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The Effects of an Educational Intervention Based on Prevention against Tobacco Dependence (PAD) regarding Frequency of Tobacco Use among Students in Varamin City: Results of the Second Phase

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ABSTRACT

Background: Tobacco use by adolescents is one of the most devastating social challenges throughout the world, threatening the health of future generations and communities in all social, cultural, health, and environmental aspects. This study aims to evaluate the effectiveness of the prevention against Tobacco dependence (PAD) interventions among students in Varamin City in 2020.

Methods: This study utilized the findings from the initial phase of the Prevention against Tobacco Dependence (PAD) project, which was conducted using a cohort method in Varamin city (Tehran province). The study encompassed four phases and involved both male and female students. For the second phase, a sample of 780 ninth-grade students was chosen using stratified sampling, with 350 students (45%) serving as PAD-helpers. Data was collected using a modified version of a questionnaire developed by the World Health Organization (WHO).

Results: In the students' families, most fathers still used cigarettes (25.5%) and hookah (11.4%). In total, the prevalence of hookah, cigarette, and new tobacco product use among students was 35%, 15.9%, and 22.2%, respectively. The most important reason for smoking was curiosity (56.7%), and more than 71% of students believed that PAD project increased their knowledge about dangers of smoking. Based on t-test scores, there was a significant difference between PAD-helpers and non-PAD-helpers in terms of anti-smoking knowledge, attitude, and practice. Two variables of the level of knowledge and attitude towards smoking had a significant direct relationship with the variable of anti-smoking practice ($p < 0.05$).

Conclusion: This project contained effective interventions to raise the students' knowledge and change their attitudes towards smoking, and these changes have been more evident among PAD-helpers and their anti-smoking practice.

Keywords: Cigarette Smoking, Prevalence, Students, Tobacco Products

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Introduction

One of the most worrisome social issues in today's world is the use of tobacco by people under 18 and the inhalation of second-hand smoke, which can cause them many social and health problems (Azagba, Manzione, Shan, & King, 2020). This chronic social and health challenge leads to the death of millions of people each year and imposes enormous difficulties on communities in various economic, social, cultural, and health fields (Barrington-Trimis et al., 2020).

Although smoking is a concern at all ages, its use by adolescents and young people as an active group in the community raises more concern in the social context. Most adults who smoke today have started smoking for the first time in their adolescence period, and this has been the beginning of a deadly addiction (Ahun et al., 2020). The study on young children in South Korea also showed that the knowledge, attitude, and ability to take measures for smoke prevention regarding five- and six-year-old children significantly improved after participating in the anti-smoking education program (Kim et al., 2020).

In 2020, the prevalence of consuming two or more tobacco products within thirty days before the interview was approximately 2.8% among middle school students and 8.2% among high school students. This indicates that approximately three out of every 100 middle school students and about eight out of every 100 high school students reported engaging in such tobacco consumption (Organization, 2019). A study on the global prevalence of smoking among adolescents aged 13 to 15 in 143 countries indicated that the prevalence of tobacco use (excluding cigarettes) over the past two decades in 81 out of 137 countries (59.1%) had not changed or increased (Jafari et al., 2021).

In Iran, there are no recent accurate studies on the rate of adolescents' smoking. However, the Caspian national study in 2016 examining 13486 students and Based on self-report illustrated 2.6% (3.5% boys and 1.7% girls) at the time of the survey were smokers and 5.9% (7.5% boys and 4.2% girls) used to smoke. The results of a meta-analysis also showed that smoking among teenagers was 9% (12% of boys and 6% of girls) (Kelishadi et al., 2016).

Based on the findings of the first phase of the PAD project in 2019, the prevalence of hookah use among students was 23.6%, while cigarette use was reported by 6.9% of the students. Additionally, the study revealed that 49.7% of the students reported curiosity as the primary reason for smoking (Hemayatkhah, Ghaffari, Masjedi, & Rahmanian, 2021). About 50% of the students who smoked did so for the first time between the ages of 12 and 13. According to the latest report submitted by Iran to the WHO, the prevalence of smoking among Iranian adolescents was 10.2% (12.9% of boys and 7.7% of girls) (Organization, 2019).

Nowadays, the prevalence of smoking is associated with the introduction of new products such as electronic cigarettes, flavored cigarettes, chewing tobacco, hookah, etc. The variety of these products increases attraction to tobacco smoking and motivates consumption for adolescents and young people (Choi, Fabian, Mottey, Corbett, & Forster, 2012). A study titled "Tobacco-Free Schools as a Core Component of Youth Tobacco Prevention Programs" (Agaku, Obadan, Odukoya, & Olufajo, 2015) The study emphasized the importance of comprehensive tobacco prevention programs, particularly those that include tobacco-free school policies, in reducing youth smoking rates. In a review conducted by O'Connor et al. (2019), the current state of knowledge on tobacco product interventions was examined, and the best or most promising practices were highlighted. The findings indicated that the majority of interventions focused on public education and school-based efforts, aiming to educate youth about the risks associated with smoking in order to prevent initiation or promote cessation of smoking (O'Connor, Pelletier, Bayoumy, & Schwartz, 2019).

Applying educational and informational methods on adolescents is one of the initiatives that

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effectively links research to implementation. In this particular context, peer-to-peer education is characterized as a process, strategy, communication channel, and tool. The purpose of peer education is to create or improve the knowledge, attitudes, beliefs, and skills necessary for social and health activism. Through peer education strategies and programs, teenagers can be trained by providing the necessary information and encouraged to pass on the information gained to their peers. Overall, peer education is one of several tools available to transfer learning and skills to individuals, along with the use of other communication methods. Peer education programs are designed with various theoretical approaches to help shape interventions. Therefore, studies have emphasized the effectiveness of peers in preventing risky behaviors and raising awareness of the harms of tobacco use (Ghasemi, Simbar, Rashidi Fakari, Saei Ghare Naz, & Kiani, 2019; Yang, Ma, Zhao, Magnussen, & Xi, 2022).

In a study conducted by Khani (2021), the effectiveness of an educational intervention in empowering high school male students to prevent smoking was demonstrated (Khani Jeihooni, Mobaraei, Kiani, Afzali Harsini, & Karami Ghazi Khani, 2022).

At present, there is a lack of coherent, participatory, and effective programs to inform children and adolescents about tobacco prevention. Accordingly, the Iranian Anti-Tobacco Association (IATA), a non-governmental organization, has launched a project titled PAD intending to change attitude and strengthen anti-smoking behaviors in adolescents. In the second phase of this project, ninth-grade students were selected as the target group. The purpose of this phase was to examine the behavioral and attitudinal changes of students after implementing related educational interventions.

Methods

Study design and setting

Prevention against tobacco dependence (PAD) was based on the action research method, and as a participatory interventional project, focuses on smoking prevention from childhood and adolescence periods. This project was carried out in four phases (pilot, smoke-free school, smoke-free neighborhood, smoke-free city) in Varamin city (the pilot region) to reduce the tendency to smoke in future generations, as well as realizing tobacco-free schools, neighborhoods, and cities in Iran. The study protocol and the results of the first phase were published elsewhere (Hemayatkhah et al., 2021; Masjedi et al., 2020).

Study participants and sampling

After recognizing the current situation of the target community in the first phase, the main goal in the second phase was to achieve smoke-free schools. Therefore, information, training, and skills were provided to students, parents, and educators by IATA experts and facilitators. At this phase, after attracting volunteer students (PAD-helpers) as activists, it was tried to increase their sensitivity, knowledge, and skills about the side effects of tobacco; hence, their individual and social ability to fight tobacco. These students were encouraged to engage voluntarily in peer education and raise awareness of peers, and then, local and urban communities (phases three and four) about the dangers of smoking.

After about two years of work on the implementation of the PAD project and performing educational interventions, and to evaluate the effectiveness of the project, a questionnaire was administered. At this phase, the statistical population included all ninth-grade students in Varamin city (including 63 schools), 780 of whom were selected.

The sample size was determined using the Cochran formula, and participants were selected through proportional stratified sampling. Schools were first classified by type (governmental, non-profit, gifted, Shahed) and gender (girls/boys). The number of participants was then allocated to each stratum based on its proportion to the total population, Table 1.

Table 1. A sample size of the ninth-grade students (no = 3657)

Gender	Public schools	Private schools	Gifted schools	Magnet schools	Total
Female	294	38	13	39	384
Male	289	56	13	38	396
Total	583	94	26	77	780

Data collection tool and technique

To gather data in line with targeted interventions, a mixed-method approach was used consisting of the WHO questionnaire with a local adaptation, interviews, and observations. The questionnaire aimed to evaluate the performance of ninth-grade students in raising awareness and preventing others from using tobacco. Additionally, it aimed to assess the smoking status of students and their families compared to the first phase of the study. The questionnaire consisted of Likert scale questions with a scale ranging from 1 to 5. To ensure the validity of the questionnaire, the content validity ratio (CVR) index was used to calculate the content validity index (CVI) which was assessed by experts. The reliability coefficient was estimated using Cronbach's alpha, which was found to be acceptable ($\alpha = 0.703$).

Educational intervention program

In the initial phase, the current situation of the target community was assessed, and the primary objective for the subsequent phase was to establish a smoke-free school. To accomplish this goal, students, parents, and teachers received valuable information, training, and skills from the experts and facilitators affiliated with the Office of the Population against Tobacco Use. Especially at this stage, by recruiting and organizing student volunteers (pad-helper), the authors first tried to increase their individual and social ability to fight against tobacco use by sensitizing, informing, and increasing their skills as peer activists. These students were strengthened to educate peers and raise the awareness of families and neighbors. As a result, in the local and urban community (Phase 3 and 4), students would work voluntarily with focus on the harms of smoking. Over the course of approximately two years, the PAD project was actively implemented, and various educational and skill interventions took place. These interventions included regular, monthly, and periodic meetings in all schools (known as Padyaran). Facilitators actively participated in the meetings of parents' associations and educators, raising awareness about tobacco through educational materials provided by the Office of the Population against Tobacco Use. Additionally, anti-smoking advertisements were displayed in schools, highlighting the consequences of tobacco use. Health educators played a crucial role in delivering this awareness. Numerous cultural and artistic competitions centered on the theme of tobacco were organized, along with recreational educational camps that focused on anti-tobacco skill training. In line with the Tobacco Control Law, relevant institutions monitored and controlled tobacco supply centers, ensuring they were located at least 150 meters away from schools. Furthermore, the law prohibited the sale of tobacco products to students.

Statistical analysis

The data were inputted into SPSS 17.0 (SPSS Inc., Chicago, IL, USA), and the normality of the data was assessed using the Kolmogorov-Smirnov test. Descriptive statistics, including frequency and percentage, were utilized to analyze the data. Inferential statistics, such as the t-test and Pearson's correlation coefficient, were employed for further analysis. The significance level for all tests was set at less than 0.05, indicating a threshold for statistical significance.

Statement of ethics

Prior to their involvement in the research, all parents and students provided written consent and officially agreed to participate. The research itself received approval from the Institutional Review

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Board (IRB) of Tehran University of Medical Sciences, Iran (IR.TUMS.DDRI.REC.1398.006).

Results

The average age of the participants was 14.84±0.71, and the majority of parents had elementary, middle, or high school education. A total of 350 students (45%) were PAD-helpers, indicating a high level of interest and engagement in educating and informing their peers about the dangers of smoking. However, the prevalence of tobacco use among peers was worrisome, with more than 35% consuming cigarettes and 54% consuming hookah.

25.5% of the fathers in the students' families used cigarettes, and 11.4% of them consumed hookah. Among the relatives of students, 21% (including uncles, cousins, grandmothers, and grandfathers) were found to consume cigarettes and hookah. In addition, 33.3% and 39.4% of those around the students used cigarettes and hookah, respectively.

The overall prevalence of tobacco use among the students was 35% for hookah, 15.9% for cigarettes, and 22.2% for new tobacco products such as electronic cigarettes, electronic hookah, and chewing tobacco. There was a significant difference in the average rate of consumption of new tobacco products between male and female students ($p < 0.05$), with male students exhibiting a higher average rate of consumption compared to female students.

According to the data provided, out of the 294 students who responded (37% of the total participants), 49% had their first experience of hookah or cigarette smoking between the ages of 14 and 15. Additionally, 16% of these students reported having their first experience with cigarette or hookah before the age of nine.

The most important reasons for not smoking among non-smoking students were health concerns (47.5%), followed by religious beliefs (21.9%), and family opposition (19.8%). Among smoking students, 68.5% expressed their willingness to quit smoking, and the most important reason for quitting was health concerns (56.7%), followed by family opposition (22.2%) and economic reasons (11.9%).

In this regard, about 76% of the students agreed with the law prohibit the sale or supply of tobacco to individuals under 18, while about 17% of them opposed it. These figures seem important because about 16% of the ninth-grade students had experienced smoking.

One of the questions raised to assess the effectiveness of the PAD project was whether or not ninth-grade students still use tobacco. The data showed that of 288 respondents (37%) who had experienced cigarette or hookah consumption, 111 students (14.2%) were still smokers; most of them at least smoked one cigarette or had a session of hookah smoking per week. Respondents were then asked when they stopped smoking (if they did not smoke). For most respondents (42 students), this figure was one to two years ago; that is, since the time the PAD project began.

The average rate of the ninth-graders practice in informing others and prohibiting them from smoking was about 2.48 (out of 5), which means that about 50% of students had tried to do their task voluntarily. The average rate of knowledge and attitude of the students towards smoking were 4.1 and 4.25 (out of 5), which means that the student's knowledge was relatively good. Moreover, 82% of the students had a negative attitude towards using cigarettes and hookah. On the other hand, the level of knowledge and attitude towards smoking had a direct and significant relationship ($r = 0.698$, $p < 0.05$). Also, as the level of knowledge and attitude improved, the level of practice increased, Table 2.

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Table 2. Pearson Correlation Coefficient (r) for the Association between Knowledge, Attitude, and Practice regarding Smoking

Variable 1	Variable 2	r	P-value
Level of knowledge	Practice	0.147	<0.0001
Attitude towards smoking	Practice	0.300	<0.0001
Level of knowledge	Attitude towards smoking	0.698	<0.0001

The association between the students' practice and their role as PAD-helpers

The average rate of practice was 7.76 in the group of PAD-helpers and 7.18 in the group of non-PAD-helpers; this shows that the average rate of PAD-helpers' practice was better than non-PAD-helpers (P = 0.025), Table 3.

Table 3. Results of the t-test for the difference in mean practice according to the role of the students as PAD-Helpers

Variables	Number	Mean	SD	t	Significance level
PAD-Helpers	298	7.76	3.14	2.24	0.025
Non-PAD-Helpers	340	7.18	3.39		

The association between the students' knowledge and their role as PAD-helpers

The average levels of knowledge among PAD-helpers and non-PAD-helpers were 30.08 and 27.97; this indicates that the average level of knowledge of PAD-helpers was higher than non-PAD-helpers (P < 0.0001), Table 4.

Table 4. Results of the t-test for the difference in mean knowledge according to the role of the students as PAD-Helpers

Variables	Number	Mean	SD	t	Significance level
PAD-Helpers	333	30.08	4.49	5.84	< 0.0001
Non-PAD-Helpers	370	27.97	5.03		

The association between the students' attitude towards smoking and their role as PAD-helpers

The mean levels of attitude in PAD-Helpers and non-PAD-Helpers were 43.06 and 39.97. Therefore, the average score of negative attitude towards smoking among PAD-helpers was higher than non-PAD-helpers (P < 0.0001), Table 5.

Table 5. Results of the t-test for the difference in mean attitude according to the role of the students as PAD-Helpers

Variables	Number	Mean	SD	t	Significance level
PAD-Helpers	338	43.06	7.22	5.36	< 0.0001
Non-PAD-Helpers	376	39.97	8.06		

Discussion

The results of this study indicate an alarming prevalence of tobacco use among ninth-grade students, as well as their fathers, relatives, and those around them. However, the PAD project was found to be effective in improving students' knowledge, attitude, and practice towards smoking, with a significant number of students quitting since the beginning of the project.

The prevalence of tobacco use among the youth is a major public health concern worldwide. The findings of this study revealed that more than one-third of ninth-grade students reported cigarette use, and over half of them reported hookah use. This was consistent with the results of other studies conducted in different countries. For example, a

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study conducted in India reported a prevalence rate of 22% for cigarette smoking among teenagers (Rani, Bonu, Jha, Nguyen, & Jamjoum, 2003), while another study in Pakistan found a prevalence rate of 15.2% for smoking use among adolescents (Ahmad et al., 2005).

According to a study conducted in the United States in 2017, the prevalence of current tobacco product use among high school students was 19.6%, corresponding to approximately 2.95 million students. Among middle school students, the prevalence was 5.6%, which accounted for approximately 0.67 million students. The study also revealed that e-cigarettes were the most commonly used tobacco product among both middle school students (3.3%) and high school students (11.7%) (Anic, Sawdey, Jamal, & Trivers, 2018).

In 2015, Meysami et al. reported the prevalence of cigarette and hookah use as 11.5% and 41.5% (Meysamie, Mahdiin, & Seddigh, 2015). Barikani reported a prevalence rate of 2.41% for hookah use in high school students in Tehran (Barikani, 2008) in several studies, while the prevalence of hookah use in high school students in Karaj, Nazarabad, and Tabriz were reported as 53.2%, 46.7%, and 48.9%, respectively (Alaee, Kadivar, Mohammadkhani, Sarami, & Alaee, 2011; Fakhari, Mohammadpoorasl, Nedjat, Sharif Hosseini, & Fotouhi, 2015; Ghavidel et al., 2012). The observed difference in the prevalence of hookah use among Iranian students and other regions of the world could be attributed to the historical background and customs of the Middle Eastern region (such as Iran) and greater accessibility to hookah for adolescents in this region compared to other parts of the world.

The high prevalence of tobacco use among youth had significant and negative health consequences, including increased risk of respiratory and cardiovascular diseases, cancer, and addiction. Therefore, it is crucial to implement effective interventions to prevent and reduce tobacco use among youth. The measures include educational campaigns, policy changes, and stricter enforcement of laws related to tobacco use.

Considering that the level of education of parents plays an essential role in the level of knowledge, attitude, and practice of their children, the findings of this project suggested that as in the first phase (Hemayatkhah et al., 2021), the level of education of more than 50% of parents of ninth-grade students was low. Meysami *et al.* demonstrated that there was a significant and negative correlation between parental education and tobacco use among adolescents, which was consistent with the results of the present study (Meysamie et al., 2015). Therefore, as in the first phase, families still played a key role in transmitting anti-tobacco knowledge to the students; parents' low education may diminish their positive role in educating and empowering their children to prevent them from smoking.

Another finding of this phase was that in the eyes of the students, hookah use seemed more common, more acceptable, and less dangerous than cigarettes. Students start hookah consumption by their friends more easily than cigarettes, and inhale second-hand smoke from hookah use by which is less dangerous than inhaling cigarette smoke. Of course, there was a significant difference compared to the first phase (Hemayatkhah et al., 2021), but about 30% of ninth-grade students needed more knowledge and skills to avoid inhaling second-hand smoke.

Regarding the consumption of traditional and modern tobacco products by ninth-grade students, the result showed an upward trend compared to the first phase. As in the first phase, hookah use was more common than cigarette smoking, and this was more prevalent among girls than boys. This was consistent with the results of the previous research. In the second phase of the project, it was found that the consumption of modern tobacco products by ninth-grade students increased by 10% compared to the first phase of the project. Erinoso et al. conducted a study that found a prevalence of E-cigarette use at 7.9%. The study identified that being older and male were independently associated with increased odds of E-cigarette

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consumption. Additionally, the study observed that the use of alcohol, other tobacco products, or substances was significantly associated with higher odds of E-cigarette use (Erinoso et al., 2021).

In the second phase of the project, the factors influencing the students' tendency to smoke were very similar to the results of the first phase (Hemayatkhah et al., 2021). In the study by Kalishadi et al., the presence of a smoker in the family was found to be significantly associated with an increased likelihood of smoking; the highest rate of smoking was related to having a smoking sister for girls and a smoking brother for boys (Kelishadi et al., 2016). Two other studies have also shown a significant statistical association between having smoking parents and smoking behavior in the offspring (Araban, Montazeri, Stein, Karimy, & Mehrizi, 2020; Bashirian, Barati, Karami, Hamzeh, & Ezati, 2020). Additionally, in the study by Vakili et al. in Yazd, having a smoking father and being in the company of smokers were reported as predictive factors for smoking behavior in students (Pirdehghan, Vakili, Arab, & Aghakoochak, 2014).

Overall, the interventions led to beneficial and increasing changes in the level of knowledge, attitude, and practice of the students regarding the prevention of smoking and exposure to second-hand smoke. The students level of knowledge and their attitude towards smoking improved by about 20% and 3%, respectively. Regarding the practice of the students, about 50% of them had tried to inform and remind their friends and relatives about tobacco-related issues. Of course, what was evident here was that in all three areas studied (knowledge, attitude, and practice), PAD-helpers had been more successful and effective than non-PAD-Helpers.

There have been other studies in the field of educational interventions to control and reduce tobacco consumption in other countries (Brownson, Matson Koffman, Novotny, Hughes, & Eriksen, 1995; Gielen & Green, 2015; Murphy-Hoefer et al., 2005). Most of the studies conducted pointed out the important and effective role of educational interventions and their effectiveness to reduce smoking among students which yielded remarkable results.

Strengths and limitations

One of the limitations of this study was the method of self-reported data collection, which might have affected the results of the study and caused underreporting of smoking prevalence among students of course, this restriction may be more in the case of smoking, due to its greater social stigma compared to hookah.

Despite the mentioned limitations, according to the writers' knowledge, the PAD study with this method was the only study conducted to reduce smoking among students; one of the most important target groups for preventing smoking in society.

Conclusion

The present study, which was based on the second phase of the PAD project (Tobacco Use Prevention in Schools), proved successful with the measures and interventions it has taken to inform and empower students in the face of tobacco products. By training volunteer students named PAD-helpers, this project has been able to make changes, especially in the level of knowledge and attitude of the students towards tobacco and its negative consequences. Of course, unless the anti-smoking practices are institutionalized for the general public, one cannot hope for the realization of a tobacco-free society.

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Conflict of interest

The authors declared no conflict of interest.

Authors' contributions

Conceptualization, M. H; methodology, M. M. and M. H; data collection, F. A and V. R; writing original draft, V. R and M. H; Data analysis, F. A.

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