

DĪ TÓU ZÚ AND MUSCULOSKELETAL DISCOMFORT AMONG THEM: A SURVEY OF THE MEDICAL STUDENTS OF PESHAWAR

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ABSTRACT

Objective: To find out the relationship between smartphone addiction and musculoskeletal discomfort in the neck and hand among medical students of Peshawar.

Methodology: This cross-sectional study was conducted in the medical and dental institutions of Peshawar, Pakistan using a convenience sampling technique. The duration of the study was from December to March 2020. All students from first to final year, consenting to participate, were included in the study. The Smartphone Addiction Scale Short Version (SAS-SV), Neck disability Index (NDI) and Cornell Hand Discomfort questionnaire (CHDQ) were used for conducting this study. Data was analyzed using SPSS V .25.

Results: The mean age of the sample (n=950) was 20.97 ± 1.63 years with the age range of 18-25 years. The cronbach alpha reliability was 0.843 for the Smartphone Addiction Scale, 0.806 for the Neck Disability Index and 0.862 for musculoskeletal pain in the Hand. More than half of the students were addicted to smartphones (n=573, 60.3%). Pearson correlation analysis showed a mild and significant correlation between SAS-SV and NDI (r=.271, p=0.000) and SAS-SV and CHDQ (r=.132, p=0.000) respectively. Also, a moderate and significant correlation between CHDQ and NDI (r=.413, p=0.000) was shown. No significant differences were found between gender, and discipline on SAS, NDI and CHDQ (p>0.01) respectively.

Conclusion: The study concluded that smartphone addiction has a significant positive correlation with musculoskeletal problems in the hand and neck which initially might be temporary but can lead to permanent problems.

Key Words: Smartphone Addiction, Musculoskeletal pain, Medical students

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INTRODUCTION

In the contemporary era, smartphones are indispensable devices for most college students. There have been huge advancements in smartphones which have increased its use and have made users more reliant on them. Lin et al. considered smartphone addiction as a form of technological addictions¹. Griffiths operationally defined technological addictions as non-chemical (behavioural) addictions that involve human-machine interaction².

In a Time Mobility Poll in 2012, it was found that 1 in 4 people checked their phone every 30 minutes and 1 in 5 people checked it every 10 minutes³. A third of participants reported that being without their phones for even short periods of time caused anxiety. A survey done in 2020 found that 75.4% of people consider themselves

addicted to their phones and 65.6% check their phones up to 160 times per day⁴. The Chinese have coined a term for smartphone addicted people: Dī Tóu Zú, which literally means "lowered head clan"⁵. A correlation between the rise in smartphone use and musculoskeletal problems has been reported⁶. The typical posture adopted while holding a smartphone involves holding it below the eye level, looking down at the device and using the thumb to touch the screen⁶. Therefore, the term 'Dī Tóu Zú' is accurate in terms of the musculoskeletal discomfort that accompanies the posture adopted by smartphone users.

A repetitive stress injury known as "Text Neck" results from forward neck flexion for prolonged periods of time causing pain in the neck, head, shoulder and upper back region, and increased curvature of the spine^{7, 8}. A study reports that heavy use of smartphone may cause change

in cervical curve and threshold of pain in the muscles around the neck⁹.

"De Quervain's syndrome" or "Texting Thumb" results from continuous grasping and repetitive movements of the thumb and is associated with pain and discomfort in the thumb and thumb musculature¹⁰. Body postures that involve holding the smartphone for prolonged periods of time contributes to overuse of hand muscles and to the development of musculoskeletal pain in the hand and forearm¹¹.

Smartphones are being used by students for SMS, text messages, e-mails, video calls and voice calls using social media networks. More than 90% of medical students, irrespective of their year of study, feel that smartphones are useful for medical education¹². However, a study found that students, on average, activated their smart phones after every 12 minutes, which makes it more than 80 times a day¹³. A study conducted in United Kingdom found that the most smartphone-addicted population was college aged participants (18-24 years)¹⁴. Studies have correlated smartphone addiction with musculoskeletal pain^{15, 16}, with neck pain¹⁷ or pain in the hand and thumb separately¹⁸, but only one small scale study focused on the correlation between smartphone addiction and musculoskeletal pain in the neck and thumb¹¹. Therefore, this study was conducted with the aim to find out self-reported smartphone addiction and its correlation with musculoskeletal discomfort in the hand and neck of medical students of Peshawar.

METHODOLOGY

A Cross-sectional study was conducted in the medical and dental institutions of Peshawar, Pakistan using a Convenience sampling technique. The duration of the study was from December 2019 to March 2020. The study was carried out after ethical approval from the ethical review committee (ERC) of Peshawar Medical College. The participation was entirely voluntary, and all participants were enrolled after their implied consent and provision of information about the instruments. Students with congenital physical disabilities related to hand and neck muscles and those already on treatment for musculoskeletal problems were excluded from the study.

A questionnaire was administered including demographic questions which included "The Smartphone Addiction Scale Short Version", "Neck Disability Index" and the "Cornell Hand Discomfort Questionnaire".

Smartphone Addiction Scale-Short Version (SAS-SV): It is a reliable and valid measurement tool for the evaluation of smartphone addiction. The SAS-SV comprises of 6 factors, has 10 items, scored on a likert scale (1 for "strongly disagree" to 6 for "strongly agree"). Scores range from 10 to 60. The scoring criteria is based on the

cut-off value of 31 for males and 33 for females¹⁹.

Neck Disability Index (NDI): This validated instrument for assessing self-rated disability in patients with neck pain consists of 10 items. These are scored from 0 to 5, where 0 means "No pain" and 5 "Worst imaginable pain". The higher score shows more neck disability²⁰.

Cornell Hand Discomfort Questionnaire (CHDQ): This screening tool is used to assess abnormal symptoms related to hand functions. It has 6 items and consists of 6 shaded areas of the hand, shown in a diagram, marked as A to F. A formula (frequency × discomfort × interference) is used for calculating the total discomfort value and higher scores indicate more discomfort²¹.

The results were analysed using the SPSS v.25. Analysis of the basic variables was carried out using descriptive statistics. The reliability of the scales was carried out through cronbach alpha reliability. Independent sample t-test was applied to find out the gender, and discipline-wise differences on SAS, NDI, and hand discomfort scale. Pearson correlation coefficient was used to find out the relationship between SAS-SV, NDI, and CHDQ. The results of all the tests of significance were considered significant at $p < 0.05$ level.

RESULTS

The mean age of the sample ($n=950$) was 20.97 ± 1.63 years with the age range of 18-24 years. The Cronbach alpha reliability was 0.843 for the Smartphone addiction scale and 0.806 for the Neck disability Index and 0.862 for musculoskeletal pain in the Hand. More than half of the students were addicted to smartphones ($n=573$, 60.3%). Details are given in table 1.

Pearson correlation analysis showed a mild and significant correlation between SAS-SV and NDI ($r=.271$, $p=.000$), SAS-SV, and CHDQ ($r=.132$, $p=.000$) but showed a moderate and significant correlation between CHDQ and NDI ($r=.413$, $p=0.000$) respectively (Table 2).

Table 3 shows gender and discipline-wise mean differences on smartphone addiction, hand discomfort, and neck disability index, where they showed no significant differences between male and female and among medical and dental students ($p > 0.01$) respectively. Details are given in table 3.

Majority of the students felt discomfort on the thenar area ($n=205$, 21.6%), followed by discomfort in the index, middle, half of the ring finger ($n=194$, 20.4%); the lower part of the hypothenar area of the hand ($n=189$, 19.9%); and the thumb ($n=178$, 18.7%). Few reported discomforts in half of the ring finger and the little finger ($n=167$, 17.6%) and on the upper part of palm ($n=165$, 17.4%) respectively.

DISCUSSION

Table 1: Demographic details (n=950)

S. No	Variables		Frequencies (%)
1	Gender	Male	382 (40.2%)
		Female	568 (59.8%)
2	Age	M (SD)	20.97 (1.63)
3	Discipline	Medical	709 (74.6%)
		Dental	241 (25.4%)
4	Smart phone addiction	No Addiction	377 (39.7%)
		Addiction	573 (60.3%)
5	Neck Disability Index	M (SD)	10.69 (7.44)
6	Hand Discomfort	M (SD)	10.33 (21.05)

Using Mean and SD for age, neck disability index and hand discomfort and frequencies and percentages for the rest

Table 2: Pearson correlation among Smartphone Addiction, Neck Disability Index and Hand Discomfort (n=950)

S. No	Scales	I p (p-value)	II p (p-value)	III p (p-value)
I	Smartphone Addiction	1		
II	Neck Disability Index	.271** (.000)	1	
III	Hand discomfort	.132** (.000)	.413** (.000)	1

Table 3: Mean differences on the gender and discipline wise differences on all the scales (n=950)

Scales	Gender		t- value	Sig	Discipline		t- value	Sig
	Male n=382 Mean (SD)	Female n=568 Mean (SD)			Medical n=709 Mean (SD)	Dental n=241 Mean (SD)		
Smart Phone Addiction-Short Version	35.45 (9.99)	35.51 (11.27)	-.077	.939	35.81 (10.97)	34.52 (10.13)	1.610	.095
Neck disability index	10.89 (7.86)	10.55 (7.15)	.698	.486	10.54 (7.42)	11.12 (7.48)	1.036	.300
Cornell Hand Discomfort Questionnaire	11.78 (23.69)	9.37 (19.11)	1.569	.117	9.73 (18.21)	12.33 (28.57)	1.449	.252

Smartphone users adopt a posture which involves forward neck flexion along with single-handedly holding the device which exposes both the neck and hand to intense stresses leading to discomfort in the neck and hand. Similarly, forward head posture, a poor posture in the sagittal plane, might lead to neck and back pain syndromes and changes in the curvature of the cervical spine²². The Cronbach alpha coefficient of smartphone addiction in our study was close to the original scale ($\alpha=0.91$)²³ and other versions namely Turkish, Italian, Malay, Spanish, Belgian and Urdu ($\alpha=0.88, 0.79, .0=94, 0.88, 0.90, 0.81$) respectively²⁴⁻²⁸. The mean age of our study participants was similar to other studies conduct-

ed in students on the same topic^{11,28}.

Smartphone addiction was more prevalent in our population as per our findings. A study conducted at King Abdul Aziz University reported similar findings to those of our study²⁹. Similarly, other studies reported findings of prevalence of smartphone addiction among students of medical colleges, that corresponded with our findings^{15, 28, 30}. However, there are studies that have reported a lower prevalence rate of smart phone addiction (10 to 21.5%) than our research findings^{27, 31, 32}. This dissimilarity might be due to be the difference in age distribution or the tools and scales used to conduct these studies. Our study results regarding smartphone

addiction, showed a higher prevalence than the Asian and Middle East region, including India, (39-44%)³³ and Saudi Arabia (48%)³⁴.

In our study, there was no significant gender difference in terms of smartphone addiction, which is similar to other studies that reported the non-association of gender with smartphone addiction^{35, 36}. However, there were some studies that reported more smartphone addiction in males than females^{34, 37}. These differences might be due to cultural differences or use of applications such as games that requires greater screen time in males³⁸.

The most frequent pain related to smartphone addiction was in the neck (60.8%), which is similar to our findings²⁰. The results of the Cornell Hand Discomfort Questionnaire showed that there was maximum discomfort in the shaded areas E and F and C, showing more discomfort in the thumb and thenar area. A similar study conducted by Shah et al found that areas C and E showed more discomfort in the thumb and these findings were similar to ours¹⁰. According to a survey, in the last 5 years, 43 percent of smartphone users have experienced thumb pain³⁹.

Our study results showed a significant positive but mild correlation between smartphone addiction and neck discomfort, which is in contrast with the findings of Shah et al¹⁰. However, we found a significant mild and positive correlation between SAS-SV and CHDQ, which is in favour of the findings of Shah et al¹⁰.

IMPLICATIONS

Students should try to reduce the time of usage of smartphones, adopt proper posture, take short breaks in between usage time, and perform mobility exercises during the breaks. They should try to hold their smartphones with both hands and type with fingers other than the thumb to reduce discomfort in the thumb.

CONCLUSION

Smartphone addiction has a significant positive correlation with musculoskeletal problems in the hand and neck. Excessive usage of smartphones can lead to problems in skeletal structures and musculature surrounding the neck and hand which, if not addressed, may lead to long term problems.

LIMITATIONS

Self-administered questionnaires were used, which may increase the risk of response bias. Since the study was conducted in a single setting, it cannot be generalized unless replicated in different settings. The age range in the sample population was a bit narrow so our findings cannot be applied to a higher age range regarding severity of symptoms or level of addiction.

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CONTRIBUTORS

AM and MI conceived and conceptualized the idea and wrote the manuscript. BM led data collection and data entry and helped in the write up of the study. MRS did statistical analysis and helped in the write up of the study. MI critically revised the manuscript and supervised the study. All authors contributed significantly to the submitted manuscript.