RESEARCH PAPER

Prevalence of Neck Pain and Disability Due to Prolonged Digital Device Use Among Health Workers: A Cross-Sectional Study

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ABSTRACT

Introduction: Prolonged use of digital devices, particularly smartphones, contributes to forward head posture and text neck syndrome, leading to neck pain and disability. This is increasingly relevant among health workers with high screen time.

Objective: To determine the prevalence of neck pain and assess its impact on daily activities and quality of life among health workers.

Methods: This cross-sectional study included 100 health workers aged 25-60 years from Bundelkhand Medical College, Sagar, Madhya Pradesh, India, using digital devices ≥3 hours daily. Exclusion criteria included non-users, history of neck injury, or pre-existing musculoskeletal/neurological disorders. Neck pain and disability were measured using the Neck Pain and Disability (NPAD) Scale (0-100 score).

Results: Participants included 62 males and 38 females. NPAD findings showed no pain/disability in 23%, moderate disability in 28%, severe disability in 46%, and complete disability in 3%. Subscale analysis revealed moderate to severe pain in 55%, limitations in physical function/social activity in 40-45%, and work-related fear in 65%.

Conclusion: Neck pain and disability are highly prevalent among health workers with prolonged digital device use. Awareness of posture, breaks, and exercises is essential for prevention.

Keywords: Neck pain, Digital device use, Forward head posture, Text neck syndrome, Health workers, Neck disability.

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INTRODUCTION

A mobile phone (also known as a cell phone) is a portable wireless device primarily designed for voice communication and data transmission over cellular networks. It enables users to make and receive calls while on the move, without being tied to a fixed location [1]. A survey indicates that 79% of individuals aged 18-44 keep their smartphones with them (on or near them) for nearly all of their waking hours-typically all but about two hours of the day. Prolonged smartphone use often leads users to adopt a forward head posture for extended periods, contributing to text neck syndrome [1].

The cervical spine is a complex, coordinated system of 7 vertebrae, facet joints, intervertebral discs, ligaments, muscles (including deep stabilizers, flexors, extensors, trapezius, and scalenes), nerves, and the spinal cord. It supports the head's weight, allows smooth neck and head movements, and protects the spinal cord-a vital nerve pathway extending from the brainstem downward. Eight

pairs of cervical nerves (C1-C8) exit between the vertebrae and supply sensation and movement to the neck, shoulders, arms, hands, and parts of the head and diaphragm. Any irritation, inflammation, or compression along this pathway-due to muscle tension, joint issues, disc problems, poor posture, or pinched nerves-disrupts normal function and commonly causes neck pain that may stay local or radiate to the shoulders, upper back, arms, or head, along with aching, stiffness, tingling, numbness, or weakness. Early recognition and management help prevent chronic or long-term complications [1].

A recent systematic review (Xie et al., 2017) on musculoskeletal complaints among users of mobile handheld devices reported a wide range of prevalence rates, from 1.0% to 67.8% overall, with neck complaints showing the highest rates, ranging from 17.3% to 67.8% [2].

A recent study of 2,061 students found that 74.8% showed moderate nomophobia (anxiety about being without their mobile phone), while 18.9% had severe levels-meaning nearly all participants displayed moderate to severe mobile phone addiction and related distress when separated from their device [3].

Modern smartphones have far surpassed their original purpose as simple communication devices. With powerful processors, vibrant high-resolution touchscreens, and seamless connectivity through cellular data, Wi-Fi, Bluetooth, and other technologies, they now serve as compact, multifunctional handheld computers. These devices support a broad spectrum of features and services, such as text and multimedia messaging, email management, instant messaging apps like WhatsApp, social media platforms including Facebook and Instagram, full internet browsing, mobile gaming, high-quality photography and video recording, GPS navigation with location-based services, multimedia playback for music and videos, live streaming, and thousands of additional applications available through app stores. As a result, smartphones have become essential everyday tools that seamlessly integrate into work, education, entertainment, social interaction, navigation, and overall productivity [4].

A recent study from Thailand describes text neck as a growing global epidemic, affecting people of nearly all ages who regularly use mobile phones [5]. This condition is a major emerging health concern worldwide. If not addressed or corrected early, text neck can cause serious and permanent damage, including overuse syndrome, repetitive stress injuries, chronic inflammation of neck muscles, ligaments, and nerves, and irreversible arthritic changes. Long-term untreated cases may also result in flattening of the natural cervical curve, early-onset arthritis, spinal misalignment, degenerative changes, disc compression, and disc herniation. With rapidly increasing dependence on mobile phones and extended daily usage, various musculoskeletal problems are becoming more common [6-7].

Untreated text neck can cause serious long-term damage, including flattening of the natural cervical curve, early-onset arthritis, spinal misalignment, degenerative changes in the spine, disc compression, and disc herniation. With rapidly growing dependence on mobile phones and increasing daily screen time, various musculoskeletal problems are becoming more common [8-10].

Recent physiotherapy-based studies have further highlighted the effectiveness of postural correction and cervical stabilization interventions in reducing pain and disability associated with text neck syndrome. Shobhit et al. demonstrated that chin tucking exercises significantly improved pain and disability in individuals with text neck syndrome [16]. Similarly, Baranwal et al. reported that cervical stabilization exercises effectively improved postural impairments and functional outcomes among individuals with prolonged digital device use [17]. In addition, neural mobilization combined with cervical traction has also shown beneficial effects in cervical dysfunction and radiculopathy-related symptoms [18]. These findings emphasize the growing importance of multimodal rehabilitation strategies for technology-related cervical musculoskeletal disorders.

This study aims to Prevalence of Neck Pain and Disability Due to Prolonged Digital Device Use Among Health Workers: A Cross-Sectional Study.

MATERIALS And METHODS

Study Design

This was a cross-sectional observational study employing simple random sampling to select participants.

Study Setting and Population

The study was conducted at Bundelkhand Medical College and associated hospital, Sagar, Madhya Pradesh, India from 15 November 2025 to 15 December 2025. A total of 100 health workers (including doctors, nurses, technicians, and other staff) aged 25-60 years were recruited. Participants were required to have used smartphones or other digital devices (e.g., tablets, laptops) for at least 3 hours per day on average over the preceding month.

Inclusion Criteria

Health workers aged 25-60 years. Self-reported average daily use of digital devices (smartphones, tablets, or laptops) of ≥3 hours for professional or personal purposes.

Exclusion Criteria

Individuals who reported no or minimal use of digital devices (<3 hours/day). History of acute or chronic neck trauma, injury, or accident. Pre-existing diagnosed musculoskeletal disorders (e.g., cervical spondylosis, fibromyalgia), neurological conditions (e.g., radiculopathy, neuropathy), or cardiovascular disorders that could confound neck pain assessment.

Sample Size and Sampling

A convenience sample of 100 eligible health workers was enrolled via random selection from departmental lists and duty rosters to minimize selection bias. No formal sample size calculation was performed due to the exploratory nature of the study and resource constraints; however, the sample was deemed adequate based on similar cross-sectional studies in comparable populations.

Data Collection and Outcome Measure

Data were collected using a structured questionnaire that included demographic details (age, gender, occupation, average daily device usage hours) and the validated Neck Pain and Disability Scale (NPAD) [11].

The NPAD [11] is a 20-item self-administered questionnaire developed to assess the intensity of neck pain and associated disability. Each item is scored on a 100-mm visual analog scale (VAS) ranging from 0 (no pain/no disability) to 10 (worst pain/maximal disability), yielding a total score from 0 to 100, where higher scores indicate greater pain and disability. The NPAD has demonstrated good reliability, validity, and responsiveness in patients with neck pain, covering domains such as pain intensity, functional limitations, social/recreational activities, emotions, and work-related concerns [11].

Participants completed the NPAD questionnaire in a quiet setting after providing informed consent [11]. No additional clinical examinations (e.g., range of motion or imaging) were performed.

Ethical Considerations

The study protocol was approved by the Institutional Ethics Committee of NIMS University, Jaipur, Rajasthan. Written informed consent was obtained from all participants prior to enrollment. Participation was voluntary, and confidentiality was maintained throughout.

Statistical Analysis

Data were summarized using descriptive statistics. Categorical variables (e.g., pain severity categories, disability levels) were presented as frequencies and percentages. Continuous variables (e.g., total NPAD scores) were expressed as mean ± standard deviation (SD) where applicable. No inferential statistics were applied due to the descriptive focus of the study.

RESULTS

Demographic Characteristics A total of 100 participants with chronic neck pain were enrolled in this study. The demographic distribution showed that 62 participants (62%) were male and 38 (38%) were female.

Neck Pain and Disability (NPAD) Scale Findings Baseline assessment using the Neck Pain and Disability (NPAD) Scale revealed the following distribution of responses across seven key subscales [11]. All data are expressed as number (percentage) of participants (N = 100).

The subscale analysis of the Neck Pain and Disability (NPAD) Scale revealed distinct patterns of impairment among the 100 participants. In the pain subscale, 45% of participants reported no pain, 40% experienced moderate pain, and 15% reported severe pain. For physical function, 60% indicated no limitations, while 40% had moderate limitations and none reported severe limitations. Social activity remained unaffected in 70% of participants, was moderately affected in 25%, and severely affected in 5%. Depression was not affected in 60%, moderately affected in 20%, and severely affected in 20%. Emotions were unaffected in 70%, moderately affected in 15%, and severely affected in 15%. Work-related fear was not affected in 35%, moderately affected in 55%, and severely affected in 10%. Pain control was rated as complete relief by 60%, moderate relief by 30%, and no relief by 10% (Table 1). These findings highlight a significant proportion of moderate to severe impairment across multiple domains, particularly in pain intensity, work-related concerns, and emotional well-being, underscoring the substantial impact of prolonged digital device use on neck-related disability in this population.

Subscale	No / Not affected / Complete relief (%) (n=100)	Moderate (%) (n=100)	Severe / No relief (%) (n=100)
Pain Subscale	45 (No pain)	40	15 (Severe pain)
Physical Function	60 (No limitations)	40	0 (Severe limitations)

Social Activity	70 (Not affected)	25	5 (Severely affected)
Depression	60 (Not affected)	20	20 (Severely affected)
Emotions	70 (Not affected)	15	15 (Severely affected)
Work-Related Fear	35 (Not affected)	55	10 (Severely affected)
Pain Control	60 (Complete relief)	30	10 (No relief)

Table 1: NPAD Sub-Scale tabulation

The composite interpretation of the Neck Pain and Disability (NPAD) Scale scores demonstrated a substantial burden of disability among the 100 health workers evaluated. Specifically, 23 participants (23%) reported no pain or activity limitations, 28 participants (28%) exhibited moderate disability, 46 participants (46%) showed severe disability, and 3 participants (3%) presented with complete disability (Table 2). These findings indicate that nearly three-quarters of the study population experienced moderate to severe levels of neck-related disability, with severe disability being the most prevalent category. The predominance of severe disability highlights the significant functional impact of prolonged digital device use on cervical spine health in this occupational group and underscores the need for targeted preventive and rehabilitative strategies in healthcare settings with high screen time demands.

NPAD Interpretation	**Score %**
No pain or activity limitations	23 (23%)
Moderate disability	28 (28%)
Severe disability	46 (46%)
Complete disability	3 (3%)

Table 2: Overall Interpretation of NPAD Scale

DISCUSSION

This cross-sectional study examined the contributing factors to text neck syndrome (also known as forward head posture strain or tech neck) among health workers at Bundelkhand Medical College, Sagar, Madhya Pradesh, India. These professionals heavily rely on smartphones, tablets, and laptops for both occupational tasks (such as accessing electronic medical records, telemedicine, research, patient communication, and administrative duties) and personal activities (social networking, messaging, entertainment, and leisure browsing). The assessment focused on several key domains: daily screen time and usage patterns, postural habits and behaviors during prolonged sessions, self-reported neck pain, stiffness, or functional disability, preferred communication methods (e.g., voice calls, texting, or social media applications) and their role in exacerbating neck strain, and participants' awareness of preventive strategies, including regular breaks and targeted neck/upper back exercises.

The Neck Pain and Disability (NPAD) Scale results revealed a considerable burden of symptoms in this population. Only 23% of participants reported no pain or activity limitations, whereas 28% demonstrated moderate disability, 46% severe disability, and 3% complete disability. Subscale findings further illustrated the impact, with moderate to severe pain noted in a majority of cases, alongside notable effects on work-related concerns (e.g., fear or avoidance behaviors in 65% of participants moderately or severely affected), emotional well-being, social/recreational participation, and perceived control over pain. These outcomes indicate that neck-related issues substantially compromise occupational efficiency, daily functioning, sleep, and overall quality of life among health workers.

The high prevalence of disability observed aligns with established biomechanical and clinical evidence on text neck syndrome. In the contemporary digital environment, smartphones have evolved into indispensable tools for a multitude of routine tasks, including education, professional communication, navigation, entertainment, and social interaction, rendering them nearly inseparable from daily life [4]. This pervasive reliance frequently escalates into heavy dependence or addiction, where excessive time spent on devices-often at the expense of rest, physical activity, or interpersonal engagement-triggers nomophobia (no mobile phone phobia), manifesting as significant anxiety when separated from the device due to low battery, poor signal, or absence [11-12].

Smartphones, as the primary device for quick and frequent tasks, commonly enforce prolonged forward head posture (FHP), with the head tilted downward

toward the screen. This position dramatically amplifies gravitational forces on the cervical spine, imposing mechanical loads far exceeding the normal 10-12 pounds of adult head weight in neutral alignment [13]. Repetitive exposure to such strain leads to muscle imbalance and tightness (particularly in posterior extensors like the trapezius and levator scapulae, with relative weakness in deep cervical flexors), progressive loss or reversal of the natural cervical lordosis, shifts in spinal alignment, accelerated wear on intervertebral discs and facet joints, and heightened susceptibility to degenerative processes [13].

If uncorrected, these changes elevate the risk of early-onset cervical spondylosis (neck arthritis), disc degeneration/compression, bulging or herniation, chronic instability, and permanent structural alterations. Health workers are especially vulnerable owing to the dual demands of high occupational screen time (often uninterrupted during shifts) and suboptimal ergonomics (e.g., handheld use in standing, reclined, or awkward positions during rounds or documentation). Literature consistently reports neck pain prevalence in comparable high-exposure groups-such as healthcare professionals, medical students, and office-based workers-ranging from approximately 30% to 70% or higher, frequently associated with prolonged device use, limited breaks, female gender, and low physical activity levels [14].

The present findings are consistent with recent physiotherapy literature focusing on technology-related neck disorders. Shobhit et al. reported significant improvements in pain intensity and disability following chin tucking interventions in individuals with text neck syndrome, supporting the importance of postural correction exercises in cervical rehabilitation [16]. Similarly, Baranwal et al. demonstrated positive effects of cervical stabilization exercises on postural dysfunction and neck-related disability among smartphone users [17]. Furthermore, Pallewar et al. observed beneficial outcomes with neural mobilization combined with cervical traction in patients with cervical radiculopathy, suggesting that multimodal physiotherapy interventions may effectively address both mechanical and neural components of cervical pain syndromes [18].

The severe disability rate of 46% in this cohort, along with widespread moderate impacts, underscores the urgent need for greater awareness and intervention. Despite the growing recognition of text neck as a modern musculoskeletal concern, preventive knowledge (e.g., holding devices at eye level to limit flexion to <15-20°, adhering to short breaks like the 20-20-20 rule, and incorporating simple strengthening/stretching routines for neck stabilizers and scapular muscles) remains inadequate in many professional settings. Workplace-based education, ergonomic adjustments, and routine self-assessment could substantially alleviate strain and halt progression to chronic issues [15].

Limitations of the study include its single-center setting (potentially restricting broader applicability), relatively small sample size (n=100), dependence on self-reported data (susceptible to recall or reporting bias), absence of objective posture evaluation (e.g., through imaging or sensors), and the cross-sectional design (which limits causal attribution between usage patterns and disability). Future research should adopt longitudinal approaches, multicenter sampling, biomechanical assessments, and controlled intervention studies to validate preventive measures and explore long-term outcomes.

In this research, prolonged digital device use among health workers is strongly linked to substantial neck pain and disability, driven by biomechanical overload from sustained forward head posture and amplified by occupational and personal screen demands. These results highlight the critical importance of fostering awareness, implementing ergonomic practices, encouraging regular breaks, and promoting targeted exercises to protect cervical spine health, sustain professional productivity, and enhance long-term well-being in technology-intensive healthcare environments.

CONCLUSIONS

In today's digital era, health workers, including medical professionals, commonly spend 5-7 hours daily using smartphones and other digital devices for tasks such as accessing online resources, reviewing patient notes, conducting research, and professional communication. Prolonged screen exposure frequently promotes forward head posture and contributes to neck pain or disability, with studies indicating that musculoskeletal complaints affect a substantial proportion-often approaching or exceeding 50%-of frequent users.

Effective prevention and management of neck pain require targeted education on ergonomic practices, including holding devices at eye level to minimize forward flexion, incorporating regular short breaks (e.g., every 20-30 minutes), and performing targeted strengthening and stretching exercises for the neck and upper back muscles. Implementing these evidence-based strategies can help mitigate strain on cervical structures, decrease the likelihood of chronic or degenerative changes, and support sustained musculoskeletal health and overall quality of life in environments with high technology dependence.

Limitations

1. The study was conducted at a single institution, which may limit the generalizability of the findings to other healthcare settings or populations.
2. The sample size was relatively small (n=100), which may reduce the statistical power and broader applicability of the results.
3. The cross-sectional study design limits the ability to establish a causal relationship between prolonged digital device use and neck pain/disability.
4. Data were collected using self-reported questionnaires, which may introduce recall bias or response bias among participants.
5. Objective assessments such as cervical posture analysis, range of motion measurements, ergonomic evaluation, or radiological investigations were not included.
6. The duration and pattern of device usage were based on participant reporting and were not objectively monitored using digital tracking methods.
7. Psychological factors such as stress, anxiety, sleep quality, and occupational workload, which may influence neck pain, were not separately evaluated.
8. The study did not differentiate between various digital devices (smartphones, tablets, laptops, desktop computers), which may have different ergonomic impacts on cervical posture.

Future Recommendations

1. Future studies should include larger sample sizes from multiple healthcare institutions to improve the generalizability of findings.
2. Longitudinal and prospective cohort studies are recommended to establish causal relationships between prolonged digital device use and development of neck pain or disability.
3. Objective biomechanical and postural assessments, including cervical angle measurements, ergonomic analysis, and motion analysis techniques, should be incorporated in future research.
4. Randomized controlled trials evaluating preventive and rehabilitative interventions such as ergonomic correction, cervical stabilization exercises, posture training, and physiotherapy programs are recommended.
5. Future research should investigate the role of psychosocial factors including occupational stress, mental health, sleep disturbances, and workload in the development of text neck syndrome.
6. Comparative studies between different healthcare professions and different types of digital devices may provide deeper insight into occupation-specific risk factors.
7. Workplace-based awareness programs emphasizing ergonomics, scheduled breaks, posture correction, and exercise interventions should be developed and scientifically evaluated.
8. Future studies should also explore long-term musculoskeletal consequences of excessive digital device use and assess the effectiveness of early preventive strategies in reducing chronic disability.

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