

# Impact of Smartphone Addiction on Functional Neck Disability in Physiotherapy Students: A Review of Literature

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## ABSTRACT

### Background

Smartphone addiction has become a significant contributor to cervical dysfunction among young adults, particularly physiotherapy students. Prolonged forward head posture and repetitive neck flexion during smartphone use lead to pain, reduced range of motion, and functional disability.

### Objective

This review synthesizes evidence on the relationship between smartphone addiction and neck disability and evaluates physiotherapy interventions aimed at improving posture and function.

### Methods

A systematic search of PubMed, Scopus, Web of Science, Google Scholar, and ResearchGate was conducted for studies published between 2019–2025 using Boolean operators. Eight full-text articles meeting inclusion criteria were analyzed for sample size, intervention, and outcomes.

### Results

All studies reported significant associations between smartphone use and neck dysfunction. Physiotherapy interventions—McKenzie, deep neck flexor, scapular stabilization, multimodal therapy, and ergonomic education—effectively reduced pain and disability.

### Conclusion

Smartphone addiction adversely affects cervical health. Physiotherapy-based interventions and ergonomic education are effective preventive strategies for reducing neck pain and improving posture among physiotherapy students.

**Keywords:** Smartphone addiction, neck disability, physiotherapy students, forward head posture, cervical dysfunction, ergonomic education

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### Introduction

Smartphone technology has revolutionized communication, education, and entertainment, becoming an indispensable part of modern life. [1] Among university students, particularly those in health sciences and physiotherapy, smartphones are used extensively for academic purposes, social networking, and leisure. [2] However, this pervasive use has been accompanied by growing concerns regarding musculoskeletal health, especially in the cervical spine. [3] Prolonged forward

head posture (FHP), repetitive neck flexion, and sustained screen viewing are biomechanical stressors that contribute to a clinical condition widely recognized as *text neck syndrome*. This condition manifests as neck pain, stiffness, headaches, shoulder discomfort, and functional limitations, and has been increasingly documented in young adults and student populations. [4]

The prevalence of smartphone addiction among college students is alarmingly high, with studies reporting rates ranging from 25% to 76% depending on the population

# Impact of Smartphone Addiction on Functional Neck Disability in Physiotherapy Students: A Review of Literature

and diagnostic criteria.<sup>[5]</sup> Smartphone addiction is characterized not only by excessive screen time but also by compulsive usage patterns that interfere with daily functioning. Physiotherapy students, who are expected to maintain optimal musculoskeletal health and posture awareness, paradoxically represent a vulnerable group due to their high academic and social reliance on smartphones.<sup>[6]</sup> The consequences of smartphone addiction extend beyond pain, encompassing reduced cervical range of motion, impaired muscle endurance, altered craniovertebral angle, and increased scores on disability indices such as the Neck Disability Index (NDI) and Copenhagen Neck Functional Disability Scale (CNFDS).<sup>[7]</sup>

Biomechanically, forward head posture increases the load on cervical structures exponentially. For instance, flexing the head at 60° can increase the effective weight borne by the cervical spine to more than 27 kg.<sup>[8]</sup> This abnormal posture leads to muscular fatigue, ligamentous strain, and degenerative changes, thereby reducing functional capacity. The deep neck flexors, which play a critical role in cervical stability, are particularly compromised in smartphone users, resulting in impaired endurance and proprioception. These changes not only affect physical health but also academic performance, concentration, and psychosocial well-being.<sup>[9]</sup>

Given the rising incidence of smartphone-related musculoskeletal disorders, physiotherapy researchers have investigated various interventions ranging from ergonomic education and awareness programs to structured exercise regimens such as McKenzie neck exercises, scapular stabilization, multimodal physiotherapy, and deep neck flexor strengthening.<sup>[10]</sup> Evidence suggests that targeted physiotherapy interventions can significantly reduce pain, improve posture, and enhance functional outcomes.<sup>[11]</sup> However, the literature remains fragmented, with studies differing in methodology, outcome measures, and populations studied. A comprehensive synthesis is therefore warranted to evaluate the impact of smartphone addiction on functional neck disability among physiotherapy students and to identify effective preventive and therapeutic strategies. This review aims to consolidate findings from recent studies examining the relationship between smartphone addiction and neck disability, focusing on physiotherapy for students and young adults.

## Methodology

A structured search was conducted across PubMed, Scopus, Web of Science, Google Scholar, and

ResearchGate for studies published between 2019–2025. Boolean operators were applied to refine results, combining terms such as “*smartphone addiction*” OR “*mobile phone use*” AND “*neck pain*” OR “*text neck*” OR “*forward head posture*” AND “*physiotherapy students*” OR “*college students*”. Truncations and phrase searching ensured sensitivity and specificity.

Inclusion criteria were original research articles (cross-sectional, experimental, RCTs, comparative studies) involving physiotherapy students or young adults aged 18–30, assessing musculoskeletal outcomes related to smartphone use, and published in English with full-text availability. Exclusion criteria were reviews, case reports, editorials, conference abstracts, non-English publications, or studies outside the target age group.

Titles and abstracts were screened, followed by full-text review. From the initial pool, eight full-text articles met with eligibility and were included in the synthesis. Data extracted included year, author, sample size, interventions, outcome measures, and findings. Common measures across studies were Neck Disability Index (NDI), Copenhagen Neck Functional Disability Scale (CNFDS), Visual Analog Scale (VAS), Numerical Pain Rating Scale (NPRS), Craniovertebral Angle (CVA), Deep Neck Flexor endurance test, and grip/pinch strength.

## Results

Across the eight included studies, smartphone addiction and prolonged usage were consistently associated with neck pain, reduced cervical mobility, impaired muscle endurance, and increased disability scores among physiotherapy students and young adults. Interventional trials demonstrated that physiotherapy-based approaches including multimodal therapy, ergonomic education, McKenzie exercises, scapular stabilization, and deep neck flexor strengthening were effective in reducing pain and improving posture and function. While some studies found comparable benefits between exercise protocols, others highlighted the superiority of McKenzie exercises or combined awareness and education programs. Overall, the evidence underscores the negative musculoskeletal impact of smartphone addiction and the positive role of targeted physiotherapy interventions in mitigating these effects. A detailed summary of all included studies is presented in **Table 1**.

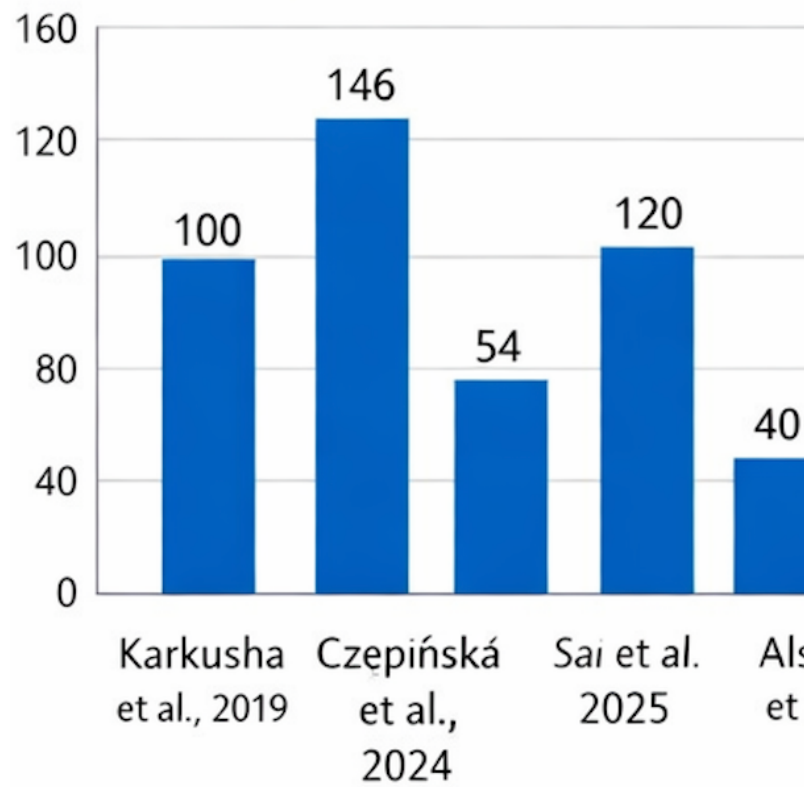
## Impact of Smartphone Addiction on Functional Neck Disability in Physiotherapy Students: A Review of Literature

S n . N o.	Y ear	Auth or (et al.)	Samp le Size	Interv ention	Outc ome Mea sures	Findin gs
1	20 19	Kark usha et al.	100 PT students	Smartp hone addicti on vs. non-addicte d groups; assesse d cervica l ROM and CNFD S	SAS- SV, CRO M, CNF DS	Smartp hone addicti on signifi cantly reduce d cervica l ROM (except extensi on) and increas ed neck disabili ty.
2	20 24	Czеп ińska et al.	146 PT students	Observ ational; compar ed student s with/wi thout neck pain, bedtim e phone use	VAS, NDI	Neck pain group had higher disabili ty; chroni c pain worsen ed functio n; bedtim e use linked to poor concen tration.
3	20 24	Nath ani et al.	54 smart phone - addict	Tailor- made physiot herapy protoco	VAS, NDI, CHD Q, SAS	Signifi cant reducti on in pain,
4	20 25	Sai et al.	120 colleg e student s with text neck	Multim odal physiot herapy (8 weeks) : ergono mics, posture correcti on, stretchi ng, strengt hening	SAS- SV, VAS, NDI	Disabili ty, and hand discom fort post- interve ntion; person alized physiot herapy effecti ve.
5	20 21	Alsh ahran i et al.	40 male student s	Cross- section al compar ison of addicte d vs. non-addicte d	SAS- SV, DNF endurance , CEE T, Grip & Pinc h stren gth	Smartp hone addicti on reduce d neck flexor endura nce; no effect on extens or endura nce, grip, or

## Impact of Smartphone Addiction on Functional Neck Disability in Physiotherapy Students: A Review of Literature

						pinch strength.
6	2024	Patel et al.	56 PT students (RCT)	Group A: Awareness + education + conventional physiotherapy; Group B: conventional physiotherapy only	NRS, NDI, CV-Angle	Both groups improved, but awareness + education group had greater reduction in pain, disability, and better posture.
7	2021	Yana et al.	40 smartphone users with neck pain	Group A: Deep Neck Flexor strengthening; Group B: McKenzie exercises (6 weeks)	NDI, SF-MPQ	Both groups improved significantly; no statistical difference between DNF and McKenzie groups.
8	2024	Deepak et al.	52 smartphone users with FHP	Group A: McKenzie neck exercises; Group B:	CVA, NDI	Both improved, but McKenzie group showed

				B: Scapular stabilization exercises (4 weeks)		greater improvement in CVA and NDI, correcting FHP more effectively.
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**Figure 1 – Sample Size Across Included Studies**

# Impact of Smartphone Addiction on Functional Neck Disability in Physiotherapy Students: A Review of Literature

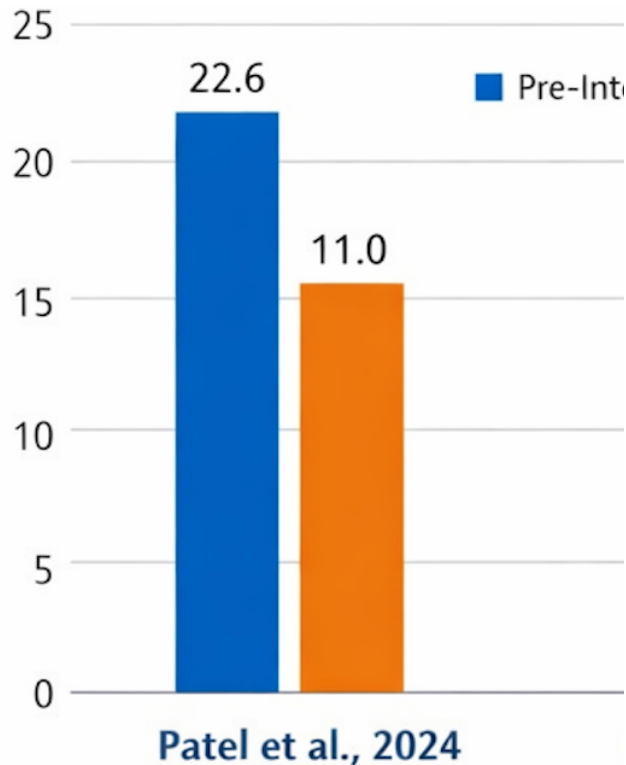


Figure 2 – Reduction in Neck Disability Scores

## Discussion

### Smartphone Addiction and Cervical Dysfunction

The reviewed studies consistently highlight the detrimental impact of smartphone addiction on cervical spine health. Karkusha et al. (2019) demonstrated that addicted physiotherapy students exhibited significantly reduced cervical range of motion, particularly in flexion, lateral flexion, and rotation, alongside higher disability scores on the Copenhagen Neck Functional Disability Scale. Similarly, Alshahrani et al. (2021) found that smartphone-addicted students had markedly lower deep neck flexor endurance compared to non-addicted peers, although hand grip and pinch strength remained unaffected. These findings underscore the biomechanical strain imposed by prolonged forward head posture and repetitive flexion, which compromises cervical muscle endurance and mobility.

### Neck Pain, Disability, and Usage Patterns

Czępińska et al. (2024) reported a high prevalence of neck pain among physiotherapy students, with chronic pain (>3 months) associated with greater disability, impaired concentration, and functional limitations such as difficulties in reading and driving. Bedtime smartphone use was particularly linked to poorer focus

and higher NDI scores, suggesting that usage patterns exacerbate musculoskeletal and cognitive outcomes. Sai et al. (2025) further documented a 26% prevalence of text neck syndrome among college students, with smartphone addiction scores averaging above the diagnostic threshold. These findings emphasize that both duration and timing of smartphone use are critical risk factors for neck disability.

### Effectiveness of Physiotherapy Interventions

Interventional studies provide strong evidence for the role of physiotherapy in mitigating smartphone-related cervical dysfunction. Nathani and Phansopkar (2024) demonstrated that a tailor-made physiotherapy protocol significantly reduced pain (VAS), disability (NDI), and hand discomfort (CHDQ) in individuals with text neck syndrome and SMS thumb. Patel and Pansala (2024) showed that combining awareness and ergonomic education with conventional physiotherapy exercises yielded superior improvements in pain, posture (craniocervical angle), and disability compared to exercises alone, highlighting the importance of preventive education.

### Comparative Efficacy of Exercise Protocols

Several studies compared to specific exercise regimens. Yana et al. (2021) found that both deep neck flexor strengthening and McKenzie neck exercises significantly reduced pain and disability, with no statistical difference between groups, suggesting both approaches are equally effective. In contrast, Deepak and Sharma (2024) reported that McKenzie exercises were more effective than scapular stabilization exercises in improving craniocervical angle and reducing disability, indicating a potential superiority of McKenzie-based protocols for correcting forward head posture. These findings suggest that while multiple exercise modalities are beneficial, McKenzie exercises may offer faster and more pronounced improvements in posture-related outcomes.

### Multimodal and Preventive Approaches

Sai et al. (2025) emphasized the effectiveness of multimodal physiotherapy, incorporating ergonomics, posture correction, stretching, and strengthening, in reducing pain and improving function among students with text neck syndrome. Preventive strategies such as ergonomic advice, mobility breaks, and awareness programs were consistently recommended across studies. Patel and Pansala (2024) particularly highlighted the added value of education in sustaining behavioral changes and reducing recurrence.

# Impact of Smartphone Addiction on Functional Neck Disability in Physiotherapy Students: A Review of Literature

## Conclusion

This review consolidates evidence from eight studies examining the impact of smartphone addiction and usage on cervical function, posture, and disability among physiotherapy students and young adults. The findings consistently demonstrate that excessive smartphone use is associated with neck pain, reduced cervical mobility, impaired muscle endurance, and increased disability indices. Interventional trials highlight the effectiveness of physiotherapy-based approaches—including multimodal therapy, ergonomic education, McKenzie exercises, scapular stabilization, and deep neck flexor strengthening in reducing pain and improving posture and function. Preventive strategies such as awareness and education programs further enhance outcomes by promoting behavioral change. Collectively, the evidence underscores the urgent need to integrate structured physiotherapy interventions and ergonomic education into student health programs to mitigate the growing burden of smartphone-related cervical dysfunction.

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