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ORIGINAL ARTICLE

Neck and shoulder pain in students: Unveiling associated factors of video display terminal devices use

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ABSTRACT

Background: Neck and shoulder pain is becoming a major public health concern due to increased use of digital display terminal devices. It negatively affects individual's health and results in a burden on health care system.

Objective: To determine the frequency of neck and shoulder pain and identify the factors associated with it among students who use video display terminal (VDT) devices.

Methods: This cross-sectional study was conducted from June 2022 to October 2022 in various colleges and universities of the Punjab, Pakistan using a web-based survey. Convenience sampling technique was used to include 415 undergraduate students. A self-structured questionnaire was used to collect data of sociodemographic details and ergonomic practices. Data was analyzed using Statistical Package for Social Sciences (SPSS) version 23. A p-value of ≤ 0.05 was considered as statistically significant.

Results: The mean ±SD age of respondents was 21.3±2.8 years. Neck and shoulder pain was reported by 40.2% of the students who used VDT devices. Gender, course of study, and frequency of taking breaks while using VDT device were significantly associated with neck and shoulder pain (p value ≤0.05).

Conclusion: About 40% of the students reported having neck and shoulder pain. Neck and shoulder pain was more frequent in females, allied health sciences students and those taking frequent breaks.

Key Words: Neck pain, Shoulder pain, Students, Video display terminals

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INTRODUCTION

Video display terminal (VDT) is the device that converts electrical signals into visual display. Globalization of technology has resulted in exponential increase in use of VDT devices like computers, laptops, electronic notebooks, tablets, and a variety of portable cellular phones.[1] The use of electronic digital devices has also become an inherent part of daily routine of students.[2] Due to prolonged use of such devices, college students frequently have symptoms such as neck and upper extremity pain.[3]

The lack of an appropriate workspace setup and the limited awareness of the ergonomic principles contribute to an increased risk of developing musculoskeletal problems of neck and shoulder areas.[4] During computer use, the neck goes to forward flexion, the normal curvature of the cervical spine is flattened, and the neck musculature is stretched.[5] Smartphone users are prone to the muscle

fatigue, reduced pressure pain threshold and reduced cervical range of motion.[6]

A study conducted on social media platforms in Jordan reported that the occurrence of neck and shoulder pain is related to the use of computers. This study also identified some risk factors, such as prolonged hours of using digital devices and female gender.[7] Myint et al. conducted their research among students using VDT devices in Malaysia and found that 60 % and 56% of respondents had symptoms of neck and shoulder pain, respectively.[8] Another study conducted among medical students in Peshawar, Pakistan reported that 43.52 % of computer users were suffering from neck pain.[9]

For students, experiencing neck and shoulder pain may impact their educational achievement and quality of life. Moreover, it can result in a significant financial burden due to the cost of medical treatment and an increase in the demand for medical services.[10]

Gaps exist regarding knowledge about ergonomic practices of students while using VDT devices. Little research has been carried out in Pakistani undergraduate college students to identify the ergonomic practices related to VDT devices usage and their effects on neck and shoulder health. This study will be helpful in creating awareness among the students about the proactive measures to combat this health issue. The objective of the study was to determine the frequency of neck and shoulder pain among students using VDT devices and identify the associated factors.

METHODS

This descriptive cross-sectional study was conducted from June 2022 to October 2022 in various colleges and universities of the Punjab, Pakistan. Undergraduate students of Akhtar Saeed Medical & Dental College, Lahore; Sheikh Zayed Medical College, Rahim Yar Khan; Bakhtawar Amin Medical and Dental College, Multan; Akhtar Saeed College of Allied Health Sciences, Lahore; Govt College University, Faisalabad; Punjab Group of Colleges, Lahore; University of Engineering and Technology, Lahore; National University of Science and Technology, Islamabad; Government College for Boys, Pakpattan; and University of Agriculture, Faisalabad participated in the study.

Using Raosoft sample size calculator, with 5% margin of error and 95% confidence level, the size of sample calculated was 371 undergraduate students.[9] However, using a web-based survey through online Google forms, a total sample of 415 undergraduate college students was included by convenience sampling technique. Link of Google form was shared with undergraduate students via emails and students' WhatsApp groups. Informed consent in the form of e-consent was taken from the participants.

Undergraduate students of both genders, 18 to 25 years of age, and using VDT devices like computers/mobiles/tablets/laptops were included. A self-constructed questionnaire containing both open-ended and close-ended questions was used to record sociodemographic information (age, gender, course of study), ergonomic practices (daily average screen time, number of VDTs being used, posture while using device, level of the screen while using the device, usual distance from the device, frequency of taking breaks) and presence of neck and shoulder pain. Research questionnaire was designed after extensive literature search. Then, it was reviewed by two public health specialists.

Ethical Approval

Ethical approval was obtained by the institutional review board of Akhtar Saeed Medical and Dental College, Lahore, Pakistan, (IRB no. M-22/86/-CM). Permission was taken from various participating institutes to collect data from students.

Statistical Analysis

The data were entered and analyzed using SPSS version 23. For the analysis of qualitative data, frequencies and percentages were calculated to provide an overview of the distribution of categorical variables.

To examine the relationship between neck and shoulder pain and various demographic and ergonomic factors, the Chi-square test was employed. This test was used to assess whether there was a statistically significant association between the presence of musculoskeletal discomfort and factors such as gender, academic discipline, and break habits during VDT usage. A p-value of ≤ 0.05 was considered to indicate statistical significance, meaning that any observed associations were unlikely to have occurred by chance. This threshold was used to ensure the reliability and robustness of the findings, particularly in understanding the factors contributing to neck and shoulder pain among the study participants.

RESULTS

The study participants had a mean age of 21.3 ± 2.8 years, with a gender distribution of 264 males (63.6%) and 151 females (36.4%). The participants were undergraduate students from various academic institutions across Pakistan, including Akhtar Saeed Medical & Dental College, Lahore (n=173); Sheikh Zayed Medical College, Rahim Yar Khan (n=28); Bakhtawar Amin Medical and Dental College, Multan (n=22); Akhtar Saeed College of Allied Health Sciences, Lahore (n=59); Government College University, Faisalabad (n=16); Punjab Group of Colleges, Lahore (n=26); University of Engineering and Technology, Lahore (n=30); National University of Science and Technology, Islamabad (n=22); Government College for Boys, Pakpattan (n=24); and the University of Agriculture, Faisalabad (n=15).

Table 1: Sociodemographic data and ergonomic practices of participants using Video display terminal (VDT)

Variables	Frequency (n)	Percentage (%)
Age		
18-20 years	138	33.3
21-25 years	277	66.7
Course of Study		
Medical	223	53.7
Engineering &IT	52	12.5
Allied health Sciences	59	14.3
Other disciplines	81	19.5
Average screen time/day		
≥ one minute - < 4 hours	58	14
4-6 hours	180	43.4
> 6 hours-10 hours	117	28.2
More than 10 hours	60	14.4
Posture		
Lying	54	13
Sitting	88	21.2
Both	273	65.8
Level of screen		
Below level of the eyes	46	11.1
Above level of the eyes	246	59.3
Same level of the eyes	123	29.6
Usual distance from device		
≤ ¾ of arm length	321	77.3
More than ¾ of arm length	94	22.7
Frequency of taking breaks		
Every 20-30 minutes	99	23.8
Every 31-60 minutes	102	24.6
No regular breaks	214	51.6

Regarding VDT usage, 180 participants (43.4%) reported spending 4-6 hours daily on these devices. The majority of students (59.3%) positioned their screens above eye level while using these devices. The details of the participants' sociodemographic characteristics and ergonomic practices are summarized in Table 1.

A significant finding of the study was the high prevalence of musculoskeletal discomfort, particularly neck and shoulder pain, with 40.2% of the participants reporting such issues (Figure 1). This underscores the potential health risks associated with prolonged use of VDTs, which may affect students' overall well-being.

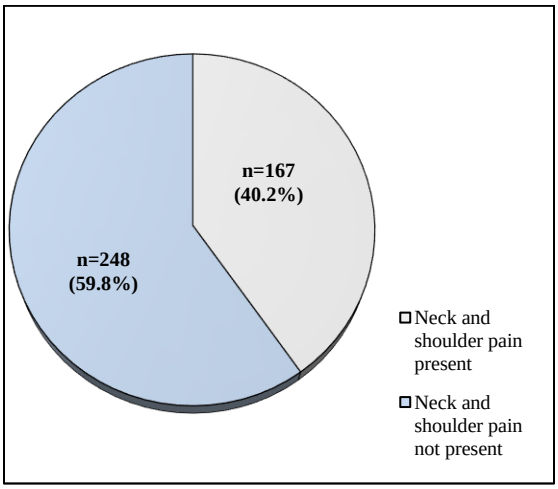

Figure 1: Neck and shoulder pain among study participants (n=415)

Further analysis using the Chi-square test revealed significant associations between the occurrence of neck and shoulder pain and several factors, including gender, course of study, and break frequency during VDT use. The data indicated that females were more likely to report neck and shoulder pain compared to males. Additionally, students from the Allied Health Sciences discipline experienced higher levels of discomfort. The study also found that participants who took breaks every 20-30 minutes while using VDTs reported more frequent pain, suggesting that the duration between breaks may be a contributing factor to musculoskeletal discomfort. These findings, summarized in Table 2, highlight the role of demographic factors and ergonomic practices in the development of neck and shoulder pain among individuals using VDT devices for extended periods.

Table 2: Association between sociodemographic variables, ergonomic practices of participants and presence of neck & shoulder pain

Characteristics	Total n	Pain present n (%)	Pain not present n (%)	χ^2	p-value
Age					
18-20 years	138	57(41.3)	81(58.7)		
21-25 years	277	110(39.7)	167(60.3)	0.097	0.760
Gender					
Female	151	90(59.6)	61(40.4)		
Male	264	77(29.2)	187(70.8)	37.00	<0.001*
Course of Study					
Medical	223	91(40.8)	132(59.2)		
Engineering &IT	52	19(36.5)	33(63.5)		
Allied health Sciences	59	32(54.2)	27(45.8)		
Other disciplines	81	25(30.9)	56(69.1)	8.09	0.040*
Daily average screen time					
≥ one minute - < 4 hours	58	21(36.2)	37(63.8)		
4-6 hours	180	67(37.2)	113(62.8)		
> 6hours-10 hours	117	57(48.7)	60(51.3)		
More than 10 hours	60	22(36.7)	38(63.3)	4.89	0.180
# of VDTs used					
Only one	274	101(36.9)	173(63.1)		
Multiple	141	66(46.8)	75(53.2)	3.83	0.0503
Posture while usingVDT					
Sitting	88	34(38.6)	54(61.4)		
Lying	54	21(38.9)	33(61.1)		
Both	273	112(41)	161(59)	0.21	0.901
Level of screen					
Above level of eye	246	110(44.7)	136(55.3)		
Below level of eye	46	17(37)	29(63)		
Same level of eye	123	40(32.5)	83(67.5)	5.30	0.070
Distance from VDT					
≤¾ of arm length	321	128(39.9)	193(60.1)		
More than ¾ of arm length	94	39(41.5)	55(58.5)	0.08	0.780
Frequency of taking breaks					
Every 20-30 minutes	99	49(49.5)	50(50.5)		
Every 31-60 minutes	102	45(44.1)	57(55.9)		
No regular breaks	214	73(34.1)	141(65.9)	7.50	0.020*

*Chi-square test was applied. *p-value less than 0.05 is statistically significant. VDT= Video display terminal, # = Number*

DISCUSSION

A significant proportion (40.2%) of undergraduate students who used VDT device reported having neck and shoulder pain. This finding was consistent with other previously conducted researches. According to a study conducted among Physiotherapy students at universities in Bangladesh and India, the prevalence rate of musculoskeletal pain in the neck and shoulder was 43.3% and 42.9%.[11] Results of a study conducted in Malaysia among students who used laptops revealed that about 55% of participants had neck discomfort while 46% had shoulder discomfort.[12] The prevalence of neck pain among undergraduate students of Malaysia in the previous 12 months was 58.8% followed by shoulder pain which was reported by 58.5% of the students.[13]

The frequency of neck and shoulder pain among the students at Odisha, India was 45% and 20.5%, respectively.[14] According to the results of another study conducted in Jordan, about 54% of participants reported pain at neck and 51% reported shoulder pain.[15] Another research of Saudi population revealed that 55.9% of participants reported having shoulder discomfort and 59.2% reported having neck pain.[16]

Frequency of neck and shoulder pain was higher among females than males. Findings of current study revealed that 59.6% of females and 29.2% of males reported presence of neck and shoulder pain. Association between gender and neck and shoulder pain was significant. In another research by Legan M. et al., about 33.1% of female students compared to 19.4% of male students reported having neck pains.

In the same study, shoulder pain was reported by 53.8% females in comparison to 41.8% male students and the association between gender and musculoskeletal pain in neck and shoulder regions was also significant.[17]

According to present study, students of Allied Health Sciences were more likely to experience neck and shoulder pain. These symptoms were reported by about 54% of Allied Health Sciences students who used VDT devices. Chan et al., described in their study that physiotherapy and nursing students had significantly higher prevalence of neck pain as compared to business students.[18]

There was no significant association between daily average screen time and neck and shoulder pain. This finding was in accordance to the study conducted among Saudi students, which also showed no significant association between daily average screen time and neck and shoulder pain.[19]

This study found no significant association between level of the screen and neck and shoulder pain. This result was in accordance with the finding of the study conducted in Malaysia which also found no significant association between level of the screen and neck and shoulder pain.[20]

Astonishingly, there was an association between neck and shoulder pain and taking breaks every 20-30 minutes. Another study conducted in Alexandria, Egypt among computer office workers showed an association between break autonomy and neck pain.[21] Most probably, those respondents were suffering from neck or shoulder pain and used to take frequent breaks as compared to those who did not have such symptoms.

Some modifiable and non-modifiable risk factors for shoulder and neck pain have been identified in this study. Specific prevention strategies should be developed and implemented to reduce the risk of neck and shoulder pain among college students.

CONCLUSION

Frequency of neck and shoulder pain was high among students using VDT devices. Neck and shoulder pain was more common in females, students of allied health sciences, and those taking frequent breaks. This shows that they already had the disease which forced them to take frequent breaks. The study's findings offer preliminary evidence that VDT device use may have a deleterious impact on health, including neck and shoulder pain. More targeted, timely, and comprehensive intervention strategies that are intended to prevent neck and shoulder pain among undergraduate college students, need to be developed.

Limitations of the study

In this study, there is a chance of recall bias as it relies on retrospective information provided by the respondents. The cross-sectional nature of the survey prevents drawing inferences or establishing cause-and-effect relationships among variables.

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REFERENCES

1. Priya S, Krishna HS, Veljbhai BB. Comparison of neck muscle flexibility, strength, endurance and proprioception among the video display terminal user's in college students with neck pain and without neck pain. Int J Physiother Res. 2019;7(5):3232-3238. doi: 10.16965/ijpr.2019.169
2. Vitta AD, Bento TP, Perrucini PD, Felippe LA, Poli-Frederico RC, Borghi SM. Neck pain and associated factors in a sample of high school students in the city of Bauru, São Paulo, Brazil: Cross-sectional study. Sao Paulo Med J. 2021;139(1):38-45. doi: 10.1590/15163180.2020.0168.R1. 30102020
3. Boro T, Nagrale O. The prevalence of cervical extension deficit among young adults: A cross-sectional observational study. Int J Phys Educ Sports Health. 2020;7(2):120-124.
4. Direksunthorn T, Polpanadham P, Summart U, Mahem K, Kempanya P, A'la MZ, et al. Association of electronic learning devices and online learning properties with work-related musculoskeletal disorders (WMSDs): A cross-sectional study among Thai undergraduate students. PloS one. 2023;18(10):e0291597. doi: 10.1371/journal.pone.029 1597
5. Kashmeera PK, Vijay Selvan N, Andrews M. Prevalence of tension neck syndrome in frequent computer users. Medi Clin Case Rep J. 2023;1(2):65-68. doi: 10.51219/MCCRJ/ Vijay - Selvan-N/20
6. Purushothaman VK, Guna Segar S, Muniandy Y, Subbarayalu AV, Prabaharan S, Rubavathi Marimuthu P. Comparison of neck muscle strength, range of motion, and craniovertebral angle among Malaysian young adults using different electronic devices. Electron J Gen Med. 2023;20(4):em499. doi: 10.29333/ejgm/13185
7. Abusamak M, Jaber HM, Alrawashdeh HM. The effect of lockdown due to the covid-19 pandemic on digital eye strain symptoms among the general population: A cross-sectional survey. Front Public Health. 2022;10:895517. doi: 10.3389/fpubh.2022.895517
8. Myint WW, Saimon R, Majid NN, Saripuddin MB, Rajan RA. The relationship between usage of digital devices and musculoskeletal symptoms: A cross-sectional study among university students in Sarawak. Int J Online Biomed Eng. 2021;17(9):35-47. doi: 10. 3991/ijoe.v17i09.24605
9. Ullah I, Khan A, Ullah S, Khan MS, Beland B, Shah A. Prevalence of neck pain in computer users among the undergraduate students at Khyber Medical University, Peshawar. Ann Allied Health Sci. 2021;7(1):8-11.
10. Maayah MF, Nawasreh ZH, Gaowgzeh RA, Neamatallah Z, Alfawaz SS, Alabasi UM. Neck pain associated with smartphone usage among university students. PloS one. 2023;18(6):e0285451. doi: 10.1371/journal.pone.0285451

11. Ahmed S, Mishra A, Akter R, Shah MH, Sadia AA. Smartphone addiction and its impact on musculoskeletal pain in neck, shoulder, elbow, and hand among college going students: A cross-sectional study. Bull Fac Phys Ther. 2022;27(1):5-13. doi: 10.1186/s43161-021-00067-3
12. Arshad MA, Shamsudin MZ, Mustafa MJ. Laptop use and upper extremities musculoskeletal disorders among higher learning students. J Environ Health. 2020;2(2):1-4.
13. Ling KY, Hui OJ. Prevalence of musculoskeletal pain and its association with computer workstation ergonomics among undergraduates in Malaysia. INTI Journal. 2023;2023(32):1-8.
14. Satapathy J, Dash A. The impact of video display terminals on ocular and non-ocular health among students: A cross-sectional study. J Evid Based Med Healthc. 2019; 6(46), 2935-2939. doi: 10.18410/jebmh/2019/612
15. Hawamdeh M, Al-Nassan SM, Obaidat SM, Shallan A, Hawamdeh ZM, Eilayyan O, Altaim TA, Alanazi F. The relationship between using smartphones and text neck syndrome in online learning among university students in Jordan: A Survey Study. Ortopedia Traumatologia Rehabilitacja. 2023;25(6):315-320. doi: 10.5604/01.3001.0054.2883
16. El-Gamal F, Najm F, Najm N, Aljeddawi J. Visual display terminals health impact during covid 19 pandemic on the population in Jeddah, Saudi Arabia. Entomol Appl Sci Lett. 2021;8(2):91-99. doi: 10.51847/jJp0wj6I4S
17. Legan M, Zupan K. Prevalence of mobile device-related musculoskeletal pain among working university students: A cross-sectional study. Int J Occup Saf Ergon. 2022;28(2):734-742. doi: 10.1080/10803548.2020.1827561
18. Chan LL, Wong AY, Wang MH, Cheung K, Samartzis D. The prevalence of neck pain and associated risk factors among undergraduate students: A large-scale cross-sectional study. Int J Ind Ergon. 2020;76:102934. doi: 10.1016/j.ergon.2020.102934
19. Elsiddig AI, Altalhi IA, Althobaiti ME, Alwethainani MT, Alzahrani AM. Prevalence of neck and shoulder pain among Saudi universities' students who are using smartphones and computers. J Family Med Prim Care. 2022;11(1):194-200. doi: 10.4103/jfmpc.jfmpc_1138_21
20. Huey TY, Pillai SG. Prevalence and associated risk factors of neck pain among university students in Kuantan, Pahang during covid-19 pandemic. Asian J Med Heal Sci. 2021;4:228-238.
21. Elshaer N. Prevalence and associated factors related to arm, neck and shoulder complaints in a selected sample of computer office workers. J Egypt Publ Health Assoc. 2017;92(4):203-211. doi: 10.21608/EPX.2018.22041

AUTHORS' CONTRIBUTION:

SM: Conception of the study, data acquisition, analysis, manuscript drafting, final approval of the published version

IM: Data collection, analysis & interpretation, critical review, final approval of the published version

MTS: Data collection, manuscript drafting, critical review, final approval of the published version

MRR: Data collection, data analysis, critical review, final approval of the published version

MI: Data analysis, critical review, final approval of the published version

MU: Data collection, data analysis, critical review, final approval of the published version

All Authors agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

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The data are available from the corresponding author upon reasonable request.

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