

# Prevalence of shisha smoking and risk factors among female adolescents in Iran

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## Research article

**Keywords:** Female, adolescents, student, shisha smoking

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# Abstract

**Background:** shisha smoking is on the increase in Iran, but there are limited data on its use among adolescents. This research purpose is to survey the prevalence of shisha smoking and risk factors among female in Iran.

**Methods:** This was a cross-sectional study. The study participants were 1302. The sampling was multistage random. 12 schools from three sectors of Kermanshah in the western city in Iran (4 schools from each sector), were selected. Students were in grades 7 to 12. Data were collected using questionnaire and analyzed by descriptive statistical methods and Logistic regression test by using SPSS 22 software.

**Results:** The mean (SD) ages of the students and the ages when the participants started SS were  $15.22 \pm 1.85$  and  $13.64 (1.64)$  respectively. 32.4% of the participants ever having used a shisha and 20.4% mentioned they used shisha the last 30 days. Most of the subjects smoked shishas in friends' houses (45.8%) and with their friends (47.4%). The significantly important factors that affect SS in these age groups were the father's and mother's occupation, family size, living with others, father's education, having a friend who smokes shishas, friends' encouragement to smoke shisha, and being in a family that smoke shishas.

**Conclusions:** shisha smoking has become a major concern in female. shisha prevention needs extensive studies. Investigation of shisha behavioral factors is essential in designing of educational interventions. Key words: Female, adolescents, student, shisha smoking.

## Background:

The frequency of using shishas reveals a worrying scenario [1]. 4.9 million students were current tobacco smoker in 2018 [2]. Evidence shows that 630,000 students are shisha users in U.S (3). The prevalence of SS in high school it was 59.6% in Iran [4]. The first experience of smoking is one of the risk factors for re-use among adolescents (5). The decrease in the age of SS and the popularity of shisha amongst adolescents has become a major problem in the world [6]. In a global survey in 2014 the use of tobacco and shishas, and the prevalence of SS among girls (13–15 years-old) was highest in Lebanon, the UAE and Iran [7]. Results of a national survey showed that the prevalence of daily SS using waterpipes in Iran was on average 3.5 times a day (2.8 in male and 4.5 in female). Also, more than 50% of Iranian females smoke tobacco and smoke it with shishas [8]. The prevalence of using shishas among females is higher than cigarette smoking. Iranian females often face many restrictions with regard to cigarette smoking, but family members approve of SS as traditional entertainment with no trouble, and girls are allowed to use them inside and outside the home [9]. Although SS is considered as a means of entertainment for Iranian females, it is also used as a way to have fun with friends. Moreover, SS was always a pretext to get together with old friends and family members, as well as a method for the creation of intimate social networks [10]. It is known that tobacco smoking among females has nearly as many risks as that of males, but compared to males they are more susceptible to some types of lung cancers [11]. In this respect, it is predicted that in the next 10 years the prevalence of chronic diseases in females will surpass that of males [12]. The results of this study showed that in Middle Eastern societies, it was particularly more acceptable for females to smoke shishas compared to cigarettes. The majority perceive SS as less addictive than cigarette smoking [13]. In another study in San Diego County it was

discovered that students believed SS was less harmful than cigarette[14]. the presence of charcoal and certain toxins that are produced by the shisha in higher levels compared with cigarettes are also another risk factor, and it is worth highlighting that, in a single shisha session, the amount of smoke inhaled can reach up to 150 times that of a single cigarette [15]. there is generally a paucity of studies done on SS in Iran, especially among middle and high schools students [16]. given the fact that SS is the most common form of tobacco use among female students, and the importance of identify the factors influencing its pattern of use among females, there is a need to conduct studies focusing on SS in females. the results of such studies can help in the improvement of preventive strategies to curb the smoking using shishas in females. The aim in reaserch is to the survey prevalence of shisha smoking and risk factors among female in Iran.

## Materials And Methods

### Setting

This is a descriptive study and this study was conducted in Kermanshah, Kermanshah is located in the west of Iran. Kermanshah is one of the largest cities in Iran and one of the first places in the field of tobacco smoking. This study was conducted from January to August 2019..

### Study population and sampling method

Participants in this study were 1302 high school female students aged 12–18. the inclusion criteria to this study for students over the age of 16 was a willingness to participate in the study and possession of informed consent, and written consent from parents was necessary for under the age of 16 years. sampling was a multi-stage randomized systematic approach. at first, a list of schools in three districts of Kermanshah was prepared and 12 schools were selected by systematic random sampling (4 Schools from each district ). at the school level, sampling units will be randomly selected based on the number of students from grades 7 to 12 and the proportion of the total sample size. The calculated P is determined based on study (17) .using 95% confidence interval and applying clustering coefficient 2.

### Data collection instruments

The data collection instruments was questionnaire. The questionnaire included two parts. The first part included demographic questions, including age, education level, parents occupation, parents' education level, family size and living conditions. The second part included shisha smoking related factors : such as having smoking experience, the first place to smoke shisha, the first person who provide shisha for the students, having a parent who smokes shisha, having a friend who smokes shisha, encourage to smoke shisha by friends .

### Pilot testing of questionnaire

The questionnaire was distributed among 15 students and asked them to express their own opinions about the appearance of the questionnaires, the clarity of the used terms, the font size and any confusion the required reforms were done.

### Questionnaire reliability:

Internal reliability (internal consistency) and external reliability (test and retest) will be used to determine the reliability of the questionnaires. For this purpose, the questionnaire was distributed among 30 students at two time intervals over a 2-week period. The internal and external consistency coefficients of the questions were measured and the Cronbach's alpha value was more than 0.8.

### Study Participants

This cross-sectional study was performed among 1302 high school female students recruited multistage random sampling method in Kermanshah city, west of Iran in 2019. There are three educational sectors in the city, which each region 4 schools randomly selected.

### Ethics approval and consent to participate

Written informed consent was obtained from 16-year-old students and older students. Written informed consent was also obtained from parents of students under the age of 16. The names of the participants were not recorded in the questionnaire and other information was kept confidential and was used only in this study. The Ethical Committee of Hamadan University of Medical Sciences approved this study (reference number: IR.UMSHA.REC.1397.696).

### Data collection

The person who was responsible for collecting data and distributing a questionnaire was native to the region and the questionnaire was coded without registration and surname, and this increased the confidence of the students. On the other hand, the subject of shisha was attractive to students, and all students tended to fill out questionnaires.

## Statistical analysis

The data were entered into IBM SPSS 22 software after collection. Logistic regression was used to investigate and predict factors affecting shisha. Chi-square and logistic regression were performed to identify statistical differences and analyze factors associated with shisha.

## Results

In this research, students' ages ranged from 12 to 18 years with a mean of  $15.22 \pm 1.85$ . A total of 191 (14.7%) students were in grade 7, 234 (18. %) in grade 8 and 223 (17.1%) were in grade 9 at Middle school level and out of 209 (16.1%) students who were in grade 10, 218 (16.7. %) in grade 11 and 227 (18.4%) were in grade 12 at high school level. (53.1%) Fathers who were self-employed and ( 92.2%) of their mothers were housewives. 92% of the participants lived with parents. Regarding the first place of starting shisha use, home friends and with friends (Table 1).

Table 1

Demographic Characteristics of the Study Participants (n = 1302).

Table 2. Behavioral Risk Factors Characteristics among Students (n = 1302)

<b>Variables</b>	<b>Categories</b>	<b>Number (%)</b>
Age (year)	12	107 (8.2)
	13	179(13.7)
	14	191(14.7)
	15	229(17.6)
	16	219 (16.8)
	17	198 (15.2)
	18	179 (13.7)
Grade	Seventh	191(14.7)
	Eighth	234(18)
	Ninth	223(17.1)
	Tenth	209 (16.1)
	Eleventh	218 (16.7)
	Twelfth	227 (18.4)
Father's Education	Illiteracy	65 (5.00)
	Under the diploma	285 (21.9)
	Diploma	649 (49.8)
	College	303 (23.3)
Mother's Education	Illiteracy	75 (5.8)
	Under the diploma	485 (37.3)
	Diploma	608 (46.7)
	College	134 (10.3)
Father's job	Unemployed	215 (16.5)
	Self-employed	691 (53.1)
	Employee	396 (30.4)
Mother's job	Housewife	1201 (92.2)
	Employed	101 (7.8)

Variables	Categories	Number (%)
Living (with)	Both parents	1202 (92.3)
	Others	100 (7.7)
Variables	Categories	Number (%)
shisha Smoking	Never	883 (67.8)
	Former	419 (33.2)
	current	265(20.4)
shisha user Father	Yes	414(31.8)
	No	888 (68.2)
shisha user mother	Yes	180 (13.8.)
	No	1122 (862)
shisha user Brother and sister	Yes	356 (27.3)
	No	946 (72.7)
shisha user Friends	Yes	856(65.8)
	No	445 (34.2)
where. shisha smoking	Home-self	122(29.2)
	By Friend	192(45.8)
	Park	39(9.4)
	Caffi	61(14.6)
produce. shisha	Self	25(5.7)
	Friend	199(47.4)
	Family	149(35)
	Other	46(10.7)

According to SS behaviors, 883 (67.8%) were never SS, 419 (32.3%) former SS and 265 (20.4%) current SS. The mean (SD) age at SS initiation was 13.65 ± 1.65 years. A total of 1302 (31.8%) of fathers and 13.8% of mothers and 27.3% of their brothers or sisters used shishas. (47.4%) of the students used shisha with their friends and (45.8%) of the students used shishas in friends' houses ( Table 2).

The findings of Table 3 show that the age group of 14–15 year olds has a significant relationship with the likelihood of an increase in SS, which is 1.5 times more than other ages. ORs = 1.50; 95% CI [1.15, 1.12]. The level of fathers' education was significantly related to SS in such a way that ,the likelihood of an increase in SS in students whose parents were illiterate / below the level of diploma / diploma was 1.95, 1.81, 1.37 times more likely than those whose father had an academic education( p-valu = 0.001). Also, the likelihood of an increase in SS in students whose fathers were self-employed ORs = 3.85; 95% CI [2.52–5.87] and un-employed ORs = 3.23; 95% CI [2.3, 4.3] was 3.85 and 3.23 times more likely than those whose fathers were employees .The significant relationship to the likelihood of an increase in current SS in the students that their mothers

were employees was 1.83 times more likely than those whose mothers were house wives. The probability of an increase in SS in femals who lived with one of their parents or someone other than a parent were 1.6 times more than girls who lived with their parents. Also, the findings showed a significant relationship between the number of family members and SS in that with families with fewer members, the probability of an increase in SS was 2.6 times more .Table 4 shows that having friends who smoke using shishas [AORs = 4.96.55; 95% CI [3.86, 6.38]and having SS fathers [ORs = 4.12; 95% CI [3.02, 5.2)] and having SS mothers [ORs = 4.49; 95% CI [3.23, 6.45] and having SS brothers and sisters [ORs = 4.81; 95% CI [3.07, 5.21] and friends who encourage others to join them in SS[AORs = 7.25; 95% CI [4.40, 9.70]]) were significant in relation to former and current SS. Students that had friends who smoked shishas were 4.9 times more likely to be former smokers of shisha than those whose peers did not used shishas ( $P < .001$ ). Students with friends who insist on them joining in when SS were 5.4 times more likely to be current smokers of shishas compared to those who did not insist. ( $p = 0.001$ )

Table 3  
 Logistic Regression: shisha smoking and Demographic Factors (n = 1302)

Characteristics	Never shisha smoking (n = 883) (%)	Former shisha smoking (n = 419) (%)	AOR (95% CI)	P-value	Past-month shisha smoking (n = 265) (%)	OR(95% CI)	P-value
Age a(yr)							
12–13	200 (15.3)	86 (6.6)	0.94(0.69 to 1.028)	0.7	53 (20)	1.05(0.73 to 1.5)	0.7
14–15	273(20.9)	147(11.2)	1.18(0.91 to 1.5)	0.2	106(40.)	1.5(1.15 to 2.1)	0.04**
16-17-18 <sup>b</sup>	410(31.5)	186(14.3)	1	-	106(40)		1
High school grade <sup>a</sup>							
Seven	137(10.6)	54(4.1)	0.69(0.46 to 1.04)	0.08	31(11.7)	0.74(0.45 to 1.2)	0.24
Eighth	168(12.1)	66(5.1)	0.88(0.69 to 1.28)	0.5	48(18.1)	0.98(0.62 to 1.5)	0.95
Ninth	126(9.7)	97(7.45)	0.75(0.51 to 1.1)	0.1	68(25.6)	1.68(1.09 to 2.5)	0.01*
Tenth	164 (12.6)	45 (3.4)	0.56(0.31 to 0.84)	0.006***	33(12.4)	0.71(0.43 to 1.17)	0.945
Eleventh	154 (12.4)	64 (5)	0.55(0.35 to 0.87)	0.004***	38 (14.3)	0.82(0.5 to 1.31)	0.673
Twelfth <sup>b</sup>	134(10.5)	93(7.1)	1	—	47(17.8)	1	—
Father's Education <sup>a</sup>							
Illiteracy	39 (2.1)	26 (2.00)	1.95(1/1 to 3/4)	0.01*	16 (6.4)	1.37(0.73 to 2.50)	0.3
Under the diploma	176 (13.6)	109 (8.5)	1.81 (1.27 to 2.50)	0.001***	72 (27.1)	1.40 (0.96 to 2.1)	0.07

CI confidence interval, OR adjusted odds ratio

\*p < 0.05; \*\*p < 0.01; \*\*\*p < 0.001 / b Reference group

Characteristics	Never shisha smoking (n = 883) (%)	Former shisha smoking (n = 419) (%)	AOR (95% CI)	P-value	Past-month shisha smoking (n = 265) (%)	OR(95% CI)	P-value
Diploma	442 (34.0)	207 (15.9)	1.37 (1.01 to 1.84)	0.04*	119 (45)	0.71 (0.66 to 1.33)	0.73
College <sup>b</sup>	226 (17.4)	77 (6.0)	1	-	58 (21.9)	1	-
Mother's Education <sup>a</sup>							
Illiteracy	55 (4.2)	20 (1.5)	0.78(0.4to 1.4)	0.4	12 (4.5)	0.60(0.29 to 1.26)	0.1
Under the diploma	326 (25)	159 (12.2)	1.03 (0.68 to 1.55)	0.83	97 (12.7)	0.79 (0.51 to 1.25)	0.32
Diploma	411 (31.5)	197 (15.2)	1.01 (0.68 to 1.54)	0.94	124 (46.8)	0.81 (0.52 to 1.27)	0.37
College <sup>b</sup>	91 (7.0)	43 (3.3)	1	-	32 (12.1)	1	-
Father's job <sup>a</sup>							
Unemployed	489 (37.5)	288 (22.12)	3.23(2.3 to 4/3)	0.001***	184 (69.5)	2.62(1.7 to 3.6)	0.00***
Self-employed	114 (8.8)	80 (6.3)	3.85 (2.52 to 5.81)	0.000***	46 (17.4)	1.48 (1.63 to 4.21)	0.00***
Employee <sup>b</sup>	280 (21.5)	51 (4.00)	1	-	35 (13.1)	1	-
Mother's job <sup>a</sup>							
Housewife <sup>b</sup>	819 (58.8)	382 (33.7)	1	-	234 (24.4)	1	-
Employed	64 (3.4)	37 (2.7)	1.23(0.81 to 1.81)	0.31	31 (1.9)	1.83 (1.17 to 2.86)	0.008**
Family size							

CI confidence interval, OR adjusted odds ratio

\*p < 0.05; \*\*p < 0.01; \*\*\*p < 0.001 / b Reference group

Characteristics	Never shisha smoking (n = 883) (%)	Former shisha smoking (n = 419) (%)	AOR (95% CI)	P-value	Past-month shisha smoking (n = 265) (%)	OR(95% CI)	P-value
2-4	71(5.5)	68(5.3)	2.67(1.4 to 4.6)	0.001	46(17.3)	1.88(1.00 to 3.5)	0.05
5-7	753(57.9)	328(25.2)	1.1.(67 to 1.64)	0.6	200(75.5)	0.87.(47 to 1.3)	0.4
8-10 <sup>b</sup>	59(4.6)	23(1.8)	1		18(6.8)	1	
Living (with) <sup>a</sup>							
Others	58 (4.1)	42 (3.1)	1.58(1.04 to 2.40)	0.03*	30 (1.6)	1.76(1.12 to 2.76)	0.014*
Both parents <sup>b</sup>	825 (63.2)	377(29.6)	1		235 (24.7)	1	—
CI confidence interval, OR adjusted odds ratio							
*p < 0.05; **p < 0.01; ***p < 0.001 / b Reference group							

Table 4  
 Logistic Regression: shisha smoking and Behavioral Risk Factors (n = 1302).

Characteristics	Never shisha smoking (n = 813) (%)	Former shisha smoking (n = 409) (%)	AOR (95% CI)	P-value	Current shisha smoking (n = 265) (%)	OR (95% CI)	P-value
shisha user friends <sup>a</sup>							
No <sup>b</sup>	685 (52.4)	172 (13.2)	1	-	107 (40.3)	1	-
Yes	198 (15.2)	247 (19)	4.96 (3.86 to 6.38)	0.000***	158 (59.7)	3.85 (2.19 to 5.1)	0.000***
shisha user mother <sup>a</sup>							
No <sup>b</sup>	816 (86.2)	306 (30.8)	1	-	181 (18.4)	1	-
Yes	67(5.1)	113 (5.6)	4.49(3.23 to 6.25)	0.000***	84 (7.9)	4.56(3.26 to 6.34)	0.000***
shisha user father							
No <sup>b</sup>	692(53.1)	196(15)	1	-	121(45.07)	1	-
Yes	191(14.7)	223(17.12)	4.12(3.2 to 5.2)	0.000***	144(54.3)	3.38(2.55 to 4.46)	*0.000**
shisha user Brother and Sister							
No <sup>b</sup>	734(56.4)	212(16.3)	1	-	120(45.3)	1	-
Yes	149(11.5)	207[]	4.81(3.71 to 6.23)	0.000***	145(54.7)	4.73(3.55 to 6.29)	0.000***
Suggest to use from friends							
No <sup>b</sup>	791(60.7)	227(17.5)	1	-	138(52)	1	-
Yes	92(7.06)	192(14.8)	7.27(5.41 to 9.70)	0.000***	127(48)	5.81(3.84 to 6.92)	0.000***

CI confidence interval, OR adjusted odds ratio

\*p < 0.05; \*\*p < 0.01; \*\*\*p < 0.001\*\*\* b Reference group

Characteristics	Never shisha smoking (n = 813) (%)	Former shisha smoking (n = 409) (%)	AOR (95% CI)	P-value	Current shisha smoking (n = 265) (%)	OR (95% CI)	P-value
Insist from friends							
No <sup>b</sup>	833(64)	311(23.9)	1	-	184(69.5)	1	—
Yes	50(3.85)	108(8.3)	5.75(4.03 to 8.23)	0.000***	81(30.5)	5.4(3.86 to 7.78)	0.000***
CI confidence interval, OR adjusted odds ratio							
*p < 0.05; **p < 0.01; ***p < 0.001*** b Reference group							

## Discussion

The findings showed that 32.3% of females had at least once participated in SS during their lifetime and 20.4% had smoked shishas in the past month. Estimates of the prevalence of our study were similar to study [17] and [7]. For example, Rawson [17] in his study showed the prevalence of SS in Iranian females 34.4% and in the Mazik study [7] prevalence of SS among Iranian female was reported 23% at the present time. Our findings were similar to other studies. For example, in a reaserch in Turkey, the prevalence of SS was 32.7% [18] and it has been reported that SS in the US in the past month was 20% [19]. In the present study, the mean age of the initiation of SS was 13/64 years old, whilst the study in China [20] also reported tobacco smoking after the age of 12. The results of the study are similar to study of [21, 22].

The findings also showed that the probability of increasing SS was in the age group of 14–15 years old. Smith, in his study, show the prevalence of tobacco smoking, especially shishas, is seen in adolescents under 18 and emphasizes that SS under the age of 18 should be studied [14]. A study in India showed that 65% of the people under the age of 18 had easy access to shishas, they have not reached the legal age [23].

In this study, the results indicate that having a friend who smokes shishas, increases the probability of SS, similar to the results of the study [9, 24, 25]. Studies have shown that the rate of smoking was 10 folds higher among students with friends who smoked or classmates [25]. The findings showed that the influence and encouragement of peers to smoke shishas increased the probability of smoking shishas 7 times more among students, which is similar to the results of study [26, 27]. It seems that lack of sufficient people skills, such as the ability to say 'no' to the suggestion of friends, is one of the main reasons for the tendency to smoke shishas. 47% of students reported having smoked shishas with their friends the first time. Also, studies [28, 29] showed that friends had an important impact on SS.

In this study, having a parent and brother or sister who smoke shishas increases the probability of an increase in SS in students, which is similar to the results of studies [10, 30–32]. Most families do not allow Iranian

females to smoke, but when family members commonly smoke shishas for fun, they also allow Iranian women to smoke also.

The research showed that the job and education of parents play a significant role in the increase of SS, in such a way that, the probability of SS in students whose fathers are unemployed and self-employed is 3 times more than students whose fathers are employee which is similar to the results of study [33–35]. The students whose mothers were employees were 1.83 times more likely to smoke than those whose mothers were housewives which is similar to the results of study [34]. The findings showed that the father's level of education has a significant relationship with SS, so much so that females whose fathers have a lower level of education are more likely to smoke shishas. [9, 36, 37]. Being unemployed and lack of education and low income is one of the important factors in the tendency of people to smoke tobacco[9]. The findings showed that the probability of an increase in SS in female who lived with one of their parents or someone other than a parent is more than students who live with their parents which is similar to the results of the study [32, 38] Studies showed that the number of family members was effective in the tendency to smoke tobacco, in that the lower the number of family members and the number of children, the higher the tendency towards shisha usage but the results of this study [39]. showed that the number of family members did not affect the tendency to smoke shishas. We can suppose that a reduction in the number of family members has increased the students' desire to find and have friends outside of their homes,,but we must not forget that their friends also have a significant impact on SS.

### Limitations

One limitation of this study was to consider public schools and private schools were not included in the study.

### Strengths

Given that the sample size is based on the total number of students in the population, ( the age range of 12 \_ 18 years), the selected samples are generalizable to individuals in the community.

## Conclusion

The prevalence of SS smoking in adolescent female is significant and identifying factors affecting women's tendency to SS smoking is the first step in preventing tobacco smoking. Given the influence of female on their peers and the effective role of family, it is necessary to pay attention to these factors in the design of interventions to prevent smoking of shisha smoking, and further studies are needed .

## Abbreviations

SS

Shisha Smoking.

## Declarations

### Ethics approval and consent to participate

Written informed consent was obtained from 16-year-old students and older students. Written informed consent was also obtained from parents of students under the age of 16 . The names of the participants were not recorded in the questionnaire and other information was kept confidential and was used only in this study. The Ethical Committee of Hamadan University of Medical Sciences approved this study (reference number: IR.UMSHA.REC.1397.696).

### **Consent to publish**

The manuscript has been read and approved by all authors.

### **Availability of data and materials**

Data used in this study is analyzed and the data is available any time you had request.

### **Competing interests**

The authors declare that they have no conflicts of interest.

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### **Authors' Contributions**

SB, MB, MK, BH and EE participated in the study designing. EE participated in data collection. SB, MK and EE participated in the data analysis and SB and EE wrote the manuscript.

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