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Effect of Smart Phone Usage on Neck Pain and Posture Among University Students

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Abstract

Introduction and Background: Smartphone is one of the dynamic trends in communication, in which one's mobile phone can be used for communication through email, exploring internet & using certain apps. In recent years, the usage of mobile phones has increased so much in young adults (mainly students). Many users of smart phone look sharply downwards & hold their arms in front of them to read the screens which make their head move forward & cause excessive anterior curve in the lower cervical vertebrae and excessive posterior curve in the upper thoracic vertebrae to maintain the balance which put lots of stress on the cervical spine and the neck muscles. Forward head posture is most commonly seen poor posture in sagittal plane. There is increasing incidence of the musculoskeletal problems of neck around the world due to excessive use of mobile phone and electronic devices. *Method*: Total 100 healthy students (both male and females) who use smart phones were selected by convenience sampling method from Amity university, noida, with age group of 18–25 years. General assessment of the students was performed to shortlist the students meeting the inclusion criteria, all the students who met the inclusion criteria were invited to participate in this study. A written informed consent was provided to each student prior to the study. They were asked to fill a smart phone addiction scale (SAS), neck disability index (NDI) and posture of neck was measured using ruler method. Karl pearson's coefficient of correlation was used to correlate between the SAS and NDI and SAS and TWDn-TWDc. *Results*: The karl pearson's coefficient of correlation showed a significant correlation between SAS and NDI (r=0.68, $p<0.05$) but no correlation between SAS and forward head posture (-0.13, $p>0.05$). *Conclusion*: The study suggested that there is a significant relation between smart phone usage and neck pain but no significant relation between smart phone usage and forward head posture. But forward head posture can develop later as degenerative process must have started which is leading to pain in the neck.

Keywords: Smart phone addiction; Neck pain; Forward head posture; Musculoskeletal disorders.

Introduction

Smartphone is one of the dynamic trends in communication, in which one's mobile phone can be used for communication through email, exploring internet and using certain apps.[1] In recent years, the usage of mobile phones has increased so much in young adults (mainly students). Many users of smart phone look sharply downwards and hold their arms in front of them to read the screens which make their head move forward and cause excessive anterior curve in the lower cervical vertebrae and excessive posterior curve in the upper thoracic vertebrae to maintain the balance which put lots of stress on the cervical spine and the neck muscles, forward head posture is most commonly seen poor posture in sagital plane.[2] There is increasing incidence of the musculoskeletal problems of neck

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around the world due to excessive use of mobile phone and electronic devices.[3]

Using smartphones for longer periods of time promote repetitive and continues use of certain muscles, resulting in injury of muscle fibers, cumulative damage from acute trauma and myogenic tonus, which occurs mostly in the neck and shoulders.[4] Repetitive and cumulative trauma in the neck and shoulder causes forward head posture (a specific musculoskeletal abnormality).[5] There are number of adverse effects of long duration sitting and sedentary living on the health of the individual, in the same way people should know and understand the effect of long duration smart phone usage on their posture.[6] FHP is noticed when person is using smart phone which can lead to pain in neck.[7] When a person use smart phone for longer period of time it reduces person's social implication in real world and as a result his/her psychological well being is affected because it produces a kind of isolation, loneliness and may result in depression.[8] The heavy smart phone users meet their friends and other people very less in person.[9] According to the last few studies, the excessive user group has experienced difficulty in expressing emotions than the comparison group, and the excessive user group had suffered from very high level of anxiety which is inter personal than the comparison group.[10]

Some previous studies have reported that users of smart phone often complain that they have neck pain, muscle fatigue and ROM of cervical than the normal phone users.[11] And some studies have directly evaluated the effects of excessive usage of smart phone on pain, cervical angle and depression is commonly seen in people who are addicted to smart phone and spend most of the time using smart phones.[9]

"Text neck" is a term which was coined by Dr. dean L. fishman, who is a chiropractor. This term is used to describe repetitive stress injury or an overuse syndrome in which a person has his/her head hung or flexed in a forward position and it is bent in downward direction looking to the phone or some other electronic devices for long duration of hours, In the world to which we belong where technology has advanced so much and usage of mobile phones has increased so much there are increasing number of people who are spending their lots of time on electronic devices such as smart phones, laptops, tablets and e- readers. The result in the end is prolonged flexion of the neck when bent over these electronic devices which results in a "text neck" or "turtle neck" posture, this condition is a growing health concern and it has the potential that it affects the millions of people around the world.[12] Smart phone usage in stationary position and arm unsupported could bring an abnormal alignment of neck and shoulders, this is because small monitors of smart phones that are held downward near laps allowing users to bend their heads to look at the screens which increase the activity of the neck extensor muscles, increases muscle fatigue, decreases work capacity and affects musculoskeletal system.[5] The FHP weakens the deep cervical flexors muscles, the mid thoracic rhomboid muscle for retraction of the scapula and the middle and lower trapezius muscles. FHP also shortens the pectoralis major. And neck extension muscles. The activity of upper trapezius muscle is highly increased in forward head posture as compared to normal anatomical posture and also number of patients complain of pain due to over use of muscles.[13] Shah p. *et al.*[3], 2018, conducted a study on 100 healthy physiotherapy college students in Ahmadabad and found that musculoskeletal problems in neck and hand (thumb predominantly) can be seen in smart phone addict students which may be initially short term but later on it can become long term disability. Kim S. *et al.*[14], 2016, conducted a study to see the effect of smart phone use on neck and shoulder muscle fatigue and the investigation of pain was done in adults with forward head posture. They concluded that pain and fatigue worsened with longer use of smart phone.

In recent few years use of smart phone and electronic devices have spread widely among many communities and across all ages. Previous studies showed that musculoskeletal problems in neck can be seen in smart phone addicted people. However this study aims to see the effect of smart phone usage on neck pain and posture among university students.

Materials and Methods

Total 100 healthy students (both male and females) who use smart phones were selected by convenience sampling method from Amity University, Noida, with age group of 18–25 years. General assessment of the students was performed to shortlist the students meeting the inclusion criteria, all the students who met the inclusion criteria were invited to participate in this study. A written informed consent was provided to each student prior to the study. Only those students who agreed to fill the consent form were included in the study, others were excluded.

They were asked to fill a smart phone addiction

scale (SAS), neck disability index (NDI) and posture of neck was measured by using ruler method.

Smart phone addiction scale (SAS)

The SAS is a scale to assess smart phone addiction. In SAS the total possible score in each section is 6 and least score is 1. The score range from 33 to 198. The higher the score the greater the degree of pathological use of smart phone. The SAS is a reliable and valid measurement tool for the evaluation of smart phone addiction.[15]

Neck disability index (NDI)

The NDI assessment involves 10 items, 50 point index questionnaire, of the 10 items 4 relate to subjective symptoms, 4 activities of daily living and 2 discretionary activities of daily living each item is scored on a 0 to 5 rating scale in which 0 means no pain and 5 means worst unimaginable pain, the maximum score is 50. Higher NDI score indicates greater neck disability. This index is widely used and most validated instrument for assessing self rated disability in patients with neck pain.[16]

Measurement of forward head posture

The subjects were asked to stand in a relaxed position with back and buttocks against the wall and knees straight. Instructions for relaxed posture were to stand relaxed and look straight ahead and for cued posture they were asked to look straight ahead with max. effort to stand straight and tall and touch the back of the head to the wall without tilting, The measures of forward flexed posture were as follows: occiput to wall status, tragus to wall distance and C7 to wall distance. For occiput to wall status the participants were scored as yes or no based on their ability to touch the occiput to wall. A rigid ruler was used to measure tragus to wall distance and mean of two values for the final score was taken. The distance b/w C7 to wall was measured with metal caliper and rigid rulr, the spinous process was palpated and marked with paper tag. The caliper was hold horizontally, light contact was ensured of the tips of caliper to the tag, the tips were subsequently held against ruler to measure the distance. This method is reliable and validated for measurement of forward head posture and among all the variables the most reliable was tragus to wall distance which was taken to conclude whether or not the subject has forward head posture.[17]

Based on the scores and measurement relationship between SAS, NDI and forward head posture was determined.

Fig. 1: Measurement of tragus to wall distance in normal position Measurement of tragus to wall distance in cued position

Results

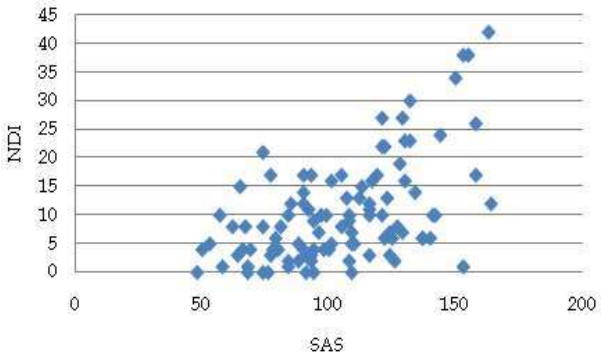
Out of total 100 subjects, 19 were males and 81 were females. Mean age of the subjects was 20.87 ± 1.17 years (Table and Graph 1-2).

Table 1: Correlation Between SAS and NDI

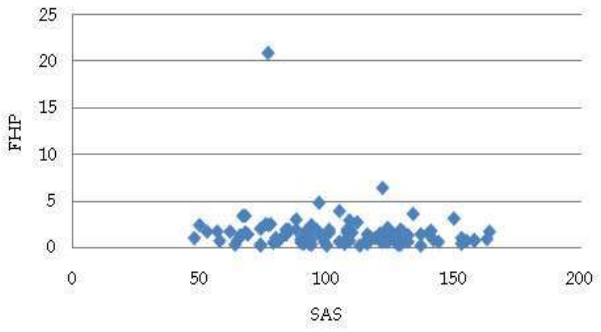
Variable	SAS	NDI
Mean ± SD	104.63 ± 27.95944	10.46 ± 9.089254
r Value	0.68* (significant at p<0.05)	

Table 2: Correlation between SAS and FHP

Variable	SAS	FHP
Mean ± SD	104.63 ± 27.95944	1.697 ± 2.2072175
r Value	-0.13533 (non significant at p<0.05)	



Graph 1: Correlation between SAS and NDI (r=0.68)



Graph 2: Correlation between SAS and FHP (r= -0.13)

Discussion

This study concerned with the effect of smart phone usage on neck pain and posture among university students. The result in present study showed that the degree of smart phone usage is significantly correlated with pain in neck among university students. There is significant positive correlation between smart phone addiction scale (SAS) and neck disability index (NDI). SAS showed a higher score indicating addiction to smart phone use and along with it the NDI scores showed significant disability.

Excessive use of smart phones may lead to repetitive movements of the head and neck, such movements are associated with high risk of chronic neck pain and may explain the strong association between SAS and NDI.[2] Similar conclusion were given by shah p. *et al.*[3] in the year 2018, their study showed that musculoskeletal problems in neck and hand can be seen in smart phone addiction students which may be short term initially but can later lead to long term disability.Also, kim S *et al.*[14] concluded that pain and fatigue worsened with longer smart phone use.

The result in the present study also showed that there is no significant correlation between smart phone addiction scale (SAS) and forward head posture the reasons could be that the study is only limited to very young and certain type of population and there are the chances that degeneration process must have started which is leading to pain but posture is not affected at present. However, follow up study of 1 to 2 year should be conducted on this type of population which will show the affect on forward head posture also.

Conclusion given by jung S. *et al.*[6] is that prolonged use of smart phones could negatively affect both posture and respiratory function but in this study there is no significant effect on forward head posture.

The reasons could be that they have also measured the rounded shoulders and scapular index of participants while in present study only tragus to wall distance is taken. Also they have not used the SAS for assessing the smart phone addiction and participants were randomly allocated to 2 groups according to duration of smart phone usage reported by each individual.

Clinical Implication of the Study

This study may help in considerations that need to be taken for the proper time management of smart phone usage, they should make effort to reduce the amount of time spent using a smart phone and also preventive measures like maintenance of correct posture while using the smart phone and taking frequent short breaks in between which can reduce the chances of development of forward head posture in future.

Limitations in the Study

- Short duration study.
- Study is limited to specific population only.
- The study is limited to a particular age group (18–25 years).

Scope for Further Study

- A follow up study of 1 to 2 years can be done to see the effect on forward head posture also.
- Above 25 years age group can also be studied.
- Other variables can also be studied like rounded shoulders.

Conclusion

The study was conducted to check any association between effect of smart phone usage on neck pain and posture among university students. Proper time management of smart phone usage and proper posture while using the smart phone can reduce the occurrence of neck pain and can reduce the chances of development of forward head posture. The study suggested that there is a significant relation between smart phone usage and neck pain but no significant relation between smart phone usage and forward head posture. But forward head posture can develop later as degenerative process must have started which is leading to pain in the neck.

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