Original Article

Risk factors for smoking behavior among university students

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Aim: To identify factors associated with increased smoking risks among Kırıkkale University students using a questionnaire. Smoking is a widespread habit in Turkey and a major public health problem in the world.

Materials and methods: We assessed 1734 (11.6% of 15,000 total) students (869 males and 866 females, both smokers and nonsmokers) at Kırıkkale University with the questionnaire, which included questions about age, gender, smoking status of student, smoking status and education levels of parents, income, daily sports activities, smoking history (age when started or quit smoking, daily average number of cigarettes smoked, attempts to quit smoking, the reasons for starting smoking), alcohol use, and behavioral problems. Fagerström Test for Nicotine Dependence (FTND) scores and categorical nicotine dependence variables were calculated based on individual scores. We also created dichotomous income and smoking status variables using corresponding levels.

For the analyses, we used descriptive statistics, the t-test, the chi-square test, and bivariate and multivariate logistic regressions. Significant factors from the bivariate logistic regressions were included in the multivariate logistic regression analysis.

Results: According to the questionnaire, 548 study participants (31.6%) were identified as smokers, smoking every day for a month or longer. The data indicated that of the 548 respondents who were smokers, 66.1% were males and only 33.9% were females. Means and standard deviations (SD) of number of cigarettes per day, age at commencement of smoking, and FTND score were 15.9 (SD = 7.8), 16.6 (SD = 3.0), and 4.4 (SD = 2.3), respectively, in males, and 13.1 (SD = 6.5), 17.4 (SD = 2.4), and 3.9 (SD = 2.4), respectively, in females. There was a significant positive correlation between FTND score and number of cigarettes per day (r = 0.612, P < 0.05) and a significant negative correlation between FTND score and age at commencement of smoking (r = –0.232, P < 0.05). The risk of smoking was 2.968 times higher in males than in females. Having a smoking sibling increased the risk of smoking 2.368 times, having a smoking mother increased the risk 1.564 times, and having a smoking father increased the risk 1.488 times. Having a high family income also increased the risk, 1.579 times.

Conclusion: Our study shows that gender, the existence of a smoking person in the family, the mother's education level, and family income all play a significant role in smoking behavior among students. Increased levels of cigarette smoking and nicotine dependence in youth were observed to coincide with an increase in daily parental cigarette smoking. It is recommended that parents, along with young people, be informed about the hazards of smoking and about smoking cessation. The common assessment of both genetic and environmental factors in the development of smoking habits is of great importance.

Key words: University students, smoking, risk factors, FTND, logistic regression analysis

Üniversite öğrencileri arasında sigara içme davranışının risk faktörleri

Amaç: Sigara içme, Türkiye'de yaygın bir alışkanlık ve dünyada önemli bir halk sağlığı sorunudur. Bu çalışmada, anket formu kullanarak Kırıkkale Üniversitesi öğrencilerinin sigara içme riskinin artışı ile bağlı olan faktörlerin belirlenmesi için istatistiksel analizler yapılmıştır.

Yöntem ve gereç: Yaş, cinsiyet, öğrencinin sigara içme durumu, velilerin sigara içme durumu ve eğitim düzeyi, gelir, günlük spor aktiviteleri, sigara içme öyküsü (sigaraya başlama/bırakma yaşı, günlük içtiği ortalama sigara sayısı, sigara bırakma girişimi, sigaraya başlama nedenleri), alkol kullanımı ve davranış problemlerini kapsayan anket 1734 (toplam 15.000 öğrencinin % 11,6'sı) Kırıkkale Üniversitesi öğrencilerine (869 erkek ve 866 kız, sigara kullanan ve kullanmayan) uygulanmıştır. Bireysel puanlara dayalı olarak nikotin bağımlılık puanları Fagerström Test for Nicotine Dependence (FTND) ve kategorik nikotin bağımlılığı değişkenleri hesaplandı. Aynı zamanda iki düzeyli gelir (income2) ve sigara içme durumu değişkenlerini oluşturulmuştur.

Analizler için betimsel istatistikler, t-testi, ki-kare testi, tek ve çok değişkenli lojistik regresyon kullanılmıştır.

Bulgular: Çalışmaya katılan öğrecilerden bir ay veya daha uzun süre içerisinde her gün sigara içmiş olan 548 (% 31,6)'i sigara kullanan olarak tespit edildi. Veriler sigara içen 548 öğrencinin % 66,1'inin erkek, % 33,9'unun bayan olduğunu göstermektedir. Günlük içilen sigara sayısının, sigaraya başlama yaşının ve FTND puanlarının ortalaması ve standart sapması (SS) erkekler için, uygun olarak, 15,9 (SS = 7,7), 16,6 (SS = 3,0) ve 4,4 (SS = 2,3), kızlar için, uygun olarak, 13,1 (SS = 6,5), 17,4 (SS = 2,4) ve 3,9 (SS = 2,4) olarak bulunmuştur. FTND puanları ve günlük içilen sigara sayısı arasında pozitif korelasyon (r = 0,612, P < 0,05); FTND puanları ve sigaraya başlama yaşı arasında negarif korelasyon (r = −0,232, P < 0,05) saptandı. Erkeklerin sigara içme riskleri kızlara göre 2,968 kez çok çıkmıştır. Öğrencinin sigara içme riskini sigara içen kardeşinin olması 2,368 kez, annenin sigara içmesi 1,564 kez, babanın sigara içmesi 1,488 kez artırmaktadır. Yüksek aile geliri de riski 1,579 kez artırıyor.

Sonuç: Çalışmamız, üniversite öğrencilerinin sigara içme davranışında cinsiyet, ailede sigara içen kimselerin bulunması, annenin eğitim düzeyi, ailenin gelir durumu anlamlı rol oynamaktadır. Ebeveynlerin günlük içtikleri sigara sayısı artıkça gençlerin de sigara içme düzeyinde ve sigaraya olan bağımlılık durumunda artış gözlenmiştir. Gençlerle beraber aile büyüklerinin de sigaranın zararları ve sigarayı bırakma konusunda bilgilendirilmesi önerilmektedir. Sigara alışkanlığının hem çevresel hem de genetik boyutlarının ortak değerlendirilmesinin büyük önem arzettiği görülmektedir.

Anahtar sözcükler: Üniversite öğrencileri, sigara içme, risk faktörleri, FTND, lojistik regresyon analizi

Introduction

The epidemic of tobacco use among young people is defined as a major public health problem in developed and developing countries. The purpose of this study was to investigate the reasons for students' smoking status and to determine the risk factors for the smoking behavior of Turkish university students.

Cardiovascular diseases and cancer are the top 2 causes of mortality in Turkey. Smoking leads to 25,000 cases of lung cancer annually in Turkey (1). Smoking leads to 87% of deaths from lung cancer and about 30% of other cancer-related deaths in developed countries (2). Case-control, twin, and sib-pair investigations suggest that genetic factors play an important role in nicotine dependence (3).

In November of 2008, the Global Adult Tobacco Survey (GATS) selected 11,200 households in Turkey and interviewed 9030 individuals aged 15 and older living in those households. The GATS was implemented in parallel in a total of 14 countries, including Bangladesh, Brazil, China, the Philippines, India, Mexico, Egypt, Poland, Russia, Thailand, Turkey, Ukraine, Uruguay, and Vietnam. It was the first study dealing with the use of tobacco and tobacco products in Turkey (4).

The GATS findings showed that 25.4% of all daily smokers or occasional smokers were in the age group of 15-24; therefore, young adults are the largest at-risk group. The male smoking rate was 39.7% within this age group, whereas the female smoking rate in this age group was only 11.7%. Overall, in Turkey, approximately 31.2% of the population currently smokes.

In 2008, the number of cigarette smokers among US adults was estimated to be 20.6% (46.0 million). Of these, 79.8% (36.7 million) smoked every day, and 20.2% (9.3 million) smoked some days. In 2008, smoking prevalence was higher among men (23.1%) than women (18.3%) (5,6).

According to the World Health Organization (WHO) European Region report, smoking levels among women of different countries vary significantly, but countries tend to fall into 3 distinct groups. In the Nordic and some Western European countries, smoking rates for women and men are similar and are declining. For example, the proportions of male and female smokers are 30% and 30% in Norway, 34% and 28% in Ireland, and 33% and 28% in the Netherlands, respectively. In many countries of Central and Southern Europe, more men than

women smoke, though rates among women are also high (63% of men versus 39% of women in Greece, 47% versus 41% in Austria, and 49% versus 38% in Bulgaria). Finally, in the newly independent states of the former USSR, smoking rates are high among men and relatively low among women (64% versus 22% in Belarus; 53% versus 24% in Latvia, and 43% versus 9% in Kazakhstan). Nevertheless, smoking among women is rising rapidly in some of these countries. Across the region, the gender divide in smoking rates is narrower among young people. According to the Global Youth Tobacco Survey (GYTS) conducted from 1999 to 2009, 21% of boys and 17% of girls had smoked cigarettes in the previous 30 days (7).

There are quite a few studies about the smoking status of Turkish students in the literature. Our study of Kırıkkale University students provides valuable information regarding factors related to nicotine dependence, age, gender, social situation, and family structure. Our results were compared with results from other well-known worldwide studies. Detailed analysis of this advanced epidemiological research can provide important information for understanding nicotine dependence and suggestions for clinicians on finding possible ways to prevent nicotine dependence.

Materials and methods

Design and survey sample

We assessed 1734 (11.6% of 15,000 total) students (869 males and 866 females, smokers and nonsmokers) with a questionnaire that contained 34 smoking-related questions. The study was carried out at Kırıkkale University, in Kırıkkale, Turkey, in 2008. Kırıkkale is a city in the central Anatolian region of Turkey. It is located 80 km east of Ankara, which is the capital of Turkey. We used face-to-face interviews as a data collection method to ensure data quality.

We used Minitab 15.1 for the power analyses to determine sample size. With a mean difference of 0.5, a standard deviation (SD) of 3.0, a type 1 error level of 0.05, and a power of 0.95, the sample size for 2 sample t-tests was 937. With our sample size of 1734, the power was 0.99. Changing the standard deviation to the maximum SD in the variable list (7.86, number of cigarettes per day for female) with a mean difference

of 1.0 resulted in a sample size of 1607. With n = 1734 and a mean difference of 1.0, the power for a SD of 7.86 was 0.96.

This study was a pilot study for the first twin nicotine project in Turkey, funded by Kırıkkale University (Grant No: 2009/43). Twin study details will be published soon. One of the main goals of the twin project is to determine the latent genetic and environmental risk factors of smoking and behavioral problems. In the first step of the twin study, we interview twins living in the Kırıkkale and Ankara regions of Turkey. The questionnaire includes questions about nicotine use, psychiatric disorders, and information about the family, and also questions to determine zygosity. The data collection stage is coming to an end now and initial analyses, along with data cleaning, have been done. Preliminary results of this study have been published (8).

Data collection

In the present study, data were collected using a standard questionnaire that contained 34 questions. Completion took an average of 15 min. Conflicting answers to those questions were determined by cross-checking, when possible. Conflicted data were defined as missing data.

Sociodemographic characteristics data form

The questionnaire included questions about age, gender, smoking status, smoking status of parents, education level of parents, income, daily sports activities, smoking history (age when started or quit smoking, daily average number of cigarettes smoked, attempts to quit smoking, and reasons for starting smoking), alcohol use, and behavioral problems. It was difficult to identify the income level in Turkey because of a high inflation rate. Income was defined using 6 group variables (≤400, 401-800, 801-1200, 1201-1600, 1601-2400, and >2400 US$/month). The smoking statuses of parents and siblings were also changed to categorical variables having 4 groups (1-10, 11-20, 21-30 and ≥31 cigarettes/day). The education level of parents was defined using 6 group variables (illiterate, primary school, secondary school, high school, university, and graduate).

FTND scores

Nicotine addiction does not take the same form and is not at the same level in everyone who smokes

cigarettes. Various methods for assessing the level of nicotine dependence have been developed. The most widely known method is the scale known as the Fagerström Test for Nicotine Dependence (FTND). The FTND score for smokers is based on 6 questions (9). A confirmed Turkish translation of the FTND form was used in this study (10).

According to the answers to the FTND questions, a score of 7 or higher was considered to be a strong sign of addiction and a score of 4 or higher was defined as nicotine dependence. We analyzed the relationships between nicotine dependence, gender, age, socioeconomic situation, family education level, age of onset, number of cigarettes per day, and other measures.

Statistical analyses

Data were analyzed with PASW Statistics 18. Descriptive statistics, cross tables, and correlations were also used to understand the results of the analyses and tests (11). We performed t-tests for equality of means of noncategorical variables (number of cigarettes per day, age at commencement of smoking, and FTND score) between male and female respondents. Assumptions about the equality of variances were made using Levene's test of equality of variances. Associations between dichotomous and categorical variables were tested using the chi-square test.

Risk factors for smoking were determined and assessed first by bivariate logistic regression, and then by multivariate logistic regression involving significant candidate parameters from the bivariate logistic regression. Among the possible risk factors considered, like gender, dichotomous relatives' smoking status and education, and sports activities, only the variable of sports activity was found to have a nonsignificant association in bivariate logistic regression. Therefore, we performed a multivariate logistic regression between smoking status and all remaining variables.

Results

The numbers of respondents per question, given both as a value and as a percentage of the total and partitioned by smoking status (smokers and nonsmokers), are shown in Table 1. The last column

of Table 1 shows the P-values of the chi-square test. Means and SDs of the number of cigarettes per day, age at commencement of smoking, and FTND score were 15.9 (SD = 7.8), 16.6 (SD = 3.1), and 4.4 (SD = 2.3), respectively, in males, and 13.1 (SD = 6.5), 17.4 (SD = 2.4), and 3.9 (SD = 2.4), respectively, in females.

Table 2 shows the results of Levene's test for equality of variances and a t-test for equality of means between male and female respondents. Age at commencement of smoking showed a significant difference between male and female students ($P < 0.002$). Appropriate t-test assumptions about the equality of variances were based on the results of Levene's test. These tests found significant differences between the number of cigarettes per day ($P < 0.001$), age at commencement of smoking ($P = 0.002$, under assumption of nonequal variances), and FTND score ($P = 0.034$).

The top 3 reasons given for smoking initiation were foreign commercials, foreign movies, and parental smoking (tobacco and alcohol commercials are prohibited by law in Turkey). The study showed that 46.2% of students started smoking because of a friend or other environmental influence and kept smoking because of discomfort, unhappiness, and stress.

Table 3 presents the associations between smoking status and gender, income, education status of parents, and smoking status of parents. Pearson's chi-square test was used to determine whether there were significant associations between 2 categorical variables. Cramer's V provided information about the strength of the association between 2 categorical variables.

We created a categorical nicotine dependence variable corresponding to the total FTND scores, as follows: 0-3 (not a tobacco addict, coded as 0), 4-6 (a tobacco addict, coded as 1), and 7 and higher (a severe tobacco addict, coded as 2). We further analyzed the relationship of the nicotine dependence to gender, income, education of parents, smoking level of parents, sports activities, and alcohol use (Table 4). We also defined new smoking level variables for parents and siblings depending on the number of cigarettes per day. Smoking level was coded as 1 for individuals who smoked 1-10 cigarettes per day, 2 for

Table 1. Frequencies of sociodemographic variables by smoking status (smokers and nonsmokers).

Values of risk factors	All individuals		Nonsmokers		Smokers		P-value[a]
	n	(%)	n	(%)	n	(%)	
Gender							
Male	869	(50.1)	507	(42.7)	362	(66.1)	<0.001
Female	865	(49.9)	679	(57.3)	186	(33.9)	
Mother's smoking status							
No	1397	(80.6)	995	(83.9)	402	(73.4)	<0.001
Yes	337	(19.4)	191	(16.1)	146	(26.6)	
Father's smoking status							
No	965	(55.7)	701	(59.1)	264	(48.2)	<0.001
Yes	769	(44.3)	485	(40.9)	284	(51.8)	
Siblings' Smoking Status							
No	1364	(78.7)	982	(82.8)	382	(69.7)	<0.001
Yes	370	(21.3)	204	(17.2)	166	(30.3)	
Family income level (US$/month)							
≤400	65	(3.7)	51	(4.3)	14	(2.6)	<0.001
401-800	360	(20.8)	284	(23.9)	76	(13.9)	
801-1200	546	(31.5)	390	(32.9)	156	(28.5)	
1201-1600	372	(21.5)	226	(19.1)	146	(26.6)	
1601-2400	231	(13.30)	139	(11.7)	92	(16.8)	
≥2401	128	(7.4)	71	(6.0)	57	(10.4)	
Missing	32	(1.8)	25	(2.1)	7	(1.3)	
Income2							
Low	971	(56.0)	725	(61.1)	246	(44.9)	<0.001
High	731	(42.2)	416	(36.8)	295	(53.8)	
Missing	32	(1.8)	25	(2.1)	7	(1.3)	
Daily sports activities							
No	1293	(74.6)	890	(75.0)	403	(73.5)	ns
Yes	435	(25.1)	291	(24.5)	144	(26.3)	
Missing	6	(0.3)	5	(0.4)	1	(0.2)	
Mother's educational level							
Illiterate	73	(4.2)	59	(5.0)	14	(2.6)	<0.001
Primary school	593	(34.2)	432	(36.4)	161	(29.4)	
Secondary school	287	(16.6)	208	(17.5)	79	(14.4)	
High school	514	(29.6)	337	(28.4)	177	(32.3)	
University	240	(13.8)	135	(11.4)	105	(19.2)	
Graduate	19	(1.1)	8	(0.7)	11	(2.0)	
Missing	8	(0.5)	7	(0.6)	1	(0.2)	
Father's educational level							
Illiterate	30	(1.7)	20	(1.7)	10	(1.8)	<0.001
Primary school	336	(19.4)	255	(21.5)	81	(14.8)	
Secondary school	259	(14.9)	191	(16.1)	68	(12.4)	
High school	586	(33.8)	389	(32.8)	197	(35.9)	
University	465	(26.8)	293	(24.7)	172	(31.4)	
Graduate	41	(2.4)	24	(2.0)	17	(3.1)	
Missing	17	(1.0)	14	(1.2)	3	(0.5)	
FTND							
Mean, SD = 4.2121, 2.38575							
0	-	-	-	-	37	(6.8)	-
1	-	-	-	-	43	(7.8)	
2	-	-	-	-	47	(8.6)	
3	-	-	-	-	76	(13.9)	
4	-	-	-	-	81	(14.8)	
5	-	-	-	-	68	(12.4)	
6	-	-	-	-	62	(11.3)	
7	-	-	-	-	53	(9.7)	
8	-	-	-	-	31	(5.7)	
9-10	-	-	-	-	16	(2.9)	
Alcohol use							
Never	-	-	-	-	184	(33.6)	-
Rarely	-	-	-	-	239	(43.6)	
Often	-	-	-	-	99	(18.1)	
Always	-	-	-	-	18	(3.3)	
Missing	-	-	-	-	8	(1.4)	

ns = nonsignificant.
[a]P-values based on chi-square test; P < 0.05 significant.

Table 2. Independent t-test results by gender.

Variables		Levene's test for equality of aariances		t-test for equality of means		
		F	P-value	t	df	P-value[b]
Number of cigarettes per day	Equal variances assumed	3.732	0.054	4.188	533	<0.001*
Mean (SD): Male, 15.90 (7.86); Female, 13.0 (6.47)	Equal variances not assumed			4.458	429.6	<0.001
Age at commencement of smoking	Equal variances assumed	12.913	<0.001	−2.949	523	0.003
Mean (SD): Male, 16.60 (3.13); Female, 17.38 (2.40)	Equal variances not assumed			−3.191	460.6	0.002*
FTND	Equal variances assumed	1.029	0.311	2.124	512	0.034*
Mean (SD): Male, 4.37 (2.34); Female, 3.90 (2.44)	Equal variances not assumed			2.096	342.2	0.037

[b]P-values based on t-test; *P < 0.05 significant.

Table 3. Associations between smoking status and categorical variables by cross tables.

Variable	Pearson's chi-square	df	P-value[a]	Cramer's V
Gender	81.461	1	<0.001*	0.217
Income	50.699	5	<0.001*	0.173
Mother's education level	37.165	5	<0.001*	0.147
Father's education level	21.323	5	0.001*	0.111
Sports activities	0.564	1	0.453	0.018
Mother's smoking status	26.582	1	<0.001*	0.124
Father's smoking status	18.146	1	<0.001*	0.102
Siblings' smoking status	38.279	1	<0.001*	0.149

[a]P-values based on chi-square test; *P < 0.05 significant.

11-20 cigarettes per day, 3 for 21-30 cigarettes per day, and 4 for 31 or more cigarettes per day.

As can be seen from Table 4, gender, income, education of parents, smoking status of parents, and alcohol use are significantly related to nicotine dependence. Neither smoking status nor categorical FTND score showed a significant correlation to a person's sports activities. This variable did not categorically measure activities, so many individuals answered 'yes' to this question even if they had only

Table 4. Associations between categorical FTND scores and categorical variables by cross tables.

Variable	Pearson's chi-square	df	P-value[a]	Cramer's V
Gender	6.634	2	0.036*	0.014
Income	22.031	10	0.015*	0.147
Mother's education level	27.571	10	0.002*	0.164
Father's education level	34.535	10	<0.001*	0.184
Sports activities	0.566	2	0.753	0.033
Mother's smoking status	7.954	2	0.019*	0.068
Father's smoking status	5.946	2	0.051	0.059
Siblings' smoking status	25.960	2	<0.001*	0.124
Alcohol use	37.375	8	<0.001*	0.191

[a]P-values based on chi-square test; *P < 0.05 significant.

limited activities. In the future, we will use a more definite variable to assess sports activities.

Significant Pearson correlations were found between FTND scores and the continuous variables in the study. There was a significant positive correlation between FTND score and number of cigarettes per day (r = 0.612, P < 0.05) and a significant negative correlation between FTND score and age at commencement of smoking (r = –0.232, P < 0.05). There was no significant relationship between age and FTND score (r = 0.043, P = 0.332, because of the closeness of ages of students in this study.

To determine the significant risk factors for smoking, we performed bivariate logistic regression analyses with 8 factors: gender; mother's, father's, and siblings' smoking statuses; income2; mother's and father's education levels; and sports activities. The income2 variable was defined as 0 (<1200 US$/month) or 1 (≥1200 US$/month). The average number of family members of smokers was 4.61 (SD = 1.451), while 45.5% of students were from families with incomes less than 1200 US$/month. Table 5 shows estimated beta and exp(beta) coefficients, Wald statistics, 95% confidence interval for exp(beta), and P-values for single bivariate analyses. As can be seen from Table 5, only the variable sports activities was not significantly associated with smoking status. We excluded smoking status and selected all remaining

risk factors for multivariate logistic regression analysis (Table 6).

Sports activities and the father's education level did not affect the smoking status. The influence of the mother's education level on smoking status may be greater than that of the father's education level because the mother spends more time on the child's discipline. If the parents' education level is high, the income is also expected to be high. The risk of smoking was 2.968 times higher in males than in females (Table 6). Having a smoking sibling increased the risk of smoking 2.368 times, while a smoking mother increased the risk 1.564 times and a smoking father increased it 1.488 times. High income also increased the risk, 1.579 times. This is related to the high prices of tobacco products, which are a result of government policy against smoking and make cigarette use less affordable for low-income people. The Turkish government has also made significant progress in preventing smoking in public places and prohibiting tobacco commercials. We classified 70.7% of the participants using the logistic regression model. Furthermore, the specificity value of the model was 58.5% and the sensitivity value was 76.0%. A goodness-of-fit test was performed using the Hosmer-Lemeshow test, which showed that the model selection methods were successful in the description of our data.

Table 5. Univariate logistic regression models for predicting smoking status.

Variable	B	Wald	P-value[c]	Exp(B)	95.0% CI for exp(B)
Gender	0.958	79.229	<0.001*	2.606	(2.111-3.219)
Mother's smoking status	0.638	26.099	<0.001*	1.892	(1.481-2.416)
Father's smoking status	0.441	18.043	<0.001*	1.555	(1.268-1.906)
Siblings' smoking status	0.738	37.405	<0.001*	2.092	(1.651-2.650)
Income2	0.690	42.806	<0.001*	1.994	(1.622-2.452)
Mother's education level	0.248	32.128	<0.001*	1.282	(1.176-1.397)
Father's education level	0.192	17.946	<0.001*	1.212	(1.109-1.324)
Sports activities	−0.089	0.563	0.453	0.915	(0.726-1.154)

[c] P-values based on logistic regression; *$P < 0.05$ significant.

Table 6. Logistic regression model for predicting smoking status.

Variable	B	Wald	P-value[c]	Exp(B)	95.0% CI for exp(B)
Constant	−2.731	137.121	<0.001*	0.065	-
Gender	1.088	89.296	<0.001*	2.968	(2.368-3.719)
Mother's smoking status	0.447	9.867	0.002*	1.564	(1.183-2.067)
Father's smoking status	0.397	11.881	0.001*	1.488	(1.187-1.865)
Siblings' smoking status	0.862	43.146	<0.001*	2.368	(1.831-3.063)
Income2	0.457	13.872	<0.001*	1.579	(1.242-2.009)
Mother's education level	0.160	6.830	0.009*	1.173	(1.041-1.322)
Father's education level	0.045	0.513	0.474	1.046	(0.925-1.182)

[c]P-values based on logistic regression; *$P < 0.05$ significant.

Discussion

Our study shows that gender, the existence of a smoking family member, the educational level of parents, and the level of family income all play a significant role in smoking behavior among Turkish college students. In addition, the findings of the present study indicate that the use of a multivariate statistical method, such as multivariate logistic regression analysis, for smoking, which may be influenced by many variables, is better than a univariate statistical evaluation. A multivariate logistic regression model was used to evaluate the data and to find the best model.

According to our knowledge, these findings represent the first detailed data analysis on smoking patterns among college students in Turkey using FTND scores. The Turkish translation of the FTND test that was used in this paper was studied through factor analysis by Uysal et al. (10).

We found significant differences in the number of cigarettes per day, age at commencement of smoking, and FTND scores between genders (Table 2). Gender, income, educational level of parents, smoking level of parents, and alcohol use were all significantly related to the categorical FTND score (Table 4). FTND was positively correlated to the smoking habits of the mother, father, and siblings, and income played a significant role in smoking behavior among Turkish university students (Table 6). This is also supported by the results given in Table 3.

Smoking attitudes are similar in different regions of Turkey. Akçay et al. (12) questioned 3156 students studying in Ankara and found higher smoking levels in students with high-income families. Similarly, Aslan et al. (13), in a study involving 1050 male students, concluded that students from high-income families have a higher smoking level. The logistic regression study of 1126 household members from the southeastern Anatolian region of Turkey by Bozkurt et al. (1) showed that males were 6.7 times more likely to be smokers than females. Erdogan et al. (14) studied 3659 students from 6 universities in Ankara and showed that there were significant differences in most smoking-related behaviors between genders. They found that 33.4% of interviewed students were regular smokers, and females had a lower tendency to smoke. Celikel et al. (15) measured the risks of smoking and depression in 1870 university students and concluded that being male increased the risk of smoking 2.72 times, while parental smoking increased the risk of smoking 1.45 times. Erbaydar et al. (16) surveyed 6012 urban youth, aged 13 to 17, throughout 15 provinces in Turkey. Ever-smoking rates for youths aged 13 to 17 were found to be 57.5% for boys and 41.1% for girls, while the current smoking rate was 25.2% for boys and 10.5% for girls. The mother's education level was a predictor for both boys' and girls' smoking.

When comparing our results with US data, we found a slightly higher frequency of smoking in males (41.3% versus 37.9%) and slightly lower smoking levels in females (21.4% versus. 29.7%) between Turkish and US college students (17,18). Smoking rate, tobacco consumption level, and nicotine dependence (as measured by craving upon waking) also varied considerably for 5 schools in the US data. Overall smoking prevalence at the 5 schools was 23%. Self-reported smoking level and nicotine dependence were found to be highly correlated (r = 0.44, P < 0.001 and r = 0.612, P < 0.05 for US and Turkish data, respectively) (19).

Conclusions

The cigarette smoking habits of family members constitutes an important risk factor for the cigarette smoking of youth. Increased levels of cigarette smoking and nicotine dependence in youth were observed to coincide with an increase of parental daily cigarette smoking, along with a higher mother's educational level and a higher family income. It is recommended that parents, along with young people, be informed about the hazards of smoking and about smoking cessation. The common assessment of both genetic and environmental factors in the development of smoking habits is of great importance.

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