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Prevalence of Text Neck Syndrome and its Association with Forward Head Posture and Aerobic Capacity Among Medical Students

Original Research

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Abstract

Background: To find the prevalence of text neck syndrome and its association with forward head posture and aerobic capacity.

Objective: The objective of the study is to determine the prevalence of text neck syndrome and its association with forward head posture and aerobic capacity among medical students using electronic devices frequently.

Methods: A cross-sectional study was conducted at the University of Medical and Dental College Faisalabad on undergraduate medical students in Pakistan, from April 12, 2024, to June 12, 2024. The sample size collected was 203 using a convenient sampling technique, with participants randomly selected based on specific criteria. Upon obtaining consent, participants were administered a screening form to gather information about their age, discipline, and duration of phone or tablet usage. A goniometer was then used to calculate the Craniovertebral Angle (CVA), where a CVA of less than 49 degrees indicated forward head posture. This was followed by the performance of a 6-minute walk test to assess aerobic capacity.

Results: The total sample size was 203 and the mean age of the subjects was 18-25 years. 27.09% of participants found reduced aerobic capacity while 66.50% showed forward head posture. There was a strong significant association between forward head posture and aerobic capacity with a p-value of 0.000.

Conclusion: This study finds a high prevalence of text neck syndrome and a significant association with forward head posture and aerobic capacity. Most participants face neck pain, neck discomfort, headache, and reduced aerobic fitness due to using electronic gadgets.

Keywords: Prevalence, aerobic capacity, electronic devices, forward head posture, mobile phone usage, musculoskeletal disorders, posture assessment, smartphone addiction, text neck syndrome, undergraduate students, young adults.

INTRODUCTION

In a short time, the mobile phone has become the dominant and extensively utilized gadget for many day-to-day tasks, encompassing information exchange, internet access, social interaction platforms, betting, and an array of additional events (1). Mustafaoglu R et al. found a high incidence of pain in the back of the hand, neck, wrist, and hand among individuals addicted to smartphones (2). Dr. Dean L. Fishman, an American chiropractor, introduced the term "Text Neck." It refers to a condition alternatively known as "Turtle Neck Posture," characterized by recurring stress injuries and neck pain due to prolonged use of handheld devices (3). When someone keeps their head forward and bent down, engrossed in their mobile device (4). Mobile phones are progressively suspected to cause the growth of musculoskeletal disorders involving nerves, tendons, muscles, and associated structures of the body (5). Normally, neck muscles are anatomically positioned to support the weight of the head, approximately 10–12 pounds. However, tilting the head forward by just an inch doubles the burden on these neck muscles. Additionally, the phenomenon known as "text neck" can give rise to various health concerns, including reduced lung capacity due to restricted expansion and difficulty for the heart to pump blood efficiently to the peripheral parts when adopting a slouched posture while using electronic devices (6).

The primary indicators of text neck syndrome encompass a rigid neck, uneasiness, spreading pain, and weakened muscles (usually affecting the trapezoidal muscle, rhomboid muscles, and shoulder external rotators) (7). Using a smartphone can have various effects on the musculoskeletal system, one of which is the forward head posture. This posture occurs when individuals stare at a monitor positioned below eye level for extended periods, causing the head to protrude forward. This leads to an excessive anterior curve in the lower cervical vertebrae and an exaggerated posterior curve in the upper thoracic vertebrae to maintain balance (8). The elevated kyphotic posture in the upper thoracic region among users, caused by their forward head posture, leads to increased internal thoracic pressure during exhalation, potentially impacting the active mechanism of the function of the lungs. This displacement of the cavity of the chest might also generate opposition during out-breath, posing a risk to lung function (9).

Forward head posture significantly impacts respiratory function by causing a decline in the strength of respiratory muscles, mainly the Sternocleidomastoid, scalene muscles, upper trapezius, and pectoralis major muscles, which play crucial roles as accessory respiratory muscles during inhalation, and their weakness causes limited breathing function (10). The decline in the condition of these accessory muscles significantly affects their ability to effectively assist in respiratory function (11).

METHODS

A descriptive, cross-sectional survey was carried out at the University of Medical and Dental College Faisalabad under the medical department of MBBS, BDS, and DPT in March 2024. Convenient sampling techniques were used in the selection of the study sample after screening with inclusion and exclusion criteria. Only female students aged 18 to 25 years who were smartphone and electronic device users for more than 4 hours per day for over a year were included. Students with congenital torticollis, surgical conditions in a supine position, a history of postural and structural deformity of the thoracic region, and any history of lung disease were excluded.

This study was based on a self-administered questionnaire and other measuring tools, including the Craniovertebral angle and the six-minute walk test. Subsequently, a goniometer was utilized to evaluate the craniovertebral angle. The craniovertebral angle was determined by measuring the degrees between a horizontal line crossing the spinous process of the C7 and a line linking the tragus of the ear with the spinous process of C7 (12). The tragus of the ear served as a reference point due to its visibility and direct correlation with skull movement, while the spinous process of C7 was selected as a marker for the lower cervical spine, being easily identifiable through palpation. A CV angle less than 50 degrees indicated a forward head position, followed by the performance of a 6-minute walk test to assess aerobic capacity (13).

A flat, non-slippery ground was chosen in a suitable environment, and cones were positioned at each end of the 30-meter stretch to serve as turning points. Participants then walked on this marked floor continuously for 6 minutes. After the test, the distance covered was measured, and aerobic capacity was calculated. Statistical tests, such as the Chi-Square test, were used, with a p-value of ≤ 0.05 considered statistically significant.

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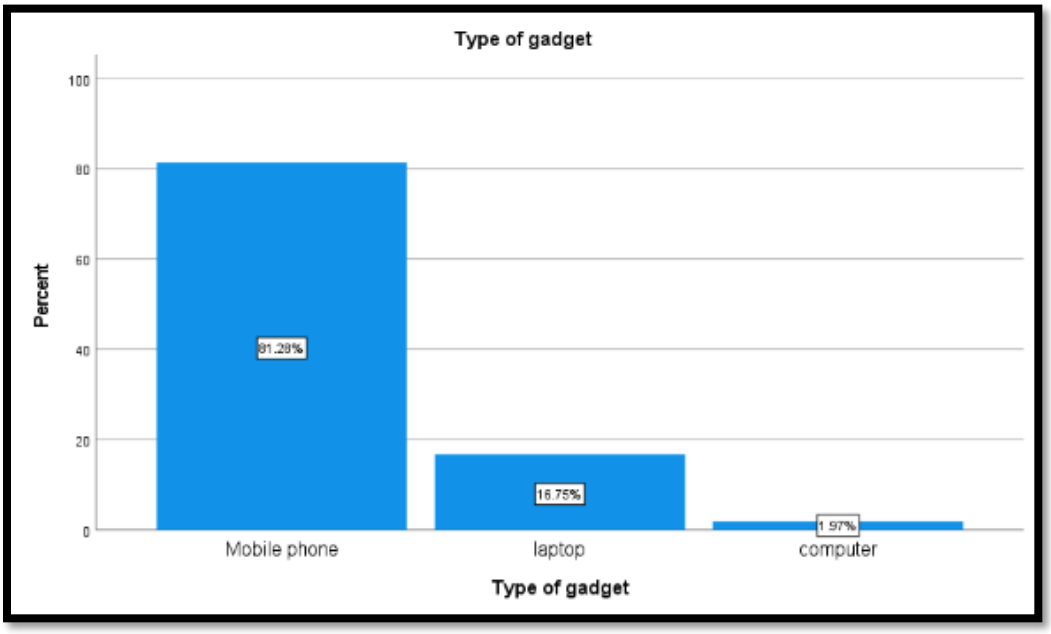
RESULTS

Bar chart representing the type of gadget participants use daily



The above bar chart table shows the type of gadgets participants use. A total of 203 participants were selected in this sample. The percentage shows that 81.3% of participants use mobile phones, 16.7% of participants use laptops and only 2% of participants use computers.

Frequently participants use electronic devices (e.g., smartphones, tablets, laptops) daily

The above graph reveals that 2.5% of participants use electronic gadgets for 1-2 hours, 7.9% of participants use them for 2-4 hours, 56.7% of participants use them for 4-6 hours and 33% of participants use them for more than 6 hours.

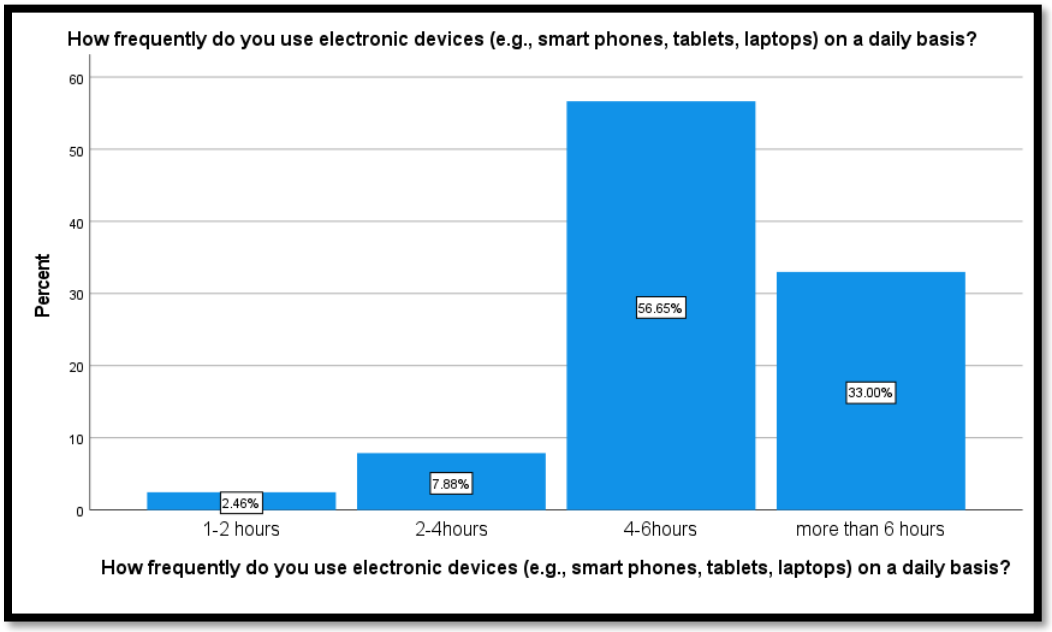


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Table I: Association of Six-minute Walk Test with Craniovertebral Angle

Different associations	P-value
How frequently do you use electronic devices (e.g., smartphones, tablets, laptops) daily with a Six-minute walk test?	0.000
How frequently do you use electronic devices (e.g., smartphones, tablets, laptops) daily in association with Cranio-vertebral Angle?	0.000
Have you experienced any of the following symptoms in the past six months with a Six-minute walk test?	.332
Have you experienced any of the following symptoms in the past six months with Craniovertebral Angle?	0.102
Do you believe that your neck pain or discomfort is related to the prolonged use of electronic devices with the Six-minute walk test?	.005
Do you believe that your neck pain or discomfort is related to the prolonged use of electronic devices with a Craniovertebral angle?	.016
Do you often find yourself with your head positioned forward while using electronic devices with a Craniovertebral Angle?	.000
Six-minute walk test with Craniovertebral Angle Cross tabulation	.000

The data presented in Table I reveals significant associations between the Six-minute Walk Test (6MWT), Craniovertebral Angle (CVA), and electronic device usage. Notably, both the frequency of daily electronic device use and the forward head posture while using these devices are significantly associated with changes in the 6MWT and CVA, with p-values of 0.000. Additionally, individuals who believe that their neck pain or discomfort is related to prolonged electronic device use show significant associations with both the 6MWT ($p = 0.005$) and CVA ($p = 0.016$). However, the presence of symptoms in the past six months does not show a significant association with either the 6MWT ($p = 0.332$) or CVA ($p = 0.102$). The cross-tabulation between the 6MWT and CVA also indicates a strong association ($p = 0.000$). These findings suggest that frequent electronic device use and associated postural changes significantly impact both functional mobility, as measured by the 6MWT, and the craniovertebral angle, highlighting the potential musculoskeletal consequences of prolonged electronic device usage.

DISCUSSION

This study evident that individuals who spend more time using electronic devices such as mobile phones and laptops etc. tend to have a higher proportion of decreased aerobic capacity and craniovertebral angle. For instance, among those who use electronic devices for more than 6 hours daily, 43.3% have a decreased aerobic capacity and 53.7% decreased Craniovertebral angle. On the other hand, among those who use electronic devices for 1-2 hours daily, 20.0% have a decreased aerobic capacity, with 80.0% having a normal capacity.

This research aimed to explore how vital capacity, diaphragm movement distance, and oxygen saturation correlate with forward head posture and round shoulder posture among 50 young adults. Previous studies have shown a positive relationship between craniovertebral angle, VO2 Max, and VCO2, indicating that as the craniovertebral angle decreases, forward head posture worsens, leading to decreased respiratory function. Moreover, the severity of forward head posture is linked to lower maximum inspiratory and expiratory pressures. Consistent with prior findings, this study revealed that more severe forward head posture is associated with lower vital capacity, with closer-to-normal posture associated with higher vital capacity. Additionally, diaphragm movement decreases with worsening forward head posture (14).

It becomes apparent that individuals who spend more time using electronic devices tend to have a higher proportion of forward head posture compared to those with less device usage. For instance, among those who use electronic devices for more than 6 hours daily, 53.7% exhibit forward head posture, while only 46.3% have a normal craniovertebral angle. Conversely, among those who use electronic devices for 1-2 hours daily, 80.0% have a normal craniovertebral angle, with only 20.0% exhibiting forward head posture. A P-value of .000 indicates that the significant association between electronic device usage and craniovertebral angle is unlikely to have occurred by chance.

The posture adopted while texting on a cell phone can disrupt the natural alignment of the spine, leading to muscle spasms and neck pain. This continuous forward bending increases the risk of early arthritis and alters neck alignment, potentially causing permanent damage. Our study revealed that the majority of students (62.4%) experienced continuous neck stress while using a cell phone, while 20.8% experienced on-off stress and 16.8% reported no stress (15).

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This study noticed that individuals who report experiencing neck pain or discomfort frequently or always while using electronic devices tend to have a higher proportion of decreased aerobic capacity (6MWT scores below 400m) compared to those who report experiencing neck pain or discomfort rarely or occasionally. For instance, among those who experience neck pain or discomfort frequently, 96.0% exhibit decreased aerobic capacity, while among those who experience it rarely, 76.5% have normal aerobic capacity. A P-value of .016, indicating that a significant association between the frequency of neck pain or discomfort while using electronic devices.

Elżbieta Szczygieł examined the significant correlation between Forward Head Posture (FHP) and reduced motion of the costal arch. Additionally, tilting the head in the frontal plane was observed to influence breathing biomechanics, resulting in decreased respiratory actions of the lower ribs (16).

Individuals who report experiencing neck pain or discomfort frequently or always while using electronic devices tend to have a higher proportion of forward head posture (craniovertebral angle <49) compared to those who report experiencing neck pain or discomfort rarely or occasionally. For instance, among those who experience neck pain or discomfort frequently, 92.0% exhibit a forward head posture, while among those who experience it rarely, 69.1% have a forward head posture.

Kim et al. investigated how forward head posture relates to respiratory function and muscle activity in young adults. They examined 33 healthy individuals in their 20s, analyzing metrics like craniovertebral angle, cranial rotational angle, and respiratory parameters. Positive correlations were found between craniovertebral angle and respiratory function, while negative correlations were observed with sternocleidomastoid activity. Conversely, the cranial rotational angle showed negative correlations with respiratory metrics and positive correlations with muscle activity. These findings highlight the importance of maintaining proper head posture for optimal respiratory health (17).

CONCLUSION

This study found a high prevalence of text neck syndrome and they had a significant association with forward head and aerobic capacity. Most participants face neck pain and neck discomfort, headache, and reduced aerobic fitness due to using electronic gadgets. There is a need to educate the students about proper posture guidance during the usage of electronic devices.

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