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...

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 smart phone addiction, hand discomfort and neck disability.

Results
There is more number of females 52% than males 48%. Mean ±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 affictions 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 × discomfort × 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

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

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: 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

<table>
<thead>
<tr>
<th>CONTENT</th>
<th>MEAN</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smart phone addiction scale</td>
<td>106.4</td>
<td>30.4</td>
</tr>
<tr>
<td>Neck disability index</td>
<td>19.74</td>
<td>6.8</td>
</tr>
<tr>
<td>Cornell hand discomfort questionnaire</td>
<td>46.2</td>
<td>57.0</td>
</tr>
</tbody>
</table>

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 smartphone 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 smartphone use shows 30 – 48 % have moderate disability.

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 smartphone use could cause upper extremity pain.

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 smartphone. 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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REFERENCE


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