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SMARTPHONE ADDICTION AMONG MEDICAL STUDENTS OF UNIVERSITY OF TABUK, KINGDOM OF SAUDI ARABIA

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Abstract

Background: Although smartphone has become an essential part of health improvement, when it is overused, it can affect negatively the body and psychological health, directly or indirectly.

Objectives: To explore smartphone addiction phenomenon and its determinants and adverse effects among medical students.

Subjects and methods: A cross-sectional study was conducted at medical colleges (College of medicine, college of medical sciences, and college of pharmacy), Tabuk University among regular students enrlled during 2024-2025 academic year. Arabic electronic self-administered questionnaire was distributed to participants, including socio-demographic information, smartphne addiction risk facts and consequences of smartphone use as well as the problematic use of mobile phones (PUMP) scale to assess smartphone addiction.

Results: A total of 388 students were included in thee study. Femaes represented 65.2% of them. Over half (54.3%) of the students used three applications (apps) daily on smartphone. The main purpose of using these applications was social networking (89.7%), followed by academic tasks (57.7%). The most used applications were TikTok (60.1%), Snapchat (52.6%) and WhatsApp (46.1%). The mean±standard deviation of the total smartphone score was 64.63±15.82, out of a mapossible maximum of 100. Total smartphone addiction score was significantly associated with feeling less energetic, decreased sleep hours, less exercised, more fast food consumption, more gained weight and less academic performance.

Conclusion: In conclusion, the study revealed that Tabukmdical university students in Saudi Arabia are at risk of smartphone addiction and this adversely impact their sleep hours, energy level, eating behaviour, weight gain, less physical exercise, and lower academic performance.

Keywords: Smartphone, Addiction, Academic performance, medical students, Saudi Arabia

INTRODUCTION

Nowadays, smartphones are considered as one of the most important tool that help a person to communicate with the outer society, because they have many functions and feature that make our lives easier, more convenient, and more enjoyable. The number of users has dramatically increased in recent years all over the world. Saudi Arabia ranks 3rd in smartphone use globally with almost 29 million users, representing 72.8% of the population.[1]

As an entertainment machine, smartphones provide us with endless sources of entertainment, such as, podcasts, videos, music, games books, and more. We can download, share, capture photos and videos. Moreover, we can create work or study environment through smartphones. Doing assignments becomes easier, quicker, and more efficient.[2]

However, although it has become an essential part of health improvement, smartphones can affect negatively the body and psychological health, directly or indirectly especially when is overused.[3-5]

Iinvestigations and research are still ongoing to find if there is a relationship between mobile over use and health. Info graphic statistics in 2023 revealed that 67% of the surveyed teachers, 67% noticed their students being negatively distracted by mobile devices. In the 18 to 29-year-old age category, 22% of smartphone-using respondents had to check their device every few minutes.[6]

Recent researches have demonstrated that the usage of smartphones in adolescents increased the risk of depression,[7-9] anxiety[7, 8, 10] and behavioural disorders.[11]

Diagnostic and Statistical Manual of Mental Disorders(DSM-5) define "behavioral addiction as disorders characterized by loss of control over a compulsive, time- and resource-consuming behavior, which persists in the face

of adverse consequences, with continued escalation of the behavior and/or withdrawal symptoms from reduction of the behavior".[12]

Studies about smartphone addiction give more understanding regarding this problem and can be helpful for assessing its patterns and severity. Also, it provides helpful resources that could be used to diagnose or predict the onset of certain disorders related to it and provide interventions and treatments.To date, although many studies were done about smart phone addiction, however, it was not so clear enough for the students in Tabuk University. Thus this study was conducted to investigate smartphone addiction phenomenon among students in Tabuk University, Saudi Arabia.

Subjects and methods

A cross-sectional study was conducted at Medical colleges (College of medicine, college of medical sciences, and college of pharmacy), Tabuk University, Tabuk city iwhich s located at the northwest part of Kingdom of Saudi Arabia. Its population was in 2022 around (735.000) Saudi citizens; 70% of them are youth.[13]

Tabuk University established in 2006, currently, there are more than 1659 faculty members in the university, of whom 40% are female, and the number of students is 29407 students of all 24 specialties available. This number was obtained by Admission and Registration Deanship of Tabuk University.[14]

The target populations were regular students (male and femaleof medical students. (College of medicine, medical sciences, and pharmacy) enrlled in Tabuk University during 2024-2025 academic year.

Using EPI info version 27, the sample size calculated to be 381 students: By using a prevalence of smartphone addiction =27.7% from previous study,[5] worst acceptable result of 5% and 95% confidence interval. The sample size was proportionally taken from colleges of medicine, applied medical sciences, nursing and pharmacy.

Arabic electronic self-administered questionnaire was distributed to participants. It included 3 major sections: socio-demographic information, smartphne addiction risk facts and consequences of smartphone use.[5] The smartphone addiction was evaluate by validated Arabic version of the problematic use of mobile phones (PUMP) scale.[5] The PUMP scale is a 20-item questionnaire that evaluate mobile phone use based on the DSM-5criteria for substance use disorder.[15] The PUMP scale has a single structure with excellent internal consistency and validity. The answers of each PUMP scale questions are (strongly disagree, disagree, neutral, agree, or strongly agree). The PUMP score was calculated by summing the scores of each question and the higher scores indicate higher levels of addiction. Based on a previous Saudi study, the smartphone addiction was considered at a score of ≥ 59 in order to estimated the prevalence.[16]

Data were analysed using the Statistical Package for Social Sciences (SPSS) software version 29. Frequency, percentage, mean and standard deviation were utilized for data description while independent two-sample t-test and chi-square test were used for data analysis. In addition, spearman rank correlation coefficient was adopted and for all, p-value <0.05 was considered statistically significant.

ApprovalIRB in TabukUniversity was obtained (No: UT-425-238-2024, dated 26/9/2024).

RESULTS

A total of 388 students were included in thee study. Table 1 presents their sociodmographic characteristics. More than half of them (53.6%) aged between 18 and 21 years. Femaes represented 65.2% of them and majoroty (95.6%) were singles. About one-fourth of them (25.8%) were enrolled in the fourth year. About two-thirds (69.1%) were ever smokers and 24.7% have used steroids. Figure 1

Smartphone usage

More than half (56.2%) of the students started feeling an increase in smartphone usage one year ago and 58.3% spent 2-6 hours daily using smartphone. Over half (54.3%) of the students used three applications (apps) daily on smartphone. As regards the main purpose of using these applications, social networking (89.7%) ranked first, followed by academic tasks (57.7%) and news (56.4%). The most used applications were TikTok (60.1%), Snapchat (52.6%) and WhatsApp (46.1%).

Smartphone addiction

Most of the students either agreed or strongly agreed that they have used their phone even when they knew that they should be sleeping (82%), the time they spent using their smartphone prevents them from completing other important tasks (74.7%), .they have used their phone even when they knew that they should be doing academic tasks instead (73%) and they believed that they currently spend more time on their phone than they should (71.9%). Table 3

Overall, the total smartphone scre was normally distributed as shown by insignificant Shapiro-Wilk test. Its mean±SD was 64.63±15.82, out of a mapossible maximum of 100. Figure 2

The prevalence of smartphone addiction, based on a cut-off score of smartphone addiction scale was 66.2% as seen in Figure 3.

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Most of the students felt less energetic the next day of using smartphone extensively (69.2%) and noticed that their sleep hours decreased (60.8%). Almost half of them exercised less than befor (49.7%) and consumed more fast food than before (47.4%). A considerable proprtion of them have gained weight (40.5%), and their academic performance has been negatively affected (37.9%). All of these effects were significaly positive correlated with the total smartphone addiction score, p<0.001. Table 4

Male were more likely than females to addict smartphone use (67.2±14.7 vs. 63.3±16.3), p=0.020. As regards the study year, the highest score was observed among students of the fourth year (68.4±16.6) while the lowest score was observed among those of the sixth year (60.3±13.9), p=0.039. Students addicting tranquilizers were more likely than thos addicting other substances to addict smartphone, p=0.001. Table 5

As shown in Table 6, after control for confounding, female versus male were less likely to addict smartphone use while tranquilizers addicts versus those smoking cigareetes/shisha had significantly higher likelihhod of smartphone addiction. All together were responsible for approximately 4% variability of the knowledge score (r-square=0.041). Students` study year was not significantly associated with overall smartphone addiction score.

DISCUSSION

Despite, smartphone overuse provides a wide range of users`cognitive activities as it enables them to engage in a lot of online activities,[17] it poses a negative effect on their ability to remember, think, pive attention, and control emotion.[18] The popularity and frequency increase of smartphone utilization has result in existence of clinical cases presented with smartphone addiction.[19]

In agreement with many studies who reported prevalence rate ranged between 37.4% and 70%,[20-23] the prevalence of smartphone addiction among university students was high in the current study (66.2%). Lower rates have been reported by others. [2, 24-26] The great variation in the rate of smartphone addiction observed in different studies might have explained by many factors including variations in study tools and cut-offs that define addiction, sample size, and demographic characteristics of the surveyed individuals.

In the current study, 58.3% of the students spent 2-6 hours daily and 38.6% spent more than 6 hours using smartphone. In a previous Saudi study conducted amng university students in Riyadh, 61% of them reported spending at least 5 hours per day using their smartphones and 27.2% spend over 8 hours per day.[5]

The present study also revealed that over half (54.3%) of the students used three apps daily on smartphone while in Riyadh, 75% of the students used at least 4 applications per day.[5] The main purpose of using smartphone apps in the current study was social networking, followed by academic tasks and watching news. In Riyadh, the main puopses were social networking and watching news.[5] So, overall, quite similar pattern of smartphone usage was observed in both studies, indicating homogenecity in this regards between university students in Saudi Arabia.

In the present study, males were more likely to addict smartphone compared to females. The same has been observed among university students in Thailand[27] and India.[28, 29] The possible explanation of this finding could be the more engagement of males than females in online gaming.[30] However, in a previous Saudi study, no gender difference was detected.[5] Also, no gender difference was reported in an Indian study.[2] In disagreement with out finding, Mok et al (2014) in Korea, observed that females were more addicted to smartphones than males.[31] Also, some others reported that females were more likely than males to have smartphone addiction.[32, 33]

Negative impact of smartphone addiction on sleeping hours is confirmed in this study as 60.8% of surveyed students noticed that their sleep hours decreased. This finding agrees with what has been reported in other studies.[2, 5, 15, 34-36]

Most of the students in the present study felt less energetic the next day of using smartphone extensively (69.2%). The same has been observed by others.[5, 34]

A considerable proportion of students in the present study agreed that they had bad lifestyle because of using their smartphones such as less physical exercise (49.7%), more consumption of fast food (47.4%). and gain weight (40.5%). Association between smartphone addiction and obesity has been also was observed by others.[5, 28, 37,]

Findings of the current study showed negative affection of the students`s academic performance with increasing in the score of smartphone addiction. A similar affection has been observed in numerous local,[5, 35] and international studies.[4, 36, 38, 39]

Important limitations of the present study should be discussed. First, the design of the study as a cross-sectional one is considered a limitation as the temporal relationship between exposure and outcome variables cannot be investigated. Second, being a single center study that could impact our ability to generalize its results over other settings. Thire, utilizing self-administered tool is a limitation as it is mostly subjected to reporting bias. Despite of those limitations, the study could be of significance to decion makers for controlling the use of smartphone among university studts

In conclusion, the study revealed that Tabuk mdical university students in Saudi Arabia are at risk of smartphone addiction and this adversely impact their sleep hours, energy level, eating behaviour, weight gain, less physical exercise, and lower academic performance. Therefore, a rehabilitation program is recommended for treatment of smartphone addiction, including cognitive behavioral therapy ans well as motivational programs. Additionally, a larger multi-center study including students from different colleges and universities in Saudi Athat is needed to invesigate the problem in national level.

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Table 1: Sociodemographic characteristics of the participants (n=388)

Characteristics	Frequency	Percentage
Age (years)		
18-21	208	53.6
22-25	158	40.7
26-29	9	2.3
≥30	13	3.4

Gender		
Male	135	34.8
Female	253	65.2
Marital status		
Single	371	95.6
Ever married	17	4.4
College		
Medicine	116	29.9
Pharmacy	112	28.9
Nursing	104	26.8
Applied Medical sciences	56	14.4
Study year		
First	19	4.9
Second	91	23.5
Third	52	13.4
Fourth	100	25.8
Fifth	75	19.3
Sixth	51	13.1

Table 2: Description of the current Smartphone usage among the participants

Variables	Responses	Frequency	Percentage
Time since start feeling an increase in smartphone usage	Less than a year	218	56.2
	One year and more	170	43.8
Number of hours spent daily using smartphone	1 hour	12	3.1
	2-6 hours	226	58.3
	7-12 hours	122	31.4
	More than 12 hours	28	7.2
Number of applications (apps) used daily on smartphone	1 app	15	3.9
	3 apps	211	54.3
	6 apps	132	34.0
	9 apps	20	5.2
	More than 9	10	2.6
Main purpose of using these applications*	News	219	56.4
	Social networking	348	89.7
	Academic tasks	224	57.7
	Gaming	155	39.9
	Sports	174	44.8
	Culture	157	40.5
	Religion	94	24.2
	Science	80	20.6
Application used the most*	YouTube	159	41.0
	Twitter	172	44.3
	Instagram	176	45.4
	Snapchat	204	52.6
	WhatsApp	179	46.1
	Facebook	8	2.1
	TikTok	233	60.1
	Search Engines	85	21.9
	Global new channels	11	2.8
	Academic Websites		
	Others	26	6.7
		30	7.7

*Not mutually exclusive (i.e. sum may exceed 100%)

Table 3: Assessment of the participants` smartphone addiction

Question	Strongly Disagree N (%)	Disagree N (%)	Neutral N (%)	Agree N (%)	Strongly Agree N (%)
I do not feel fully satisfied when I reduce my smartphone usage time.	55 (14.2)	112 (28.9)	80 (20.6)	94 (24.2)	47 (12.1)
To satisfy my craving, I use my smartphone for longer periods than before.	50 (12.9)	85 (21.9)	78 (20.1)	109 (28.1)	66 (17.0)
When I stop using my smartphone, I become moody and irritable.	74 (19.1)	127 (32.7)	77 (19.8)	72 (18.6)	38 (9.8)
It is emotionally difficult for me to give up my smartphone.	44 (11.3)	52 (13.4)	58 (14.9)	140 (36.2)	94 (24.2)
The time I spend using my smartphone prevents me from completing other important tasks.	19 (4.9)	49 (12.6)	69 (17.8)	150 (38.7)	101 (26.0)
I previously thought that spending this much time on my phone was unusual.	20 (5.2)	35 (9.0)	77 (19.8)	160 (41.3)	96 (24.7)
I believe I currently spend more time on my phone than I should.	16 (4.1)	38 (9.8)	55 (14.2)	168 (43.3)	111 (28.6)
Others tell me that I spend too much time on my phone.	51 (13.1)	106 (27.4)	77 (19.8)	100 (25.8)	54 (13.9)
When I am not using my phone, I think about using it or plan to use it.	20 (5.2)	56 (14.4)	85 (21.9)	153 (39.4)	74 (19.1)
I feel anxious when I go a long time without receiving any calls or messages.	79 (20.4)	112 (28.8)	62 (16.0)	81 (20.9)	54 (13.9)
I have ignored people around me due to smartphone use.	74 (19.1)	96 (24.7)	66 (17.0)	108 (27.9)	44 (11.3)
I have used my phone even when I knew I should be doing academic tasks instead.	19 (4.9)	32 (8.2)	54 (13.9)	159 (41.0)	124 (32.0)
I have used my phone even when I knew I should be sleeping.	6 (1.5)	15 (3.9)	49 (12.6)	157 (40.5)	161 (41.5)
When I stop using my phone due to its negative impact on my life, I often return to using it.	22 (5.7)	51 (13.1)	83 (21.4)	154 (39.7)	78 (20.1)
I have gotten into trouble at work or college because of my smartphone use.	82 (21.1)	118 (30.5)	58 (14.9)	84 (21.6)	46 (11.9)
Sometimes, I find myself using my phone instead of spending time with important people in my life.	54 (13.9)	83 (21.4)	69 (17.8)	111 (28.6)	71 (18.3)
I have used my phone even when I knew it was dangerous to do so.	46 (11.9)	83 (21.4)	72 (18.6)	130 (33.4)	57 (14.7)
I have nearly caused an accident due to my smartphone use.	105 (27.0)	88 (22.7)	45 11.6)	91 (23.5)	59 (15.2)

| My smartphone use has caused problems in my relationships with others. | 101 (26.0) | 90 (23.2) | 65 (16.8) | 88 (22.7) | 44 (11.3) |
| I have continued using my phone even when someone asked me to stop. | 75 (19.3) | 97 (25.0) | 61 (15.7) | 113 (29.2) | 42 (10.8) |

Table 4: Effects of smartphone use and their correlation with total smartphone addiction score

Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	r* (P-value)
I noticed that my sleep hours decreased	26 (6.7)	54 (13.9)	72 (18.6)	136 (35.0)	100 (25.8)	0.435 (p<0.001)
I feel less energetic the next day	13 (3.4)	41 (10.6)	65 (16.8)	157 (40.4)	112 (28.8)	0.529 (p<0.001)
I consume more fast food than before	34 (8.8)	89 (22.9)	81 (20.9)	94 (24.2)	90 (23.2)	0.589 (p<0.001)
I have gained weight	69 (17.8)	95 (24.4)	67 (17.3)	90 (23.2)	67 (17.3)	0.456 (p<0.001)
My academic performance has been negatively affected	48 (12.4)	84 (21.6)	109 (28.1)	98 (25.3)	49 (12.6)	0.543 (p<0.001)
I exercise less than before	34 (8.8)	64 (16.5)	97 (25.0)	107 (27.5)	86 (22.2)	0.472 (p<0.001)

*Spearman`s rank correlation coefficient

Table 5: Factors associated with smartphone addictin among medical students, Tabuk University.

Variables	Mean±SD	t-value/F-value	p-value
Age (years)			
18-21 (n=208)	65.7±16.7		
22-25 (n=158)	63.7±14.7		
26-29 (n=9)	61.2±16.9		
≥30 (n=13)	61.2±13.3	0.820	0.483**
Gender			
Male (n=135)	67.2±14.7		
Female (n=253)	63.3±16.3	2.327	0.020*
Marital status			
Single (n=371)	64.5±15.9		
Ever married (n=17)	66.4±13.9	0.460	0.646*
College			
Medicine (n=116)	64.8±16.0		
Pharmacy (n=112)	62.9±15.4		
Nursing (n=104)	67.2±15.6		
Applied Medical sciences (n=56)	62.8±16.4	1.594	0.190**
Study year			
First (n=19)	67.5±13.8		
Second (n=91)	64.2±18.0		
Third (n=52)	64.4±13.6		
Fourth (n=100)°	68.4±16.6		

Fifth (n=75)	62.5±14.2		
Sixth (n=51)°	60.3±13.9	2.375	0.039
Smoking status/regular used of substances			
Cigarettes/Shisha (n=268)·†	62.7±16.3		
Steroids (n=96)·	68.4±13.2		
Tranquilizers (n=21)†	73.3±15.8		
Pain killers (n=3)	58.7±16.4	5.606	0.001

SD: Standard deviation

*Two-independent sample t-test

*** One-way analysis of variance (ANOVA) test

°Tuky test (p=0.032)

·Tuky test (p=0.012)

†Tuky test (p=0.014)

Table (6) Best fitting multiple linear regression model for total smartphone addiction score.

	Unstandardized Coefficients		Standardized Coefficients (Beta)	t-test	p-value	95% Confidence Interval for B	
	B	**Std. Error**				**Lower**	**Upper**
Constant	68.253	4.212		16.203	<0.001	59.97	76.54
Gender (reference: male)	-3.268	1.686	-0.099	-1.938	0.053	-6.58	0.05
Smoking status/regular used of substances (reference: Cigarettes/Shisha)	4.231	0.284	0.167	3.294	0.001	1.71	6.76

r-square=0.048, Adjusted R^2=0.041

Model ANOVA: F=6.522, p<0.001

Variables entered and excluded: Study year
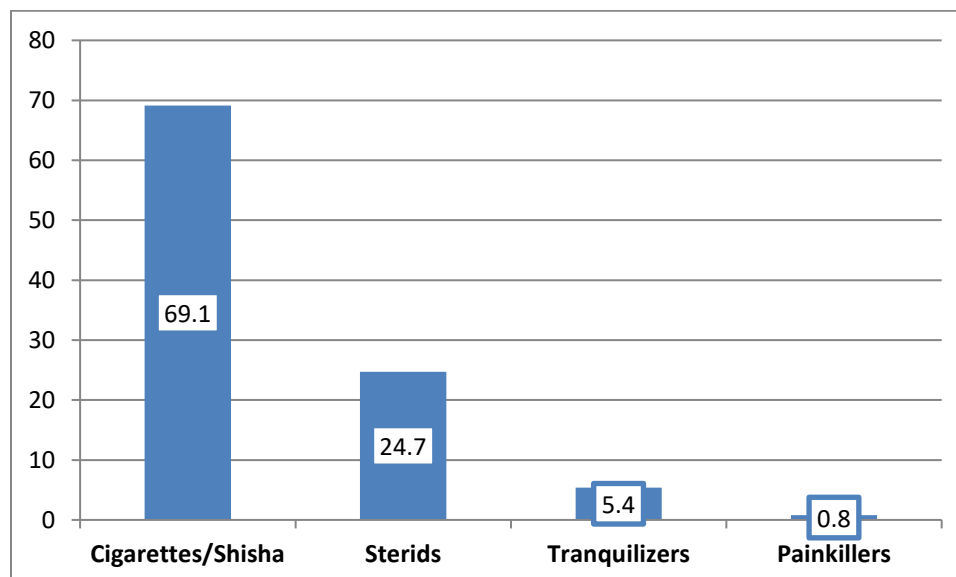
Figure 1: History of ever been a smoker or regularly used any of the following substances among the participants
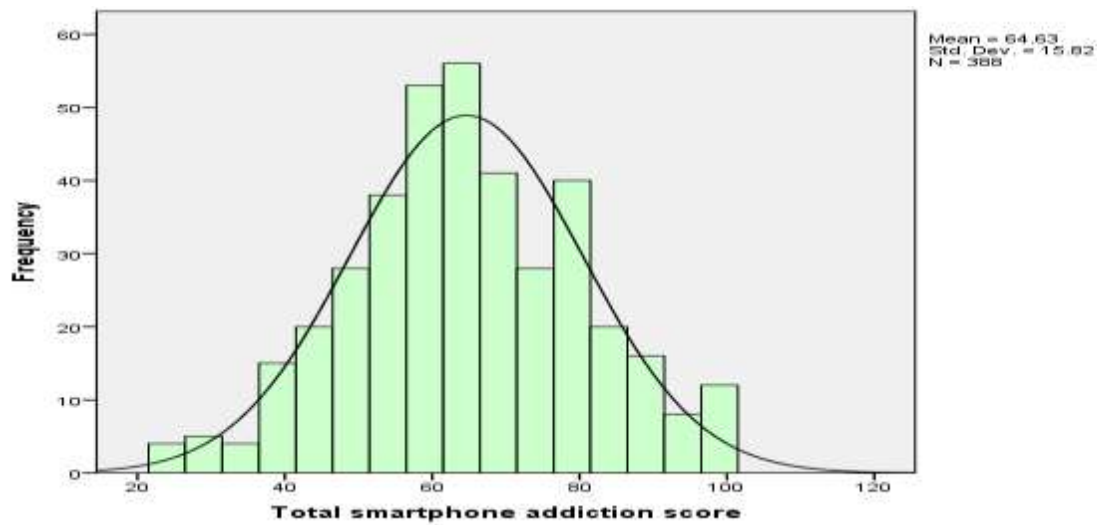
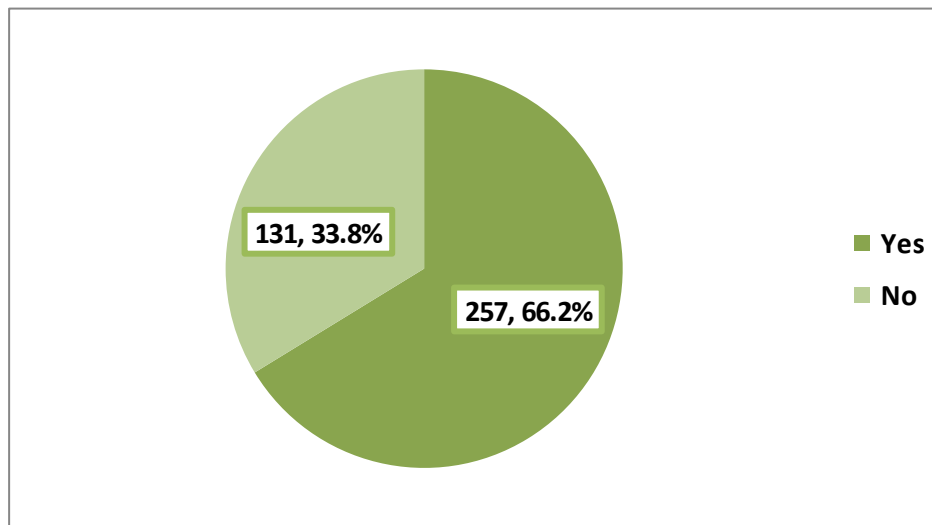**Figure 2: Distribution of the total smartphone addiction score among the participants.**

Figure 3: Prevalence of smartphone addiction amng university students in Tabuk, Saudi Arabia