



Effect Of Smartphone Dependency On Musculoskeletal System

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Abstract: Smartphone users are vulnerable to experience severe musculoskeletal pain due to the user's static repeated motion, users minimal muscle tension caused by long hours of exposure, poor posture and using phone without breaks. Their constant repeated motion and posture during smartphone usage can lead to repetitive strain injury resulting in various symptoms like pain, discomfort or tingling, numbness in the upper extremities among which musculoskeletal pain is the most prominent symptom. To find the smartphone dependency among students and its effects on the musculoskeletal system a questionnaire based survey was done among 100 students. Musculoskeletal pain experienced by them was measured by Nordic musculoskeletal questionnaire. An informed consent was taken from students and they were asked to fill out the questionnaire. Data was analyzed and graphically represented by using Microsoft excel. There is a high prevalence of smartphone dependency among students as most of them agree that they feel anxiety when there is no phone around and it is also affecting their sleep and rest time. The students who are highly dependent on smartphones suffer from more musculoskeletal pain as compared to the students who are not dependent on smartphone and using it for lesser duration. Neck being the most affected region followed by upper back, wrists and shoulders. 54% students were suffering from neck pain, 42% students were suffering from upper back pain, 16% students were suffering from wrist pain and these are the students who spend more time on texting, 13% students were suffering from shoulder pain. Smartphone dependency is affecting student's musculoskeletal system resulting in musculoskeletal pain.

Keywords: Smartphone dependency, texting, musculoskeletal pain

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I. INTRODUCTION

The cell phones have turned into the most prophylactic and most generally utilized gadget ever, seemingly in the historical backdrop of humanity itself. Throughout the years, the expansion in the handling and computational speed of cell phones has made people fundamentally more multifunctional, ¹India has become the second biggest smartphone market in terms of active unique smartphone users. India is the 2nd most popular country in the world and is projected to pass US in number of smart phone users in 2017 ². Teens nowadays have slowly become dependent on mobile phone. It is a typical sight to see individuals in a line or while hanging tight for train, transport, plane to have advanced cell in their palm which indicates their dependence on such gadgets. Lu and Wang (2008) in their research study also indicated towards internet addiction and viewed it as a psychological dependence on or a behavioral action. In their research on internet online games addiction, several systems were identified: - like unpleasant feeling when offline or obsessive thinking which justifies their severity of dependence.³ Other than their conduct transformation one can see manifestations of strain. Content sharing utilizing cell phone is regular among understudies. As a rule, the digits utilized for messaging are thumb of each hand, which are not intended for fine manipulative or handy work as different fingers hence making them more prone to get damaged. ⁴. At the point when a piece of body is called to work more earnestly, extend further, and work at an incredible dimension than what it is set up for prompt effect will happen inside a moment, however when this episode happens over and over it might prompt tedious strain damage. The development of injury because of inappropriate position or abuse, is called combined injury ⁵. Smart phone clients are defenseless against having serious musculoskeletal agony because of the client's static rehashed movement, users negligible muscle strain brought about by long hour of introduction, poor stance, utilizing telephone without breaks, lead to different side effects like torment, distress or shivering in the furthest points among of which musculoskeletal damage is most noticeable side effect ⁶. Abuse of an advanced cell phones have negative impact, for example, diminished physiological

capacities, interruption of autonomic sensory system, making issue in day by day life and can influence both visual and musculoskeletal framework prompting pressure, and developing migraine. Because of static rehashed movement the blood flow is likewise decreased which keep the supplements from being provided to muscles and prompt weariness and torment and furthermore leading to ischemia and metabolic changes that hinder the compounds capacities which result in musculoskeletal damage. Thus through our study we will be aiming to find the smart phone dependency among students and its effects on musculoskeletal system.⁷

2. MATERIALS AND METHODS

A cross sectional survey was done on 100 students fulfilling the inclusion criteria (18-25 years of age, students using smartphones). Informed consent was taken from each subject explaining them the purpose of the study and ensuring them the confidentiality of information. Data was collected with the help of a questionnaire consisting of 3 parts. 1st part consisted of participants demographic details. 2nd part consisted of smart phone dependency and degree of influence. 3rd part consisted of Musculoskeletal discomfort (Nordic Musculoskeletal Questionnaire)

3. STATISTICAL ANALYSIS

The data collected, was computed in the Microsoft excel sheet (windows 2010) and frequency distribution tables were prepared and graphical represented to interpret the result.

4. RESULT

Our result shows that there is a high prevalence of smart phone dependency among students as most of them agree that they feel anxiety when there is no phone around and it is also affecting their sleep and rest time. The students who are highly dependent on smart phones suffer from more musculoskeletal pains as compared to the students who are not dependent on smart phone and using it for lesser duration.

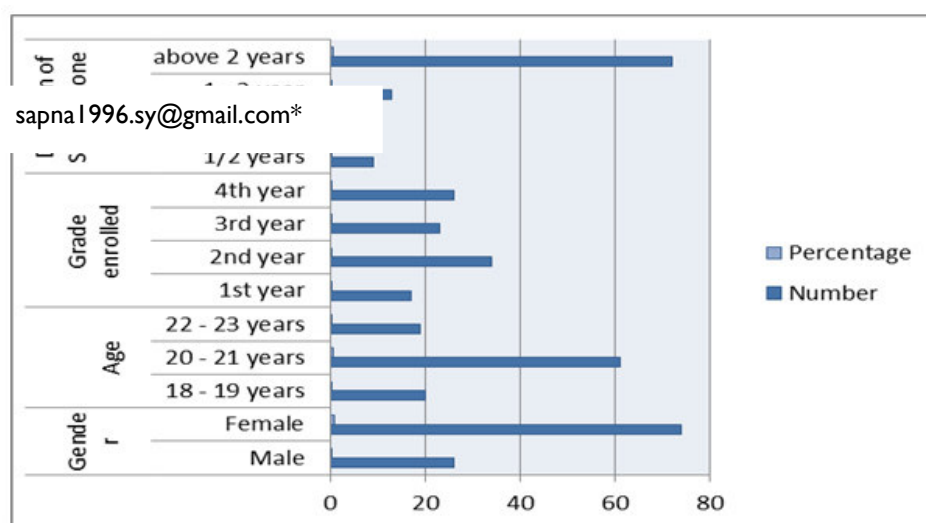


Fig 1. Student's demographics

Out of 100 students 26% were males and 74% were females with mean age 18 ± 20.5 , out of 100 students 72% students were using smartphone for above 2 years (Figure 1)

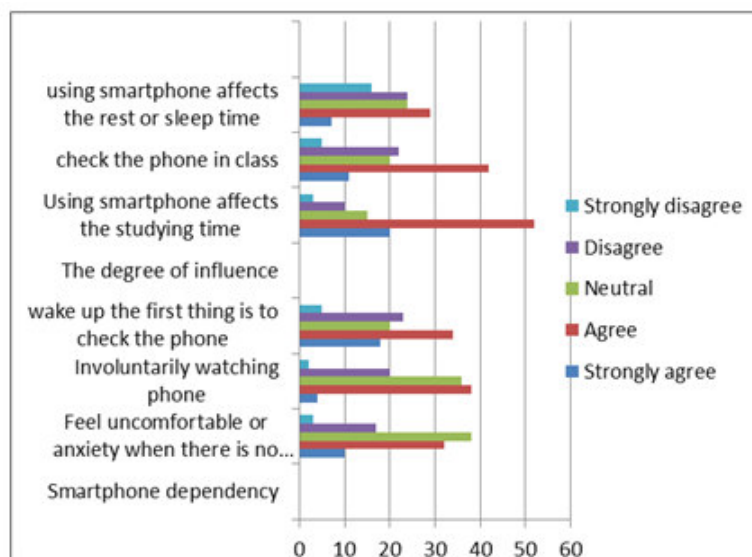


Fig 2. Smartphone using behavior

Out of 10 students 36% students were using phone for texting purpose. 20% were using it for phoning purpose. And it shows that students use phone more on weekends as compared to weekdays. Figure -2

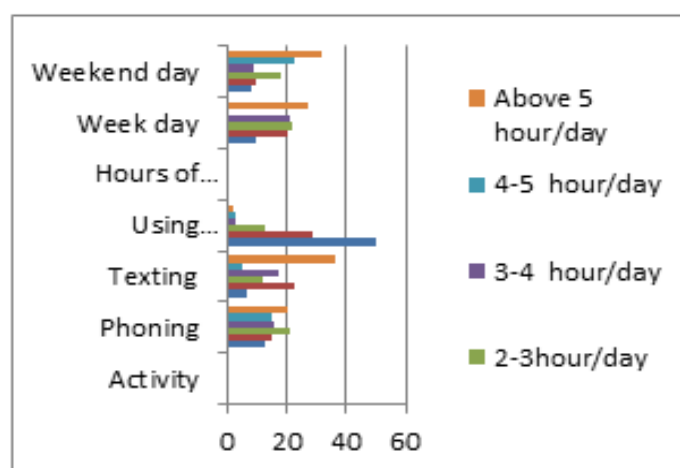


Fig 3. Dependency and degree of influence

32% students agreed that they feel anxiety when there is no phone around, 38% students agreed that they watch their phone involuntarily, 34% students agreed that they check their phone in morning, 52% students agreed that it is

Affecting their studying time, 42% students agreed that they Check their phone in class and 29% students agreed that it is Affecting their rest time. Figure-3

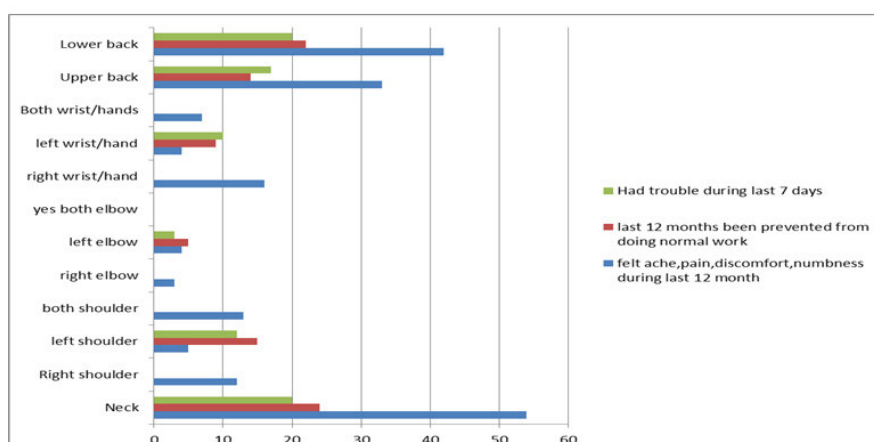


Fig 4. Musculoskeletal discomfort

Most of the students were suffering from musculoskeletal pain. Neck being the most affected region followed by back, wrists and shoulders. 54 students were suffering from neck pain, in which 24 students felt difficult to do normal work due to that pain in last 12 months, and 20 students had trouble in last 7 days, 42 students were suffering from back pain, where 22 students felt difficulty in doing normal work due to that pain in last 12 months, 20 students had trouble in last 7 days, 16 students were suffering from wrist pain, 9 students felt difficulty in doing normal work due to that pain in last 12 months, 10 students had trouble in last 7 days, and most of these students having wrist and hand pain spends more time on texting as compared to the other individuals who are not having pain, 13 students were suffering from shoulder pain, whereas 15 students felt difficulty in doing normal work due to that pain in last 12 months, 12 students had trouble during last 7 days. Figure-4

5. DISCUSSION

The objective of this study was to find smart phone dependency and its effects on musculoskeletal system due to excessive use. Our study shows that most of the students are dependent on smart phones and are suffering from musculoskeletal pain due to repetitive strain type injury to soft tissues. Neck being the most affected region followed by upper back, wrists and shoulders. The impact on spine increases at higher flexed postures as seen during smart phone usage. At neutral position looking forward, the head weighs about 10-20 pounds, at 15° flexion –it weighs 27 pounds. The stress on the spine increase by degrees and at 60° it weighs 60 pounds, putting increased strain on the neck resulting in pain. Because of various composing procedures and stances embraced by students while utilizing their smart phones can cause musculoskeletal agony. Like, holding phone up to the ears for longer period of time can cause problems with elbows, neck and shoulders. And texting for a longer duration can lead to thumb and wrist pain. Redundant strain damage can show as musculoskeletal torment which can be portrayed as any damage that may include the muscles, ligaments, tendons, bones and joints. Musculoskeletal problems of the upper limb and especially the thumb have been reported like for texting. The keys and screen in our smart phone are in same plane and to reach a comfortable posture for the arms when texting, most hold the phone quite low in front of the belly which means they have to flex the neck to read screen. When someone constantly bends their head to look at a small screen, various problems such as forward head postures or slouched posture can arise because external flexion torque increases due to forward head posture which places stack on extensors of neck and surrounding connective tissues⁸. Upper trapezius showed

highest muscle fatigue at cervical flexion 50 and lower at 30° angle. Zaid un nisa et al in their study concluded that upper trapezius muscle fatigue depends on the cervical flexion angle when using smart phone, the cervical flexion angle during smart phone use may influence the muscle fatigue and pain of the upper trapezius. In the long term poor postures can damage not only the neck bone and structures around vertebrae but also ligaments. It is important to understand ergonomics for smart phone and tablet devices. As technology changes, ergonomic must change in order to keep up with the changing technology. To avoid these symptoms, some preventive measures can be taken⁹ By maintaining an upright spinal posture when texting, avoiding looking down as this bends the neck and rounds the shoulders will prevent in developing neck pain. We must try to maintain the phone at our chest, chin or eye level to minimize the bending of neck. and if the phone is below eye level, we should look down with our eyes rather than neck and keep changing the grip posture to ensure load rotation. Using hands free also helps to avoid static and awkward postures when talking on the phone. Using thumb and fingers alternatively to reduce repetitive and awkward thumb movement. And by keeping our wrists relaxed and as straight as possible will help to minimize the strain on wrists, fingers and thumb. These all precautions if considered will help in minimizing the symptoms associated with smart phone dependency.¹⁰

5.1 Limitation of study

- Small sample size
- Dependency among students can be measured by using different dependency measuring scales.

6. CONCLUSION

The study performed showed that there is significant effect of smart phone dependency on musculoskeletal system as most of the students were experiencing musculoskeletal discomfort due to their dependency on smart phone.

7. AUTHOR CONTRIBUTION STATEMENT

Nidhi Kalra devised the project and designed the model. Sapna Yadav collected the data and analyzed the data. Sapna Yadav and Nidhi Kalra performed the statistical analysis. Both the authors discussed the results and worked on the final drafting of manuscript.

8. CONFLICT OF INTEREST

Conflict of interest declared none.

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