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A study to assess the correlation between smart phone use addiction with text neck syndrome and hand discomfort among the adult students in Saveetha University

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ABSTRACT

The smart phone is the most popular device used among the adults. Smart phone addiction is the most common phenomenon that pertains to be common among the smart phone user. The incidence of musculoskeletal disorders (MSD) of hand, wrist, forearm, arm and neck has been increasing all over the world due to prolonged; forceful, low amplitude, repetitive use of hand held devices (HHD) such as computer, laptops, smart phones, tablets, etc., continuous repetitive use of movements in the hand.

Methods

A descriptive research design was done in Saveetha University. 100 adult students are included in our study. Purposive sampling method was used in selecting the samples. Structured interview by using Smart Phone Addiction scale, Cornell Hand Discomfort Questionnaire (CHDQ), Neck Disability Index (NDI), were used to collect the data on smart phone addiction, hand discomfort and neck disability.

Results

There is more number of females 52% than males 48%. Mean \pm SD of SAS, NDI and CHDQ are 106 ± 34 , 19.74 ± 6.8 and 46.2 ± 57 . Spearman rank correlation coefficient shows a significant moderate positive correlation between SAS and NDI ($r = 0.651$, $p < 0.001$), and between SAS and CHDQ ($r = 0.541$, $p < 0.001$).

Keywords: Smartphone addiction, Text neck, Hand discomfort, Adult students.

INTRODUCTION

The smart phone is the most popular device used among the adolescents. Most of the people in India are using smart phone on their daily basis [1]. Mobile phones include standard phones and smart phones in which they can make calls and send short messages, and may have the power of a small computer and the capacity to take advantage of a

wide range of applications. Worldwide technology and its changes play a major role in each individual's life. The current trend of the society is to adopt every change in the field of communication. Mobile phones are a boon of this country.

The term "Text neck" was coined by Dr. Dean L. Fishman, who is a US chiropractor. The term text neck is used to describe a repetitive stress

injury or an overuse syndrome where a person has his/her head flexed in a forward position and is bent down looking at his/her mobile or other electronic device for prolonged periods of time [1]

Smart phone addiction is the most common phenomenon that pertains to be common among the smart phone user. The adolescents group is tend to be the most highest risk group among the population. Adolescents group people are more strongly attached to the smart phones.

Adolescents are more inclined towards using mobile phones for activities other than communication than older generation because in adolescence stage, people are more susceptible to changing fashion trends and style, building them more Tech savvy which creates certain behavioral disorder.

In addition to being a means of communication and having rapidly spreading use around the world, mobile phones, in particular the new generation of smart mobile phones, are technological tools due to offering many functions, such as providing short message service (SMS) to users. "Addiction is the term used to refer to loss of control over one's behavior, usually with negative consequences." Smart phone addiction is the most common phenomenon that pertains to be common among the smart phone user [1]. Studies have been reported about this substantial increase in the number of adolescent smart phone users, having various behavioral effects and its association with musculoskeletal discomfort in recent years, which is becoming a growing problem and having a large impact globally.

The incidence of musculoskeletal disorders (MSD) of hand, wrist, forearm, arm and neck has been increasing all over the world due to prolonged; forceful, low amplitude, repetitive use of hand held devices (HHD) such as computer, laptops, smart phones, tablets, etc.,. Continuous repetitive use of movements in the hand. The adolescents group is tend to be the highest risk group among the population. Adolescent's group people are more strongly attached to the smart phones. [12]

The musculoskeletal disorders which occurs due to smart phone addiction was been initially small but in later periods it may cause a permanent disability. This condition is a growing health concern and has the potential to affect millions of people all over the world. People with this smart

phone addiction encounter physical, mental and social health problems. Many smart phone users have been reported that they can't survive without their smart phone. Other physical problems resulted due to cell-phone abuse, includes rigidity and muscle pain, ocular afflictions resulting from Computer Vision Syndrome which results in fatigue, dryness, blurry vision, irritation, ocular redness [2].

In today's world, where the smart phone technology has been advanced so much, there are more people who are spending an increased amount of time on handheld devices , such as Smartphone, computer, tablets and e-readers. The end result of using this hand held devices is prolonged flexion of the neck while bent over these electronic devices resulting in the 'text neck posture'. [3] This condition is a growing health concern and has the potential to affect millions of people all over the world.

Thus the aim of the present study was to assess the level of self reported smart phone addiction and correlate its relationship with musculoskeletal disorders in neck as well as in hand in young healthy adolescent students

OBJECTIVES

- To assess the level of smart phone addiction among the adult students in saveetha university (boys & girls).
- To determine the musculoskeletal disorder [text neck syndrome and SMS thumb] among the adult students in saveetha university (boys & girls).
- To assess the correlation between smart phone addiction and neck disability and between smart phone addiction and hand discomfort among the adult students in Saveetha University.
- To associate the level of smart phone addiction among the adult students with their selected demographic variables.

MATERIALS AND METHODS

A sample of 100 adult students which includes 48 boys and 52 girls, of age between 17 – 22 years. Samples are selected by purposive sampling techniques.

The descriptive study was conducted during the one week period. Data collection was conducted in saveetha university after getting permission from

the HOD's of various departments. The questionnaire were distributed which consists of 4 parts including 1) Demographic variable consists of age, gender, time of smart phone usage, number of smart phones used, frequency of mobile phone checking during sleep, purpose of using smart phone and self evaluation smart phone addiction (Gustafsson et, al.,) [6] 2. Smart Phone Addiction Scale (valid to measure the smart phone addiction) 3. Neck Disability Index 4. Cornell Hand Discomfort Questionnaire for measuring the hand discomforts due to smart phone usage.

Smart Phone Addiction Scale (SAS)

The smart phone addiction scale is a self reporting scale to assess smartphone addiction (Kwon et al). It consists of 33 items, with a six point likert scale (1:strongly disagree, 2:disagree, 3:weakly disagree, 4:weakly agree,5:agree,6:strongly agree. The respondent circles the statement which most closely related to describing the smart phone use characteristics. Scores range from 33 to 198. The higher the score, the greater the degree of pathological use of the smart phone (ching et al). The SAS is a reliable and valid measurement tool for the evaluation of smart phone use addiction.

Neck Disability Index (NDI)

The NDI assessment involves the 10 item,50 point index questionnaire that assess the effects of neck pain, and symptoms during the range of functional activities. Each item is 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 the greater neck disability. This index in this study was used to assess the self reliable disability in patients with neck pain.

Cornell Hand Discomfort Questionnaire (CHDQ)

It is a six item questionnaire containing a hand map diagram showing 6 shaded areas, of the hand . Total discomfort score was calculated by using the formula frequency \times discomfort \times interference , where higher the scores indicated

more discomfort maximum scoring for each area is 90,and the total scoring for six areas is 560, (higher score showing more discomfort). The tool was developed by professor Alan Hedge and ergonomics graduate students at Cornell university (Cornell university ergonomics web, hedge et al., 1999). The CHDQ tool mainly used in this study to assess the hand discomfort.

The study investigators explained to the students about the study's objectives, rationale and requirement of consent to participate in the study. The investigators then provided instructions for filling the questionnaire, and then guided the students Understanding of each question was checked by asking the students to repeat the meaning. During the filling of questionnaires, the investigators helped the students throughout and helped simplifying the meaning of each question, clarifying doubts and checking for completeness of filling up the questionnaire.

Chi – Square test was used to test between the categorical variables. $P < 0.005$ was taken as statistically significant.

RESULTS

Out of 100 samples, 52(52%) were females and 48(48%) were males, 47(47%) use their smart phones for 3-4 hours,, in that 36(36%) use for the purpose of messenger and SNS, 34(34%) check their mobile phones in between their sleep and 66(66%) doesn't check their cell phone in between their sleep, among this 32(32%) have been self evaluated that they are addicted , 41(41%) self evaluated that they are non- addicted. There was an association between the demographic variable and the correlation between SAS and NDI and in between SAS and CHDQ. Spearman rank correlation coefficient shows a significant moderate positive correlation between SAS and NDI ($r = 0.651$, $p = < 0.001$), and between SAS and CHDQ ($r = 0.541$, $p = < 0.001$). There was significant found between time of smart phone usage, purpose of smart phone usage, number of years smart phone used and time frequency of smart phone checking on the level of smart phone use addiction. $P < 0.005$

Table 1: Distribution of demographic variables of adult students in saveetha university

SI.NO	DEMOGRAPHIC DATA	FREQUENCY (n)	PERCENTAGE (%)
1.	Age		
	17 -18 years	10	10%
	19-20 years	10	10%
	21-22 years	47	57%
	22 years or older.	33	33%
2.	Gender		
	Male	48	48%
	Female	52	52%
3	Time of smart phone usage		
	3-4 hours		
	4-5 hours.	47	47%
	more than 5 hours	33	33%
		20	20%
4.	Purpose of using smart phone Messenger and SNS Entertainment Web surfing Others		
		36	36%
		33	33%
		13	13%
		18	18%
5.	Time frequency of mobile phone checking		
	0-10		
	11-20		
	21-30		
	>30	32	32%
		29	29%
		20	20%
		19	19%
6	.Checking mobile phone in between sleep		
	Yes		
	No	34	34%
		36	36%
7.	Self evaluation of smartphone addiction		
	Addicted Non- addicted.		
	Not known	32	32%
		41	41%
		27	27%

The students of the age group of 21- 22 years are 57%, most of them were girls 52% and 48% are males, 47% use their smart phone for 3- 4 hours, 33 % use their smart phone for 4- 5 hours, 36% use the

smart phone for the purpose of messenger, 33% use for the purpose of entertainment 32% check their mobile phone for 0 -10 times.

Figure 1

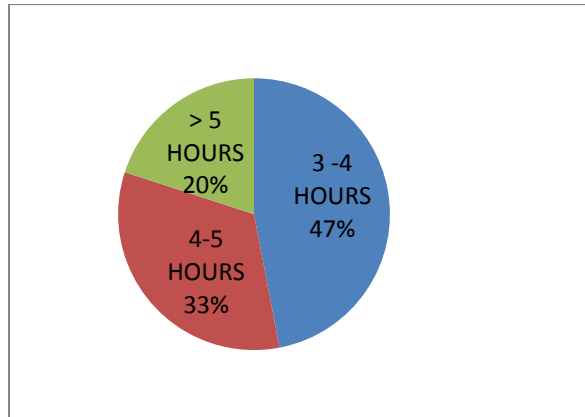


Figure 1: Shows that 47% of people use mobile phones for 3-4 hours, 33% of people use their mobile phones for 4-5 hours and only 20% of people their mobile phones for > 5 hours.

Table 2: Mean and standard deviation of the outcome measure

CONTENT	MEAN	SD
Smart phone addiction scale	106.4	30.4
Neck disability index	19.74	6.8
Cornell hand discomfort questionnaire	46.2	57.0

Table 2: shows the mean and standard deviation of smart phone addiction scale, neck disability

index and for the cornell hand discomfort questionnaire.

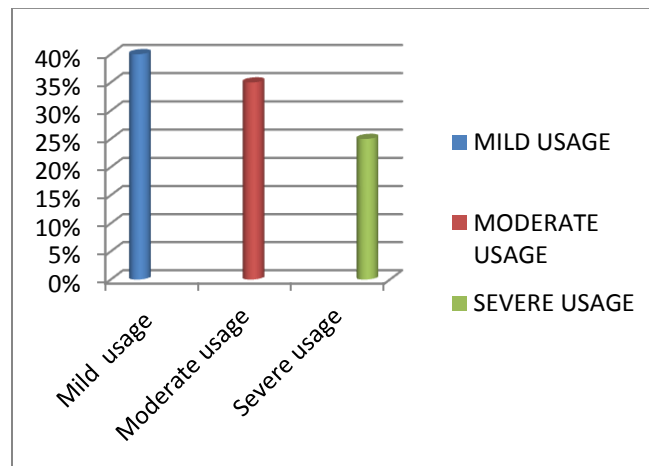


Figure 2: Level of Smart Phone Use Addiction

Figure 3 shows that 40% had mild usage of smart phone, 35% had moderate usage of smart phone and 25% had severe usage of smart phone.

Spearman rank correlation coefficient shows a significant moderate positive correlation between SAS and NDI ($r = 0.651, p < 0.001$), and between SAS and CHDQ ($r = 0.541, p < 0.001$).

DISCUSSION

The present study shows that the smart phone addiction was significantly correlated with musculoskeletal discomfort in the participants. Significant moderate positive correlation between SAS and NDI ($r = 0.651, p < 0.001$), and between SAS and CHDQ ($r = 0.541, p < 0.001$). along with the smart phone use with neck disability, 6% of students has no disability, 10% of students has mild disability, 58% of students had moderate

disability and only 26% of students had severe disability.

Which is similar to the findings reported by Priyal P. Shah et, al., (2018), a study conducted to assess the relationship between smart phone use with text neck syndrome and SMS thumb among the physiotherapy students in Gujarat. A total of 100 students were included in the study were most of them are females (76%), in which neck disability associated with addiction to smart phone use shows 30 – 48 % have moderate disability. [1]

Similar conclusion was given by Eva Gustaffson et, al., showed that the physical exposure while texting on a mobile phone consists of low physical load, repetitive thumb movements, and excessive neck flexion causing neck pain and also concluded that prospective associations were found between text messaging on mobile phones and MSDs, implies most short term effects and to extent long term effects in MSD in neck and upper extremities [7]

Hakala et,al., reported that frequent use of mobile phone increases the risk of neck shoulder and lower back pain. [13] Lee et,al., stated that

smart phone use could cause upper extremity pain. [14]

Sustaining gripping and repetitive movements with the thumb and finger was been identified as a risk factor which will lead to disorders of the thumb and musculature, leading to associated syndromes such as wrist tendinitis. [1]

The implication of the present study shows that students should make an effort to reduce the time usage of smart phone. Musculoskeletal problems in neck and hand is seen in smart phone addicted students which is short term initially will may proceed to long term in future.

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