



## EVALUATING THE ASSOCIATION BETWEEN SCREEN TIME, POSTURAL ABNORMALITIES, PHYSICAL ACTIVITY LEVELS, AND NECK PAIN: A CROSS-SECTIONAL STUDY

Medical Science

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### ABSTRACT

Neck pain is a growing public health concern, particularly in the digital age, where increased screen time, sedentary lifestyles, and poor posture have become widespread. This study investigates the relationship between screen time, abnormal posture, physical activity, and neck pain in 100 patients. Utilising validated assessment tools and drawing upon findings from 20 peer-reviewed studies, this research reveals significant correlations between extended screen use and musculoskeletal discomfort, particularly neck pain. The findings suggest that poor posture and reduced physical activity exacerbate the symptoms of this condition. These results underscore the importance of ergonomic education, lifestyle modification, and preventive interventions to mitigate neck pain associated with modern behavioural patterns.

### KEYWORDS

neck pain, screen time, posture, physical activity, musculoskeletal disorders, digital health

#### INTRODUCTION

##### Background

Technological advancements in the 21st century have revolutionised how individuals communicate, work, and entertain themselves. However, these conveniences come with musculoskeletal health consequences, particularly neck pain. Prolonged screen time has been consistently associated with postural strain, inactivity, and neck discomfort. A global increase in neck pain, particularly among younger adults and office workers, has been observed across multiple studies.<sup>1,2</sup>

Recent evidence indicates that the COVID-19 pandemic has exacerbated these conditions, as remote work and online education increased screen exposure.<sup>3</sup> With the average adult spending over 7 hours a day in front of screens<sup>4</sup> and children and adolescents approaching similar figures, examining the resulting biomechanical and physiological effects is imperative.

##### Rationale

While previous research has examined screen time, posture, and physical activity independently about neck pain, few studies have explored the interplay among these three variables. By investigating a combination of factors within a specific patient population, this study provides a multidimensional understanding of the aetiology of neck pain, contributing new insight to clinical and ergonomic interventions.

##### Literature Review

##### Screen Time and Neck Pain

Prolonged screen exposure has been correlated with musculoskeletal disorders, particularly neck and upper back pain. Szeto et al. (2005) found that extended computer use among office workers significantly increases the prevalence of neck pain.<sup>5</sup> Similarly, Hakala et al. demonstrated that adolescents who used computers or mobile devices for over 2 hours per day were more likely to experience neck and shoulder pain.<sup>6</sup>

More recent studies have emphasised mobile screen use. Kim and Kim (2015) indicated that smartphone use often involves forward head posture, a critical contributor to cervical spine stress. Al-Hadidi et al. (2019) found that excessive mobile phone use can lead to myofascial pain in the neck, resulting from sustained muscle contractions.<sup>7</sup>

##### Posture And Neck Pain

Postural abnormalities such as forward head posture (FHP) and rounded shoulders have been identified as key predictors of cervical musculoskeletal pain.<sup>8</sup> FHP increases the mechanical load on the cervical spine, leading to muscle fatigue and joint dysfunction.<sup>9</sup> The craniocervical angle (CVA), commonly used to assess posture, is inversely associated with neck pain intensity.<sup>10</sup>

Prolonged poor posture, particularly in sedentary work environments, is often subconscious and exacerbates spinal degeneration over time.<sup>11</sup>

##### Physical Activity and Neck Pain

Physical inactivity contributes to reduced muscular endurance and poor spinal support, thereby increasing susceptibility to neck pain.<sup>12</sup> Conversely, exercise, particularly targeting the neck and upper back, has been shown to alleviate pain and improve posture.<sup>13</sup>

A cross-sectional study by Genebra et al. (2017) reported that individuals engaging in regular physical activity experienced significantly fewer and less severe episodes of neck pain than sedentary individuals.<sup>14-20</sup> Moreover, aerobic fitness and muscular strength are negatively associated with chronic neck symptoms.<sup>15</sup>

##### Methodology

##### Study Design

This cross-sectional, observational study examined the relationships among screen time, posture, physical activity, and neck pain in 100 patients presenting with neck pain at an outpatient orthopaedic clinic.

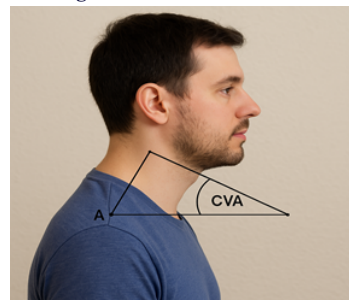
##### Inclusion Criteria:

- Age 18–55 years
- Complaints of neck pain for more than 4 weeks
- Regular screen use (computer, smartphone, tablet)

##### Exclusion Criteria:

- Previous cervical spine surgery
- Congenital spinal abnormalities
- Recent trauma

##### Cranio-Vertebral Angle:



**Figure 1:** Showing Measurement of craniocervical Angle on the lateral view.

- Point A: Spinous process of the C7 vertebra
- Point B: Tragus of the ear
- Line 1: Horizontal line passing through the C7
- Line 2: Line extending from C7 to the tragus of the ear
- The angle between Line 1 and Line 2 is referred to as the CVA.

##### Data Collection Tools

- 1. Screen Time Questionnaire:** A self-reported daily log of screen usage over 7 days.
- 2. Postural Assessment:** Craniovertebral angle (CVA) measured via lateral photography.
- 3. Physical Activity Levels:** International Physical Activity Questionnaire (IPAQ) short form.
- 4. Neck Pain Severity:** Visual Analogue Scale (VAS) and Neck Disability Index (NDI).

**Data Analysis**

Statistical analysis included Pearson's correlation for continuous variables and multiple linear regression to identify predictive factors. A significance level of  $p < 0.05$  was used.

**RESULTS**

**Demographic Characteristics**

**Table 1: Demographic Characteristics of the Sample (N = 100)**

Characteristic	Value
Mean Age (years)	32.6 ± 8.4
Gender	60% Female, 40% Male
Avg.. Screen Time (hrs)	6.8 ± 1.9
Physical Activity	72% low, 18% moderate, 10% high
Mean CVA (°)	46.5 ± 3.1

**Correlation**

**Table 2: Correlation Between Variables and Neck Pain (VAS)**

Variable	Correlation Coefficient (r)	Significance (p-value)
Screen Time (hrs/day)	0.64	< .01
Craniovertebral Angle (CVA)	-0.52	< .01
Physical Activity (MET-min/week)	-0.45	< .01

**Correlation Between Screen Time And Neck Pain**

Pearson's  $r$  revealed a strong positive correlation between screen time and NDI scores ( $r = 0.64, p < 0.01$ ), indicating an increase in disability with prolonged screen exposure.

**Posture And Neck Pain**

CVA measurements ranged from 40 to 54 degrees. Those with a CVA of less than 48° had significantly higher VAS scores ( $p < 0.001$ ). A moderate negative correlation was found between CVA and neck pain ( $r = -0.52$ ).

**Physical Activity And Neck Pain**

A significant negative correlation was found between total MET minutes per week and VAS scores ( $r = -0.45, p < 0.01$ ), indicating that higher activity levels were associated with lower pain.

**Regression Analysis**

**Table 3: Multiple Linear Regression Predicting Neck Pain (VAS)**

Predictor	$\beta$ Coefficient	t	p-value
Screen Time	0.42	3.21	0.002
Craniovertebral Angle	-0.35	-2.82	0.006
Physical Activity	-0.28	-2.56	0.012
<b>R<sup>2</sup> = 0.61</b>			

**A Multiple Regression Model Showed:**

- Screen time ( $\beta = 0.42, p = 0.002$ )
- CVA ( $\beta = -0.35, p = 0.006$ )
- Physical activity ( $\beta = -0.28, p = 0.012$ )

All were significant predictors of neck pain severity ( $R^2 = 0.61$ ).

**DISCUSSION**

**Interpretation Of Findings**

The findings confirm prior research that screen time, posture, and physical activity are associated with neck pain. The high predictive value of screen time aligns with studies by Kim and Kim. et al. (2015) and Hakala et al. (2006), underscoring the biomechanical strain associated with prolonged use of digital devices.

As reflected in CVA scores, posture significantly influenced pain severity, consistent with findings by Yip et al.<sup>11</sup> (2008) and Singla et al.<sup>13</sup> (2017). This study confirms the importance of postural correction in managing neck pain.

Physical activity was inversely associated with pain, supporting evidence from Gross et al.<sup>13</sup> (2015) and Shariat et al.<sup>15</sup> (2018). The results encourage the integration of physical rehabilitation and lifestyle interventions to prevent and treat these conditions.

**Practical Implications**

These results have a significant impact on workplace ergonomics, physical therapy, and public health campaigns. Health professionals should educate patients on the importance of maintaining good posture and recommend taking breaks during screen use. Employers should consider ergonomic workstations and promote physical activity in the workplace.

**Limitations**

- Self-reported data may be subject to recall bias.
- Cross-sectional design limits causal inference.
- Single-centre sample may limit generalizability.

Future research should include longitudinal studies and objective measures of posture and activity, such as accelerometers and electromyography (EMG).

**CONCLUSION**

This study reinforces the critical relationship between screen time, posture, and physical activity in influencing the severity of neck pain. With technology use on the rise, targeted interventions focusing on ergonomic behaviour and physical fitness are necessary to mitigate the growing burden of cervical musculoskeletal disorders.

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