



A community-based survey on prevalence of neck pain associated with smart phone overuse & effect of social habits on health

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Abstract

Background: People of all ages have started using cellphones for a variety of daily tasks, making them an indispensable item in daily life. Smartphones are an important source of information and pleasure in addition to being a tool for communication. The world is getting more and more reliant on cellphones, which may contribute to a number of musculoskeletal issues. Today, every single person uses a cell phone. It is risky to utilize them without understanding their negative effects. There are studies on cancers caused by electromagnetic radiation from cell phones, but more research is needed to determine the negative physical and emotional impacts on heavy users, such as college students and others. This investigation focused on the negative health impacts of cell phone use among college students enrolled in professional courses.

Aim: This study sought to determine the prevalence and contributing variables of neck and shoulder discomfort among people aged 18 to 45 and older who use smartphones and computers and other Gadgets.

Method: This cross-sectional study was conducted through a household survey from December 24, 2022 to April 18, 2023. This cross-sectional study conducted face-to-face

interviews in both urban and rural areas. It is used for learning both in urban and rural areas of Karnataka, Andhra Pradesh, Uttarakhand, Maharashtra, Tamil Nadu, Delhi, Kerala, Mumbai, Assam, Meghalaya and from other states.

Results: The majority of subjects (3.4%) are between the ages of less than 18, 71.4% are between the ages of 18 to 25, 13.3% are between the ages of 25 to 35, followed by the age groups of 35 to 45 (5.8%), and those over 45 (3.4%). Out of all the volunteers, 55.7% were females and 43.9% were males & rest were Trans genders (0.2%). 1.9% were housewives, 4.5% engineers, 52.0% students, 3.4% teachers, 5.6% pharmacists, 1.5% retired persons. 29.5% of people stay in hostel & 70.5% rest of them stay at home. 89.7% of the subjects had no past medical history, 3.0% had diabetes and 2.8% had hypertension. Out of which, 2.8% of people have disabilities & 96.6% of people have no disabilities

Conclusion: According to the current study, roughly half of study participants had complained of neck pain within the previous four months. Personal traits, such as last year's college enrollment, increased smartphone use, gaming, skipping breaks, or use of other electronic gadgets, are also problematic. The use of mobile phones results in accidents. To lessen negative impacts on subjects, recommendations include reducing reliance on devices, reducing call time, increasing communication via SMS, keeping devices as far away from the head as feasible, using headphones or speakers, etc. was a recommendation made in the takeaway message.

Keywords: Addiction, Cross-sectional study, Musculoskeletal pain, Pain & Smartphone.

Introduction

Mobile technology has spread rapidly around the globe. Today, it is estimated that more than 5 billion people have mobile devices, and over half of these communication devices are smart phones [1]. Young adults today have grown up with smartphones as an evident part of their lives. As the use of electronic device has become more significant nowadays due to the various functions it offers to the users, it has been reported that there is an increase in ownership and usage of electronic devices among young adults [1–4]. In a recent study, smart phone ownership among adults aged 18 to 34 was reported as 92% and 95% in the USA and Australia respectively [4]. In the last 20 years, worldwide mobile phone subscriptions have grown from 12.4 million to over 5.6 billion, penetrating about 70% of the global population [5]. Its usage has also become an important public health problem, as there have been reports of plenty of health hazards, both mental and physical, in people of all age groups. While

some of these oft-seen effects are critical like cancers, others that cause definite morbidity are both physical and mental. On 31 May 2011, the World Health Organization confirmed that cell phone use indeed represents a health menace, and classified mobile phone radiation as a carcinogenic hazard, possibly carcinogenic to humans. In spite of some knowledge on unfavorable health effects, the usage of cell phones has increased dramatically especially since the time they have become more affordable and available all over the world. Almost 87-90% of the population in an advanced country like the USA, use cell phones, and a sizeable number of these are school and college going students [6].

The purpose of the study is to increase awareness of neck pain and related disorders associated with smart phone over-usage. All the illnesses associated with smart phone over-usage are being estimated are tried to correct by this study. In addition, it would prove useful to establish systematic guidelines for proper body posture and usage of smart phones. This study has a benefit of preventing spondylosis in future in prone subjects.

Benefits of study

Benefits include: Reducing neck pain and related disorder in short time by a simple life style change, getting knowledge about perfect body posture to maintain while using smart phone, prevention of further neck injuries like spondylitis or any other severe neck injuries, and cost effective safe and easy management.

Materials and Methods

Inclusion & exclusion criteria: Both men and women of all ages, who use smartphones with agreed informed consent form were included in the study. Patients with musculoskeletal disorders, neurological disorders, psychological disorders, neck injury, spinal anesthesia, comorbidity and disabilities were not included in the study. In addition, patient who does not have personal smartphone and have neck pain before using smartphone were also excluded from the study.

Study Design

For this cross-sectional study, we performed in-person interviews in both urban and rural locations. From 20 December 2022 to 30 April 2023, it was carried out by a household survey.

Study setting

Both urban and rural regions of Karnataka, Andhra Pradesh, Uttarakhand, Delhi, Maharashtra, Tamil Nadu, Kerala, Mumbai, Assam, and Meghalaya were used for the study.

The investigation was conducted using the provided questionnaire both online and offline. More than 466 participants took part in the study.

Methodology

This is a cross sectional study conducted through Google forms. Questionnaire (Google form) was distributed in various parts of India. The study population includes both genders of all age groups. Patient data was obtained by data collection forms (Google form). Patient's demographics, medical history and details on phone usage and neck pain were hence obtained over a period of 5 months. At the end of study period, data is analyzed statistically.

Analysis of data

The required details from the study subjects were collected paying due attention to inclusion and exclusion criteria. Data was analyzed based on variables like age, profession, duration of use, posture, drugs, addiction status, etc.

Results

The majority of subjects (3.4%) are under the age of 18, followed by people between the ages of 18 and 25 (71.4%), people between the ages of 25 and 35 (13.3%), people between the ages of 35 and 45 (5.7%), and those over 45 (3.4%). Out of all the volunteers, 55.7% of them were female, 43.9% were male, and 0.2% were others. 1.9% of people were housewives, 4.5% were engineers, 52.0% were students, 3.4% were teachers, 5.6% were chemists, and 1.5% were retirees. 70.5% of persons live at home, while 29.5% stay in hostels. 3.0% of the participants had diabetes, 2.8% had hypertension, and 89.7% had no prior medical history. 2.8% of them are individuals have disabilities, while 96.6% are disability-free (Table 1).

Table 1: Factors associated with neck pain due to smartphone over usage

S. No.	Factor	Options	No. of Participants in
1	Age	Less than 18 years	3.40%
		Between 18 to 25 years	71.40%
		Between 26 to 35 years	13.30%
		Between 36 to 45 years	5.80%
		More than 45 years	1.30%
2	Gender	Male	43.90%
		Female	55.70%
		Others	0.20%

3	Profession	Retired	1.50%
		Engineer	4.50%
		Housewife	1.90%
		Pharmacist	5.60%
		Teacher	3.40%
		Student	52.00%
4	Past medical history	Diabetes	3.0 %
		Hypertension	2.8 %
		Epilepsy	4.5 %
		No past medical history	89.7 %
5	Do you think depression is the reason for	Yes	34.0 %
		No	65.6 %
6	Do you have a personal smart phone?	Yes	94.8 %
		No	3.9 %
7	Since how many years are you using smart phone?	Less than 1 year	5.8 %
		Between 1 to 3 years	25.8 %
		Between 4 to 6 years	60.9 %
8	How many hours per day do you use smart phone? [Average time per day]	Less than 2 hours	17.2 %
		Between 2-6 hours	59.9 %
		Between 7 to 11 hours	2.2 %
		Between 12 to 16 hours	5.0 %
		More than 18 hours	15.7 %
9	Do you use smart phone at night?	Yes	72.6 %
		No	25.4 %
10	Choose the option based on your smart phone usage at night	Early night (7 PM) tonight (10 PM)	58.8 %
		Night (10 PM) to mid night (1 AM)	24.4 %
		Mid night (1 AM) to early morning (5 AM)	5.2 %
		Sometimes in night (9 PM to 2 AM)	7.3 %
		Whole night till early morning (9 PM TO 5 AM)	4.3 %
11	Position of using smart phone?	Lying on side	19.2 %
		Lying on back	25.6 %
		Sitting	41.8 %
		Standing	1.1 %
		Walking	9.5 %
		Lying on stomach	2.8 %

12	Distance of smart phone from eye?	Less than 10 cms	11.4 %
		Between 10 to 20 cms	59.5
		Between 21 to 30 cms	23.5 %
		More than 30 cms	4.1 %
15	Location of Neck pain? (Based on image below)	Above C4	14.6 %
		Below C4	28.9 %
		Above and below	9.8 %
16	When do you experience the pain mostly?	While using phone	19.6 %
		Immediately after using phone	4.3 %
		Pain after sometime of using phone	23.7 %
		All the time	5.2 %
		Others	47.2 %
17	Body angle posture of using smart phone?	0°	16.6 %
		15°	40.0 %
		30°	24.5 %
		45°	4.5 %
		60°	14.4 %
18	How many hours of sleep do you get daily?	<4hrs	5.6 %
		4-6hrs	33.5 %
		6-8hrs	57.2 %

Discussion

It is evident from the above-mentioned results that almost an equal number of subjects from both medical and other colleges were included in this study. Almost all students own a cell phone. Of the 3.9 % who did not own a cell phone, it was revealed that they had either lost theirs a few days ago or were new in the city and would procure one in due course of time. It is therefore clear that cell phones are a basic requisite. Seventy five percent of the subjects in the study said that have been using a cell phone for more than a year and this finding compares well with that of the Indian study of 2004 wherein most subjects owned the mobile phone for more than a year and as we will discuss later all of them responded by stating that they were suffering from one or other health effects due to handling of cell phones.

Smartphones are the fastest growing in the market nowadays. It is essential to every person's life. Children need it just as much as the elderly do. Students and employees alike require it. Smartphones are ubiquitous. It offers a variety of entertainment, informational, social, calling, messaging, and browsing pleasures. It is more opulent if internet access is available. In addition to giving pleasure, it also has negative health effects for long-term users.

Everyone uses it incorrectly today for extended periods of time, which can lead to musculoskeletal issues like headaches, neck discomfort, shoulder pain, back pain, and insomnia. The effects of radiation on health are more severe than these ailments.

Therefore, in this study, we assessed the frequency of neck pain among smartphone users as a result of excessive use and various other posture-related issues. Our study showed a link between excessive smartphone use and neck pain. There is a correlation between excessive smartphone use and bad or inappropriate posture, which results in neck pain. According to our study, 35% of the population had neck pain because of excessive smartphone use. The study's findings make it abundantly evident which types of postures, usage durations, body angles, and types of activities caused neck pain. Therefore, it is crucial that we comprehend and put into practice the best practices for handling technology. Such good practices include a) Maintaining body angle 0° or 15° while using smartphone, b) Use smartphones for not more than 2 hours per day and c) Maintaining correct posture.

Conclusion

According to the current study, roughly half of study participants had complained of neck pain within the previous four months. Personal traits, such as last year's college enrollment, increased smartphone use, gaming, skipping breaks, or use of other electronic gadgets, are also problematic. The use of mobile phones results in accidents. To lessen negative impacts on subjects, recommendations include reducing reliance on devices, reducing call time, increasing communication via SMS, keeping devices as far away from the head as feasible, using headphones or speakers, etc. was a recommendation made in the takeaway message.

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Authors Contributions

All the authors contributed equally in design of the work, acquisition and interpretation of data, and manuscript preparation, all authors have read and approved the manuscript.

Conflict Of Interest

There is no conflict of interest from all the authors.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his/her consent for his/her images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Data Availability Statement

The data sets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

References

1. Taylor K, Silver L. Smartphone ownership is growing rapidly around the world, but not always equally. Pew Research Center. 2019;5. [Google Scholar]
2. Liadi OF. College students and smartphone ownership: symbolic meanings and smartphone consumption among Nigerian Students. *Acta Universitatis Danubius Communicatio*. 2016;10(1):17–31. [Google Scholar]
3. Poushter J. Smartphone ownership and internet usage continues to climb in emerging economies. Pew research center. 2016;22(1):1–44. [Google Scholar]
4. Rideout VJ, Foehr UG, Roberts DF. Generation M 2: Media in the Lives of 8-to 18-Year-Olds. Henry J Kaiser Family Foundation. 2010. [Google Scholar]
5. Electromagnetic Fields and public health: mobile phones (2011) Fact sheet No.193, World Health Organization.
6. World Health Organization Says Cell Phones a Possible Cause of Cancer (2011) American Cancer Society.
7. AlAbdulwahab SS, Kachanathu SJ, AlMotairi MS. Smartphone use addiction can cause neck disability. *Musculoskeletal Care*. 2017;15:10–2. <https://doi.org/10.1002/msc.1170>.
8. Samaha M, Hawi NS. Relationships among smartphone addiction, stress, academic performance, and satisfaction with life. *Comput Human Behav*. 2016;57:321–5. Available from: [doi.org/](https://doi.org/10.1016/j.chb.2015.12.045). <https://doi.org/10.1016/j.chb.2015.12.045>.
9. Mustafaoglu R, Yasaci Z, Zirek E, Griffiths MD, Ozdinciler AR. The relationship between smartphone addiction and musculoskeletal pain prevalence among young population: a cross-sectional study. *Korean J Pain*. 2021;34:72–81. Available from: <https://doi.org/10.3344/kjp.2021.34.1.72>.

10. Chen B, Liu F, Ding S, Ying X, Wang L, Wen Y. Gender differences in factors associated with smartphone addiction: a cross-sectional study among medical college students. *BMC Psychiatry*. 2017;17:1–9. Available from: <https://doi.org/10.1186/s12888-017-1503-z>.
11. Ahmed S, Akter R, Pokhrel N, Samuel AJ. Prevalence of text neck syndrome and SMS thumb among smartphone users in college-going students: a cross-sectional survey study. *J Public Heal*. 2021;29:411–6. Available from: <https://doi.org/10.1007/s10389-019-01139-4>.
12. Baabdullah A, Bokhary D, Kabli Y, Saggaf O, Daiwali M, Hamdi A. The association between smartphone addiction and thumb/wrist pain: a cross-sectional study. *Medicine (Baltimore)*. 2020;99:e19124. Available from: [doi.org/https://doi.org/10.1097/MD.00000000000019124](https://doi.org/10.1097/MD.00000000000019124).
13. Can S, Karaca A. Determination of musculoskeletal system pain, physical activity intensity, and prolonged sitting of university students using smartphone. *Biomed Hum Kinet*. 2019;11:28–35. Available from: <https://doi.org/10.2478/bhk-2019-0004>.
14. Matar Boumosleh J, Jaalouk D. Depression, anxiety, and smartphone addiction in university students- a cross sectional study. *PLoS One*. 2017;12:e0182239. Available from: <https://doi.org/10.1371/journal.pone.0182239>.
15. Ahmed S, Nikita pokhrel, Swastik Roy AJS. Impact of nomophobia: a nondrug addiction among students of physiotherapy course using an online cross-sectional survey. *Indian J Psychiatry*. 2019;61:77–80. Available from. <https://doi.org/10.4103/psychiatry.India.nJPsychiatry>.
16. Soliman Elserty N, Ahmed Helmy N, Mohamed Mounir K. Smartphone addiction and its relation to musculoskeletal pain in Egyptian physical therapy students. *Eur J Physiother*. 2020;22:70–8. Available from: <https://doi.org/10.1080/21679169.2018.1546337>.
17. Alzaid AN, Alshadoukhi O, Alnasian A. The prevalence of neck pain and the relationship between prolonged use of electronic devices and neck pain in a Saudi Arabia: Cross - Sectional Study in Saudi Arabia. *Egypt J Hosp Med*. 2018;70:1992–9. Available from: doi: <https://doi.org/10.21608/EJHM.2018.9405>.
18. Kwon M, Kim DJ, Cho H, Yang S. The smartphone addiction scale: development and validation of a short version for adolescents. *PLoS One*. 2013;8:e83558–e83558. Available from. <https://doi.org/10.1371/journal.pone.0083558>.
19. Vernon H, Mior S. The Neck Disability Index: a study of reliability and validity. *J Manipulative Physiol Ther*. 1991;14:409–15.

20. Roy J-S, MacDermid JC, Woodhouse LJ. Measuring shoulder function: a systematic review of four questionnaires. *Arthritis Rheum.* 2009;61:623– 32. Available from: <https://doi.org/10.1002/art.24396>.
21. Roach KE, Budiman-Mak E, Songsiridej N, Lertratanakul Y. Development of a shoulder pain and disability index. *Arthritis Care Res.* 1991;4:143–9.
22. Ebrahimzadeh MH, Kachooei AR, Vahedi E, Moradi A, Mashayekhi Z, Hallaj-Moghaddam M, et al. Validity and Cross-Cultural Adaptation of the Persian Version of the Oxford Elbow Score. *Int J Rheumatol.* 2014;2014:381237. Available from: [doi.org/https://doi.org/10.1155/2014/381237](https://doi.org/10.1155/2014/381237).
23. Erdinc O, Hot K, Ozkaya M. Turkish version of the Cornell Musculoskeletal Discomfort Questionnaire: cross-cultural adaptation and validation. *Work.* 2011 [cited 2019 Apr 18];39:251–60. Available from: doi: <https://doi.org/10.3233/WOR-2011-1173>.
24. Neupane S, Ali U MA. Text Neck Syndrome - Systematic Review. *Imp J Interdiscip Res.* 2017;3:141–148. Available from: doi: [https://doi.org/10.1016/s0003-6870\(02\)00036-4](https://doi.org/10.1016/s0003-6870(02)00036-4).
25. Kim HJ, Kim JS. The relationship between smartphone use and subjective musculoskeletal symptoms and university students. *J Phys Ther Sci.* 2015;27:575–9. Available from: doi: <https://doi.org/10.1589/jpts.27.575>.
26. Sharan D, Mohandoss M, Ranganathan R, Jose J. Musculoskeletal disorders of the upper extremities due to extensive usage of hand held devices. *Ann Occup Environ Med.* 2014;26:22. Available from: doi: <https://doi.org/10.1186/s40557-014-0022-3>.
27. Bonney RA, Corlett EN. Head posture and loading of the cervical spine. *Appl Ergon.* 2002;33:415–417. Available from: doi: [https://doi.org/10.1016/s0003-6870\(02\)00036-4](https://doi.org/10.1016/s0003-6870(02)00036-4).
28. Eitivipart AC, Viriyarajanakul S, Redhead L. Musculoskeletal disorder and pain associated with smartphone use: a systematic review of biomechanical evidence. *Hong Kong Physiother J.* 2018;38:77–90. Available from: [doi.org/https://doi.org/10.1142/S1013702518300010](https://doi.org/10.1142/S1013702518300010).
29. Sharan D, Ajeesh PS. Risk factors and clinical features of text message injuries. *Work.* 2012;41 Suppl 1:1145–1148. Available from: doi: <https://doi.org/10.3233/WOR-2012-0294-1145>.
30. Shah PP, Sheth MS. Correlation of smartphone use addiction with text neck syndrome and SMS thumb in physiotherapy students. *Int J Community Med Public Heal.* 2018;5:2512–6. Available from: doi: <https://doi.org/10.3233/WOR-2012-0294-1145>.