

## School-Based Smoking Prevention Programs for Middle School Students in Nowshahr- Iran: a Randomized Controlled Trial

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### Abstract

**Background:** Smoking among youths is a main public health concern, and detecting predictors of smoking is essential for designing preventive programs. Any interventional program should plan with highlighting on behavioral change models and based on operative interventional program. So, this study aimed to investigate school-based smoking prevention programs for middle school students in Nowshahr, Iran.

**Materials and Methods:** A quasi-experimental study was performed with 280 male students aged 15-17 years selected by multistage sampling. For this purpose, 6 middle schools were randomly recruited from male students in Nowshahr- Iran. Then, 140 students were randomly chosen for each the experimental and the control groups. After pretest, educational program based on Health Belief Model were performed in experimental group. Also, post-test was applied four months after interventional program in both experimental and control group.

**Results:** Based on the results, the prevalence of smoking was higher at age 14 old in both experimental (38.7%) and control (30 %) groups. About 35% of participants in the experimental group and 33.6% in control group had smoker father. Additionally, 10% in experimental group and 7.8% in control group had smoker mother. Most main cause for smoking in 57.9% of the experimental group and 52.63% of the control group was reducing anxiety. Results also shown that there was a significant difference between students in the experimental and control groups after performing educational program in the mean scores of perceived susceptibility, perceived severity, perceived benefits, perceived barriers, perceived self-efficacy, and preventive behaviors of smoking ( $P < 0.05$ ).

**Conclusion:** By performing educational program, it was found that the prevalence of cigarette smoking was decreased in the intervention group. So, with a better understanding of factors affecting on this complex behavior (cigarette smoking), it can be a valuable phase to decrease rate of costs and improve adolescents' health outcomes.

**Key Words:** Cigarette smoking, Health Belief Model, Iran, Students.

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## 1- INTRODUCTION

kidney injury (AKI) is defined as a drop in renal filtration that can happen over a period of minutes to a few days. This complication that follows an injury to the renal tissues is considered as one of the main public health issues with a rising prevalence all over the world (1). Various complications are associated with this problem including metabolic acidosis, hyperkalemia, uremia and changes in the balance of body fluids. Long term complications of renal failure also include cardiovascular diseases, stroke and heart failure. Children with renal failure most commonly expire due to cardiovascular diseases and infections (2). The burden of AKI in children and its burden are much more severe than the adult population. However, recent studies have shown that implementing preventive strategies and early diagnosis of AKI can significantly decrease the burden of this disease (3).

Early detection and treatment of AKI can prevent progression of this disease and its long lasting complications such as chronic renal failure. Nevertheless, despite the vast improvements in the medical sciences, in some cases diagnosis of AKI cannot be made early in the course of the disease which leads to development of long standing injuries. Accordingly, researchers are currently searching for a new diagnostic method to prevent such cases.

In recent years, serum and urine biomarkers have been proposed as sensitive and specific methods for early diagnosis of renal diseases with a higher prognostic performance compared to other diagnostic techniques (4-6). Few of these factors include serum creatinine, cystatin C, Neutrophil gelatinase associated lipocalin (NGAL) protein and Kidney Injury Molecule 1 (KIM-1) (7-9). NGAL is a membrane protein minimally expressed in blood and kidney cells. During an AKI the plasma/serum

concentration of NGAL increases and peaks within 2 hours. Studies have shown that the level of NGAL in the serum is correlated with the severity of AKI, which makes it a good diagnostic factor in acute injuries of the kidney (10). Much attention has been paid to this biomarker in recent years, but still no comprehensive conclusion has been drawn. One of the main methods to reach such conclusion is implementation of a systematic review and meta-analysis (11-14), an approach that has not yet been taken on the performance of plasma/serum NGAL concentration in detection of AKI in children. Only one meta-analysis has been carried out with a similar aim, the findings of which have shown an acceptable diagnostic value for serum NGAL in detection of AKI (15).

The mentioned systematic review has mainly focused on data gathered from adults, and so the need for such meta-analysis on data from children has not been fully met. Multiple meta-analyses other than the mentioned study have also been published on this subject, but similarly all of them have mainly evaluated data from adult patients with a brief notion of findings among children. Moreover, only specific settings have been assess in most these surveys such as post-cardiac surgery or contrast induced nephropathy. They have also not proposed a precise cut-off point or a specific timing of measurement for this biomarker (15-17). Accordingly, we aimed to conduct a systematic review and meta-analysis to provide evidence on the diagnostic performance of plasma/serum NGAL in detection of AKI in children. Smoking is one of the main public health difficulties that has the bad effects on human health. It is one of the most preventable causes of deaths and diseases around the world (1). Tobacco-related diseases reason for approximately half a million deaths yearly in the United States as stated by the Centers for Disease Control (CDC) (2).

Scientific results demonstrate that cigarette smoking is dangerous not only for smokers, but also for persons close to smokers indirectly (3, 4). It is expected that by 2030, cigarette smoking will be the reason of 70% of mortality rate worldwide in developing countries every year (5). It was reported the cigarette smoking prevalence among male youths of 13–15 years of age during 2005–2010 years has been 17% in eastern Mediterranean (6).

Ninety percent of adult smokers begin although in their adolescences, or earlier; and two-thirds become regular, daily smokers before they reach the age of 19 years. Approximately 10.8% of all high school students (grades 9–12) are current smokers, including 9.7 % of females and 11.8 % of males. However, 11.4 % of high school students are current smokers by the time they leave high school. Based on World Health Organization (WHO) information in 2015, about 21.5% of Iranian male adolescence (ages 15–24) stated being steady smokers (6).

Studies demonstrate that the cigarette smoking prevalence is growing in both boys and girls. This confirm that the beginning age of cigarette smoking is reducing (7-9). Study by Mohtasham Amiri indicated that the average age to start cigarette smoking was at 13 years (10). Definitely, the adult health is influenced by healthy behavior of the infancy and teens (11). Early using of smoking is too worrying. It is thought that the change period from teens to early maturity brings significant variations in behavior and attitude of the persons. Having healthy lifestyle is vital for persons. Having decisions on a healthy lifestyle is important factor for character structure of the adolescences. Actually, the adult health is influenced by healthy behavior of the childhood and adolescence (12). Several researches have displayed that it is a powerful predicting cause of cigarette smoking in middle age (13, 14).

Beginning of cigarette smoking in earlier ages will be integrated with problems to leave cigarette smoking in adult life (15).

It was reported that the cigarette smoking amongst youths was associated with being smoker persons among family members and friends (16-18). Additionally, studies reported that numerous factors counting lack of knowledge about the addictive property of cigarette smoking and its consequence on health, perceived social acceptance affected by use, life complications, the influence and stress of peers for use, socioeconomic situations, familial background of cigarette smoking use, accompanied by personal elements such as low level of self-esteem, trend to get a personality, and doing dangerous behaviors affect in reduced or improved chance of start of cigarette smoking among adolescents (16, 18-20). So, detecting factors influencing smoking behavior help to planning for changing risky behavior. Thus, researchers in developed countries have accentuated on cigarette smoking prevention in adolescents, and interventional programs have been applied to get this objective (21, 22).

Additionally, if smoking should be prevented, it is important to perform the models that find the factors influencing student's behavior. These interventional programs designed to increase students' knowledge, modify their attitudes, and improve their behavior successfully (21-23). Therefore, any educational program designed for empowering students against cigarette smoking should be applied with highlighting on theories of behavioral change. One of the most appropriate models of health preventive behavior for expectation of preventive health events is the Health Belief Model (HBM). HBM emphasizes on health and behavior's belief. Furthermore, HBM argue the perception of what is risk threatens for somebody and her/him evaluation of the perceived benefits and barriers of that healthy

behavior (24, 25). Performing HBM might help individuals to modify their behavior through understanding the subject entity, their perceived susceptibility, and benefits, barriers, and self-efficacy in circling to healthy behaviors (26).

Since youths can be liked to perform in high-risk behaviors. Consequently, this is a try to perform the HBM for planning educational programs in order to decrease dangerous behaviors like smoking. Based on the HBM, if individuals believe that they are very exposed for health threats, they will be more encouraged to meet with threats, and then the appraisal begins for the efficacy of suggested approaches, and the consequence of efficacy of suggested approaches is evaluated to counter threats. Actually, fear of threat will reason individuals to counter with health threats by implementing approaches. So, it is probably the modification of attitude, intention, and behavior will rise (26, 27), encouragement of threat message about smoking based on HBM has been useful in non-smoking programs among persons (28). According to the population structure of Iran and the key role of age when cigarette smoking consumption starts, commonly from adolescents' periods, and its impacts on the psychological and physical health of adolescent students (18, 29), this study was aimed to determine the effect of educational programs based on health beliefs model for prevention of cigarette smoking among middle school students in Nowshahr, Iran. It is expected that this work provides the suitable key to prevent smoking among students and improves their health by providing valuable outcomes.

## 2- MATERIALS AND METHODS

### 2-1. Study design and population

This study was interventional quasi-experimental research that was carried out among male students of middle schools in

Nowshahr, North of Iran in the period of 2014–2015. In present study, participants were recruited in 6 middle schools by multistage clustering sampling method. First, six middle schools from eleven middle schools of Nowshahr were randomly selected from the three municipal regions (two schools from each regions). Then, these six middle schools were randomly divided into the experimental (three schools) and the control group (three schools). In the next stage, from each school of experimental and the control group, two classes were randomly selected from the tenth and eleventh grades of each school.

Sample size was determined based on the estimation of the limited population formula because about 500 male students are studying in middle school in the Nowshahr city. Therefore, the sample size in each group was 140 students, with 95% confidence interval (CI) and the power of a hypothesis test was 80%. In total, 280 students, including 140 students randomly selected for the experimental group and 140 students for the control group. All students were registered namelessly into the study. Sample size estimation is as follows.

$$N = \frac{(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta})^2}{Z_0^2} + 3$$

$$N = \frac{(1.96 + 0.84)^2}{(0.31)^2} + 3 = 193$$

$$N_1 = \frac{193}{1 + \frac{193}{500}} = 140$$

### 2-2. Methods

In order to data collection, we used a researcher-made questionnaire according to Health Belief Model for cigarette

smoking and its consequences. The questionnaire was validated applying the comments offered by five experts of health education and promotion from Tehran and Iran Universities of Medical Sciences. In order to assess the reliability of the scale, a pilot study was performed on 30 students. Cronbach's alpha for each construct of HBM, were as follows: Perceived susceptibility ( $\alpha = 0.81$ ), perceived severity ( $\alpha = 0.72$ ), perceived benefit ( $\alpha = 0.77$ ), perceived barriers ( $\alpha = 0.80$ ), and perceived self-efficacy ( $\alpha = 0.84$ ), showing internal consistency.

To start the process, first by referring to the classes, chosen through the multistage cluster sampling out of the male middle school in Nowshahr city -Iran, the mentioned scale was offered to and completed by all students in those classes. From among the 11 male high schools, 6 high schools (clusters) were chosen relative to the students under coverage, where the higher the number of high school students, the greater the number of samples recruited.

### 2-3. Measuring tools

The data collection instrument was a questionnaire includes 37 items in three sections based on the Health Belief Model. The first part of the questionnaire was included 7 questions about demographic data, including age, having smoker father (yes/no), having smoker mother (yes/no), having smoker friends (yes/no), friends' insistence on smoking (yes/no), age of the first-time smoking ( $\leq 11$  years; 12 years; and  $\geq 13$  years), main cause of smoking (having smoker friends, to reduce anxiety, serious need, curiosity, and happiness). The second included 24 questions related to the HBM constructs, was specified with the 5-choice Likert scale from 1= completely disagree to 5= completely agree including 4 questions about perceived susceptibility (with a min score of 4 and a max score of 20), 4 questions

about perceived severity (with a min score of 4 and a max score of 20), perceived benefits 5 questions and perceived barriers 5 questions (with a min of 5 and a max score of 25), 6 questions about perceived self-efficacy (with a min of 6 and a max score 30). The third part included 6 questions related to preventive behavior (with a min score of 0 and max of 6) (**Table.1**).

### 2-4. Intervention

Questionnaire was completed in the first stage (pretest) of the study in both experimental and control groups. In the next step, based on the results of pretest and HBM constructs, educational program was designed, and suitable educational packages were organized and applied for students in experimental group. Type, content, and approaches of educational program, besides the number and proper time for educational session were organized according to the analysis of results on pretest phase and essential educational materials were considered.

According to the results in this phase, educational intervention was designed according to HBM in four session's 60-minute using the method of lecture, group discussion, question and answer, role playing, pamphlet, and booklet (smoking prevention content in youths was prepared and distributed among the students of experimental group). All sessions were performed in selected schools with subjects are as follows having a discussion (**Table. 2**). In the second phase (post-test) and after four months of educational intervention, the students (both experimental and control group) completed the questionnaire once more.

### 2.5-Ethical consideration

The ethics committee of Tehran University of Medical Sciences approved the study. To take ethical considerations into account, first permission was received from Tehran University of Medical

Sciences; then the required coordination were performed with the province Education Department, Nowshahr city, and the managers at the selected high schools.

Before completion of the instrument, the aim of the study was described to the participants and their consent was taken writing. Further, it was declared that inclusion of these students was completely voluntary, with the anonymity of the scale being stressed to guarantee them that their information would be collected and preserved privately.

### 2-6. Inclusion and exclusion criteria

Inclusion criteria were high school male students and consent to participate. Exclusion criteria were failure to complete the instrument correctly and entirely.

### 2-7. Data Analyses

Statistical analysis was performed using SPSS version 22 and to describe the status of the students, descriptive statistics, counting mean, percentage, and standard deviation (SD) were applied.

In order to analyze the relationship between the behavior of smoking with quantitative demographic variables and the constructs of the health belief model, independent *t*-test and paired *t*-test was used. To compare the variables qualitatively, Chi-square test was used before and 4 months after intervention in both groups with significance level of 0.05.

## 3- RESULTS

As presented in **Table.3**, about one-third of students in experimental group smoked at 14 years old (38.7%) and it was 30 % in control group. Additionally, more than one-third of participants in the experimental group and one-third of students in the control group had smoker father (35% and 33.6%, respectively). One-tenth of participants in the experimental group and less than one-tenth of students in

the control group had smoker mother (10% and 7.8%, respectively). More than one-tenth of students in the experimental group and less than one-tenth of students in the control group reported that their friends had smoking experience (12.1% and 7.8%, respectively). Moreover, less than one-tenth of student in both experimental and control group stated that their friends insisted for smoking them (7.8% and 7.1%, respectively). Finally, more than half of students in both group stated to reduce anxiety as their most main cause for smoking (57.9% and 52.63%, respectively). On the other hand, result shown significant difference was not found between two groups in socio-demographic variables.

Independent and paired *t*-tests were performed before and after the educational program in between two groups in scores of HBM constructs and smoking-preventive behavior ( $P>0.05$ ), but this relationship was significant four months after interventional program ( $P<0.001$  both groups in order to comparison the means scores for HBM components and smoking-preventive behavior' elements. Results showed that before an educational program, there was no found significant relationship) (**Table.4**).

## 4- DISCUSSION

This part highlights how the educational programs based on the HBM improve the middle school students' preventive behaviors about smoking. The prolonged nature of difficulties arising from smoking and failure of methods taken to prevent and to treat are two important encouraging aspects to plan preventive programs (30).

The results of previous researches indicate that starting of cigarette smoking is significantly correlated with the ages of youth. The results of the present study indicated that 38.7% of participants in experimental group and 30 % of student in control group had smoking onset in age of

14 years old. These results were in line with the findings of Karimi (31), Niknami (32), and Abedini (33). The tendency to use cigarette smoking in early ages can be a serious risk for the health and well-being. The results of several studies have showed that the individuals who begin smoking at earlier ages, are more prone to become heavy smokers, and so are less likely to leave it (10, 13).

In present study, a statistically significant difference was found between the score averages of the perceived susceptibility and severity in the experimental group after the educational program. This was consistent with previous results (28, 30). It was proved that if people do not sense at risk (low perceived susceptibility), or do not sense the risk to be important (low perceived severity), they may pay no attention to facts about the threat. Person's perceived susceptibility and severity may decrease when he/she knew more information about coping strategies against threat (34). Young person may involve in more risk-related behaviors like smoking, because they occasionally do not believe that their behaviors as dangerous and involve in risky behaviors (30, 35).

This result demonstrates the role of health experts to emphasize on smoking perceived susceptibility in educational programs. There was a significant difference for perceived barriers and benefits toward preventive behaviors of smoking between two groups before educational program. Our findings displayed that the mean score of both perceived barriers and benefits constructs significantly increased after the educational program in the intervention group ( $P < 0.001$ ).

The efficiency of education on increasing the perceived benefits related to the preventive behaviors was found another study (36). Our results about the perceived barriers and benefits are consistent with

the results of other studies (37-39). So, it seems that the perception of the most of the participants was high as to no smoking consequences in health promotion and decreased risk of chronic diseases. Similarly, the study by Valizadeh et al. showed that there is a positive relationship between the perceived benefits and prevention of high risk behaviors throughout youth as the greatest perceived benefits were associated with the sense of living healthy (40).

It is essential that via suitable procedures, the barriers of smoking were emphasized among students. This is since the perceived barriers are the possible inhibitory element to accept preventive measures against smoking. This reasons the individual to refuse the proposal of smoking and to analyze the benefits and uses of the action against costs, risks, consequences, time, etc., and lastly approves a healthy behavior (30).

We also found a significant relationship for perceived self-efficacy between the experimental and control group after educational program about smoking-preventive behaviors. In a study concluded by Kear et al. among Chinese students, there was a significant relationship between the self-efficacy of students and their smoking behavior (41). Similarly, the previous study (42) shown that the mean scores of perceived self-efficacy were significantly increase after the interventional programs. Teaching of the opposition skill and saying no in reply to the peer stress can be operative. The results of several studies have displayed the success of these interventions as the training of skills related to opposite to drug Abuse (43, 44). These findings shown that teaching life skills with highlighting perceived self-efficacy has positive effects in prevention of smoking behaviors among students. The promoting preventive behavior after intervention releases the influence of HBM constructs in smoking

prevention in the experimental group. Similarly, previous study (30) indicated that the mean score of preventive behavior improved after education. Generally, the findings of present study indicated that the mean scores of HBM constructs in students were improved after intervention in experimental group. Additionally, the findings of presents study indicated that with increasing the mean scores of HBM components of students, resulted in better preventive behaviors of smoking by participants themselves. According to these findings, it is needed to emphasize perceived susceptibility, severity, benefits, barriers, and self-efficacy in smoking programs. It is so, suggested that the use of HBM model may be successfully used to prevent different risky behaviors and difficulties like smoking.

#### **4-1. Limitations of the study**

It was found some limitations in this study. First, students who have not participated for any reason were not entered for presents study. Second, incorrect answers were probable due to self-report scale. Third, the concurrency of educational intervention completion and examination time of students as well as summer vacation which caused the post-test was carried out after 4 months of intervention and the new academic year. Last, the research just conducted in the male students, so in order to compare smoking in both gender, other works on females are similarly, required. It is recommended that smoking behavior among female students will similarly, be studied in future researches.

#### **5. CONCLUSION**

Interventional programs based on HBM constructs increased the perceived susceptibility, severity, benefits, barriers, and self-efficacy for the smoking-preventive behavior in students. Many of adolescences are less susceptible to dangers and risky behaviors.

Consequently, improving the perceived threat and benefits influences on increasing in susceptibility and severity in youths. Thus, training abilities to say no peers according to the perceived benefits of barriers and approaches can be affective in the smoking prevention. So, planning for school-based program should be organized with stress on the HBM components, and programs for smoking prevention should be started in younger students.

#### **6- CONFLICT OF INTEREST**

The authors declare that they have no competing interests.

#### **7-ACKNOWLEDGMENTS**

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**Table-1:** Demographic and HBM constructs questions

Variables	Items	Options	Score
Demographic	<ol style="list-style-type: none"> <li>1. Age</li> <li>2. Having smoker father</li> <li>3. Having smoker mother</li> <li>4. Having smoker friends</li> <li>5. Friends' insistence on smoking</li> <li>6. Age of the first-time smoking</li> <li>7. Main cause of smoking.</li> </ol>	<p>.....</p> <p>(yes/no)</p> <p>(yes/no)</p> <p>(yes/no)</p> <p>(yes/no)</p> <p>(≤ 11 years; 12 years; and ≥ 13 years)</p> <p>(having smoker friends, to reduce anxiety, serious need, curiosity, and happiness)</p>	
Perceived susceptibility	<ol style="list-style-type: none"> <li>1. I may smoke like some of the young people in the future.</li> <li>2. I am concerned risk of heart disease with cigarette smoking.</li> <li>3. I am concerned risk of respiratory disease with cigarette smoking</li> <li>4. I cannot enjoy my favorite sport if I smoke.</li> </ol>	<ol style="list-style-type: none"> <li>1 = Completely disagree</li> <li>2= Disagree</li> <li>3= No idea</li> <li>4= Agree</li> <li>5 = Completely agree</li> </ol>	4-20
Perceived severity	<ol style="list-style-type: none"> <li>1. I believe that smoking causes lung cancer.</li> <li>2. I believe that Lifetime smokers is lower than non-smokers.</li> <li>3. I believe that the risk of developing heart disease is more in smokers.</li> <li>4. I believe that the risk of respiratory disease is more in smokers.</li> </ol>	<ol style="list-style-type: none"> <li>1 = Completely disagree</li> <li>2= Disagree</li> <li>3= No idea</li> <li>4= Agree</li> <li>5 = Completely agree</li> </ol>	4-20
Perceived benefit	<ol style="list-style-type: none"> <li>1. Smoking cause the popularity of individual in the family.</li> <li>2. Basically lifetime of non-smokers is more than smokers.</li> <li>3. Non-smokers are less at risk for cancer.</li> <li>4. The risk of heart disease is lower in non-smokers.</li> <li>5. Quit smoking (even one person) improve financial situation.</li> </ol>	<ol style="list-style-type: none"> <li>1 = Completely disagree</li> <li>2= Disagree</li> <li>3= No idea</li> <li>4= Agree</li> <li>5 = Completely agree</li> </ol>	5-25
Perceived barriers	<ol style="list-style-type: none"> <li>1. Smoking causes I have more focus during study.</li> <li>2. Smoking is OK during unemployment.</li> <li>3. Smoking causes my friends pay more attention me.</li> </ol>	<ol style="list-style-type: none"> <li>1 = Completely agree</li> <li>2= Agree</li> <li>3= No idea</li> </ol>	5-25

	<p>4. Smoking gives me a good feeling                      5. Smoking reduces my discomfort and anxiety.</p>	<p>4= Disagree                      5 = Completely disagree</p>	
Perceived self-efficacy	<p>1. I believe that I cannot resist pressure from my friends                      2. I protect myself against smoking with using the resistance skills                      3. Even when I cannot sleep well, I don't smoke.                      4. I don't smoke even when I'm upset.                      5. I am able to say NO when my friends offer me cigarette                      6. Although cigarettes are available, I am not smoke.</p>	<p>1 = Completely disagree                      2= Disagree                      3= No idea                      4= Agree                      5 = Completely agree</p>	6-30
Preventive behavior	<p>1. Have you smoked in the previous 4 months?                      2. In the last 4 months, when you exposed to smoke, have you tried to get outside it?                      3. In the last 4 months, have you ever tried that your family attained more data about side effects of cigarette smoking, and methods to avoid it?                      4. In the last 4 months, do you have to speak about side effects of smoking?                      5. if yes, whom did you speak?                      6. when your friends suggest you a cigarette, what is your response?</p>	<p>(yes/no)                      (yes/no)                      (yes/no)                      (yes/no)                      (family, peers and friends, others)                      (I smoke cigarette, I'm not saying against them offer and immediately leave there, and I stay with them, but I'm not smoking).</p>	0-6

**Table- 2:** Designed educational programs to prevent smoking behavior in experimental group students based on the results of the pretest

Sessions	Subjects	Educators	Training Time	Education Areas	Educational methods	Educational materials	Evaluation	Model Structures
First session	<ol style="list-style-type: none"> <li>1. Addiction Meaning</li> <li>2. Debate about knowledge of smoking</li> <li>3. The prevalence of smoking among adolescents</li> <li>4. Influencing elements on beginning smoking.</li> <li>5. Smoking side effects</li> </ol>	Master of Health Education	60 minutes	<ol style="list-style-type: none"> <li>1.Cognitive</li> <li>2.Emotional</li> </ol>	Lecture, Slide show. question and answer	Booklet PowerPoint Pamphlet	Questionnaire Post test	Perceived susceptibility
Second session	Physical, psychological and social risks of using cigarette smoking on students' life	Master of Health Education	60 minutes	<ol style="list-style-type: none"> <li>1.Cognitive</li> <li>2.Emotional</li> </ol>	Lecture, Slide show  Lecture, Slide show, question and answer	Booklet PowerPoint Pamphlet	Questionnaire Post test	Perceived severity
Third session	<ol style="list-style-type: none"> <li>1. Having a discussion about benefits of physical, psychological, social and economic quitting smoking.</li> <li>2. Inhibiting factors in quitting smoking.</li> </ol>	Master of Health Education	60 minutes	<ol style="list-style-type: none"> <li>1.Cognitive</li> <li>2.Emotional</li> </ol>	Group discussion, Role Playing	Pamphlet Poster Film	Questionnaire Post test	Perceived benefits / barriers
Fourth Session	<ol style="list-style-type: none"> <li>1. Increase self-management ability to deal with smoking</li> <li>2. Ability in rejecting offer friends on cigarette smoking</li> <li>3. Increase in positive attitudes towards away from smoking</li> <li>4. Increase resist the temptation smoking</li> <li>5. Increase self- confidence in preventive behavior</li> </ol>	Master of Health Education	60 minutes	<ol style="list-style-type: none"> <li>1.Cognitive</li> <li>2.Emotional</li> </ol>	Group discussion, Role Playing	Pamphlet Poster	Questionnaire Post test	Perceived Self-efficacy

**Table-3:** Frequency of variables of participants in the experimental and control groups (n=280)

Variables	Answer	Experimental Group		Control Group		P-value
		Number	Percentage	Number	Percentage	
Father is smoker	Yes	49	35	47	33.6	0.517
	No	91	65	93	66.4	
Mother is smoker	Yes	14	10	11	7.8	0.458
	No	126	90	129	92.2	
Friend is smoker	Yes	17	12.1	19	13.6	0.329
	No	123	87.9	121	86.4	
Insistence on smoking by friends	Yes	11	7.8	10	7.1	0.504
	No	129	92.2	130	92.9	
Age of the first-time smoking	12 years	4	12.9	5	16.7	0.363
	13 years	7	22.6	7	23.3	
	14 years	12	38.7	9	30	
	15 years	8	25.8	9	30	
Most important reason for smoking	Having smoker friends	3	15.8	2	10.53	0.417
	To reduce anxiety	11	57.9	10	52.63	
	Curiosity	4	21.1	5	26.32	
	Happiness	1	5.2	2	12.5	

**Table- 4:** The comparison of mean of scores for HBM constructs and smoking preventive behavior, before and after intervention in the experimental and control groups (n=280)

HBM constructs	Group	Before intervention	After intervention	P-value (Paired t-test)
		Mean ± SD	Mean ± SD	
Perceived susceptibility	Experimental Group	2.71± 0.32	4.84±0.34	0.01
	Control Group	2.69± 0.35	2.7±0.36	0.11
	Independent t-test	P= 0.21	P<0.001	
Perceived severity	Experimental Group	2.37 ±0.27	4.51± 0.31	0.004
	Control Group	2.35 ±0.28	2.36± 0.27	0.41
	Independent t-test	P=0.17	P=0.002	
Perceived barriers	Experimental Group	2.43 ±0.31	4.72 ±0.36	0.001
	Control Group	2.41 ±0.32	2.56± 0.35	0.47
	Independent t-test	P=0.22	P<0.001	
Perceived benefits	Experimental Group	2.54 ±0.35	4.72± 0.36	0.001
	Control Group	2.55± 0.34	2.56 ±0.35	0.53
	Independent t-test	P= 0.62	P= 0.004	

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Perceived self-efficacy	Experimental Group	2.56 ±0.31	4.68 ±0.33	0.01
	Control Group	2.53± 0.32	2.49± 0.32	0.57
	Independent t-test	P=0.27	P<0.001	
Preventive behavior	Experimental Group	1.63 ±0.22	2.81 ±0.24	0.001
	Control Group	1.52 ±0.19	1.58 ±0.21	0.17
	Independent t-test	P= .07	P<0.001	