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## Smart-phone addiction can cause neck disability in college going students

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### Abstract

**Background:** A smart-phone is a mobile hand-held device with advanced computing capabilities, such as internet connection, information retrieval, entertainment, e-commerce and other capabilities. 94% of people aged from 18-24 years have smart-phones and 91% of them are college students using the smart-phone on regular basis and spending 5.7 -6 hours of time on an average day. The concept of addiction, though traditionally used to describe a physical dependence on a substance has been applied to excessive use of the internet. The continuous use of smart-phone for long time can cause various musculoskeletal problems, mainly neck disabilities and pain. As the continuous use of phone in a faulty posture especially forward head posture or static neck flexion will commonly cause neck pain and soreness.

**Objective of the study:** To determine the level of smart-phone addiction and its relationship with neck function and disability in college going students.

**Methodology:** A study with total 25 college going students in and around Mangalore aged from 18 to 25 years had participated. The initial assessment of students to include them according to inclusion and exclusion criteria was done. And they were asked to fill the neck pain disability index (NDI) and internet addiction scale (IAT) after they agreed to participate in the study with filled informed consent. And obtained results were analyzed in SPSS 1.6 for the correlation.

**Results:** Pearson correlation was used to find the association between the outcome measures. And the correlation between the neck pain and internet addiction ( $r=0.386, p=0.057$ ) shows a moderate positive correlation and is significant.

**Conclusion:** The findings of this research supports that the addiction of the internet on smart-phone use causes a various degree of neck problems among the college going students.

**Keywords:** Addiction, NDI, IAT, disabilities, forward head posture

### Introduction

A smart phone is a mobile hand-held device having advanced computing capabilities such as internet access, information retrieval, entertainment, e-commerce, and other features. The smart phone has a big impact on modern living because of its portability<sup>[1]</sup>. 94% of people aged from 18-24 years have smart-phones and 91% of them are college students using the smart-phone on regular basis and spending 5.7 -6 hours of time on an average day<sup>[2]</sup>. The worldwide sales of smart-phone to end users totaled 349 units in the 1st quarter of 2016, which is 3.9% increase over the same period in 2015. Smart-phone sales represented 70% of total mobile sales in the 1<sup>st</sup> quarter of 2016<sup>[3]</sup>. Messages, music, movies, internet access, photographs, and games are all used on smart phones for both communication and enjoyment<sup>[2-3]</sup>. With the advancement of the technologies and the extent to which it has made the generation dependent on it making the addiction of the smart-phone specially with internet presence. Internet has become a boon as well as bane because within the tips of our hand we can access a huge amount of information or stay connected to the person present in a distant place virtually and making the most of a technology that was created to improve our lives is the most rational thing to do. However, it is a mockery of our intelligence to allow ourselves to be enslaved by the same technology or become a parasite that isn't able to stay without internet and smart-phone<sup>[3]</sup>.

The problem of internet addiction grows in tandem with the internet's development and expansion. Adolescents (12-17 years old) and emerging adults (18-29 years old) use the internet more than any other age group and are at a higher risk of overuse, hence the problem

of internet addiction disorder is especially pertinent to them [4]. The concept of addiction, though traditionally used to describe a physical dependence on a substance (Holden, 2001) has been applied to excessive use of the internet.

Long-term usage of a smart-phone can result in a variety of musculoskeletal issues [5].

Among the musculoskeletal issues neck pain is the most dominant issue in the people whose use of internet on smart-phone. Neck pain is a tremendous load on our society" [5, 6]. Maintenance of a non-neutral neck posture, such as a flexed posture, is well known cause of neck pain. The maintenance of forward head posture decreases cervical lordosis of the lower cervical vertebrae and creates a posterior curve in the upper thoracic vertebrae to maintain balance; this is known as the forward head posture (text neck) [7-8]. Forward head posture is one of the commonly recognized poor postures in the sagittal plane. It has been indicated that this posture might contribute to the onset and perpetuation of neck and back pain syndromes [9]. Neck pain is associated with change in movement and co-ordination, universally neck pain is a fourth leading seed with disability due to this reason a lot of work done on its prevention and therapy to know the exact mechanism [10, 11].

Prolonged shearing of the vertebrae from forward head posture eventually irritates the small facet joints in the neck as well as ligaments and soft tissue. This irritation can result in neck pain that radiates down to the shoulder blades and upper back, potentially points in the muscle, which are points of exquisite tenderness that are painful to touch, along with limited range of motion, Disc degeneration problems, which may potentially lead to cervical degenerative disc disease, cervical osteoarthritis, or a cervical herniated disc etc. [12, 13].

Thus, the neck function not only depends on the time frame of use of internet on smart-phone but also on other various factors like activities of daily living, diet or underlying disease etc. but to know what extend is the internet addiction is causing the neck disability finding it's relationship is needed.

## Methods

### Subjects

25 college going students were randomly selected in and around Mangalore aged from 18 to 25 years had participated in the study and Ethical clearance was obtained from the ethics committee of A.J. Institute of Medical Sciences, Mangalore. The inclusion criteria were: between the ages 18 to 25 years [3, 5, 6, 7]. Subjects were excluded if they were suffering from recent injury to neck (last 6 months), neurological disorders like stroke or concussion, any vestibular deficits like benign paroxysmal positional vertigo (BPPV), or neck disorders, unwillingness to participate [3, 5, 6, 7]. The subjects participating in the study were given information sheet containing the study details and, also the patient consent form was obtained from the subjects prior to the study. Written informed consent was obtained and demographic data were obtained. The initial assessment of players to include them according to inclusion and exclusion

criteria was done.

## Outcome Measures

### 1. Internet Addiction Test (IAT) [4]

IAT is a self-assessment tool used. Participants leisure time, internet and computer use was measured by assessing internet addiction test. The questionnaire asked about how often use of internet and how it affected the life. This questionnaire has been shown have acceptable reliability and validity for internet or computer use. It comprises 20 items rated in a five-point Likert scale (from 1-not at all, to 5 – always). The amount of leisure time internet and computer use was split into 3 categories: (20-39 points) an average on-line user who has full control of his or her usage; (40-69) experiences frequent problems because of excessive internet use; or (70-100 points) has significant problems because of internet use.

### 2. NDI [8].

Neck pain disability index assessment involves 10 items. 50 point index questionnaire that assesses the effect of neck pain and symptoms during a range of functional activities (Vernon and Mior 1991). Of the four items, four relate to subjective symptoms (pain intensity, headache, concentration, sleeping), four to activities of daily living (lifting, work, driving, recreation) and two of discretionary activities of daily living (personal care, reading). Each Item scored on a 0 to 5 rating scale, in which zero means 'No pain and 5 means Worst imaginable pain. The test was interpreted as a raw score, with a maximum score of 50. A higher NDI score indicates greater neck disability. This index is the most widely used and strongly validated instrument for assessing self-rated disability in patients with neck pain. Neck disability index have acceptable reliability and validity for neck pain.

## Data analysis

The collected demographic and outcome measures was assessed for their normality using Kolmogorov–Smirnov test. The data had from normal distribution, and then the descriptive statistics were analyzed by using Pearsons correlation to know the correlation between the NDI and IAT. The collected data was analyzed using statistical package for social science software version 1.6.

## Results

Total 25 subjects were considered for data analysis. Demographic data and the outcome measures data of the sample is presented in table 1. And showing their mean values and standard deviation.

**Table 1:** Shows the descriptive statistics of demographic data and outcome measures

Descriptive Statistics				
	Minimum	Maximum	Mean	Std. Deviation
Age (years)	19	25	23.70	1.625
IAT	20	83	47.12	19.14
NDT	10	50	29.18	11.72
N=25				

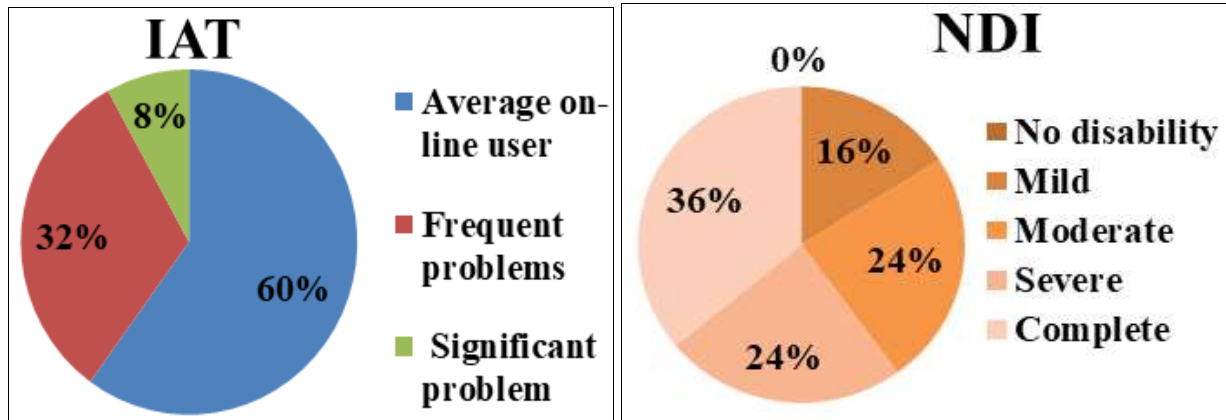


Fig 1: Shows percentage of distribution in IAT and NDI

Table 2: Shows the Pearson correlation of IAT and NDI

Correlations		IAT	NDI	
Pearson correlation	IAT	Correlation Coefficient	1.000	-.386
		Sig. (2-tailed)	.	.057
		N	25	25
	NDI	Correlation Coefficient	.386	1.000
		Sig. (2-tailed)	.057	.
		N	25	25

Pearson correlation coefficient was calculated between the parameters. It shows that there is a moderate positive correlation between IAT and NDI ( $r=0.386$ ,  $p=0.057$ ).

### Discussion

Purpose of the study was to correlate the impact of smart-phone addiction can cause neck disability in college going students. In this study 25 college students with neck pain were asked to answer the two questionnaires namely Internet Addiction Test (IAT) and Neck Disability Index (NDI) to assess amount of neck disability related to internet addiction.

Descriptive statistics for IAT and NDI was taken. Based on IAT our study showed that about 60% of the students are average on-line users, 32% are having occasional/ frequent problems due to internet use and 8% are having significant problems (neck pain). On the basis of NDI about 16% of the college going students had mild neck pain, 24% had moderate neck pain, 24% of students had severe neck pain and 36% had profound or complete neck pain. In this study there is a statistical significant correlation between IAT and NDI (i.e.  $p = 0.057$ ) and in Pearson's correlation there is a moderate positive result which indicates that if there is either an increase or decrease in the internet use than there will also be an increase or decrease in the neck pain (i.e. Pearson's correlation = 0.386).

This study demonstrated that addiction to smart-phone use is associated with neck pain problems and disability among healthy young adult subjects. This is consistent with a study by Jenkins *et al.*, 2007 which showed high level of computer use is related to the musculoskeletal symptoms around the neck among young college students. Our result also supports many studies done. Park J.H *et al.*, 2015 that the smart-phone use will cause reduction in cervical mobility & pain threshold and depression [3]. Lee S. *et al.* 2015 showed increased cervical flexion angle and fatigue cervical erector spinae and upper trapezius due to prolonged smart phone use [14]. Thus, the prolonged use of the smart-phone has shown to cause the muscle fatigue, cervical spine mobility reduction causing deviation from the normal cervical movements [15, 16].

The neck disability among smart-phones users might be

related to frequent neck flexion posture, which changes the natural curve of the cervical spine and increases the amount of stress, leading to irritation and spasm in the surrounding skeletal structures and ligaments and proprioception deficits in the cervical vertebrae [17, 18].

The maximum use of the smart-phone nowadays needs internet which basically relates to addiction of internet. Similar study done by Kim Sang *et al.* 2016 showed the higher incidence of fatigue and pain related neck problems because of internet use among university students [19]. Excessive use of smart-phone can lead to habitual repetitive and continuous movements of the head and neck toward the screen throughout the day [20].

Such movements are associated with a high risk of chronic neck pain and may explain the strong association between IAT and NDI scores in the present study. As indicated above, those with high internet and smart phone use have an unfavorable health risk profile.

### Conclusion

The findings of this research point out moderate correlation between IAT and NDI. Thus, study results pointing that addiction to smart-phone use with an internet is causing various degrees of neck problems among the college students.

### Limitation and recommendation

The major limitations of this study are that the sample size of the study was small in number. And it relies on self-reported measures which do not allow determination of the causal direction of the results. More research, using objective measures and prospective study designs, is needed to evaluate this association.

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