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# PUBLIC HEALTH RESEARCH

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## Prevalence of Internet Addiction and Its Associated Factors among Medical Students, Yemen

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### ABSTRACT

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<b>Introduction</b>	Problematic Internet addiction becomes one of the major problems in today's world. This study aimed to identify the prevalence of Internet addiction and its associated factors among medical students of University of Sciences and Technology.
<b>Methods</b>	A cross sectional analytic study was carried out among 275 medical students of University of sciences and Technology, during a period of 7 months. The Internet addiction was measured by using structural questionnaire developed by Dr. Young. The sample was selected by stratified random sampling and analyzed by SPSS. Results were presented by tables and figures according to variables types.
<b>Results</b>	275 medical students from 1 <sup>st</sup> to 6 <sup>th</sup> academic levels were participating in this study. Of them 138 (50.2%) were males. The mean age was 21.6 ±1.98 year. It was found that 224 (81.5%) of students were placed in the Internet addiction group. Generally, 68.7% of students had mild addiction, problematic addiction 12.8%; 12.4% moderate and 0.4% severe. The prevalence of problematic Internet addiction varied from 14.5% among males to 10.9% among females. Students who were non-Yemeni and married, had more than 10 friends, visited Internet outside college, spent online 4-6 hours and more per day and used high-speed Internet were more significantly Internet addicts. There were no significant associations between other variables and Internet addiction.
<b>Conclusions</b>	Internet usage causing significant problem was low among medical students but considerable proportion of medical students were Internet addicted that causes frequent problems.
<b>Keywords</b>	Prevalence - Internet addiction - Medical students - Yemen.

### INTRODUCTION

Internet has been used widely worldwide for many reasons; communication, business, entertainment, education and many other uses.<sup>1</sup> Internet use has been increased among university and school students, and teachers. It has a major breakthrough by helping students to improve their academic knowledge and to communicate with each other. Despite the great benefits of Internet, it has many negative effects.

Yemen is among countries with growing Internet users. There is a large expansion in Internet usage through fixed broadband and mobile Internet provided through the mobile phone operators. According to Internet World Stats (IWS), there were 6,773,228 Internet users on June 30, 2016 which constituted 24.7% of the population.<sup>2</sup>

Pathologic Internet usage or Internet addiction disorder was first defined by Kimberly S. Young in 1995.<sup>1</sup> Internet addiction is characterized by excessive Internet uses to the extent that interferes with the normal daily life, leading to impairment of the user's life, relationship, and work.<sup>3,4</sup> Internet addiction is included in Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) according to the American Journal of Psychiatry. Internet addiction is like other addictions, dependency is the main feature that share the presence of four factors; excessive use, withdrawal symptoms, tolerance and negative consequences like fatigue and social isolation.<sup>5</sup>

There are many factors that lead to problematic Internet addiction and some of them are: media, social communication, online gaming, gambling, and lack of social and parent support.<sup>6,7</sup> There are many reasons why university students are more susceptible to Internet addiction.<sup>8</sup> Some universities are provided by Internet services that facilitate students' access to Internet. The students are in the age groups that mostly like to use modern technology including Internet. Furthermore, developmental and psychological characteristics of college students, searching of new friends and finishing assignments are predisposing factors of Internet addiction among university students.<sup>8</sup> It has been reported that demographic factors such as sex, age, employment status, marital status and other factors could be significant risk factors of Internet addiction.<sup>9</sup>

Reports from several countries about Internet addiction have given significant results about the magnitude of problem and its impact on the person's health and performance that should be considered as an important health problem. It results in psychological problems such as sleep disorder, anxiety or depression, social phobia, unhappiness, musculoskeletal problems such as back pain and nutritional problems such as overweight.<sup>1,10,11</sup> The academic performance of the

students can be affected negatively by the level of their Internet addiction. Moreover, eating, time management and sleep problems occur for the Internet addicts.<sup>6,12,13,14</sup> According to study in Iran, there was negative correlation between Internet addiction and the students' family cohesion.<sup>7</sup> Nowadays, using of smart phones aggravates the problem as the students can use them anywhere to access Internet.

The prevalence of Internet addiction varies from one country to another. It ranges from 5.6% in Greece<sup>15</sup> to 42% in Nepal.<sup>16</sup>

Medical students are young adults who are more susceptible to Internet addiction and due to easy access of Internet inside and outside college and the lack of previous studies on Internet addiction in our society, this study was aimed to determine the prevalence and the associated factors of Internet addiction among medical students of faculty of Medicine and Health Sciences, UST, Yemen.

### METHODS

#### *Study design*

This study was a cross-sectional analytical study that was carried out among undergraduate medical students of University of Science and Technology, Sana'a, Yemen during the academic year 2015 – 2016.

#### *Sample size*

The sample size was estimated by using the equation of one proportion formula based on the prevalence of Internet addiction from previous study in Pakistan (23.9%).<sup>17</sup>  $n = ((z^2_{1-\alpha/2}) * pq) / d^2$  where  $z_{1-\alpha/2} = 1.96$  (at 5%  $\alpha$  error);  $p =$  expected proportion in population,  $q = 1 - p$  and  $d = 0.05$ . So the calculated sample was 280 students that was selected from a total of 701 students (347 males and 354 females). However, 5 questionnaires were excluded due to incomplete data and so the final sample was 275 students.

#### *Sampling Method*

There are six levels of students (First to Sixth) and the students were selected from each level using systematic random sampling according to their proportion from the total.

#### *Data Collection*

A structured questionnaire was used to collect the data from the respondents that consisted from three parts. The first part contained demographic characteristics of the participants. The second part was about Internet using questions, but the third part was adopted from Dr. Young Internet Addiction Test.<sup>18</sup> The Cronbach's Alpha of the questionnaire in this study was equal to 0.87. All

subjects were asked through direct interview to fill out a questionnaire by trained graduate students.

*Operational definition of variables*

The Internet Addiction Test consisted from 20 questions based on Likert scale from 0 (Does not apply) to 5 (always), so the total score of each participant ranges from 0 to 100. The diagnosis of Internet Addiction was based on the following: 0 – 19 points; normal users, 20 – 49 points: mild Internet addiction (An average on-line user, staying longer times on the web but he/she can control over usage), 50 – 69 points: moderate Internet addiction (Experiencing occasional or frequent problems because of the Internet) and 70 – 100 points: severe Internet addiction (Causing significant problems in your life). A score of 50 or more is considered a problematic Internet addiction.<sup>18</sup>

*Inclusion criteria*

All students of faculty of medicine in University of Science and Technology of both sexes were included in the study

*Exclusion criteria:*

Medical students who were not Internet users.

*Data analysis*

The data were analyzed by SPSS program version 23. Frequency (%) were used to describe the qualitative variables. Mean and standard deviation were used to describe the quantitative variables as the data were normally distributed. Odds ratios (OR) and 95% confidence intervals were calculated to measure the risk. Chi- square tests were used to show the significant of association between Internet addiction and its risk factors at level of significance 0.05. For quantitative variable, Independent t-test was used to determine the difference in mean score between the two groups. The association between the significant risk factors

and Internet addiction was further tested using multiple logistic regression analysis by using enter technique.

*Ethical consideration*

The study was reviewed and approved by the Medical Research Ethic Committee, Department of Scientific Research, UST. In addition, verbal consent was taken from each participant.

**RESULTS**

This study was carried out among 275 students with age range from 17 to 29 year and mean age 21.6±1.98. Males were nearly the same of females (50.2% vs. 49.8%). The majority of students was Yemeni either living inside the country (80%) or expatriates (12%). They were mainly living with their families (62.5%) and single (89.5%). Out of all students, 16.4% had a scholarship, 11.3% were smokers and 30.2% were khat chewers. The majority of students had more than 5 friends (80.9%). It was found that 14 (5.1%) medical students had a history of chronic diseases. The mean duration of Internet usage was 5.6 year. More than half of the students (59.6%) had an experience and knowledge on computer and cell phone programming. The majority of respondents (94.5%) used their mobiles to access the Internet, then their laptops and desktops (54.5% vs. 19.6% respectively). The majority accessed the Internet from their homes (91.2%), then from the collage and Internet café (53.3% vs. 20.1% respectively). 84% of the students used the Internet daily and they mainly spent one to three hours online (56%). About fifth of the students (21.1%) liked tea or coffee drinking during Internet usage. Many of the participants (77.1%) used the Internet more when the speed of Internet is faster (Table 1).

**Table 1** General characteristics of the students (n=275)

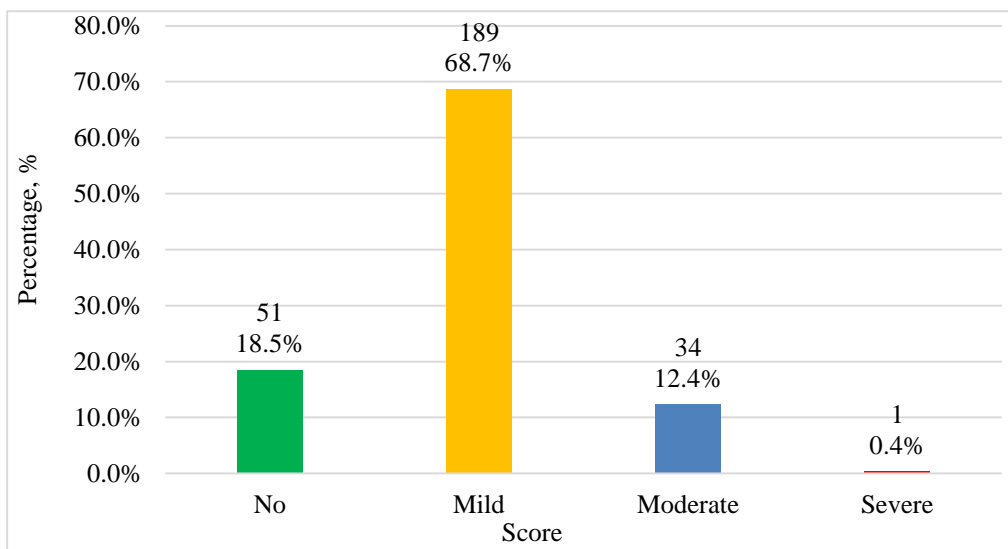
Variable	Mean (SD)	freq.	%
Age (year)	21.6 (1.98)		
Sex			
Male		138	50.2
Female		137	49.8
Nationality			
Non – expatriate Yemeni		220	80.0
Expatriate Yemeni		33	12.0
Not Yemeni		22	8.0
Academic level			
First		47	17.1
Second		62	22.5
Third		48	17.5
Fourth		58	21.1
Fifth		35	12.7
Sixth		25	9.1

## Internet Addiction among Students

Variable	Mean (SD)	freq.	%
Residence			
With family		172	62.5
In dormitory		56	20.4
Alone		47	17.1
Marital status			
Single		246	89.5
Married		29	10.5
Payment type			
Self		230	83.6
Scholarship		45	16.4
Smoking			
Yes		31	11.3
No		244	88.7
Khat chewing			
Yes		83	30.2
No		192	69.8
Having real friends			
Yes		272	98.9
No		3	1.1
No. of real friends			
≤5		52	19.1
>5		220	80.9
Having chronic diseases			
Yes		14	5.1
No		261	94.9
Internet use duration (year)	5.6 (3.32)		
Experience and knowledge on computer and cell phone programming			
Yes		164	59.6
No		111	40.4
Internet access tools			
Desktop		54	19.6
Laptop		150	54.5
Mobile		260	94.5
others		25	9.9
Internet access places			
Home		250	91.2
Collage		146	53.3
Internet café		55	20.1
Frequency of Internet use			
Daily		231	84.0
Infrequent		44	16.0
How many hours you stay online per day			
< 1hr		54	19.6
1-3 hrs		154	56.0
4-6 hrs		45	16.4
> 6 hrs		22	8.0
Do you like consumption of tea or coffee during usage of the internet?			
Yes		58	21.1
No		217	78.9
Do you stay online more when the speed of Internet is faster ?			
Yes		212	77.1
No		63	22.9

According to the IAT scoring system, this study revealed that 224 (81.5%) medical students were found to be Internet addicts. They were distributed as following: mild 189 (68.7%), moderate 34 (12.4%) and severe Internet addiction

1 (0.4%). Problematic Internet addiction that includes moderate and sever Internet addiction constituted 12.8% of the total participants (Figure 1). The mean score of IAT was  $32.5 \pm 15.09$ .



**Figure 1** Prevalence of Internet addiction among the Internet –used students (n=275)

This study found that although the prevalence of problematic Internet addiction was more among students; male, married, fifth academic level, who lived alone, and who paid for the university by them-self, but the associations were not statistically significant. There was no significant difference in mean age between Internet addicted and non-addicted students (p-value 0.622). Non-Yemeni students were more Internet addicts as compared to Yemenis and this was statistically significant (31.8% vs. 11.1%, p-value 0.014). This study showed that no statistical association was found between Internet addiction, and smoking and khat chewing. Internet addicted students who had friends more than 10 were more Internet addicts than others, and this is statistically significant (p-value 0.033). There were no significant association between problematic Internet addiction and the

participants’ history of chronic diseases, duration of Internet use, experience and knowledge on computer and cell phone programming, Internet access tools, frequency of Internet use and consumption of tea or coffee during usage of the Internet. Students using Internet in the college were less addicts to Internet than those using it in other places (8.9% vs. 17.2%, p-value 0.040). Moreover, Internet addiction was significantly higher among students who spent 4 to 6 hours or more than 6 hours using Internet (p-value 0.035 and <0.001 respectively) compared to those who spent less than one hour. In this study, 15.6% of the Internet-addicted participants stayed online when the speed of Internet is faster more than non-addicted (3.2%) and this was statistically significant (p-value 0.010) (Table 2).

**Table 2** Association between Internet addiction and other variables (n=275)

Item	Problematic Internet addiction (n=35)			Normal and average users (n=240)			P-value	OR	95% CI
	Mean (SD)	freq.	%	Mean (SD)	freq.	%			
Age (year)	21.7 (2.14)			21.5 (1.96)					
	>22	8	19.0	34	81.0	0.182	1.80	0.75 - 4.28	
	≤22	27	11.6	206	88.4				
Sex						0.378	1.38	0.67 - 2.82	
	Male	20	14.5	118	85.5				
	Female	15	10.9	122	89.1				
Marital status						1.000	0.90	0.29 - 2.76	
	Single	31	12.6	215	87.4				
	Married	4	13.8	25	86.2				
Nationality						0.014	3.75	1.41 - 9.99	
	Non-Yemeni	7	31.8	15	68.2				
	Yemeni	28	11.1	225	88.9				
Academic level						Ref.			
	First	8	17.0	39	83.0				
	Second	7	11.3	55	88.7	0.393	0.62	0.21 - 1.85	
	Third	6	12.5	42	87.5	0.536	0.70	0.22 - 2.19	

## Internet Addiction among Students

Item	Problematic Internet addiction (n=35)			Normal and average users (n=240)			P-value	OR	95% CI
	Mean (SD)	freq.	%	Mean (SD)	freq.	%			
Residence	Fourth	6	10.3	52	89.7	0.321	0.56	0.18 - 1.75	
	Fifth	6	17.1	29	82.9	0.988	1.01	0.32 - 3.23	
	Sixth	2	8.0	23	92.0	0.303	0.42	0.08 - 2.17	
Payment type	Alone	7	14.9	40	85.1	0.625	1.25	0.51 - 3.06	
	Dormitory or with family	28	12.3	200	87.7				
Smoking	Self	30	13.0	200	87.0	0.772	1.20	0.44 - 3.28	
	Scholarship	5	11.1	40	88.9				
Khat chewing	Yes	6	19.4	25	80.6	0.240	1.78	0.67 - 4.70	
	No	29	11.9	215	88.1				
No. of real friends	Yes	9	10.8	74	89.2	0.538	0.78	0.35 - 1.74	
	No	26	13.5	166	86.5				
Having chronic diseases	>10	27	16.2	140	83.8	0.033	2.41	1.05 - 5.53	
	≤10	8	7.4	100	92.6				
Internet use duration (year).	Yes	2	14.3	12	85.7	1.000	1.15	0.25 - 5.38	
	No	33	12.6	228	87.4				
Experience and knowledge on computer and cell phone programming	6.1 (3.37)			5.5 (3.31)		0.345	NA		
Internet access tools	Yes	22	13.4	142	86.6	0.678	1.17	0.56 - 2.43	
	No	13	11.7	98	88.3				
Desktop	Yes	8	14.8	46	85.2	0.608	1.25	0.53 - 2.93	
	No	27	12.2	194	87.8				
Laptop	Yes	18	12.0	132	88.0	0.692	0.87	0.43 - 1.76	
	No	17	13.6	108	86.4				
Mobile	Yes	34	13.1	226	86.9	0.744	2.11	0.27 - 16.53	
	No	1	6.7	14	93.3				
Home	Yes	32	12.8	218	87.2	1.000	1.03	0.29 - 3.64	
	No	3	12.5	21	87.5				
Collage	Yes	13	8.9	133	91.1	0.040	0.47	0.23 - 0.98	
	No	22	17.2	106	82.8				
Internet Café	Yes	7	12.7	48	87.3	0.991	1.00	0.41 - 2.41	
	No	28	12.8	191	87.2				
Frequency of Internet use	Daily	32	13.9	199	86.1	0.199	2.20	0.64 - 7.52	
	Infrequent	3	6.8	41	93.2				
How many hours you stay on line per day	< 1hr	2	3.7	52	96.3	Ref.			
	1-3 hrs	14	9.1	140	90.9	0.217	2.60	0.57 - 11.83	
	4-6 hrs	8	17.8	37	82.2	0.035	5.62	1.13 - 28.01	
	> 6 hrs	11	50.0	11	50.0	<0.001	26.00	5.04 - 134.18	
Do you like consumption of tea or coffee during usage of the Internet?	Yes	10	17.2	48	82.8	0.246	1.60	0.72 - 3.56	
	No	25	11.5	192	88.5				

Item	Problematic Internet addiction (n=35)			Normal and average users (n=240)			P-value	OR	95% CI
	Mean (SD)	freq.	%	Mean (SD)	freq.	%			
Do you stay online more when the speed of Internet is faster?									
Yes		33	15.6	179	84.4	0.010	5.62	1.31 - 24.13	
No		2	3.2	61	96.8				

In multiple logistic regression analysis, non-Yemeni students were more Internet addicts than others and the association was statistically significant (p-value 0.021, AOR 4.10). Subjects who had more than 10 friends had 4.43 times risk of being Internet addicted than those had less than or equal 10 friends (p-value 0.004). Students accessed Internet inside college had lower susceptibility to Internet addiction than others (p-

value 0.003, AOR 0.26). The odds of Internet addiction among students who stayed online more than 6 hours was about 17.27 times more than those stayed less than one hour (p-value <0.001). The study showed that the respondents who “stay online when the speed of Internet is faster” had 7.5 times the odds of developing Internet addiction (p-value 0.014) (Table 3).

**Table 3** Multivariable analysis for the association between Internet addiction and other variables

Variables	B	S.E.	Wald	Sig.	AOR	95% C.I
Nationality (Non-Yemeni)	1.73	0.67	6.68	0.010	5.62	1.52 - 20.82
Marital status (Married)	1.41	0.71	3.96	0.047	4.08	1.02 - 16.30
No. of real friends (>10)	1.63	0.54	9.27	0.002	5.09	1.79 - 14.53
Internet access places (collage) (Yes)	-1.57	0.47	11.08	0.001	0.21	0.08 - 0.52
How many hours you stay on line per day						
1-3 hrs	1.44	0.83	2.96	0.085	4.20	0.82 - 21.51
4-6 hrs	2.19	0.90	5.87	0.015	8.93	1.52 - 52.46
> 6 hrs	4.27	1.00	18.34	<0.001	71.23	10.11 - 501.92
Do you stay online more when the speed of Internet is faster? (Yes)	2.17	0.82	6.95	0.008	8.73	1.74 - 43.75

**DISCUSSION**

Our finding illustrated that there were no significant association between the participants’ socioeconomic characteristics (age, sex, marital status, residence, academic level and payment) and the prevalence of Internet addiction except the students’ nationality. A study done among Greek medical students reported the same non-significant results.<sup>15</sup> Younger age was significant risk factor of Internet addiction in Indian study.<sup>22</sup> Though our result revealed Internet addiction was more among males than females, this was not statistically significant. The same finding reported in previous study conducted in Pakistan.<sup>17</sup> The majority of previous reviews reported that males were more significantly affected than females.<sup>4, 8-10, 12, 20, 22</sup> The males’ predominance of being Internet-addicted can be inferred by that they have more friends, social freedom and different preferences like video games compared to females.<sup>11</sup> This survey reported that the likelihood of Internet addiction was more among international non-Yemeni students. This could be because they have more freedom due to living far from their families. No significant relationship was found between stage of education and IA in the present study. However, another

study showed that high-level students were more Internet addicted than basic-levels students because they might become more familiar with Internet use than basic ones<sup>11</sup> but opposite result was reported in Iran.<sup>8</sup> In our study, marital status had no significant association with Internet addiction. Other finding from previous study in Iran revealed that married people was more Internet addicted.<sup>20</sup> However, this is controversial to other studies in Nepal<sup>16</sup> and Iran<sup>9</sup> that showed Internet addiction was more common among single students. This may be because singles are more sociable during using the Internet that increases the possibility of being Internet addicts.<sup>9</sup> Based on the findings, there was no significant association between the students’ residence and the rate of Internet addiction which resembles other findings.<sup>8, 20</sup> On the other hand, it has been reported in Iranian study that students lived in dormitory or home were less Internet addicted than those lived alone because they may not have facilities to use Internet.<sup>9</sup>

The current study indicated that the students’ knowledge on computer and Cell phone programming did not differ significantly between the normal and the addicted students. This could possibly imply that using Internet does not need

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skills on programming of computer or smartphones. This contradicts another study in Iran in which this factor was significant predictor of Internet addiction.<sup>20</sup>

Chewing of khat plant, which is amphetamine-like stimulant, is highly prevalent among people in Yemen and some African countries.<sup>23</sup> The people usually consume khat for hours especially afternoon and in the evening. Our study did not find any significant association between the participants' special habits (khat chewing and smoking) and the occurrence of Internet addiction. Another study in Iran reveals the same, that Internet addiction did not differ significantly between smokers and non-smokers.<sup>8</sup>

Regarding years of Internet use, our study showed that there was no significant difference between Internet addicts and non-addicts. This reveals that the person can be addicted to Internet regardless of years of use. The same result was found in another Greek study.<sup>15</sup>

The current study did not find significant association between Internet addiction and the types of Internet access tools; desktops, laptops and mobiles. In previous study, access Internet by mobiles was associated significantly with Internet addiction more compared to laptops or desktops.<sup>22</sup> This was due to the wide availability of smartphones that allow the students to access Internet easily and continuously. The difference in findings could be that in other countries there is widespread presence of wireless mobile Internet access services that facilitate using Internet by mobiles.

Our findings revealed that medical students who accessed Internet in college were significantly less likely to be addicted to Internet. This could be because the medical students did not have enough time to use Internet in college compared to other places. In Greek study among medical students, those who visited Internet in Internet cafes had higher significant percentage of addiction.<sup>15</sup> Another study in Nepal indicated that there was no significant association between the Internet access places and the rate of Internet addiction.<sup>16</sup>

The present study showed that Internet addicted students consumed coffee and tea more than non-addicted when they used Internet but this was not statistically significant. The same result was found in Iranian study but the association was statistically significant.<sup>8</sup> This explains that Internet addiction can be associated with other addictive personal habits of coffee and tea drinking (15). In another Taiwanese study, coffee drinking during Internet usage was less reported among addicted students.<sup>24</sup>

According to this study result, the Internet addiction was high among students who spent more than 6 hours using Internet. This result was

consistent with other studies done in Greece,<sup>15</sup> Nepal,<sup>16</sup> Iran<sup>8</sup> and India.<sup>22</sup> The students spend many hours daily on Internet to satisfy their needs from communicating with friends, chatting, searching information and social relations which increase the likelihood that a person becomes addicted to the Internet.

Our finding demonstrated that the rate of Internet addiction was high among students who used high-speed Internet more than others. When the speed of Internet is high, the students are more likely to spend much time on Internet and this increases the probability of becoming Internet addicts. This was in agreement with previous study conducted among health sciences students in Nepal.<sup>16</sup>

## CONCLUSION

The prevalence of Internet addiction was significantly high in this study although it was mainly mild. As illustrated in multivariate model, non-Yemeni and married students, having many friends, visiting Internet outside college, spending many hours using Internet, and high-speed Internet were the significant determinants of Internet addiction. This result can be used as warning sign for the health and universities authorities to pay attention to this problem.

## RECOMMENDATION

Further studies in Yemen are required from different medical governmental and non-governmental universities to assess the magnitude of real problem of Internet addiction among medical students and its impact especially on their academic level. Efforts including educational campaigns should be done for universities students to illustrate the ideal use of Internet by students to get benefits and to minimize its bad impact on their life.

## LIMITATION

This study was done in one private university that is equipped by Internet wireless services, therefore we cannot generalize its results to the governmental universities that the majority do not have this service. In the current time, our university is the only private university in Yemen that contains faculty of medicine.

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