ORIGINAL REPORT

Smoking Stages in an Iranian Adolescent Population

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Abstract- The aim of this study is determining the prevalence of smoking stages in adolescents of Tabriz city (northwest of Iran) and identifying the personal, environmental, and psychological factors relating to cigarette smoking. Fifty-seven high schools were randomly selected, and 4903 students were completed a self-administered questionnaire about cigarette smoking and the related risk factors. The association of independent variables with cigarette smoking was evaluated using the ordinal logistic regression model. In total, 17.3% of the participants were experimenters (95% CI: 15.8-18.9) and 5.0% were regular smokers (95% CI: 3.7-6.2). The results showed that the male gender (OR=2.92; CI: 1.94-4.77), age (OR=1.27; CI: 1.02-1.64), having general risk taking behavior (OR=1.50; CI: 1.02-2.21), presence of a cigarette smoker in the family (OR=1.78; CI: 1.23-2.54), friendship with close cigarette smoker friends (OR=2.52; CI: 1.65-3.86), substance abuse experience (OR=8.27; CI: 2.61-25.61), attitude toward cigarette smoking (OR=1.22; CI: 1.10-1.27) and positive thinking about cigarette smoking (OR=1.05; CI: 1.01-1.14) are associated to cigarette smoking in adolescents. The cigarette smoking prevalence is minimal in Tabriz city adolescents, especially in girls; but the experimenter prevalence is considerable. Findings of this study justifies adopting more serious measures in the pre-adolescence and adolescence period.

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Introduction

Cigarette smoking is one of the most important public health problems, recognized as a significant preventable risk factor of premature deathes (1). One of the priorities of public health for decreasing the prevalence of the cigarette smoking is preventing the adolescents of becoming smokers. A good argument in favour of preventing the adolescents from cigarette smoking is that if smoking is not started in adolescence period, there is lower probability for an individual to become a cigarette smoker (2); on the other hand, the probability of quitting smoking in adults is inversely related to the beginning age of smoking (3). Also, non-recurring experience of cigarette smoking in adolecence considerabely increases the risk of becoming a smoker in adult life (4). Hence, to decrease the prevalence of cigarette smoking, focusing preventive and control measures in this age group will be effective.

Different studies have shown that the beginning age of cigarette smoking both in developed and in developing countries is decreasing (5). Prevalence of cigarette smoking in adolescents of western countries is about 25%, but as it is shown, it has been decreasing since 1990s (6-8). In Iran, the prevalence of cigarette smoking among the adolescents has been reported about between 2.5 to 17% (9-15). Such a broad range is primarily due to the variety of the definition of "being a smoker", the age difference of the samples under study and the location where such studies have been undertaken.

Cigarette smoking in adolescents is a complicated behavior, connected with different environmental-social (cultural, familial, peers, etc.) and personal factors (1,2,9,10,16,17). Besides, some risk factors can produce various effects in different environments (18). Therefore, the factors relating to the cigarette smoking stages must be studied in each specific society, so that

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the preventive and control measures can be planned considering the risk factors and the extent of the problem.

Considering the lack of information about the cigarette smoking stages in Iranian adolescents, a longitudinal study is currently in progress aiming at determining different stages of cigarette smoking and the predictors of transition between different stages. The present paper from the first phase of this comprehensive longitudinal study deals with the prevalence of different stages of cigarette smoking in adolescents and the related personal-environmental and psychological factors.

Materials and Methods

Study population

At first, based on the school type, the high schools of Tabriz city in each region (both genders) were classified to public school, private school, technical and vocational training school and Work-Knowledge schools. Next, 57 high schools (25 and 32 boys' and girls' high schools respectively) were randomly selected and with considering the school type, the number of students in each school and the education major, 196 classes (82 and 114 boys and girls classes respectively) were randomly selected as clusters and all students of these classes were intered into the study. The total number of the students in the selected classes was 5106 who participated in completing a self-administered multiple choice questionnaire. For the purpose of facilitating follow up of the students in the next stage of the study, the sample included only the 10th grade students.

The respondents were ensured about the voluntary nature of participating in the study and confidentiality of the information before distributing the questionnaire; also they were asked not to enter their personal information in the questionnaire. This study and the relating questionnaire have been approved by the East Azarbaijan Province Education Organization and Ethics Committee of Tabriz University of Medical Sciences.

Data collection tools

The questions had been designed for investigating the demographical characteristics, socio-economical information, cigarette smoking behavior, general risk taking behavior, substance abuse, cigarette smoking norms of the family and friends, self-esteem, attitude towards cigarette smoking as well as positive thinking about cigarette smoking. For the purpose of measuring the content validity of the questionnaire, it was sent to 5 content experts in cigarette smoking and adolescents fields, 6 methodology experts in questionnaire field, 4 education experts and teachers involved in students' training and consultation issues and 5 lay expert (alert students), together with a response form for their quantitative views regarding the relevance and clarity of the mentioned form. The mean percentage of questionnaire relevancy for experts and lay experts was 94% and 98%, respectively. The mean clarity percent of the experts and lay experts were obtained 78% and 93%, respectively. For measuring the reliability of the measurements, the questionnaire was presented twice with a two- weeks interval to a small sample of the students (n=23) and the internal consistency (Cronbach's alpha) and reliability was determined. Also, for determining the reliability of the cigarette smoking stages, the related part of the questionnaire was presented twice with a two-week interval to sample of 154 students and the Intra-class correlation coefficient of 0.929 (CI95%: 0.903-0.948) was obtained.

In this study, the cigarette smoking stages were measured by using a valid algorithm and the prevalence of the stages were calculated according to data in Table 1. However, to consider the factors relating to cigarette smoking, the respondents were classified in three stages of cigarette smoking continuum according to the Kaplan *et al.* (16) as represented below:

1. Never Smoker: adolescents who have never smoked (even a puff)
2. Experimenter: adolescents who have tried the cigarette (even a puff), but have smoked less than 100 cigarettes in lifetime.
3. Regular smoker: adolescents who have smoked 100 cigarettes and more in lifetime, without considering their present consumption.

The general risk taking behavior was measured in a similar way as Kaplan *et al.* (16), using the question "Do you enjoy doing a little risky actions?" with "Yes" and "No" response.

Self-esteem was measured using the Rosenberg 10-item questionnaire. It has been constructed in 1965 (19) and has been used in numerous studies. Each of these 10 questions assigns a score 1 to 4. The answer choices of these questions include "completely agree", "agree", "disagree" and "completely disagree", assigning the scores 1 to 4 to themselves respectively. Half of the questions were "positive" and another half was "negative", each scored using its special method. The self-esteem scores range from 10 to 40, in which the lower scores show higher self-esteem.

Table 1. Definations of smoking acquisition stages and cessation stages.

Smoking Acquisition Stage	Definition
Committer	Never smoked and Sure never start smoking
Immotive	Never smoked and Have not planning to start smoking in the next 5years
Progressive	Never smoked and Have planning to start smoking in the next 5 years, but not within next six months
Contemolator	Never smoked and Have planning to start smoking in the next six months
Preparatory	Never smoked and Have planning to start smoking in the next month
Tried	Tried only a puff or one-two cigarettes. Has not smoked in lastMonth.
Exprementer	Smoked more than two cigarettes but less than 100 cigarettes in life time. Has not smoked in lastWeek and probably in last month.
Regular Smoker	Smoke occasionally, at least monthly;And more than 100 cigarette in life time. has smoked probably in last week.
Established/Daily Smoker	Smoke daily or almost every day. Hase smoked in last week.
Cessation Stages	
Precontemplation	Not thinking about quitting in the next 6 months.
Contemplation	Thinking about quitting in the next 6 months.
Preparation	Tried to quit within the last 6 months and thinking about quitting in the next 30 days.
Action	Had quit smoking within the last 6 months.
Maintenance	Had quit smoking more than 6 months ago.

The Pearson correlation coefficient of self-esteem of 23 students with a two-week interval was 0.80 and the Cronbach's alpha coefficient for the internal consistency of the measurement was obtained 0.81.

The attitude toward smoking among the students was measured through 6 questions similar to Hill *et al.* (20); accordingly, 6 pairs of bipolar answers were introduced for the question "I think that for me, to smoke cigarettes is …." as follows: "disagreeable–agreeable, bad–good, annoying–interesting, unpleasant–pleasant, unhealthy–healthy, and disadvantageous–advantageous". For translating the mentioned words into Persian, our attempt was made to use the words that students usually use; that is, the said uncompleted sentence was written on whiteboards in 4 classes (116 students in total) and the students were asked to complete the above sentence at least using 3 words. Every pairs of the words was considered as a separate question and the score of each question was ranked between +2 to -2. For example, "very pleasant" was scored as +2, "pleasant" as +1, "unpleasant" scored as -1 and "very unpleasant" got -2. On the whole, the attitude toward smoking for every student is composed of total sum of these scores, range between -12 to +12. The Pearson correlation coefficient of attitude toward smoking scores of 23 students within a two-week interval was 0.78 and the Cronbach's alpha coefficient was obtained 0.89.

The cigarette smoking norm regarding the students' opinion about their relatives' (father, mother, brother and sister) and the closest friend's reaction about their smoking, were assessed by 5 similar questions. If you lit up a cigarette in front of your father/ mother/ brother/ sister/ closest friend, how do you think he/or she would react? Two severe and mild reactions were considered for the questions.

Positive thinking to cigarette smoking was measured through asking 5 questions. These questions asked about positive effects of the cigarette smoking (increasing concentration, decreasing the anger, decreasing the sorrow, sign of maturity, and sign of independence). The answers for each question included "completely agree", "agree", "no idea", "diagree", "completely disagree" which assigned the scores 5 to 1. So the range of this measure was between 5 to 25, which the higher scores indicated more positive attitude toward cigarette smoking. In a pilot sample of 23 students, the Cronbach's alpha coefficient for the internal consistency was 0.84 and the Pearson correlation coefficient for reliability of the measurement within a two-week interval was obtained 0.88.

Socio-economic status of the samples was built using the father education, mother education, the family assets, and the family income. Considering the high correlation between such variables, this variable was built using the principal component analysis for preventing from co-linearity in the model. Using this variable, the students were classified in one of the five socio-economic status levels of very high, high, middle, lower, and much lower.

Table 2. Prevalence of smoking acquisition and cessation stages by gender.

Stages	Boys n (%)	Girls n (%)	Total n (%)	Total standardized prevalence % (95% CI)
Smoking acquisition stage				
Committer	1353 (64.5)	2318 (83.5)	3671 (75.3)	73.7 (71.4-76.1)
Immotive	57 (2.7)	48 (1.7)	105 (2.2)	2.2 (1.7-2.7)
Progressive	19 (0.9)	40 (1.4)	59 (1.2)	1.1 (0.8-1.5)
Contemplator	2 (0.1)	8 (0.3)	10 (0.2)	0.2 (0.1-0.3)
Preparatory	2 (0.1)	19 (0.7)	21 (0.4)	0.4 (0.2-0.6)
Tried	320 (15.2)	290 (10.5)	610 (12.5)	12.9 (11.8-14.0)
Exprementer	152 (7.2)	39 (1.4)	191 (3.9)	4.4 (3.6-5.2)
Regular smoker	51 (2.4)	5 (0.2)	56 (1.1)	1.3 (0.9-1.7)
Established/Daily smoker	77 (3.7)	6 (0.2)	83 (1.7)	2.0 (1.3-2.7)
Ex-smoker	66 (3.1)	2 (0.1)	68 (1.4)	1.6 (1.1-2.2)
Total	2099 (43.1)	2775 (56.9)	4874 (100)	100 (-)
Smoking cessation stages				
Precontemplation	29 (14.9)	5 (38.5)	34 (16.4)	16.0 (10.7-21.3)
Contemplation	31 (16.0)	1 (7.7)	32 (15.5)	15.6 (9.9-21.3)
Preparation	68 (35.1)	5 (38.5)	73 (35.3)	35.2 (28.0-42.4)
Action	26 (13.4)	2 (15.4)	28 (13.5)	13.5 (9.3-17.6)
Maintenance	40 (20.6)	0 (0.0)	40 (19.3)	19.7 (14.3-25.1)
Total	194 (93.7)	13 (6.3)	207 (100)	100 (-)

Statistical analysis

The sampling method in this study was cluster sampling, and it can affect the confidence intervals. So survey analysis have been used in all analyses. Because of the difference between the number of girls and boys and the cigarette smoking prevalence between the two genders, the cigarette smoking and quitting stages for all the sample was calculated using direct standardization method. The Chi-square test and one-way ANOVA test, were used in univariate form for studying the cigarette smoking status related factors. Besides, for multiple analyses of the cigarette smoking factors the ordinal logistic regression model was used. We checked the assumptions of ANOVA using the Kolmogorov–Smirnov test for normality, and homogeneity of variances test. Also, ordinal logistic regression assumes that the coefficients that describe the relationship between each pair of outcome groups are the same. This assumption is not violated in this study.

Results

Out of 5106 sampled students, 4903 participated in the study and filled out the questionnair (with 96.05 response rate). From those who did not complete the questionnaire, 196 (3.8%) students were absent and 7 (0.15%) students did not participate in the study. The mean and standard deviation of the students' age who participated in the study was 15.69±0.73 (14-19 years old age range). 2104 (42.9%) of the sample students were boys and 2799 (57.1%) were girls. Table 2 shows the frequency distribution of the cigarette smoking and quitting stages by gender. As it can be seen in this table, 73.7% of the students are in committer stage and higher stages of cigarette smoking are more prevalent among the boys than girls. After merging the cigarette smoking stages in boys, 68.3% of the participants were never-smokers (95% confidence interval [CI]: 65.0-71.6), 22.5% were experimenters (95% CI: 20.4-24.6) and 9.2% were regular smokers (95% CI: 7.2-11.3); in girls, 87.7% were never-smokers (95% CI: 85.9-89.5), 11.9% were experimenters (95% CI: 10.1-13.6) and 0.5% were regular smokers (95% CI: 0.2-0.7); In total, using direct standardization and considering cluster sampling, 22.3% of the participants were ever smoked (95% CI: 20.0-24.6), 17.3% of the participants were experimenters (95% CI: 15.8-18.9) and 5.0% were regular smokers (95% CI: 3.7-6.2).

Table 3 shows the demographical features and other variables of the students as per the cigarette smoking status with their significance using univariate analysis. As can be seen, all the variables except socio-economic status showed a significant relationship with cigarette smoking.

Table 3. Demographic and other characteristics of the adolescents with regard to smoking status.

Characteristics	Never smoker n (%)	Experimenter* n (%)	Regular smoker** n (%)	Total n (%)	*P*-value
Gender					
Boys	1433(68.3)	472(22.5)	194(9.2)	2099(43.1)	<0.001
Girls	2433(87.7)	329(11.9)	13(0.5)	2775(56.9)	
Total	3866(79.3)	801(16.4)	207(4.2)	4874(100)	
Age					
14 and 15 years	1770(84.0)	296(14.0)	42(2.0)	2108(43.5)	<0.001
16 years	1773(78.7)	393(17.5)	86(3.8)	2252(46.4)	
17 years	236(62.6)	84(22.3)	57(15.1)	377(7.8)	
18 and 19 years	63(56.8)	27(24.3)	21(18.9)	111(2.3)	
Socioeconomic status					
Very low	695(76.5)	168(18.5)	45(5.0)	908(20.1)	0.407
Low	708(77.5)	167(18.3)	39(4.3)	914(20.2)	
Middle	732(80.2)	145(15.9)	36(3.9)	913(20.2)	
High	725(80.8)	137(15.3)	35(3.9)	897(19.8)	
Very high	714(80.1)	140(15.7)	37(4.2)	891(19.7)	
Living with parents					
Yes	3673(80.0)	736(16.0)	180(3.9)	4589(94.4)	<0.001
No	179(66.1)	65(24.0)	27(10.0)	271(5.6)	
General risk taking behaviors					
No	1778(88.0)	189(9.4)	53(2.6)	2020(41.6)	<0.001
Yes	2070(73.1)	608(21.5)	153(5.4)	2831(58.4)	
Peer smoking norm					
Not high	2598(83.3)	460(14.8)	60(1.9)	3118(64.4)	<0.001
High& very high	1241(71.9)	337(19.5)	147(8.5)	1725(35.6)	
Smoker in the family					
No	2419(83.3)	405(14.0)	79(2.7)	2903(60.3)	<0.001
Yes	1379(73.0)	392(20.5)	124(6.5)	1913(39.7)	
Number of smoker friend					
0	3432(86.1)	504(12.6)	50(1.3)	3986(81.8)	<0.001
≥ 1	434(48.9)	297(33.4)	157(17.7)	888(18.2)	
Father norm					
Mild reaction	120(52.9)	82(36.1)	25(11.0)	227(4.8)	<0.001
Severe reaction	3641(81.0)	688(15.3)	165(3.7)	4494(95.2)	
mother norm					
Mild reaction	117(50.9)	79(34.3)	34(14.8)	230(4.8)	<0.001
Severe reaction	3713(80.9)	710(15.5)	167(3.6)	4590(95.2)	
brother norm					
Mild reaction	173(55.8)	98(31.6)	39(12.6)	310(14.3)	<0.001
Severe reaction	1524(82.3)	258(13.9)	69(3.7)	1851(85.7)	
sister norm					
Mild reaction	199(51.7)	135(35.1)	51(13.2)	385(17.1)	<0.001
Severe reaction	1579(84.3)	244(13.0)	49(2.6)	1872(82.9)	
Friend norm					
Mild reaction	1289(65.9)	508(26.0)	158(8.1)	1955(40.2)	<0.001
Severe reaction	2570(88.3)	292(10.0)	48(1.6)	2910(59.8)	
Substance abuse					
No	3825(80.1)	769(16.1)	180(3.8)	4774(98.6)	<0.001
Yes	16(23.9)	26(38.8)	25(37.3)	67(1.4)	
Self-esteem	17.48±4.69	18.91±4.86	19.55±5.23	17.80±4.79	<0.001
Attitude toward smoking	-10.93±2.16	-8.00±4.03	-4.32±5.78	-10.17±3.24	<0.001
Positive thinking about smoking	8.24±3.39	10.77±4.01	13.36±4.60	8.88±3.79	<0.001
Previous year average grades	16.82±2.14	15.83±2.26	14.54±2.16	16.56±2.23	<0.001

[a] Experimenters: respondents who indicated having tried or experimented with cigarette smoking, even a few puffs, but have smoked less than 100 cigarettes.

* Regular smokers: respondents who indicated smoking 100 cigarettes or more in their lifetime irrespective of current smoking status.

Table 4. Ordinal logistic regression analysis of the relationship between smoking status and risk variables in a sample of Iranian adolescents (2010).

Variables	OR	95 % CI	*P*-value
Gender (boy/girl)	2.92	1.94-4.77	<0.001
Age (higher age)	1.27	1.02-1.64	0.038
Living with parents (no)	1.72	0.63-4.71	0.291
Having general risk taking behaviors	1.50	1.02-2.21	0.038
Having smoker in the family	1.78	1.23-2.54	0.002
Having a smoker friend	2.52	1.65-3.86	<0.001
Substance abuse (ever use)	8.27	2.61-25.61	<0.001
Attitude toward smoking (positive)	1.22	1.10-1.27	<0.001
Positive thinking about smoking	1.05	1.01-1.14	0.032

In multivariate analysis of the factors related to the cigarette smoking status of the stusents, the variables like gender, age, living with both parents, having general risk taking behavior, cigarette smoking norm in peers, presence of a smoker member in the family, having a smoker close friend, cigarette smoking norm of the father, mother, brother, sister and closest friends, substance abuse experience, self-esteem score, attitude toward cigarette smoking score, positive thinking to cigarette smoking and the previous year average grades were entered into the ordinal logistic regression model. Results of this analysis showed that being of a male sex (OR=2.94), higher age (OR=1.30), having general risk taking behavior (OR=1.50), presence of a smoker member in the family (OR=1.78), having smoked close friend (OR=2.52), previous substance abuse experience (OR=8.21), positive attitude toward cigarette smoking (OR=1.19) and positive thinking to cigarette smoking (OR=1.06) increase the risk for an individual (student) to be positioned at a higher stage of cigarette smoking (Table 4).

Discussion

The cigarette smoking prevalence in this study in comparison with studies undertaken in other countries is much lower. In the present study, about 22.3% of the students (31.6% of the boys and 12.4% of the girls) have experienced cigarette smoking and only 5.0% (6.1% of the boys and 0.4% girls) have been regular smokers. The regular smokers in the United States (21), Hong Kong (22), and London (6) have been reported as 20%, 30% (13-18 years old range) and 8.9% (mean age: 13.6 years old) respectively. In Australia, 19% of the boys and 17% of the girls have been regular smokers (23). Also, the studies carried out for assessing the cigarette smoking status in the Iranian students have reported 2.5 to 17% prevalence of smoking among this population; the reason why the mentioned range is so wide lies in the differences of definition, age difference of the study samples and the location where the researches have been conducted (9-15). Compared with the other studies in Iran, lower prevalence reported in this study is mainly due to the fact that it comprises only the 10th grade students. Recently, Ayatollahi *et al*. (9) in Shiraz and Mohammadpoorasl *et al.* (10) in Tabriz have conducted studies with the 10th grade male students as sample and the regular smoker definition in these studies is completely similar to the present study. The regular smoker prevalence in the first and second study was obtained about 2.5% and 4.4% respectively; while in the present study the regular smoker prevalence in boys is 9.2%. These results show the increasing trend of cigarette smoking prevalence in adolescents of Tabriz city. The lower smoking rate among adolescents in Iran is mostly related to the following factors: prohibition of cigarette smoking in educational setting, implausibility of cigarette smoking in Iranian families' culture (especially in adolescents and women), and harsh parental disapproval of adolescents smoking.

Findings showed that the cigarette smoking prevalence in girls is much less than in boys. The ordinal logistic regression model demonstrated that being a boy increases the chance of being in higher stages of cigarette smoking by 3 times. In general, studies show that cigarette smoking is more prevalent in men than women; but especially in United States and the European countries, the difference among the adolescents has been reduced, while in Eastern Mediterranean countries, South Asian countries, and in Western Pacific region, the consumption difference in male adolescents is significantly higher than the females (24,25).

The higher the students' age, the more advanced stages of cigarette smoking could be expected. In fact, various studies have shown the direct and strong relationship between the adolescents' age and the cigarette smoking stages (2,9,23,26). The present study results also indicate that both the prevalence of the experimenter and regular smoker are increased by getting older age; then in multivariate analysis, despite low age variations (SD=0.73), the students' age shows significant relationship with the cigarette smoking stages.

Another aim of this study was to identify the relationship between the cigarette smoking stages and some personal-environmental as well as psychological factors. The results of multiple analysis proved that besides the gender and age, having general risk taking behavior, presence of a cigarette smoker in the family, having a smoker close friend, substance abuse experience, positive attitude toward cigarette smoking, and positive thinking to cigarette smoking are relevant to cigarette smoking in adolescents.

Previous studies have shown that risk taking behaviors are not only related to the cigarette smoking stages (9,16), but also to transmission from lower to higher stages of cigarette smoking (10). Likewise, findings indicated that compared to other adolescents, the prevalence of more advanced stages of cigarette smoking in adolescents with general risk taking behavior is high.

Various studies have shown that there is a positive relationship between the presences of a cigarette smoker member in the family−especially father−and cigarette smoking by adolescents (9,27,28). Results of this study also suggest that the presence of a cigarette smoker in the family heightens the risk of being positioned in more advanced cigarette smoking stages in adolescents by 1.78 times.

Close cigarette smoker friends not only play decisive roles in the beginning of cigarette smoking (2,5,29), but also they are strong predictors of transmission between cigarette smoking stages (10,16,26). Findings of this study show that having a smoker close friend has a powerful relationship with cigarette smoking status. Nevertheless, it can not be determined by the results of this study that whether having a smoker close friend is a risk factor for becoming a cigarette smoker or cigarette smoker students mainly choose cigarette smokers for friendship. On the other hand, the adolescents who become friends may have features in common, which are related to cigarette smoking.

Substance abuse experience in this study also, quite similar to other studies, had a significant relationship with cigarette smoking prevalence in students (9,10,16), so that the risk of being positioned in more advanced stages of cigarette smoking in students with previous substance abuse experience is more than 8 times than those without such experience.

Andrews *et al*. (30) have shown that the adolescents who have never smoked but who have a high attitude to cigarette smoking, experience smoking more than those with less attitude, and this group of the students pass the cigarette smoking stages faster than the other group. The relationship between the attitude toward smoking and the cigarette smoking stages has been confirmed in this study like the other studies (9,10,20,30); however, due to cross-sectional nature of the study, it can not be determined that having a positive attitude to cigarette moking can lead to becoming a smoker or being a smoker contribiutes the increasment of the attitude for cigarette smoking.

In univariate analysis of the cigarette smoking norm relating to the father, mother, brother, sister and the closest friend, the students with advanced stages of cigarette smoking have predicted the reaction of the family members and friend against lighting a cigarette in front of they as moderate. These findings are similar to results obtained by Hanson (31) and Kaplan *et al.* (16); but none of these variables have become significant in model in multiple analysis. Studying the role of these norms in transmission of the adolescents through cigarette smoking stages can be fruitful.

Although in some studies, self-esteem has had a relationship with cigarette smoking (2), it has not played a significant role in starting stage of cigarette smoking (32). Present study show that non-smoker students have significantly higher self-esteem compared with other students, although this variable does not show any relationship with cigarette smoking status in multiple analysis.

Several aspects of this study can limit the application of the findings: first, cross-sectional nature of the study can only act as evidences for the relationship between the predictor variables and cigarette smoking stages and does not show the causality; and the second, despite using quite satisfactory methodology and sampling method, generalization of the study results is limited due to the study itself being limited to 10th grade students of Tabriz city. In conclusion, cigarette smoking prevalence in adolescents of Tabriz city, especially in girls is very low, but the experimenter prevalence is considerable and taking into account that starting cigarette smoking is a

strong predictor for becoming a cigarette smoker, findings of this results suggests adopting preventive measures in adolescence and pre-adolescence period. Considering the strong association between the cigarette smoking stages and substance abuse experience, friendship with smoker close friends and presence of a cigarette smoker in the family, preventive actions concerning substance abuse as well as intervention for decreasing cigarette smoking in the society can help reduce the cigarette smoking in adolescents. Longitudinal studies in adolescents is necessary for better understanding of the cigarette smoking process and determining the risk factors of cigarette smoking beginning and the transmission stages thereof, so that making plans for the preventive measurs can be possible.

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References

1. NovotnyTE. Tobacco use. In: Brownson RC RP, DavisJR. editors, editor. Chronic Disease Epidemiology and Control. Baltimore: American Public Health Association 1993. p. 199-220.
2. Tyas SL, Pederson LL. Psychosocial factors related to adolescent smoking: a critical review of the literature. Tob Control 1998; 7(4):409-20.
3. Breslau N, Peterson EL. Smoking cessation in young adults: age at initiation of cigarette smoking and other suspected influences. Am J Public Health 1996; 86(2):214-20.
4. Chassin L, Presson CC, Sherman SJ, Edwards DA. The natural history of cigarette smoking: predicting young-adult smoking outcomes from adolescent smoking patterns. Health Psychol 1990; 9(6):701-16.
5. Huang M, Hollis J, Polen M, Lapidus J, Austin D. Stages of smoking acquisition versus susceptibility as predictors of smoking initiation in adolescents in primary care. Addict Behav 2005; 30(6):1183-94.
6. Best D, Rawaf S, Rowley J, Floyd K, Manning V, Strang J. Drinking and smoking as concurrent predictors of illicit drug use and positive drug attitudes in adolescents. Drug Alcohol Depend 2000; 60(3):319-21.
7. Bender E. Trends in Teen Drinking, Smoking Continue Gradual Decline. Psychiatric News 2006;41(2):9. http://psychnews.psychiatryonline.org/newsarticle.aspx?articleid=109658
8. Scollo MM, Winstanley MH. Tobacco in Australia: Facts and Issues. Edition T, editor. Melbourne 2008. *www.tobaccoinaustralia.org.au/*
9. Alireza Ayatollahi S, Mohammadpoorasl A, Rajaeifard A. Predicting the stages of smoking acquisition in the male students of Shiraz's high schools, 2003. Nicotine Tob Res 7(6):845-51.
10. Mohammadpoorasl A, Fakhari A, Shamsipour M, Rostami F, Rashidian H. Transitions between the stages of smoking in Iranian adolescents. Prev Med 2011;52(2):136-8.
11. Kelishadi R, Ardalan G, Gheiratmand R, Majdzadeh R, Delavari A, Heshmat R, Mokhtari MR, Razaghi EM, Motaghian M, Ahangar-Nazari I, Mahmood-Arabi MS, Barekati H; CASPIAN Study Group. Smoking behavior and its influencing factors in a national-representative sample of Iranian adolescents: CASPIAN study. Prev Med. 2006 Jun;42(6):423-6.
12. Ramezankhani A, Sarbandi Zaboli F, A. Z, Heydari G, Masjedi MR. Pattern of cigarette smoking in adolescent students in Tehran. Pejouhandeh 2010;15(75):115-22. (Persian). http://www.sid.ir/en/View
13. Namakin K, Sharifzadeh GR, Miri MR. Prevalence of cigarette smoking and evaluation of attitude and knowledge in its high school boys in Birjand, 2005. Journal of Birjand University of Medical Sciences 2008; 15(1):66-70. (Persian). http://journal.bums.ac.ir/browse.php?a_code=A-10-1-260&slc_lang=en&sid=1&sw=Evaluation
14. Agha Molaei T, Zare S. Cigarette and hookah using pattern in over-15 population of Bandar Abbas, a population based study. Medical Journal of Hormozgan University 2008;11(4):241-6. (Persian).
15. Ziaee P, Hatamizadeh N, Vameghi R, Dolatabadi S. A study on prevalence of cigarette smoking and the age of first smoking in senior high school students in Tehran 1998-99. Hakim 2001;4(2):78-84. (Persian).
16. Kaplan CP, Napoles-Springer A, Stewart SL, Perez-Stable EJ. Smoking acquisition among adolescents and young Latinas: the role of socioenvironmental and personal factors. Addict Behav 2001 26(4):531-50.
17. Turner L, Mermelstein R, Flay B. Individual and contextual influences on adolescent smoking. Ann N Y Acad Sci 2004;1021:175-97.

18. Novak SP, Clayton RR. The influence of school environment and self-regulation on transitions between stages of cigarette smoking: a multilevel analysis. Health Psychol 2001;20(3):196-207.
19. Rosenberg M. Society and the Adolescent Self-Image: Princeton University Press, Princeton, NJ; 1965.
20. Hill AJ, Boudreau F, Amyot E, Dery D, Godin G. Predicting the stages of smoking acquisition according to the theory of planned behavior. J Adolesc Health 1997;21(2):107-15.
21. Centers for Disease Control and Prevention. Cigarette Use Among High School Students—United States, 1991–2007 . MMWR Morb Mortal Wkly Rep 2008;57(25):686-8..
٢2. Lam TH, Stewart SM, Ho LM: Youth Sexuality Study Task Force 1996, The Family Planning Association of HongKong. Prevalence and correlates of smoking and sexual activity among Hong Kong adolescents. J Adolesc Health 2001;29(5):352-8.
23. White V, Hayman J. Smoking behaviours of Australian secondary students in 2005. Melbourne: Centre for Behavioural Research in Cancer, Cancer Control Research Institute, The Cancer Council Victoria 2006. http://www.nationaldrugstrategy.gov.au/
24. Warren CW, Jones NR, Eriksen MP, Asma S; Global Tobacco Surveillance System (GTSS) collaborative group. Patterns of global tobacco use in young people and implications for future chronic disease burden in adults. Lancet 2006;367(9512):749-53.
25. Morley KI, Hall WD. Explaining the convergence of male and female smoking prevalence in Australia. Addiction 2008;103(3):487-95.
26. Mayhew KP, Flay BR, Mott JA. Stages in the development of adolescent smoking. Drug Alcohol Depend 2000;59 Suppl 1:S61-81.
27. Komro KA, McCarty MC, Forster JL, Blaine TM, Chen V. Parental, family, and home characteristics associated with cigarette smoking among adolescents. Am J Health Promot 2003;17(5):291-9.
28. Simons-Morton B, Chen R, Abroms L, Haynie DL. Latent growth curve analyses of peer and parent influences on smoking progression among early adolescents. Health Psychol 2004;23(6):612-21.
29. Chen X, Stanton B, Fang X, Li X, Lin D, Zhang J, Liu H, Yang H. Perceived smoking norms, socioenvironmental factors, personal attitudes and adolescent smoking in China: a mediation analysis with longitudinal data. J Adolesc Health 2006;38(4):359-68.
30. Andrews JA, Duncan SC. The effect of attitude on the development of adolescent cigarette use. J Subst Abuse 1998;10(1):1-7.
31. Hanson MJ. The theory of planned behavior applied to cigarette smoking in African-American, Puerto Rican, and non-Hispanic white teenage females. Nurs Res 1997 46(3):155-62.
32. Jackson C. Initial and experimental stages of tobacco and alcohol use during late childhood: relation to peer, parent, and personal risk factors. Addict Behav 1997;22(5):685-98.