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CORRELATION OF CERVICOGENIC HEADACHE AND NON-SPECIFIC NECK PAIN WITH SMART DEVICE USAGE PATTERN AMONG IT STUDENTS

Iqra Fatima[*1], Summia Zahid[2], Muhammad Zeshan Ahmad[3], Maryam Nasim[4], Ayesha Zarmeen[5], Khadija Zubair[6], Fiza[7]

[1,2,3,4,7]*Department of Physiotherapy, University of South Asia, Lahore, Pakistan*
[5]*Omar Hospital & Cardiac Centre, Lahore, Pakistan*
[6]*Department of Allied Health Sciences, Superior University Lahore, Pakistan*

Corresponding Author: *
Iqra Fatima
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ABSTRACT

Extensive usage of smart devices among IT students has sparked worries about its potential negative health impacts. This study aims to determine the correlation of cervicogenic headaches and non-specific neck pain with smart device usage pattern among IT students.

Methodology: *This was a cross-sectional study with a sample size of 354 participants. Non probability convenient sampling technique was used to collect the data. The inclusion criteria included IT/CS students aged 18-27, experiencing headaches for more than 5 days per month; spending more than 3 hours daily on smart devices. Exclusion criteria excluded participants with systemic illnesses, migraine, cervical trauma, and congenital disorders of the cervical spine.*

Results: *This study revealed that 45% students experienced neck pain and 42% experienced headaches 2-3 times monthly. 23% of participants scored 40 for neck pain intensity and cervicogenic headache on VAS. NDI scoring showed 38% with mild disability, 32% moderate, and 10% with severe disability. Significant correlation was found between VAS neck pain and headache intensity ($p = 0.01$, $R = 0.74$), smart device usage and NDI ($p = 0.01$), and device usage time with both CGH ($p = 0.01$) and the neck pain intensity ($p = 0.01$). The majority, 63%, used electronic devices for more than four hours daily.*

Conclusion: *It is concluded that, cervicogenic headaches and non-specific neck discomfort are significantly more common when smart devices are used for extended periods of time.*

Keywords: *Headache, cervicogenic, neck pain, cervicalgia, cervicodynia, neckache, visual analogue scale, neckache, cervical pain, pains.*

INTRODUCTION

Smart gadgets have become an essential need of day to day lives, serving an array of functions and catering to people of all ages and professions. While these gadgets have undoubtedly improved productivity, efficiency, and connectivity, there are concerns about their potentially detrimental impact on health, particularly concerning cervicogenic headaches and non-specific neck pain (1). In recent years, significant research areas have included office workstation design, body alignment and posture, and ergonomics. Regarding ergonomics and workstation design, various studies evaluate the musculoskeletal health of employees in the real-world software industry (2).

Cervicogenic headaches (CGHs), is is not a primary headache as it shares overlapping symptoms with migraines, making diagnosis

difficult. Since cervicogenic headaches can occur anywhere from a few hours to days and radiate from the back of the neck to the front of the head and the ipsilateral eye, they have been known to reduce people's quality of life and physical abilities (3).

Non-specific neck pain (NSNP) is caused by elements such as poor posture, overuse, or repetitive stress, it is another type of neck pain but without a specific cause (4). More than 70% of people on the planet will at some point in their lives have neck pain, of which 50–85% are predicted to recur within a year or five after the first onset. This makes neck discomfort a serious global issue causing a sharp rise in the cost of healthcare associated with spinal pain (5).

Previous studies have highlighted the negative impact of prolonged device use, such as bad neck posture and repetitive strain injuries including the notion that gender plays significant role in occurrence of CGH and NSNP, and explored the impact of smart devices on musculoskeletal health
(6). Young Adults who attend universities and lead sedentary lifestyles, as well as use computers and mobile phones, are at a significant danger of having pain in neck. (7). While some previous studies have suggested that due to differences in musculoskeletal anatomy and pain sensitivity, females may be more prone to certain musculoskeletal conditions (3, 8).

Over the years, it has been observed that a significant number of Information Technology students tend to spend extended periods using smart devices, leading to a sedentary lifestyle and poor ergonomic habits that's why they are experiencing more health disparities as compared to the general population. This behavior puts them at a higher risk of experiencing neck pain and discomfort (9). This important cohort has been overlooked for a considerable period, due to which there is insufficient information about CGH and NSNP in IT students (10).

Unfortunately, most studies on the subject of interest had inadequate population and gender representation, used inappropriate case definitions and evaluation instruments with unclear psychometric qualities. The certainty of simulated prevalence estimates was low, owing mostly to the possibility of bias and indirectness (11).

Owing to all these disparities and limitations of the existing body of knowledge regarding these musculoskeletal diseases specifically in students, this research aimed to fill the gap by studying the correlation of smart devices usage pattern with cervicogenic headache and non-specific neck pain. The study is driven by the excessive use of smart devices for study and entertainment purpose in Information Technology Students, who have their education and lives revolving around the ongoing technological trends and uses. This study mainly aims to focus on the smart device usage pattern, ignoring the physiological or anatomical differences of gender among students.

MATERIALS AND METHODS

This study was conducted in both government and private sector universities of Lahore. The study spanned six months from December 2023 to May 2024. To ensure robust statistical analysis, a sample of 354 students was measured. The Non-Probability Convenient Sampling Technique was employed in this study to recruit participants. Inclusion criteria included Students aged 18-27, enrolled in IT or Computer Science programs, experiencing headaches for more than 5 days per month, spending more than 3 hours daily on laptop and who reported frequent headaches in the previous month. Exclusion criteria excluded any participants with systemic illness i.e. diabetes, heart issues, autoimmune disorders, Recent history of cervical whiplash accident, or with an already diagnosed psychological or behavioral issue, migraine, cervical arthritis, neck trauma, and congenital disorders of the cervical spine and students unwilling to participate. Initially, approval was gained from ethical committee of the University. Demographic information, academic standing, device ownership, and prior neck related concerns were gathered through a survey. Then, data was collected from the participants by using CGHIS Criteria, VAS, SASSV and NDI tool. All the obtained data was kept confidential. And all ethical standards were maintained and kept. Data collection involved the recording of information through

questionnaires to ensure precision and accuracy. The collected data was subjected to statistical analysis using SPSS, to explore relationships and differences between the variables of interest. Descriptive statistics was employed to summarize participant demographics, including age, gender, smoking, headache distribution, owned devices, time served on devices, headache frequency and neck pain attacks. Pearson correlation test assessed the correlation between VAS headaches intensity, VAS neck pain intensity, NDI and SAS-SV. The significant value of $p < 0.05$ guided the inferential statistics of results.

RESULTS

The study collected data from 370 IT students. 75% of participants aged between 18-22 years old, with 63% identifying as male (n=235) and 36% as female (n=135). The sample consisted of various occupation groups, including students only (57%), students with freelance work (14%), students with part-time jobs (16%), and students with internships (2.7%). The study found that 15% of participants experienced daily neck pain, while 22.2% had weekly attacks, 45% had The Figure 1 reveals that a higher percentage of participants (22%) reported no neck pain, whereas a lower percentage (7.8%) reported no headache. Moderate pain intensity (scores 20-60) was the most common reporting for both neck pain and headache, with a slight variation in distribution. Remarkably, more participants reported severe headache intensity (scores 80-100) compared to monthly episodes, and 17% reported irregular occurrences. Headache frequency was also assessed, with 18% of participants experiencing daily headaches, 30% weekly, 42% monthly, and 9.7% reporting headaches only during stressful periods or prolonged smart device use. The duration of pain varied, with 26% reporting pain lasting from a few minutes to an hour, 30% from 1 hour to a full day, 33% until taking medication, and 10.5% reporting other patterns. Only 33.2% of participants took pain-relieving medication, with Panadol being the most common choice (41%). The study also explored lifestyle habits, revealing that 90% of participants never smoked, and 10% were smokers. Of the smokers, 9.2% had been smoking for more than 6 months. Of the vape users, 7.6% had been vaping for more than 6 months. The study found that 39.2% of participants had a history of headaches lasting less than 6 months, 44.6% had a history of more than 6 months, and 16.2% reported no previous history. Similarly, 39.5% had a history of neck pain lasting less than 6 months, 29.2% more than 6 months, and 31.4% reported no previous history.

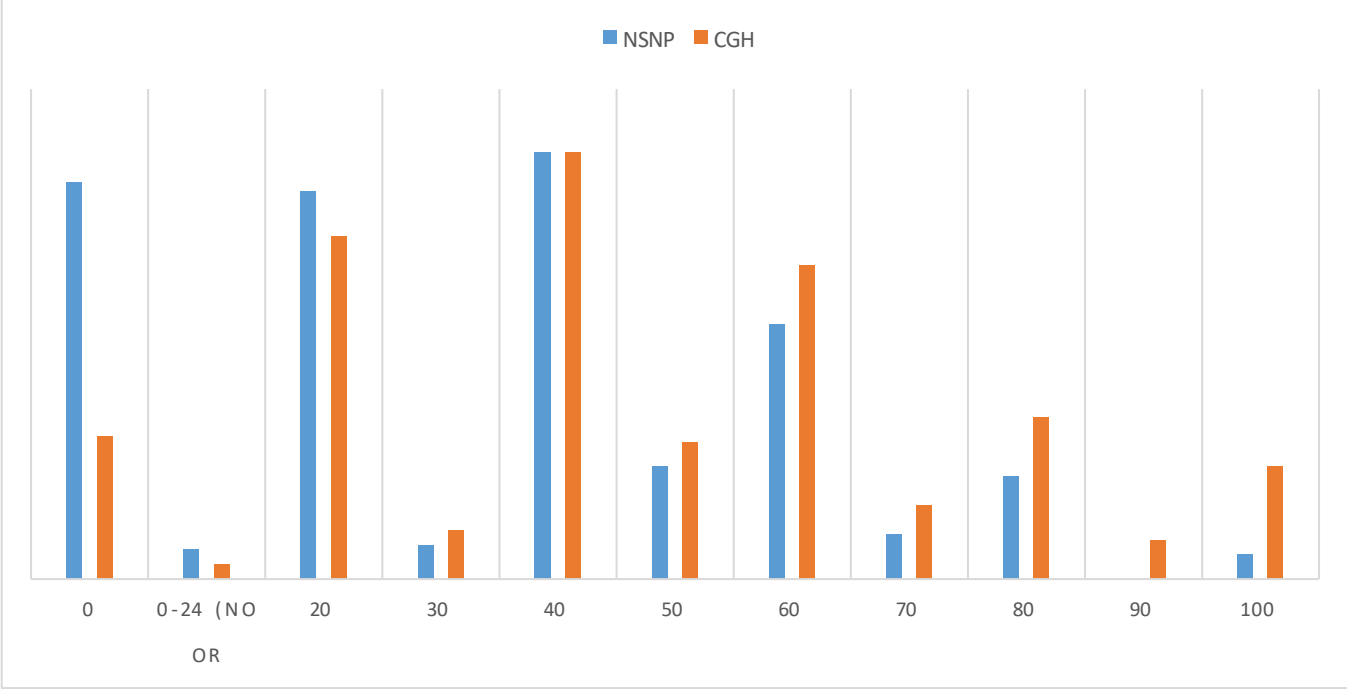
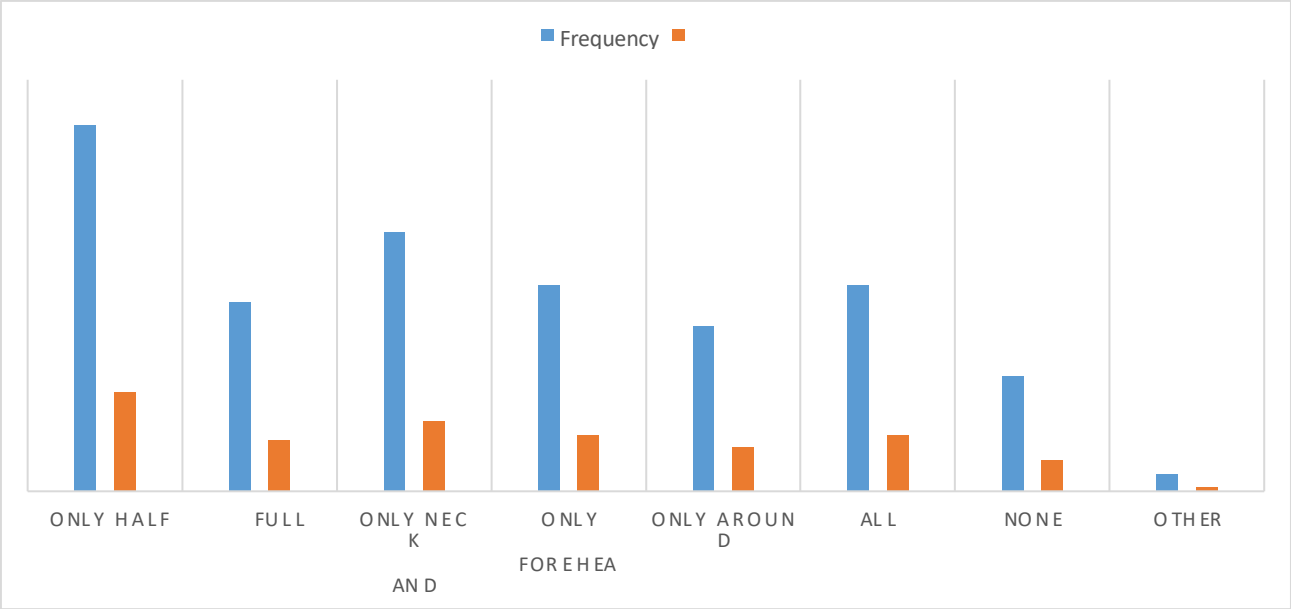


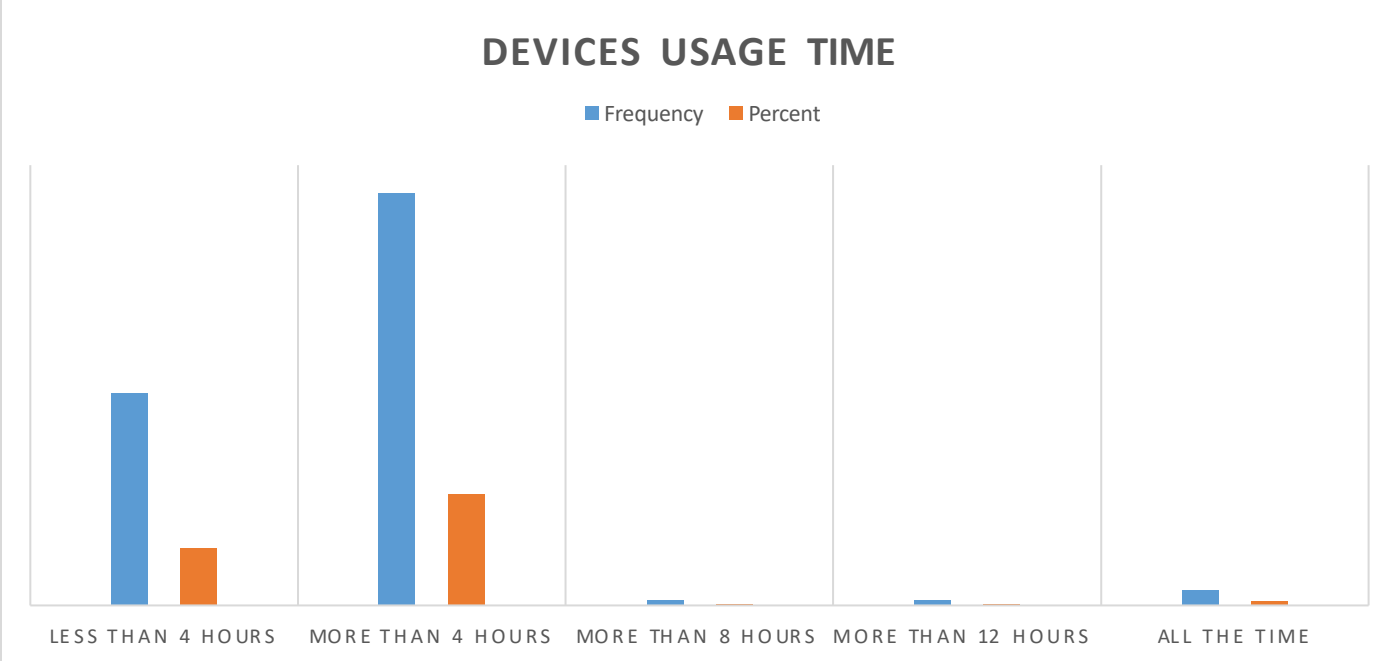
Figure 1: VAS rating of NSNP

severe neck pain intensity. Interestingly, the proportion of participants reporting the highest pain intensity (score 100) was similar for both neck pain and headache, at 1.4% and 6.2%, respectively.



The figure 2 shows the cervicogenic headache distribution based on the Cervicogenic Headache International Study Group (CGHIS) criteria, that showed that 24% of participants' experience headache in half side of head (often confusing it with migraine), 12% get full headache, 17% experience only neck and shoulder pain, 13% experience only forehead pain and 10.8% experience pain around or behind the eyes whereas, 13.5% reported that they suffer from pain in all of these aforementioned areas.

Figure 2: CGHIS criteria headache distribution pattern



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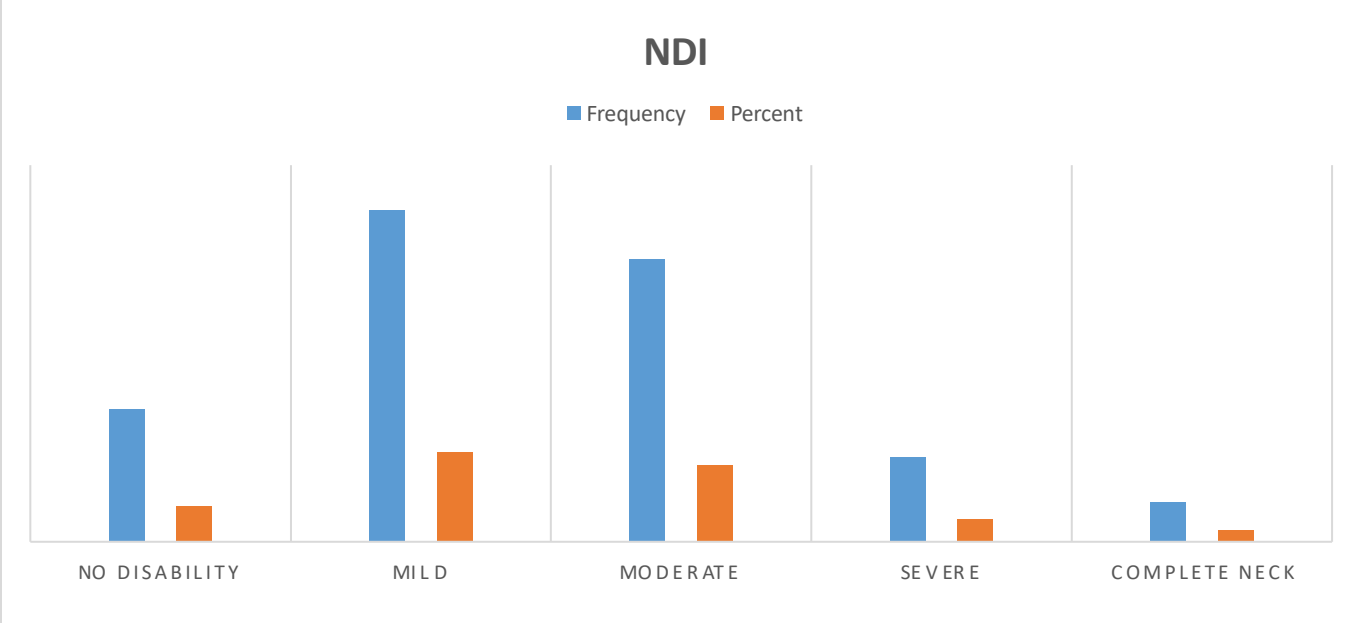
The figure 3 show the device usage pattern in IT students. Approximately 32.7% of the population reported using their devices for less
than 4 hours, 63% use electronic devices for more than 4 hours and 2.4% reported using the device all the time except during sleep.

121 32.7 63.2 3 0.8 3 0.8 9 2.4

Figure 3: Distribution of device usage time



141 120 The figure 4 show the Neck Disability Index (NDI) scoring in sample population. The result show that 15.1% had no disability, 38.1% had mild disability, 32.4% had moderate disability, 9.7% had severe disability and 4.6% had complete neck disability and needed assistance in doing work.

56 15.1 38.1 32.4 36 9.7 17 4.6

Figure 4: NDI Scoring for NSNP

Table 1 show strong positive correlation (0.674, $p < 0.01$) between neck pain intensity and headache intensity. Additionally, positive correlations emerged between neck pain intensity and both the NDI (0.188, $p < 0.01$) and SAS-SV (0.130, $p < 0.05$). A positive correlation (0.193, $p < 0.01$) was also found between NDI and SAS-SV.

Table 1: Pearson Correlation between different Variables

Variable 1	Variable 2	Correlation Coefficient	Significance
VAS neck pain intensity	VAS headache intensity	0.674	$p < 0.01$
VAS neck pain intensity	NDI (Neck Disability Index)	0.188	$p < 0.01$
VAS neck pain intensity	SAS_SV (Self-rating Anxiety Scale)	0.130	$p < 0.05$
VAS headache intensity	NDI (Neck Disability Index)	0.164	$p < 0.01$
NDI (Neck Disability Index)	SAS_SV (Self-rating Anxiety Scale)	0.193	$p < 0.01$

DISCUSSION

The findings of this study align with the previous researches, emphasizing the significant impact of prolonged device usage on musculoskeletal health. Previous studies have indicated that young adults are more prone to developing neck pain and headaches because of prolonged device usage (1, 12). This study supports these findings, with a visible portion of young participants reporting frequent neck pain and headaches. In this study, pain intensity was measured using the Visual Analog Scale (VAS), revealing that 23% of participants scored 40, 21% scored 20, and 20% reported no pain. Similarly, the findings on headache frequency, with 45% experiencing neck pain 2-3 times monthly and 42% reporting the same frequency for headaches, align with findings from a 2022 study that highlighted the incidence and impact of neck pain globally (10). This study highlights a significant correlation between smart device usage and the prevalence of cervicogenic headaches and non-specific neck pain among IT students. A 2022 study also reported a high prevalence of cervicogenic headaches associated with mobile phone usage among young adults
(15). This result is also consistent with a 2024 study, which demonstrated that prolonged screen time is a key factor in developing musculoskeletal issues, including neck pain and headaches, demonstrating a similar link between cervical spine issues and headache prevalence (16). Furthermore, a positive correlation (0.193, $p < 0.01$) was found between NDI and SAS-SV. Specifically, 63% of participants in this study used electronic devices for more than 4 hours daily, with the majority of participants reporting the usage of devices while lying down or with forward head posture, correlating with higher incidences of neck pain and headaches that is accordant with findings from a 2022 research that also reported a higher association between device addiction and neck pain (13). This study also highlighted that 33.2% of participants took pain-relieving medication, with Panadol being the most common drug of choice. Moreover, this study found that 44.6% of participants had a headache history of more than six months, and 29.2% had a history of neck pain, with a significant portion reporting a history of these conditions for over six months, aligning with the chronicity observed in other studies. A 2023 study found that non-specific neck pain often requires ongoing management strategies, including physical therapy and ergonomic interventions (14). This study's findings suggested that 38% of participants had mild disability and 32% had moderate disability, based on NDI. While this study focused on device usage patterns, headache frequency, and neck pain intensity among IT students, it's important to consider broader factors. For

instance, a 2020 study highlighted smoking as significantly associated with increased pain across various body regions, including the spine, head, trunk, and limbs (17). Given the presence of smoking 10% and vaping 8.1% among this study's participants, alongside frequent headaches (18% daily) and neck pain (15% daily), there is serious concern about their potential impact on pain severity and frequency. By confirming previous findings and highlighting specific correlations, it emphasizes the impact of prolonged device usage on neck pain and headaches in this cohort. Future research should further explore these correlations while addressing potential confounding variables, such as lifestyle factors, to enhance the validity of findings and inform effective preventive measures.

CONCLUSION

The study aimed to find the correlation of cervicogenic headache and non-specific neck pain with smart device usage patterns among IT students. The results concluded that there was significant correlation of smart device usage pattern with non-specific neck pain and cervicogenic headaches. The measured prevalence also supported the significant positive correlation between the variables. The findings highlighted the detrimental effects of prolonged device use on neck health and overall well-being among IT students.

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QUESTIONNAIRE

Correlation of Cervicogenic Headache and Non-Specific Neck Pain with Smart Device Usage Pattern among IT Students: A Comprehensive Study

What is your age?

- 18-22
- 23-27
- More than 27
- Other:

What is your Gender?

- Male
- Female

What is your Education?

- Intermediate
- Undergraduate
- Postgraduate

Your field of study?

- Computer Science
- IT
- Other:

Your occupation

- Student
- Student+ freelancer
- Student and internee
- Student and part time worker
- Other:

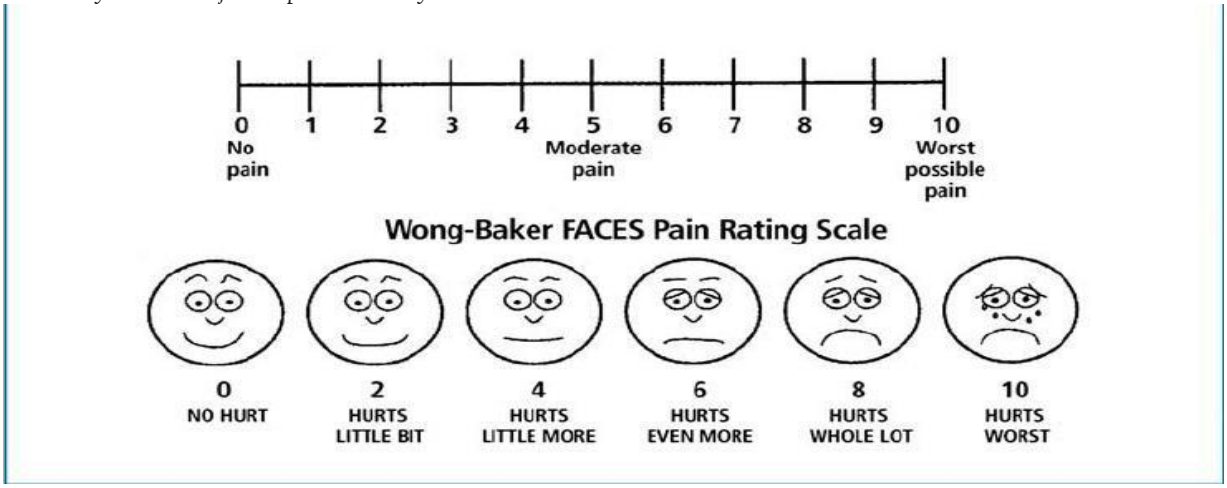
Your residence?

- Punjab
- Sindh
- KPK
- Balochistan
- Azad Kashmir
- Gilgit Baltistan

How often do you have pain in your neck?

- Daily
- Weekly
- Monthly 2-3 times
- Other:

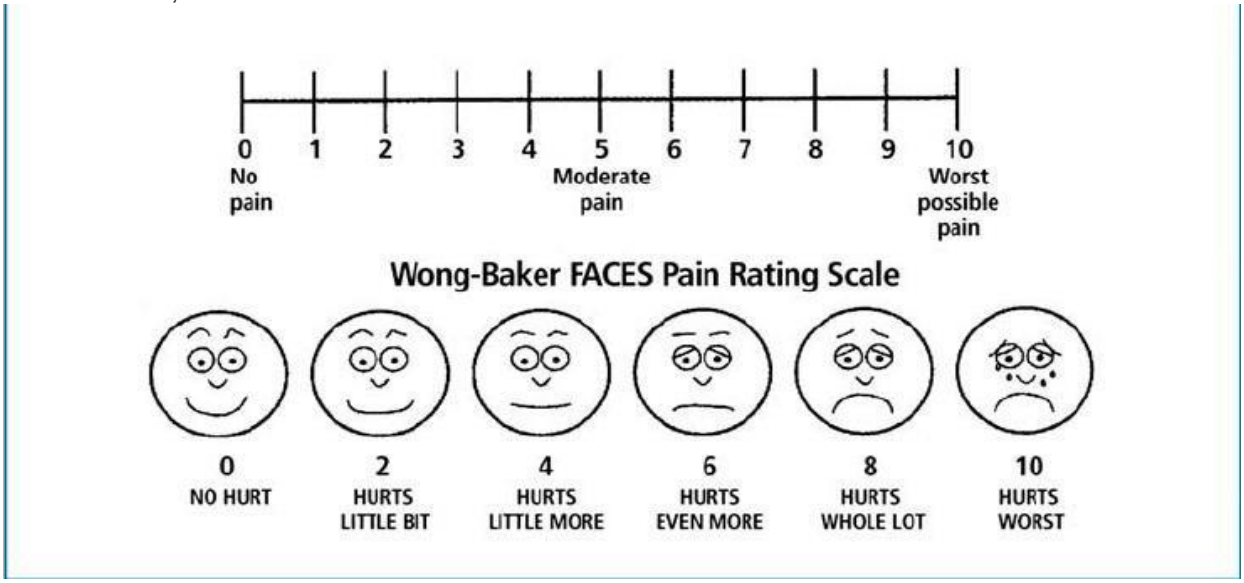
What is your Level of neck pain intensity?



How often do you have pain in head?

- Daily
- Weekly
- Monthly 2-3 times
- Other:

What is your Level of head pain intensity?



Does your headache distribution involves the neck, shoulders, and back of head with referred pain that can encompass the side of head, forehead, and eye regions?

- Only half side of head
- Full head pain
- Only neck and shoulder pain
- Only forehead pain
- Only around or behind eyes
- Only back of head
- None
- All
- Other:

What is the duration of your pain?

- Minutes to 1 hour
- 1 hour to full day
- Until take medicine
- Other:

Can you easily move your neck/head in all directions without pain or decreased movement?

- Yes
- No
- Other:

Do you take medicine?

- Yes
- No

If yes then then what medicine do you take?

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Do you smoke?

- Yes
- No

Do you vape?

- Yes
- No

How long have you been vaping?

- Less than 6 months
- More than 6 months
- Never

How long have you been smoking?

- Less than 6 months
- More than 6 months
- Never

How long it has been since you have head pain?

- Less than 6 months
- More than 6 months
- Never

How long it has been since you have neck pain?

- Less than 6 months
- More than 6 months
- Never

What smart devices do you own?

- Phone
- Tablet
- Laptop/computer
- None
- All
- Other:

How long do you use smart devices for?

- Less than 4 hours straight
- More than 4 hours straight
- Other:

Do you have any diagnosed disease?

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Do you have migraine diagnosed by a doctor?

- Yes
- No

Have you ever had a head injury?

- Yes
- No

Are you willing to let us use your data for research purpose?

- Yes
- No

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SAS-SV

THE SAS-SV QUESTIONNAIRE IS DESIGNED TO BETTER UNDERSTAND SMARTPHONE ADDICTION AND ITS IMPACT ON INDIVIDUALS, PARTICULARLY IN TERMS OF DEPENDENCY LEVELS AND BEHAVIORAL EFFECTS.

Missing planned work due to smartphone use

- Strongly disagree
- Disagree
- Weakly disagree
- Weakly Agree
- Agree
- Strongly agree

Having a hard time concentrating in class, while doing assignments, or while working due to smartphone use

- Strongly disagree
- Disagree
- Weakly disagree
- Weakly Agree
- Agree
- Strongly agree

Feeling pain in the wrists or at the back of the neck while using a smartphone

- Strongly disagree
- Disagree
- Weakly disagree
- Weakly agree
- Agree
- Strongly Agree

Will not be able to stand not having a smartphone

- Strongly disagree
- Disagree
- Weakly disagree
- Weakly agree
- Agree
- Strongly agree

Feeling impatient and fretful when I am not holding my smartphone

- Strongly disagree

- Disagree
- Weakly disagree
- Weakly Agree
- Agree
- Strongly agree

Having my smartphone in my mind even when I am not using it

- Strongly disagree
- Disagree
- Weakly disagree
- Weakly agree
- Agree
- Strongly agree

I will never give up using my smartphone even when my daily life is already greatly affected by it

- Strongly disagree
- Disagree
- Weakly disagree
- Weakly agree
- Agree
- Strongly agree

Constantly checking my smartphone so as not to miss conversations between other people on Twitter or Facebook

- Strongly disagree
- Disagree
- Weakly disagree
- Weakly Agree
- Agree
- Strongly agree

Using my smartphone longer than I had intended

- Strongly disagree
- Disagree
- Weakly disagree
- Weakly agree
- Agree
- Strongly agree

The people around me tell me that I use my smartphone too much

- Strongly disagree
- Disagree
- Weakly disagree
- Weakly agree

- Agree
- Strongly agree

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Ne

ck Disability Index

THIS QUESTIONNAIRE IS DESIGNED TO HELP US BETTER UNDERSTAND HOW YOUR NECK PAIN AFFECTS YOUR ABILITY TO MANAGE EVERYDAY -LIFE ACTIVITIES. PLEASE MARK IN EACH SECTION THE ONE BOX THAT APPLIES TO YOU. ALTHOUGH YOU MAY CONSIDER THAT TWO OF THE STATEMENTS IN ANY ONE SECTION RELATE TO YOU, PLEASE MARK THE BOX THAT MOST CLOSELY DESCRIBES YOUR PRESENT -DAY SITUATION.

SECTION 1 - PAIN INTENSITY

- I have no neck pain at the moment.
- The pain is very mild at the moment.
- The pain is moderate at the moment.
- The pain is fairly severe at the moment.
- The pain is very severe at the moment.
- The pain is the worst imaginable at the moment.

SECTION 2 - PERSONAL CARE

- I can look after myself normally without causing extra neck pain
- I can look after myself normally, but it causes extra neck pain.
- It is painful to look after myself, and I am slow and careful
- I need some help but manage most of my personal care.
- I need help every day in most aspects of self -care.
- I do not get dressed. I wash with difficulty and stay in bed.

SECTION 3 – LIFTING

- I can lift heavy weights without causing extra neck pain.
- I can lift heavy weights, but it gives me extra neck pain.
- Neck pain prevents me from lifting heavy weights off the floor but I can manage if items are conveniently positioned, ie. On a table.
- Neck pain prevents me from lifting heavy weights, but I can manage light weights if they are conveniently positioned
- I can lift only very light weights.
- I cannot lift or carry anything at all.

SECTION 4 – READING

- I can read as much as I want with no neck pain.
- I can read as much as I want with slight neck pain.
- I can read as much as I want with moderate neck pain.
- I can't read as much as I want because of moderate neck pain.
- I can't read as much as I want because of severe neck pain.
- I can't read at all.

SECTION 5 – HEADACHES

- I have no headaches at all.
- I have slight headaches that come infrequently.
- I have moderate headaches that come infrequently.
- I have moderate headaches that come frequently.
- I have severe headaches that come frequently.
- I have headaches almost all the time.

SECTION 6 – CONCENTRATION

- I can concentrate fully without difficulty.
- I can concentrate fully with slight difficulty.
- I have a fair degree of difficulty concentrating.
- I have a lot of difficulty concentrating.
- I have a great deal of difficulty concentrating.
- I can't concentrate at all.

SECTION 7 – WORK

- I can do as much work as I want.
- I can only do my usual work, but no more.
- I can do most of my usual work, but no more.
- I can't do my usual work.
- I can hardly do any work at all.
- I can't do any work at all.

SECTION 8 – DRIVING

- I can drive my car/bike without neck pain.
- I can drive my car/bike with only slight neck pain.
- I can drive/bike as long as I want with moderate neck pain.
- I can't drive as long as I want because of moderate neck pain.
- I can hardly drive at all because of severe neck pain.
- I can't drive my car at all because of neck pain.

SECTION 9 – SLEEPING

- I have no trouble sleeping.
- My sleep is slightly disturbed for less than 1 hour.
- My sleep is mildly disturbed for up to 1-2 hours.
- My sleep is moderately disturbed for up to 2-3 hours.
- My sleep is greatly disturbed for up to 3-5 hours.
- My sleep is completely disturbed for up to 5-7 hours

SECTION 10 – RECREATION

- I am able to engage in all my recreational activities with no neck pain at all.
- I am able to engage in all my recreational activities with some neck pain.
- I am able to engage in most, but not all of my recreational activities because of pain in my neck.
- I am able to engage in a few of my recreational activities because of neck pain.

- I can hardly do recreational activities due to neck pain.

I can't do any recreational activities due to neck pain