Waterpipe smoking among university students: Prevalence and association with mental health, risky health behaviors and psychosocial factors

Waterpipe smoking among university students

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Abstract

Aim: Waterpipe contributes significantly to the tobacco epidemic, especially among youth. The aim of this study is to investigate the prevalence of waterpipe smoking and its association with mental health, risky health behaviours and psychosocial factors in university students.

Materials and Methods: An online survey was applied to students of Çanakkale Onsekiz Mart University. In total, 4430 (15.49%) of 28582 students were reached. Waterpipe smoking was evaluated in categories of "ever" and "never". After univariate analyzes, a "Hierarchical" Binary Logistic Regression model was performed.

Results: The mean age of the participants was 21.79±3.57 [17–63] years; 51.96% of the participants were ever waterpipe smokers. Male gender (OR=1.61), staying in students' home in contrast to all other places (OR=1.43), low academic achievement (OR=1.24), ever smoking cigarettes (OR=4.83), ever drinking alcohol (OR=3.50), being sexually active after the age of 18 (OR=2.11), the inability to cope with anger (OR=1.26), higher level of sensation seeking (OR=1.14) and higher level of impulsivity (OR=1.13) were found to be significantly associated with being ever waterpipe smoker.

Discussion: Better understandings of the factors associated with waterpipe smoking may lead to more successful cessation and prevention strategies.

Keywords

Waterpipe smoking; Mental health; Risky health behavior; Psychosocial factors; Youth

Introduction

Tobacco use is one of the main determinants of global health. Waterpipe smoking involves inhaling the smoke through water after the tobacco is heated with coal. This method of tobacco use contributed to the tobacco epidemic in some countries and specific age groups through exceeding cigarette smoking [1]. Some studies have shown that ever waterpipe smoking ratios are between 3% - 65% [2]. People perceive falsely that waterpipe is safer than cigarettes because the smoke is filtered by passing through water. However, smoking of waterpipe has been shown to cause diseases such as lung cancer, respiratory diseases, cardiovascular diseases and low birth weight [3].

University years are an emotionally tempestuous transition period to adulthood, and mental disorders are quite common in this period. Understanding the causal links between tobacco use and mental disorders can help develop effective cessation interventions for young people of university age [4].The relationship between mental disorders and cigarette smoking has been clearly demonstrated, while for waterpipe smoking it is still unclear.

Risky health behaviors increase in youth and cause serious morbidity and mortality for both the present and future [5]. Waterpipe smoking is also a kind of risky health behavior. It has been shown for a long time that risky health behaviors are related to each other and tend to cluster [6]. Although many studies have shown that waterpipe smoking is associated with other forms of tobacco use, substance use, and alcohol drinking [7,8], more studies are needed to explain the relationship between waterpipe smoking and other risky health behavior.

To develop successful prevention and treatment strategies for waterpipe smoking, psychosocial factors should be examined in a comprehensive manner [9]. Impulsivity and sensation seeking factors are usually evaluated in tobacco and drug addiction studies, but there are few studies evaluating psychosocial factors in the context of waterpipe smoking.

There is an insufficient number of studies, which evaluate mental health, risky health behaviors and psychosocial factors in the context of waterpipe smoking. Also, the existing literature is still controversial. More studies are needed, especially in the young population, for a better understanding of waterpipe smoking and for developing more effective prevention and intervention strategies. The aim of this study is to investigate the prevalence of waterpipe smoking and its association with mental health, risky health behaviors and psychosocial factors in university students.

Material and Methods

Population and sample

This study was conducted as part of a multidimensional youth survey at Çanakkale Onsekiz Mart University, which hosted 28582 students in 9 faculties, 4 colleges and 11 vocational colleges during the 2011–12 educational year. Among the students, 15.49% (4430) participated in the research, and 3909 of 4430 (88.24%) replied to the waterpipe question. The study aimed to reach 10% of the student population of the university, as similar studies reached similar rates.

Measures and Variables

The original survey included 71 questions, but in this study, 54 of them were evaluated in accordance with our aim. The question regarding smoking waterpipe was asked "Do you smoke waterpipe? If you smoke waterpipe, how often do you use it?"; options such as "never", "1-2 times in my life", "1-2 times per month", "1-2 times per week" and "every day" were proposed and recoded into a dummy variable with two categories as "ever waterpipe smoker" and "never waterpipe smoker". Depressive symptoms, anxiety, hopelessness, anger management inability, lack of assertiveness, sensation seeking and impulsivity were measured by BAPI scales [10]. All variables are given in Table1 with details.

Application

An online survey was available for students to be completed between the September 2011 and May 2012 (one educational year). All students were informed of the survey through an automated system that students used for learning of class grades at various times during the year. The notification was repeated to boost the participation rates in the survey. Firstly, information about the study was given to the participants, and then consent was requested. Participants who gave consent were then requested to anonymously complete the survey questions. While completing the survey, participants could skip questions they did not want to answer.

Statistical analysis

Data were analyzed by using statistical software and univariate analyses were done using Chi-Square, Mann-Whitney U, and Kendall's tau-b tests. A "Hierarchical" Binary Logistic Regression Analysis model was used to evaluate factors associated with ever waterpipe smoking. All independent variables were included in this model, except for subjective economic status, problem drinking, and lack of assertiveness, because they were not related to ever waterpipe smoking. Firstly, independent variables of general characteristics, then variables of risky health behavior, mental health and psychosocial factors were added to model respectively. All analyses were examined for two-way p-values, and a level of significance was accepted as $p < 0.05$.

Permission and consent

Approval and permission for this study was obtained from the Clinical Research Ethics Committee and the Çanakkale Onsekiz Mart University rectorate.

Results

Data from 3909 students who completed the waterpipe question are presented; 2104 (53.82%) of them were female and 1803 (46.18%) were male. The mean age of the participants was 21.79±3.57 [17–63] years. The mean age of females (21.70±3.77) was significantly lower than the mean age of males (21.89±3.30) (U=1776695, p=0.001), and1845 (47.20%) of the participants were ever cigarette smokers; 2031 (51.96%) were ever waterpipe smokers, and 599 (29.49%) of these people had never smoked cigarettes in their lifetime. Male gender, being older, being single in contrast to married, staying in students' home in contrast to all other places, low academic achievement, lower self-rated health status, ever smoking cigarettes, ever drinking alcohol, ever drug and substance use, violent behaviors, exposed to intimate partner violence, more exercise, lower level of perceived mental health status, ever

Table 1. Measures

FEATURE	Number of Questions	DESCRIPTIONS
Waterpipe smoking	1	
GENERAL CHARACTERISTICS		
Sociodemographic		Divorced and widowed were excluded due to their too low frequency (0.59%)
Gender		
Age	5	Living place was recoded into two categories: student's home and other places, due to the fact that ever waterpipe smoking rates have always been the same for others (with family, dormitory, with relatives, others), but not for the student home.
Marital status		
Living places		
Subjective economic status		
Academic Achievement	1	Have you ever lost a year in your academic life? Yes / No
Self-Rated Health Status	1	5-point Likert scale with the options: "very good", "good", "moderate", "bad" and "very bad" was recoded in reverse order for analysis.
RISKY HEALTH BEHAVIOUR		
Cigarette smoking status	1	"Do you smoke cigarettes? If you smoke, how often do you use it?" with 5 options of point Likert scale from "never" to "regular" – Recoded into dummy variable as "ever" and "never"
Alcohol drinking	1	"How often do you drink alcohol?" with options of 5-point Likert scale from "never" to "every-day" – Recoded into dummy variable as "ever" and "never"
	4	Problem drinking -CAGE
Drug and Substance usage	8	Questions for different type of drugs and substances with options "never" and other frequencies – recoded into one dummy variable as "never" and "ever"
Violent behavior	2	"Have you ever been in a fight in the last year?" and "Do you carry knife, or any other weapon?" with options "never" and other frequencies in 5-point Likert scale - Sum of both questions recoded into "dummy variable" with "never" and "ever" violent behavior
Exposed to intimate partner violence	1	"Did your boyfriend or girlfriend hit you or give you harm in the last year?" with options "never", and other frequencies in 5-point Likert scale -recoded into dummy variable as "never" and "at least one time"
Self-harm	1	"Did you cut any part of your body or hurt your body in the past?" with options "never" and other frequencies in 5-point Likert scale - recoded into dummy variable as "never" and "at least one time"
Sexual risky behavior	1	Question about being sexually active with options: "never", "before age 18" and "after age 18" – Being sexually active before the age of 18 was accepted as sexual risky behavior
Exercise	1	"How often do you exercise?" with 5-point Likert scale options from "never" to "everyday"
MENTAL HEALTH		
Perceived mental health status	1	5-point Likert scale with the options: "very good", "good", "moderate", "bad" and "very bad" - recoded in reverse way for analysis
Psychiatrist and psychologist consultation	1	With options: "never", "once", "2-3 times", "more than 4 times" and "I don't want to answer" - recoded into dummy variable as "never" and "at least one time"
Suicide	1	"Have you ever planned or attempted suicide in the past?" with the multiple options recoded into dummy variable as "never" and "at least one time"
Depressive symptoms	4	
Anxiety	3	
PSYCHOSOCIAL FACTORS		
Hopelessness	1	"My future seems dark" with options of 5-point Likert scale from "never" to "always" (Adopted from Beck's Hopelessness Scale)
Happiness	1	"Do you feel happy in general?" with options of 5-point Likert scale from "never" to "too often"
Anger management inability	3	
Lack of assertiveness	5	
Sensation seeking	3	
Impulsivity	3	

Table 2. Univariate analyses

FEATURES	EWS	NWS	STATISTICS
GENERAL			
Sociodemographic			
Gender (male)	57.07%	34.33%	X^2= 202.869; p<0.001
Age	21.89±3.30	21.70±3,77	U=1656934.5; p<0.001
Marital status (single)	98.23%	97.12%	X^2=5.185; p=0.023
Living places (student home)	41.51%	24,12%	X^2=133.072; p<0.001
Subjective economic status			tau_b=-0.014 p=0.374
Low academic achievement	39.09%	27.58%	X^2=57.987; p<0.001
Self-Rated Health Status	3.98±0.77	4.09±0.71	U=1202597.5; p<0.001
RISKY HEALTH BEHAVIOR			
Cigarette smoking (ever smoker)	70.51%	21.99%	X^2=921.571; p<0.001
Alcohol drinking			
Ever drinking	72.88%	28.43%	X^2=762.762; p<0.001
Problem Drinking	84.13%	85.23%	X^2=0.354; p=0.552
Ever drug and substance usage	17.48%	6.00%	X^2=111.612; p<0.001
Violent behavior	28.70%	11.12%	X^2=161.982; p<0.001
Exposed to intimate partner violence	8.84%	3.40%	X^2=42.854; p<0.001
Self-harm	14.17%	4.59%	X^2=89.345; p<0.001
Sexual risky behavior – being sexually active before the age of 18	38.28%	54.14%	X^2=14.531; p<0.001
Exercise	3.08±1.25	2.94±1.34	U=1269837.0; p=0.014
MENTAL HEALTH			
Perceived mental health status			tau_b= -0.135; p<0.001
Ever psychiatrist or psychologist consultation	27.17%	19.59%	X^2=25.717; p<0.001
Ever suicide attempt	19.97%	9.92%	X^2=63.185; p<0.001
Depression	34.74%	21.23%	X^2=70.475; p<0.001
Anxiety	40.05%	25.76%	X^2=71.795; p<0.001
PSYCHOSOCIAL FACTORS			
Hopelessness			tau_b= 0.132; p<0.001
Happiness			tau_b= -0.069; p<0.001
Anger management inability	75.83%	63.35%	X^2=58.642; p<0.001
Lack of assertiveness	55.32%	52.64%	X^2=2.290; p=0.130
Sensation seeking			tau_b=0.236; p<0.001
Impulsivity			tau_b=0.125; p<0.001

EWS: Ever waterpipe smoker, NWS: Never waterpipe smoker
(Statistics tests performed: X^2: Chi-square, U: Mann-Whitney U, tau_b: Kendall's tau-b correlation)

received psychiatrist and psychologist consultation, ever made a suicide attempt, being depressive, being anxietic, higher level of hopelessness, lower level of happiness, anger management inability, higher level of sensation seeking and higher level of impulsivity were associated with being ever waterpipe smoker in univariate analysis. Sexual risky behavior variable needs special attention because subcategories of safe sexual behavior groups show different pattern in the context of waterpipe smoking. People who are not sexually active has lower rates of ever waterpipe smoking, while people who became sexually active after the age of 18 have higher rates than people who became sexually active before the age of 18. Thus, in regression analysis, this variable was evaluated with all subcategories. All univariate analyses are given in the Table 2.

In the last model of regression, male gender (1.61), staying in students' home in contrast to all other places (1.43), low academic achievement (1.24), ever smoking cigarette(4.83),

Table 3. Regression model for risk factors of waterpipe smoking

	Model 1	Model 2	Model 3	Model 4
	OR (95% C.I.)	OR (95% C.I.)	OR (95% C.I.)	OR (95% C.I.)
GENERAL				
Male Gender	2.24 (1.93 - 2.61)*	1.48 (1.20 - 1.82)*	1.49 (1.20 - 1.84)*	1.61 (1.29 - 2.00)*
Age	1.00 (0.97 - 1.03)	0.96 (0.93 - 1.00)*	0.96 (0.93 - 1.00)*	0.97 (0.94 - 1.01)
Marital status (single)	1.33 (0.75 - 2.38)	1.64 (0.79 - 3.39)	1.60 (0.77 - 3.31)	1.62 (0.78 - 3.36)
Staying at student home (ref. cat:all other places)	1.98 (1.68 - 2.33)*	1.49 (1.22 - 1.81)*	1.48 (1.22 - 1.80)*	1.43 (1.17 - 1.74)*
Low academic achievement	1.52 (1.29 - 1.79)*	1.23 (1.01 - 1.50)*	1.21 (0.99 - 1.48)	1.24 (1.01 - 1.51)*
Self-Rated Health Status	0.80 (0.72 - 0.88)*	0.99 (0.88 - 1.13)	1.03 (0.90 - 1.19)	1.04 (0.91 - 1.20)
RISKY HEALTH BEHAVIOUR				
Ever cigarette smoking		5.00 (4.16 - 6.02)*	4.94 (4.10 - 5.95)*	4.83 (4.00 - 5.82)*
Ever alcohol drinking		3.68 (3.06 - 4.43)*	3.66 (3.04 - 4.41)*	3.50 (2.90 - 4.23)*
Ever drug and substance usage		1.29 (0.94 - 1.78)	1.25 (0.90 - 1.72)	1.26 (0.91 - 1.74)
Violent behavior		1.32 (1.03 - 1.70)*	1.29 (1.00 - 1.66)*	1.17 (0.91 - 1.51)
Exposed to intimate partner violence		1.12 (0.74 - 1.69)	1.07 (0.70 - 1.63)	1.07 (0.70 - 1.64)
Self-harm		1.55 (1.10 - 2.20)*	1.46 (1.02 - 2.09)*	1.37 (0.96 - 1.96)
Sexually active before the age of 18 (ref. cat: not sexually active)		0.98 (0.70 - 1.36)	0.97 (0.70 - 1.35)	0.89 (0.64 - 1.24)
Sexually active after the age of 18 (ref. cat: not sexually active)		2.27 (1.62 - 3.17)*	2.24 (1.60 - 3.13)*	2.11 (1.50 - 2.95)*
Exercise		1.03 (0.96 - 1.10)	1.03 (0.96 - 1.11)	1.02 (0.95 - 1.09)
MENTAL HEALTH				
Perceived mental health status			0.97 (0.86 - 1.10)	1.03 (0.90 - 1.18)
Ever Psychiatrist and psychologist consultation			0.98 (0.78 - 1.23)	0.96 (0.76 - 1.21)
Ever suicide attempt			1.15 (0.86 - 1.55)	1.10 (0.82 - 1.48)
Depression			1.05 (0.83 - 1.34)	0.950 (0.74 - 1.22)
Anxiety			1.09 (0.87 - 1.37)	1.00 (0.79 - 1.25)
PSYCHOSOCIAL FACTORS				
Hopelessness				1.06 (0.95 - 1.18)
Happiness				0.99 (0.90 - 1.09)
Anger management inability				1.26 (1.02 - 1.56)*
Sensation seeking				1.14 (1.07 - 1.21)*
Impulsivity				1.13 (1.04 - 1.24)*
MODEL STATISTICS				
Omnibus X^2	285900; p<0.001	944626; p<0.001	3694; p=0.594	42965; p<0.001
Cox&Snell R^2	0.088	0.328	0.329	0.338
Nagelkerke R^2	0.118	0.437	0.438	0.451
Classification accuracy rate (Null model: 51.31%)	62.25%	75.85%	75.98%	76.56%

Hierarchical regression analysis was performed to determine the association of waterpipe smoking with mental health, risky health behaviours and psychosocial factors.   *: p<0.05

ever drinking alcohol (3.50), being sexually active after the age of 18 (2.11), inability to manage anger (1.26), higher level of sensation seeking (1.14) and higher level of impulsivity (1.13) were found to be significantly associated with the fact of being ever waterpipe smoker. A summary of regression models is given in Table 3.

Discussion

In our study, the rate of ever waterpipe smoking is 52.0%. It seems higher than ratios for US - up to 44.2% [11], and Europe -up to 11.6% [12], but lower than ratios for Eastern Mediterranean Region – up to 65.3% [2]. Turkey shares some cultural properties with the Eastern Mediterranean Region, so ever waterpipe smoking ratio determined in our study seems to be coherent with the literature.

The first block of variables in our regression model included socio-demographic characteristics, academic achievement,

and self-rated health status. These variables accounted for 11.8% of the variance in waterpipe smoking. Male gender is significantly associated with waterpipe smoking, as in most of the previous studies [4,7-9,13], on the other hand, few others state that there is no gender interaction [14]. In Turkey, waterpipe smoking is more socially acceptable for females, and it should never be forgotten that the rate of waterpipe smoking among females (41.4%) is still high. We did not determine the significant relationship between age and waterpipe smoking in the same way as Jackson and Aveyard [13], but there are studies that suggest the opposite, as the waterpipe smoking rate decreases [15] or increases with age [7,14]. It seems confounding, but in our opinion, controversy over this is useless. Since the waterpipe smoking rate is highest between the ages of 18 – 24 [16], and we are already trying to evaluate people who are in this short age range. In our study, the rate of waterpipe smoking was higher among single people than married people.

Staying in students' home (off-campus), in contrast to all other places, was also associated with higher waterpipe smoking, as in other studies [17]. Family supervision [17] and dormitory codes led to lower rates of waterpipe smoking. Low academic achievement is also associated with higher waterpipe smoking rates.

Risky health behaviors, especially cigarette smoking[8,9,13] and alcohol drinking [9,14], were significantly associated with being ever waterpipe smoker, similar to previous studies. Only a study [14] conducted in Russia did not state a relationship between waterpipe and cigarette smoking. Some experts believe that waterpipe is a gateway for smoking cigarettes, but the direction of causality is not clear [8]. Cigarette smoking is seen as one of the most powerful predictors of being ever waterpipe smoker, with an odds ratio of 4.8 in our last regression model, but one-third of waterpipe smokers still have not smoked cigarettes in their lifetime. It is already known that the cigarette smoking rate among young people has declined, probably due to effective cessation interventions, but the waterpipe smoking rate is increasing [7]. To prevent this shift, waterpipe should be considered in tobacco cessation programs. We have not determined any relationship between waterpipe smoking and drug or substance use similar to Galimov et al. [14], in contrast to previous studies that stated a significant relationship [7,15]. Cultural and geographical features strongly affect drug and substance use [18]. Drug and substance use rates in Turkey were far below than developed countries [19]. Thus, differences in the cultural properties of the populations in which studies were conducted maybe the cause of irrelevance. Risky sexual behavior was not associated with being ever waterpipe smoker, similar to Berg at al. [9], who used the number of sex partners in the past year as an indicator of risky sexual behavior. According to Berg at al. [9], irrelevance was interesting and one question may not be enough to evaluate risky sexual behavior in the same way as our study in which we tried to measure risky sexual behavior with one question. Self-harm [20] and exercise [17] were not associated with being ever waterpipe smoker in the literature, similar to our data presented.

None of the mental health variables (perceived mental health status, ever psychiatrist and psychologist consultation, ever suicide attempt, depression, and anxiety) in this study were associated with being ever waterpipe smoker. In fact, the association between mental health and waterpipe smoking is highly controversial. King et al. [21] (weak association) and Primacket al. [4] demonstrated a moderate association between mental health and waterpipe smoking, while Goodwin et al. [7] and Bandiera et al. [22] reported no association. Differences in the methodology of studies (for example, scales used to measure mental health) or cultural properties of the populations in which studies were conducted, may be the cause of diversity in these results.

In our study, hopelessness was not associated with waterpipe smoking, but a previous study, which considered waterpipe as a drug or substance, demonstrated the association between hopelessness and drug and substance usage [23]. Impulsivity was associated with being ever waterpipe smoker, according to our regression model. According to another study, conducted only with female university students, impulsivity was still not associated with being ever waterpipe smoker, while it was associated with the frequency of smoking waterpipe [15]. Targeting impulsive adolescents may be effective in preventing waterpipe use as well as preventing cigarettes, alcohol or drugs. Sensation seeking was associated with being ever waterpipe smoker, as in one previous study [9]. Sensation seekers are interested in rewarding actions and risky health behaviors such as waterpipe smoking [24]. Suggesting healthy behaviors, such as exercise, may provide enough satisfaction for sensation seekers and may lead to a decrease in waterpipe smoking [9].

Waterpipe smoking rates among young are increasing, while cigarette smoking rates are declining. In some regions, waterpipe smoking exceeds cigarette smoking and may be more harmful than cigarette smoking. Waterpipe should be included in tobacco cessation programs to prevent the transition between risky health behaviors. Also, it should be noted that nearly one-third of waterpipe smokers do not smoke cigarettes. A better understanding of the factors associated with waterpipe smoking may lead to more successful cessation and prevention strategies. Even for some of these factors determined in our study, the literature is still controversial. It may indicate that the nature of waterpipe smoking varies according to cultural or geographical features.

Study Limitations

Firstly, this study was conducted only in one university, so the results should be generalized cautiously for the population. In this study, waterpipe smoking was evaluated only in two categories: "ever smoker" and "never smoker", thus this may lead us to miss associations between the independent variables and other frequencies of waterpipe smoking. The mental health scales in this study were screening tools and their diagnostic capability may be restricted. Lastly, the real rejection rate of our questionnaire was not clear due to the technical limitations of the online survey methodology.

This study contributed to the deficient and controversial area of the relationship between waterpipe smoking and mental health, risky health behaviors and psychosocial factors, by using subjective measures and representing crowded university population.

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