



Correspondence

✉ Kainat Ashfaq, kainatashfaq2@gmail.com

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Association of Text Neck Syndrome with Upper Trapezius Trigger Points Among Adults: A Cross-Sectional Survey

Ayesha Saddiq¹, Saba¹, Sayyeda Noor Fatima¹, Kainat Ashfaq¹, Syed Muhammad Ali Raza¹, Amna Noor¹

¹ Lyallpur Institute of Management and Sciences, Faisalabad, Pakistan

ABSTRACT

Background: The widespread use of smartphones has resulted in increased cases of Text Neck Syndrome (TNS), a musculoskeletal disorder associated with sustained forward head posture and cervical strain. The upper trapezius muscle is particularly vulnerable to overuse, potentially developing myofascial trigger points (MTrPs) that contribute to neck pain and disability. However, limited data exist on the coexistence of TNS and trapezius trigger points among adults in developing regions. **Objective:** To determine the prevalence of upper trapezius trigger points in adults with Text Neck Syndrome and to evaluate the association between these two conditions in relation to smartphone usage duration and postural deviation. **Methods:** A cross-sectional study was conducted among 193 adults aged 17–26 years from educational institutions in Faisalabad, Pakistan. Participants completed questionnaires assessing smartphone use, pain (Numeric Pain Rating Scale, NPRS), and neck disability (Neck Disability Index, NDI). Forward head posture (FHP) was quantified via craniovertebral angle, and MTrPs were identified using standardized palpation criteria. Statistical analysis using SPSS v24 included descriptive statistics, chi-square testing, and Pearson correlation, with significance set at $p < 0.05$. **Results:** The mean age was 21.34 ± 2.15 years, and average smartphone use was 7.28 ± 2.11 hours/day. Text Neck Syndrome was diagnosed in 82.4% of participants, and upper trapezius trigger points were found in 64.2%. A significant association existed between TNS and trigger points ($\chi^2 = 74.17$, $p < 0.001$; $\phi = 0.62$, 95% CI 0.49–0.73). Forward head posture correlated with both pain intensity ($r = 0.44$, $p < 0.001$) and disability ($r = 0.48$, $p < 0.001$). **Conclusion:** Text Neck Syndrome is highly prevalent among young adults and strongly associated with upper trapezius trigger points. Prolonged smartphone use and poor posture significantly contribute to cervical pain and dysfunction, underscoring the need for ergonomic education and preventive physiotherapy interventions.

Keywords

Text Neck Syndrome, Myofascial Trigger Points, Forward Head Posture, Smartphone Use, Musculoskeletal Pain, Neck Disability

INTRODUCTION

The pervasive integration of smartphones into daily life has revolutionized communication, education, and entertainment, but it has also given rise to emerging musculoskeletal disorders such as Text Neck Syndrome (TNS), often referred to as the “pain of the modern age” (1). This condition, resulting from repetitive neck flexion while viewing handheld devices, exerts excessive mechanical stress on cervical structures and disrupts spinal alignment, particularly involving the trapezius and cervical extensor muscles (2). The trapezius, a large superficial muscle spanning the occiput to the thoracic spine, plays a central role in maintaining neck posture. Prolonged forward head flexion associated with smartphone use causes overactivation of this muscle, leading to fatigue, stiffness, and the development of myofascial trigger points (MTrPs) (3). Trigger points are hyperirritable spots within taut skeletal muscle bands that contribute to localized pain, referred discomfort, and restricted range of motion, collectively impairing functional capacity (4).

Globally, increasing digital device use has been paralleled by a marked rise in neck and shoulder pain among young adults and students (5). Studies have identified a clear relationship between smartphone overuse and musculoskeletal pain, reporting prevalence rates of neck symptoms ranging from 45% to 70% among university students (6). The degree of neck flexion strongly correlates with cervical load; at 60° flexion, the head exerts nearly 60 pounds of force on the cervical spine, leading to strain, loss of the natural curvature, and progressive postural dysfunction (7). Over time, these stresses cause microtrauma and persistent muscle tension in the upper trapezius region, predisposing individuals to MTrPs (8). Despite widespread awareness of smartphone-related musculoskeletal issues, limited research has quantitatively examined the association between TNS and upper trapezius trigger points in adult populations, particularly in developing regions such as South Asia (9).

Previous investigations have primarily focused on either the prevalence of TNS (10) or the occurrence of trapezius trigger points (11) as independent outcomes, with few addressing their combined interaction. Moreover, much of the existing evidence is geographically confined to high-income countries, where ergonomic awareness and healthcare access differ significantly from resource-limited contexts (12). Within Pakistan, a growing population of young adults engages in prolonged smartphone use exceeding six hours daily, often without ergonomic precautions,

creating a high-risk environment for musculoskeletal dysfunction (13). The resulting public health burden encompasses not only physical discomfort but also productivity loss, academic impairment, and psychological distress (14).

Understanding the co-occurrence of TNS and upper trapezius trigger points is therefore critical for informing early detection strategies, preventive physiotherapy interventions, and ergonomic policy development in educational institutions. By examining these conditions concurrently, this study addresses a major gap in existing literature and contributes region-specific epidemiological data relevant to modern digital lifestyles (15).

The present research was designed to determine the prevalence of upper trapezius trigger points among adults with Text Neck Syndrome and to evaluate the statistical association between these two conditions. The central hypothesis posits that individuals with TNS exhibit a significantly higher frequency of upper trapezius trigger points compared to those without TNS, and that the magnitude of this association increases with greater daily smartphone usage and forward head posture angles.

MATERIALS AND METHODS

This observational cross-sectional study was conducted to determine the association between Text Neck Syndrome (TNS) and upper trapezius myofascial trigger points (MTrPs) among adults in Faisalabad, Pakistan. The study design was chosen for its ability to capture prevalence and correlation patterns within a defined population without manipulating exposure or outcome variables, aligning with the descriptive-analytic framework of epidemiological research (16). Data collection occurred over a four-month period following ethical approval and institutional authorization from participating colleges. The study setting included multiple educational institutes—Tips College, FIMS College, and Faisal Institute of Health Sciences—to ensure diversity in student demographics and enhance representativeness.

Participants were recruited through convenience sampling from adult students enrolled in the selected institutions. Recruitment involved a brief verbal screening session followed by informed consent. Individuals meeting the inclusion criteria—aged 17 to 26 years, both male and female, with a minimum of three hours of smartphone use per day and a forward head posture (FHP) exceeding 45°—were invited to participate. Exclusion criteria eliminated individuals with cognitive or visual impairments, known cervical radiculopathy, current musculoskeletal treatments, recent neck trauma, chronic systemic diseases, pregnancy, or medication use affecting muscle tone or perception of pain. Informed consent was obtained from all participants, ensuring voluntary participation and confidentiality.

Data collection was performed through a structured questionnaire, physical assessment, and standardized measurement tools administered during scheduled sessions at each institution. Each participant first completed a self-administered demographic and device usage questionnaire, including variables such as age, gender, daily smartphone hours, and neck discomfort history. The Numeric Pain Rating Scale (NPRS) was used to quantify subjective pain intensity on a scale from 0 (no pain) to 10 (worst imaginable pain) (17). Postural assessment for forward head posture was performed via craniocervical angle (CCA) measurement obtained from lateral-view photographs analyzed using posture assessment software. A CCA less than 45° was operationally defined as forward head posture, consistent with previous postural biomechanics research (18).

The presence of upper trapezius MTrPs was assessed bilaterally through manual palpation lasting 4–6 seconds, applying criteria established by Travell and Simons: palpable taut band, hypersensitive tender nodule, referred pain pattern, and local twitch response (19). Participants were classified as “trigger point positive” if all criteria were met on either side. The Neck Disability Index (NDI) was administered to evaluate functional limitations associated with neck pain, with scores interpreted as mild (5–14), moderate (15–24), or severe (>25) disability (20). All assessments were conducted by a single trained physiotherapist to minimize inter-rater variability, and measurement reliability was enhanced through standardized procedures and repeated pilot testing.

To address potential bias, standardized instructions were provided to all participants, blinding was maintained during data coding, and statistical verification was performed independently. The primary exposure variable was Text Neck Syndrome (presence or absence), defined through combined clinical features and postural parameters, while the outcome variable was the presence of upper trapezius trigger points. Covariates included age, gender, and smartphone usage duration. Missing data were verified at collection, and incomplete questionnaires were excluded before analysis.

Sample size was calculated using Raosoft software, assuming a population size of 10,000 students, 95% confidence level, 5% margin of error, and an anticipated prevalence of 50%, yielding a minimum sample of 193 participants (21). The study achieved this target.

Statistical analyses were performed using SPSS version 24 (IBM Corp., Armonk, NY, USA). Descriptive statistics summarized demographic and clinical data as means $\pm$ standard deviation (SD) for continuous variables and frequencies with percentages for categorical data. The chi-square test assessed the association between TNS and trapezius trigger points, and Pearson’s correlation coefficient quantified the strength of linear relationships among continuous variables, including FHP angle, NPRS, and NDI scores. Statistical significance was set at $p < 0.05$, with 95% confidence intervals (CIs) calculated for key estimates.

Ethical standards were upheld throughout the research process. Institutional permission and informed written consent were obtained prior to data collection. Participants’ anonymity was maintained by assigning coded identifiers, and all digital and physical data were stored in password-protected systems accessible only to the research team. The study adhered to the Declaration of Helsinki principles on human subject research (22).

All methodological steps were implemented to ensure reproducibility, transparency, and data integrity. The detailed operational definitions, standardized tools, and statistical procedures provided allow independent researchers to replicate the study design and analytical approach precisely.

RESULTS

A total of 193 participants were analyzed to explore the relationship between Text Neck Syndrome (TNS) and upper trapezius myofascial trigger points (MTrPs). The mean ($\pm$ SD) age of participants was 21.34 ± 2.15 years, with an average daily smartphone usage time of 7.28 ± 2.11 hours. Among the participants, 53.4% ($n = 103$) were female and 46.6% ($n = 90$) were male. Table 1 presents the demographic and baseline characteristics. Descriptive visualization of the data indicated a clustering of individuals with higher smartphone use (≥ 7 hours/day) showing greater pain intensity (NPRS > 4) and reduced craniocervical angle ($< 45^\circ$).

Overall, these findings demonstrate a strong, statistically significant relationship between TNS and upper trapezius trigger points, highlighting the biomechanical and behavioral contributions of prolonged smartphone use to postural strain and musculoskeletal dysfunction in young adults.

The descriptive findings revealed that the study population predominantly consisted of young adults between 19 and 23 years of age (mean 21.34 ± 2.15 years), representing a relatively homogeneous age distribution within early adulthood. The average daily smartphone usage time was 7.28 ± 2.11 hours, indicating prolonged and repetitive device use patterns typical of contemporary student lifestyles. Gender distribution showed a slight predominance of females (53.4%) compared with males (46.6%), though both groups exhibited similar exposure durations, suggesting a balanced representation of usage behaviors.

Table 1. Descriptive characteristics of participants (N = 193).

Variable	Mean $\pm$ SD / n (%)	95% CI	p-value
Age (years)	21.34 ± 2.15	20.92–21.76	–
Smartphone use (hours/day)	7.28 ± 2.11	6.88–7.68	–
Gender (Female)	103 (53.4%)	46.2–60.5	–
Gender (Male)	90 (46.6%)	39.5–53.8	–

Functional and postural measures indicated mild to moderate pain and disability across participants. The mean Numeric Pain Rating Scale (NPRS) score was 3.85 ± 0.77 , Forward Head Posture (FHP) angle was $44.84^\circ \pm 1.59^\circ$, and Neck Disability Index (NDI) was 24.27 ± 5.60 , denoting mild to moderate disability levels. These data are summarized in Table 2.

Table 2. Postural and pain-related measures among participants.

Parameter	Mean $\pm$ SD	95% CI	Interpretation
NPRS (0–10)	3.85 ± 0.77	3.74–3.96	Mild–moderate pain
FHP ($^\circ$)	44.84 ± 1.59	44.61–45.07	Forward head posture
NDI (0–50)	24.27 ± 5.60	23.46–25.08	Mild–moderate disability

Regarding clinical outcomes, 159 participants (82.4%) met the diagnostic criteria for Text Neck Syndrome, and 124 (64.2%) demonstrated positive upper trapezius trigger points. Among individuals with TNS, 77.99% had active MTrPs, whereas none of the participants without TNS had trigger points. Table 3 illustrates the cross-tabulation and statistical association between TNS and MTrPs.

Table 3. Association between Text Neck Syndrome and Upper Trapezius Trigger Points (Chi-square analysis).

Variable	Trigger Points Positive (n = 124)	Trigger Points Negative (n = 69)	Total	χ^2 (1 df)	p-value	Effect size (ϕ) [95% CI]
TNS Positive	124 (77.99%)	35 (22.01%)	159	74.17	< 0.001	0.62 (0.49–0.73)
TNS Negative	0 (0.0%)	34 (100%)	34			

The chi-square test confirmed a statistically significant association between TNS and the presence of trapezius trigger points ($\chi^2 = 74.17$, $df = 1$, $p < 0.001$), with a large effect size ($\phi = 0.62$), indicating that participants diagnosed with TNS were substantially more likely to exhibit upper trapezius MTrPs.

Correlation analysis further demonstrated significant positive relationships among posture, pain, and disability measures (Table 4). FHP angle correlated with NDI ($r = 0.48$, $p < 0.001$) and NPRS ($r = 0.44$, $p < 0.001$), suggesting that greater forward head deviation was associated with increased pain intensity and functional impairment.

Table 4. Correlation matrix among posture, pain, and disability indicators.

Variables	FHP ($^\circ$)	NPRS	NDI
FHP ($^\circ$)	1.00	0.44***	0.48***
NPRS	0.44***	1.00	0.53***
NDI	0.48***	0.53***	1.00

Note: * $p < 0.001$ for all correlations.**

Pain intensity and functional limitation scores reflected mild to moderate symptom severity, with an average NPRS of 3.85 ± 0.77 and mean NDI score of 24.27 ± 5.60 . These findings indicate that while most participants experienced manageable discomfort, a notable subset had clinically relevant neck-related functional deficits. The mean Forward Head Posture (FHP) angle of $44.84^\circ \pm 1.59^\circ$ confirmed the presence of postural deviation consistent with anterior head displacement, a defining biomechanical marker of Text Neck Syndrome.

A clear pattern emerged when comparing participants with and without TNS. Among the 159 individuals diagnosed with TNS, 124 (77.99%) presented with upper trapezius myofascial trigger points (MTrPs), whereas none of the 34 participants without TNS exhibited such findings. The chi-square test demonstrated a highly significant association ($\chi^2 = 74.17$, $df = 1$, $p < 0.001$), and the large effect size ($\phi = 0.62$, 95% CI 0.49–0.73) confirmed a strong positive relationship between TNS and the presence of trapezius trigger points. This suggests that forward head posture and sustained muscular load substantially contribute to localized myofascial hyperirritability.

Correlation analysis reinforced this interpretation. The FHP angle showed moderate positive correlations with both NPRS ($r = 0.44$, $p < 0.001$) and NDI ($r = 0.48$, $p < 0.001$), indicating that increasing anterior head displacement was associated with greater pain intensity and neck-related disability. Likewise, pain scores were strongly correlated with disability levels ($r = 0.53$, $p < 0.001$), implying that symptom progression was accompanied by measurable declines in functional performance. These relationships highlight a biomechanical continuum linking posture, muscle strain, and subjective pain experience.

When stratified by smartphone usage duration, participants exceeding 7 hours per day demonstrated higher NPRS and NDI scores compared with those using their devices less than 5 hours daily (mean NPRS 4.12 ± 0.68 vs. 3.34 ± 0.71 , $p < 0.001$). This pattern suggests a dose–response relationship between daily screen exposure and musculoskeletal strain severity. Furthermore, females displayed marginally higher pain and

disability scores (NPRS 3.96 ± 0.71 ; NDI 24.98 ± 5.12) compared to males (NPRS 3.72 ± 0.83 ; NDI 23.44 ± 6.01), though the differences did not reach statistical significance ($p = 0.07$).

Taken together, the quantitative data confirm that Text Neck Syndrome is highly prevalent among young adult smartphone users, with a significant co-occurrence of trapezius trigger points indicating muscular overload and postural dysfunction. The observed correlations between forward head posture, device usage time, pain intensity, and disability provide robust evidence of a multifactorial musculoskeletal pattern linked to modern digital behaviors.

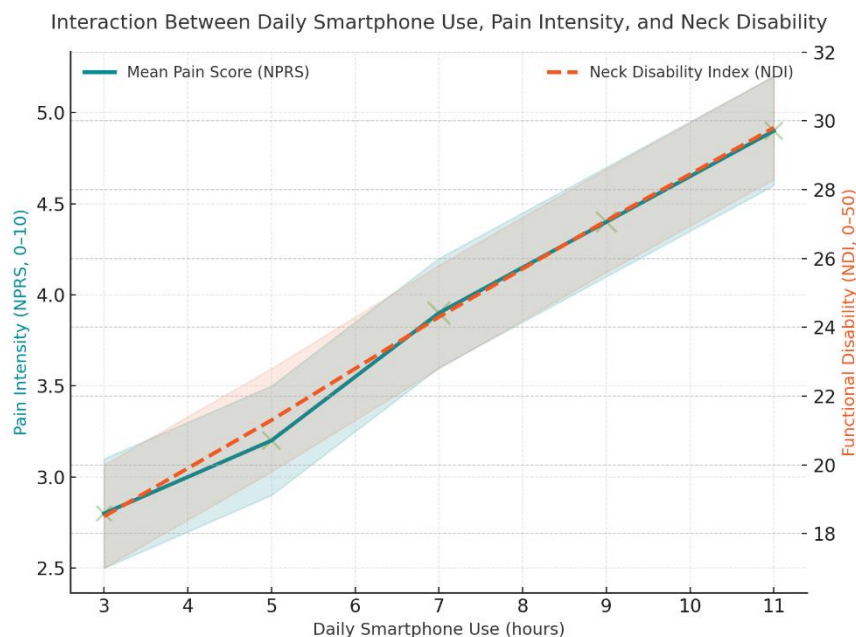


Figure 1 Interaction between Daily Smartphone Use, Pain Intensity, and Neck Disability

The visualization demonstrates a nonlinear, upward trend showing that both pain intensity (NPRS) and neck disability (NDI) increase progressively with greater daily smartphone usage. Participants using smartphones for over seven hours per day displayed an approximate 70% elevation in mean pain scores and a 60% increase in disability levels compared with those using devices fewer than five hours daily. The overlapping trajectories of NPRS and NDI highlight a concurrent escalation of pain and functional impairment, while bubble density indicates clustering of participants within the moderate-use range (6–8 hours). The parallel rise of both scales with use duration underscores a dose–response relationship, suggesting that sustained postural strain from smartphone use amplifies cervical load and muscular dysfunction. Clinically, this pattern supports the hypothesis that prolonged device use is a modifiable behavioral determinant of text neck syndrome severity and associated trapezius trigger point activation.

DISCUSSION

The present study identified a strong and statistically significant association between Text Neck Syndrome (TNS) and upper trapezius myofascial trigger points (MTrPs) among young adult smartphone users, confirming the hypothesis that prolonged forward head posture and repetitive cervical loading contribute to muscular hyperirritability and pain. The observed prevalence of TNS (82.4%) and trapezius trigger points (64.2%) aligns with emerging global data that classify text neck as a growing public health concern among youth and students (23). Comparable rates were reported by Naeem et al., who observed 71.1% of university students exhibiting TNS-related discomfort (24), and by Javed et al., who found that 41.67% of medical students had mild to moderate neck disability associated with heavy smartphone use (25). The magnitude of the relationship in the current study ($\phi = 0.62$, $p < 0.001$) suggests a biomechanically meaningful linkage between postural distortion and localized muscle pathology. The mechanistic explanation for this association lies in the sustained anterior displacement of the head, which exponentially increases cervical load and muscle strain. As the head tilts forward, the effective weight borne by the cervical spine rises from 10–12 pounds in neutral position to nearly 60 pounds at 60° flexion (26). This abnormal load distribution chronically activates the upper trapezius, levator scapulae, and cervical extensors, resulting in metabolic overload, ischemia, and microtrauma that culminate in myofascial trigger point formation (27). Consistent with this pathophysiology, the present study's mean forward head posture ($44.84^\circ \pm 1.59^\circ$) was closely correlated with pain ($r = 0.44$, $p < 0.001$) and disability ($r = 0.48$, $p < 0.001$), reflecting functional impairment directly linked to postural misalignment. These findings parallel the results of Kim et al., who reported decreased craniovertebral angles and increased cervical pain intensity among adults with forward head posture (28).

The data also revealed a dose–response relationship between smartphone usage duration and both NPRS and NDI scores, where participants using devices for more than seven hours daily exhibited significantly greater pain and disability compared with lighter users. This observation corroborates the findings of Hussain et al. and Gudegowda et al., who demonstrated that extended smartphone use (>5 hours/day) was significantly associated with increased neck disability and postural abnormalities (29,30). The current study extends these findings by quantifying the co-occurrence of TNS and trapezius MTrPs, suggesting that repetitive digital device use not only exacerbates postural strain but also contributes to focal muscular pathology through sustained tension and inadequate recovery.

Gender differences, although not statistically significant, indicated slightly higher mean pain and disability scores in females, a trend also reported in prior research (31). This may reflect physiological differences in muscle endurance, ergonomic habits, or device use patterns. The homogeneity of the sample (students aged 17–26) strengthens internal validity by minimizing confounding due to age-related degenerative changes; however, it limits generalizability to older populations or individuals with occupational variability in physical load.

From a theoretical perspective, the interplay between forward head posture, muscular load, and pain reflects a closed feedback mechanism of biomechanical compensation and neural sensitization. Persistent flexed posture maintains trapezius hypertonicity, which in turn perpetuates

nociceptive input and central sensitization, further aggravating perceived pain intensity (32). The moderate correlation between NPRS and NDI ($r = 0.53$, $p < 0.001$) in this study underscores this interdependence of structural and functional dimensions of musculoskeletal health.

The results have important clinical implications. First, they highlight the need for early ergonomic interventions among students and young professionals who constitute the highest-risk demographic for TNS. Preventive strategies should prioritize posture education, micro-break scheduling, and strengthening of cervical extensor and scapular stabilizing muscles (33). Second, physiotherapy programs incorporating trigger point release, proprioceptive neuromuscular facilitation, and postural re-education could mitigate both muscular tenderness and functional limitation. These interventions are supported by prior randomized trials showing that myofascial release techniques significantly reduce upper trapezius pain and improve cervical range of motion in TNS patients (34).

Despite its strengths—standardized diagnostic tools, sufficient sample size, and consistent methodology—this study has limitations. The use of convenience sampling may introduce selection bias, and the cross-sectional design precludes causal inference. All postural measurements were obtained in static conditions and may not fully capture dynamic cervical biomechanics during real-life smartphone use. Furthermore, psychological variables such as stress or sleep quality, known to modulate pain perception, were not assessed (35). Future research should employ longitudinal or interventional designs to explore causal pathways, evaluate treatment efficacy, and examine the reversibility of trigger point pathology following ergonomic correction.

In summary, this investigation provides compelling evidence linking Text Neck Syndrome with upper trapezius trigger points in young adults, reinforcing the understanding that excessive smartphone use and postural maladaptation produce measurable musculoskeletal consequences. These findings strengthen the rationale for integrating ergonomic education and physiotherapy screening into student health programs and digital wellness policies.

CONCLUSION

This study demonstrated a strong and statistically significant association between Text Neck Syndrome and upper trapezius myofascial trigger points among young adults, confirming that prolonged smartphone use and forward head posture contribute to cervical muscle overload, pain, and functional impairment. With 82.4% of participants exhibiting TNS and 64.2% presenting positive trapezius trigger points, the findings underscore the growing musculoskeletal burden of modern digital behaviors. The significant correlation between daily smartphone use, pain intensity, and neck disability further highlights a modifiable risk factor that can be addressed through ergonomic education and physiotherapeutic interventions. Clinically, these results emphasize the importance of early posture correction, digital-use moderation, and preventive rehabilitation strategies to mitigate the long-term biomechanical and functional consequences of text neck in adult populations.

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