normal shoulder function. During elevation of the arm overhead, scapula should upwardly rotate and posteriorly tilt on the thorax. Upward rotation is the predominant scapulothoracic motion [11].

The study is done to find out relation of position of scapular position in undergraduate students suffering from text neck Syndrome which is found to be very common musculoskeletal disorder in adolescent population.

Methodology

Present research is a case control research. A total number of 500 subjects (including male and female) who fulfilled the inclusion criteria were included in the study. 500 undergraduate students were included in the study from various colleges of Delhi and NCR. Randomized selection of the subjects were done. Subject who fulfilled the inclusion criteria and gave their informed consent were included in the study.

Subjects were divided into two groups. First Group includes students who were having Text Neck pain. Second Group Includes students who were not having Neck Pain.

Inclusion criteria: Undergraduate students from colleges of Delhi and National Capital region NCR, Students who were having text neck, Students of Age between 19-25, 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.

Exclusion criteria: Any diagnosed case of vascular/ cardiopulmonary or vestibular, visual or neurological deficits. And psychological/psychiatric disorders, any diagnosed case of malignancy. Any history of surgery of any limb, any students who is physically challenged.

Material required: Vernier caliper, Marker, Goniometer

Procedure: Initially before measuring the scapular position, a brief physical assessment was taken which included demographic data and assessment of neck pain by using VAS. The numbers of hours each individual play in a day will also be taken in to consideration. Two groups were included in the Study group-with Text Neck pain. Control group- Without neck pain.

Measurement of scapular protraction

Scapular protraction measurements were taken with the participant standing with normal, relaxed posture. The measurements were performed at 3 different positions

1. At rest.
2. Hands on hip.
3. 90º glen humeral abduction with internal rotation.

First the inferior angle of scapula was palpated and marked. The subject was asked to stand relaxed with arms by the side of the body. This was considered as position of rest. The distance from the inferior angle of corresponding spinouts process was taken. Right and left side measurements were recorded. The measurements were done three times. Average of the three readings were considered as final reading. The same procedure was repeated for second position hands on hip, and for third position 90º Glen humeral GH abduction.

Data analysis

Statistical methods

Descriptive statistical analysis has been carried out in the present study. After using descriptive statistics mean value, standard deviation, confidence interval, t value and p value were obtained.

Statistical test

Independent t test was used to compare the mean in terms of distance of right and left side in study and control group, also test was used to compare the mean difference of scapular position at three different position between study and control group.

Table 1: gives details of scapular position in individuals without neck pain, At rest mean values of distance between inferior angle of scapula and corresponding spinous process shows 10.54 for right side and 10.68 for left side, similarly for second position hands on hip mean value shows 12.32 for right side and 12.15 for left side and finally for 90^0 abduction the mean shows 13.30 for right side and 13.15 for left side. Results show there is no significant difference between right and left side in all three positions.

Table 1: Scapular position in undergraduate students without Neck pain

Position	Right Mean	Left Mean	T-value	p-value
At rest (cm)	10.54	10.68	1.98	0.884
Mean difference	0.14			

Handson hip (cm)	12.32	12.15	1.98	0.995
Mean difference	0.17			
90^0 abduction (cm)	13.30	13.15	1.98	0.93
Mean difference	0.15			

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

Table 2: gives details of scapular position in individuals with neck pain, At rest mean values of distance between inferior angle of scapula and corresponding spinous process shows 12.00 for right side and 10.02 for left side, similarly for second position hands on hip mean value shows 12.50 for right side and 11.43 for left side and finally for 90^0 abduction the mean shows 13.60 for right side and 12.45 for left side. Results show there is significant difference between right and left side in all three positions.

Table 2: Scapular position in Undergraduate students with Neck pain

Position	Right Mean	Left Mean	t-value	p-value
At rest(cm)	12.00	10.02	1.98	0.0004
Mean difference	1.98			
Hands on hip(cm)	12.50	11.43	1.98	0.0007
Mean difference	1.07			
90^0abduction(cm)	13.60	12.45	1.98	0.005
Mean difference	1.15			

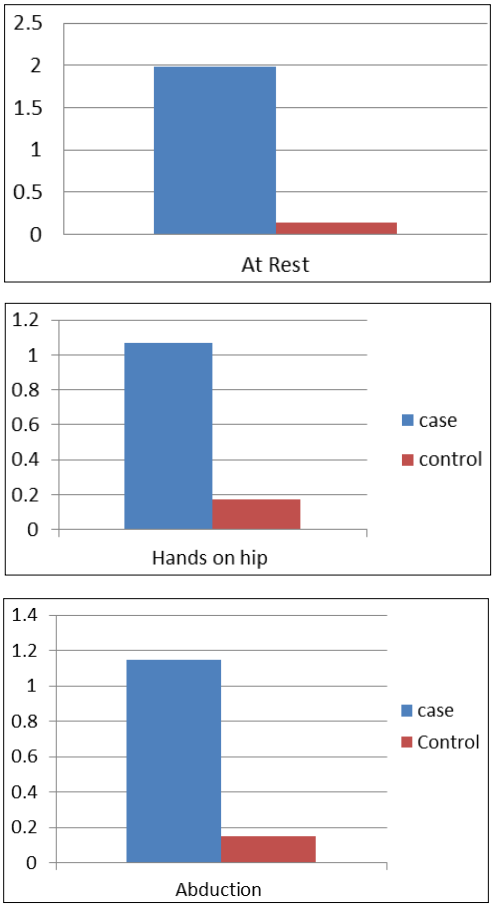
The result shows there is a significant difference between the right and left side in all three positions.

Table 3: 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 3: Comparison between study and control group

Position	Control Mean	Cases Mean	t-value	p-value
At rest (cm)	0.14	1.98	1.9	0.0007
Hands on hip (cm)	0.17	1.07	1.9	0.0009
90^0abduction (cm)	0.15	1.15	1.9	0.0006

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



Graph 1: Comparison between study and control group.

Discussion

The present study assessed the scapular position in undergraduate students who were having with text neck syndrome and without text neck syndrome in three different positions. The Vernier caliper was used to assess the scapular position in swimmers.

The result of the study showed that there is significant difference of scapular position in all three positions that is at rest, hands on hip and 90^0 glen humeral abduction with internal rotation in undergraduate students with Text neck syndrome Which infers that the scapular kinematics is altered in all three positions in Undergraduate students who use mobile phones continuously for long duration in abnormal posture which cause neck pain.

A study done by Balikci K. 2009 *et al.* [14] investigated the psychophysiological patterns associated with cell phone text messaging (texting). Twelve college students who were very familiar with texting were monitored with surface electromyography (SEMG) from the shoulder (upper trapezius) and thumb (abductor policies brevis/opponents policies); blood volume pulse (BVP) from the middle finger, temperature from the index finger, and skin conductance (SC) from the palm of the non-texting hand; and respiration from the thorax and abdomen. The counter-balanced procedure consisted of a 2 min pre-baseline, 1 min receiving text messages, 2 min middle baseline, 1 min sending text messages and 2 min post-baseline. The results indicated that all subjects showed significant increases in respiration rate, heart rate, SC, and shoulder and thumb SEMG as compared to baseline measures. Eighty-three percentage of the participants reported hand and neck pain during texting, and held their breath and experienced arousal when receiving text messages. Subjectively, most subjects were unaware of their physiological changes. The study suggests that frequent

triggering of these physiological patterns (freezing for stability and shallow breathing) may increase muscle discomfort symptoms. Thus, participants should be trained to inhibit these responses to prevent illness and discomfort.

There is evidence of muscle dysfunction related to the control of the movement system. There is a clear link between reduced proprioceptive input, altered slow motor unit recruitment and the development of chronic pain states. Dysfunction in the global and local muscle systems is presented to support the development of a system of classification of muscle function and development of dysfunction related to musculoskeletal pain. The global muscles control range of movement and alignment, and evidence of dysfunction is presented in terms of imbalance in recruitment and length between the global stability muscles and the global mobility muscles [15].

The possible reason for this change can be explained by the fact that Neck pain from poor biomechanics can be explained as in an upright position the head is supported by the spinal vertebrae. Once the head is flexed forward, the vertebrae do not support the weight of the head as much. Muscles, tendons, and ligaments work harder to hold up the head. Overtime the muscles and other soft tissues tighten up due to the excessive workload required to hold the head in position. The anterior neck muscles become weak from being in shortened position and neural structures are kept in less than optimal positions. This chronic overload and tightening of soft tissues may eventually result in decreased blood flow and oxygen to the soft tissues, ultimately causing pain.

Conclusion

In the present study, it was seen that scapular position is altered in undergraduate students who are suffering from text neck syndrome in all three positions that is at rest, hands on hip, and 90 degree Glen humeral abduction.

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