

Original Article



The Effect of Educational Intervention Based on Health Belief Model on Smoking Preventive Behaviors Among Female Students

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Abstract

Background: The increase in smoking among female students in recent years has become one of the major public health concerns in the world. Therefore, the aim of this study was to determine the effect of educational intervention based on the health belief model (HBM) on the adoption of smoking preventive behaviors among university female students.

Methods: This was an experimental interventional study that was conducted on 114 female students of Islamic Azad University of Tonekabon Branch (57 in each intervention and control group) in 2018. The data collection tools included a demographic questionnaire and the International Tobacco Survey based on HBM about the dangers of smoking which was completed in two stages before and one month after the intervention. The educational intervention was conducted in three sessions using two methods of lecture and group discussion. The collected data were analyzed using proportional tests and SPSS software, version 21.

Results: Before the intervention, there was no significant difference in the mean scores of the HBM constructs and smoking preventive behaviors between the two groups ($P > 0.05$), but one month after the intervention, a statistically significant increase was observed in the mean scores of all constructs and preventive behaviors in the experimental group ($P < 0.05$).

Conclusion: Overall, the HBM-based education was effective in preventing smoking among female students, and the implemented intervention was appropriate to the used model.

Keywords: Attitude, Education, Smoking, Students

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Introduction

The prevalence of smoking among different strata is one of the serious health threats that has been considered one of the most important problems in society in recent years due to rapid social changes by health organizations, law enforcement, and social policymakers (1). Smoking is one of the leading causes of death among people in today's society and is one of the most serious public health threats in the world, which has ever been faced and is killing nearly eight million people every year. In other words, one death per six seconds occurs due to smoking (2). The World Health Organization (WHO) predicted that the number of smoking-related deaths would reach beyond 10 million, and if this trend continues, it will reach one billion by 2030 (3); more than 32000 young people start smoking daily

and currently 98% start smoking until the age of 26 (4). Of course, the increase in the onset of smoking, especially in young girls, increases its repetition in future women (5) because those who start smoking at an early age can hardly quit it anymore (6). Of the 5.8 trillion people who smoke globally, more than 176 million are women, which is expanding greatly (7).

This finding indicates that in the near future, we will face an increase in the prevalence of cigarette smoking in young women (8). This is while the policy of countries on smoking rates in adult men and women is declining worldwide (9). However, the results of the world's largest survey on adolescents and tobacco conducted in more than 151 countries show that the prevalence of smoking among girls was the same as among boys in 58% of the



studied places (9). In addition, according to the National Survey of Iran, most people start smoking before the age of 18, and the first experience of smoking has been reported to start under 14 years of age. However, the mean age of smoking onset among Iranian women and the average age of the first experience of smoking were 24 and 21 years, respectively (10). Further, 28.7% of smokers were between the ages of 18 and 24 years, and the highest student population was related to the same age group (11).

During student life, in terms of the physical and sexual transition from adolescence to youth and being placed in a new social environment, smoking takes on a legal aspect (12). In studies by Panahi et al (13) and Babaei Heydarabadi et al (14), this rate was 23.8% and 47.4%, respectively. Furthermore, the results of studies in other countries have reported different rates of the prevalence of smoking among students. In other studies by Li et al (15), La Torre et al (16), and Berg et al (17), the corresponding rate was 14.1%, 29.3%, and 35.3%, respectively. Regarding the prevalence of smoking in female students, Tavakolizadeh et al reported that the prevalence of smoking among female students aged 17-26 years was 4.1% (18). Moreover, Ghodousi et al found that the prevalence of smoking among female students aged 22-24 years was 4.5% (19).

The studentship is when one's life changes, the person first moves away from home and makes his or her own decisions. He or she finds new friends, participates in new classes, and starts new activities. Usually at these ages, drugs, cigarettes, and sexual behavior are among the activities that people encounter and must decide whether to participate in or avoid them anyway. Researches in this field show that these behaviors are normal in the university environment, and different personal, social, and psychological factors can affect them. Therefore, in recent years, smoking and risky behaviors have increased among students. Investigation and prevention interventions in this area can be considered among the serious and specific priorities of planners and officials (20,21). Behavioral motivations, including spending time, entertainment, refreshment, following peers and friends, valuable people of life, maturity, attention-seeking, and the like are among the reasons for attracting people to cigarettes, and incorrect advertising policies in societies are highly effective in this issue. On the other hand, smoking, along with consumption of any kind of tobacco is a disease and makes the person dependent and addicted to, and this addiction, if it does not even cause disease, is itself a disease. Thus, if we consider tobacco use as a disease, the first step is to prevent the disease. Hence, the most effective and preventive solutions can be used by changing the behavior of people in society, as well as its early diagnosis and prevention and increase of the life expectancy of patients (22).

In health education, models are designed to practically help design effective educational programs in a way that can change behaviors that cause problems for society (23).

According to the results of research on behavior changes, today, successful preventive training is implemented according to known patterns (23) so that some studies have shown that important factors in addiction withdrawal are consistent with some of the constructs of the health education model (24). The health belief model (HBM) is one of the most applicable models of health education in the field of prevention (25,26). A review of the study represents that this is a good model for education in smoking prevention (27). Based on this model, for adopting smoking preventive behaviors, people should first feel threatened by the problem (smoking or exposure to smoke, which is called perceived susceptibility); then, they should understand the depth of this risk and the seriousness of its various complications in their physical, social, psychological, and economic dimensions (perceived severity) with positive symptoms from their surroundings or indoors (cues to action). Further, they should believe in the usefulness and applicability of the smoking prevention program (perceived benefit); the deterrent factors of this action (cues) are also less costly than its benefits (perceived barriers), and to overcome the barriers of behavior, they should feel sufficient and sufficient (self-efficacy) to eventually take preventive measures for smoking (28). The effectiveness of this model for preventing smoking has so far been proven in various studies, and various researchers have suggested the use of this model to prevent smoking (28,29). Therefore, due to the high prevalence of smoking among students, their central role in society (30). And considering the possible spread of smoking among young girls in the future (8), the aim of this study was to determine the effect of HBM-based education on smoking preventive behaviors among female students in 2018.

Materials and Methods

This experimental interventional study was conducted in 2018. The study population consisted of 400 female students studying in the second semester in two faculties of nursing-midwifery and biomolecular medicine at Islamic Azad University of Tonekabon. The sampling was performed by multi-stage random sampling so that the faculties of nursing and midwifery and biomolecular medicine were selected as the experimental and control group, respectively. Then, 57 students in each group participated in this study by simple randomization. In this study, the pre-test was performed in two groups. Next, an educational intervention was performed in the nursing-midwifery faculty, and after one month, the post-test was conducted again in both experimental and control groups. The inclusion criteria included showing a willingness of individuals to participate in the study and studying in one of the two faculties of nursing-midwifery or biomolecular school of Islamic Azad University of Tonekabon. On the other hand, unwillingness to continue participating in the study, lack of participation in educational classes, and incomplete completion of questionnaires were considered

the exclusion criteria. The sample size and the statistical confidence were 80% and 95%, respectively, and the mean of the two groups was 69.10 and 76.36. Accordingly, 47 people were considered for each group, and 57 according to a 20% fall, which is consistent with the study of Panahi et al (31).

Data collection tools included a questionnaire containing demographic and background factors, constructs of HBM, and preventive behaviors of smoking using the International Tobacco Survey scale. Demographic and background factors contained questions about age, marital status, permanent residence, current residence, parental education, employment status, and the determination of the status of the individual in terms of smoking or not smoking. In this study, cigarette smoking was attributed to a person who, according to the WHO, consumed at least 100 cigarettes in his lifetime and still continued smoking in any way (regular and irregular). Students who had experienced smoking in the past (even taking a yarn), along with non-smokers were placed in the group of non-smokers (32). An HBM-based questionnaire included 59 questions to measure perceived susceptibility (n=10), perceived severity (n=10), perceived barriers (n=11), perceived benefits (n=8), self-efficacy (n=5), and cues to action (n=15). All questions related to the constructs were scored on a 7-point Likert-type scale ranging from I fully agree=7, I agree=6, I agree a little bit=5, I disagree=4, I disagree a little bit=3, I disagree=2, to I completely disagree=1 (33). Additionally, the questionnaire about the preventive behaviors of smoking included 17 questions, each having 3 options, which were awarded as the best (3 scores), worst (1 score), and intermediate (2 scores) behaviors (34).

In this study, a number of experts with experience in tobacco and tool design were contacted by e-mail. Using

the opinion of validity experts, this tool was measured by content validity ratio (CVR), and questions that were more than 0.49 were accepted. Further, the content validity index (CVI) for questions with values of 0.72 and above was accepted. Internal consistency was used to determine the questionnaire's reliability so that these questionnaires were given to 30 students, and Cronbach's alpha was calculated for different parts of it. The results revealed that Cronbach's alpha coefficient of each of the constructs was close to or more than 0.7, and Cronbach's total alpha score was 0.92.

In this study, HBM-based education was performed in three sessions using lecture and group discussion so that two 45-minute lecture sessions and one group discussion session of 1-3 hours in three groups of 11-12 individuals were conducted by the researcher with the guidance and leadership of the discussions. The educational content of these sessions was presented based on the program protocol, guidance, and educational content in the above contents, which were used to implement each HBM. Cases such as the harms of smoking or exposure to cigarette smoke, consequences of non-prevention of smoking, the importance and benefits of smoking prevention, and the effect of smoking on chronic diseases were explained to students in the experimental group. Furthermore, some strategies for increasing self-efficacy were presented to the students of this group, including encouraging smokers to gradually reduce consumption, providing successful patterns in quitting and reducing smoking, and saying no to friends to smoke. In addition, educational aids, posters, and educational films were used in these sessions (Table 1).

After observing ethical and research standards, they included receiving ethics codes, presenting introduction letters to faculties, and explaining the nature and objectives

Table 1. Educational Intervention Program in Experimental Group Participants

Sessions	Objectives	A summary of Topics and Activities	Educational Time (min)
Lecture Sessions 1	Specific objective (1): To determine the scores of HBM constructs (perceived threat and perceived benefits and barriers) of women under study in relation to preventive smoking behaviors before and after training through HBM in intervention and control groups.	The educational content of these sessions was based on the protocol and program guide, and the educational content was presented in the above categories, which was used to implement each of the constructs of HBM by designing an educational program based on the questions raised earlier. The program was followed by two lectures and one group session at the end of the program. Based on the following chapters on what is smoking, knowledge of smoking in the world, characteristics of tobacco, distribution and production, the structure of cigarettes, chemical elements of cigarettes, the effect of smoking on human and community health, lung cancer, and other smoking-related cancers, dependence and addiction of smoking, Brno smoking effects of youth and youth, men and women were presented in the first session of the lecture.	A 45-minute lecture
Lecture Sessions 2	Specific objective (3): To determine the scores of HBM constructs (perceived benefits and barriers; practice guide) and self-efficacy of women under study in relation to preventive smoking behaviors before and after training through HBM in intervention and control groups.	In the second session, a lecture based on the effect of smoking on physical and mental health, respiratory diseases - heart - blood pressure, skin - hair - nails - teeth - bad breath, the effect of smoking on fitness, mental health, social and community health, personality and social credibility and acceptance, ways to control preventive behaviors, the effect on economic costs and effective smoking policies in controlling preventive behaviors, the role of life skills, family and peers in smoking, the role of volunteers in controlling preventive behaviors, and effective relationships in smoking were the effect of self-confidence on smoking, how to quit smoking, and preventive smoking behaviors.	A 45-minute lecture
Session 3	--	Group discussion related to the whole learning content was performed in two lecture sessions.	End of session, 1 session group discussion (1-3 hours)

Note. HBM: Health belief model.

of the study to the participating students. Informed consent was obtained from the participating students, and then the questionnaires were provided to them. All students were asked to answer the questionnaire with complete honesty and assured that all the information requested in the questionnaire would be used confidentially. Moreover, students were given sufficient opportunities to understand the questions and answer them properly. Participation in the study was based on people's wishes and desires, and whenever people were willing to withdraw from the study, there was no complacent need to continue the study. Meanwhile, questionnaires were completed in students' classrooms with the help of faculty officials.

After collecting the questionnaires, the data were entered into SPSS software, version 21. In data analysis, data distribution status was assessed in terms of normality and lack of data using the Kolmogorov-Smirnov test. Finally, independent *t* test, chi-square, McNemar, and paired *t*-test were employed to analyze the data, and the significant level was considered less than 0.05.

Results

The results of this study demonstrated that the mean and standard deviation of the age of the students in the experimental and control groups were 22.58 ± 58 and 21.1 ± 90.65 years, respectively. Based on the results of the study, there was no significant difference between the two groups in terms of demographic and background variables ($P > 0.05$, Table 2).

The findings of this study showed no significant difference between the mean scores of the HBM constructs in the two groups before intervention. However, the mean scores of perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action,

and perceived self-efficacy among the participants of the intervention group were significantly increased after the educational intervention ($P < 0.001$, Table 3). In addition, there was no significant difference between the mean scores of adoption of preventive behaviors in both experimental and control groups before the intervention ($P > 0.05$). After the intervention, a significant difference was found between the mean scores of the adopting preventive behaviors of smoking in the two groups ($P < 0.05$, Table 4).

Discussion

This study sought to determine the effect of HBM-based education on the adoption of smoking preventive behaviors among female students. In the present study, after training, the mean perceived sensitivity score increased significantly in the experimental group, and there was a significant difference between the two groups in terms of perceived susceptibility. Considering that perceived susceptibility has a strong cognitive component and somewhat depends on people's awareness (35), it can be indicated that by increasing awareness about the harms of smoking and information about the risks of exposure to tobacco smoke, education has been able to increase perceived susceptibility in students and as a result, they consider themselves more susceptible to smoking-related diseases compared to the students in the control group. This finding is consistent with the results of Rakhshani et al (28), Renuka and Pushpanjali (29), and Solhi and Abolfathi studies (36), while it contradicts those of Giti and Shojaizadeh (37) and Lee et al (15).

The results of this study demonstrated that the mean perceived severity score represented a significant increase in the experimental group after training, and a significant

Table 2. Demographic Characteristics of Students Participating in the Two Groups of Experimental and Control

Variables	Control Group		Experimental Group		P Value*	
	Number	Percent	Number	Percent		
Marital status	Single	51	89.5	46	80.7	0.190
	Married	6	10.5	11	19.3	
Permanent residence	City	49	86	41	71.9	0.070
	Village	8	14	16	78.1	
Father's education	University	31	54.4	27	47.4	0.450
	Diploma or less	26	45.6	30	52.6	
Mother's education	University	28	49.1	22	38.6	0.260
	Diploma or less	29	50.9	35	61.4	
Employment status	Unemployed	49	86	49	86	1.000
	Employed	8	14	8	14	
Current location	Home (only)	7	12.28	1	1.75	0.101
	Home (with friends)	12	21.05	2	3.50	
	Home (with relatives)	8	14.03	18	31.57	
	Dorm	1	1.75	7	17.28	
Current situation in terms of smoking	Smoker	17	29.8	16	28.1	0.840
	Non-smoker	40	70.7	41	71.9	

Note. *Chi-square test.

Table 3. Comparison of the Mean Scores of HBM Constructs in the Two Experimental and Control Groups

Constructs		Control Group	Experimental Group	P Value*
		Mean ±SD	Mean ±SD	
Perceived susceptibility	Before intervention	73.2±9.5	73.8±15.9	0.790
	After intervention	72.8±9.01	88.3±6.6	>0.001
Severely perceived	Before intervention	75.9±11.3	75.8±11.6	0.940
	After intervention	77.7±11.1	88.9±6.6	<0.001
Perceived benefits	Before intervention	63.6±6.4	65.2±12.8	0.490
	After intervention	64.4±7.8	84.3±12.4	<0.001
Perceived barriers	Before intervention	61.2±5.5	61.5±7.9	0.390
	After intervention	60.6±9.2	66.9±13.02	<0.001
Cues to action	Before intervention	66.7±8.6	69.1±14.9	0.330
	After intervention	68.9±14.2	81.8±15.6	<0.001
Self-efficacy	Before intervention	69.2±8.4	71.3±4.9	0.120
	After intervention	70.1±8.6	88.9±8.2	<0.001

Note. SD: Standard deviation. *P value related to independent *t* test.

difference was observed between the two groups in terms of this variable. Perceived severity somewhat relies on people's awareness (35), thus, increasing awareness leads to an increase in people's perceptions about the severity of smoking-related diseases and complications of bad exposure to cigarettes such as lung disease, cancers, myocardial infarction, infertility, blackness and opaque teeth, and premature death. In addition, it could play an important role in adopting preventive behaviors against smoking. This finding corroborates the results of Rakhshani et al (28), Solhi and Abolfathi (36), and Renuka and Pushpanjali (29), while contradicting those of Lee et al (15).

In the current study, after the implementation of training, the mean perceived benefit score increased significantly in the intervention group, and there was a significant difference between the experimental and control groups in this regard. In this study, education has probably been able to identify the positive benefits of smoking prevention through increasing awareness, including reducing the risk of cancers, not leaning toward addiction, promoting the health of themselves and their families, and the like more than before for the students of the experimental group. This finding conforms to the results of Rakhshani et al (28), Renuka and Pushpanjali (29), as well as Solhi and Abolfathi (36), but it is not consistent with the findings of Lee et al (15), Rahnavard et al (38).

After training, there was a significant increase in the mean score of perceived barriers in the experimental group, as well as a significant difference between experimental and control groups with regard to this variable. Adjustment of perceived barriers in the experimental group implies that increasing perceived severity through educational interventions can indirectly moderate perceived barriers (35). Therefore, in this study, in addition to educational programs to adjust perceived barriers, parts of educational programs aimed at increasing perceived severity could indirectly be effective in adjusting perceived barriers. On the other hand, self-efficacy affects perceived factors

so that higher self-efficacy moderates perceived barriers (38). Hence, one of the reasons for adjusting the perceived barrier score of the experimental group in this study can be the increase in self-efficacy, which matches the results of Solhi and Abolfathi (36), Giti and Shojaizadeh (37), and Rakhshani et al (28), while not being in line with the results of Panahi et al (13) and Lee et al (15). In the present study, the mean score of cues to action in the experimental group significantly increased after education, and a significant difference was found between the two groups in this respect, which is consistent with the results of Bashirian et al (39).

Based on the results of this study the mean self-efficacy score of the intervention group demonstrated a considerable increase after training, and there was a significant difference between the two groups in terms of this variable. Self-efficacy is defined as a person's belief and confidence in their abilities to successfully perform a behavior and is a vital and influential construct emphasized in educational theories (39). Accordingly, in designing educational programs, the special and practical role of this construct should be considered regarding habitual behaviors such as smoking behavior or smoking prevention. Increasing the self-efficacy of the students in the current study may be due to increased awareness and adjustment of perceived barriers, which conforms to the results of Renuka and Pushpanjali (29), Rakhshani et al (28), and Solhi and Abolfathi (36).

Based on the findings of the study, after training, the mean score of adopting preventive behaviors of smoking increased significantly in the students of the experimental group, and a significant difference was observed between the experimental and control groups in this regard. This finding is consistent with the results of similar studies (28,39,40). However, no predictive factor was obtained in the research by Budden (41). These results represented that education based on health beliefs could promote the adoption of smoking preventive behaviors in students

Table 4. Comparison of the Frequency of Preventive Smoking Behavior in Two Experimental and Control Groups

Preventive Behavior of Smoking		Control Group		Experimental Group		P Value*
		No	Yes	No	Yes	
		No. (%)		No. (%)		
Habit of saying no	Before intervention	10 (17.5)	47 (82.5)	30 (52.7)	26 (45.6)	0.531
	After intervention	14 (24.6)	43 (75.4)	1 (1.75)	56 (98.2)	0.001
	P value**	0.632		0.023		
Get used to going to the hookah house	Before intervention	35 (61.0)	22 (39.0)	29 (51.0)	28 (49.0)	0.260
	After intervention	36 (63.0)	21 (37.0)	19 (33.3)	38 (66.7)	0.002
	P value**	0.348		0.027		
Avoid exposure to secondhand smoke	Before intervention	33 (58.0)	24 (42.0)	37 (66.1)	19 (33.9)	0.370
	After intervention	31 (54.4)	26 (45.6)	4 (7.0)	53 (93.0)	0.001
	P value**	0.480		0.001		
Acknowledging the harmfulness of smoking	Before intervention	32 (56.1)	25 (43.9)	79 (69.6)	18 (30.4)	0.170
	After intervention	30 (52.7)	27 (47.3)	11 (19.3)	46 (80.1)	0.001
	P value**	0.560		0.001		
Habit of inhaling cigarette smoke into the lungs	Before intervention	12 (21.0)	5 (8.7)	11 (19.3)	6 (10.5)	0.320
	After intervention	8 (14.0)	8 (14.0)	13 (22.8)	3 (5.3)	0.020
	P value**	0.642		0.005		
Smoking without a filter	Before intervention	11 (19.3)	6 (10.5)	11 (19.3)	6 (10.5)	0.990
	After intervention	9 (15.8)	7 (12.3)	13 (22.8)	3 (5.3)	0.040
	P value**	0.874		0.021		
Smoking to the end	Before intervention	10 (17.5)	7 (12.3)	11 (19.3)	6 (10.5)	0.320
	After intervention	6 (10.5)	10 (17.5)	15 (26.3)	1 (1.7)	0.003
	P value**	0.771		0.012		
Put the cigarette between the lips for a long time	Before intervention	14 (24.7)	3 (5.3)	11 (19.3)	6 (10.5)	0.080
	After intervention	11 (9.3)	5 (8.7)	15 (26.3)	1 (1.7)	0.040
	P value**	0.783		0.023		
Put a cigarette between your fingers for a long time	Before intervention	6 (10.5)	11 (19.3)	8 (14.0)	9 (15.8)	0.301
	After intervention	3 (5.3)	13 (22.8)	13 (22.8)	3 (5.3)	0.002
	P value**	0.674		0.045		
Habit of encouraging smoking	Before intervention	12 (21.0)	5 (8.7)	11 (19.3)	6 (10.5)	0.320
	After intervention	7 (12.3)	10 (17.5)	14 (24.7)	3 (5.3)	0.008
	P value**	0.562		0.041		
Get used to the compliments of smoking	Before intervention	10 (17.5)	7 (12.3)	11 (19.3)	6 (10.5)	0.310
	After intervention	4 (7.01)	12 (21.0)	15 (26.3)	1 (1.7)	0.001
	P value**	0.665		0.032		
Habit of smoking indoors	Before intervention	10 (17.1)	9 (15.8)	11 (19.3)	8 (14.0)	0.560
	After intervention	4 (7.0)	12 (21.0)	15 (26.3)	1 (1.7)	0.001
	P value**	0.443		0.036		

Note. *P value related to chi-square test; **P value associated with McNemar test.

through possible increases in awareness and changes in the constructs of HBM (people's attitude). Therefore, the implemented education was proportional to the used model.

One of the limitations of this study is that due to the license obtained from Islamic Azad University of Tonekabon, there were no limitations in terms of educational rules, time of holding, and class interference. Only in terms of the target group in the present study, female students studying at the Islamic Azad University of Tonekabon

were considered limited to all students studying. Thus, the results of this study cannot be generalized to other age and student groups. Hence, other studies are recommended using this model in different populations and groups (in terms of age, gender, education, and geographic region). Data collection was also performed as a self-report, which was one of the limitations of this study.

Conclusion

In general, the results of this study showed that HBM-

based education could change attitudes and beliefs, and promote appropriate behaviors about the prevention of smoking among students. Therefore, the implemented training is proportional to the applied model.

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Authors' Contribution

Conceptualization: AG, AR; Methodology: AG, AR; Validation: AG, AR; Official analysis: AG, SK, AR; Research and review: AG; Sources: AG; Data management: AG, AR, SK; Writing – preparation of the original aft: AG, AR, SK; Writing - review and editing: AG, AR, DS; Avatar: AG; Supervision: AR; Project management: AG, AR Funaising: Shahid Beheshti University of Medical Sciences, Tehran.

Conflict of Interests

The authors of this article declare that there is no conflict of interests, real or perceived, financial or non-financial.

Ethical Permissions

Ethical approval was obtained from Shahid Beheshti University of Medical Sciences, Tehran (IR.SBMU.PHNS.REC.1396.145).

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