PREVALANCE OF NECK PAIN AND ITS EFFECTS ON CERVICAL RANGE OF MOTIONS AMONG ELECTRONIC DEVICE USERS OF UNIVERSITY UNDERGRADUTE STUDENTS

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ABSTRACT

To evaluate the predominance of neck pain and determine whether there is a link between cervical pain and its range of motion in undergraduate university students due to electronic device usage (mobile phone, desktop computer and laptop). A multi-central observational cross-sectional study was conducted across 282 undergraduate university students from three different institutes of district Gujranwala. The SLUMP questionnaire was distributed among the participants and the data was collected at the spot. Cervical range of motion (ROM) was measured with the help of goniometer. To measure the severity of the pain, a visual analog scale (VAS) was employed. Statistical package for social sciences (SPSS) version 24 was used to examine the collected data. Outcomes were determined at 95% confidence interval. Student t-test Chi square test were used to test significance. Out of 282 participants who were electrical device users, 80.14% were females and prevalence of neck pain was observed 64.54%. In cervical flexion (76.08±6.79 vs. 65.70±4.83), extension (47.67±12.06 vs. 39.04±5.04), rotation (63.35±9.19 vs. 59.46±6.13) and side bending (23.35±10.33 vs. 17.49±1.69) statistical significant difference were found with p-value <0.001 among participants with and without neck pain respectively. It was concluded that prevalence of neck pain is very high among university undergraduate students of electrical device users and their neck range of motions was also compromised. Posture related awareness was needed.

Index Terms: Prevalence, neck pain, electric devices, students, range of motion, **Cervical** pain , SLUMP

INTRODUCTION

Neck pain is strain in or around the cervical spine, which is located beneath your head. Neck pain is one of the prime musculoskeletal problems in adults. In total

world's population its prevalence ranges from 16.7% to 75.1%, this disorder consist of complicated etiology; the factors including ergonomics, high physical activity, use of force and vibrations, repetitive movements and poor posture. Other factors include behaviors (smoking) age BMI, high level of physical activity, stress ,anxiety and depression.(1)

Musculoskeletal Neck pain is the most common disorder among population second to low back pain. Most of the people suffering from acute neck pain don not get primary health attention due high medical expenses and low income and may cause frequent disability and economic burden(2)

Neck pain without myopathy and radiculopathy ,or in the absence of any clear underlying disease is called as mechanical neck pain.(3) The nature of musculoskeletal diseases is inflammatory and degenerative.The symptoms in MSD's include burning pain stiffness, numbness, paraesthesia and aches(11)

Poor posture (Forward head) causes an abnormal stress on joint in cervical spine (facet joints) and soft tissues or muscles around the cervical spine and causes musculoskeletal disorders i.e. neck pain called mechanical neck pain. Mostly patients suffering from neck pain comes with impaired spinal curvature.(4)

One of most common reason of neck pain among people is the rapidly increasing rate of using electronic devices such as mobile phone, laptop, tablets, and desktop computers. Mobile phones are the most favored electronic device that can easily carry with us anywhere. According to a recent research about 77% of world's population has their own mobile phones. The main purpose of.(5) In present time the use of mobile phones are increasing rapidly, up to 91% of university students uses mobile at the age of 20 years and the ratio of this group is much more higher than other groups.(6)

Neck pain can be muscular due to poor posture adaptation during mobile phone or laptop usage. It can be from innervated structures that are present in neck muscle fibers inter-vertebral disc, zygapophyseal joint, diameter or nerve root compression (due to degenerative changes in body) but it is noted in most of the cases that the pathogenesis of main cause of neck pain is not known(7)

In general population the range of the prevalence of neck pain is from 0.4 to 86% of world's total population.(8) Prevalence of neck pain was assessed higher in female and developed country countries compared with underdeveloped and more in rural area as compared to urban areas.(9)

In a study the correlation between mobile phone usage and the time period in which the device is being use with bad posture .i.e. forward headed posture the incidence of 75.8% students were experiencing mild pain while 24.2% students were suffering from moderate pain .(5) In another study explained that students were used cell phone more than 14 hours and neck pain severity was observed 44.50% with mild pain.(10) According to researches there is a greater possibility of prevalence of neck pain as we age. i.e there are more chances of chronic neck pain in old age but recently it was discovered that chances of neck pain are more in young adults. The computer users and video game players are at high risk of getting chronic neck pain.(12)

The neck pain and computer use are directly associated with each other due prolong sitting with neck flexion (forward head) and rounded shoulders without resting intervals causes to stretch the neck muscles. Forward head posture in prolong sitting causes the anterior neck muscles to shorten and tighten slowly with the passage of time. While the shortening and tightening of anterior neck muscles causes the lengthening of posterior neck muscles hence they become weaker. It also disturb their normal C-spine curvature that is slightly abnormal position. Theses anatomic changes in users causes to develop neck pain.(13)

Purpose of current research was to determine the prevalence of cervical pain and effects of pain on cervical ROM as well as relationship of cervical pain and BMI with ROM among electric device users of undergraduate university students.

METHODS

Study design, target population, setting and study duration
An analytical cross-sectional study was completed on electronic device users as well as undergraduate university students of University of Lahore, Gujrat Campus, Gift University, Gujranwala, University of Gujrat, Gujrat, Punjab, Pakistan between May to August 2022.

Sampling technique and sample size calculation

A sample of 282 students was selected by non-probability sampling technique.

Following formula was used to estimate sample size;

$$n = (Z_{1-\alpha/2})^2 (p)\, (1-p)/\, (d)^2$$

Where n=281.88 which was approximately 282 sample size was calculated by Z =1.96 at 95% confidence interval (two-tail), P=0.242 is expected prevalence and d=expected precision or effect size=0.05.

Participants

Undergraduate university students were included in study that had self-mobile phone/ laptop who were used their phones or laptops for > 6 months and >3 hours per day[1] Students were suffered from any severe MSDs (like pathology or fracture to muscle, bone, joint, spine) or previous surgery.[1] Students who had whiplash injury, tumor, and migraine and gave incomplete information were excluded from the study.

Ethical approval and consent

This study was approved by Institute Review Board (IRB) of University of Lahore. Informed and written consent was taken before collecting data from the selected participants.

Data collection and measurements

For the completion of current research, from 282 undergraduate university students of Gujarat and Gujranwala, Punjab, Pakistan who fulfilled the inclusion and exclusion criteria, data were collected. After the informed consent was taken from the individual demographic data (age of participant, gender, sex) were taken. SLUMP (Student Laptop Use and Musculoskeletal Posture) questionnaire and VAS were used to collect the information to assess the adopted postures during device and intensity of pain respectively. Through goniometer, neck ranges of motion (cervical flexion, extension, rotation and side bending) were measured in degrees.

Statistical analysis

Data were entered and analyzed using statistical package for social science (SPSS) version 24. Numeric data was described in mean and standard deviation. Frequency and percentages were used to display qualitative data. Independent t test was applied to compare the ROM between two groups (one with neck pain and other one was without pain). P≤0.05 was considered as significant value. All results were calculated at 95% confidence level.

RESULTS

Total 282 participants were included as a sample; there average age was observed 21.99 ± 1.59 years and 22.44 ± 4.32 kg/m^2. Mostly 226(80.10%) were females and more than half 165(58.50%) were used Mobile phone as an electric device and 83(29.40%) participants were using mobile phone as well as laptop and about half of the population were used their devices >6 hours in different activities that was shown in **table 1**.

Table 1. Demographic Characteristics of participants

Variables	Responses/Units	n	%	Mean ±S.D
Age of participants	Years			21.99±1.59
Body Mass Index	Kg/m^2			22.44±4.32
Gender	Male	56	19.9	
	Female	226	80.1	
Electric Device	Mobile Phone	165	58.5	
	Laptop	21	7.4	
	Desktop Computer	2	0.7	
	Mobile Phone & Laptop	83	29.4	
	Desktop Computer and Laptop	7	2.5	
	All	4	1.4	
Devices used (Hours)	3-4	88	31.2	
	5-6	57	20.2	
	> 6	137	48.6	
Total		282	100	
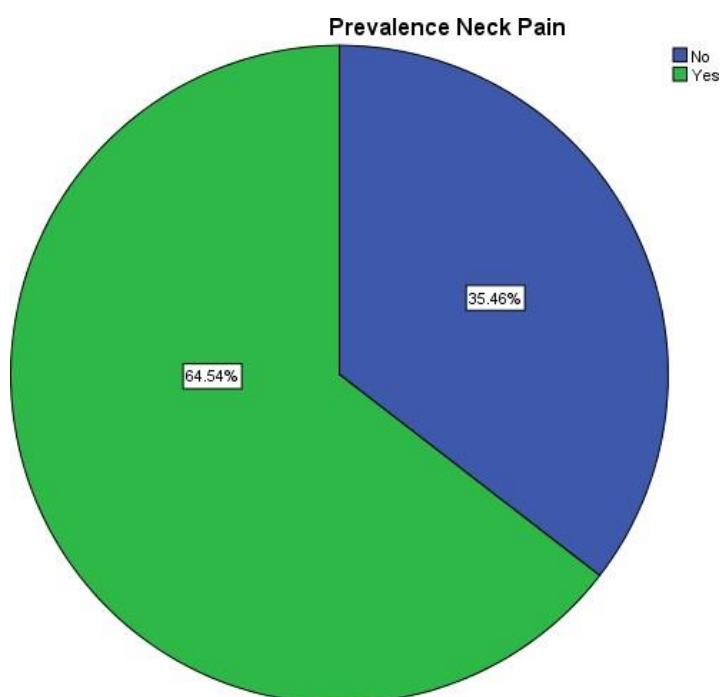
Figure 1. Prevalence of neck pain

Prevalence of neck pain was shown in **Figure 1.** That was 64.54% and pain intensity was presented in **Figure 2.** Out of total, 30.85%, 21.63% and 10.99% were moderate, normal and sever pain respectively
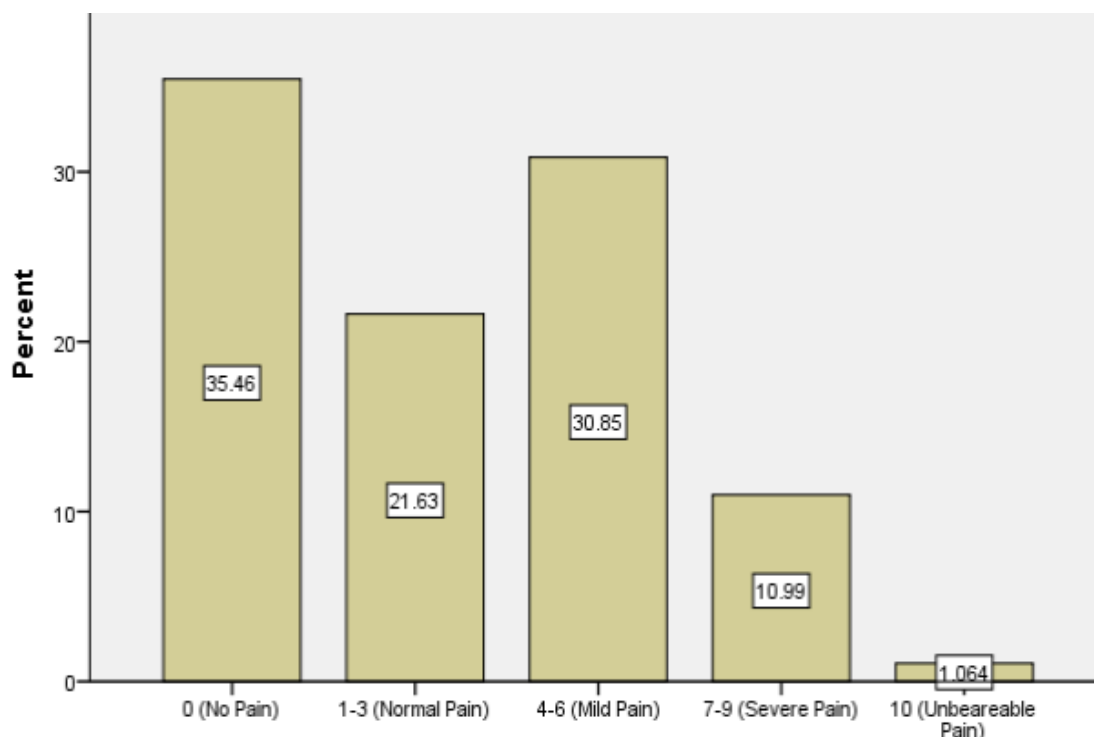
Figure 2. Pain severity explained through Visual Analog scale (VAS)

Mean range of motions in participants with and without neck pain were compared with student's independent t-test. In cervical flexion (76.08±6.79 vs. 65.70±4.83), extension (47.67±12.06 vs. 39.04±5.04), rotation (63.35±9.19 vs. 59.46±6.13) and side bending (23.35±10.33 vs. 17.49±1.69) statistical significant difference were found with p-value <0.001 among participants with and without neck pain respectively that is shown in **table 2&3.**

Table 2. Descriptive analysis of BMI and Range of Motion among with and without Neck Pain

Variables	Neck Pain	
	Mean±S.D	
	No	Yes
ROM Cervical Flexion (degree)	76.08±6.79	65.70±4.83
ROM Cervical Extension (degree)	47.67±12.06	39.04±5.04
ROM Cervical Rotation (degree)	63.35±9.19	59.46±6.13
ROM Side Bending (degree)	23.35±10.33	17.49±1.69
Total	**100(35.50)**	**182(64.50)**

Table 3. Range of motion comparison between with and without neck pain

	t	d.f	P-value	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
ROM Cervical Flexion	13.53	155.20	<0.001*	10.38	8.87	11.90
ROM Cervical Extension	6.84	118.32	<0.001*	8.63	6.13	11.13
ROM Cervical Rotation	3.80	148.36	<0.001*	3.89	1.87	5.92
ROM Side Bending	5.63	101.92	<0.001*	5.86	3.80	7.93

"*" indicates the statistical significant difference

DISCUSSION

A sample of 282 participants were selected and data were collected with the help of questionnaire. Females were more with neck pain in current study. Another study showed on text neck ache became common in female students with usage of phone day by day in life. Like this current study, high proportion 59 % was female students. They concluded that the cervical pain was becoming worse with use of mobile phones and other electronic devices. (14)

A study was conducted among university students. The primary aim of this study was to investigate the relationship with neck pain and time spent on devices. This study shows that there was a significant positive correlation between mobile phone usage time. Out of 500 students 379(75.8%) students were experiencing mild pain while on the other hand 121 students (24.2%) were experiencing moderate to severe pain. (5)

A research was conducted in past and objective of this study was to identify the prevalence and associated factors of neck and shoulder pain attributed to smartphone and computer use in Saudi university students. 45% of participants used smartphones. 35.1% spent an average of 6-9 hours. Participants who used both an iPad or tablet and a computer had significantly higher rates of neck and shoulder pain compared to other user devices. Participants who used the device for learning had significantly higher rates of neck and shoulder pain than those who used it for other purposes. (15)

A recent study determines the relationship between digital device use and musculoskeletal symptoms in college students. Self-administered questionnaires are digitally structured Questions about object-using devices and Cornell musculoskeletal discomfort (CMDQ) was conducted among 311 students. The mean age of study

participants was 21.6±1.0. The majority of respondents (94.9%) use mobile phones in a sedentary position (seated position) for long periods of time .I.e 5 -7.5 hours per day. Approximately 32% to 60% of respondents experienced musculoskeletal symptoms neck, shoulder, waist and upper back. Women are more prone to musculoskeletal symptoms. Usage time of digital devices, distance from eyes to screen, posture, Age of first use was significantly correlated with musculoskeletal symptoms. College students are at increased risk of developing musculoskeletal symptoms associated with the use of digital devices. If left untreated, these musculoskeletal symptoms can lead to further impairment and disability at an early age.(16)

 The most common device being used now-a-days is mobile phone. The (58.5%) students uses mobile phone. 7.4% students uses laptop. 0.7% out of 282 uses desktop computer. 29.4% uses both mobile and laptop. 2.5% uses laptop and desktop both. 1.4% uses all the electronic devices .i.e mobile, laptop , desktop computer. the P-value of age was 0.038. BMI P-value was 0.0287.

A cross sectional study was performed in china in order to examine the neck posture during the electronic device usage in male and female. the research was done to analyze posture postural difference of both genders during the use of different devices. They noticed the ratio of mobile use in forward headed posture was more in males than female participants. they also concluded that there is an association between the use of devices and posture.(17)

 In our study, we try to uncover the different factors in students using smartphones, tablets and laptops for their educational and personal purposes. Your daily usage in hours and usage patterns of different devices in daily life. Disability practices and patterns have also been observed. P-value of ROM(cervical rotation, flexion, extension, side-bend) was <0.001 that was statistical significant. Our study also shows that the BMI shows no significant differences of participants of both groups (group with pain and other group with no pain), as the p value was not statistically significant. While the ROMs of both groups shows a remarkably change i.e. standard deviation of both groups. Which concluded the ROM had not strongly effected (Limited ROM) by cervical pain as the range of motions of group experiencing muscles soreness and pain in both male and female equally.

CONCLUSION

It was concluded that prevalence of neck pain is very high among university undergraduate students of electrical device users and their neck range of motions was also compromised. Posture related awareness was needed.

Conflict of Interest:

The authors declare that there is no conflict of interest regarding this study.

Financial Statement:

There was no any type of funding.

Data availability statement :

The data that support the findings of this study are available on request from the

Corresponding author.

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