Afsha Jabeen et al /J. Pharm. Sci. & Res. Vol. 14(10), 2022, 928-933

ISSN:0975-1459
Journal of Pharmaceutical Sciences and Research
www.jpsr.pharmainfo.in

A community-based survey on prevalence of neck pain associated with smartphone over usage

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ABSTRACT

Smartphones are now a days an unavoidable thing and without which we can't even imagine the world. 77% of world population has their own smartphone and in India out of 130 crores population 345.9 million use smartphone. Unfortunately, there is a limited amount of data about the effects of widespread use of smartphones. To date, many studies have already shown adverse effects about the long-term use of smartphones. Among which neck pain is the second largest after back pain among smartphone users. As billions of people use smartphones globally, a small increase in the incidence of adverse effects on health could have major public health implications on long term basis. This is a cross sectional study conducted through online using Google forms. Questionnaire (Google form) was distributed in various parts of India through social medias. The study population includes both genders of all age group. 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 6 months. All the aspects of the study protocol including access to and use of patient information were authorized by the ethics committee and informed consent form was taken. At the end of study period, data is analyzed statistically. Our study provided the association of smartphone over usage and neck pain. There is an association that excessive smartphone over usage in wrong or incorrect posture leads to neck pain. Results revealed that about 35% of the population suffered with neck pain due to smartphone over usage. Study results also reveals that what type of postures, duration of use, body angle posture and type of activity was leading to neck pain. So, there is an urgent need to understand the good practices of handling devices and apply them in our day-to-day life. 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; c) Maintaining correct posture.

KEYWORDS: Text neck syndrome, Neck pain, Smartphone, Forward head posture, Prevalence, Correct posture.

INTRODUCTION:

Smartphones are a new class of mobile phones that provides integrated services which may be for official purpose like communication, computing and mobile sectors including voice communications, messaging, personal information management (PIM) applications, send/receive e-mail, and wireless communication capability and unofficial and entertainment purpose like displaying photos, playing games, playing videos, navigation, built in camera, audio/video playback and recording, built in apps for social web sites and surf the Web, wireless internet etc[1, 2]. The greater availability of smartphones has helped tremendously. The intention to keep the cost at lower side to attract more and more customers. So there has been a driving trend of increasing consumer appetite for internet browsing, content consumption and engaging with apps and services on mobile devices[3-5].

Many investigations have studied the effect of using smartphones on pain in different parts of the body and the correlation between symptom severity and time spent on a smartphone[6-8]. Other investigations have demonstrated that the excessive use of cell phone can result in deficiencies such as rounded shoulders and forward head posture, increased cognitive distraction, reduced situation awareness and increases in unsafe behavior. In addition, pain, fatigue, posture and respiratory function worsened with longer smartphone usage[9-11]. Smartphone over usage has correlation with many other diseases like anxiety and fear chronic neck, thoracic and low back pain, headaches and decreased concentration[12]. Sometimes it's also founded to be carcinogenic due to mobile phone radiation[13].

Among all other conditions associated with smartphone usage musculoskeletal effects are mostly seen because of poor posture. From many of the cross sectional studies the relationship between musculoskeletal symptoms and mobile touch screen device has been seen when compared to traditional devices. Therefore, it is important to evaluate the association between addiction/overuse of smartphones and musculoskeletal pain. Among all the musculoskeletal disorders neck and/or shoulder symptoms had the highest prevalence rates reported among smartphone users due to repetitive or prolonged head flexion posture, repetitive movements and ongoing muscle tension[14-15].

Shoulder-arm-neck syndrome is mainly found in people who do repetitive work for more than six months. As the use of Smartphone increases with this occurrence of diseases occur such as exophthalmia. The condition of poor cervical posture causing head flexion (the anterior positioning of the cervical spine) is called forward head posture. Also called as "text neck" syndrome. Forward head posture often appears in teenagers and progresses to old age. As the head and neck are brought forward in the forward head posture, the patient is forced to extend the occiput to keep the eyes horizontal, resulting in overactivity of the suboccipital muscles leading to eyestrain. Neck flexion is affected by the posture, screen size and usage duration while using a smartphone[16-17].

Text neck syndrome has become a global epidemic affecting a large number of populations of almost all ages who use mobile phones. The purpose of the study is to determine the prevalence of neck pain among smartphones

users due to overuse. The prime aim of this research work is to determine the prevalence of neck pain associated with smartphone over usage and various other posture related problems. The prime objectives of this study are, a) To determine the percentage of smartphone users with neck pain in given population, b) To know the pharmacoepidemiology of drugs used in neck pain, c) To aware people regarding the illness related to smartphone over usage, d) To aware people about posture related illnesses.

MATERIALS AND METHODS:

Inclusion & exclusion criteria

Both men and women of all age who use smartphones with agreed inform 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 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 group. 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 6 months. All the aspects of the study protocol including access to and use of patient information were authorized by the ethics committee and informed consent form was taken. At the end of study period, data is analyzed statistically.

Obtaining clearance from institutional ethical committee

For obtaining the ethical clearance, an application along with study protocol, which included the proposed title, study site, inclusion and exclusion criteria, objective and methodology about work to be carried out was submitted to chairman of the institutional ethical committee of MNR hospital.

Data entry proforma

A separate data entry form was prepared for incorporating details of study participants. It included demographic details, medical history and details on phone usage and neck pain.

Collection of data

Patient details were obtained by construction of patient-oriented questionnaire relating to the parameters needed for our study.

Analysis of data:

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

Ethical considerations

Letter of ethical clearance was obtained from the Ethical Review Board. Privacy and confidentiality were ensured during the pharmaceutical care services. Discrepancies were identified and resolved/prevented and appropriate patient education provided so that health and economic outcome was ensured.

RESULTS AND DISCUSSION:

Responses received from the participants for various questions presented in the participant questionnaires are analyzed and presented in the following tables and figures. The obtained details are discussed individually for each question.

Total number of participants attended the participant questionaries used in this study are 800. In those 25 participants are not agreed to participate in the study and remaining 775 participants are agreed to take part in this research study. Hence the total population for the present work is taken as 775 i.e., n = 775.

The online questionnaire reached 18 states of India. Out of 775 total study population, majority of the study population were from Telangana state with 66.58% followed by Tamil Nadu with 13.29% of population. Population from Andhra Pradesh and West Bengal are 6.06% and 6.19%, respectively. From other states like Assam, Maharashtra, Delhi, Kerala, Jammu and Kashmir, Punjab, Orissa, Rajasthan, etc. 5.55% populations participated in the study. Majority of study participants were of age group between 18-25 years with 75.6% of total study population. 14.3%, 5.16%, 3.74% and 1.68% of the study population are between 26-35 years, less than 18 years, between 36-45 years and more than 45 years age group, respectively.

No trans gender is participated in this study. In addition, there is no much difference in female (56%) and male (44%) populations. Among all the participants, students accounted for 58.06% of total study population. 10.58%, 5.55%, 4.26%, 3.10%, 3.35% and 2.71%, of populations are pharmacist, engineer, professor, teacher, house wife, and doctor, respectively. Out of 775 participants majority of the population were living at home. 15% were from hostel, 9% were not willing to answer or the options above were not applicable to them.

Among the 775 participants majority of 698 (90.06%) participants are with no past medical history and participants with diabetes were 5.16%, followed by hypertension (1.55%), epilepsy (0.52%) and other diseases (2.71%). Majority of the population (93.94%) were not having any disabilities.

20% of the study population opinioned that depression is the reason for the smartphone usage. 40.77% of populations are not agreed that depression is the reason for the smartphone usage. Rest of 40.39% populations agreed that sometimes depression is the reason for the smartphone usage. There are 88.77% of participants having only one smartphone and only 8% people having two own smartphones and rest of 3.23% study populations having more than or equal to 3 own smartphones. The most commonly used gadgets along with smartphone were laptop (326) and television (323). There are also 212 participants do not use any other gadgets. Play station and

tables were least used gadgets. Here we can observe that people are in major extent exposed to electronic gadgets along with smartphone.

37.16% of study population were using smartphone between1 to 3 years followed by 25.94% of population using it between 4 to 6 years. 23.87% of populations are using smartphones more than 6 years. 13.03% of study population are using smartphones less than one year. Almost 50% of study population i.e., 49.16% using mobile phones between 2 to 6 hours per day. 6.84% & 2.58% of the study populations only using smartphones between 12 to 16 hours & more than 18 hours, respectively per day. In addition, 12.77% of the study populations using smartphones only less than 2 hours. Out of 295 participants spending more than 6 hours per day for smartphone use, 222 participants age is between 18 to 25 years and 51 participants age is between 26 to 35 years. This indicates that young peoples are spending more time than elder people. Study results showed that majority of participants are using smartphone at nights (65.4%) which show a great health impact. Among 65.42% (507) of total study populations who uses mobile phone at night 43.59% are using mobile between 7 PM to 10 PM and 31.36% are using mobile between 10 PM to 1 AM. Only very less participants (3.75%) are using smartphones whole night between 9 PM to 5 AM. The results indicates that majority of the peoples are using mobile phone before going to sleep which may leads to sleep disturbances.

Although there are 37.54% participants has an angle of 15° but there is no much difference of the participants (34.71%) who has an angle of 30° which shows that they are maintaining forward head posture which is one of the leading causes of neck pain. 13.68%, 12.13% and 1.94% participants using smartphone at an angle of 0°, 45° and 60°, respectively. 50.19% of participant using smartphone in sitting position followed by lying on back were 17.03%, lying on side 12.39%, lying on face 9.29%. Least positions while using smartphone were standing 5.55% and walking 4.52%. 48.39% participants use mobile with right hand and only 6.58% of participants use mobile with left hand which means they are left-handed. Approximately half of the percentage 45.03% use mobile with both hands which is ambidextrous.

57.68% of the study population uses smartphone with a distance between 10 to 20 cm from the eye. 17.03% of the study population uses smartphone with a distance less than 10 cm from the eye which is not good for eye. Rest of study population uses smartphone with a distance more than 20 cm from the eye.

Study results reveal that majority of the study populations uses smartphones for multi-purpose. 88.90% populations use mobile for calling purposes. Approximately 50% of the total population uses smartphone for texting (61.54%), browsing (50.97%), watching videos (59.35%), reading & writing (50.58%) and studying (57.03%). Most common problem encountered by the study populations while using smartphone was headache (53.42%), followed by eye symptoms (36.26%), Sleeping disturbance (30.06%), back pain (27.35%), elbow pain (14.06%), numbness (13.81%), problem in fingers (12.26%), ear ache (11.61%), problem in wrist (11.35%), problem in thumb (9.55%), tingling sensation (8.77%). In mean time, approximately 25% of the study populations (23.10%) not faced any of the problems mentioned in the study.

Neck pain

Among the 775 number of participants 250 (32.26%) are suffering with neck pain and 525 (67.74%) reported that they do not have neck pain. 32% of population having neck pain is enough to prove that smartphone use is associated with neck pain. These 32% of the total study populations are further used in this study. Among 250 participants reported to possess neck injury, only 9 (3.60%) participants are reported that they suffered from previous neck injury. Hence, these 9 participants are excluded from the further studies. Rest of 241 (96.40%) participants who don't have previous neck injuries are considered for the further studies.

The above-mentioned symptoms are of text neck syndrome in which the 70.12% study subjects experienced severe head ache, 68.05% experienced eye strain, 49.38% experienced frequent shoulder pain, 43.57% experienced muscle weakness and 33.20% of study subjects experienced vertigo 29.5%. Only 52 study population among 241 are not having these text neck syndrome symptoms. Rest of 189 among 241 of the study population who experience the neck pain also showed the symptoms of text neck syndrome. 87.14% of the study participants experienced neck pain since using smartphone which is much clear count that smartphone use is associated with neck pain. Only very small study populations (12.86%) experienced neck pain before using smartphone.

Approximately 18.67% of study participants experienced mild to moderate pain. 18.26% of participants experienced acute to mild pain; 17.84% of participants experienced the mild pain, moderate pain in experience by 17.43% of participants. 15.35% of the study population experienced acute pain. Only 7.88% experienced moderate to severe pain and 4.55% participants experienced severe pain. This shows that intensity of the neck pain differs greatly among the study participants. 41.08% of the study participants are experiencing neck pain only below C4 and only 18.26% of the study participants are experiencing pain above C4. The participants who are experiencing pain both above and below C4 are 40.06%. This shows that neck pain is most common effect when seen through cranial bones structure. 43.57% of participants experienced the neck pain after some time of using phone. 33.61% of participants experienced pain while using phone and 15.35% of participants experienced pain immediately after using phone. Only 4.15% of participants experienced pain all the time.

The most common time participants experiencing the pain is at night in 39.84% of population. 32.78% of participants experiences pain throughout the day and 16.18% and 11.20% participants experience pain in the morning and afternoon, respectively. 61% of participants take rest for managing their neck pain. 16.60% of participants take massage to get relieve from neck pain. 7.05% of participants are doing neck exercise to get relieve from neck pain. Very less participants (approximately 3%) use neck bands, cold therapy, heat therapy and other methods

to get relieve from pain. Only0.82% participants are not doing anything to manage their pain.

In the above observation we find that 52.71% of study subjects don't even used any medication when they experience neck pain. About 17.84% of study subjects used acetaminophen (paracetamol) and 8.71% of study subjects used calcium supplement. 6.22% of study subjects used ibuprofen for neck pain relief. 4.56% of study subjects used aceclofenac, 3.74% study subjects used naproxen and 3.73% study subjects used diclofenac. For neck pain management only 2.49% peoples used herbal supplements.

In the above observation we observed that 75.10% of study participants agreed that using medication gives relieve from pain. Only 24.90% of study participants not getting relieve from neck pain after using medication. Majority of study populations (72.61%) are not aware about text neck syndrome. Only one fourth (27.39%) of the participants are aware of text neck syndrome. According to the participants awareness that 40.66% of participants says usage of smartphone can leads to depression. 18.26% of participants say smartphone usage can leads to insomnia and 12.45% says smartphone usage may leads to anxiety. 8.71% of participants says obesity, 4.15% says male infertility and 3.33% of participants says diabetes and 7.05% of participants are not aware any of it. Majority of participants (63.90%) told that neck pain is due to smartphone over usage. Only 12.86% of study population are not accepted that neck pain is due to smartphone usage. 22.82% of study population stated that they do not have pain, but they believe that this type of pain is related to smartphone use. Only 0.41% of study population stated that they have pain, and do not believe that this type of pain is related to smartphone usage.

Neck pain (10.99%) ranks third in our study when compared with other complaints. The highest ranked complaints among study participants are headache (18.8%), the second highest is eye symptoms, followed by sleeping disturbance, back pain, and various other problems.

When studied in SAS-SV the most common answer of the participants was "Feeling pain in the wrists or at the back of the neck while using a smartphone". Which shows that how smartphone is being hurting the musculoskeletal system. Most of the participants selected only one option. Few participants selected more than one option and highest is seven options. 33.20% of participants status is addicted to the smartphone as per SAS – SV score clearly. Whereas rest of 66.80% of participants status was found to be non-addicted but if we see the above statistics, we can observe that participants are somehow agreeing the minimum statements which can clearly proves that this minimum selection of statements can show the effect of neck pain.

Factors associated with neck pain

Various factors associated with neck pain due to smartphone over usage are summarized in Table 1 and each factors discussed elaborately.

a) Time: Majority of the participants spending more times for smartphone use per day. 43.98% and 39.01% of the participants spend between 7 to 11 hours and 2 to 6 hours for smartphone use per day, respectively. 8.31%, 6.63% and 2.07% of the participants spend between 12 to 16 hours, less than 2 hours and more than 16 hours for smartphone use per day, respectively.

b) Position: 52.28% of participants using smartphone in sitting position followed by lying on back were 22.41%. Neck pain is mostly reported in sitting and lying on back position only. Improper sitting may be reason for neck pain. 8.30, 7.47%, 4.56% and 3.73% of participant using smartphone in lying on side, lying on face, standing and walking, respectively. Only 1.24% participants reported that they are using smartphone in all position.

c) Years of use: 12.44%, 26.97%, 28.22% and 32.37% of participants are affected with neck pain who are using smartphones less than 1 year, between 1 to 3 years, between 4 to 6 years and more than 6 years, respectively. Results clearly indicates that when the number years increasing the% of populations suffering with neck pain is also increasing.

d) Depression: In this factor we observed that 27.39% of participants who is having neck pain agreed that smartphone is somehow related to depression and 50.20% of participants almost agreed about depression related to smartphone. Only 22.41% of participants with neck pain don't agree the relation between depression and smartphone.

e) Usage at night: In this observation it was clear that the participant who use smartphone at night are majorly affected by the neck pain (75.93%); whereas participants with neck pain and don't use smartphone at night are only 24.07%.

f) Posture of neck: Participants who flexed 30° (67.22%) reported highest neck pain compared to rest of body angle posture. 0.41%, 17.02% and 15.35% of participants using 0°, 15° and 45° neck angle while using smartphones.

g) Age: The participants with the age group between 18-25 years are majorly (72.61%) affected by neck pain due to smartphone over usage. 21.58%, 4.56%, 3.31% and 2.07% of the neck pain participants were in the gae group of between 26 to 35, between 36 to 45, less than 18 and more than 45, respectively.

h) Gender: Females with 54.36% are slightly more affected by the neck pain due to smartphone in comparison with male with 45.64%.

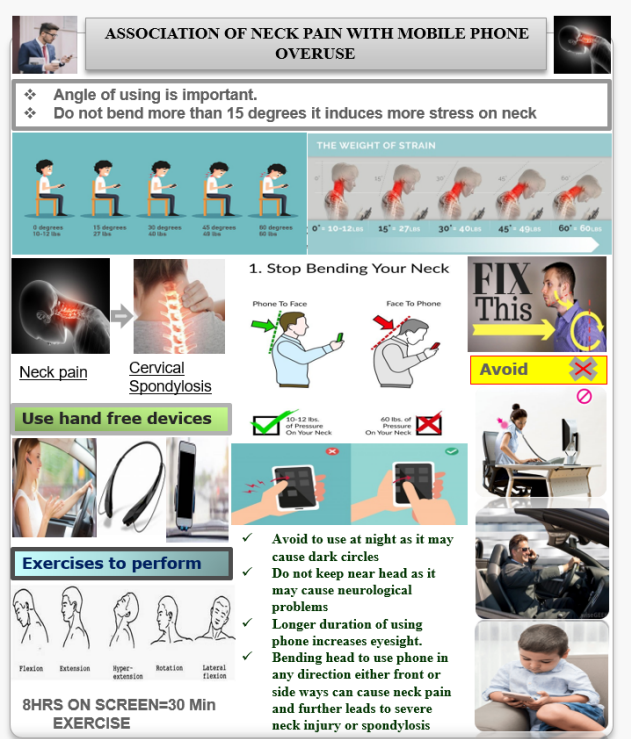
i) Profession: The majority of the participants experiencing neck pain due to smartphone over use are students who are accounted for 73.44%. Rest of all profession are accounted only for 26.56%.

j) Usage of other gadgets: Although the usage of laptop and television show neck pain but there are also 28.22% of the participants who do not use any other gadgets are also suffering from neck pain whose main reason may be smartphone usage only. 51.87% and 43.57% of the participants are also using laptop and television, respectively along with smartphones.

k) Medical condition: Results clearly indicates that there is no much relation of neck pain due to smartphone usage and medical conditions because 95.02% of the participants stated that they don't have any past medical history. Rest of 4.98% were reported their past medical history.

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

S. No.	Factor	Options	Number of participants (%)
1	**Time spent on smartphone per day**	Less than 2 hours	16 (6.63%)
		Between 2-6 hours	94 (39.01%)
		Between 7 to 11 hours	106 (43.98%)
		Between 12 to 16 hours	20 (8.31%)
		More than 18 hours	5 (2.07%)
2	**Position while using smartphone**	Lying on side	20 (8.30%)
		Lying on back	54 (22.41%)
		Sitting	126 (52.28%)
		Standing	11 (4.56%)
		Walking	9 (3.73%)
		Lying on face	18 (7.47%)
		All	3 (1.24%)
3	**Years of smartphone usage**	Less than 1 year	30 (12.44%)
		Between 1 to 3 years	65 (26.97%)
		Between 4 to 6 years	68 (28.22%)
		More than 6 years	78 (32.37%)
4	**Opinion on depression due to smartphone usage**	Yes	66 (27.39%)
		No	54 (22.41%)
		Some times	121 (50.20%)
5	**Smart phone usage at night**	Yes	183 (75.93%)
		No	58 (24.07%)
6	**Angle of neck while using smartphone**	0°	1 (0.41%)
		15°	41 (17.02%)
		30°	162 (67.22%)
		45°	37 (15.35%)
		60°	0 (0%)
7	**Age groups (in years)**	Less than 18	11 (4.56%)
		Between 18 to 25	175 (72.61%)
		Between 26 to 35	52 (21.58%)
		Between 36 to 45	8 (3.31%)
		More than 45	5 (2.07%)
8	**Gender**	Male	110 (45.64%)
		Female	131 (54.36%)
		Transgender	0 (0%)
9	**Profession**	Student	177 (73.44%)
		Pharmacist	12 (4.98%)
		Engineer	9 (3.73%)
		Teacher	8 (3.32%)
		House wife	9 (3.73%)
		Doctor	5 (2.07%)
		Professor	7 (2.91%)
		Others	14 (5.82%)
10	**Other gadgets used**	Laptop	125 (51.87%)
		Play station	14 (5.81%)
		Television	105 (43.57%)
		Tablet	4 (1.66%)
		No other gadgets	68 (28.22%)
11	**Past medical history**	Diabetes	3 (1.24%)
		Hypertension	2 (0.83%)
		Epilepsy	0 (0%)
		No medical history	229 (95.02%)
		Other diseases	7 (2.91%)



CONCLUSION:

Smartphones are the fastest growing in the market nowadays. It is necessary in every individual life. Not only elders but also children need it. Not only employees but students also need it. Everyone has a smartphone. It provides various pleasures of entertainment, knowledge, finding friends, calling, texting and browsing. If present with internet it is more luxurious. Besides providing pleasures it equally harms the health in chronic users. Nowadays everyone is using it for long period and in incorrect posture which could rely them on various musculoskeletal problems like neck pain, shoulder pain, back pain, headache, insomnia, etc. This are postural health impacts. Radiation health impacts are worse than these conditions. Text neck syndrome has become a global epidemic affecting a large number of populations of almost all ages who use mobile phones. Hence, in this research work, we determined the prevalence of neck pain among smartphones users due to overuse and various other posture related problems. Our study provided the association of smartphone over usage and neck pain. There is an association that excessive smartphone over usage in wrong or incorrect posture leads to neck pain. In our study about 35% of the population suffered with neck pain due to smartphone over usage. Reports of the study clearly indicates that what type of postures, duration of use, body angle posture and type of activity was leading to neck pain. So, there is an urgent need to understand the good practices of handling devices and apply them in our daily life. 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.

Conflict of interest:

The authors have no conflicts of interest regarding this investigation**.**

Acknowledgments:

The authors are thankful to the management of MNR College of Pharmacy and MNR Medical College & Hospital, Fasalwadi, Sangareddy, Telangana, India, for providing facilities to carry out this research work.

REFERENCE

1. Sarwar M, Soomro TR. Impact of smartphone's on society. European journal of scientific research. 2013 Mar 2;98(2):216-26.
2. Samir S, Elshinnawy A, Elrazik R, Battesha H, Ali M, Gazya A. The long-term effect of smartphone overuse on Cervical Posture and range of motion in asymptomatic sedentary adults. Journal of Advanced Pharmacy Education & Research. 2019;9(4).
3. Verstockt S, Decoo D, Van Nieuwenhuyse D, De Pauw F, Van de Walle R. Assistive smartphone for people with special needs: The Personal Social Assistant. In2009 2nd Conference on Human System Interactions 2009 May 21 (pp. 331-337). IEEE.
4. Abbas S, Singh AK. Mobile Media Penetration: Growing trends in four centrally backward districts of Uttar Pradesh. Amity Journal of Media and Communication Studies. 2015:66.
5. Iyengar K, Upadhyaya GK, Vaishya R, Jain V. COVID-19 and applications of smartphone technology in the current pandemic. Diabetes & Metabolic Syndrome: Clinical Research & Reviews. 2020 Sep 1;14(5):733-7.
6. Jung SI, Lee NK, Kang KW, Kim K, Do YL. The effect of smartphone usage time on posture and respiratory function. Journal of physical therapy science. 2016;28(1):186-9.
7. Lamberg EM, Muratori LM. Cell phones change the way we walk. Gait & posture. 2012 Apr 1;35(4):688-90.
8. Chen R, Liu J, Cao X, Duan S, Wen S, Zhang S, Xu J, Lin L, Xue Z, Lu J. The relationship between mobile phone use and suicide-related behaviors among adolescents: the mediating role of depression and interpersonal problems. Journal of affective disorders. 2020 May 15;269:101-7.
9. Skierkowski D, Wood RM. To text or not to text? The importance of text messaging among college-aged youth. Computers in Human Behavior. 2012 Mar 1;28(2):744-56.
10. Cochrane ME, Tshabalala MD, Hlatswayo NC, Modipana RM, Makibelo PP, Mashale EP, Pete LC. The short-term effect of smartphone usage on the upper-back postures of university students. Cogent Engineering. 2019 Jan 1;6(1):1627752.
11. Peterson-Kendall F, Kendall-McCreary E, Geise-Provance P, McIntyre-Rodgers M, Romani W. Muscles testing and function with posture and pain. US: Philadelphia: Lippincott Williams & Wilkins, Ltd. 2005: 95-111.
12. Shan Z, Deng G, Li J, Li Y, Zhang Y, Zhao Q. Correlational analysis of neck/shoulder pain and low back pain with the use of digital products, physical activity and psychological status among adolescents in Shanghai. Plos one. 2013 Oct 11;8(10):e78109.
13. Lee S, Kang H, Shin G. Head flexion angle while using a smartphone. Ergonomics. 2015 Feb 1;58(2):220-6.
14. Rawat D, Dixit V, Gulati S, Gulati S, Gulati A. Impact of COVID-19 outbreak on lifestyle behaviour: A review of studies published in India. Diabetes & Metabolic Syndrome: Clinical Research & Reviews. 2021 Jan 13.
15. Vyas L, Butakhieo N. The impact of working from home during COVID-19 on work and life domains: an exploratory study on Hong Kong. Policy Design and Practice. 2021 Jan 2;4(1):59-76.
16. Raffaeli W, Arnaudo E. Pain as a disease: an overview. Journal of pain research. 2017;10:2003.
17. Straker LM, Coleman J, Skoss R, Maslen BA, Burgess-Limerick R, Pollock CM. A comparison of posture and muscle activity during tablet computer, desktop computer and paper use by young children. Ergonomics. 2008 Apr 1;51(4):540-55.