Iranian J Publ Health, Vol. 41, No.5, May 2012, pp.46-57

Original Article

Modeling the Underlying Predicting Factors of Tobacco Smoking among Adolescents

*M Asghari Jafarabadi [1], *H Allahverdipour [2], S Bashirian [3], A Jannati [4]*

1. *Injury Epidemiology and Prevention Research Center, Dept. of Statistics and Epidemiology, Faculty of Health and Nutrition, Tabriz University of Medical Sciences, Tabriz, Iran*
2. *Dept. of Health Education and Promotion, Faculty of Health and Nutrition, Tabriz University of Medical Sciences, Tabriz, Iran*
3. *Dept. of Public Health, Faculty of Health, Hamadan University of Medical Sciences, Hamadan, Iran*
4. *Dept. of Health Service Management, Faculty of Health and Nutrition, Tabriz University of Medical Sciences, Tabriz, Iran*

(Received 19 Sep 2011; accepted 14 Feb 2012)

Abstract

Background: With regard to the willing and starting tobacco smoking among young people in Iran. The aim of the study was to model the underlying factors in predicting the behavior of tobacco smoking among employed youth and students in Iran.

Methods: In this analytical cross-sectional study, based on a random cluster sampling were recruited 850 high school students, employed and unemployed youth age ranged between 14 and 19 yr from Iran. The data of demographic and tobacco smoking related variables were acquired via a self-administered questionnaire. A series of univariate and multivariate logistic regressions were performed respectively for computing un-adjusted and adjusted Odds Ratios utilizing SPSS 17 software.

Results: A number of 189 persons (25.6%) were smoker in the study and the mean smoking initiation age was 13.93 (SD= 2.21). In addition, smoker friend, peer persistence, leaving home, and smoking in one and six month ago were obtained as independent predictors of tobacco smoking.

Conclusions: The education programs on resistance skills against the persistence of the peers, improvement in health programs by governmental interference and policy should be implemented.

Keywords: Tobacco Smoking, Factors, Employed adolescences, Students, Iran

Introduction

Willingness and starting tobacco smoking among young people accompanied by its morbidity and mortality is one of the most worrisome aspects of smoking. Based on statistics from CDC, more than 80% of established adult smokers begin smoking before age 18 years. Based on CDC in 2009, 8.2% of middle school students and 23.9% of high school students reported current use of any tobacco product, and 5.2% of middle school students and 17.2% of high school students reported current use of cigarettes (1). If the trend in early initiation of cigarette smoking continues, approximately 5 million children aged <18 years who are living today will die prematurely because they began to smoke cigarettes during adolescence (2).

In Iran, the prevalence of the smoking was reported as 19.4% for youth in their lifetime (3) and

***Corresponding Author:** Tel: 0098411-3357580-2 (383), E-mail address: allahverdipourh@tbzmed.ac.ir

the prevalence was reported as 28.9% among students who somehow smoked (4). The rate of smoking was estimated as 92.5% among addict youth in Iran (5). Various figures from 14.2% to 39% of smoking prevalence have been reported from different areas of the world (6-21).

Tobacco smoking in adolescence and young is one of the gateways and pathways as well as familiarity to the consumption of substances such as heroin, opium, hashish, cocaine, and stimulant drugs. It has a very strong role in changing and predicting the behaviors associated with drug in future (22, 23). Tobacco smoking in adolescence and young and continuing it, also declines in physical and educational performance in students, in addition to the attenuation and increasing the chance of tobacco related disease in adulthood (4). In addition, teens that start smoking at age 16 would likely to continue for 16 and 20 years of smoking in boys and girls respectively (24).

Employed and unemployed young people are of the major risky population groups, exposed to high-risk behaviors which are unfortunately neglected in health related researches and preventive interventions. The employment rate of school-age youth is different in various communities. Mitchell (1921) pointed to the estimates about the employment of school-aged youth; at the age of 16 years, 75 percent of young people are doing a work type activity. This rate at the age between 14 and 15 varies between 1 and 6 to between 1 and 2 in young population (25). Half of people in age between 14 and 17 years have expressed the incidence of at least one damage caused by the work (26).

A study showed higher rate of drug consumption among employed students, compared to un-employed students (27). One third of young people have started smoking in the workplace (28). Although drug abuse in the workplaces can lead in threatening consequences for the health of this age group (29), they have been studied less with regard to drug abuse in young people. Hence, it seems necessary to study the underlying effective factors cause smoking with the aim of executing the prevention and control programs.

The aim of this study was to model the underlying factors in predicting the tobacco smoking among employed and unemployed youth and students in Iran.

Material and Methods

Study participants

This analytical study was performed cross-sectionally on the 14 to 18 years age high school students and employed and unemployed youth in the Hamadan City, Iran in 2008.

For sample size determination, the primary information for the prevalence of tobacco smoking in the youth estimated in a pilot study by 100 subjects randomly selected form the study population. By a primary analysis, the least value of the Odds Ratio (OR) for investigating the relationship was 1.35. Considering a 95% confidence level, 80% Power, and utilizing G-Power software, the sample size resulted to 375 cases, which multiplied, by design effect of 1.75 and considering 20% for dropout, finally the sample size of the study was estimated 850 cases form, which 760 questionnaires entered in the analysis.

The sampling scheme was cluster sampling which was performed in the first to fourth grade high school boy and girl students. For employed youth, the working places were chosen randomly and the data of the youth willing to incorporate in the study were gathered. In addition, for unemployed youth, in the same time of the presence of the students in the school, the data of the subjects who willing to incorporate in the study were gathered in the streets and parks. The adolescents had to have permission by their parents to incorporate in the study.

A proportion to size sample selection scheme was used; based on the 65% (60% boys), 20% and 15% distribution of the study population for students, employed and unemployed youth respectively, the samples was chosen. A number of 8 high schools were randomly chosen from the fourfold educational district of the Hamadan city, and in these schools students were selected based on stratified random sampling schedule, so that in each of four educational grades, 20 boy student

and 15 girl students were selected randomly and complete the checklist of the information. In addition, for employed and unemployed youth the sampling scheme was the convenience sampling procedure.

This study was conducted with approval from Hamadan University of Medical Sciences' Institutional Review Board. Informed assent and consent were obtained from participants and to increase the validity of the responses, efforts were made to guarantee complete anonymity.

The data of demographic and tobacco smoking related variables were gathered through a self-administered questionnaire.

Demographics

Background collected data included: age, gender, employment status (students; employee; unemployment), educational course (natural sciences; mathematics; human sciences; technical and occupational; work and knowledge; first grade high school student; pre university), living status (living with both parents; one parent; alone), number of siblings, father's and mother's age, father's and mother's job, history of failing in school (yes/no), history of truancy (yes/no), history of leaving home (yes/no).

Tobacco smoking Related Factors

In addition to demographic characteristics, survey instruments included several items that were specifically designed to capture the tobacco smoking related behaviors. History of tobacco smoking in the past month (yes/no), and six months (yes/no), Pattern of tobacco smoking (daily or occasionally), having parents who smoked (never; occasionally; always), having friends who smoked (never; occasionally; always), having friends who had experienced substance (never; occasionally; always), history of smoking ceasing (yes/no), peer pressure to smoke (yes/no), persuasion enticement from friends to tobacco smoke (yes/no). In addition, the participants were asked to report their motivation to begin tobacco smoking (sensation seeking, having smoker friends, to take pleasure in, and sense of need to smoking, not to recall problems). Smokeless tobacco is not common among Iranians, as a result, cigarettes smoking is the only method of tobacco use in Iran.

Statistical Analysis

All statistical analyses were performed by SPSS 17 Statistical Analysis (SPSS Inc., Chicago, IL). Data were presented by mean (SD) and frequency (percent) for quantitative and qualitative variables respectively. Tobacco smoking status considered as the dependent outcome of interest by coding one for smokers and coding zero for non-smokers. For investigating the relationship of the demographic and tobacco smoking related variables with this outcome a series of simple and multiple logistic regressions were performed in the context of univariate and multivariate analyses respectively for computing un-adjusted and adjusted Odds Ratios (ORs) and their 95% confidence intervals. In the univariate analyses, each (demographic or tobacco smoking related) variable were entered separately and in the next step for multivariate analyses, those variable entered which were significant in the univariate analyses. In addition in the final step a backward elimination multiple logistic regression was performed to find the set of best predictors of the tobacco smoking. *P*-values <0.05 considered to be as significant.

Results

Study participant characteristics

From all the subjects in the study a number of 537 persons (70.7%) were student, 161 persons (21.2%) were employed and the rest of them (8.2%) were Un-Employed. also from all participants recruited in the study 388 (51.1%) were boys (Table 1, in addition for other background characteristics) .

Tobacco smoking related variables

A number of 189 persons (25.6%) were smoker in the study and the mean smoking initiation age was 13.93 (SD= 2.21) in them. One hundred seventy four (23.8%) of subjects had fathers who were always smoker, 174 (23.8%) subjects had fathers who were occasionally smoker.

Table 1: Summary statistics for characteristics of study participants

Variables	Frequency	Percent
Employee Status		
Student	537	70.7
Employed	161	21.2
Un-Employed	62	8.2
Sex		
Boy	388	51.1
Girl	372	48.9
Major		
natural sciences	82	15.3
mathematics	81	15.1
human sciences	63	11.8
technical and occupational	71	13.2
work and knowledge	100	18.7
first grade high school student	99	18.5
other	40	7.5
Father's Job		
Worker	248	36.1
Employee	131	19.1
Free job	246	35.8
Retired	48	7.0
Unemployed	14	2.0
Mother's Job		
Housewife	630	89.0
Employed	78	11.0
Living Status		
Both parents	695	92.1
Father	9	1.2
Mother	44	5.8
Alone	7	.9
Age #	16.72 (1.15)	
Father Age #	47.90 (7.38)	
Mother Age #	41.79 (6.25)	
Sister No #	1.59 (1.22)	
Brother No #	1.61 (1.26)	

For These variables, Mean (Std. Deviation) is reported

Table 2: Summary statistics for tobacco smoking related characteristics

Variables	Fre-	Per-
Tobacco smoking		
No	549	74.4
Yes	189	25.6
Smoker Father		
Always	174	23.8
Occasionally	174	23.8
Never	384	52.5
Smoker Friend		
Always	52	6.9
Occasionally	237	31.3
Never	468	61.8
Substance - User Friend		
Always	7	.9
Occasionally	73	9.8
Never	668	89.3
Persuasion		
No	520	69.0
Yes	234	31.0
Peer pressure		
No	574	85.2
Yes	100	14.8
Leaving Home		
No	607	80.7
Yes	145	19.3
Truancy		
No	360	49.1
Yes	373	50.9
Enjoy Smoking		
Yes	67	35.4
No	74	39.2
Somehow	48	25.4
Consumption Rate		
Daily	20	12.3
Occasionally	142	87.7
Motivation		
Sense of need	24	12.1
Take Pleasure	40	20.1
Decreasing Pressures	43	21.6
Smoker Friends	10	5.0
Reject-Inability	62	31.2
Sensation seeking	15	7.5
not recall	5	2.5
Smoking during one month		
No	539	85.8
Yes	89	14.2
Smoking during six month		
No	498	79.3
Yes	130	20.7
Leaving Smoking		
No	85	54.1
Yes	72	45.9
Smoking Initiation Age #	13.93 (2.21)	

For this variable, Mean (Std. Deviation) is reported

A number of 52 subjects (6.9%) had always smoker friends and 237 (31.3%) of subjects had occasionally smoker friends and the seven (0.9%) and 73 (9.8%) of the subjects had always and occasionally substance- user friends respectively. A total of 234 persons (31.0%) and 100 persons (14.8%) had persuasion and persistence to smoke by their friends. One hundred forty five (19.3%) and 373 (50.9%) of the subjects had the habit of leaving home and truancy, respectively. In the smoker subjects, 67 (35.3%) and 49 (25.8%) of the subjects enjoyed and somehow enjoyed from smoking respectively and in these subjects the consumption rate was 12.3% in daily smoking and the rest somehow smoking. The most frequent Motivation (31.2%) for smoking was Reject-Inability and also, Sense of Need, Taking Pleasure, Decreasing Pressures, Smoker Friends, and Sensation seeking was the reason for 12.1%, 20.1%, 21.6%, 5.0%, and 7.5% of the smoker subject and the rest of them (2.5%) have not recall the reason. Since one month ago and six month ago 89 (14.2%) and 130 (20.7%) of the subjects have already smoked, respectively. Of the smokers' subjects, 72 persons (45.9%) had already tried to leave the smoke (Table 2).

Relationship of participant characteristics with tobacco smoking

Based on the results of simple logistic regression (Un-adjusted OR's) for participant characteristics, employee status, age and sex were significantly related to tobacco smoking (All $P<0.05$); Unemployed and employed youth respectively had 55% more and 2.43 times the odds of smoking than students, with an increase of age in one year the odds of smoking increased by 27% and Boys had 2.45 times more than girls the odds of smoking. These variables were candidate as to enter in the multivariate analysis. However, none of the above-mentioned variables were significant in the multivariate analysis (All $P>0.05$) (Table 3).

Relationship of smoking related characteristics with tobacco smoking

Based on the results of simple logistic regression (Un-adjusted OR's) for smoking related characteristics, smoker father, smoker friend, substance-user friend, suggestion, persist, leaving home, truancy, smoking in one and six month ago were significantly related to smoking (All $P<0.05$); These variables were candidate as to enter in the multivariate analysis.

However, of the above mentioned variables, smoker friend, substance-user friend, persist and smoking in six month ago, were significant in the multivariate analysis (All $P<0.05$). Based on these results, subjects with always and occasionally smoker friends had smoking odds of 5.28 and 2.92 times compared to never smoker friends respectively. Subjects with peer pressure had smoking odds of 2.64 times versus without pressure. Persons who had smoked during six month ago, had smoking odds of 19.48 times compared with those who had not smoking during six month ago (Table 4).

In addition, a backward elimination modeling leads to a model with smoker friend, persist, leaving home and smoking in one and six month ago variables which were significant in the analysis (All $P<0.05$).

Table 3: Results of logistic regression for un-adjusted and adjusted Odds Ratios (ORs) for participant characteristics

	Un-Adjusted				Adjusted			
Variables	**OR**	**Lower**	**Upper**	**P-Value**	**OR**	**Lower**	**Upper**	***P*- value**
Employee Status								
Un-Employed	1.55	1.04	2.31	.030	3.13	0.89	11.03	.076
Employed	2.43	1.40	4.20	.002	1.94	0.51	7.34	.331
Student	Referent	----	----	----	Referent	----	----	----
Age (yr)	1.27	1.10	1.48	.002	1.06	0.81	1.38	.668
Sex								
Boy	2.45	1.73	3.46	<0.001	1.03	0.53	1.99	.937
Girl	Referent	----	----	----	Referent	----	----	----
Major								
natural sciences	0.72	0.31	1.67	.439	----	----	----	----
mathematics	0.50	0.21	1.22	.129	----	----	----	----
human sciences	0.57	0.23	1.44	.236	----	----	----	----
technical and occupational	0.42	0.16	1.10	.078	----	----	----	----
work and knowledge	0.98	0.44	2.19	.962	----	----	----	----
first grade high school student	0.61	0.27	1.42	.253	----	----	----	----
other	Referent	----	----	----	Referent	----	----	----
Father Age	1.03	1.01	1.04	.007	1.01	0.97	1.04	.665
Mother Age	1.03	1.00	1.05	.044	1.00	0.96	1.05	.981
Father's Job								
Worker	.93	.28	3.05	.898	----	----	----	----
Employee	.86	.25	2.93	.808	----	----	----	----
Free job	.87	.26	2.86	.813	----	----	----	----
Retired	.83	.22	3.15	.788	----	----	----	----
Unemployed	Referent	----	----	----	----	----	----	----
Mother's Job								
Housewife	.867	.508	1.481	.602	----	----	----	----
Employed	Referent	----	----	----	----	----	----	----
Sister No	1.12	0.97	1.28	.117	----	----	----	----
Brother No	1.12	0.98	1.28	.098	----	----	----	----
Living Status								
Both parents	1.37	0.15	12.37	.777	----	----	----	----
Father	1.14	0.08	16.95	.923	----	----	----	----
Mother	1.60	0.16	15.82	.688	----	----	----	----
Alone	Referent	----	----	----	----	----	----	----

OR: Odds ratio
Lower: Lower Bound for 95% C.I. for OR
Upper: Upper Bound for 95% C.I. for OR
Hosmer and Lemeshow Test showed an acceptable of model fit (Chi-square (8) = 7.454, *P*-Value = .489)
A total of 86.8% of subjects were correctly classified

Table 4: Results of logistic regression for un-adjusted and adjusted Odds Ratios (ORs) for tobacco smoking related variables

	Un-Adjusted				Adjusted			
Variables	**OR**	**Lower**	**Upper**	**P-Value**	**OR**	**Lower**	**Upper**	***P*-Value**
Smoker Father								
Always	1.94	1.29	2.93	.001	1.11	0.55	2.26	.773
Occasionally	1.91	1.27	2.87	.002	1.86	0.91	3.78	.087
Never	Referent	----	----	----	Referent	----	----	----
Smoker Friend								
Always	7.79	4.18	14.52	<0.001	5.28	1.62	17.18	.006
Occasionally	7.96	5.38	11.77	<0.001	2.92	1.43	5.97	.003
Never	Referent	----	----	----	Referent	----	----	----
Substance - User Friend								
Always	2.85	0.63	12.89	.174	0.05	0.00	0.65	.022
Occasionally	7.60	4.49	12.85	<0.001	1.12	0.43	2.89	.814
Never	Referent	----	----	----	Referent	----	----	----
Persuasion								
Yes	9.85	6.76	14.37	<0.001	1.93	0.90	4.13	.089
No	Referent	----	----	----	Referent	----	----	----
Peer Pressure								
Yes	8.01	5.03	12.76	<0.001	2.64	1.13	6.18	.025
No	Referent	----	----	----	Referent	----	----	----
Smoking Initiation Age	1.05	0.82	1.33	.708	----	----	----	----
Leaving Home								
Yes	4.21	2.87	6.19	<0.001	1.82	0.92	3.58	.084
No	Referent	----	----	----	Referent	----	----	----
Truancy								
Yes	2.69	1.88	3.85	<0.001	1.26	.68	2.34	.459
No	Referent	----	----	----	Referent	----	----	----
Motivation								
Sense of need	2.75	0.20	38.01	.450	----	----	----	----
Take Pleasure	1.75	0.16	18.97	.645	----	----	----	----
Decreasing Pressures	1.09	0.11	11.15	.940	----	----	----	----
Smoker Friends	-----	-----	-----	.999	----	----	----	----
Reject-Inability	1.96	0.19	20.15	.570	----	----	----	----
Sensation seeking	1.62	0.11	22.98	.719	----	----	----	----
not recall	Referent	----	----	----	----	----	----	----
Smoking during one month ago								
Yes	40.31	18.90	85.95	<0.001	3.13	0.98	10.00	.055
No	Referent	----	----	----	Referent	----	----	----
Smoking during six month ago								
Yes	37.85	21.45	66.80	<0.001	19.48	7.89	48.10	<0.001
No	Referent	----	----	----	Referent	----	----	----
Leaving Smoking								
Yes	1.15	0.46	2.91	.767	----	----	----	----
No	Referent	----	----	----	----	----	----	----

OR: Odds ratio
Lower: Lower Bound for 95% C.I. for OR
Upper: Upper Bound for 95% C.I. for OR
Hosmer and Lemeshow Test showed a acceptable of model fit (Chi-square (8) = 7.454, *P*-Value = .489)
A total of 86.8% of subjects were correctly classified

Discussions

This study demonstrated the prevalence and predictive ability of some demographic and tobacco smoking related characteristics with smoking among employed youth and students in Hamadan in 2008. In this study about 25.6% smokers were found which is compatible with some studies (6, 10, 15, 19), higher than that of other studies (8, 11, 13, 14, 16), and lower than reported by some other studies (7, 9, 12, 17, 18, 20, 21).

The results showed that smoker friend, persist, leaving home and smoking in one and six month ago, variables were obtained as independent predictors of smoking in this study. Subjects with always and occasionally smoker friends had smoking odds of 2.46 and 3.83 times compared to never smoker friends, respectively. Subjects with peer pressure had smoking odds of 3.47 times versus without pressure. Those youth who had leaving home, had 2.34 times odds of smoking than those without leaving home. Persons who had smoked during one and six month ago, had smoking odds of 16.79 and 7.06 times compared with those who had not smoking during one and six month ago (Table 5). These results have been supported by other studies (9-15, 17, 19, 21, 30-32).

Table 5: Results for multiple logistic regressions Analysis of study variables based on Backward LR procedure

	OR	Lower	Upper	*P*-Value
Smoker Friend				
Always	2.46	.73	8.31	.149
Occasionally	3.83	2.05	7.15	<0.001
Never	Referent	----	----	----
Peer Pressure				
Yes	3.47	1.54	7.82	.003
No	Referent	----	----	----
Leaving Home				
Yes	2.34	1.18	4.62	.015
No	Referent	----	----	----
Smoking during six month ago				
Yes	16.79	6.51	43.28	<0.001
No	Referent	----	----	----
Smoking during one month ago				
Yes	7.06	1.70	29.29	.007
No	Referent	----	----	----

OR: Odds ratio
Lower: Lower Bound for 95% C.I. for OR
Upper: Upper Bound for 95% C.I. for OR
Hosmer and Lemeshow Test showed a acceptable of model fit (Chi-square (4) = 9.343, *P* = .053)
A total of 87.1% of subjects were correctly classified

The persistence of peers and advising smoking to the friends is one of the most important risk factors predisposing to the smoking experience and in the next stages substance abuse among youth. Compared to the other age periods, young people are more and more under the influence and persistence of peers. In this regards, training the skills of "saying no" against the persistence of the peers have an important role in the prevention of substance usage. There are several studies in the field of substance abuse prevention which emphasis on dealing with peer pressure (33-35).

However, at a young age to ensure maximum effectiveness the implementation of the programs of

abuse prevention in the transitional period, and especially before the transitional period and continuing it in the transitional period is more essential. Therefore, the design and evaluation of abuse prevention approaches should focused on adolescence and youth as the most vulnerable risk groups. Schools as the first places where their focus is youth should be used for prevention programs; positive teacher-relationships would reduce the risk of daily smoking (32, 36). In addition the program should not be unaware and possibly ignore the population of young people who drop out or are excluded from the study by any reason since they are much higher vulnerable and at risk than students. However, schools should accept their important and critical role in developing and enhancing students' social (37) and life skills (38) in addition to formal training and with an improvement in health programs by the interference of ministry of education and ministry of health and medical education to prevent the increasing prevalence of the abuse.

On the other hand, some disciplines and suitable regulations should be provided for regular attendance of students in schools to leave little opportunities for them to have unwarrantable absence in the school (37, 39).

In Botevin (2000) theory (33), according to the complex nature of drugs, all abuse prevention programs designed for youth, in addition to the emphasis on individual approaches in school-based programs, should be combined with prevention approaches based on social influences (40-42) environmental factors, demographic factors (10), Life Skill training (38) and policy (43) such as reducing tobacco use in movies (44, 45), should be implemented to achieve the maximum effectiveness.

Obviously, with considering all young people of school age, especially those who are out of school for any reason, the health providers should concentrate on social inoculation strategies (46, 47).

Finally, the data were collected from youths in Hamadan city who might not be representative of all youths in our country. This was one of limitation of our study. Youths who have dropped out of school are more likely to smoke than youths who are in school, which this issue has not been considered in our study. As another limitation in this study, response and recall bias might have been introduced because the data are self-reported. One possible reason for non-significancy of the big ORs, for example in the “Employee Status”, is the decreased sample size in the multivariate analysis because of the simultaneous occurring of missing values in the variables entered in the model. This was another limitation of the study.

In addition, understanding the trends in the prevalence of cigarette smoking among youths enables policy makers to target prevention resources more effectively. Longitudinal studies are needed to encompass this aim.

Willing of youths to experience cigarette use as an important indicator of the effectiveness of tobacco control policies should be evaluated in Iranian population. With this regard, the health promotion plans should be focused on making negative social imaginations of tobacco smoking behaviors (48, 49). In addition, changes in social norms, behavioral intention, behavioral control, perceived severity and susceptibility (50, 51) attitude toward and intention to smoking might help fewer tobacco uses among youths, which can be evaluated and planned in a series of studies.

In addition further efforts are needed to decrease tobacco use among youths; restrictions on advertising, promotion, and availability of tobacco products to youths and tobacco tax increases, graphic health warnings on cigarette packages and in advertisements and restrict access to tobacco by youths, should be combined with full implementation of evidence-based, communitywide, comprehensive tobacco control policies.

Ethical considerations

Ethical issues (Including plagiarism, Informed Consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc) have been completely observed by the authors.

Acknowledgments

The valuable contribution of Hamadan University of Medical Sciences in this study is greatly appreciated. The authors declare that there is no conflict of interests.

References

1. Centers for Disease Control and Prevention (CDC) (2010). Tobacco Use Among Middle and High School Students ,United States, 2000-2009. *Weekly*,59(33): 1063-8.
2. Centers for Disease Control and Prevention (CDC) (2001). Youth tobacco surveillance--United States, 2000. *MMWR CDC Surveill Summ*, 50(4): 1-84.
3. Ayatollhi A, Mohammadpoorasl A, Rajaeefard AR (2005). Predicting the three stages of smoking acquisition in the male students of Shiraz's high schools, 2003. *Med J TBZ Univ Med Sciences*, 64: 10-5.
4. Heidari GR, Amini S, Maleki E, Hosseini M, Masjedi R (2005). Prevalence of light smoking and attitudes and knowledge of smokers toward that in Tehran in 2003. *J Med Coun IR Iran*, 24 (3): 224-31.
5. Farhadinasab A, Allahverdipour H, Bashirian S, Mahjoub H (2008). Lifetime Pattern of Substance Abuse, Parental Support, Religiosity, and Locus of Control in Adolescent and Young Male User. *Iranian J Public Health*, 37(4): 88-95.
6. Bonet de Luna C, López Giménez R (1993). Alcohol and tobacco consumption of middle school students in the municipality of Madrid [Article in Spanish]. *An Esp Pediatr*, 38(1): 49-53.
7. Daszenies C, Covacevich C (1999). Smoking among high school students in a rural community of Chiloé (Article in Spanish). *Rev Med Chil*, 127(1): 38-43.
8. Deressa W, Azazh A (2011). Substance use and its predictors among undergraduate medical students of Addis Ababa University in Ethiopia. *BMC Public Health*, 22(11): 660.
9. El Mhamdi S, Wolfcarius-Khiari G, Mhalla S, Ben Salem K, Soltani SM (2011). Prevalence and predictors of smoking among adolescent schoolchildren in Monastir, Tunisia. *East Mediterr Health J*, 17(6): 523-8.
10. Gaeta G, Del Castello E, Cuomo S, Effuso L, Pirera M, Boccalatte A (1998). Personal, familial and environmental factors influencing the inclination of smoking in adolescents: differences between sexes and between city and small-town dwellers (Article in Italian). *Cardiologia*, 43(4): 417-26.
11. Harrabi I, Chahed H, Maatoug J, Gaha J, Essoussi S, Ghannem H (2009). Predictors of smoking initiation among schoolchildren in Tunisia: a 4 years cohort study. *Afr Health Sci*, 9(3): 147-52.
12. Kwamanga DH, Odhiambo JA, Amukoye EI (2003). Prevalence and risk factors of smoking among secondary school students in Nairobi. *East Afr Med J*, 80(4): 207-12.
13. Maziak W, Mzayek F (2000). Characterization of the smoking habit among high school students in Syria. *Eur J Epidemiol*,16(12): 1169-76.
14. Muula AS (2007). Prevalence and determinants of cigarette smoking among adolescents in Blantyre City, Malawi. *Tanzan Health Res Bull*, 9(1): 48-51.
15. Ogwell AE, Aström AN, Haugejorden O (2003). Socio-demographic factors of pupils who use tobacco in randomly-selected primary schools in Nairobi province, Kenya. *East Afr Med J*, 80(5): 235-41.
16. Pinilla J, González B, Barber P, Santana Y (2002). Smoking in young adolescents: an approach with multilevel discrete choice models. *J Epidemiol Community Health*, 56(3): 227-32.
17. Rigotti NA, Lee JE (2000). Wechsler HUS college students' use of tobacco products: results of a national survey. *JAMA*, 284(6): 699-705.
18. Salehi SO, Elder NC (1995). Prevalence of cigarette and smokeless tobacco use among students in rural Oregon. *Fam Med*, 27(2): 122-5.
19. Slama K, David-Tchouda S, Plassart JM (2009). Tobacco consumption among young adults in the two French departments of Savoie in 2008 [Article in French] *Rev Epidemiol Sante Publique*, 57(4): 299-304.
20. Valdivia G, Simonetti F, Cumsille P, Ramírez V, Hidalgo CG, Palma B, et al (2004).

Smoking habit in school age children, in Chile (Article in Spanish). *Rev Med Chil*, 132(2): 171-82.
21. Yang G, Ma J, Chen AP, Brown S, Taylor CE, Samet JM (2004). Smoking among adolescents in China: 1998 survey findings. *Int J Epidemiol*, 33(5): 1103-10.
22. Pierce J, Gilpin E, Choi W (1999). Sharing the blame: smoking experimentation and future smoking-attributable mortality due to Joe Camel and Marlboro advertising and promotions. *Tob Control*,8(1): 37-44.
23. Pumariega AJ, Kilgus MD, Rodriguez L (2005). Adolescents. In: *Substance Abuse: A Comprehensive Textbook*. Eds, Lowinson JH, Ruiz P, Millman RB and Langord JG. 4th ed, Lippincott William & Wilkins. Philadelphia, pp. 1021-1036.
24. Breslau N, Peterson EL (1996). Smoking cessation in young adults: age at initiation of cigarette smoking and other suspected influences. *Am J Publ Health*, 86: 214-20.
25. Mitchell HM (1921). The need for special health protection of employed adolescents. *Am J Publ Health*, 11(11): 973-8.
26. Dunn KA, Runyan CW, Cohen LR, et al. (1998). Teens at work: A statewide study of jobs, hazards, and injuries. *J Adolescents Health*, 22: 19-25.
27. Wu LT, Schlenger WE, Galvin DM (2003). The relationship between employment and substance abuse among students aged12 to 17. *J Adolescent Health*, 32: 25-15.
28. Borland R, Chapman S, Owen N, Hill D (1990). Effects of workplace smoking bans on cigarette consumption. *Am J Public Health*, 80(2): 178-80.
29. Institute of Medicine (1998). Protecting youth at work:health, safety, and development of working childeren and adolescents in the united states, (chapter 2 and 7). Washingthon DC: Committee on the health and safety implicatios of child labor. *National Research Council and Institute of Medicine*.
30. Al-Naggar RA, Al-Dubai SA, Al-Naggar TH, Chen R, Al-Jashamy K (2011). Prevalence and of smoking and associated factors among Malaysian University students. *Asian Pac J Cancer Prev*,12(3): 619-24.
31. Gaeta G, Del Castello E, Cuomo S, Effuso L, Boccalatte A (1998). Family and friends who smoke: influence on adolescents [Article in Italian]. *G Ital Cardiol*, 28(3): 259-66.
32. Perra O, Fletcher A, Bonell C, Higgins K, McCrystal P (2011). School-related predictors of smoking, drinking and drug use: Evidence from the Belfast Youth Development Study. *J Adolesc* 35(2):315-24.
33. Botvin GJ (2000). Preventing drug abuse in schools: social and competence enhancement approaches targeting individual-level etiologic factors. *Addict Behav*, 25(6): 887-97.
34. Hawkins JD, Catalano RF, Miller JY (1992). Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: Implications for substance abuse prevention. *Psychol Bull*, 112: 64-105.
35. Sawadi H (1999). Individual risk factors for adolescence substance use. *Drug Alcohol Depen*,55: 209-24.
36. Fletcher A, Bonell C, Hargreaves J (2008). School effects on young people's drug use: a systematic review of intervention and observational studies. *J Adolesc Health*, 42(3): 209-20.
37. Bond L, Butler H, Thomas L, Carlin JB, Glover S, Bowes G, et al. (2007). Social and school connectedness in early secondary school as predictors of late teenage substance use, mental health and academic outcomes. *J Adolesc Health*,40: e9-e18.
38. Botvin GJ, Eng A, Williams CL (1980). Preventing the onset of cigarette smoking through Life Skills Training. *Prev Med*,9: 135-43.
39. Bonny AE, Britto MT, Klostermann BK, Hornung RW, Slap GW (2000). School disconnectedness: identifying adolescents at risk. *Pediatrics*,106: 1017-21.
40. Arkin RM, Roemhild HJ, Johnson CA, Luepker RV, Murray DM (1981). The Minnesota smoking prevention program. *J School Health*, 51: 616-61.
41. Donaldson SI, Graham JW, Hansen WB (1994). Testing the generalizability of intervening mechanism theories. *J Behav Med*,17:195-216.
42. Sussman S, Dent CW, Stacy AW, Sun P (1993). Project Towards No Tobacco Use. *Am J Publ Health* ,83: 1245-50.
43. Moore L, Roberts C, Tudor-Smith C (2001). School smoking policies and smoking pre-

valence among adolescents: multilevel analysis of cross-sectional data from Wales. *Tob Control*, 10(2): 117-23.
44. Centers for Disease Control and Prevention (CDC) (2011). Smoking in Top-Grossing Movies, United States, 2010. *Weekly*, 60(27): 909-3.
45. Choi K, Forster JL, Erickson DJ, Lazovich D, Southwell BG (2011). Prevalence of smoking in movies as perceived by teenagers longitudinal trends and predictors. *Am J Prev Med*, 41(2): 167-73.
46. Bonell C, Fletcher A, McCambridge J (2007). Improving school ethos may reduce substance misuse and teenage pregnancy. *Brit Med J*,334: 614-6.
47. Thomas R, Perera R (2006). School-based programmes for preventing smoking. *Cochrane DB Syst Rev*, 19(3).
48. Gibbons FX, Gerrard M, Blanton H, Russell DW (1998). Reasoned Action and Social Reaction: Willingness and Intention as Independent Predictors of Health Risk. *J Pers Soc Psychol* 74(5): 1164-80.
49. Piko BF, Bak J, Gibbons FX (2007). Prototype perception and smoking: Are negative or positive social images more important in adolescence? *Addict Behav*, 32: 1728-32.
50. Rahimi Movaghar A (1986). Prevention of Addiction. Prevention Deputy of Welfare Organization [in Persian].
51. Weinstein ND (1987). Unrealistic optimism about susceptibility to health problems: conclusions from a community-wide sample. *J Behav Med*,10: 481-500.