

# Smartphone addiction and its complications related to health and daily activities among university students in Saudi Arabia: A multicenter study

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## ABSTRACT

**Aim:** The aims of this study were to study the prevalence of smartphones addiction among college and university students in Kingdom of Saudi Arabia (KSA), and to determine the risk factors and complications associated with smartphone addiction. **Method:** This study was conducted in all provinces of KSA from December 2015 to June 2016 by sending questionnaire to student clubs of various universities through Survey Monkey. Questionnaire included (1) sociodemographics, (2) smartphone usage patterns and addiction behavior, (3) impact of smartphone usage on driving and medical complications, and (4) smartphone addiction scale. **Result:** The total number of participants was 1941 (response rate 80.9%) students representing most of the provinces of Saudi Arabia. The prevalence of smartphones addiction was 19.1%. Female participants were more addicted than male participants ( $P < 0.001$ ). Smartphone addition was also significantly associated with musculoskeletal complication, upper limb, eyes and sleep complications. **Conclusion:** High frequent usage with prolonged duration of smartphone was associated with high risk to addiction. Furthermore, smartphone addiction had significant impact on performing daily activities, sleeping disorder, and health problems. Awareness about harm of smartphones addiction is required to provide to students and parents as well. Smartphones should not be given at younger age and it only be given when a child can differentiate its healthy and productive use from addiction.

**Keywords:** Addiction, behavioral addiction, compulsive mobile phone use, mobile problematic use, smartphone over use, smartphone users, smartphones

## Introduction

Smartphones changed our lives dramatically during the past couple of decades and its usage increased drastically over the years.<sup>[1]</sup> The number of smart devices increasing among college students and become mandatory for their demanding needs. Smartphones not only are the source of communication,

information, personal assistant, and entertainment but also have features such as camera, games, media players, GPS navigation, numerous applications, and Internet. Most vantage of the smartphone is wireless access to e-mail, instant messages and stay connected with your work, social activity, and interest.<sup>[1,2]</sup> Hence, addiction to smartphone should be hypothesized as multifactors causes<sup>[3]</sup> and the benefits need to be weighting by harm impact.<sup>[4]</sup>

Smartphone addiction has been defined as the overuse of smartphones to the extent that it disturbs the users' daily lives.<sup>[5]</sup> Its overuse can cause memory and concentration problems, physical abnormalities, change in eating behavior,

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and sleep disturbances.<sup>[6-9]</sup> Addiction of smartphone reduced the health-related quality of life and students' academic achievement significantly.<sup>[10-12]</sup> Use of smartphones while driving have high risk of road traffic accidents because of distraction.<sup>[13]</sup> The prevalence of smartphone addiction is higher than the Internet addiction due to difference between mobile phone and Internet. Furthermore, if features of smartphones will increase, the likelihood of addiction will also be increased.<sup>[14,15]</sup>

The problems associated with addiction of the smartphones are mostly concerned with family or community medicine clinics or primary health-care clinics. Increase in its addiction can cause increase in the problems associated with it and that lead to increase burden into health-care system. As the problems caused due to the addiction do not required any specialty to get treated with, most of the conducted studies were planned and executed under these departments.<sup>[7,15]</sup> The percentage of smartphones users is rapidly increasing in Saudi population. According to Google's latest study, Australia, United Kingdom, Sweden, Norway, Saudi Arabia, and United Arab Emirates all boast smartphone adoption rates above 50%.<sup>[15]</sup> To the authors' best knowledge, this study is first of its kind which was conducted in multiple centers. Hence, the purpose of this study was to find the prevalence of smartphones addiction among college and university students across the Kingdom of Saudi Arabia (KSA). Furthermore, association between prevalence of smartphone addiction and sleep disorder, daily physical activity, health complication, and demographic variables was also analyzed.

## Method

This cross-sectional study was conducted in various provinces of KSA between December 2015 and June 2016 after receiving approval from Research Committee at the Saudi Council for Health Specialties of joint program of family medicine at eastern province of Saudi Arabia. Both male and female college students from various colleges across the KSA participated in the study. The inclusion criteria of the study were (1) participants age should be between 17 and 27 years and (2) he/she should not be diagnosed or treated for addiction. Participation was voluntary and participants could leave the survey at any point. Consent form was signed by the participants before starting the survey.

Thirty-one governmental and nine private universities in Saudi Arabia and 21 military, industry, governmental, and private colleges distributed geographically with total number of student were 1999768. Sample size was 2399 calculated by using Raosoft calculator for sample size website.

Questionnaire had four sections. (1) sociodemographics, (2) smartphone usage patterns and addiction behavior, (3) impact of smartphone usage on driving and medical complications, and (4) smartphone addiction scale (SAS). The first three parts were constructed by the researchers to include background data as determinant of smartphone addictions. The fourth part was valid translated Arabic Smartphone addition scale. The questionnaire

translated first by certified translation office specialized in translating official Governmental papers and collage researches from English to Arabic, then reviewed by two consultants of family medicine. After that it was confirmed that questionnaire was valid to assess the addiction and the qualitative word used on each question to achieve nearest meaning on the origin English question by Constellation of consultant of psychiatrist and addiction in Amal Hospital in Dammam. Finally, the Arabic version of the scale was retranslated to English.

Survey Monkey was used to designed the survey and after then authors started contacting with leaders of student clubs in the Universities about conducting the study and data collection. After the leaders getting official approval from their respective universities, the web-link sent to students who were participating in the study by emails with instruction how to fill the self-administered questionnaire after taking online consent.

SAS is a scale to analyze smartphone addiction having 33 questions with 6- point Likert scale ranging from "1 = strongly disagree" to "6 = strongly agree". The higher scores indicate the higher risk of smartphone addiction. The total score for each participant was calculated by adding scores of all questions. Smartphone addiction was categorized as low if total score of a participant was between 33 and 87, intermediate if it was between 88 and 142 and high if score was between 143 and 198.

Data were analyzed by using the Statistical Package for the Social Sciences (SPSS) software program, version 23.0. Independent variables included age, gender, marital status, GPA, medical and nonmedical students, medical complication, physical activities, and sleeping pattern used for descriptive and inferential analysis. Due to categorical nature of independent and dependent variables, Chi-square test was used. However, only significant results were presented in the tables. Level of significance used for *P* values was 0.05. The Cronbach  $\alpha$  was 0.967.

## Results

Of 2399 medical and nonmedical students, 1581 participated and filled the questionnaire completely. Hence, the response rate was 65.9%. Descriptive analysis of the demographic variables revealed that male and female participants were 874 (55.3%) and 707 (44.7%), respectively. The average age was 21.5 ( $\pm 2.68$ ) and it was varying between 17 and 27 years. It was found from further assessment of demographic variables that the number of medical college students in the study was 467 (29.5%) and the rest were from nonmedical colleges ( $n = 1114$ , 70.5%). Approximately 70% of the participants started using smartphones when they were less than 18 years old.

19.1% of the participants were in high-risk group that is also known as addiction. 17.6% and 63.4% of the participants were in low- and intermediate-risk group. Significantly high proportion of female students (23.4%) was addicted to smartphones than males (15.6%) with  $P < 0.001$ . Similarly, nonmedical colleges'

students (20.9%) were having more addiction to smartphones than medical college students (14.7%) and the difference was statistically significant ( $P = 0.007$ ). Daily physical activity and smoking habit did not find significantly related with smartphone addiction. However, 68.5% of the participants used to use phones while driving. After correlating mobile usage while driving with their SAS score it was found people who used phones while driving were more addicted than counterpart [Table 1].

Analysis of the questions related to neck complications revealed that most were suffering from muscle rigidity and pain (39.2%) followed by neck hump which was among 29.0%, 28.9% were having shoulder pain, and 27.2% and 26.5% were having neck and back pain, respectively. Prevalence of musculoskeletal complications was compared with high-risk group and differences were statistically significant for each type of complication with  $P < 0.001$  [Figure 1]. Similarly, students were also having hand complications who were smartphone addicted. Approximately 40% of the high-risk group was complaining about hand or wrist problems and it was significantly high [Figure 2]. Furthermore, eye complication was another problem which was found significantly high among addicted students [Figure 3].

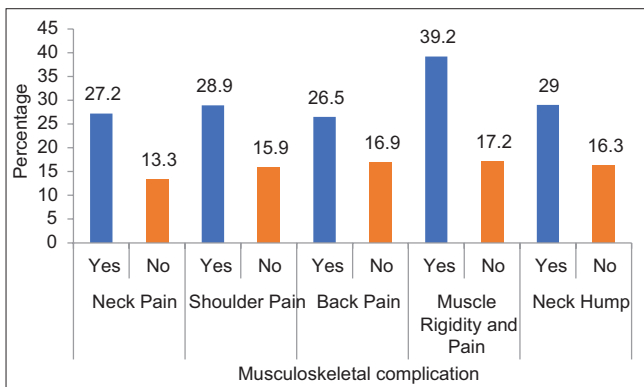
Students who were suffering from up late sleep were 23.6%, 30.2% having problem of lack of sleep, 32.0% loss of concentration, 31.6% fatigue, 30.8% delayed weak up, and

34.5% sleep during work. Comparison between SAS score and sleeping problems revealed that those who were at high risk were having more sleeping problems with statistically significant results [Figure 4].

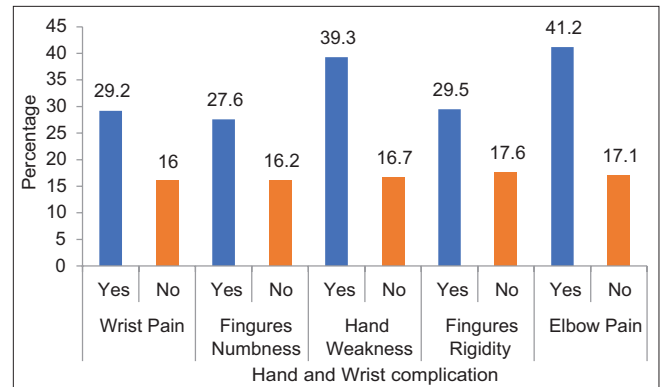
## Discussion

According to the study results, 19.1% of the students were falling in the high-risk (addicted) group followed by 63.4% who were having intermediate risk. There was probability that those who were at intermediate risk can become addicted if they do not try to reduce its usage. Smartphone addiction was found 19.92% among San Francisco State University's undergraduate students.<sup>[16]</sup> In contrast, high prevalence was reported in the studies conducted in Saudi Arabia (48%) and Turkey (39%).<sup>[5,17]</sup>

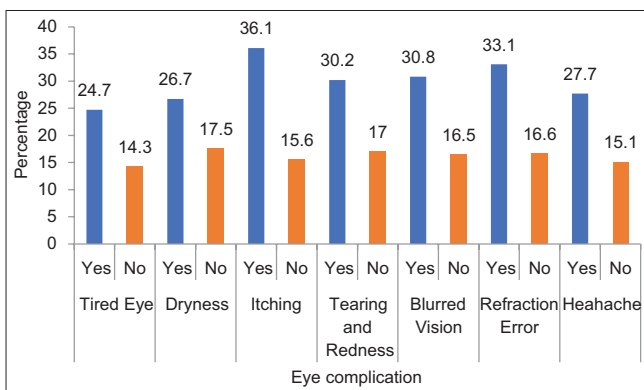
Some studies added in the literature that females were usually more addicted to phones than males<sup>[1,6]</sup> but it was not common findings and some studies denied to have any significance between addiction and gender.<sup>[18,19]</sup> Findings of this study stated there was a significant relation between gender and smartphone addiction. This finding is in line with a study published from Turkey where authors found that the prevalence was 21% in boys and 39% in girls.<sup>[20]</sup> Similarly, in Korea, it was 10% in males and 39% in females.<sup>[21]</sup>



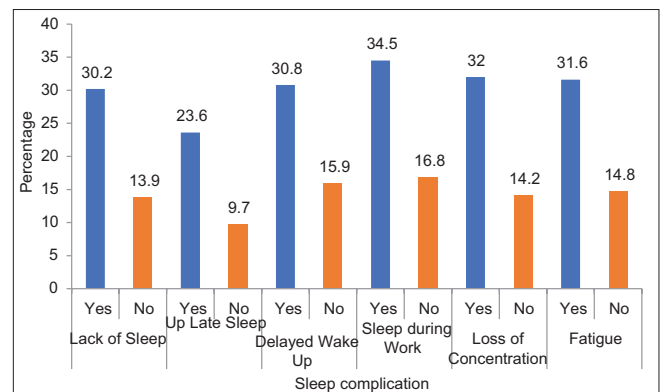
**Figure 1:** Percentage of students having high SAS score with musculoskeletal complications



**Figure 2:** Comparison of percentage of students having high SAS score with hand and wrist complications



**Figure 3:** Prevalence of eye complications in comparison with students having high SAS score



**Figure 4:** Sleep Complications in comparison with students having high SAS score

**Table 1: Smartphone addictions in relation to driving among students**

		Score group SAS			P
		Low	Intermediate	High	
Are you using your smartphone while driving car?	Yes	89 (14.9)	393 (65.6)	117 (19.5)	<0.001*
	No	77 (27.9)	174 (63.0)	25 (9.1)	

\*Statistically significant at 0.05 level of significance

Drivers who use smartphone while driving pay attention to their mobile and other cars only and not be aware to another hazard as road pump and pedestrian.<sup>[13]</sup> There are habits associated with increased risk of accidents such as frequent check of mobile phone, chatting, and listening audios; these habits will triple the risk of accident according to WHO study.<sup>[22,23]</sup> One of the important findings of this study was the association between smartphone addiction related to driving. This finding is in consistent with other studies.<sup>[13,24]</sup>

This study found a strong relation between musculoskeletal complication and smartphone addiction. The distribution of musculoskeletal symptoms or pain of any severity was most common in the neck, followed by the upper back and then the shoulders.<sup>[25]</sup> In our study, the neck and shoulders pain in the high-risk group of smartphone addiction was 26%–27%. Alsalamed *et al.* reported that 60.8% of their study participants had neck pain followed by lower back (46.8%) and shoulder pain (40.0%).<sup>[26]</sup>

In this study, the Carpal tunnel syndromes were the most common complication of hand and wrist. Therefore, the result of this study was similar to previous studies.<sup>[27,28]</sup> Among smartphone addictive, the gait can affect with abnormal posture of spine.<sup>[29]</sup> In addition, smartphone addiction also affects the vision. Same as this study, studies found the significant relation between smartphone overuse and vision problems which include redness and blurred vision.<sup>[30]</sup>

The addiction of smartphone will cause variant sleep disorders such as insomnia, interrupted sleep, and early morning wake up.<sup>[9]</sup> This study found the strong and significant relation between sleep problems and smartphones addiction. Most common sleep complication among the high-risk group was feeling sleepy during work. The prevalence of insomnia in our study was 28.9%. This was lower than ALJOUF study 31.3%<sup>[16]</sup> and 35.4% in Acharya JP. *et al.* study.<sup>[31]</sup> A study conducted in Sweden<sup>[32]</sup> in which authors found higher proportion of female participants (34%) with sleeping disorder compare to male participants (23%). In Sweden study<sup>[32]</sup> they differentiate between male and female prevalence in sleep complication and result was the female (34%) higher in sleep disturbance than male (23%).

## Conclusion

Prevalence of smartphone addiction among the students was found to be high. Females were found more addicted as compared to male students and that could be due to Saudi culture and society where females are not as much social as males. However,

impact of smartphones addition on physical and mental health are adverse and students could face severe consequences in their life ahead.

To improve general health of the students which certainly a cornerstone of any society, it is important to reduce the prevalence of addiction of smartphones. Awareness programs through media or even through educational system might help to control the problem. If it remained uncontrolled, then it could be another source of burden in health-care system.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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## Conflicts of interest

There are no conflicts of interest.

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