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Prevalence, Awareness, and Associated Factors of Text Neck Syndrome: An Observational Study

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ABSTRACT

Neck pain is a common musculoskeletal disorder, with a global prevalence ranging from 16.7% to 75.1%. It can cause discomfort in the upper extremities and lead to long-term complications. Text Neck Syndrome (TNS), often associated with prolonged mobile phone use and poor posture, is increasingly recognized as a contributing factor. This study aimed to assess awareness of TNS, determine its prevalence in a random population, and explore associations between TNS and factors such as posture, neck flexion angle, and duration of phone usage. An observational study was conducted among 300 participants using both paper-based and online questionnaires (Google Forms). Statistical analysis was performed using SPSS version 23.0, with Chi-square tests applied to examine associations between key variables. Among the participants, 42.3% were aware of TNS. Significant associations were observed between neck pain and body posture ($\chi^2 = 23.454$, $p < 0.05$), neck pain and duration of mobile phone usage ($\chi^2 = 13.517$, $p < 0.05$), headache and phone usage duration ($\chi^2 = 31.110$, $p < 0.05$), and shoulder pain and phone usage duration ($\chi^2 = 31.110$, $p < 0.05$).Poor posture and prolonged mobile phone use are significantly associated with TNS-related symptoms, including neck pain, headache, and shoulder pain. These findings highlight the need for awareness programs and ergonomic interventions to reduce the risk of TNS. Future studies with larger sample sizes are recommended to provide more robust prevalence estimates and a deeper understanding of symptom patterns.

Keywords: *Text Neck Syndrome, Neck Pain, Musculoskeletal Disorders, Posture, Mobile Phone Usage, Ergonomic Risk Factors, Headache, Shoulder Pain, Chi-Square Analysis*

1. INTRODUCTION

Neck pain is a prevalent musculoskeletal disorder with a significant global health burden. Estimates suggest that its lifetime prevalence ranges from 16.7% to 75.1%, depending on population characteristics and assessment methods (Hoy et al., 2014). In recent years, the growing use of handheld digital devices has introduced new ergonomic challenges, most notably the emergence of *Text Neck Syndrome* (TNS), a term describing neck pain and postural dysfunction associated with prolonged forward head flexion during device use (Gustafsson et al., 2018). Mobile phone usage has expanded dramatically, with global smartphone penetration exceeding 80% in many countries, leading to increased daily screen time (Pew Research Center, 2021). The typical device use posture characterized by sustained cervical flexion has been shown to increase biomechanical loading on the cervical spine, accelerating muscular fatigue, ligament strain, and potential degenerative changes (Hansraj, 2014). The resulting musculoskeletal stress may manifest as neck pain, shoulder discomfort, headaches, and upper limb

symptoms (Damasceno et al., 2018). Epidemiological studies have demonstrated a strong link between prolonged mobile phone use and neck pain prevalence. A cross-sectional study in young adults revealed that smartphone use for more than four hours per day was significantly associated with neck pain and upper limb discomfort (Al-Hadidi et al., 2019). Similarly, ergonomic research has found that each 15° of neck flexion increases cervical spine load by up to 27 pounds, indicating a dose–response relationship between flexion angle and cervical stress (Hansraj, 2014). Awareness of TNS remains low despite growing evidence of its health implications. In a recent community survey, less than half of respondents were aware of posture-related neck disorders, even though a majority reported musculoskeletal symptoms during mobile device use (Kwon et al., 2021). This gap in awareness underscores the need for public health education, particularly among younger populations with high device dependency. Psychosocial and occupational factors also contribute to the development of TNS. Sedentary lifestyles, lack of ergonomic interventions, and multitasking with devices have been linked to more severe and persistent symptoms (Shan et al., 2013). Furthermore, studies have reported that women and younger individuals tend to have higher symptom prevalence, possibly due to differences in device usage patterns and cervical muscle endurance (Xie et al., 2018). The public health implications of TNS extend beyond musculoskeletal discomfort. Chronic neck pain has been associated with reduced work productivity, increased healthcare costs, and diminished quality of life (Cohen, 2015). Given the ubiquity of smartphones and the rapid integration of digital technology into daily life, preventive strategies such as ergonomic education, usage time management, and posture correction are essential to reduce TNS burden (Gustafsson et al., 2018). Despite growing literature, few studies have examined the combined influence of posture, neck flexion angle, and mobile phone usage duration on TNS prevalence and awareness within a general population. Understanding these associations is critical for developing targeted interventions. This study aims to address this gap by assessing TNS prevalence, evaluating awareness levels, and analyzing correlations with ergonomic and behavioral factors. The findings may inform evidence-based strategies to mitigate the musculoskeletal risks associated with prolonged mobile device use.

2. MATERIAL AND METHODS

Study Design

This was an observational, cross-sectional study conducted in Pakistan using a probability-based random sampling technique. The study adhered to the ethical standards of the institutional review process, with formal approval obtained from the Institutional Ethical Review Committee.

Ethical Considerations

All participants were informed of the study's objectives, and their anonymity was ensured throughout the process. Written informed consent, including participant signatures, was obtained prior to data collection. The data were used solely for research purposes and stored securely.

Study Setting and Duration

The study was carried out between January 2021 to June 2021 in three provinces of Pakistan: Baluchistan, Khyber Pakhtunkhwa, and Punjab.

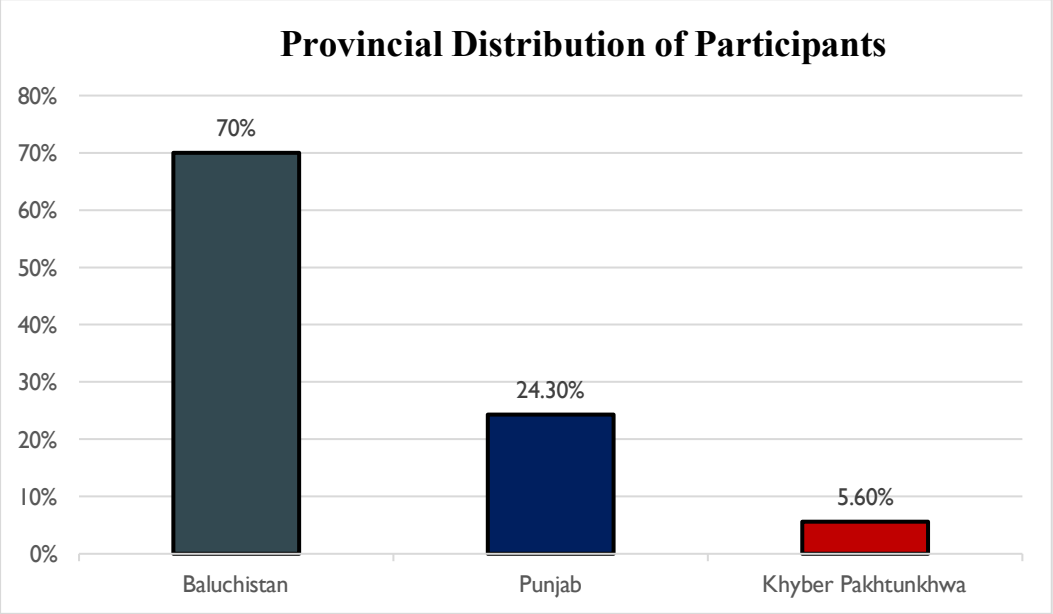

Figure 1: Province Wise Distribution of Participant

Participants

A total of 300 participants were recruited from various occupational backgrounds, including students, teachers, housewives, laborers, business owners, advocates, and government employees. Participants represented a wide age range to capture variability in mobile device usage patterns.

Eligibility Criteria

Inclusion criteria: Individuals who had used mobile phones, tablets, laptops, or desktop computers for at least six months.

Exclusion criteria: Individuals with pre-existing cervical spine disorders prior to mobile device usage or diagnosed musculoskeletal disorders unrelated to device use.

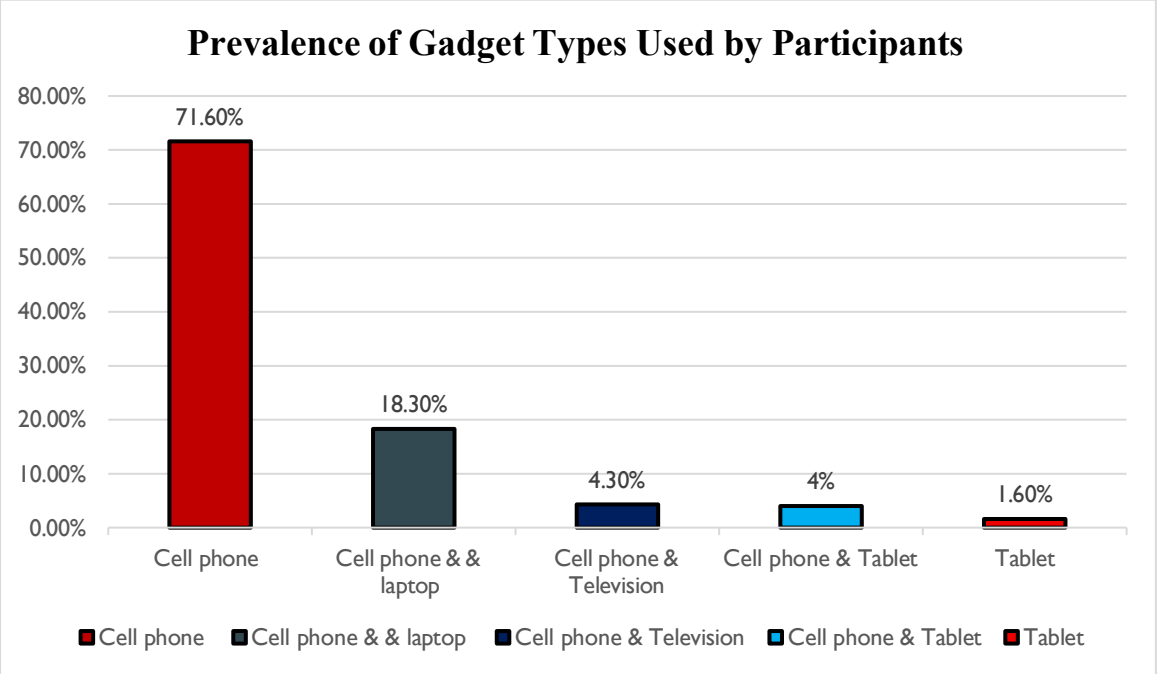

Figure 2: Distribution of Gadget Usage Among Participants

Sampling Technique

A random sampling approach was used to select participants. Recruitment was performed through two modes:

- **Door-to-door survey**: 56.6% of responses collected in person.
- **Online and phone-assisted survey**: 43.3% collected remotely via *Google Forms* (survey link) due to COVID-19 restrictions.
- https://docs.google.com/forms/d/e/1FAIpQLSdIeT5dDoKn4h37OgASCY9ubWywFTyqweKSNus-7dyAJo6l6A/viewform *Google Forms* (survey link)

Data Collection Instruments

The questionnaire was developed in Microsoft Word 2016 for printed distribution and adapted for web-based participation via Google Forms. The survey comprised two sections:

1. **Demographic Section:** gender, age, occupation.
2. **General Section**: questions on:
    - Device characteristics: weight, model, duration of daily use, and years of usage.
    - Ergonomic variables: body posture and neck flexion angle during device use.
    - Awareness of Text Neck Syndrome (TNS) and its causes.
    - Symptom reporting: neck pain, shoulder pain, arm pain, headache, lack of concentration, insomnia, eye strain, and depression.
    - Medical background: calcium deficiency and prior cervical injuries.

A Likert scale was applied to evaluate symptom frequency. Both open-ended and closed-ended questions were included (Annexure 1).

Data Analysis

Statistical analyses were performed using SPSS version 23.0. Descriptive statistics, including means and standard deviations, were calculated for continuous variables, while categorical variables were presented as percentages.

- Chi-square tests were used to examine associations between posture, neck flexion angle and duration of mobile phone usage with symptoms such as neck pain, shoulder pain, headache and arm numbness.
- Statistical significance $\alpha = 0.05$.

Data Presentation

Results were visually presented using Microsoft Excel 2016, with bar charts and pie charts illustrating frequency distributions and percentage comparisons.

3. RESULTS

A total of 300 participants were included in this study through probability-based random sampling. The cohort comprised 53.3% females (n = 160) and 46.6% males (n = 140), with a mean age of 25.88 ± 9.03 years (range: 11–65 years). Age distribution indicated that most respondents (60.6%) were between 21 and 30 years, followed by those aged 11–20 years (21.6%), 31–40 years (10.3%), 41–50 years (5%), 51–60 years (2%), and above 60 years (0.6%). Geographically, the majority resided in Baluchistan (70%), with smaller proportions from Punjab (24.3%) and Khyber Pakhtunkhwa (5.6%). Occupationally, the largest group were students (58%), followed by workers (12.3%), teachers (10.6%), housewives (7.3%), businesspersons (6%), advocates (3%), and government employees (2.7%). Awareness of text neck syndrome (TNS) was reported by 42.3% of participants, while 57.7% had not heard of the condition. Among those aware, 22.3% had learned about TNS through friends and 20% via social media. Mobile phones were the most frequently used device (71.6%), followed by mobile phones with laptops (18.3%), mobile phones with television (4.3%), mobile phones with tablets (4%), and tablets alone (1.6%). Samsung devices were the most common brand (45%), followed by Apple iPhones (25.6%), Oppo (9.6%), Huawei (7.6%), Realme (6.6%), and Infinix (5.3%). On average, participants reported 4.45 ± 1.51 hours of daily mobile phone use, with texting as the predominant activity (35.3%), followed by calling (28.6%), e-reading (17.3%), both calling and texting (9.6%), mixed use including gaming (5%), and gaming alone (4%). Regarding posture during device use, half of the participants (50.3%) reported sitting as the primary position, while 27.3% preferred lying down, 13.6% alternated between sitting and lying, and 8.6% used mixed postures including standing. Neck flexion angles most commonly adopted were 45° (39.3%), 30° (26.6%), 60° (17.3%), and 15° (16.6%). More than one-third of participants (38.3%) reported daily usage of more than six hours, while 16% used devices for five hours, 14.3% for four hours, 15.3% for three hours, and 16% for two hours. A majority (88%) had used handheld devices for over three years. When asked about potential causes of TNS, 70% attributed it to prolonged mobile phone use, 12.3% to extended book reading, and 17.6% to other causes. A range of symptoms was reported during or after device use. Neck pain was always experienced by 15.6% of participants and sometimes by 47.6%. Headaches were always reported by 19% and sometimes by 45.6%, while shoulder pain was always present in 11.6% and sometimes in 43%. Arm pain was always experienced by 9.6% and sometimes by 38%. Lack of concentration was always reported by 17.3% and sometimes by 40%, eye strain was always present in 15.6% and sometimes in 41.3%, insomnia was always reported by 7.6% and sometimes by 34.3%, and depressive symptoms were always noted by 15% and sometimes by 37%.

Statistical analysis using the Chi-square test revealed significant associations between neck pain and posture ($\chi^2 = 23.454$, $p < 0.05$), neck pain and duration of mobile phone use ($\chi^2 = 13.517$, $p < 0.05$), headache and duration of mobile phone use ($\chi^2 = 31.110$, $p < 0.05$), and shoulder pain and duration of mobile phone use ($\chi^2 = 31.110$, $p < 0.05$). No significant associations were found between arm pain and posture, headache and posture, lack of concentration and posture, shoulder pain and posture, arm pain and mobile phone usage duration, or lack of concentration and mobile phone usage duration (all $p > 0.05$).

Table1: Frequencies of Pain Experienced by the Participants

Symptoms	Always	Sometimes	Rarely	Never
Neck Pain	15.6%	47.6%	24%	12.6%
Headache	19%	45.6%	22.6%	12.6%
Shoulder Pain	11.6%	43%	30%	15.3%
Arm Pain	9.6%	38%	50.3%	2%

Lack of Concentration	17.3%	40%	40.6%	2%
Eye Stain	15.6%	41.3%	30%	0%
Insomnia	7.6%	34.3%	58%	0%
Depression	15%	37%	48%	0%

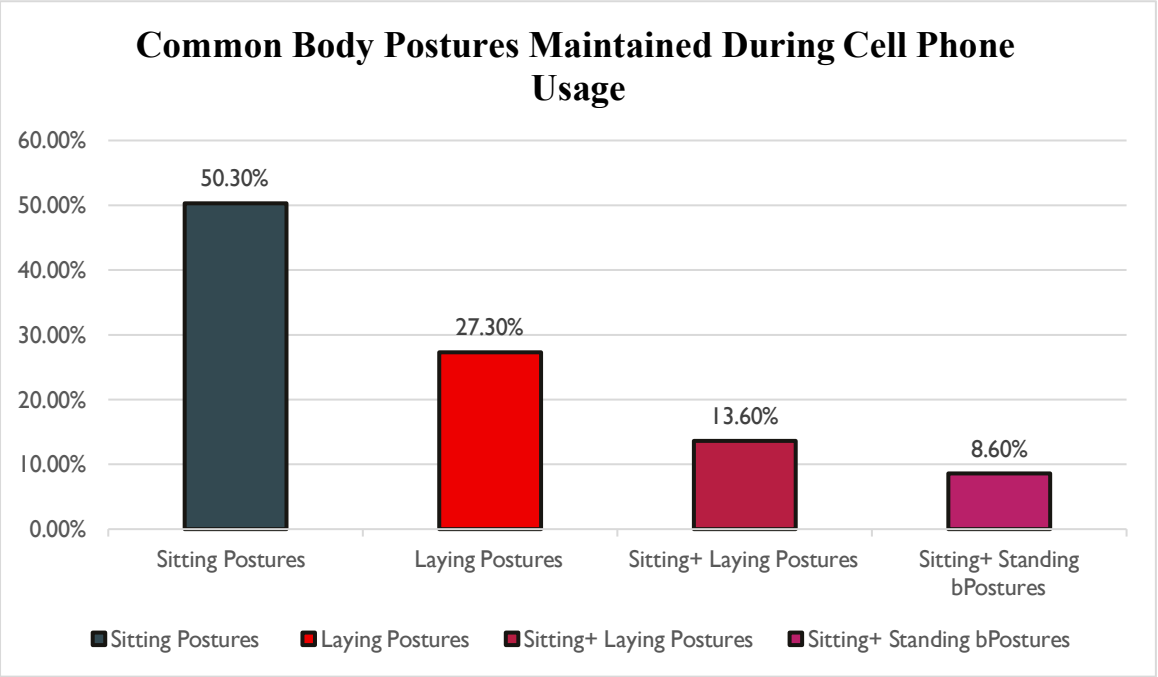

Figure 3: Prevalence of Body Posture Maintained While Using Cell Phone

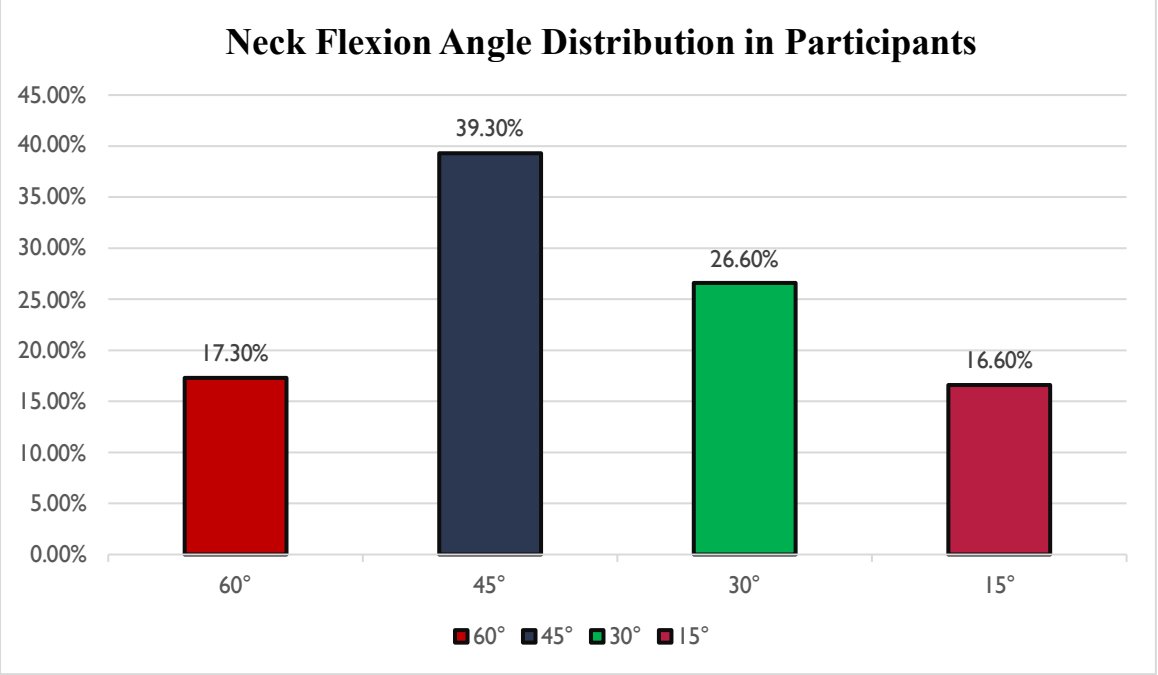

Figure 4: Degree of Neck flexion Angle

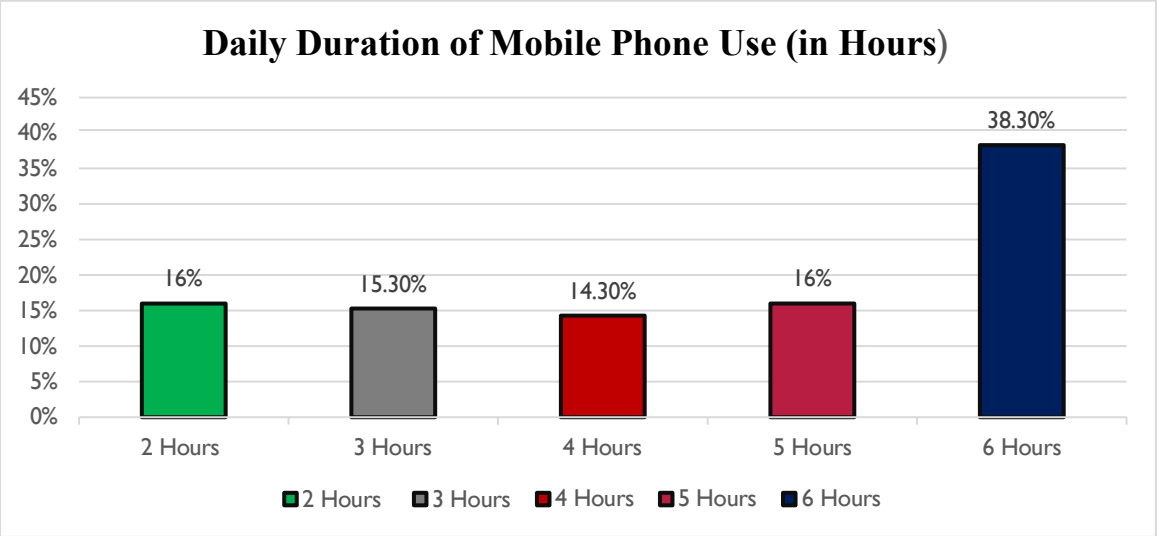

Figure 5: Duration of phone use per day (hours)

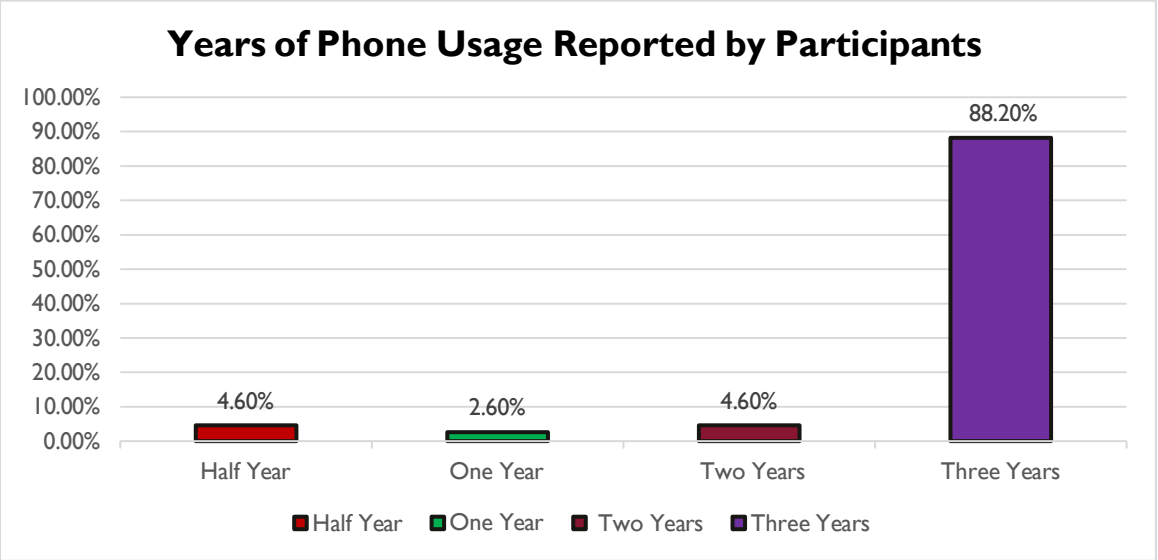

Figure 6: Time Period of phone used by the participants

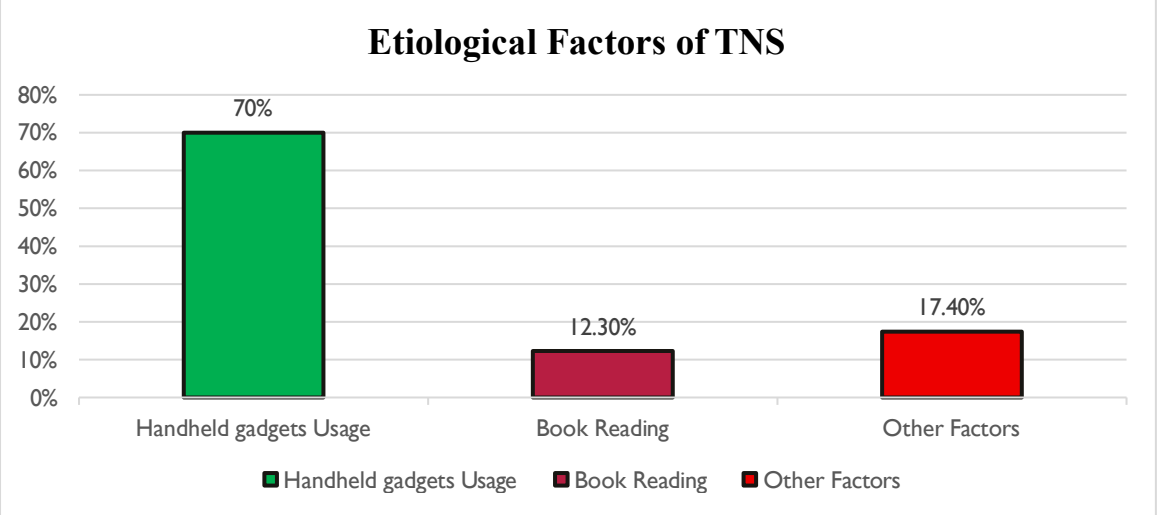

Figure 7: Etiology of Text Neck Syndrome (TNS).

4. DISCUSSION

The present investigation reveals a notable prevalence of musculoskeletal symptoms linked to mobile phone usage, particularly neck pain, headaches, and shoulder discomfort, among a diverse sample of adults. These findings are congruent with accumulating evidence that prolonged neck flexion during handheld device use imposes excessive biomechanical stress on the cervical spine and surrounding musculature, a phenomenon increasingly recognized as text neck syndrome (TNS) (Alshahrani et al., 2022; Kim & Kim, 2015). The prevalence of neck pain observed in this study exceeding 60% parallels the upper ranges reported in international cohorts, confirming that this is not an isolated regional issue but part of a global musculoskeletal health trend (Xie et al., 2020; Shan et al., 2013).This analysis underscores a strong association between forward head posture and neck pain ($\chi^2 = 23.454$, $p < 0.05$), corroborating biomechanical studies showing that each increment in neck flexion significantly amplifies cervical disc compression and extensor muscle activity (Hansraj, 2014; Yoon et al., 2021). Even modest neck flexion angles of 15° to 30° can double the load borne by the cervical spine, while postures exceeding 45° markedly increase strain and accelerate degenerative changes (Neupane et al., 2017). The significant correlation between device usage duration and both neck pain and headaches aligns with cumulative load theory, suggesting that prolonged exposure to repetitive microtrauma may precipitate both acute discomfort and chronic musculoskeletal disorders (Guan et al., 2016). In addition to cervical strain, our results reveal that prolonged mobile phone usage is linked to shoulder pain ($\chi^2 = 31.110$, $p < 0.05$). This finding is consistent with prior electromyographic studies demonstrating elevated trapezius and levator scapulae activity during sustained device use, leading to muscle fatigue, ischemia, and development of myofascial trigger points (Cagnie et al., 2010; Szeto et al., 2012). The coexistence of neck and shoulder symptoms underscores the interconnected nature of the cervical-thoracic musculoskeletal system and supports a regional interdependence model in which dysfunction in one area influences adjacent anatomical structures. The association between prolonged device use and headaches is particularly noteworthy. While musculoskeletal strain from forward head posture can trigger cervicogenic headaches, other factors such as visual strain from prolonged screen exposure and alterations in cranio-cervical proprioception likely contribute to symptom onset (Sheppard & Wolffsohn, 2018). This multifactorial etiology suggests that interventions must address both biomechanical and sensory contributors to symptom development. A significant and concerning aspect of our findings is the limited public awareness of TNS, with fewer than half of participants (42.3%) identifying it as a health concern. This mirrors reports from studies in East Asia, the Middle East, and North America, where awareness remains disproportionately low despite widespread device adoption (Lee et al., 2016; Alsalameh et al., 2019). Given that awareness is a prerequisite for behavioral change, public health campaigns emphasizing ergonomic device use, posture correction, and periodic breaks are essential. Preventive strategies such as educational workshops, posture-monitoring applications, and incorporation of microbreaks into daily routines have been shown to significantly reduce symptom severity and frequency (Berolo et al., 2011; Yun et al., 2017). Demographic analysis of our sample provides further insight into at-risk groups. The predominance of young adults (mean age 25.88 years) and the high representation of students (58%) reflect usage patterns observed globally, where younger populations display higher device dependency for academic, occupational, and social activities (Twenge et al., 2019; Al-Hadidi et al., 2019). These groups often engage in prolonged static postures with minimal ergonomic awareness, increasing their vulnerability to musculoskeletal strain. Moreover, geographic distribution patterns, with a substantial portion of participants from Baluchistan, may indicate sociocultural differences in ergonomic education access, warranting targeted regional interventions (Alrashidi et al., 2022). Although arm pain and concentration difficulties were not statistically significant in relation to posture or device use in our study, these symptoms should not be overlooked. Literature suggests that arm pain may emerge from referred cervical radiculopathy or peripheral nerve compression, conditions that may require longer-term follow-up to detect (Hoy et al., 2014). Similarly, reduced concentration may be linked to factors beyond musculoskeletal strain, including digital eye strain, disrupted sleep from evening screen exposure, and psychosocial stressors (Demirci et al., 2015). From a methodological perspective, combining paper-based and online questionnaires allowed for broader reach during COVID-19 restrictions, although self-report data inherently carry recall bias. Despite this limitation, the congruence of our findings with those from well-controlled epidemiological and experimental studies lends credibility to our results. Due to escalating global mobile device use, the implications of our study are clear: early preventive measures are critical to curbing the growing burden of TNS. A multidisciplinary approach integrating ergonomic redesign, physiotherapy-led posture training, behavioral interventions, and policy-level screen time recommendations is likely to be most effective (Sharan et al., 2014; Singla & Veqar, 2017). Longitudinal research with larger, demographically diverse populations will be essential to better understand causality, monitor long-term musculoskeletal health outcomes, and evaluate the real-world impact of prevention strategies. This study reinforces the growing consensus that TNS represents a significant musculoskeletal health challenge in the digital era. By identifying posture and usage duration as key modifiable risk factors, these findings provide a foundation for targeted intervention programs aimed at reducing the prevalence and severity of related symptoms. Addressing this emerging health issue requires both individual-level behavior change and systemic public health action.

5. CONCLUSION

This study highlights the considerable prevalence of text neck syndrome (TNS) related symptoms among mobile device users in Pakistan, with neck pain, headache, shoulder pain, and eye strain being the most commonly reported complaints. Despite the high incidence of these musculoskeletal and associated symptoms, awareness of TNS was limited to less than half of the

surveyed population, underscoring a significant public health gap. The analysis revealed that prolonged daily mobile phone use, greater neck flexion angles, and poor posture were significantly associated with increased risk of neck pain, headaches, and shoulder pain, indicating that both duration and ergonomics of device use play a critical role in symptom development. Given that smartphones were the most widely used device and that texting constituted the most frequent activity, these behavioral patterns likely contribute to sustained cervical flexion and muscular strain. The findings also suggest that prolonged device use may not only impact musculoskeletal health but also contribute to secondary issues such as lack of concentration, insomnia, and depressive symptoms, reinforcing the multifactorial burden of TNS. From a preventive standpoint, the study emphasizes the importance of ergonomic education, posture correction, regular breaks, and moderated screen time as key strategies to reduce the onset and severity of TNS symptoms. Increasing public awareness through targeted campaigns and integrating preventive guidelines into educational and workplace health programs could be instrumental in mitigating the growing musculoskeletal health challenges posed by excessive mobile device usage. Furthermore, the observed associations warrant longitudinal and interventional studies with larger, more diverse samples to strengthen causal inferences and guide evidence-based public health policies.

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