



Effectiveness of Health Belief Model on Oral Cancer Prevention in Smoker Men

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Abstract

The purpose of the present study is investigating the effect of educational intervention based on health belief model (HBM) on oral cancer prevention in smoker men. This is a quasi-experimental study carried out on 200 smoker men with the age of 40 or older (100 subjects for the experimental group and 100 subjects for control group) resident in Fasa City, Fars Province, Iran, in 2017–2018. The educational intervention for the experimental group included seven educational sessions for 50 or 55 min-based HBM. A questionnaire consisted of items about demographic information, knowledge, HBM constructs (perceived susceptibility, severity, benefits, barriers, self-efficacy, and cues to action) was used to measure the oral cancer prevention before and 6 months after the intervention. The mean age of the men was 51.35 ± 8.41 years in the experimental group and 52.28 ± 8.09 years in the control group. Based on the obtained results, significant enhancement is observed in average scores of knowledge, perceived susceptibility, severity, benefits, self-efficacy, cues to action, and oral cancer prevention behaviors in experimental group; however, no significant changes are observed in average scores of knowledge, perceived susceptibility, severity, benefits, self-efficacy, cues to action, and oral cancer prevention behaviors of control group. Also, results indicated that, the educational program based on HBM model have positive effect on oral cancer prevention with the improvement of subject's knowledge, perceived susceptibility, severity, benefits, and self-efficacy.

Keywords Health belief model (HBM) · Knowledge · Oral cancer · Self-efficacy

Introduction

Oral cancer is one of the most prevalent cancers and one of the main causes of death around the world [1]. It includes some kinds of malignant neoplasms inside the mouth and tumors on lips, tongue, gum, hard and soft palates, tonsils, salivary glands, oropharynx, nasopharyngeal, and hypopharynx [2]. Tobacco, alcohol, diet, viruses, genetic factors, family history, immune deficiency, and infection are some of the factors

playing an important role in getting infected by oral cancer [3]. The most prevalent malignant oral neoplasm is squamous cell carcinoma which includes 90% of malignant neoplasms inside the mouth [4]. In developing countries, oral cancer is the sixth prevalent cancer in men and the tenth prevalent cancer in women [5]. Unfortunately, in most of the cases, oral cancer is diagnosed in its very developed stages (III and IV stages) [6, 7]. Oral cancer and deaths caused by this disease are different in various areas of the world. The highest value of oral cancer happens in developing countries such as India, Pakistan, Bangladesh and the Philippines [8, 9]. In southeast of Asia, especially in India, oral cancer is the most popular cancer which includes 35% of all cancers in men and 18% of cancers in women [10]. Among the factors causing oral cancer, age is the most important factor, and almost 95% of this cancer happens in people older than 45 years of age [11]. Racially, in comparison with American whites, American blacks are highly in exposure of oral and throat cancers. It seems that, this issue is due to the influence of environmental factors, because the role of the genetic factors in oral cancer has not been determined yet [1, 12]. Tobacco and alcohol are two factors causing oral and throat cancers. The danger of oral

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cancer in smokers is seven times more than the non-smokers [13, 14]. Also, the danger of oral cancer in alcoholic people is six times more and for people using both tobacco and alcohol, this danger is 38 times further [14, 15]. Eighty percent of oral cancer is due to the use of tobacco and alcohol. The other factors such as being in exposure of ultraviolet ray and immune system disorder (due to HIV and organ transplant) may cause lip cancer. Thirty percent of factors causing oral cancer are related to the human papillomavirus [16–18].

Almost 30% of deaths caused by cancers are because of smoking. In the present age, almost one milliard smoker live all around the world and up to 2030, one milliard adults will start smoking in young ages. Forty-seven percent of men and 12% of women are smoking. The World Health Organization determined the prevalence of smoking in people with the age of 15 and older. More than 24% per capita cigarette consumption is related to people with the age of 15 and older in Iran [19]. In an investigation, it is revealed that, the prevalence of smoking in Iran is 27.2% in men and 3.4% in women [20].

While there are numerous dangerous factors causing oral cancer, most people with none of the mentioned factors have been infected by this disease. Hence, all people should take the preventive measures such as avoiding the use of tobacco products, reducing or avoiding alcoholic drinks, having balance diet, using sunscreen on face and lips, frequent mouth, and tooth checkup [21]. According to the danger of oral cancer, providing programs in order to optimize the preventive behaviors in all groups of society, especially for vulnerable group of smokers older than 40 years of age, is demanded. For this reason, there are numerous theories and patterns in health education that can be employed for providing appropriate educational interventions for changing and optimizing the health of society. One of these efficient models is health belief model. The structures of this model are perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy [23 and 24]. In this model, the perceived susceptibility measures smokers' susceptibility about oral cancer. Also, the perceived severity determines men's perspective about the deterioration and side-effects of oral cancer. The sum of these two structures is the perceived threat of men about this disease. Perceived threat along with the perceived benefits and barriers (i.e., analyzing the advantages of taking preventive measures from oral cancer), analyzing the perceived barriers for having appropriate preventive behaviors along with the perceived power of men for performing these behaviors and also, cues to action or internal or external motivations such as friends, relatives, doctors or friends, and fearing from oral cancer lead people to take appropriate preventive measures [22].

Tan et al. [23] described the health beliefs related to oral cancer in a high-risk group in Malaysia, a predominantly Indian community living in an agricultural setting. His studied population was a convenient sample of 112 adults, above

20 years of age, attending oral cancer screening in two estates. Using the health belief model, the perceived susceptibility about oral cancer, its severity, and the benefits and barriers of preventive actions as well as beliefs underlying oral cancer etiology were investigated. About half of the subjects ($n = 57$, 50.9%) were susceptible to oral cancer. A majority of subjects ($n = 93$, 83.0%) felt that oral cancer is a severe disease. Thirty four people (30.4%) perceived oral cancer as a preventable disease, while 56 (50%) did not, and the remaining 22 subjects (19.6%) did not know whether oral cancer is preventable or not.

Khwankong et al. [24] assessed oral cancer knowledge and belief attitudes influencing oral cancer screening in high-risk Thai Muslims. Twelve semi-structured in-depth interviews and group discussion were conducted based on health belief model. Inclusion criteria of his investigation were those who have risky habits with the age of 40 or older who smoke more than 20 cigarettes per day for at least 20 years and/or betel quid chewers more than ten times per day for at least 10 years. Participants lacked knowledge about oral cancer in terms of signs and symptoms and predisposing factors. This influenced misleading belief attitudes concerning the susceptibility of oral cancer, barriers, and their self-efficacy to have oral cancer screening examinations.

Jeihooni et al. [25] carried out a clinical trial study on 110 pregnant women about health behaviors in Fasa City in 2016. The intervention was conducted for the experimental group based on HBM. Compared to the control group, the experimental group showed a significant increase in knowledge, perceived susceptibility, perceived severity, perceived benefits, self-efficacy, cues to action and performance, and a significant decrease in perceived barriers 4 months after the intervention.

Dodd et al. [26] carried out a study to explore the factors underlying African Americans' perceptions of oral cancer and the oral cancer examination. Focus groups were conducted to understand African Americans' attitudes and expectations regarding oral cancer and oral cancer examinations. Respondents lacked knowledge of personal susceptibility and severity of a late-stage oral cancer diagnosis. Participants had limited knowledge about risky factors.

Considering the importance of oral cancer and its preventive behaviors, the present study investigates the effect of educational intervention based on health belief model on preventive behaviors from oral cancer in smoker men living in Fasa City, Iran.

Methods and Materials

The present study is a quasi-experimental investigation performed on 200 smoker men referred to the health centers of Fasa City, Fars Province, Iran (the subjects were divided into

two groups of experimental and control groups) in 2017–2018. Initially, the present study was approved by research deputy of Fasa University of Medical Sciences and then it was coordinated with health centers of Fasa City. Among the six health centers, two of them were selected randomly, and 50 patients from each center were assigned to the intervention group and 50 patients were assigned to the control group.

The inclusion criterion was smoker men with the age of 40 or older who smoke at least ten cigarettes per day for almost 5 years resident in Fasa City, and the exclusion criterion was people suffering from psychological or physical diseases, subjects who were not interested in participation, and those who were absent in more than two educational sessions.

The educational intervention for the experimental group included seven educational sessions for 50 or 55 min by giving presentations, group discussions, asking and answering questions, presenting educational films and images, and power points. The educational programs were performed by a PhD of health education and promotion with the cooperation of an oral cancer specialist.

The details of educational sessions are the following:

First session: Oral cancer, its symptoms and side-effects were introduced to the subjects (knowledge, perceived susceptibility, and perceived severity).

Second session: The outbreak of oral cancer and its risky factors such as smoking, alcoholic drinks, and being in exposure of sunlight were discussed (knowledge, perceived susceptibility, and perceived severity).

Third session: A 55-year-old man suffering from oral cancer was invited to talk about the oral cancer, risky factors, its symptoms, and side-effects (perceived susceptibility and perceived severity).

Fourth and fifth sessions: Preventive behaviors from oral cancer, such as avoiding tobacco products, reducing or avoiding alcoholic drinks, having balance diet, using sunscreen on face and lips, and oral hygiene were discussed (preventive behaviors, perceived benefits, and perceived barriers).

Sixth session: This session stressed on the preventive behaviors from oral cancer and self-efficacy of subjects and was held with the presence of family members, specialists, dentists, and officials of health centers (preventive behaviors, self-efficacy, and cues to action).

Seventh session: Subjects were divided into four groups with 25 members, and the role of friends and families for accepting the preventive behaviors was mentioned. Also, the previous sessions were reviewed, and an educational booklet was given to the subjects (preventive behaviors and cues to action).

The educational sessions for 100 subjects of experimental group were held in four groups with 25 members once a week

in health center salon. A telegram group was also provided for interchanging information, and every 5 days, one educational and motivational message was sent to the members. Also, in order to review the previous materials, two follow-up sessions were held 1 and 3 months after the educational intervention.

For ethical consideration, this investigation was confirmed by ethical committee of Fasa University of Medical Science, and subjects filled a consent letter about their participation in study. Also, the aims, importance, and demands of this study were expressed to the subjects, and they were ensured that their personal information would remain confidential.

Both of the experimental and control groups were participated from the beginning to the end of the investigation and no one exited the study. The subjects of control group received no educational program. They were only asked for filling out a questionnaire. At the end of study, one educational session about oral cancer was held for control group, too.

The tool used in this study was a questionnaire in accordance with other similar studies [23–26] which was anonymous and coded arranged in four sections. The first section included demographic information (educational level, using alcoholic drinks, age, duration of smoking, marital status, family history in oral cancer, etc.).

The second section included 15 questions related to the knowledge of subjects about oral cancer (modify factor). The correct answer had the score of 1 and the wrong or “no idea” answer had zero score. The range of scores was from 0 to 15 points.

The third section was related to the health belief model structures. In this section, eight items were about the perceived susceptibility, eight items were about the perceived severity, six items were about the perceived barriers, six items were about the cues to action, and six items were about the self-efficacy. Scores were arranged based on five-point Likert scale, so that, “completely agree” had the score of 5, “agree” had the score of 4, “no idea” had the score of 3, “disagree” had the score of 2, and “completely disagree” had the score of 1. The range of scores for perceived benefits and perceived barriers was from 8 to 40 and for cues to action and self-efficacy was from 6 to 30.

The fourth section included items about preventive behaviors from oral cancer with ten self-reporting “yes” or “no” questions ranging from 0 to 10.

In order to evaluate the validity of questionnaire, the item effect size higher than 0.15 and content validity ratio more than 0.79 were considered, and based on the exploratory factor analysis, they were classified into nine factors. In order to determine the face validity, a list of items was checked by 25 smoker men with demographic, economic, social, and other characteristics similar to the target population. In order to determine the content validity, 12 specialists and professionals in health education and promotion (outside the research team) ($n = 10$), oral cancer specialist ($n = 1$), and biostatistics ($n =$

1) were consulted. Then, based on Lawshe's table, items with CVR value higher than 0.56 for 12 people were considered acceptable and were retained for subsequent analysis. The calculated values were higher than 0.70 for most of the items.

The overall reliability of tool based on Cronbach's alpha is 0.89. Cronbach's alpha is 0.88 for knowledge, 0.86 for perceived sensibility, 0.82 for perceived severity, 0.81 for perceived benefits, 0.83 for perceived barriers, 0.84 for self-efficacy, and 0.79 for cues to action. Since alpha values calculated for each of the studied structures are higher than 0.7, it can be said that, the reliability level of tool is acceptable.

How to complete the questionnaire was explained to the subjects, and the illiterate subjects filled the questionnaire with the help of researchers.

The questionnaire was filled out before and 6 month after the educational intervention by experimental and control groups. The obtained data were analyzed by Spss 22 software through independent *T* test, Chi-square, and paired *t* test with significance level of 0.05.

Results

In the current study, 200 smoker men (100 men for experimental group and 100 men for control group) who referred to the health centers of Fasa City were investigated. The average age of experimental group was 51.35 ± 8.41 and the average age of control group was 52.28 ± 8.09 . Based on the independent *t* test, the experimental and control groups do not show any significant differences ($P = 0.225$). Also, other demographic characteristics of subjects do not indicate any significant differences (Table 1).

Obtained results show that, before the educational intervention, there was no significant differences between experimental and control groups in knowledge, perceived susceptibility, perceived severity, perceived benefits, cues to action, self-efficacy and oral cancer prevention behaviors; however, 6 months after the educational intervention, the experimental group showed significant enhancement in mentioned factors, except in perceived barriers. Also, about the perceived barriers, experimental group has more significant reduction than control group (Table 2).

Discussions

The amount of deaths caused by oral cancer in men is higher than women and also, by increasing the age of people, this value enhances. Information revealed by World Health Organization indicate that the amount of deaths caused by oral cancer in men is three to ten times more than women [27]. One of the efficient methods for preventing oral cancer is using educational intervention based on health education patterns

and health belief model [28]. Hence, the purpose of this study is investigating the effects of educational intervention based on health belief model on preventive behaviors from oral cancer in smoker men resident in Fasa City. The obtained results show that, 6 months after the educational intervention and after the educational sessions related to the oral cancer and its preventive behaviors, the experimental group, comparing to the control group, indicated significant enhancement in health belief model constructs and oral cancer prevention. The data obtained from present educational intervention show the successfulness of this model in improvement of the knowledge of experimental group comparing to the control group. In studies of Dodd et al. [26], Azad et al. [29] and Mousavi and Shiva [30], subjects had insufficient knowledge about oral cancer. In qualitative study of Khwankong et al. [24] about oral cancer screening on Thai Muslim smokers with the age of 40 and older, it is revealed that, most of the people are not aware of the symptoms of oral cancer and some of them announced that, tobacco is a risky factor. The results of Hoffman et al. [31], Renuka et al. [32] and Watson et al. [33] indicated that, the educational intervention causes the enhancement of people's awareness about oral hygiene and oral cancer. The results of other similar studies are in a good agreement with the results of this research [34–39].

The results of the present paper show that, before the educational intervention, in both of the experimental and control groups, the average scores of perceived susceptibility and perceived severity of smokers were similar. However, 6 month after the educational intervention, the experimental group showed more significant enhancement in these constructs than control group. Using educational images and films and giving information by a person suffering from oral cancer made the experimental group to believe that they are in exposure of oral cancer and its irremediable side-effects. By using health belief model, Tan et al. [23] showed that, half of high-risk people in Malaysia (50.9%) are susceptible to oral cancer. Almost 83% of people feel that, oral cancer is a serious disease, and 30.4% of people believe that, oral cancer is a preventable disease. In a quasi-experimental study of Jornet et al. [40] performed on people with the average age of 58.60 ± 10.7 , it was revealed that the perceived susceptibility, perceived severity, and perceived benefits play the most important role in self-efficacy of people. Sargeran et al. [41] concluded that, according to the side-effects of oral cancer, providing programs for preventing and diagnosing oral cancer is demanded. In the study of Dodd et al. [23], subjects had insufficient perceived susceptibility and severity. Dodd et al. [26] stated that, his studied subjects had low perceived susceptibility and severity. The studies of Hillhous et al. [42], Jeihooni et al. [43], Mohebbi et al. [44], Bates et al. [45] and Bahri et al. [46] indicated that, the educational intervention causes the enhancement of perceived susceptibility and perceived severity of subjects.

Table 1 The comparison of individual characteristics of experimental and control groups

Variables	Experimental group (<i>n</i> = 100)		Control group (<i>n</i> = 100)		<i>P</i> value	
	Number	Percentage	Number	Percentage		
Educational level	Illiterate	3	3	2	2	0.106
	Elementary	15	15	12	12	
	Guidance school	38	38	36	36	
	High school	32	32	34	34	
	University	12	12	16	16	
Marital status	Single	5	5	4	4	0.138
	Married	88	88	90	90	
	Divorced	3	3	3	3	
	Widow	4	4	3	3	
Family history of oral cancer	Yes	3	3	2	2	0.190
	No	97	97	98	98	
History of alcohol consumption	Yes	18	18	15	15	0.248
	No	82	82	85	85	
Duration of smoking	5 to 10 years	43	43	40	40	0.312
	More than 10 years	57	57	60	60	

Comparing to the control group, 6 months after the educational intervention, the average score of perceived benefits of experimental group had significant enhancement. In the current research, by presenting educational contents about

Table 2 The comparison of average scores of health belief model constructs and preventive behaviors from oral cancer in experimental and control groups before and 6 months after the educational intervention

Variables	Groups	Before intervention M± SD	6 months after intervention M ± SD	<i>P</i> value
Knowledge	Experimental	6.89± 3.54	11.14± 2.78	0.001
	Control	3.13± 7.10	7.65± 3.08	0.212
	<i>P</i> value	0.254	0.001	
Perceived susceptibility	Experimental	16.30± 3.75	31.55± 4.10	0.001
	Control	15.97 ± 3.81	16.14± 3.83	0.177
	<i>P</i> value	0.154	0.001	
Perceived severity	Experimental	16.10± 3.32	33.58± 3.96	0.001
	Control	15.67 ± 3.90	16.16± 3.75	0.194
	<i>P</i> value	0.133	0.001	
Perceived benefits	Experimental	10.18 ± 2.65	26.60± 2.88	0.001
	Control	10.72± 2.52	11.68± 2.95	0.169
	<i>P</i> value	0.182	0.001	
Perceived barriers	Experimental	25.68± 2.65	11.43± 2.25	0.001
	Control	26.80± 2.28	25.56± 2.60	0.239
	<i>P</i> value	0.276	0.001	
Cues to action	Experimental	11.71± 2.24	26.76± 2.11	0.001
	Control	12.03± 2.40	12.97± 2.36	0.219
	<i>P</i> value	0.180	0.001	
Self-efficacy	Experimental	12.24 ± 2.45	26.13 ± 2.69	0.001
	Control	11.92 ± 2.86	12.53 ± 2.85	0.156
	<i>P</i> value	0.138	0.001	
Preventive behaviors from oral cancer	Experimental	3.84 ± 2.16	7.28 ± 2.44	0.001
	Control	3.68 ± 2.23	4.14 ± 2.32	0.227
	<i>P</i> value	0.251	0.001	

avoiding smoking, oral hygiene, proper diet, etc., the experimental group understood the advantages of preventive behaviors (their perceived benefits enhanced). In the study of Khwankong et al. [24], the studied subjects believed that, oral cancer screening has made them to learn about the oral cancer and how to prevent it. In the study of Jeihooni et al. [47] on farmers of Fasa City, the educational intervention based on health belief model and social supports caused the enhancement of average score of perceived benefits in experimental group. In other similar investigations, the educational intervention caused the increase of perceived benefits [48–51].

The results of the current research indicate that, before the educational intervention for experimental and control groups, no significant differences were observed in perceived barriers; however, 6 months after the educational intervention, these differences became more significant, and comparing to the control group, the experimental group had considerable reduction. Also, the educational programs caused the removal of barriers for taking preventive measures. Howell et al. [52] studied the perceived barriers on performing preventive behaviors from oral and throat cancers in rural and adult African Americans and concluded that, by increasing the awareness about risky factors and reducing the fear from oral cancer, the attitude of subjects about oral cancer screening will change. Khangkong et al. [24] studied people's fear from oral cancer screening. Rahmant Najarkolae et al. [53] concluded that, there is a significant relationship between the awareness and perceived barriers and oral hygiene. The results of other similar studies are in a good agreement with the results of this research [25, 39, 50, 54].

The results of this research show that, before the educational intervention, the self-efficacy of experimental and control groups did not have significant differences, but 6 months after the educational intervention, experimental group showed more significant enhancement than control group. Self-efficacy is person's confidence about his/her ability about performing a special action which depends on the control of a person on surrounding environment and his/her behavior. People with higher self-efficacy have bigger aims and their behavior is more favorable [55]. The results of Rhoads et al. [56] and Dehbari et al. [57] are in a good agreement with the results of the present paper. Buglar et al. [58] stated that, self-efficacy predicts the oral hygiene behaviors.

In the present study, after the educational intervention, the average score of cues to action (internal and external motivations) of experimental group had more significant enhancement than control group. Cue to action is a factor related to the perceived social pressures on internal motivations which leads people to take preventive measures from oral cancer. In the current research, cues to action are mostly family members, specialists, dentists, officials of health centers, and social media as the information sources and supporting factors for taking proper preventive measures. The results of this study

are in a good agreement with the results of other similar investigations [25, 59–63]. In comparison with the control group, 6 months after the educational intervention, the average score of preventive behaviors from oral cancer of experimental group significantly enhanced, indicating the positive effect of educational intervention based on health belief model on studied subjects. The enhancement of perceived threat as well as the optimization of perceived benefits of smoker men, the enhancement of perceived power for taking preventive measures, and the reduction of perceived barriers along with cues to action caused smokers to take preventive measures from oral cancer. The obtained results are in a good agreement with the studies of Shamsi et al. [64], Shahnazi et al. [65], Renuka et al. [32], and Solhi et al. [50].

In order to prevent the oral cancer, people's lifestyles should be modified, and the essential factor for changing their lifestyles is recognizing their characteristics [66]. By doing so, efficient programs about healthy life patterns would be provided.

Conclusion

The present study indicated that the educational intervention based on health belief model plays an important role in oral cancer prevention. Therefore, using HBM along with special educational methods and employing specialized people in educational sessions for motivating and changing the psychological-behavioral factors of smokers, such as perceived susceptibility, severity, and benefits (as independent variables) has great effect on taking preventive measures such as avoiding the smoking, balance diet, and oral hygiene (as dependent variables). According to the susceptibility and vulnerability of smokers, providing efficient solutions and educational programs for smokers as well as specialists, dentists, and other health personals is absolutely demanded for preventing oral cancer.

Self-reporting method used for gathering information was one of the limitations of present investigation. The other limitations were the lack of accurate answering to the questions about alcoholic drinks due to the legal, ethical, and social issues and whether subjects were able to accurately recall their past behaviors. Of course, the participants were ensured that their personal information would remain confidential.

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