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Prevalence of neck pain in smartphone users of the undergraduates

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We the undersigned certify that we have carefully read and recommended to the **Faculty of Medicine, University of Dhaka**, for acceptance of this thesis entitled, **"Prevalence of neck pain in smartphone users of the undergraduates"** Submitted by **Nishat Tasnim Kripa**, for the partial fulfillment of the requirements for the degree of Bachelor of Science in Physiotherapy (BSc. PT).

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Declaration

I, **Nishat Tasnim Kripa**, hereby declare that the research work entitled **"Prevalence of neck pain in smartphone users of the undergraduates"** is entirely my own and has been carried out as part of my academic requirements under the Department of Physiotherapy, BHPI. All sources of information, data, and literature used in the preparation of this work have been duly acknowledged and cited. Any errors or omissions are solely my responsibility. Furthermore, I understand that this work is intended solely for academic purposes.

This dissertation is a genuine representation of my academic effort, and I accept full responsibility for its content.

Signature: Nishat Tasnim Kripa

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Contents

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Acronym

Acronym	Full Form
ADL	Activity of daily living
BHPI	Bangladesh Health Professions Institute
BMI	Body Mass Index
CRP	Centre for the Rehabilitation of the Paralysed
ICF	The International Classification of Functioning, Disability and Health
IRB	Institutional Review Board
MSP	Musculoskeletal Pain
NP	Neck pain
NPDS	Neck Pain & Disability Scale
NPRS	Numeric Pain Rating Scale
NSP	Neck Shoulder Pain
SMS	Short Message Service
Spearman's rho	Spearman rank correlation
SPSS	Statistical Package for the Social Sciences
WHODAS 2.0	WHO Disability Assessment Scale
WHO	World Health Organisation

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Abstract

Background: In our digital era, smartphone usage has escalated dramatically. Concurrent with the rising prevalence of smartphones, musculoskeletal issues related to extensive smartphone usage have also escalated. Neck flexion is the predominant position assumed by smartphone users while engaging with visual display terminals for prolonged durations; this posture may result in neck diseases. **Objectives**: The objective of the present study was to examine musculoskeletal disorders (MSDs) of the neck in smartphone users to validate the high prevalence of neck discomfort. The study also seeks to ascertain the link and correlation between neck pain and smartphone users. **Methodology:** A cross-sectional study was performed with 215 students aged 18 to 25 years experiencing neck pain and impairment attributed to smartphone usage. Data were gathered via structured face-to-face interviews employing validated instruments: the NPRS score for measuring neck pain intensity, the WHODAS 2.0 (12-item questionnaire) score for evaluating neck-related impairment, and the NPDS score for assessing neck pain and disability linked with smartphone use. Descriptive statistics, Pearson's chi-square tests, and Spearman's rank correlation test were conducted utilizing SPSS 30. **Results:** Of the 215 BHPI undergraduates surveyed, 88.4% reported experiencing neck pain for more than 30 days, while 85% indicated moderate to severe level of pain during smartphone usage. Disability scores were primarily classified as mild to moderate. Notable correlations were identified between increased pain intensity and female gender (χ^2=28.705, p=0.018) as well as elevated BMI (χ^2=36.284, p=0.028). The quantity of pillows used in sleep ergonomics was associated with pain (χ^2=15.725, p=0.001). The position of the smartphone below eye level and the type/outcome of treatment were substantially correlated with pain/disability. The level of smartphone-related pain exhibited a moderate correlation with overall neck pain severity (r=0.351, p<0.001), whereas prolonged smartphone usage duration showed a minor correlation with increased disability (WHODAS r=0.188, p=0.006; NPDS r=0.225, p<0.001). **Conclusions:** This study establishes a considerable incidence of neck discomfort among student smartphone users, revealing strong correlations between neck pain intensity and variables such as gender, BMI, duration, and smartphone usage position.

Keywords: Neck pain, Smartphone, Disability, Undergraduates.

Chapter-I: Introduction

1.1 Background

The cervical spine has seven vertebrae (C1 to C7) and is divided into two main parts. The atlas (C1) and the axis (C2), the two first vertebrae, form the craniocervical junction (CCJ) alongside the occiput. The five cervical vertebrae, C3 to C7, placed caudally, form the subaxial spine and are identified by their number designations. The cervical spine supports the weight of the skull and enables movement of the head and neck (Kaiser et al., 2023).

The neck contains and protects essential structures and functions as the primary conduit for the intake and expulsion of oxygen and nutrients in the body. The cervical vertebrae offer crucial support and protection for essential structures vital for life, including the axons of the lowest cranial nerves, cervical segments of the spinal cord, the vertebrobasilar and carotid arteries, and the superior cervical ganglia of the autonomic nervous system. (Walton et al., 2024).

Neck pain is defined as discomfort located between the upper boundary of the neck and the spinous process of the first thoracic vertebra, with probable radiation to the head, trunk, and upper limbs. Neck discomfort significantly impacts quality of life and serves as a marker for numerous dangerous conditions, including severe myelopathy, atlantoaxial subluxation, and metastases. Various factors contribute to cervical discomfort, such as prolonged poor posture, excessive strain on the cervical spine, and improper sleeping positions (Jing et al., 2025).

The primary form is termed axial neck pain, distinguished by its musculoskeletal origin, encompassing diseases such as whiplash or muscle strain. Secondly, radiculopathy. Symptoms of cervical radiculopathy include arm pain, numbness, or paralysis due to nerve root compression. Thirdly, myelopathy, also known as spinal cord compression, occurs due to pressure on the spinal cord. Symptoms may include numbness, difficulty walking, or neck pain followed by weakness in the arm or leg (Morken et al., 2007).

Neck soreness is a common affliction globally, especially among middle-aged and elderly populations. The Global Burden of Disease Study 2017 (GBD 2017) disclosed its considerable global prevalence and recognized it as the foremost contributor to disability, especially in highly developed countries. The proportion of individuals in white-collar jobs and those who excessively use cellphones has significantly increased, whereas the time devoted to physical activity and outdoor activities has notably decreased (Xia et al., 2024).

Neck discomfort is a prevalent musculoskeletal ailment and a significant factor in worldwide impairment (Hoy et al., 2014). The anticipated 1-year prevalence of neck soreness was 45.5% among office workers (Cagnie et al., 2007) and ranged from 45.8% to 54.7% among healthcare professionals (Nordin et al., 2011). Neck pain may result in decreased work hours, reduced participation in leisure activities, and sleep disruptions (Long et al., 2012). Neck pain significantly impacts workforce turnover (Fochsen et al., 2006).

Studies demonstrate that many cases of neck pain occur during college and persist after graduation (Hoving et al., 2004). Similarly, Hanvold and Veiersted (2010) found that neck pain in technical school students persisted well after they began their careers. Given that early onset of neck pain may lead to recurrent or chronic issues (Croft et al., 2001; Hoving et al., 2004), it is crucial to determine the prevalence of neck pain among students to enable suitable preventive or intervention strategies (Chan et al., 2020).

Mobile technology has rapidly disseminated globally. Recent data found that smartphone ownership among individuals aged 18 to 34 was 92% in the USA and 95% in Australia. In 2016, 26% of young adults in Kenya and 28% in Nigeria have smartphones. In 2019, the share increased to 41% in Kenya and 39% in Nigeria. In 2016, it was reported that 4% of youth in Ethiopia owned smartphones, although 41% of adult internet users used the internet at least once daily. In almost all countries, encompassing both established economies and emerging or developing nations, persons aged 18 to 34 exhibit a significantly higher propensity to utilize the internet and cellphones compared to those aged 35 and older (Ayhualem et al., 2021).

Contemporary individuals employ cellphones more often than PCs on a daily basis, rendering it unexpected that several detrimental effects of excessive smartphone usage have emerged. In daily life, smartphone users utilize the internet, interact on social media, communicate, play games, gamble, listen to music, and perform various other activities on their smartphones. During these activities, individuals may maintain a static posture for prolonged durations or engage in repeated actions, leading to various musculoskeletal disorders (Mustafaoglu et al., 2021).

Smartphones have emerged as the preeminent portable electronic gadget worldwide. The use of smartphone technology and applications has increased among university students in the modern digital environment. A significant prevalence of musculoskeletal disorders, particularly in the cervical region, has been seen among university students. In 2019, the age-standardized prevalence rate of neck pain was 27.0 per 1000 adults, making it one of the most common musculoskeletal illnesses (Maayah et al., 2023).

The relationship between mobile device messaging and NSP has been thoroughly investigated in numerous articles. Prolonged neck flexion is associated with discomfort in the neck, shoulders, and upper extremities during diverse tasks. This problem is due to the static muscular strain caused by extended neck flexion, lack of arm support, and repetitive finger movements, especially when using one hand. This position should be sustained temporarily, while grasping the cell phone with both hands and utilizing both thumbs (Kandasamy et al., 2024).

Neck pain significantly contributes to morbidity and disability in everyday life and the workplace in many countries. It can impact the individual's health, social, and psychological well-being, resulting in increased costs for society and businesses. Furthermore, the growing older population in medium- and low-income countries may result in a significant rise in neck pain prevalence in the next decades, requiring enhanced comprehension of the related risk factors and possible preventive or therapeutic interventions. (Genebra et al., 2017).

1.2 Justification

The cervical spine has seven vertebrae (C1 to C7) and is categorized into two primary sections. The atlas (C1) and the axis (C2), the two superior vertebrae, constitute the craniocervical junction (CCJ) in conjunction with the occiput. The five cervical vertebrae, C3 to C7, located caudally, constitute the subaxial spine and are designated by their numerical identifiers. The cervical spine bears the weight of the skull and facilitates head and neck movement (Kaiser et al., 2023).

The neck houses and safeguards several vital tissues and serves as the principal channel for the absorption and evacuation of oxygen and nutrients in the body. The cervical vertebrae provide essential support and protection for critical structures necessary for life, including the axons of the lowest cranial nerves, cervical segments of the spinal cord, the vertebrobasilar and carotid arteries, and the superior cervical ganglia of the autonomic nervous system. (Walton et al., 2024).

Neck pain is characterized as discomfort situated between the upper limit of the neck and the spinous process of the first thoracic vertebra, potentially extending to the head, trunk, and upper extremities. Neck discomfort profoundly affects quality of life and indicates several serious disorders, such as severe myelopathy, atlantoaxial subluxation, and metastases. Multiple factors lead to cervical discomfort, including sustained bad posture, heightened strain on the cervical spine, and inappropriate sleeping positions (Jing et al., 2025).

Cervical discomfort can be classified into three fundamental groups. The principal classification is referred to as axial neck discomfort, characterized by its musculoskeletal origin, including conditions such as whiplash or muscular strain. Secondly, radiculopathy. Cervical radiculopathy symptoms including arm pain, numbness, or paralysis resulting from nerve root compression. Thirdly, myelopathy, or spinal cord compression, arises from pressure exerted on the spinal cord. Symptoms may encompass numbness, ambulation difficulties, or cervical pain, subsequently accompanied by paralysis in the arm or leg (Morken et al., 2007).

Neck discomfort is a prevalent condition worldwide, particularly among middle-aged and older individuals. The Global Burden of Disease Study 2017 (GBD 2017) revealed its significant global prevalence and identified it as the primary contributor to disability, particularly in highly developed nations. The ratio of those in white-collar occupations and those who excessively utilize telephones has markedly risen, while the time allocated to physical exercise and outdoor pursuits has greatly diminished (Xia et al., 2024).

Neck pain is a common musculoskeletal disorder and a major contributor to global disability (Hoy et al., 2014). The projected 1-year prevalence of neck discomfort was 45.5% in office workers (Cagnie et al., 2007) and varied from 45.8% to 54.7% in healthcare professionals (Nordin et al., 2011). Neck pain can lead to diminished work hours, decreased engagement in recreational activities, and disturbances in sleep (Long et al., 2012). Neck pain is a major factor influencing employee turnover (Fochsen et al., 2006).

Research indicates that numerous instances of neck pain arise during college and continue beyond graduation (Hoving et al., 2004). Likewise, Hanvold and Veiersted (2010) discovered that neck pain in technical school students continued long after they commenced their employment. Considering that early onset of neck pain might result in recurrent or chronic problems subsequently (Croft et al., 2001; Hoving et al., 2004), it is essential to ascertain the prevalence of neck pain among students to facilitate appropriate preventive or intervention measures (Chan et al., 2020).

Mobile technology has swiftly proliferated worldwide. Recent data indicated that smartphone ownership among individuals aged 18 to 34 was 92% in the USA and 95% in Australia. In 2016, 26% of young adults in Kenya and 28% in Nigeria have smartphones. In 2019, the proportion rose to 41% in Kenya and 39% in Nigeria. In 2016, it was stated that 4% of Ethiopian youngsters possessed smartphones, although 41% of adult internet users used the internet at least once daily. In nearly all nations, including both developed and developing economies, individuals aged 18 to 34 demonstrate a markedly greater tendency to use the internet and mobile phones than those aged 35 and above (Ayhualem et al., 2021).

Modern individuals utilize cellphones more frequently than personal computers daily, making it surprising that numerous adverse effects of excessive smartphone use have arisen. In everyday life, smartphone users access the internet, engage on social media, chat, play games, gamble, listen to music, and do various other activities on their devices. During these occupations, individuals may adopt a static posture for extended periods or do repetitive tasks, resulting in numerous musculoskeletal problems (Mustafaoglu et al., 2021).

Smartphones have become the foremost portable electronic device globally. The utilization of smartphone technology and applications has markedly risen among university students in the contemporary digital landscape. A notable incidence of musculoskeletal diseases, especially in the neck area, has been seen among university students. In 2019, the age-standardized prevalence rate of neck pain was 27.0 per 1000 persons, rendering it one of the most prevalent musculoskeletal disorders (Maayah et al., 2023).

The correlation between mobile device texting and NSP has been extensively examined in several articles. Extended neck flexion correlates with discomfort in the neck, shoulders, and upper limbs during various activities. This behavior can be attributed to the static muscle strain resulting from prolonged neck flexion, insufficient arm support, and repetitive finger motions, particularly when utilizing one hand. This position should be maintained temporarily, with both hands gripping the cell phone and employing both thumbs (Kandasamy et al., 2024).

Neck pain substantially affects morbidity and functionality in daily activities and professional environments throughout several nations. It can affect the individual's health, social, and psychological welfare, leading to heightened expenses for society and enterprises. Moreover, the increasing elderly population in medium- and low-income nations may lead to a substantial increase in neck pain prevalence in the next decades, necessitating a thorough understanding of the associated risk factors and potential preventive or therapeutic measures. (Genebra et al., 2017).

1.3 Research question

What is the prevalence of neck pain among undergraduate smartphone users?

1.4 Aim

To find out the prevalence of neck pain among undergraduate smartphone users.

1.5 Objectives

1.5.1 General Objective

- To determine the prevalence of neck pain among undergraduate's student who use smartphone.

1.5.2 Specific Objectives

- To ascertain the socio-demographic characteristics of undergraduate students utilizing smartphones.
- To elucidate the correlation between smartphone usage and neck discomfort and disability, considering socio-demographic variables, lifestyle factors, and co-morbid conditions.
- To ascertain the relationship between smartphone usage and neck pain and impairment.
- To ascertain neck pain-associated impairment among undergraduate smartphone users.

1.6 Operational definition

Prevalence

Prevalence is defined as the ratio of individuals in a population possessing a condition at a certain moment or over a designated timeframe.

Neck pain

Neck pain originates in the cervical region and may be accompanied by radiating discomfort in one or both arms. Neck discomfort may arise from several conditions or diseases affecting the tissues in the neck, including nerves, bones, joints, ligaments, or muscles.

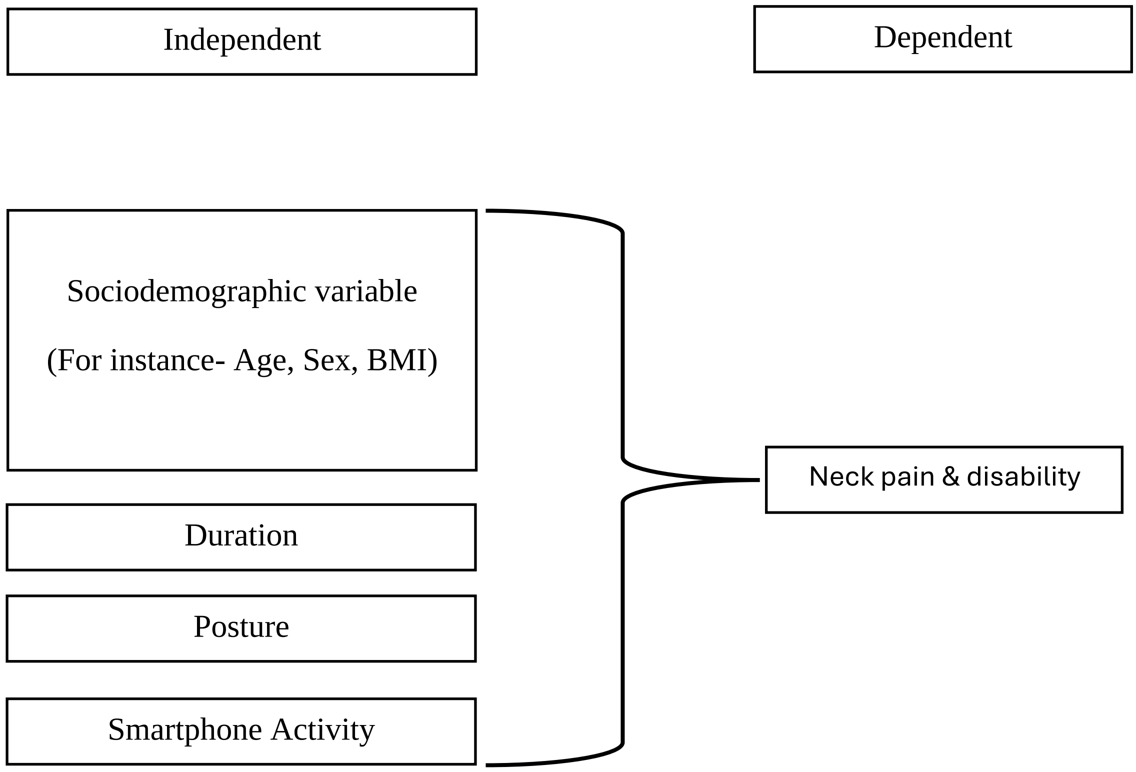
Smartphone

A smartphone is a cellular device that integrates a computer and features not often associated with telephones, such as an operating system (OS), web browsing capabilities, and the ability to run software applications.

Disability

Disability refers to any condition—cognitive, developmental, intellectual, mental, physical, sensory, or a combination thereof—that hinders an individual's capacity to engage in specific activities or access opportunities fairly within society. This concept underscores that disability results from the interplay between individuals and societal obstacles, rather than being exclusively a characteristic of the individual.

1.7 Conceptual framework



Chapter-II:	Literature Review

Neck pain is increasingly common worldwide. It profoundly impacts individuals, their families, communities, healthcare systems, and organizations. The prevalence of neck discomfort in the general population ranges from 0.4% to 86.8% (mean: 23.1%); point prevalence fluctuates between 0.4% and 41.5% (mean: 14.4%); and one-year prevalence extends from 4.8% to 79.5% (mean: 25.8%). The frequency is generally higher among women, increased in high-income countries compared to low- and middle-income countries, and more significant in urban areas than in rural regions. A variety of environmental and personal factors influence the onset and advancement of neck pain. Multiple studies indicate a higher incidence of neck pain among women. (Hoy et al., 2010).

Neck pain is a sensation or discomfort localized in the cervical region, potentially stemming from disorders affecting any anatomical structures in the neck, including cervical vertebrae, intervertebral discs, nerves, muscles, blood vessels, esophagus, larynx, trachea, lymphatic organs, thyroid gland, or parathyroid glands (Barbuto et al., 2008). The neck contains the upper portion of the spinal column, which supports the head and protects the spinal cord. The seven cervical vertebrae form the skeletal structure of the spinal cord, through which the spinal nerve passes. A multitude of ligaments and muscles are attached to the spine, scapula, and cervical region, augmenting stability. The physical structures of the neck include muscles, arteries, veins, lymph nodes, the thyroid and parathyroid glands, esophagus, larynx, and trachea (Barbuto et al., 2008).

Neck discomfort is a multifaceted condition and represents a considerable concern in modern society. Although neck discomfort may not be the primary musculoskeletal issue, it remains significantly pertinent. The economic ramifications of neck pain are substantial, including treatment costs, reduced productivity, and employment-related challenges. In 2016, low back and neck pain were the leading health care costs among 154 conditions in the United States, amounting to nearly $134.5 billion. In 2012, neck pain led to occupational absenteeism for 25.5 million Americans, resulting in an average of 11.4 days of lost productivity. In 2017, the global age-standardized prevalence and incidence rates of neck discomfort were 3551.1 and 806.6 per 100,000, respectively (Kazeminasab et al., 2022).

Neck pain is commonly observed among university students in both industrialized and developing nations. The incidence of cervical pain was 29% in Finland (Oksanen et al., 2014), 34.6% in Australia (Smith and Leggat, 2004), 54% in the USA (Jenkins et al., 2004), 49.7% in Brazil (Mattos et al., 2009), 46% in Thailand (Kanchanomai et al., 2011), 54% in Saudi Arabia (Gharib and Hamid, 2013), and 55.58% in Korea. (Kim & Kim, 2013).

Guzman and his associates identified that the predominant characteristics of non-physical components reported by medical students pertained to individual-related, psychological, and physical elements. Disruption of anatomical neck structures, encompassing nerves, airways, circulatory systems, and musculoskeletal systems, in conjunction with extended exercise, inadequate posture, and a history of neck injuries, can all exacerbate this problem. Diverse sociodemographic factors, including gender, age, and body mass index (BMI), as well as behavioral and psychosocial factors such as smoking, alcohol consumption, physical activity, stress, and sleep patterns, along with physical factors like computer or tablet usage, prolonged sitting, backless seating, reading duration, repetitive motions, and improper posture, are thought to be correlated with neck pain in medical students (Weleslassie et al., 2020).

Global literature reveals that neck pain in Malaysian (RAZVI et al., 2018), Indian (KALIRATHINAM et al., 2017), Canadian (BEROLO et al., 2011), and Iranian (BAYATIANI et al., 2016) university students is associated with the duration and frequency of cell phone usage; conversely, no such correlation was observed in Korean students. A correlation was observed between Canadian (BEROLO et al., 2011) and American (LEE et al., 2018; BLAIR et al., 2015) students regarding tablet usage; however, no such association was found among Chinese (CHIANG AND LIU, 2016) university students. In Brazil, there is a paucity of epidemiological research about neck pain in university students. De Vitta et al. (2020).

A study on cervical discomfort was performed in Bangladesh in 2002. The research revealed that 1,350 of the 6,476 individuals experienced neck pain. It was approximately 21.01%. Men comprised 54.44% and women 45.55%, with 26.08% employed, 23.43% homemakers, and 14.08% pensioners (Shakoor et al., 2002). One hundred eight students, or 76.8% of the total, reported having cervical discomfort. Fifty-one female students (59.8%) reported feeling neck pain more often than thirty-five male students (40.2%). The highest prevalence was noted among persons reliant on computers or other electronic devices (63.4%) and those participating in extended study sessions (58.9%). Forty-five point five percent of participants ascribed their neck problems to extended class attendance, while sixty-seven point nine percent cited inadequate ergonomics as the explanation. Johora et al. (2016).

A significant and continuous link has been established between prolonged sitting and neck pain. In a previous study, researchers found that those who remained seated for more than 95% of their work hours had a neck risk that was twice that of those who rarely worked when seated. The probability of neck pain increases with the length of time spent sitting at work. This demonstrates a clear relationship between prolonged sitting and cervical discomfort (Gross et al., 2010).

Musculoskeletal problems are the second major cause of disability and the fourth most substantial impact on health. The musculoskeletal disorder is a major worldwide issue (Vos et al., 2010). Neck pain has recently been a prominent concern in various nations. A research in Norway indicated that over 40% of individuals request sick time due to musculoskeletal pain and injuries, with 30% of these instances leading to impairment among elderly (Hanvold, 2015).

The widespread use of telephones has significantly altered modern lifestyles, particularly among young adults and students. Prolonged smartphone usage is often linked to adverse postural habits, such as forward head posture and extended neck flexion, which are associated with musculoskeletal problems, especially cervical pain. Gustafsson et al. (2017) contend that sustained maintenance of a flexed neck posture when using cellphones increases mechanical stress on the cervical spine, leading to discomfort, muscle fatigue, and resultant pain. Multiple cross-sectional studies have demonstrated a notable prevalence of neck pain among smartphone users, particularly those engaging with their devices for over 3–4 hours daily. These studies reveal a substantial correlation between screen time and the severity of neck discomfort complaints.

The global point prevalence of cervical pain was 4.9% (95% CI 4.6 to 5.3). Disability-adjusted life years increased from 23.9 million (95% CI 16.5 to 33.1) in 1990 to 33.6 million (95% CI 23.5 to 46.5) in 2010. In the Global Burden of Disease 2010 Study, neck pain was rated 4th for impairment, measured by Years Lived with impairment (YLDs), and 21st in overall burden among the 291 illnesses evaluated (Hoy et al., 2014). The Global Burden of Disease 2010 report designates neck pain as the fourth most common cause of disability in the United States, subsequent to back pain, depression, and other musculoskeletal disorders. Women exhibit a higher susceptibility to neck pain, with peak occurrence occurring during middle age. Fejer et al. (2005).

The epidemiology of cervical discomfort is important for multiple reasons. A comprehensive assessment of the scale and scope of this issue would facilitate accurate forecasting of the demand for physiotherapy resources. The prevalence of neck pain among banking employees is essential for determining the relationship between age and profession (Statistics Sweden, 1992). Neck pain is common in developed countries and substantially contributes to the demand for healthcare services and the economic impact of work absence due to illness. Population-based studies reveal a lifetime prevalence above 70% and a point prevalence between 12% and 34% (Croft et al., 2001; Borghouts et al., 1998).

Epidemiological studies have demonstrated that neck pain is more common in women than in males, however the degree of these observed sex differences in incidence requires further investigation. Furthermore, it is essential to examine the relationship between these sex variations and both pain intensity and disability (Smith et al., 2004). Biological and behavioral factors have been suggested as explanations for the sex-specific differences in pain. Experimental studies on mechanical pressure pain thresholds reveal that females exhibit a lower pain threshold than males, indicating that this reduced threshold is associated with an increased risk of musculoskeletal pain. The increased pain sensitivity and worse pain tolerance in women indicate that biological factors may explain gender disparities (Smith et al., 2003).

The increasing use of mobile devices in the twenty-first century necessitates an examination of their health consequences (Szucs, Cicuto, and Rakow et al. 2018). Numerous studies concentrate on identifying and analyzing muscle activity and risk variables associated with electronic device usage (Maslen and Straker 2009). This study included findings from an investigation into user preferences for electronic devices, such as mobile phones and touch screen devices, used for daily functions like education, communication, and social media, as well as research on the effects of these devices on musculoskeletal symptoms and disorders (Binboga and Korhan 2014).

Moreover, smartphone usage has been associated not only with postural issues but also with psychosocial factors that may intensify musculoskeletal discomfort. The excessive use of mobile devices can lead to psychological stress, sleep disturbances, and reduced physical activity, which collectively contribute to cervical and upper dorsal pain. Adolescents and university students are considered at heightened risk due to their tendency for prolonged usage for educational, recreational, and social purposes. Al-Hadidi et al. (2019) emphasized that poor ergonomics, such as inadequate lumbar support, situating the phone under eye level, and extended one-handed texting, intensify musculoskeletal strain, especially in the neck region.

It is crucial to identify the principal determinants of neck discomfort, especially the potentially modifiable risk factors. Occupational activities have been recognized as potential contributors to neck disorders (Palmar et al., 2001). Previous studies have demonstrated that neck pain can affect social dimensions, such as shopping, familial relationships and interactions, travel, and leisure activities. The physical attributes associated with neck pain included significant lifting, repetitive tasks, static postures, monotonous occupations, and an increased work pace. The psychological factors affected by neck pain encompassed impaired sleep resulting from discomfort, reduced focus, and increased worry and despair (Leonard et al., 2009).

The incidence of musculoskeletal pain among students was 73.3% in Korea, approximately 36.9% in Japan, and 67.6% in China. China demonstrates a higher incidence of musculoskeletal pain among students than Korea and Japan (Alshagga et al., 2013). A survey revealed that students in health care professions were the group most affected by musculoskeletal pain, encompassing discomfort in the neck, shoulder, arm, hand, and back. The prevalence of mechanical discomfort was higher among students than in another age group (Lorusso et al., 2010). The predominant musculoskeletal discomfort was observed in the neck at 25.42%, in the back at 37.29%, and in the upper back at 18.64% (Bharadva et al., 2014).

Chronic neck discomfort is common in the Netherlands, exhibiting a point incidence of 14.3%. This is a common problem that leads to considerable morbidity in Western countries, with prevalence rates reported between 9.5% and 22%. In the Netherlands, neck discomfort is one of the three most often reported musculoskeletal ailments, with a point prevalence of 21% (Vonk et al., 2004).

A study revealed that neck pain had the highest occurrence rate, with 64.3% of individuals experiencing discomfort in the cervical region within the preceding year. Students often have neck pain due to inadequate posture, as they spend prolonged durations in classrooms, libraries, and laboratories without adhering to correct posture and movement practices. Approximately 65.4% indicated that their pain lasted beyond two days, over 53.1% suffered neck pain that affected their daily activities, and 30.9% pursued medical intervention (Hayes et al., 2009). Neck discomfort affects 30–50% of the general population annually, with 15% enduring persistent neck pain for over three months at some point in their lives. Furthermore, 11–14% of the workforce will experience activity limitations due to neck pain each year. The prevalence peaks during middle age, with women being more commonly affected than men. Risk factors include repetitive work, prolonged cervical spine flexion, heightened psychological job stress, smoking, and previous neck or shoulder injuries (Falla, 2008).

Mobile phones are among the most ubiquitous portable electronic devices currently. Recent estimates suggest that a minimum of 77% of the worldwide population owns a mobile phone. The principal reason for the worldwide increase in mobile phone utilization is its dependability as a communication and entertainment apparatus. Prolonged smartphone use often leads to cervical discomfort, known as “text neck.” This ailment is caused by an anterior head posture and poor ergonomics while looking down at the screen.

A 2012 survey of university students in the United States indicated that text messaging, or short message service (SMS), is the primary form of communication. Multiple studies have investigated the correlation between mobile phone messaging and neck and shoulder pain. Moreover, sustained neck flexion correlates with discomfort in the neck, shoulders, and upper limbs, even throughout various activities. Al-Hadidi et al. (2019).

Suboptimal neck positioning (forward head posture) occurs with smartphone usage, potentially leading to cervical discomfort. Neck discomfort includes various differential diagnoses, ranging from benign to life-threatening illnesses (e.g., trauma, infection, cancer), and substantial research has established a correlation between neck pain and the use of smart devices. A cross-sectional study was conducted at King Saud University in Riyadh, Saudi Arabia, with 78 individuals (mean age 21.3 years). The findings revealed a substantial association between prolonged smartphone use and cervical discomfort. Alzaid et al. (2018).

Adolescents are generally more likely than other age groups to own the latest technology, with smartphones impacting practically every aspect of their lives. Smartphone addiction is characterized by several phrases, such as smartphone overuse, mobile phone addiction, problematic mobile usage, addiction proneness, and excessive smartphone use. Smartphone addiction is classified as a behavioral addiction in current psychiatric research on smartphones. The dependence on smartphones has been influenced by improvements in their capabilities, including Internet browsing, social media applications, gaming applications, mobile shopping, portable media players, small digital cameras, and high-resolution touchscreens. (Wang et al., 2023).

Smartphone users with neck discomfort demonstrate a little elevation in neck flexion relative to those without neck pain while using their devices. Approximately 91% of university students sustain their necks in a flexed posture when utilizing smartphones. Enhanced neck flexion leads to elevated compressive stress on cervical structures. The severity of musculoskeletal pain is associated with the daily duration of smartphone use. Utilization of smartphones for two hours or more daily is associated with cervical and shoulder discomfort. Previous studies revealed a moderate-to-strong connection between overall smartphone usage duration and neck pain, with an adjusted odds ratio (AOR) ranging from 1.49 to 8.63; variations were noted according to smartphone usage duration, postures, and other variables. (Wah et al., 2022).

Preventive strategies and comprehension of proper smartphone usage are essential in alleviating neck-related problems. Research validates the effectiveness of ergonomic interventions, including as positioning the device at eye level, taking regular breaks, and performing neck mobility exercises. Physiotherapy therapies, including posture correction and cervical stabilization exercises, have proven effective in mitigating smartphone-induced neck pain. While additional longterm studies are necessary to establish causation, existing literature repeatedly demonstrates a robust association between harmful smartphone using behaviors and an increased prevalence of neck pain, especially among teens.

The prolonged use of mobile devices with dysfunctional keyboards has exacerbated neck and cervical spine discomfort (Lee et al. 2015). Text neck may result in several adverse symptoms, including as cervical discomfort, persistent headaches, and increased spinal curvature (Vate-U-Lan 2015). The diagnosis of text neck may encompass several symptoms, including acute pain in the lower neck, localized tenderness in the neck and trapezius area, radiating pain from the neck to the shoulders and arms, numbness and weakness in the shoulder muscles, and stiffness in the head (Neupane, Ali, and Mathew 2017). Neglecting to promptly address text neck may result in substantial permanent damage, including inflammation of the neck ligaments, muscles, and nerves, irreversible arthritic changes, spinal misalignment, degeneration, disc compression and herniation, as well as flattening of the spinal curvature (Samani et al., 2018).

Chapter-III: Methodology

3.1 Study Design:

A cross-sectional study was performed, as it is an observational design that assesses exposure and disease simultaneously within a specified population (Kanchanaraksa et al., 2008). The aim of this study is to examine the prevalence of neck pain among undergraduate students who utilize smartphones. This study will involve a sample of undergraduate students who will be surveyed using a structured questionnaire to gather data on the prevalence of neck pain, the frequency and duration of smartphone usage, postures adopted during phone use, and demographic variables such as gender. Cross-sectional design is cost-effective, time-efficient, and facilitates the control of confounding variables during data analysis, hence augmenting the validity of the findings.

3.2 Study area:

This research was carried out at the Bangladesh Health Professions Institute (BHPI), the educational institution of the Centre for the Rehabilitation of the Paralysed (CRP), situated in Savar, around 20 km from Dhaka, Bangladesh. The CRP was established in 1979 by Valerie Ann Taylor, a British Bangladeshi physiotherapist, social worker, and philanthropist, commonly known as the "Mother Teresa of Bangladesh" for her contributions to rehabilitation services. Founded in 1992, BHPI seeks to cultivate proficient health professionals to deliver healthcare and rehabilitation services across the nation. The institute's emphasis on health professions education and its varied undergraduate demographic, involved in rigorous academic and practical training, render it an optimal environment for examining the incidence of neck pain among smartphone users. This study utilizes BHPI's distinctive environment to investigate musculoskeletal health issues encountered by students in a technology-oriented academic setting.

3.3 Study duration:

The study was conducted from 1st June 2024 to 31 May 2025.

3.4 Study population and sampling:

The study population comprises all undergraduate students enrolled at the Bangladesh Health Professions Institute (BHPI), the educational entity of the Centre for the Rehabilitation of the Paralysed (CRP) in Savar, Bangladesh. The diverse student demographic, engaged in rigorous academic and practical activities, provides a unique context for investigating the prevalence of neck pain among smartphone users. Smartphone penetration among young adults in Bangladesh is significant, with estimates suggesting that 48% of mobile phone users possessed smartphones in 2022, and this figure is likely higher among undergraduates. Thus, it is anticipated that the vast majority of BHPI undergraduates employ cellphones, making this demographic suitable for the study. The sample was acquired by the convenience sampling technique.

3.5 Sample size:

The required sample size (n) was calculated using the standard formula:

$$n = \left\{ \frac{z\ (\ 1 - \frac{a}{2}\ )}{d} \right\}^2 * pq$$

Here,

Confidence interval = $z(1 - \frac{a}{2})$ = 1.96

Prevalence = p = 0.791 (Koh et al. 2012)

Sampling Error = d = 0.05

$$q = 1 - p$$
$$= 1 - 0.791$$
$$= 0.209$$

Although the calculation yielded a sample size of 254, logistical and time constraints of the fourth-year academic research project necessitated limiting the final sample to 215 undergraduate students.

3.6 Sample selection criteria:

3.6.1 Inclusion criteria:

- Patient experiencing cervical discomfort attributed to smartphone usage. (Babushkina et al., 2017).
- Only BSc students from BHPI are considered (Saiful et al., 2023).
- Participants include both boys and girls. Hasan et al. (2018)
- Age 19 – 25 years (Wah et al., 2022).
- Participation: Subjects who expressed a willingness to engage in the study (Ahmed et al., 2022).
- Neck pain has persisted for almost seven days (Fejer et al., 2006).

3.6.2 Exclusion criteria:

- Student who are not interested (Halvorsen et al., 2014).
- Medically unstable patients. (Kim et al., 2017)
- Congenital abnormalities and severe surgical and neurological disorders (Ahmed et al. 2022).
- Red flags of neck pain (such as ankylosing spondylitis, tumours, infection and rheumatoid arthritis (Aysha & Faizan,2016).

3.7 Data collection tools:

The inquiries were classified into distinct sections addressing nearly all facets associated with the risk factors of neck pain, including age, gender, educational level, BMI, behavioral and lifestyle choices, sleep patterns, study habits, overall health status, educational environment, ergonomic factors, activities of daily living (ADL), smartphone usage, NPRS, WHODAS 2.0, and NPDS.

3.7.1 Numeric pain rating scale

Numerical pain rating scale for evaluating pain intensity. The 11-point Numerical Pain Rating Scale (NPRS) was utilized to evaluate the patient's pain intensity. The scale is defined on the left by the term "no pain" and on the right by the term "worst imaginable pain." The average of the three ratings or any single rating may be employed to indicate the patient's level of pain. Numeric pain scales have shown both reliability and validity (Mintken et al., 2009).

Interpretation

NPRS Score	Pain Level
0	No Pain
1–3	Mild Pain
4–6	Moderate Pain
7–10	Severe Pain

3.7.2 Who Disability Assessment Scale 2.0

The 12-item WHODAS 2.0 is a widely utilized tool for assessing disability and health status, based on the World Health Organization's Disability Assessment Schedule. The scores from each item are combined, resulting in a total score ranging from 0 to 48.

The WHODAS-2 is a disability assessment instrument based on the conceptual framework of the International Classification of Functioning, Disability, and Health (ICF). It provides a thorough evaluation of disability globally.Garin et al. (2010) The World Health Organization Disability Assessment Schedule (WHODAS) has been updated to a second edition (WHODAS 2.0), operating as a thorough measure for evaluating functioning and disability across essential living domains. Ustun et al. (2010).

Interpretation

- 0 = None (there is no disability)
- 1 = Mild disability
- 2 = Moderate disability
- 3 = Severe disability
- 4 = Extreme or cannot do

3.7.3 Neck pain & disability scale

The Neck Pain and Disability Scale (NPDS) is a commonly employed questionnaire for evaluating neck pain and related disability. It lists 20 aspects related to cervical movements, the intensity of cervical pain, the influence of cervical pain on emotions and cognition, and the extent of interference with everyday activities. The NPDS is clear and attainable for both patients and clinical researchers. The NPDS has been evaluated for reliability, face validity, and concept validity. (Yao et al., 2019).

Interpretation

Total Score	**Disability Level**
0–20	Minimal or No Disability
21–40	Mild Disability
41–60	Moderate Disability
61–80	Severe Disability
81–100	Very Severe/Complete Disability

3.8 Method of data collection

A self-administered questionnaire was employed to gather data from undergraduate students at the Bangladesh Health Professions Institute (BHPI) to ascertain the prevalence of neck pain among smartphone users. The questionnaire was designed to include three main areas: demographic information, smartphone using behaviors, and evaluations of neck pain and associated disability. Subsequently, informed consent was acquired from the individual prior to data collection. The author's identity and the research project, together with its aims, were initially conveyed verbally to the participants. Subsequent persons were selected to determine their interest in participating.

3.9 Analysis

Following the completion of data collection, the data was entered into the SPSS (Statistical Package for the Social Sciences) software. The Spearman rank correlation test is utilized to assess the relationship between neck pain and smartphone usage. Microsoft Office Excel 2007 was employed to improve the bar graph and pie charts. The data underwent analysis via descriptive statistics, and the findings were illustrated using pie and bar charts.

3.9.1 The Spearman Rank Correlation

The Spearman Rank Correlation, or Spearman's rho (ρ), is a non-parametric statistical method used to evaluate the strength and direction of the association between two ordinal variables.

Key Features:

Values range from -1 to +1:

- +1 = Perfect positive correlation
- 0 = No correlation
- -1 = Perfect negative correlation

Formula:

$$\boldsymbol{\rho} = \mathbf{1} - \frac{\mathbf{6} \sum_{i=1}^{n} d_i^2}{n(n^2 - 1)}$$

Where:

- d_i = difference between ranks of each pair
- n = number of observations

3.9.2 Chi-square test

The Chi-Square (χ^2) Test is a statistical technique used to determine the existence of a significant association between two categorical variables or to assess the alignment of observed data with an expected distribution. It compares observed frequencies with expected frequencies using the formula.

Formula:

$$\chi^2 = \sum \frac{(\mathrm{O_i} - E_i)^2}{E_i}$$

Where,

- χ^2 = Chi-square statistic
- O = Observed frequency
- E = Expected frequency
- $\sum$ = Summation overall categories

Test assumptions:

- Both variables are categorical.
- Two or more categories (groups) for each variable.
- All observations are independent.

3.10 Ethical Considerations

The Institutional Review Board (IRB) evaluated and sanctioned the study protocol to guarantee compliance with ethical standards. Ethical considerations were crucial to protect participants' rights, safety, and well-being. The study adhered to the protocols set out by the Institutional Review Board (IRB), the World Health Organization (WHO), and the Bangladesh Medical Research Council (BMRC). Participants were fully informed of the study's objectives, and agreement was obtained accordingly. Participation was voluntary, allowing individuals to withdraw at any time without consequences. The research alleviated risks without employing invasive techniques and obtained authorization from the Bangladesh Health Professions Institute (BHPI) management.

3.11 Informed Consent

All students provided signed informed consent prior to completing the questionnaire. The researcher elucidated the study's objective, the methodologies employed, and the students' right to withdraw at any moment without consequences. Participation was entirely voluntary. Confidentiality was strictly maintained, and no personal identities were revealed at any point during the investigation. Although students had no immediate advantages, they were informed that the study could improve future awareness and prevention of neck pain.

Chapter-IV: Results

A comprehensive descriptive and inferential statistical analysis was conducted to examine the correlations among various dependent and independent variables. In the descriptive analysis, categorical variables were summarized using frequencies and percentages, with their distributions illustrated by bar charts, pie charts, and frequency tables. Central tendency (mean) and dispersion (standard deviation) measures were calculated for continuous variables to provide a thorough evaluation of data distribution. Appropriate statistical tests were employed in the inferential analysis to determine the significance of correlations between variables. The Chi-square test of independence was used to examine associations among categorical variables, while the Spearman rank correlation coefficient assessed the strength and direction of linear correlations between variables. The analysis aimed to identify statistically significant patterns and correlations relevant to the study objectives.

4.1: Age range of participants:

The ages of the 215 participants are roughly normally distributed, centered around a mean of 22.51 years with a standard deviation of 1.53.

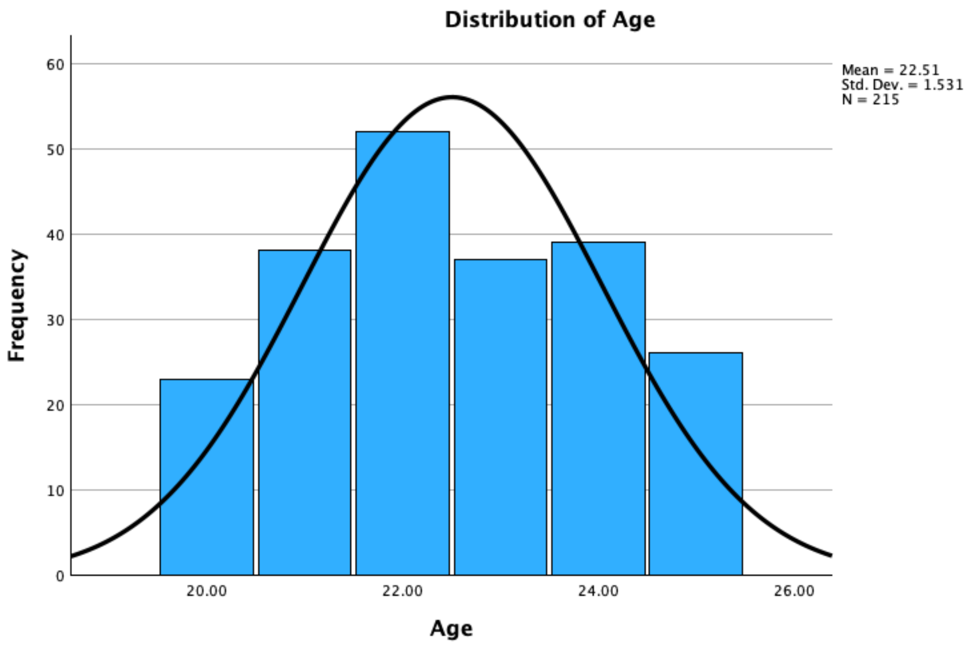


Figure 1: Age distribution of participants

4.2: Gender of participants:

The sample is slightly female dominated, with approximately 57.2% female and 42.8% male participants.

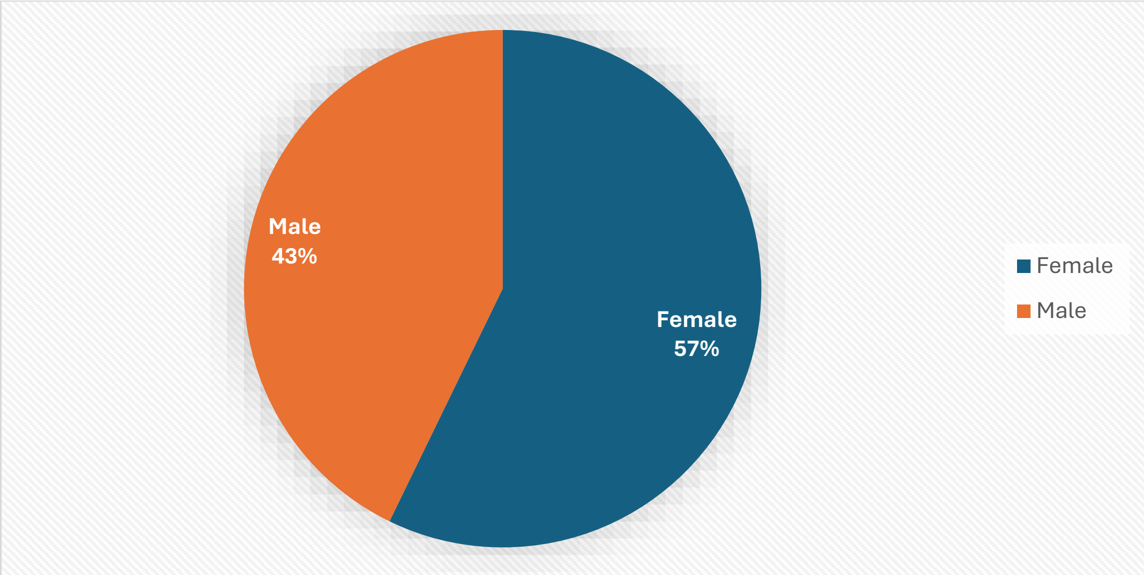


Figure 2: Gender distribution of participants

4.3: Academic year of participants:

Participants are fairly evenly spread across academic years, with a slight tilt: 4th year highest (29.8%), followed by 2nd (26.1%), 1st (23.3%), and 3rd year (20.9%).

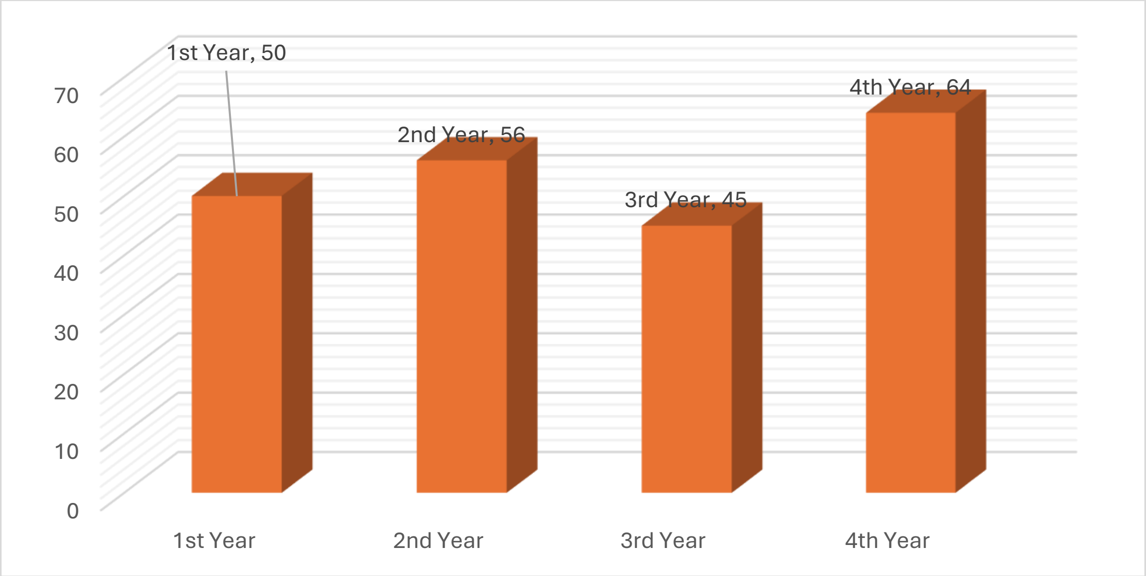


Figure 3: Distribution of students by academic year

4.4: BMI of participants:

The BMI distribution (N=215, mean ≈22.21, SD ≈4.67) is roughly bell-shaped but with a slight right skew: most participants cluster in the normal range (around 18.5–25), with a non-negligible tail of lower values (underweight cases below ~18.5) and higher values (overweight/obese above ~25).

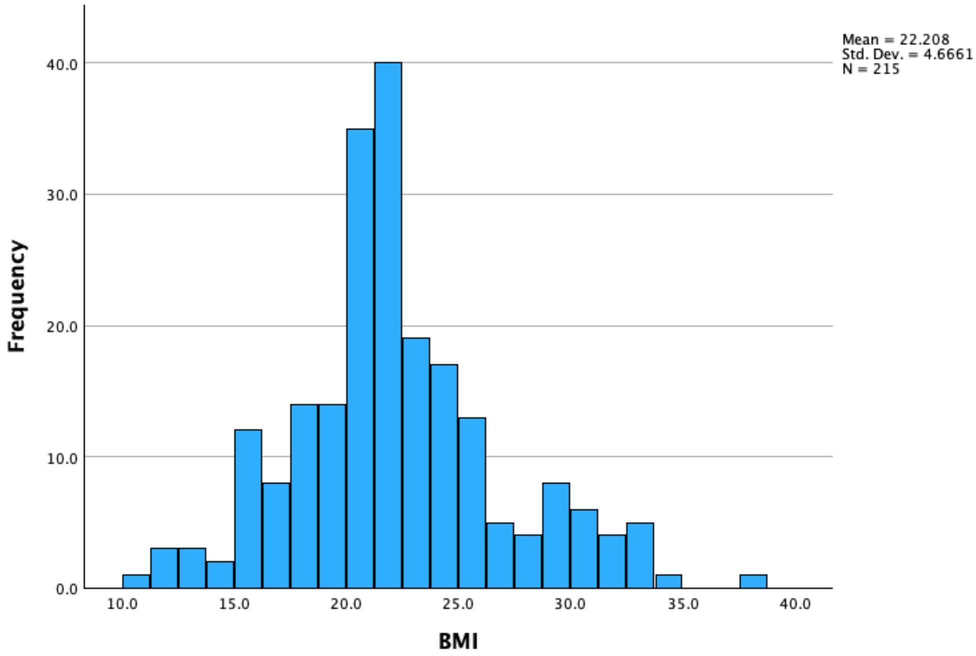


Figure 4: BMI distribution of the students

4.5: Sleep hours of the participants:

The majority of participants (≈65.6%) report sleeping 6–8 hours per night; about 27.0% sleep less than 6 hours (potentially insufficient), a small share (≈5.6%) sleep 8–10 hours, and very few (≈1.9%) sleep 10+ hours. This suggests most fall within a typical "adequate" range, but a sizable minority may be under-sleeping.

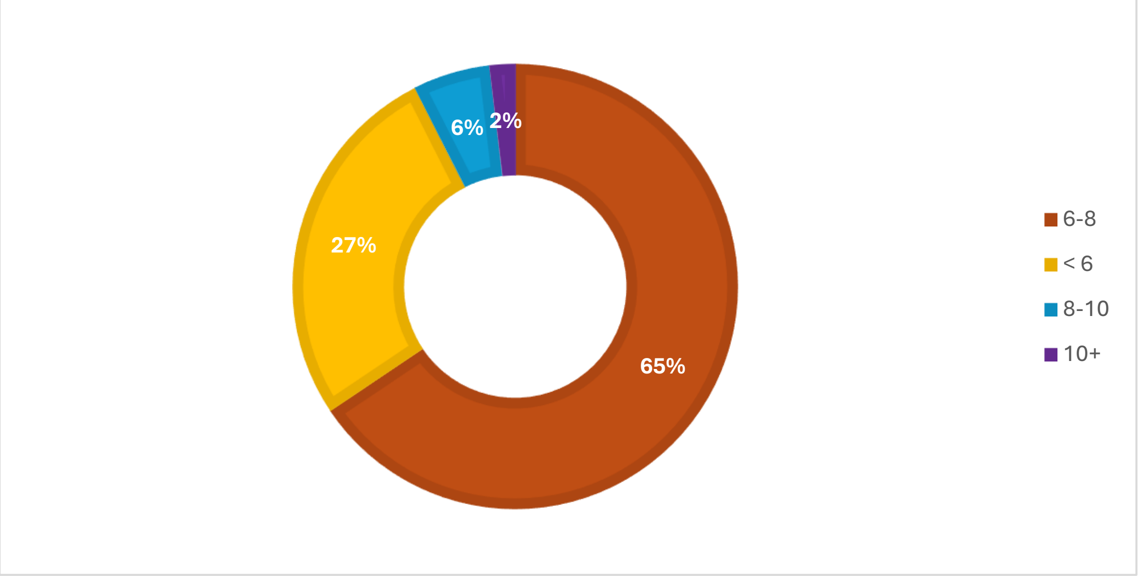


Figure 5: Distribution of sleep hours by range

4.6 Effect on sleep:

74% report no effect, 25% report an effect on sleep, and 1% are N/A, indicating most are unaffected but a notable quarter experience sleep disturbances.

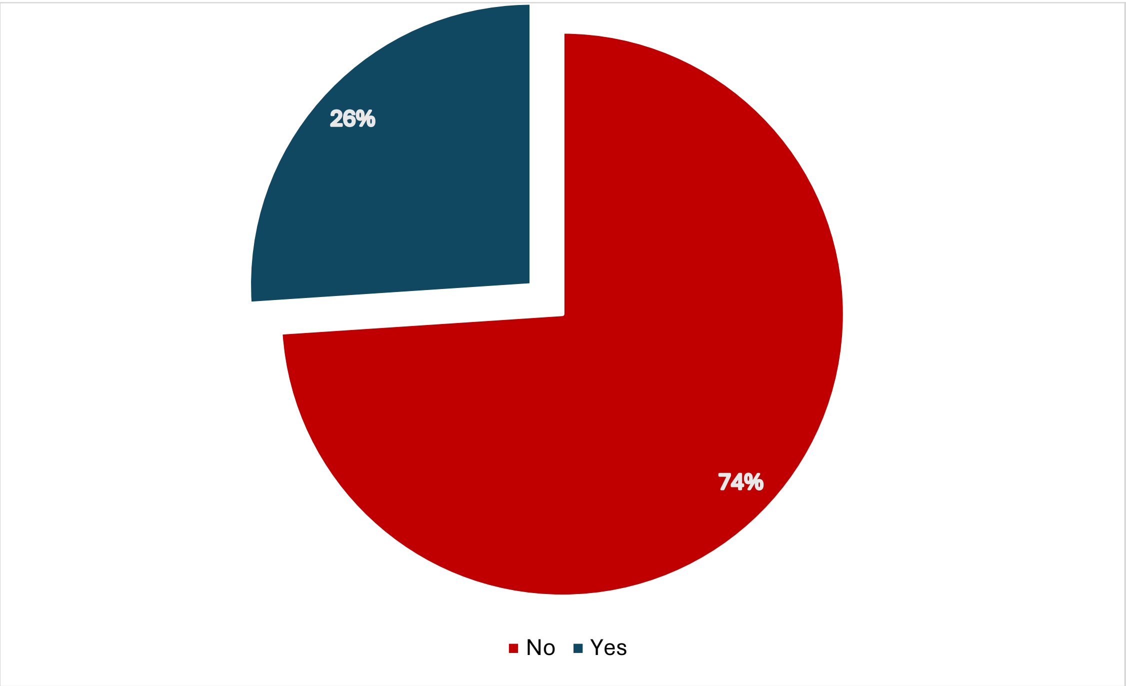


Figure 6: Effect on sleep distribution (Yes, No)

4.7: Neck pain during lying

Among the 215 participants, the vast majority (93%) reported not experiencing neck pain during lying, while only 7% reported experiencing such pain. This indicates that neck discomfort while lying is relatively uncommon among the undergraduate smartphone users surveyed. The finding suggests that lying posture may not be a major aggravating factor for neck pain in this population.

4.8: Pillow used

Among 215 students, 56.7% (122 students) reported using one pillow while sleeping, and 43.3% (93 students) used two pillows. No students reported using more than two pillows.

4.9: Sleep surface of the participants:

About half of participants (≈47.4%) sleep on a firm surface and a similar proportion (≈43.7%) on a soft surface, while only a small minority (≈8.8%) report a sagging surface; this suggests most people choose either firm or soft bedding, with few experiencing noticeable sag.

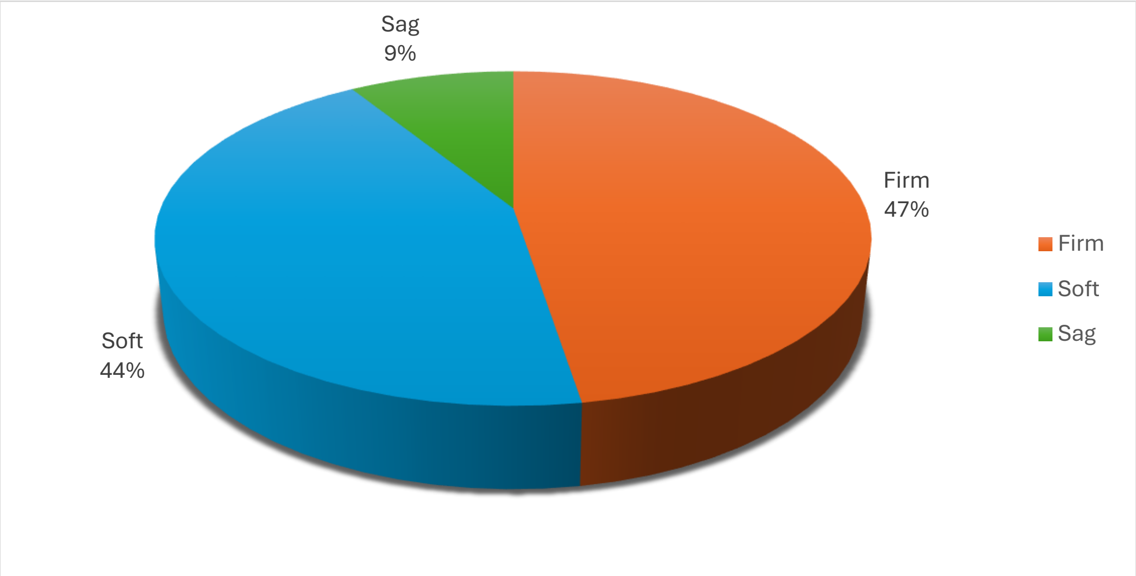


Figure 7: Distribution of sleep surface

4.10: Water intake

Among 215 undergraduate students, 41.4% (89 students) reported drinking less than 2 liters of water daily, 44.7% (96 students) consumed 2–3 liters, and only 14% (30 students) drank more than 3 liters per day.

4.11: Carry heavy bag

Out of 215 participants, a substantial proportion (71.7%) reported that they regularly carry heavy bags, while 24.8% stated they do not carry heavy bags. This high prevalence of heavy bag use among students could be a contributing factor to musculoskeletal strain, particularly neck and shoulder discomfort. Such habitual loading may have implications for posture and physical well-being, especially in the context of prolonged smartphone use.

4.12: Perform physical exercise

Out of 215 participants, just 33.5% engage in regular physical exercise, while 66.5% are completely inactive—pointing to a mainly sedentary lifestyle that, when paired with extended smartphone use, may heighten the risk of musculoskeletal issues like neck pain. Moreover, 150 participants (69.8%) reported zero hours of activity, 48 (22.3%) logged 1–3 hours, and only 17 (7.9%) reached 4–10 hours.

4.13: Duration of neck pain

Of the 215 respondents, 190 (88.4%) experienced neck pain lasting over 30 days, 14 (6.5%) reported pain persisting 14–30 days, and just 11 (5.1%) had pain for 7–14 days. This overwhelming skew toward chronic (>30 days) pain suggests that long-term neck discomfort is highly prevalent in this population and warrants sustained prevention and management strategies.

4.14: Neck pain side of the participants:

Most participants report pain in the middle of the neck (~37.7%), followed by the right side (~32.6%), with fewer on the left (~15.4%), and small proportions experiencing bilateral (~7.0%) or diffuse/all-area pain (~7.4%). This suggests midline neck discomfort is the most common.

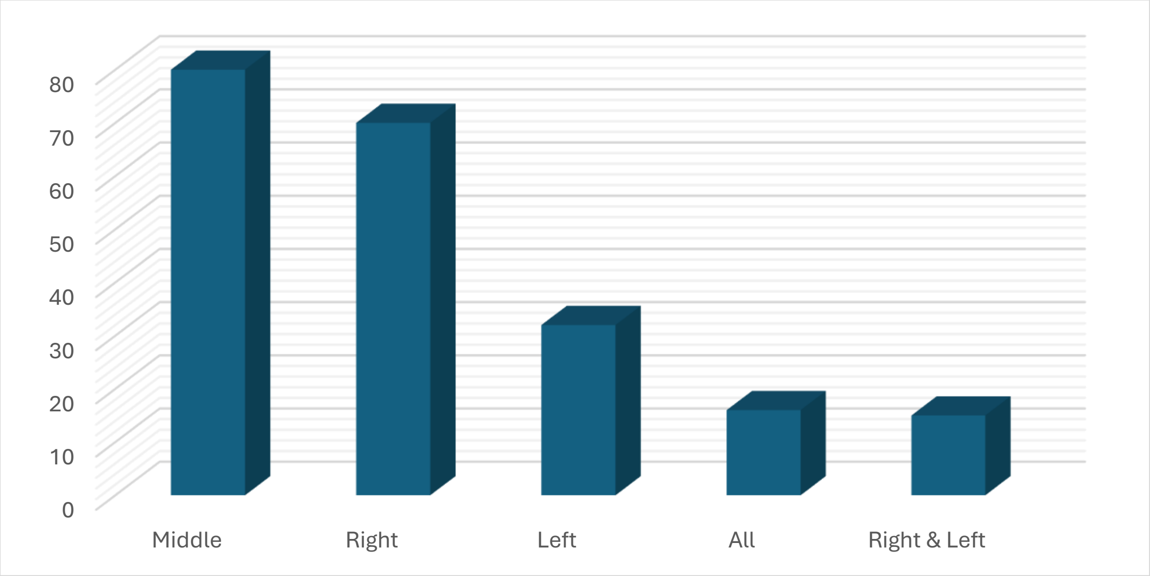


Figure 8: Distribution of neck pain side across categories

4.15: Severity of neck pain of the participants:

The high proportion of moderate pain suggests most participants experience noticeable but not extreme neck discomfort; severe cases are less common but non-trivial (~17%), and mild cases form a smaller group (~15%).

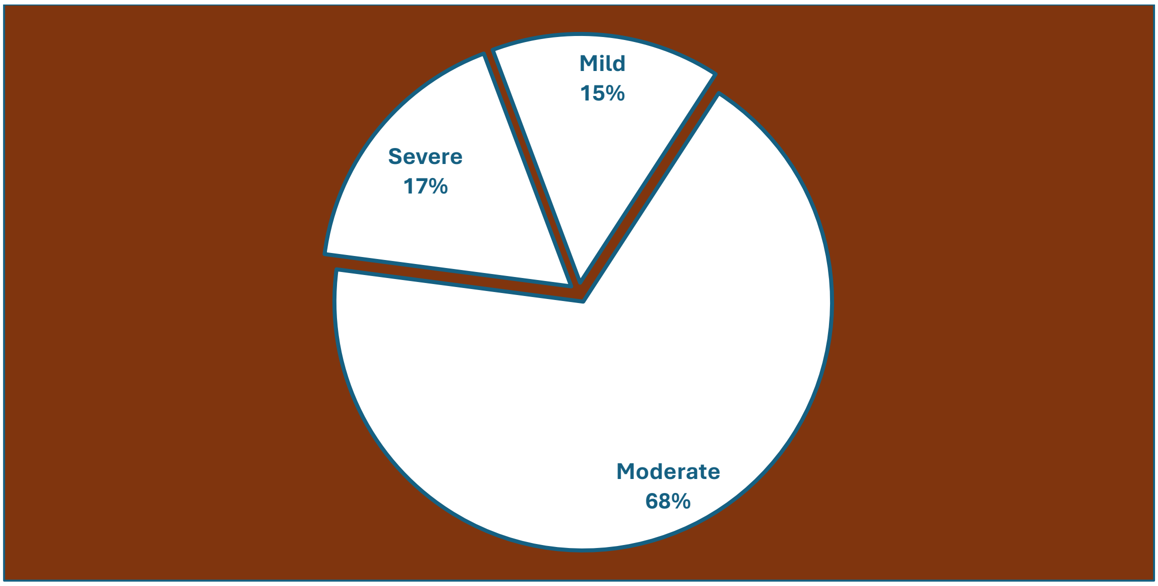


Figure 9: Distribution of neck pain side across categories

4.16: Neck pain type of the participants:

About three-quarters of participants (≈75.4%) experience intermittent neck pain, while about one-quarter (≈24.6%) have constant pain, indicating that intermittent pain is much more common.

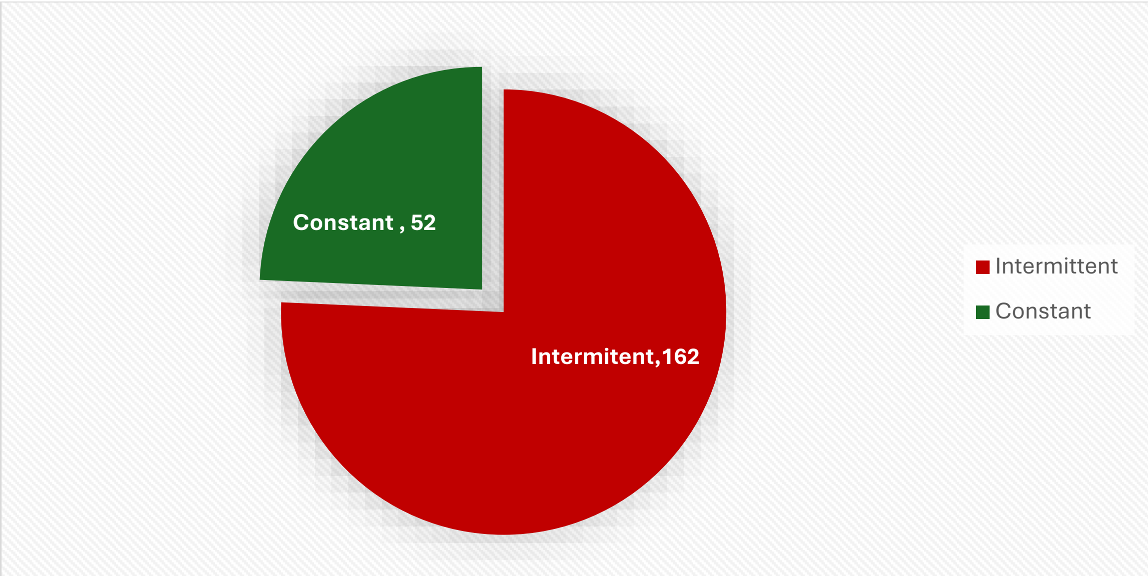


Figure 10: Frequency of occurrence (Intermittent vs. Constant)

4.17: Exacerbating movement type of participants:

A majority (58%) reported neck forward bending as the main aggravating movement, suggesting that prolonged device use (e.g., looking down at phones or laptops) may significantly contribute to neck discomfort. Backward bending (24%) was also notable, possibly linked to poor ergonomic setups or stretching. Lateral rotations (right: 10%, left: 8%) were less commonly associated with pain.

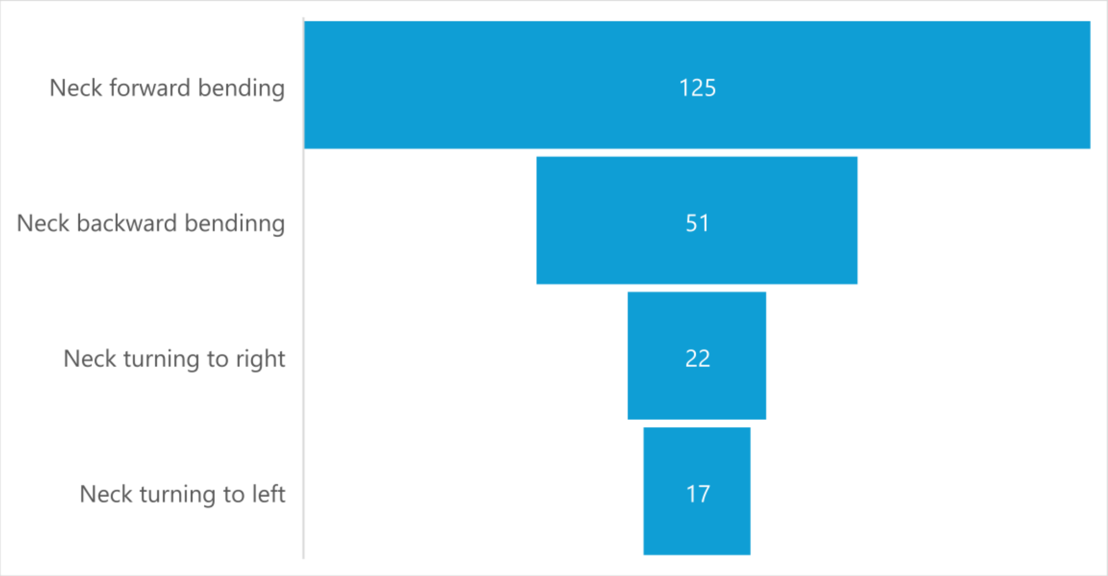


Figure 11: Most Common Neck Movements Associated with Pain

4.18: Posture

The pie chart shows that 75% of participants adopt a slouched posture versus 25% maintaining erect alignment. This threefold disparity suggests widespread ergonomic or behavioral drivers of poor posture. To reduce musculoskeletal strain, interventions—such as lumbar support, adjustable workstations, and posture awareness training—are recommended.

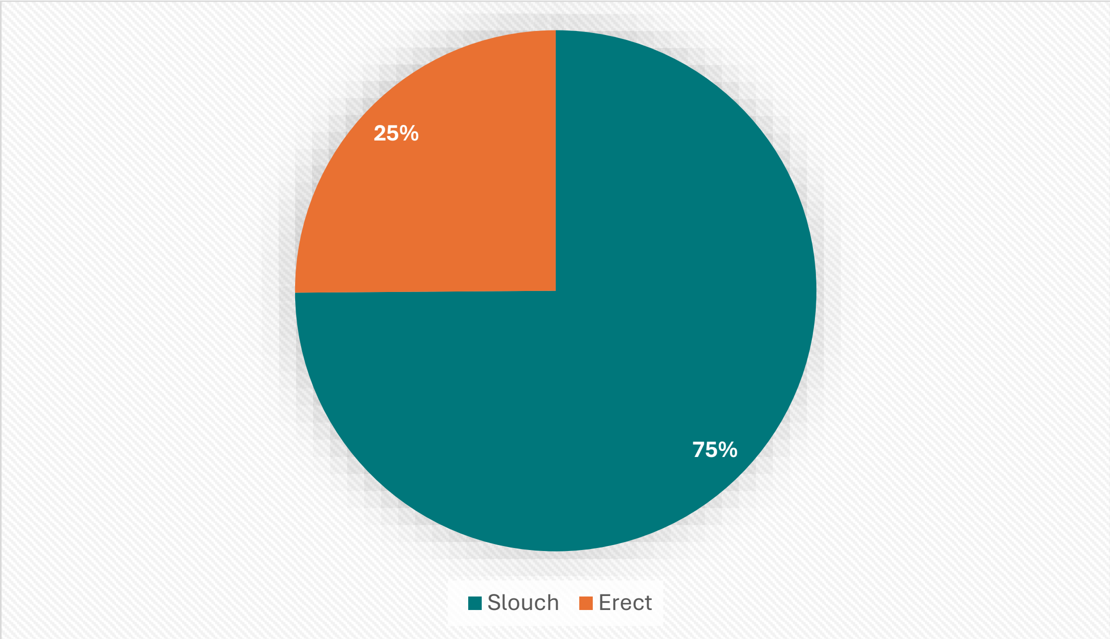


Figure 12: Participants' posture ratio

4.19: Position

The pie chart shows that **58%** of participants were **sitting**, **31%** were engaged in **other** activities (e.g. standing or walking), and only **11%** were **lying** down. The dominance of sitting indicates high sedentary behavior, which may contribute to musculoskeletal strain and metabolic risks. Interventions—such as scheduled movement breaks, adjustable workstations, and activity variation—are therefore warranted.

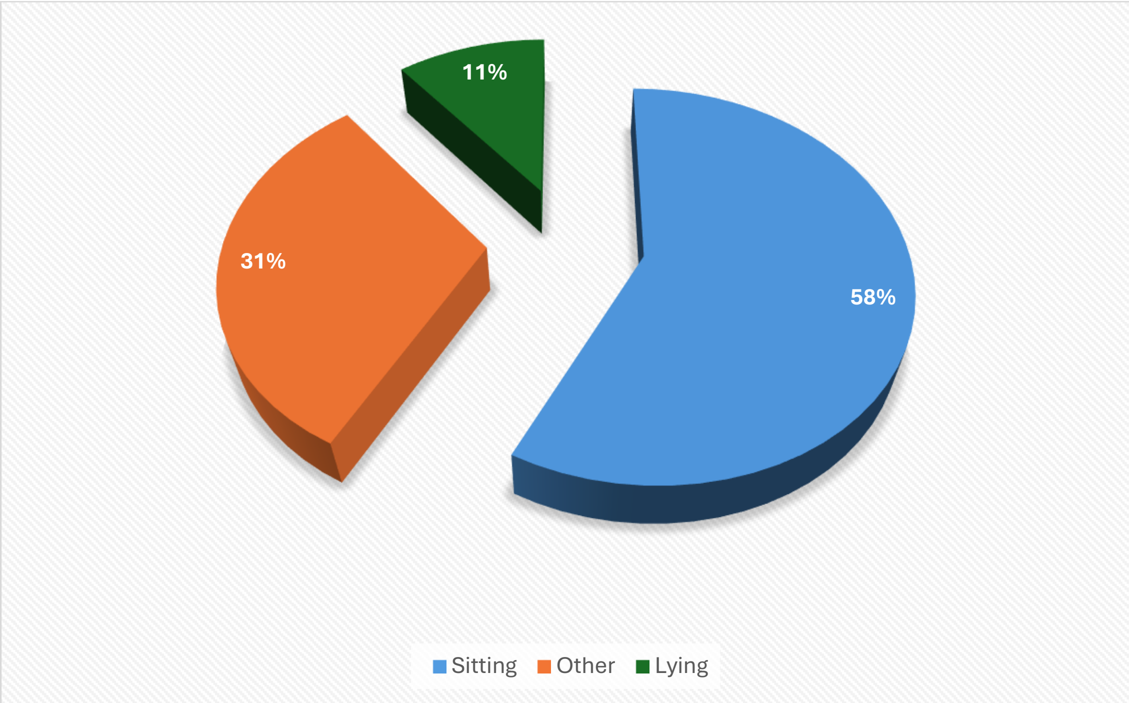


Figure 13: Ratio of position while using smartphone

4.20: Ratio of Smartphones Held at Eye Level During Usage:

Most users (55%) use their smartphones below eye level, which may lead to increased neck flexion, contributing to neck strain or musculoskeletal discomfort over prolonged periods. This behavioral insight is important when analyzing the correlation between smartphone usage posture and reported neck pain severity or frequency.

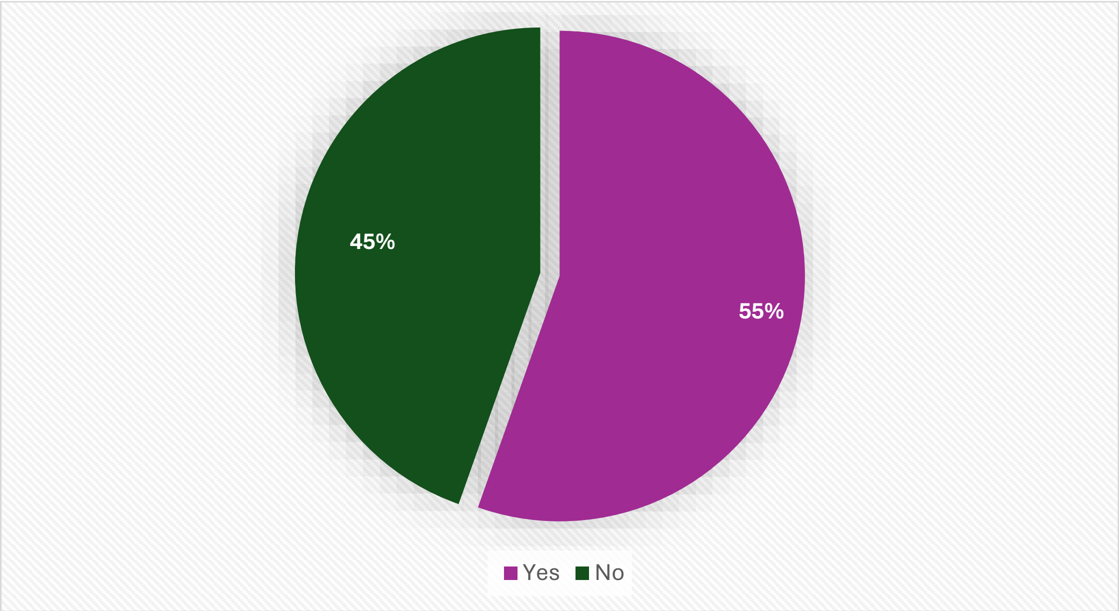


Figure 14**:** Ratio of smartphones held at eye level during usage

4.21: Common activity of the participants:

Social media is the most common activity (45%), followed by studying (29%), gaming (21%), and messaging (5%), indicating that nearly half of participants primarily use their devices for social engagement.

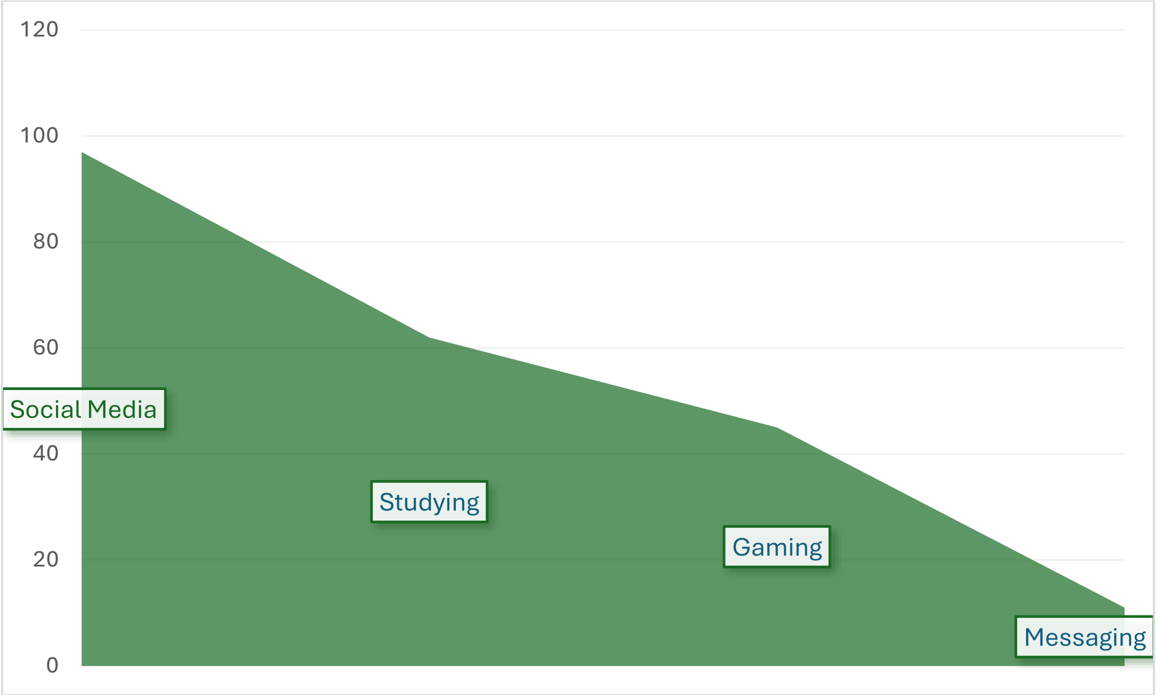


Figure 15: Distribution of smartphone activities

4.22: Smartphone usage duration:

Nearly half of participants (47%) use smartphones 3–5 hours daily, about a quarter (27%) use 0–2 hours, another quarter (24%) use 6–8 hours, and very few (2%) exceed 9 hours, indicating most have moderate usage with minimal extreme high-use cases.

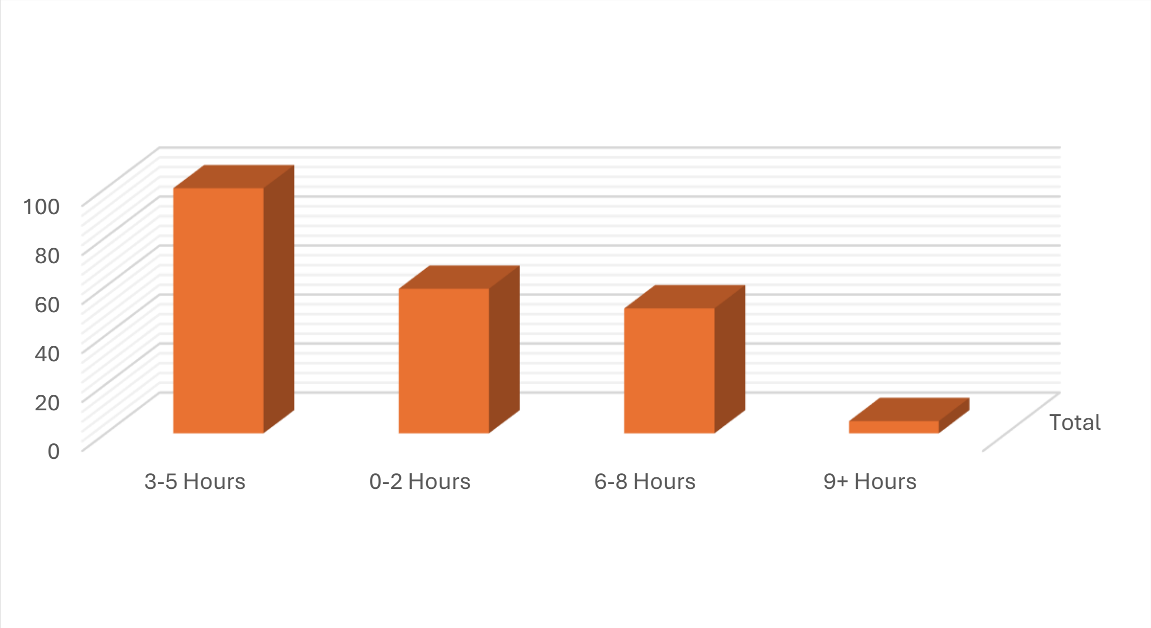


Figure 16: Distribution of hours spent in different activities

4.23: Referred pain

Of the 215 participants, 39.5% reported experiencing referred pain, while 60.5% did not. The presence of referred pain in a notable portion of the sample may indicate underlying musculoskeletal issues beyond localized neck discomfort, potentially linked to poor posture or repetitive strain from smartphone use.

4.24: Area of radiation

Radiating area	Frequency	Percentage
Shoulder & arm	38	17.7%
Scapula region	30	14%
Both	17	7.8%

Table 1: Distribution of Radiating Neck Pain by Anatomical Region

4.25 Headache of participants

Among the 215 participants, 63.7% reported experiencing headaches, whereas 36.3% did not. The high prevalence of headaches may be associated with prolonged smartphone use, forward head posture, or muscular tension in the neck and upper back, highlighting a possible link between digital device use and cervicogenic symptoms.

4.26: Neck Injury & type

Out of 215 participants, 3.3% reported a history of neck injury, with 2% attributing it to pathological causes and 5% to accidental causes (some participants may have reported both types). The remaining 96.7% had no history of neck injury. Although the prevalence is low, past neck injuries—especially accidental—could contribute to chronic neck pain or increased sensitivity during prolonged smartphone use.

4.27: Treatment type of participants:

Most participants preferred physiotherapy (48.8%), followed by medication (34.9%). A smaller portion relied on other treatments (14.0%), while 9.3% received no treatment. This reflects a general preference for formal care, though some participants may face barriers to access or awareness.

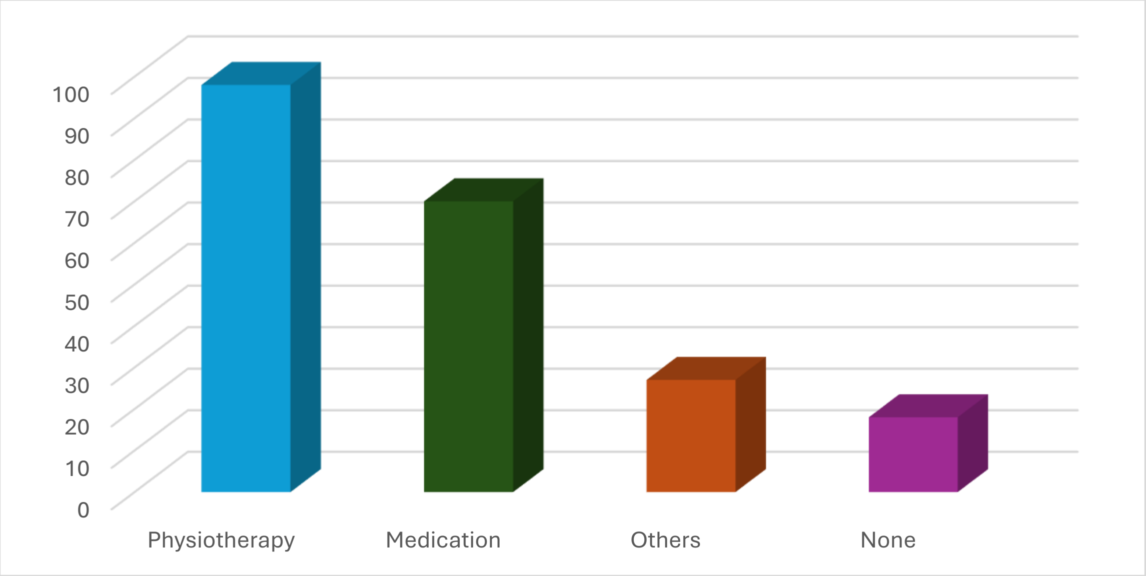


Figure 17: Distribution of treatment types among participants

4.28: Treatment result

Among the participants who received treatment for neck pain—such as physiotherapy, medication, or other interventions—60% reported improvement, 22.3% stated they had fully recovered, while 9.3% experienced no change in their condition. These findings suggest that conservative management approaches, particularly physiotherapy was largely effective in managing neck pain symptoms in this population.

4.29: NPRS pain with smartphone activity:

Among 215 participants, 71% reported moderate pain, 25% severe pain, and only 4% mild pain during smartphone use. This indicates a high prevalence of significant neck discomfort linked to smartphone activity.

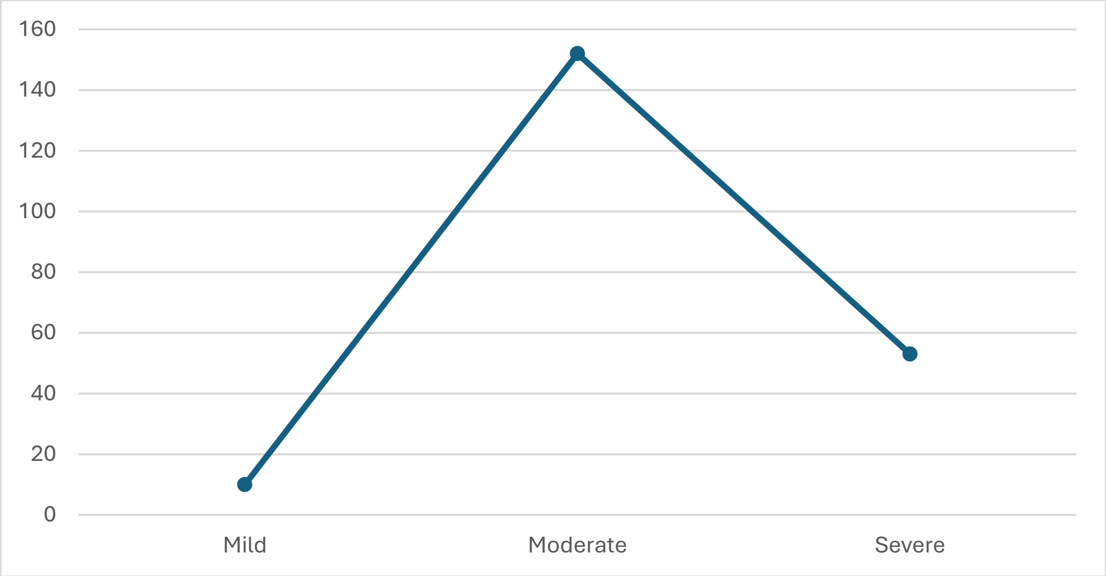


Figure 18: NPRS Pain intensity during smartphone activity

4.30: WHODAS 2.0 total score of participants:

The bar chart presents the distribution of WHODAS (World Health Organization Disability Assessment Schedule) total scores, converted using the scale:

None = 0, Mild = 1, Moderate = 2, Severe = 3, Extreme = 4.

Most participants (60%) scored 10–14, indicating mild to moderate disability, with an additional 10% scoring 15–19, reflecting moderate disability. Only a few participants (under 2%) scored in the extreme ends, indicating either no or high levels of disability.

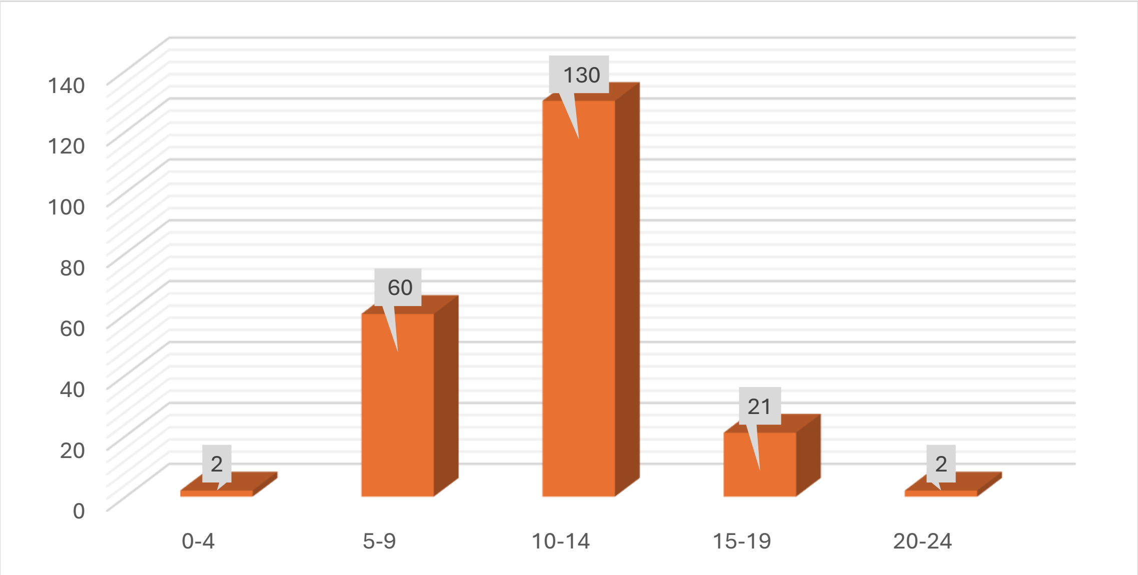


Figure 19: Distribution of WHODAS 2.0 total scores among participants

4.31: NPDS total score of participants:

The findings reveal that the majority of participants scored between 30 and 44, indicating moderate to moderately high levels of pain-related disability. The highest concentration (peak at 40–44) reflects a significant impact on daily functioning due to neck pain. Fewer individuals scored at the lower or extreme ends of the scale. These results emphasize the importance of preventive strategies and posture correction, especially in undergraduate populations with frequent smartphone use.

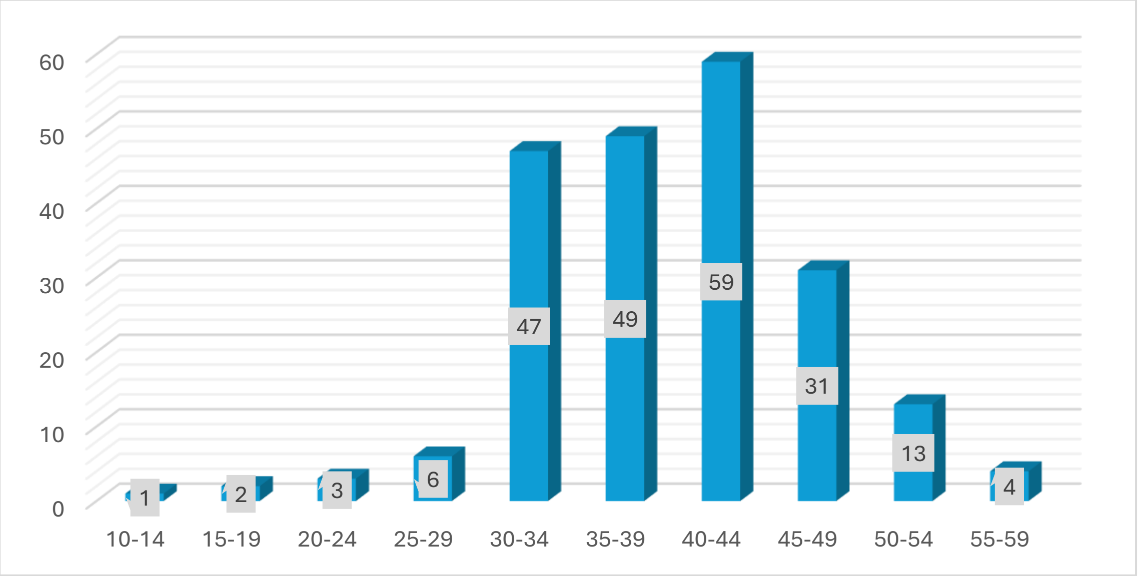


Figure 20: Distribution of NPDS total scores among participants

4.32: Relationship:

4.32.1: Association between Neck Pain intensity and other variables

Relationship between Neck pain rating scale: Smartphone (Dependent Variable) and other independent variables. To analyze the data Chi-square test was done. The test value (x2) and P value are given on table.

Association Between Neck Pain and Socio-Demographic Variables

Socio-Demographic Information		
Independent Variables	**Test value (x2)**	**p-value**
Age	11.840	.223
Gender	28.705	.018
Academic Year	16.069	.065
BMI	36.284	.028

Table 2: Association Between Neck Pain and Socio-Demographic Variables

Results and findings: The Chi-square analysis showed that neck pain intensity was significantly associated with gender ($\chi^2 = 28.705$, $p = .018$) and BMI ($\chi^2 = 36.284$, $p = .028$), indicating that differences in gender and body mass index categories relate to variations in reported neck pain intensity. In contrast, there was no statistically significant association with age ($\chi^2 = 11.840$, $p = .223$) or academic year ($\chi^2 = 16.069$, $p = .065$), although the latter approached but did not reach conventional significance. This suggests that while age group and year of study do not appear to influence neck pain intensity in this sample, gender differences and BMI categories may be important factors to consider in understanding intensity of neck pain.

Association between neck pain and lifestyle variables

Lifestyle related information		
Independent Variables	**Test value (x2)**	**p-value**
Sleep hours	7.618	.573
Disturbed sleep	9.619	.142
Neck pain lying	1.669	.644
Pillow count	15.725	.001
Sleep surface	8.891	.180
Water intake	8.315	.216
Carry heavy bag	6.542	.088
Physical exercise	3.826	.281
Exercise hours	4.558	.602

Table 3: Association between neck pain and lifestyle variables

Results and findings: The Chi-square analysis indicated that among the lifestyle factors examined, only pillow count was significantly associated with neck pain (χ^2 = 15.725, p = .001), suggesting that the number of pillows used during sleep may influence the occurrence or intensity of neck pain. Other variables—including sleep hours (χ^2 = 7.618, p = .573), disturbed sleep (χ^2 = 9.619, p = .142), neck pain while lying (χ^2 = 1.669, p = .644), sleep surface (χ^2 = 8.891, p = .180), water intake (χ^2 = 8.315, p = .216), carrying a heavy bag (χ^2 = 6.542, p = .088), physical exercise (χ^2 = 3.826, p = .281), and exercise hours (χ^2 = 4.558, p = .602)—did not show statistically significant associations with neck pain in this sample. While carrying a heavy bag approached significance, it did not meet the conventional threshold. These results imply that among the lifestyle factors assessed, pillow count stands out as a potential contributor to neck pain, whereas other habits such as overall sleep duration, sleep disturbances, and exercise patterns appear less directly related.

Association between neck pain and Co-morbid conditions

Co-morbid conditions		
Independent Variables	**Test value (x2)**	**p-value**
Neck pain since	7.100	.312
Side of neck pain	35.592	.000
Neck pain severity	9.451	.150
Neck pain type	3.979	.264
Direction of movement	3.889	.919
Posture	1.044	.791
Position	19.908	.003
Common smartphone activity	11.840	.223
Duration	3.708	.930
Headache	3.064	.382
Eye level	2.526	.471
Neck injury	3.054	.383
Injury type	8.790	.186
Treatment type	24.111	.004
Treatment result	23.514	.005
Referred Pain	2.271	.518
Radiation	11.479	.244

Table 4: Association between neck pain and Co-morbid conditions

Results and findings: The Chi-square analysis indicated that several co-morbid factors were significantly associated with neck pain: side of neck pain ($\chi^2 = 35.592$, $p < .001$), position during smartphone use ($\chi^2 = 19.908$, $p = .003$), treatment type ($\chi^2 = 24.111$, $p = .004$), and treatment result ($\chi^2 = 23.514$, $p = .005$) all showed statistically significant associations with neck pain, suggesting that where pain is felt, how participants position themselves when using a smartphone, the kinds of treatment received, and the outcomes of those treatments are related to the presence or intensity of neck pain. In contrast, variables such as duration since pain onset (χ^2 = 7.100, p = .312), neck pain severity category (χ^2 = 9.451, p = .150), pain type (χ^2 = 3.979, p = .264), movement direction exacerbating pain (χ^2 = 3.889, p = .919), posture (χ^2 = 1.044, p = .791), common smartphone activity (χ^2 = 11.840, p = .223), duration of pain experience (χ^2 = 3.708, p = .930), headache presence (χ^2 = 3.064, p = .382), holding phone at eye level (χ^2 = 2.526, p = .471), neck injury presence (χ^2 = 3.054, p = .383), injury type (χ^2 = 8.790, p = .186), referred pain (χ^2 = 2.271, p = .518), and radiation location (χ^2 = 11.479, p = .244) were not significantly associated. These results imply that specific characteristics—pain location, smartphone-use position, and treatment-related factors—are important in understanding neck pain in this study.

4.32.2: Association between WHO Disability Assessment Scale 2.0 (Total Score) with other variables

Relationship between WHO Disability Assessment Scale 2.0 (Total Score) (Dependent Variable) and other independent variables. To analyze the data Chi-square test was done. The test value (x2) and P value are given on table.

Association between WHODAS 2.0 total score and socio-demographic variables

Socio-Demographic Information		
Independent Variables	**Test value (x2)**	**p-value**
Age	81.232	.441
Gender	20.251	.209
Academic Year	67.085	.036
BMI	1520.007	.995

Table 5: Association between WHODAS 2.0 total score and socio-demographic variables

Results and findings: The Chi-square analysis showed no significant association between WHODAS 2.0 total score and age ($\chi^2 = 81.232$, $p = .441$), gender ($\chi^2 = 20.251$, $p = .209$), or BMI ($\chi^2 = 1520.007$, $p = .995$). However, a statistically significant association was observed between WHODAS 2.0 total score and academic year ($\chi^2 = 67.085$, $p = .036$), indicating that students' year of study may influence their disability levels.

Association between WHODAS 2.0 total score and lifestyle variables

Lifestyle related information		
Independent Variables	**Test value (x2)**	**p-value**
Sleep hours	41.745	.726
Disturbed sleep	30.998	.517
Neck pain lying	14.604	.554
Pillow count	19.784	.230
Sleep surface	23.246	.870
Water intake	42.914	.094
Carry heavy bag	28.761	.026
Physical exercise	18.678	.286
Exercise hours	20.022	.951

Table 6: Association between WHODAS 2.0 total score and lifestyle variables

Results and findings: The Chi-square analysis showed that carrying a heavy bag had a statistically significant association with WHODAS 2.0 total score ($\chi^2 = 28.761$, $p = .026$), indicating that individuals who carry heavy bags may experience greater disability.

Other lifestyle factors—including sleep hours (p = .726), disturbed sleep (p = .517), neck pain while lying (p = .554), pillow count (p = .230), sleep surface (p = .870), water intake (p = .094), physical exercise (p = .286), and exercise duration (p = .951)—were not significantly associated with WHODAS 2.0 scores.

Association between WHODAS 2.0 total score and co-morbid variables

Co-morbid conditions		
Independent Variables	**Test value (x2)**	**p-value**
Neck pain since	34.554	.347
Side of neck pain	69.729	.291
Neck pain severity	40.927	.134
Neck pain type	15.244	.507
Direction of movement	76.749	.005
Posture	20.004	.003
Position	38.489	.199
Common smartphone activity	22.601	.001
Duration	75.873	.006
Headache	24.444	.080
Eye level	20.942	.181
Neck injury	7.673	.958
Injury type	4.550	.337
Treatment type	59.084	.131
Treatment result	68.094	<.001
Referred Pain	19.284	.254
Radiation	27.264	.609

Table 7: Association between WHODAS 2.0 total score and co-morbid variables

Results and findings: The Chi-square analysis indicated that some co-morbid variables were not significantly directly associated with WHODAS 2.0 total score, including neck pain onset ($\chi^2 = 34.554$, $p = .347$), side of neck pain ($\chi^2 = 69.729$, $p = .291$), pain severity ($\chi^2 = 40.927$, $p = .134$), pain type ($\chi^2 = 15.244$, $p = .507$), position during smartphone use ($\chi^2 = 38.489$, $p = .199$), headache presence ($\chi^2 = 24.444$, $p = .080$), holding phone at eye level ($\chi^2 = 20.942$, $p = .181$), neck injury ($\chi^2 = 7.673$, $p = .958$), injury type ($\chi^2 = 4.550$, $p = .337$), treatment type ($\chi^2 = 59.084$, $p = .131$), referred pain ($\chi^2 = 19.284$, $p = .254$), and radiation location ($\chi^2 = 27.264$, $p = .609$). In contrast, some factors showed statistically significant associations with WHODAS 2.0 total score: the direction of movement exacerbating pain ($\chi^2 = 76.749$, $p = .005$), common smartphone activity ($\chi^2 = 22.601$, $p = .001$), the duration of pain experience ($\chi^2 = 75.873$, $p = .006$), posture during pain ($\chi^2 = 20.004$, $p = .003$), and treatment outcome ($\chi^2 = 68.094$, $p < .001$). These findings suggest that while many co-morbid characteristics do not relate significantly to overall disability, the specific movements that worsen neck pain, how long participants have experienced pain, and the effectiveness of past treatment are important factors influencing disability levels in this population.

4.32.3: Association between Neck Pain and Disability Scale (Total score) with other variables

Relationship between Neck pain disability index total (Dependent Variable) and other independent variables. To analyze the data Chi-square test was done. The test value (x2) and P value are given on table.

Association between NPDS total score and socio-demographic variables

Socio-Demographic Information		
Independent Variables	**Test value (x2)**	**p-value**
Age	200.553	.008
Gender	35.564	.262
Academic Year	127.420	.010
BMI	3236.815	.433

Table 8: Association between NPDS total score and socio-demographic variables

Results and findings: The Chi-square analysis showed significant associations between NPDS total score and both age (χ^2 = 200.553, p = .008) and academic year (χ^2 = 127.420, p = .010), indicating that disability levels as measured by the Neck Pain and Disability Scale differ across age groups and year of study. In contrast, there was no significant association with gender (χ^2 = 35.564, p = .262) or BMI (χ^2 = 3236.815, p = .433), suggesting that in this sample, disability scores were not meaningfully related to participants’ gender or body mass index.

Association between NPDS total score and lifestyle variables

Lifestyle related information		
Independent Variables	**Test value (x2)**	**p-value**
Sleep hours	78.037	.867
Disturbed sleep	58.205	.613
Neck pain lying	45.863	.042
Pillow count	38.461	.168
Sleep surface	85.632	.025
Water intake	95.947	.004
Carry heavy bag	41.005	.108
Physical exercise	42.988	.074
Exercise hours	52.524	.799

Table 9: Association between NPDS total score and lifestyle variables

Results and findings: The Chi-square analysis revealed that several lifestyle factors were significantly associated with NPDS total score: specifically, experiencing neck pain while lying down ($\chi^2 = 45.863$, $p = .042$), sleep surface ($\chi^2 = 85.632$, $p = .025$), and daily water intake ($\chi^2 = 95.947$, $p = .004$) showed statistically significant associations with disability levels on the Neck Pain and Disability Scale. This suggests that individuals who report neck pain in the lying position, who sleep on certain surfaces, and who differ in hydration habits tend to have differing NPDS scores. Other lifestyle variables did not reach significance: sleep hours ($\chi^2 = 78.037$, $p = .867$), disturbed sleep ($\chi^2 = 58.205$, $p = .613$), pillow count ($\chi^2 = 38.461$, $p = .168$), carrying a heavy bag ($\chi^2 = 41.005$, $p = .108$), physical exercise ($\chi^2 = 42.988$, $p = .074$), and exercise duration ($\chi^2 = 52.524$, $p = .799$) were not significantly associated with NPDS scores, although the association with physical exercise approached but did not achieve conventional significance. These findings indicate that while general sleep duration, exercise habits, and bag-carrying are not strongly linked to disability levels in this sample, specific factors like pain when lying, type of sleep surface, and hydration status may play more meaningful roles in influencing neck-related disability.

Association between NPDS total score and co morbid conditions

Co-morbid conditions		
Independent Variables	**Test value (x2)**	**p-value**
Neck pain since	78.777	.074
Side of neck pain	152.207	.043
Neck pain severity	76.220	.106
Neck pain type	31.793	.427
Direction of movement	133.339	.004
Posture	40.972	.109
Position	62.058	.474
Common smartphone activity	101.746	.251
Duration	10.83	.001
Headache	31.528	.440
Eye level	42.452	.082
Neck injury	33.016	.369
Injury type	4.550	.473
Treatment type	114.065	.087
Treatment result	92.427	.007
Referred Pain	41.107	.106
Radiation	68.762	.085

Table 10: Association between NPDS total score and co morbid conditions

Results and findings: The Chi-square analysis revealed significant associations between several co-morbid variables and the NPDS total score. Specifically, the side of neck pain ($\chi^2 = 152.207$, $p = .043$), direction of movement that exacerbates pain ($\chi^2 = 133.339$, $p = .004$), duration of neck pain ($\chi^2 = 10.83$, $p = .001$), and outcome of treatment received ($\chi^2 = 92.427$, $p = .007$) were significantly associated with neck-related disability levels. These findings indicate that the location of the pain, specific movements that aggravate the pain, how long the pain has been present, and the effectiveness of previous treatment interventions significantly contribute to the overall disability experienced by individuals.

Other factors, such as onset of neck pain ($\chi^2 = 78.777$, $p = .074$), pain severity ($\chi^2 = 76.220$, $p = .106$), posture during smartphone use ($\chi^2 = 40.972$, $p = .109$), common smartphone activity type ($\chi^2 = 101.746$, $p = .251$), and neck injury history ($\chi^2 = 33.016$, $p = .369$), among others, did not show statistically significant associations. Although some of these variables approached significance, they did not reach the statistical threshold required for definitive conclusions.

4.32.4: Correlation between NPRS (Smartphone), WHODAS 2.0 (Total Score), NPDS (Total Score) with Neck pain severity, Posture, Duration and Smartphone activity.

Variables	**NPRS Smartphone**		**WHODAS Total Score**		**NPDS Total Score**	
	Coefficient (r)	p-value	Coefficient (r)	p-value	Coefficient (r)	p-value
Neck Pain Severity	**.351**	**<.001**	.128	.061	.079	.247
Posture	.220	**.001**	.225	. **001**	.240	**< .001**
Duration	-.046	.505	**.**188	**.006**	**.225**	**<.001**
Smartphone Activity	.215	**.002**	.230	**.001**	.200	**.003**

** Correlation is significant at the 0.01 level.

Table 11: Correlation between NPRS (Smartphone), WHODAS 2.0 (Total Score), NPDS (Total Score) with Neck pain severity, Posture, Duration and Smartphone activity.

Results and findings: The Spearman Rank Correlation analysis indicates multiple significant associations among the examined variables. NPRS (Smartphone) scores exhibit significant and moderate positive correlations with neck pain severity ($r = .351$, $p < .001$), posture ($r = .220$, $p = .001$), and smartphone activity ($r = .215$, $p = .002$), suggesting that elevated smartphone-related pain correlates with greater pain severity, suboptimal posture, and specific smartphone usage behaviors. Nonetheless, relationships with pain duration are minimal and statistically insignificant ($r = –.046$, $p = .505$). The WHODAS total score, indicative of overall disability, exhibits strong positive relationships with the duration of smartphone use ($r = .188$, $p = .006$), posture ($r = .225$, $p = .001$), and smartphone activity ($r = .230$, $p = .001$). This suggests that extended smartphone-related discomfort, inadequate posture, and particular smartphone activities substantially enhance reported impairment. The correlation with neck discomfort severity is non-significant at the stringent 0.01 level ($r = .128$, $p = .061$). The NPDS total score, which assesses neck-related disability, demonstrates substantial positive relationships with the duration of smartphone use ($r = .225$, $p < .001$), posture ($r = .240$, $p < .001$), and smartphone activity ($r = .200$, $p = .003$). The findings indicate that persons with prolonged discomfort, suboptimal postures, and specific smartphone usage exhibit increased neck-related impairment.

Chapter-V:	Discussion

This cross-sectional study revealed a significantly elevated prevalence of neck pain among student smartphone users at BHPI, indicative of a growing global health concern. Despite our exact prevalence exceeding conventional thresholds, it corresponds with documented rates in both general and student demographics. Extensive epidemiological research reveals that the annual incidence of neck discomfort ranges from under 1% to almost 87%, with a mean annual rate of around 26% (Global Burden of Disease Collaborators, 2019). Women and inhabitants of rich or metropolitan areas consistently have a greater incidence, and our predominantly urban, university-aged cohort reflects this pattern. Comparisons with different student cohorts underscore the importance of our findings. Oksanen et al. (2014) reported that 29% of university students in Finland experienced neck pain, whereas Smith and Leggat (2004) found a prevalence of 34.6% among Australian undergraduates. In the United States, Jenkins et al. (2004) documented a notable 54% prevalence among college students—figures that are comparable to or above those of our Bangladeshi cohort. In Brazil, Thailand, Saudi Arabia, and South Korea, the prevalence of neck pain among students varies between 50% and 55%, aligning with the highest limits of our documented incidence. A previous study at our university involving BHPI physiotherapy students revealed a lifetime prevalence of neck discomfort at 76.8%, disproportionately affecting females. The international similarities suggest that neck pain in young adults is a prevalent issue, directly linked to the ubiquity of smartphones and comparable academic stressors. Our research, in addition to students, corresponds with broader musculoskeletal patterns. The Global Burden of Disease studies estimate an age-standardized prevalence of neck discomfort in the general population at 3–4%, with a point prevalence of roughly 4.9% at any one time. Occupational groups, such as office workers, demonstrate one-year neck discomfort prevalence rates of 45–55%, comparable to those of students linked to prolonged device usage and static postures. Hoving et al. (2004) observed that many instances of neck pain commence in late adolescence or early adulthood and persist into professional life, with studies on technical trainees revealing that symptoms often last throughout their careers.

Thus, our increased student prevalence likely indicates the preliminary phase of a life-course continuum of cervical disorders. Our investigation uncovered some statistically significant correlations. Initially, female students exhibited a higher prevalence and greater severity of neck pain than their male counterparts ($p < 0.05$). This corresponds with international research showing that women have a greater incidence of musculoskeletal pain and diminished pressure pain thresholds (Smith et al., 2003). Psychosocial factors, such as stress perception and coping strategies, may intensify this disparity. Some research suggests that female students dedicate more uninterrupted time to smartphone usage, perhaps exacerbating neck pain, while the data is inconsistent. Our findings highlight the need for gender-sensitive preventive measures, specifically ergonomic training and postural awareness programs tailored to the device usage habits of female students. The body mass index (BMI) shown a significant association with neck pain ($p < 0.05$). Students categorized as overweight and obese demonstrated more pronounced symptoms than their normal-weight peers. Excess body weight imposes extra mechanical stress on spinal structures and may impair postural control, leading to cervical muscle fatigue during device use. Weleslassie et al. (2020) established a similar correlation among medical students, indicating that a higher BMI is associated with increased neck pain. Moreover, sedentary habits common in overweight individuals may aggravate the decline of postural muscles. Although BMI is not readily modified, recognizing high-BMI students as a susceptible demographic facilitates targeted counseling on posture, exercise, and weight management—approaches that may mitigate neck discomfort over time. An exceptionally unique finding was the impact of cushion use during sleep. Students using two pillows experienced neck pain significantly more often than those using one ($\chi^2 = 15.725$, $p = 0.001$). No participant employed more than two pillows, hence enabling the comparison. Excessive elevation of the head may cause flexion or extension of the cervical spine, leading to persistent strain during the night. While actual studies on pillow quantity among student demographics are scarce, ergonomic guidelines consistently advise against too thick bedding. Jing et al. (2025) emphasized that improper sleep posture causes neck pain, and our results provide significant corroboration within a student demographic. Advocating for the use of a singular, appropriately supporting cushion may function as a simple, economical solution to mitigate nocturnal neck strain. Many anticipated risk factors, however, did not achieve statistical significance. Self-reported smartphone posture—holding the device at chest level versus eye level, and sitting erect versus reclining—showed no conclusive relationship with neck pain. Given that nearly all students adopt flexed-neck positions when using their phones, negligible variation may have obscured any authentic effect. Gustafsson et al. (2017) demonstrated biomechanical stress caused by neck flexion; nonetheless, our homogeneous sample may exhibit insufficient variability. The length of daily smartphone usage was not significantly correlated with neck pain, either due to continuously high usage among campus students or discrepancies in self-reported hours. Kim and Kim (2013) documented null findings in a Korean sample, suggesting that in the context of common screen usage, other variables—such as the frequency of micro-breaks and alterations in posture—may hold greater significance. The frequency of physical exercise did not exhibit a protective effect. Although some data indicates that physical exercise mitigates musculoskeletal problems, our cross-sectional analysis did not reveal a decrease in neck pain among active students. This may suggest insufficient intensity or specificity of exercise—such as leisurely walking versus targeted postural strengthening—or reverse causality, wherein students suffering from pain avoid physical activity. Moreover, prolonged study sessions with incorrect posture may undermine the benefits of exercise. Future research should assess exercise type, duration, and muscle-specific training to clarify its effects on neck health. The academic year showed no significant relationship with the occurrence or intensity of neck pain. Contrary to expectations that cumulative exposure would intensify symptoms in senior students, first-year students experienced neck pain with the same frequency as final-year students. This suggests that habitual smartphone use and its associated strain begin before university admission, hence equalizing risk across groups. It also indicates that senior pupils may develop ergonomic coping strategies or knowledge that reduce exposure. Nevertheless, preventive interventions ought to target all undergraduates from their first days on campus.

Limitations of the Study

This study has some deficiencies that require recognition. Data collection was initially confined to undergraduate students from the Bangladesh Health Professions Institute (BHPI). Thus, the sample may not precisely represent the wider undergraduate population in Bangladesh. Various colleges may display individuals with differing academic pressures, everyday schedules, and smartphone using behaviors. Therefore, the findings cannot be generalized to the entire student population. Due to time constraints, continuing sessions, and examinations, it was unfeasible to collect data from many institutions. Secondly, the sample size was rather small compared to the total population of undergraduate smartphone users in the country. A larger sample size from diverse academic institutions would have improved the statistical power of the study and strengthened the reliability and generalizability of the results. This research employed only three assessment scales. The utilization of additional validated instruments, albeit relevant to the study's aims, would have produced a more thorough and nuanced understanding of the impact and severity of neck pain associated with smartphone use. Only the Chi-square test and Spearman's rank correlation were utilized to evaluate relationships in data analysis. While appropriate for non-parametric data, more advanced statistical methods such as regression analysis could have yielded greater insights into the anticipated variables linked to neck pain. The integration of regression models could have enabled the identification of potential risk factors and the extent of their correlation with neck pain intensity. Despite these limitations, the study provides valuable insights into the neck pain experienced by student smartphone users and may serve as a foundation for future comprehensive research.

Chapter-VII:	Conclusion

The study revealed an elevated risk of neck pain among BHPI undergraduates using smartphones: almost all participants reported discomfort, with most experiencing moderate to severe intensity during device usage. Functional assessments indicated mild-to-moderate disability in the majority of patients, but a substantial cohort faced moderate-to-high disruption in daily activities. Notable factors linked to heightened pain intensity included female gender and greater BMI, but age and academic year had no significant effect. Among lifestyle characteristics, only sleep ergonomics, shown by pillow usage, exhibited a significant association. A considerable number of students demonstrated a propensity to hold smartphones beneath eye level, a posture known to increase neck strain. Treatment options, particularly physiotherapy, and perceived results were associated with reported pain and levels of disability. Correlation patterns demonstrated that chronicity and personal traits greatly affect functional impact more than isolated transitory behaviors. The extensive prevalence, potentially affected by survey methodologies and self-reported information, suggests a potential public health concern in this context. The cross-sectional technique limits causal inferences; however, robust associations align with substantial data linking prolonged device usage, posture, and sleep ergonomics to neck pain. The very high prevalence in this study suggests that contextual factors—such as educational settings, cultural norms, or school facilities—require attention. The findings underscore the imperative for targeted interventions. Ergonomic education should prioritize the preservation of eye-level device placement, the incorporation of frequent breaks, and the encouragement of neck-strengthening and mobility activities. Recommendations for sleep support, especially with regard to the selection of appropriate pillows to ensure cervical alignment, should be included in student health guidelines. Campus health services ought to implement routine screenings for cervical discomfort, offer readily available physiotherapy consultations, and organize collective activity programs. Institutional measures may include evaluating study spaces for ergonomic appropriateness, launching awareness campaigns about healthy device usage, and integrating digital ergonomics into orientation programs or curricula. Clinicians advising students should consider gender and BMI profiles when tailoring recommendations. Additional study is required due to limitations in sample representativeness, self-reporting, and cross-sectional design. Longitudinal studies investigating pain trajectories in relation to objective smartphone usage metrics (e.g., screen time data, wearable posture sensors) across multiple institutions can clarify temporal relationships and improve generalizability. Intervention trials assessing ergonomic training programs or reminder-based applications are crucial for identifying successful preventive strategies. Integrating psychological elements such as stress and thorough evaluations of sleep quality would improve understanding of various affects. Collaborative, multicenter efforts and digital data collection methods can alleviate constraints associated with sample size and resources. Future investigations should employ longitudinal, multicenter approaches with objective evaluations of device usage and posture, integrate psychosocial factors, and examine ergonomic and behavioral interventions to establish causality and identify effective preventive techniques. Institutions should establish ergonomic training for gadget utilization and sleep assistance, guarantee routine screenings and accessible physiotherapy services, assess study environments for ergonomic characteristics, and execute awareness campaigns on healthy smartphone usage. Integrating these measures into student health initiatives can mitigate neck pain and illustrate scalable approaches for musculoskeletal well-being in technology-driven settings.

Recommendations

To improve the rigor and quality of future research on neck discomfort among student smartphone users, many critical measures are recommended. The sample size must be increased to enhance statistical accuracy and result reliability. Data must be collected from many universities throughout different regions of Bangladesh to offer a more precise representation of the national student demographic. Furthermore, utilizing more comprehensive assessment tools—such as those measuring posture, screen time, stress levels, and ergonomic practices—can aid in recognizing a wider range of pertinent aspects. Researchers are encouraged to utilize advanced statistical methods, such as regression analysis, to identify predictive correlations and improve understanding of the impact of smartphone usage on neck discomfort. Integrating long-term follow-up or longitudinal studies may provide insights into the progression or persistence of neck discomfort. These improvements will enable the production of more thorough, generalizable, and publishable research outcomes.

Future cross-sectional studies should be conducted to determine the exact number of minutes of smartphone use in a correct posture that does not result in neck pain.

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অনুমতি ফর্ম

(অনুগ্রহ করে অংশগ্রহণকারীদের উদ্দেশ্যে পড়ে শোনান)

শুভেচ্ছা!

আমি নিশাত তাসনিম কৃপা, বাংলাদেশ হেলথ প্রফেশনালস ইনস্টিটিউট (BHPI) এর ফিজিওথেরাপি প্রোগ্রামের ৪র্থ বর্ষের ছাত্রী। আমার গবেষণার শিরোনাম:

"অ্যানডারগ্র্যাজুয়েট শিক্ষার্থীদের স্মার্টফোন ব্যবহারকারীদের মধ্যে গলার যন্ত্রণা'র প্রাদুর্ভাব: একটি সার্বক্ষণিক (ক্রস সেকশনাল) গবেষণা" ।

আমি গলার যন্ত্রণা সম্পর্কিত কিছু ব্যক্তিগত ও অন্যান্য তথ্য জানতে চাই। এর জন্য আনুমানিক ২০ মিনিট সময় লাগবে। এটি একটি একাডেমিক গবেষণা এবং কোনো অন্য উদ্দেশ্যে ব্যবহার করা হবে না। গবেষণায় অংশগ্রহণ আপনার একাডেমিক বা ভবিষ্যৎ জীবনে কোনো প্রভাব ফেলবে না। গবেষক সমস্ত প্রক্রিয়া ও তথ্য গোপনীয়ভাবে সংরক্ষণ করবেন। আপনার অনুমতি ছাড়া কোনো তথ্য ব্যবহার করা হবে না। গবেষণায় অংশগ্রহণ সম্পূর্ণ স্বেচ্ছাসেবী, এবং যে কোনো সময় আপনি ইচ্ছা করলে অংশগ্রহণ বন্ধ করতে পারেন।

গবেষণা বা আপনার অধিকার সম্পর্কে কোনো প্রশ্ন থাকলে, আমার অথবা আমার সুপারভাইজার ফারজানা শারমিনের সাথে (লেকচারার, বিএইচপিআই; কনসালট্যান্ট ও ওপিডি ইন-চার্জ, ফিজিওথেরাপি বিভাগ, সিআরপি - সাভার, ঢাকা-১৩৪৩) যোগাযোগ করুন।

এখন, সাক্ষাৎকার/ডেটা সংগ্রহ শুরু করার জন্য আপনার সম্মতি চাই।

আপনি কি এগিয়ে যাওয়ার জন্য সম্মত?

হ্যাঁ ☐ / না ☐

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অংশগ্রহণকারীর স্বাক্ষর ও তারিখ সাক্ষাৎকার গ্রহণকারীর স্বাক্ষর ও তারিখ

<u>গবেষণা প্রশ্নমালা</u>

শিরোনাম: অ্যানডারগ্রাজুয়েট স্মার্টফোন ব্যবহারকারীদের মধ্যে গলার যন্ত্রণার প্রাদুর্ভাব.

অংশ–১: অংশগ্রহণকারীর পরিচিতি

নম্বর	প্রশ্ন	উত্তর
১.১	শিক্ষার্থীর নাম	
১.২	শিক্ষার্থী আইডি	
১.৩	প্রতিষ্ঠান	
১.৪	ঠিকানা	
১.৫	যোগাযোগের নম্বর	
১.৬	সাক্ষাৎকারের তারিখ	

অংশ-২: সমাজ–জনসংখ্যাগত তথ্য

নম্বর	প্রশ্ন	উত্তর
২.১	বয়স	
২.২	লিঙ্গ	
২.৩	একাডেমিক বর্ষ	
২.৪	বিভাগ	
২.৫	সেশন	

অংশ-৩: দেহ পরিমাপ সম্পর্কিত তথ্য

নম্বর	প্রশ্ন	উত্তর
৩.১	ওজন	
৩.২	উচ্চতা	
৩.৩	BMI (দেহের ভর সূচক)	

অংশ-৪: জীবনযাপন সম্পর্কিত তথ্য

নম্বর	প্রশ্ন	উত্তর
৪.১	আপনি এক রাতে কতক্ষণ ঘুমান?	☐ ৬ ঘন্টার কম ☐ ৬-৮ ঘন্টা ☐ ৮-১০ ঘন্টা ☐ ১০+ ঘন্টা
৪.২	আপনার কি মনে হয় স্মার্টফোন ব্যবহার আপনার ঘুমের প্যাটার্নে প্রভাব ফেলেছে?	☐ হ্যাঁ ☐ না
৪.৩	শুয়ে থাকার সময় কি কোনো গলার ব্যথা অনুভব করেন?	☐ হ্যাঁ ☐ না
৪.৪	ঘুমানোর সময় কতটি বালিশ ব্যবহার করেন?	☐ ১ ☐ ২ ☐ ২+

৪.৫	কোন ধরনের বিছানায় ঘুমান?	☐ কঠিন ☐ নরম ☐ ঢিলে
৪.৬	আপনি দৈনিক কত জল পান করেন?	☐ ২ লিটারের কম ☐ ২–৩ লিটার ☐ ৩+ লিটার
৪.৭	আপনার কি ভারি ব্যাগ বহন করেন?	☐ হ্যাঁ ☐ না
৪.৮	আপনি কি শারীরিক ব্যায়াম করেন?	☐ হ্যাঁ ☐ না
৪.৯	যদি হ্যাঁ (৪.৮), সপ্তাহে আপনি কত ঘন্টা ব্যায়াম করেন?	☐ ১–৩ ঘন্টা ☐ ৪–১০ ঘন্টা ☐ ১০+ ঘন্টা

অংশ-৫: সহ-রুগ্ন (Co-morbid) অবস্থার তথ্য

নম্বর	প্রশ্ন	উত্তর
৫.১	দীর্ঘ সময় স্মার্টফোন ব্যবহার করার সময় বা ব্যবহার শেষে গলায় কি কোনো ব্যথা অনুভব করেন?	☐ হ্যাঁ ☐ না
৫.২	কত দিন ধরে আপনি এই ব্যথা অনুভব করছেন?	☐ ৭–১৪ দিন ☐ ১৪–৩০ দিন ☐ ৩০+ দিন
৫.৩	গলার কোন পাশ(গুলো)তে ব্যথা অনুভব করেন?	☐ ডান পাশ ☐ বাম পাশ ☐ মাঝখানে ☐ ডান ও বাম ☐ সব জায়গায়
৫.৪	আপনার গলার ব্যথার তীব্রতা কী ধরনের?	☐ হালকা ☐ মাঝারী ☐ তীব্র
৫.৫	ব্যথার ধরন কী?	☐ খণ্ডিত ☐ স্থায়ী
৫.৬	গলার কোন ধরনের নড়াচড়া করলে ব্যথা বাড়ে?	☐ গলা সামনে ঝুঁকালে ☐ গলা পেছনে ঝুঁকালে ☐ গলা ডানদিকে ঘুরালে ☐ গলা বাঁদিকে ঘুরালে

৫.৭	স্মার্টফোন ব্যবহার করার সময়ে কোন ভঙ্গি (posture) বজায় রাখেন?	☐ সোজা ভঙ্গি ☐ বাগড়ানো ভঙ্গি
৫.৮	স্মার্টফোন ব্যবহার করার সময়ে কী অবস্থান (position) নেন?	☐ বসে ☐ শুয়ে ☐ অন্যান্য
৫.৯	ফোন ব্যবহার করার সময় কি আপনি সেটি চোখের সমতলে ধরে রাখেন?	☐ হ্যাঁ ☐ না
৫.১০	আপনার সবচেয়ে সাধারণ স্মার্টফোন কার্যক্রম কী?	☐ অধ্যয়ন ☐ সামাজিক যোগাযোগ ☐ গেম খেলা ☐ মেসেজিং
৫.১১	আপনি দৈনিক কতক্ষণ স্মার্টফোন ব্যবহার করেন?	☐ ০–২ ঘণ্টা ☐ ৩–৫ ঘণ্টা ☐ ৬–৮ ঘণ্টা ☐ ৯+ ঘণ্টা
৫.১২	আপনার ব্যথা কি অন্য কোনো স্থানে (উদাহরণ: কাঁধ, বাহু) ছড়ায়?	☐ হ্যাঁ ☐ না
৫.১৩	যদি হ্যাঁ, তাহলে কোন জায়গায় ছড়ায়?	☐ কাঁধ ও বাহু ☐ পাঁজর (scapula) অঞ্চলে ☐ উভয় জায়গায়

৫.১৪	অতিরিক্ত স্মার্টফোন ব্যবহারের কারণে কি আপনার মাথা ব্যথা করে?	☐ হ্যাঁ ☐ না
৫.১৫	আপনার কি পূর্বে কোনো গলার আঘাত আছে?	☐ হ্যাঁ ☐ না
৫.১৬	যদি হ্যাঁ, তাহলে আঘাতের ধরন কী?	☐ দুর্ঘটনাজনিত ☐ রোগজনিত
৫.১৭	আপনি কী ধরনের চিকিৎসা নিয়েছেন?	☐ ওষুধ ☐ ফিজিওথেরাপি ☐ অন্যান্য ☐ কোনও চিকিৎসা নেই
৫.১৮	চিকিৎসা নেয়ার পর ফল কী হয়েছে?	☐ উন্নতি ☐ সুস্থ ☐ অপরিবর্তিত
৫.১৯	আপনি কি মনে করেন আপনার গলার ব্যথা স্মার্টফোন ব্যবহারের সাথে সম্পর্কিত?	☐ হ্যাঁ ☐ না

অংশ-৬: নিউমেরিক পেইন রেটিং স্কেল

স্মার্টফোন কার্যকলাপের সময় নিউমেরিক পেইন রেটিং স্কেলে আপনার ব্যথা কতটা তীব্র?

(এখানে ০ মানে কোনো ব্যথা নেই, ১-৩ মানে হালকা ব্যথা, ৪-৬ মানে মাঝারি ব্যথা, ৭-১০ মানে তীব্র ব্যথা)

অংশ-৭: WHODAS 2.0 স্কেল

এই প্রশ্নমালা স্বাস্থ্যগত শর্তের কারণে সৃষ্ট অসুবিধা সম্পর্কে জিজ্ঞাসা করে। স্বাস্থ্যগত শর্তের মধ্যে অন্তর্ভুক্ত—ব্যাধি বা অসুস্থতা, স্বল্পমেয়াদী বা দীর্ঘমেয়াদী অন্যান্য স্বাস্থ্যজনিত সমস্যা, আঘাত, মানসিক বা আবেগগত সমস্যা, এবং মাদক বা অ্যালকোহলের কারণে সৃষ্ট সমস্যা।

গত ৩০ দিনের অভিজ্ঞতা স্মরণ করুন এবং নিচের কার্যক্রমগুলো সম্পাদনে আপনি কতটুকু অসুবিধার সম্মুখীন হয়েছেন তা বিবেচনা করে উত্তর দিন। প্রতিটি প্রশ্নের জন্য অনুগ্রহ করে শুধুমাত্র একটি উত্তর বৃত্তাকার (circle) করুন।

গত ৩০ দিনে, নিম্নলিখিত কাজগুলোতে আপনাকে কতটুকু অসুবিধার সম্মুখীন হতে হয়েছে:					
৭.১	এমন-কি ৩০ মিনিটের মতো দীর্ঘ সময় দাঁড়িয়ে থাকা?	কোনটিই নয়	হালকা	তীব্র	চরম বা করতে অক্ষম
৭.২	আপনার গৃহস্থালীর দায়িত্বসমূহ পালন করা?	কোনটিই নয়	হালকা	তীব্র	চরম বা করতে অক্ষম
৭.৩	একটি নতুন কাজ শেখা, উদাহরণস্বরূপ কোনো নতুন জায়গায় কিভাবে যাওয়া যায় তা শেখা?	কোনটিই নয়	হালকা	তীব্র	চরম বা করতে অক্ষম
৭.৪	সমন্বিতভাবে সাধারণ যে কোনো অনুষ্ঠানে (উৎসব, ধর্মীয় বা অন্যান্য) যোগ দিতে কোনো সমস্যা অনুভব করা?	কোনটিই নয়	হালকা	তীব্র	চরম বা করতে অক্ষম
৭..৫	আপনার স্বাস্থ্যসংক্রান্ত সমস্যাগুলি কী পরিমাণে মানসিকভাবে প্রভাব ফেলেছে?	কোনটিই নয়	হালকা	তীব্র	চরম বা করতে অক্ষম
৭.৬	দশ মিনিট কোনো কাজের উপর মনোযোগ বজায় রাখা?	কোনটিই নয়	হালকা	তীব্র	চরম বা করতে অক্ষম

৭.৭	এক কিলোমিটার [বা সমমান] দূরত্ব হাঁটা?	কোনটিই নয়	হালকা	তীব্র	চরম বা করতে অক্ষম
৭.৮	পুরো শরীরে গোসল করা?	কোনটিই নয়	হালকা	তীব্র	চরম বা করতে অক্ষম
৭.৯	নিজেকে পরিধান করা (কাপড় পরে নেওয়া)?	কোনটিই নয়	হালকা	তীব্র	চরম বা করতে অক্ষম
৭.১০	যে লোকদের আপনি চিনেন না, তাদের সাথে যোগাযোগ করা?	কোনটিই নয়	হালকা	তীব্র	চরম বা করতে অক্ষম
৭.১১	কোনো বন্ধুত্ব রক্ষা/চালিয়ে রাখা?	কোনটিই নয়	হালকা	তীব্র	চরম বা করতে অক্ষম
৭.১২	আপনার দৈনন্দিন কাজকর্ম (পরীক্ষা, পড়াশোনা, চাকরি ইত্যাদি)?	কোনটিই নয়	হালকা	তীব্র	চরম বা করতে অক্ষম

অংশ-৮: গলা ব্যথা ও অক্ষমতা স্কেল (Neck Pain and Disability Scale)

১. আজ আপনার ব্যথার তীব্রতা কত?

০ |_________|_________|_________|_________|_________| ৫ ___________

(০ = কোনো ব্যথা নেই, ৫ = সর্বোচ্চ তীব্র ব্যথা)

২. গড়ে আপনার ব্যথার তীব্রতা কত?

০ |_________|_________|_________|_________|_________| ৫ ___________

(০ = কোনো ব্যথা নেই, ৫ = সর্বোচ্চ তীব্র ব্যথা)

৩. সবচেয়ে তীব্র অবস্থায় আপনার ব্যথার তীব্রতা কত?

০ |________|________|________|________|________| ৫   __________

(০ = কোনো ব্যথা নেই, ৫ = সহ্য করতে না পারার মতো ব্যথা)

৪. আপনার ব্যথা কি ঘুমে ব্যাঘাত ঘটায়?

০ |________|________|________|________|________| ৫   __________

(০ = একেবারেই নয়, ৫ = ঘুমানোই অসম্ভব)

৫. দাঁড়িয়ে থাকলে ব্যথার তীব্রতা কত?

০ |________|________|________|________|________| ৫   __________

(০ = কোনো ব্যথা নেই, ৫ = সর্বোচ্চ তীব্র ব্যথা)

৬. হাঁটার সময় ব্যথার তীব্রতা কত?

০ |________|________|________|________|________| ৫   __________

(০ = কোনো ব্যথা নেই, ৫ = সর্বোচ্চ তীব্র ব্যথা)

৭. গাড়ি চালানো বা যাত্রাপথে বসে থাকার সময় ব্যথা কি বাধা সৃষ্টি করে?

০ |________|________|________|________|________| ৫   __________

(০ = একেবারেই নয়, ৫ = মোটেই চালাতে/বসতে পারি না)

৮. সামাজিক কার্যক্রমে অংশগ্রহণে ব্যথা কি বাধা দেয়?

০ |________|________|________|________|________| ৫   __________

(০ = একেবারেই নয়, ৫ = একেবারেই অংশগ্রহণ করতে পারি না)

৯. বিনোদনমূলক কার্যক্রমে ব্যথা কি বাধা দেয়?

০ |________|________|________|________|________| ৫   __________

(০ = একেবারেই নয়, ৫ = একেবারেই অংশ নিতে পারি না)

১০. কাজকর্মে ব্যথা কি বাধা দেয়?

০ |________|________|________|________|________| ৫   __________

(০ = একেবারেই নয়, ৫ = একেবারেই কাজ করতে পারি না)

১১. ব্যক্তিগত পরিচর্যায় (খাওয়া, কাপড় পরা, গোসল ইত্যাদি) ব্যথা কি বাধা দেয়?

০ |________|________|________|________|________| ৫   __________

(০ = একেবারেই নয়, ৫ = একেবারেই করতে পারি না)

১২. পারিবারিক ও ব্যক্তিগত সম্পর্ক (পরিবার, বন্ধু, যৌনসম্পর্ক ইত্যাদি) এ ব্যথা কি প্রভাব ফেলে?

০ |________|________|________|________|________| ৫   __________

(০ = একেবারেই নয়, ৫ = সম্পূর্ণ বাধাপ্রাপ্ত)

১৩. ব্যথা আপনার জীবন ও ভবিষ্যৎ ধারণাকে কতটুকু পরিবর্তন করেছে (অবসাদ, বিষণ্ণতা, হতাশা)?

০ |________|________|________|________|________| ৫   __________

(০ = কোনো পরিবর্তন নয়, ৫ = সম্পূর্ণ পরিবর্তিত)

১৪. ব্যথা কি আপনার আবেগকে প্রভাবিত করে?

০ |________|________|________|________|________| ৫ __________

(০ = একেবারেই নয়, ৫ = সম্পূর্ণরূপে)

১৫. ব্যথা কি আপনার চিন্তা বা মনোযোগের ক্ষমতায় প্রভাব ফেলে?

০ |________|________|________|________|________| ৫ __________

(০ = একেবারেই নয়, ৫ = সম্পূর্ণরূপে)

১৬. আপনার গলা কতটা দৃঢ় বা শক্ত?

০ |________|________|________|________|________| ৫ __________

(০ = একেবারেই দৃঢ় নয়, ৫ = ঘোরানোর মতো না)

১৭. গলা ঘোরাতে কতটা অসুবিধা?

০ |________|________|________|________|________| ৫ __________

(০ = কোনো অসুবিধা নেই, ৫ = একেবারেই ঘোরাতে পারি না)

১৮. উপরে ও নিচে তাকাতে কতটা অসুবিধা?

০ |________|________|________|________|________| ৫ __________

(০ = কোনো অসুবিধা নেই, ৫ = একেবারেই তাকাতে পারি না)

১৯. উপর দিয়ে কিছু কাজ করতে কতটা অসুবিধা (যেমন তাকিয়ে কাজ করা)?

০ |________|________|________|________|________| ৫ __________

(০ = কোনো অসুবিধা নেই, ৫ = একেবারেই পারি না)

২০. ব্যথানাশক ওষুধ গুলো কতটা কার্যকর?

০ |________|________|________|________|________| ৫ __________

(০ = সম্পূর্ণ আরাম, ৫ = কোনো ফলাফল নেই)

মোট স্কোর: __________

Consent Form

(Please read out to the participants)

Greeting!

I am Nishat Tasnim Kripa. I am a fourth-year student in the Bachelor of Science in Physiotherapy program at Bangladesh Health Professions Institute (BHPI). I am conducting a study on undergraduate students titled "Prevalence of Neck Pain in Smartphone Users Among Undergraduates: A Cross-Sectional Study." I seek knowledge pertaining to personal and related aspects of neck pain. This will require roughly 20 minutes. This is an academic research study and will not serve any other purpose. Your involvement in the research will not affect your current or future academic pursuits. The researcher will uphold the secrecy of all procedures. Your data shall not be utilized without your consent. Your involvement in this study is voluntary, and you may withdraw at any point during its duration.

If you have any inquiries regarding the study or your rights as a participant, please feel free to contact me or my supervisor. Farjana Sharmin, Lecturer at BHPI, Consultant, and Outpatient Department Supervisor, Department of Physiotherapy, CRP-Savar, Dhaka-1343.

May I have your consent to proceed with the interview or work?

Yes ☐ / No ☐

……………………………...….   ………………………………..

Participant's Signature & Date   Interviewer's Signature & Date

Research questionnaire

Title: Prevalence of neck pain in smartphone users of the undergraduates.

Part -1: Participant's Identification

QN	Question	Response
1.1	Student’s name	
1.2	Student’s ID	
1.3	Institution	
1.4	Address	
1.5	Contact no	
1.6	Date of interview	

Part -2: Sociodemographic information

QN	Question	Response
2.1	Age	
2.2	Sex	
2.3	Academic year	
2.4	Department	
2.5	Session	

Part -3: Anthropometric information

QN	Question	Response
3.1	Weight	

3.2	Height	
3.3	BMI	

Part -4: Lifestyle data

QN	Question	Response
4.1	How much time do you sleep?	☐ Less than 6 hours ☐ 6-8 hours ☐ 8-10 hours ☐ 10+ hours
4.2	Do you feel your smartphone activity has affected your sleep pattern?	☐ Yes ☐ No
4.3	Do you feel any neck pain during lying?	☐ Yes ☐ No
4.4	How many pillows do you use during sleeping?	☐ 1 ☐ 2 ☐ 2+
4.5	In which surface do you sleep?	☐ Firm ☐ Soft ☐ Sag
4.6	How much water do you take daily?	☐ Less than 2 liters ☐ 2- 3 liters ☐ 3+ liters
4.7	Do you carry heavy bag?	☐ Yes

		☐ No
4.8	Do you perform physical exercise?	☐ Yes ☐ No
4.9	If yes (4.8), How many hours in a week perform physical exercise?	☐ 1-3 ☐ 4-10 ☐ 10+

Part -5: Co-morbid conditions data

QN	Question	Response
5.1	Do you feel any pain in your neck during or after long time usage of smartphone?	☐ Yes ☐ No
5.2	How many days have you been experiencing pain?	☐ 7-14 ☐ 14-30 ☐ 30+
5.3	On which side of your neck do you experience pain?	☐ Right ☐ Left ☐ Middle ☐ Right + Left ☐ All
5.4	What is the severity of your neck pain?	☐ Mild ☐ Moderate ☐ Severe
5.5	What is the type of your pain?	☐ Intermittent ☐ Constant
5.6	Which direction of movement exaggerated your pain?	☐ Neck forward bending ☐ Neck backward bending ☐ Neck turning to right ☐ Neck turning to left
5.7	Which posture do you maintain during smartphone use?	☐ Erect ☐ Slouch

5.8	Which position do you maintain during smartphone use?	☐ Sitting ☐ Lying ☐ Other
5.9	Do you hold your smartphone at eye level when using it?	☐ Yes ☐ No
5.10	What is your most common smartphone activity?	☐ Studying ☐ Social media ☐ Gaming ☐ Messaging
5.11	How much time do you use smartphone daily?	☐ 0-2 Hours ☐ 3-5 Hours ☐ 6-8 Hours ☐ 9+ Hours
5.12	Referred pain?	☐ Yes ☐ No
5.13	If yes (5.9), Where it radiates?	☐ Shoulder & arm ☐ Scapula region ☐ Both
5.14	Do you have any headache for excessive smartphone activity?	☐ Yes ☐ No
5.15	Do you have any neck injury?	☐ Yes ☐ No

5.16	If yes (5.12), What type of injury?	☐ Accidental ☐ Pathological
5.17	What type of treatment did you take?	☐ Medication ☐ Physiotherapy ☐ Others ☐ None
5.18	If you have taken treatment, what was the result?	☐ Improved ☐ Recovered ☐ Unchanged
5.19	Do you believe your pain is associated with smartphone activity?	☐ Yes ☐ No

Part -6: Numeric Pain Rating Scale

How severe is your pain in Numeric Pain Rating Scale with smartphone activity?

(Here 0 means no pain, 1-3 means mild pain, 4-6 means moderate pain & 7-10 means severe pain)

Part -7: WHODAS 2.0 Scale

This questionnaire asks about difficulties due to health conditions. Health conditions include diseases or illnesses, other health problems that may be short or long lasting, injuries, mental or emotional problems, and problems with alcohol or drugs.

Think back over the past 30 days and answer these questions, thinking about how much difficulty you had doing the following activities. For each question, please circle only one response.

In the past 30 days, how much difficulty did you have in:					
7.1	Standing for long periods such as 30 minutes?	None	Mild	Severe	Extreme or cannot do
7.2	Taking care of your household responsibilities?	None	Mild	Severe	Extreme or cannot do
7.3	Learning a new task, for example, learning how to get to a new place?	None	Mild	Severe	Extreme or cannot do
7.4	How much of a problem did you have joining in community activities (for example, festivities, religious or other activities) in the same way as anyone else can?	None	Mild	Severe	Extreme or cannot do
7.5	How much have you been emotionally affected by your health problems?	None	Mild	Severe	Extreme or cannot do
7.6	Concentrating on doing something for ten minutes?	None	Mild	Severe	Extreme or cannot do

7.7	Walking a long distance such as a kilometre [or equivalent]?	None	Mild	Severe	Extreme or cannot do
7.8	Washing your whole body?	None	Mild	Severe	Extreme or cannot do
7.9	Getting dressed?	None	Mild	Severe	Extreme or cannot do
7.10	Dealing with people you do not know?	None	Mild	Severe	Extreme or cannot do
7.11	Maintaining a friendship?	None	Mild	Severe	Extreme or cannot do
7.12	Your day-to-day work?	None	Mild	Severe	Extreme or cannot do

Part -8: Neck Pain and Disability Scale

1. How bad is your pain today?

0 |__________|__________|__________|__________|__________| 5 __________

NO PAIN MOST SEVERE PAIN

2. How bad is your pain on average?

0 |__________|__________|__________|__________|__________| 5 __________

NO PAIN MOST SEVERE PAIN

3. How bad is your pain at its worst?

0 |__________|__________|__________|__________|__________| 5 __________

NO PAIN CANNOT TOLERATE

4. Does your pain interfere with your sleep?

0 |__________|__________|__________|__________|__________| 5 __________

NOT AT ALL CAN’T SLEEP

5. How bad is your pain with standing?

0 |__________|__________|__________|__________|__________| 5 __________

NO PAIN MOST SEVERE PAIN

6. How bad is your pain with walking?

0 |__________|__________|__________|__________|__________| 5 __________

NO PAIN MOST SEVERE PAIN

7. Does your pain interfere with driving or riding in a car?

0 |__________|__________|__________|__________|__________| 5 __________

NOT AT ALL CAN’T DRIVE OR RIDE

8. Does your pain interfere with social activities?

0 |_________|_________|_________|_________|_________| 5 _________

NOT AT ALL ALWAYS

9. Does your pain interfere with recreational activities?

0 |_________|_________|_________|_________|_________| 5 _________

NOT AT ALL ALWAYS

10. Does your pain interfere with work activities?

0 |_________|_________|_________|_________|_________| 5 _________

NOT AT ALL CAN'T WORK

11. Does your pain interfere with personal care (eating, dressing, bathing, etc.)?

0 |_________|_________|_________|_________|_________| 5 _________

NOT AT ALL ALWAYS

12. Does your pain interfere with personal relationships (family, friends, sex, etc.)?

0 |_________|_________|_________|_________|_________| 5 _________

NOT AT ALL ALWAYS

13. How has your pain changed your outlook on life and the future (depression, hopelessness)?

0 |_________|_________|_________|_________|_________| 5 _________

NO CHANGE COMPLETELY CHANGED

14. Does pain affect your emotions?

0 |_________|_________|_________|_________|_________| 5 _________

NOT AT ALL COMPLETELY

15. Does your pain affect your ability to think or concentrate?

0 |_________|_________|_________|_________|_________| 5 _________

NOT AT ALL COMPLETELY

16. How stiff is your neck?

0 |__________|__________|__________|__________|__________| 5 __________

NOT STIFF CAN'T MOVE NECK

17. How much trouble so you have turning your neck?

0 |__________|__________|__________|__________|__________| 5 __________

NO TROUBLE CAN'T MOVE NECK

18. How much trouble do you have looking up and down?

0 |__________|__________|__________|__________|__________| 5 __________

NO TROUBLE CAN'T LOOK UP OR DOWN

19. How much trouble do you have working overhead?

0 |__________|__________|__________|__________|__________| 5 __________

NO TROUBLE CAN'T WORK OVERHEAD

20. How much do pain pills help?

0 |__________|__________|__________|__________|__________| 5 __________

COMPLETE RELIEF NO RELIEF

Total Score __________

2nd February 2025

To

The Head of the Physiotherapy department

Bangladesh Health Professions Institute (BHPI)

Subject: Prayer for seeking permission to collect data for conducting research project.

Sir,

With due to respect and humble submission to state that I am Nishat Tasnim Kripa, a student of 4th year B.Sc. in physiotherapy at Bangladesh Health Professions Institute (BHPI). The Ethical committee has approved my research project entitled: "Prevalence of neck pain in smartphone users of the undergraduates: A cross-sectional study" under the supervision of Farjana Sharmin, Lecturer of BHPI, Consultant and OPD In-charge, Department of physiotherapy, CRP as thesis supervisor. So, I need permission for data collection from BHPI, CRP-Savar, Dhaka-1343. I would like to assure that anything of the study will not be harmful for the participants and the Department itself.

I, therefore, pray and hope that you would be kind enough to grant my application and give me permission for data collection and oblige thereby.

Yours faithfully,

Nishat Tasnim Kripa

Nishat Tasnim Kripa

4th Year B.Sc. in Physiotherapy

Class Roll: 13; Session: 2019-20

Bangladesh Health Professions Institute (BHPI)

(An academic Institution of CRP)

CRP-Chapain, Savar, Dhaka-1343.

Forwarded for your kind Approval.

Shazal Kumar Das, PhD

Professor and Head

Department of Physiotherapy

CRP, Savar, Dhaka-1343.

Farjana Sharmin

Consultant, Physiotherapy & OPD In-charge

Physiotherapy Department

CRP Savar Dhaka-1343

বাংলাদেশ হেলথ্ প্রফেশন্স ইনস্টিটিউট (বিএইচপিআই)

Bangladesh Health Professions Institute (BHPI)

(The Academic Institute of CRP)

BANGLADESH HEALTH PROFESSIONS INSTITUTE

Ref: CRP-BHPI/IRB/12/2024/1020 Date: 15/12/2024

To
Nishat Tasnim Kripa
4th Year B.Sc. in Physiotherapy
Session: 2019-2020, Student ID: 112190482
BHPI, CRP, Savar, Dhaka-1343, Bangladesh.

Subject: Approval of the thesis proposal "Prevalence of neck pain in smartphone users of the undergraduates: A cross-sectional study"

Dear Nishat Tasnim Kripa,
Congratulations.
The Institutional Review Board (IRB) of BHPI has reviewed and discussed your application to conduct the above-mentioned dissertation, with you, as the principal investigator and Farjana Sharmin, Lecturer of BHPI, Consultant and OPD In-charge, Department of physiotherapy, CRP as thesis supervisor. The following documents have been reviewed and approved:

Sl. No.	Name of the Documents
1	Research Proposal
2	Questionnaire (English version)
3	Information sheet & consent form.

The purpose of the study is to detect the correlation between neck pain and the smartphone usage. The study involves the use of Numeric Pain Rating Scale and Neck Disability Index (NDI) that may take 20 to 25 minutes to fill in the questionnaire with instruction for collection of specimens and there is no likelihood of any harm to the participants. The members of the Ethics Committee have approved the study to be conducted in the presented form at the meeting held at **9 AM on 15 July 2024 at BHPI (44th IRB Meeting).**

The institutional Ethics committee expects to be informed about the progress of the study, any changes occurring during the study, any revision in the protocol, and patient information or informed consent and ask to be provided a copy of the final report. This Ethics committee is working in accordance with the Nuremberg Code 1947, the World Medical Association Declaration of Helsinki, 1964 - 2013, and other applicable regulations.

Best regards,

Muhammad Millat Hossain,
Associate Professor & Course Coordinator, MRS
Member Secretary, Institutional Review Board (IRB)
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

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