Original Article

Assessing the effect of an educational intervention program based on Health Belief Model on preventive behaviors of internet addiction

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Abstract:

INTRODUCTION: Internet addiction refers to the excessive use of the internet that causes mental, social, and physical problems. According to the high prevalence of internet addiction among university students, this study aimed to determine the effect of an educational intervention on preventive behaviors of internet addiction among Tehran University of Medical Sciences students.

MATERIALS AND METHODS: This study was a quasi-experimental study conducted among female college students who live in the dormitories of Tehran University of Medical Sciences. Two-stage cluster sampling was used for selection of eighty participants in each study groups; data were collected using "Young's Internet Addiction" and unstructured questionnaire. Validity and reliability of unstructured questionnaire were evaluated by expert panel and were reported as Cronbach's alpha. Information of study groups before and 4 months after the intervention was compared using statistical methods by SPSS 16.

RESULTS: After the intervention, the mean scores of internet addiction, perceived barriers construct, and the prevalence of internet addiction significantly decreased in the intervention group than that in the control group and the mean scores of knowledge and Health Belief Model (HBM) constructs (susceptibility, severity, benefits, self-efficacy) significantly increased.

CONCLUSIONS: Education based on the HBM was effective on the reduction and prevention of internet addiction among female college students, and educational interventions in this field are highly recommended.

Keywords:
Education, internet addiction, intervention, preventive behaviors

Introduction

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Internet is a means of neutralizing that can be used to search for information.[1] Internet is a global computer network providing a variety of information and communication facilities, consisting of interconnected networks using standardized communication protocol.[2] The internet with its rapid expansion to individual applications, training and research in the development of inducing and increase their knowledge and abilities of students and universities by

achieving rapid and inexpensive scientific information is undeniable benefits of internet access.[3] In 1969, the Defense Department's Advanced Research Projects Agencies of America, subsidized a network called ARPANET which was developed in the 1970s and 1980s and renamed as Internet.[4] Many uses of the internet and its attractiveness as a phenomenon are due to the advent of internet Addiction.[5] Internet addiction refers to the excessive use of the internet or using the internet as irrational.[6] Young believes that the term "addiction" was used for internet users because it has the

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same symptoms of the alcohol and cigarettes addiction.[5] Holmes suggested that using internet more than 19 h per week is a sign of internet addiction; however, Young) indicated that using internet about 38 h per week is a sign of addiction.[7,8] In recent years, the number of internet users had reached over 3 billion people worldwide compared with 360 million internet users in 2000.[9] Asian countries with 1.4 billion (45.6%) users are the first of ranking and China with 642 million users is in first place.[10,11] Iran currently has 46 million users that include totally 57.2% of internet users at the entire Middle East.[11] International estimates of internet addiction widely vary. The prevalence of internet addiction is reported from 1.5% to 25% in different countries.[12] It is estimated that about 4.4–4.7 million of Americans are affected by internet addiction.[13] In Iran, internet addiction is reported as approximately 11%, which is higher than countries such as Italy, China, and Australia, Internet addiction in these countries are 5%, 4.4%, and 8.1%, respectively.[12] According to Qasemzadeh study, the prevalence rate of internet addiction in Iran is 2%–80%.[14] Recent studies reported that the highest prevalence of internet addiction is among adolescents of 15–19 years old.[14] The university students have high vulnerability toward internet addiction disorder. Internet addiction is a global phenomenon with different levels and it ranges from 5% to 25% in the US, China, South Korea, England, Australia, Taiwan, Japan, and other Eastern and Western European countries students.[13] In Iran, 25.6% of students are addicted to the internet.[15] Another study reported the internet addiction equal to 17.7% among university students in Iran.[16] In Thailand, 5.9% of students are addicted to internet.[13] Various studies indicated that the use of the internet is on the rise as well as the incidence and prevalence of internet addiction.[17] Internet addiction is a chronic, recurrent, and widespread problem which may contribute to financial, familial, and social difficulties.[18] The personal and psychological problems such as depression, anxiety, social and physical damage resulting from internet addiction are greater than other risks.[19,20] Internet addicts lose their sleep due to being online and forget their nutrition and physical activity.[21,22] Reports of deaths due to heart attack during use of the internet, which can be due to physical disorders such as insomnia, and lack of exercise.[23] On the other hand, anonymous nature of the internet makes people say things or do things on the internet that they do not in a normal position. According to some studies, the students who experience extreme and pathological use of the internet in comparison to those who have no such experience, show more pathology and mental problems and there is a relationship between the increase of working with internet experience and decrease of mental health rate.[13] Studies showed that university students who are suffering from internet addiction have no necessary skills in their social communications.[24,25] Prevention is the best solution for addiction combating.[26] Given the importance of prevention rather than treatment, and given that internet addiction is a public health problem among young people and students community, design and implementation of educational interventions about of how to use the internet is necessary among students. Most studies in the field of internet addiction (in the world and Iran) are descriptive studies. These studies examine factors affecting internet addiction and its consequences.[27-29]

For example, Lashgarara *et al*. and Jafary Nodoushan *et al*. investigated the factors affecting internet addiction and the effect of internet addiction on the general health of Medical Sciences students.[29,30] In addition, Kiany *et al*., in their study, investigated the internet addiction and its related factors among nursing students in Tehran University of Medical Sciences. Based on their findings, 17.7% of the students have internet addiction and there was statistically significant relationship between internet addiction and demographic variables including gender, status, personal computers, science websites, personal blogs, personal websites, Web chat (chat), listening to music, surfing the Web, making friends, playing online games, blogging, duration of internet use per hours per day, time of the week, and time of internet use.[16] Dadipoor *et al*., in their study entitled "Investigate internet addiction and effective factors among students in Hormozgan University of Medical Sciences," showed that there was significant relation between variables such as gender, field of study, marital status, age, educational level, and using internet with Internet addiction. However, the location was not significantly associated with internet addiction.[31] Therefore, due to the lack of intervention studies in the field of internet addiction, design and implementation of intervention studies in the field of internet addiction is necessary. Promotion of knowledge, attitude, and belief was a beset approach to prevention of addictive behaviors.[26] Several studies have shown that based on the theory-driven approaches, educational program is one of the most effective training programs for preventing addiction.[32,33] In health education field, certain models help us explain the occurrence behavior and conduct health education program to view its effect on behavior.[34] Using models and theories of behavior change, which increases the possibility of increasing the effectiveness of health education programs, helps identify the individual characteristics and environment which may effect on behavior.[35,36] Effectiveness of health education programs depends on correct theories and models used in health education. Hence, today, using theories and models of health behavior and health education is essential for health education and health promotion professionals.[37] One of the health education

models that are used in the prevention of addictive behaviors is Health Belief Model (HBM).[26] HBM states that health-related behaviors of people are based on their perceived susceptibility (refers to one's perception of the risk or the chances of contracting a health disease or condition), perceived severity (a person's perception of the seriousness of the consequences of contracting a disease), perceived benefit (One's belief in the efficacy of the advised action to reduce risk or seriousness of impact), perceived barrier (One's opinion of tangible and psychological costs of the advised action), cues to action (Strategies to activate "readiness"), and self-efficacy (Confidence in one's ability to take action).[26] Based on search in the internet, we have not found a study in the field of internet addiction that had been done using health education models such as HBM, and therefore given the high prevalence of internet addiction among students and numerous complications attributable and with regard to the importance of implementing interventions such as educational interventions for the prevention and reduction of internet addiction among students, this study aimed to determine the effect of an educational intervention on preventive behaviors of internet addiction among Tehran University of Medical Sciences students.

Materials and Methods

This study was a quasi-experimental, case–control study. The population of this study included female college students who live in the dormitories of Tehran University of Medical Sciences in 2014. According to research study, prevalence of internet addiction among medical students in dormitories of Tehran University of Medical Sciences was about 30% and researchers believed that with educational intervention based on the HBM, this problem will decrease to 10%.[38] Therefore, sample size with a confidence interval of 0.95 and power of 0.80, determined 80 for each group. In this study, two-stage cluster sampling method was used. All dormitories of female students of Tehran University of Medical Sciences were selected and each dormitory was identified as a cluster. After that, four dormitories were randomly selected and divided into experimental and control groups, each group included two dormitories. Then, eighty students were randomly selected from each group. Ethical considerations included the following: This study was approved by the Tehran University of Medical Sciences and Iranian Registry of Clinical Trials. Informed consent was obtained from all participants and no personal identifier was recorded on the questionnaires. The inclusion criteria for this study included being student, living in the dormitories of Tehran University of Medical Sciences, and using the internet for at least 3 h per day. All students agreed to participate in this study. In this study, the Internet

Addiction Test (Young, 1998) was used to assess addiction to the internet.[39] This questionnaire has two versions: 8 and 20 questions; however, in this study, 20-questionnaire form was used. In this study, scores 49 and <49 are considered as normal internet use and scores 50 and >50 are considered as addictive internet use. In this study, questionnaire developed by the researcher was also used that was based on the HBM. This questionnaire consisted of several parts including demographic (9 questions), knowledge (7 questions), perceived susceptibility (5 questions), perceived severity (6 questions), perceived barriers (4 questions), perceived benefits (5 questions), cause to action (5 questions), and self-efficacy (6 questions). This tool is a grading scale of 5-1. In this tool for grading, Likert scale (agree = 5, relatively agree = 4, no comment = 3, relatively disagree = 2, disagree = 1) was used. To determine the validity of qualitative content, the questionnaire was given to eight health education professionals. The reliability of the questionnaire was calculated using Cronbach's alpha. Based on data analysis, coefficient alpha for the knowledge structures was 0.93, perceived susceptibility was 0.71, perceived severity was 0.6, perceived benefits was 0.83, perceived barriers was 0.65, cause to action was 0.64, self-efficacy was 0.7 and for the entire questionnaire was 0.83. The pretest was used to measure the model constructs and determine the prevalence rate of internet addiction (in intervention and control groups). After the pretest, the educational intervention was designed and implemented for the experimental group during the three sessions within 3 weeks. Control group received no intervention. Two dormitories which were designated as the intervention group, in terms of geographic, were far from two dormitories which were designated as the control group, in this way, was prevented from transmission of information among two groups. In this study education was based on active learning methods which included group discussions, questions–answers, and lectures. In this study, educational intervention was designed based on the HBM constructs, aimed of educational intervention at first session, was increasing knowledge of college students about internet addiction. In this session, questions–answers and lecture was about the addictive nature of the internet and side effects of internet addiction. The second session intervention was implemented based on the constructs of perceived susceptibility and perceived severity of the HBM, in this session, group discussion was about the negative consequences of internet addiction. Third session intervention was implemented based on the constructs of perceived benefits and perceived barriers of the HBM in this session, group discussion was about the benefits of adopting preventive behaviors of internet addiction and barriers of adopting preventive behaviors of internet addiction. In this study, posters and pamphlets to be used

as a cause to action and to increase the self-efficacy of the intervention group, were used reinforcing messages. Posttest, was taken 4 months after the intervention. To determine the period of follow-up after the intervention, interventional studies have been done on addictive behaviors were investigated.[40-43] These studies, were considered different time periods for follow-up, so, in this study given the time taken to complete the project, start summer vacation of students under study and lack of access to them after 4 months, follow-up period were considered 4 months. The collected data were entered into the SPSS version 16 (SPSS, Inc., Chicago IL, U.S.A.) and analyzed using the paired *t*-test, independent *t*-test, Chi-square, Fisher exact test, McNemar test, analysis of covariance (ANCOVA), and Kolmogorov–Smirnov; *P* < 0.05 was considered statistically significant.

Results

This study involved two groups including of 80 participants in case and 80 participants in control groups. The average age in the intervention group was 22 and that in the control group was 21.6. Majority (85%) of the intervention group and control group (91%) were single. About 42.1% in the intervention group had bachelor degree, followed by doctoral (40%), and master degree (17.5%). More than half (52.5%) of the respondents in the control group had bachelor degree, 31.2% had doctoral, and 16.3% had master degree. Before the intervention, demographic variables such as age, marital status, employment, level of education and grade point average there was no significant difference between the intervention and control groups [Table 1].

Analyses by Fisher's Exact Test showed that before the intervention, there was no significant difference between two groups in terms of hours of internet use during a day, but 4 months after the intervention, this difference was statistically significant (*P* < 0.001). Also, analyses by McNemar test showed that before and after the intervention, in the control group, there was no significant difference in terms of hours of internet use during a day, but in the intervention group, this difference was significant (*P* < 0.001) [Table 2].

Table 3 represents the frequency distribution of the normal and addicted internet user, before and 4 months after the intervention. According to Chi-squared test before the intervention, the prevalence of internet addiction there was no significant difference between two groups, while after the intervention, the prevalence of internet addiction was significantly reduced in the intervention group compared to the control group (*P* < 0.04). In addition, McNemar test showed that before and after the intervention, the prevalence of internet addiction there was no significant difference

Table 1: Respondents profile

Variables	Intervention group *n* (%)	Control group *n* (%)	*P*
Age (years)			
<20	26 (32.5)	24 (30)	0.73*
>20	54 (67.5)	56 (70)	
Mean±SD	21.6±3.2	22±2.6	0.42*
Marital status			
Married	12 (15)	7 (8.8)	0.22*
Single	68 (85)	73 (91.2)	
Employment			
Employed	11 (13.8)	13 (16.2)	0.54*
Unemployed	69 (86.2)	67 (83.8)	
Level of education			
Bachelor	34 (42.5)	42 (52.5)	0.53*
Master	14 (17.5)	13 (16.3)	
Doctoral	32 (40)	25 (31.2)	
GPA (mean±SD)	15.5±3.9	15.8±3.3	0.56**

*Chi-squared test, **Independent *t*-test, SD = Standard deviation, GPA = Grade point average

Table 2: Frequency distribution of hours of internet use per day, before and after intervention

Hours of internet use per day	*n* (%)		*P*
	Control	Intervention	
Before intervention (h)			
3-4	18 (32.5)	26 (32.5)	0.28*
4-5	36 (45)	31 (38.7)	
5-6	18 (22.5)	12 (15)	
>6	8 (10)	11 (13.8)	
After intervention (h)			
3-4	22 (27.5)	49 (61.2)	0.001*
4-5	33 (41.3)	23 (28.8)	
5-6	12 (15)	6 (7.5)	
>6	13 (16.2)	2 (2.5)	
P	0.2**	0.001**	

*Fisher's exact test, **McNemar test

in the control group, but in the intervention group this difference was statistically significant (*P* < 0.002), and after 4 month follow-up, the prevalence of internet addiction was significantly reduced compared to the baseline [Table 3].

According to independent *t*-test before the intervention, the mean scores of the HBM constructs (perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy and internet addiction), there was no significant difference between two groups, but this difference was significant for mean score of knowledge (*P* < 0.022). Based on ANCOVA test, after the intervention, the mean scores of the HBM constructs (perceived susceptibility [*P* < 0.001], perceived severity [*P* < 0.001], perceived benefits [*P* < 0.001], perceived barriers [*P* < 0.001], self-efficacy [*P* < 0.001], internet addiction [*P* < 0.001]), and knowledge (*P* < 0.04), there was significant difference between two groups. In addition, paired *t*-test showed that before and after the

Table 3: Frequency distribution of the normal and addicted user of the internet, before and after intervention

Prevalence of internet addiction	Control		Intervention		P
	Normal user	Addicted user	Normal user	Addicted user	
Before intervention	60 (75)	20 (25)	59 (73.8)	21 (26.2)	0.85*
After intervention	59 (73.8)	21 (26.2)	69 (86.2)	11 (13.8)	0.04*
P	1**		0.002**		

*Chi-squared test, **McNemar test

intervention, in the control group, the mean scores of the HBM constructs and knowledge there was no significant difference, but in the intervention group this difference was significant [Table 4].

Table 5 also shows that before the intervention, there was no significant difference between two groups in terms of report of radio and TV, pamphlets and leaflets training, classroom training and others as a cause to action, but this difference was significant for poster ($P < 0.018$). After the intervention, there was no significant difference between two groups in terms of report of radio and TV and others as a cause to action, but after the intervention, there was significant difference between two groups in terms of report of poster ($P < 0.001$), pamphlets and leaflets training ($P < 0.001$), and classroom training ($P < 0.001$), as a cause to action.

Discussion

The results of this study showed that after the intervention, the mean score of internet addiction and the prevalence of internet addiction have significantly decreased in the intervention group compared to the control group. Findings of this study support the effectiveness of education based on the HBM, to prevent and reduce the prevalence of internet addiction. Many studies have been conducted using the HBM, indicating the effectiveness of this model in improving the healthy behaviors of the students.[44,45] Several studies have reported that educational interventions based on the HBM are effective in the prevention of addictive behaviors.[26,46,47] HBM is one of the broadest frameworks for understanding health-related behavior. Hence, the main focus of this study is to promote preventive behaviors of internet addiction based on the HBM. The result of this study showed that after the intervention, the mean scores of knowledge and HBM constructs (perceived Susceptibility, perceived severity, perceived benefits, perceived self-efficacy), in the intervention group compared to the control group, significantly increased and mean score of perceived barriers significantly reduced. According to studies, knowledge is the introduction of behavior and increased knowledge is essential for adopting healthy behavior such as preventive behaviors of addiction.[40,46] In this regard, Shojaei Zadeh *et al*. declared that knowledge about side effects of addictive behaviors such as substance abuse

Table 4: Mean and standard deviation scores of Health Belief Model constructs, before and after intervention

Structures of model	Mean±SD		P
	Control	Intervention	
Knowledge			
Before intervention	9±2.5	10.1±3	0.022*
After intervention	9.3±2.2	12.6±2.1	0.001**
P	0.35***	0.001***	
Susceptibility			
Before intervention	15.4±4.6	16.2±4	0.25*
After intervention	15.2±3.8	21.8±3.6	0.001**
P	0.36***	0.001***	
Severity			
Before intervention	19.4±5.7	19.9±5.1	0.56*
After intervention	19±5.4	26.3±3.9	0.001**
P	0.06***	0.001***	
Benefits			
Before intervention	17.9±8.5	17.6±7	0.84*
After intervention	17±6.8	21.9±3.8	0.001**
P	0.07***	0.001***	
Barriers			
Before intervention	3±13.3	13.8±2.9	0.37*
After intervention	2.7±12.8	9.6±2.3	0.001**
P	0.06***	0.001***	
Self-efficacy			
Before intervention	8.3±20.1	19.5±4.6	0.56*
After intervention	5.4±19.2	26±2.6	0.001**
P	0.32***	0.001***	
Internet addiction			
Before intervention	35.4±2.3	36.4±2.4	0.99*
After intervention	37±2.3	21.9±3.7	0.001**
P	0.2***	0.001***	

*Independent *t*-test, **ANCOVA, ***Paired *t*-test, SD = Standard deviation, ANCOVA = Analysis of covariance

can protect adolescents against addictive behaviors.[26] Thus, increasing the awareness of college students about the addictive nature of the internet and side effects of internet addiction is necessary. However, just raising knowledge is not enough for adoption of health behavior. It seems that although educational intervention improves knowledge, there is often a big gap between knowledge and practice, for correcting this gap, the needs and requests targeting the college students as well as their primary knowledge, attitudes, and behavioral patterns should be considered for the promotion of health and internet addiction education programs. In this study, an education program based on the HBM appeared to have been effective in increasing the perceived susceptibility

Table 5: Frequency distribution of cause to action before and after intervention

Cause to action	Control		Intervention		P*
	Yes	**No**	**Yes**	**No**	
Radio and TV					
Before intervention	62 (77.5)	18 (22.5)	63.8 (51)	29 (36.2)	0.06*
After intervention	62 (77.5)	18 (22.5)	52 (65)	28 (35)	0.08*
P	1***		0.86***		
Poster					
Before intervention	34 (42.5)	46 (57.5)	20 (25)	60 (75)	0.018**
After intervention	52 (65)	28 (35)	79 (98.8)	1 (1.2)	0.001**
P	1***		0.001***		
Pamphlets and leaflets training					
Before intervention	11 (13.8)	69 (86.2)	5 (6.2)	75 (93.8)	0.1**
After intervention	11 (13.8)	69 (86.2)	78 (97.5)	2 (2.5)	0.001*
P	1***		0.001***		
Classroom training					
Before intervention	4 (5)	76 (95)	3 (3.8)	77 (96.2)	1**
After intervention	4 (5)	76 (95)	79 (98.8)	1 (1.2)	0.001*
P	1***		0.001***		
Others					
Before intervention	5 (6.2)	75 (93.8)	1 (1.2)	79 (98.8)	0.3**
After intervention	4 (5)	76 (95)	1 (1.2)	79 (98.8)	0.5**
P	1***		1***		

*Chi-squared test, **Fisher's exact test, ***McNemar test

and severity of Tehran University of Medical Sciences students about internet addiction. Other studies have also stated that health education based on the HBM can increase the perceived susceptibility and severity of addictive behaviors.[26,47] According to various studies conducted, increasing perceived susceptibility and perceived severity are predictive factors in adopting health behaviors such as preventive behaviors of addiction.[26,47-49] It is hoped that with the implementation of appropriate educational interventions to increase the perceived susceptibility and perceived severity about complications of internet addiction, preventive behaviors of internet addiction among college students to promote. Another finding of current study, is to increase the perceived benefit and decrease the perceived barrier of preventive behaviors of internet addiction among the intervention group, after educational intervention. Furthermore, other studies have also stated that health education based on the HBM can increase the perceived benefits and decrease the barrier of health behavior.[26,47] Consistent with our findings, Rakhshani *et al.* reported that educational program based on the HBM could increase the perceived benefits of preventive behaviors and could be effectiveness on preventive behaviors of addiction.[50] Some of the predictors of healthy behaviors such as preventive behaviors of internet addiction are perceived benefits and perceived barriers and many studies showed that there are strong relationship between the increase perceived benefits and decrease perceived barriers, with healthy behaviors.[51-55] Moreover, according to various studies conducted, increasing perceived benefits and decreasing perceived barriers are

predictive factors in adopting health behaviors such as preventive behaviors of addiction.[26,47-49] Hence, results of this study showed that design and implementation of appropriate educational interventions are necessary to accept the benefits of preventive behavior of internet addiction and overcome barriers of adopting preventive behaviors of internet addiction among college students. In this study, after the intervention, the mean score of perceived self-efficacy for adopting preventive behaviors of internet addiction significantly increased in the intervention group compared to the control group. Self-efficacy is one of the factors that influence on healthy behaviors and various studies show that increased self-efficacy increased adopting healthy behavior.[26,56] Hence, design and implementation of theory-based educational interventions are necessary to increase self-efficacy to control anxiety and depression among college students. After the intervention, the hours of internet use during a day significantly reduced in the intervention group compared to the control group. One of the factors affecting the prevalence of internet addiction among college students is hours of internet use.[7,8] Hence, design and implementation of educational interventions based on the HBM to reduce the hours of internet use will decrease the prevalence of internet addiction among college students. One of the strengths of this study was that for the first time, an educational intervention based on the HBM designed and evaluated to reduce and prevent internet addiction and this study due to lack of studies in this field can be used as a guide for other studies. The limitation of this study is that due to the lack of studies designed based on the HBM

to prevent internet addiction, we have to compare our results with other studies in other fields that are designed based on the HBM. Another limitation of this study is that the population of this study included only female college students who live in the dormitories of Tehran University of Medical Sciences. College students who were not living in dormitories and male college students were excluded from the study.

Conclusions

The results of this study showed the effectiveness of an educational intervention based on the HBM structure in improving the knowledge, attitude, and practice relating to preventive behaviors of internet addiction and reducing the prevalence of internet addiction among female college students living in dormitories of Tehran University of Medical Sciences and educational interventions in this field are highly recommended. Given that educational intervention program based on the HBM was effective on preventive behaviors of internet addiction among female college students who live in the dormitories, it is suggested that these educational interventions are designed and implemented among college students who were not living in dormitories and male college students, and due to the lack of intervention studies based on health education models in the field of internet addiction, suggested that educational interventions based on other health education models such as Theory of Planned Behavior, Transtheoretical model and PRECEDE-PROCEED model are designed and implemented in the field of internet addiction.

Conflicts of interest
There are no conflicts of interest.

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