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Attitudes of Waterpipe use among Adolescents in the Republic of Serbia - Findings from Health Behavior in School-aged Children Study

Stavovi adolescenata u Republici Srbiji o upotrebi nargila – rezultati studije ponašanje u vezi sa zdravljem kod dece školske dece

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Summary

Introduction: Smoking waterpipes has become very popular among youth around the world. Among the main reasons for this trend is the misperception that waterpipes are less harmful than cigarettes.
Aim: This paper aims to highlight motives, attitudes, and patterns of waterpipe use among adolescents in Serbia.
Methods: This study was a secondary analysis using data obtained from the study "Health behavior in school-aged children survey in the Republic of Serbia 2017/2018". An international research protocol was used to collect data on the health behavior of 15-year-old students. The questionnaire was designed for adolescents and consists of 74 questions, concerning health and waterpipe smoking habits. The survey was voluntary and anonymous.
Results: The study included 1605 students from 38 high schools, 798 (47.7%) males and 807 (52.3%) females. Waterpipe use is significantly related to smoking experience (β=0.271) and feeling nervous and depressed (β=0.150). Region (p=0.01), communication with friends about problems (p=0.01), and severe problems with family or friends (p=0.01) were all statistically significant in correlation to waterpipe smoking. Smoking habits (β=0.381) and urban regions (β=0.125) had the greatest impact on waterpipe smoking.
Conclusions: This study highlights waterpipe smoking is widespread among fifteen-year-old adolescents in Serbia. Cigarette smoking and anxiety signs like nervousness were risk factors for waterpipe use. Adolescents from Belgrade are considerably more frequently waterpipe smokers than all other regions.
Keywords: waterpipe, smoking, dependence, adolescents

Sadržaj

Uvod: Pušenje nargila je postalo veoma popularno među mladima širom sveta. Među glavnim razlozima za ovaj trend je zabluda da su nargile manje štetne nego cigarete.
Cilj rada: Ovaj rad ima za cilj da istakne motive, stavove i obrasce korišćenja nargila kod adolescenata u Srbiji.
Metod: Ova studija je bila sekundarna analiza podataka dobijenih iz studija "Ponašanje u vezi sa zdravljem kod dece školske dece 2017/2018". Međunarodni protokol istraživanja je korišćen za prikupljanje podataka o zdravstvenom ponašanju 15-godišnjih učenika. Upitnik je bio dizajniran za adolescente i sastojao se od 74 pitanja, koja se tiče zdravlja i navika pušenja nargila. Anketa je bila dobrovoljna i anonimna.
Rezultati: Studija je obuhvatila 1605 učenika iz 38 srednjih škola, 798 (47,7%) dečaka i 807 (52,3%) devojčica. Upotreba nargila bila je značajno povezana sa pušenjem cigareta (b=0,271) i osećajem nervoze i depresivnog raspoloženja (b=0,150). Region u kom adolescent žive (p=0,01), komunikacija sa prijateljima o problemima (p=0,01) i problemi sa porodicom ili prijateljima (p=0,01) su bili u statistički značajnoj korelaciji sa pušanjem nargile. Navika pušenja cigareta (b=0,381) i urbana sredina (b=0,125) imali su najveći uticaj na pušenje nargile.
Zaključak: Ova studija ističe da je pušenje nargila široko rasprostranjeno među petnaestogodišnjim adolescentima u Srbiji. Pušenje cigareta i anksioznost i nervoza su faktori rizika za upotrebu nargile. Adolescenti iz Beograda znatno su češće pušači nargila u odnosu na sve ostale regione.
Ključne reči: nargile, pušenje, zavisnost, adolescenti

Introduction

A waterpipe is a type of tobacco consumption instrument. It is known by a variety of names around the world including narghile, argileh, hubble-bubble, shisha, etc. (1). The first historical records of waterpipe use were discovered in Asia and it is still widely used in that region as well as in the Middle East.

Waterpipe use is now popular and a challenge all over the world. This method of using tobacco products is limited to the social environment and public places such as some restaurants and bars. The rise in the number of adolescents using tobacco in this manner around the world is particularly concerning (2). The tobacco industry made the availability of

waterpipes tobacco, particularly appealing with its wide variety of flavors and aromas (3). The availability of waterpipes and the prevalence of waterpipe use among younger adolescents are related (4). This trend reflects the impact of globalization and presents a new challenge for this vulnerable population.

The waterpipe is made up of at least two basic components. In the lower part of the waterpipe, there is a water container for filtering the smoke, where a silicone hose emerges and where the water flow can be controlled. A valve can be used to control the water flow rate and set it to rest. The upper section of the waterpipe is the second part, with a clay or marble vessel containing hot tobacco coals (1,3).

Jurak, mouassal, and tumbak are the three most common types of waterpipe tobacco (3). Each one differs in terms of the percentages of tobacco, glycerol, honey, sugarcane, and a large number of different flavors. Jurak, besides tobacco, contains sugarcane, fruit flavors that are released from the dried fruit that is part of the tobacco cube, and some spices (3). Mouassal, besides tobacco (30%), contains sugarcane and honey, different flavors, and glycerol. Tumbak is an unflavored tobacco leaf in its purest form (3). What makes waterpipes so appealing to use is a large source of flavor mixed with tobacco, with fruity flavors taking the lead. The number of puffs in a waterpipe session, as well as the total smoke inhaled, varies depending on the nicotine concentration in the waterpipe system, the added type of flavor that makes it more palatable to use, and the atmosphere in the group of people gathered to use it (5). In the aforementioned circumstances, the waterpipe session lasts longer (usually 30 to 90 min), a greater volume of smoke is consumed and deeper smoke inhalation occurs (6).

Factors that promote waterpipe smoking are the incorrect perception of noxiousness, the trend among young people, peer pressure to try it, the lack of restrictions in waterpipe bars, the availability of waterpipes, the allure of aromatic smells, fashion trend, a socioeconomic status that provides adolescents with pocket money, curiosity, and the need for entertainment (7,8). The growing body of evidence, particularly concerning waterpipe use points to a misunderstanding of the health risks (3).
This misconception also refers to the lack of understanding that waterpipe smoking is more harmful than smoking tobacco (6). The practice of waterpipe smoking is typically designed as a group of people gathering in a designated area, meaningful as a longer-lasting process. Waterpipe smokers spend a long time in a kind of social and entertainment interaction because the concept of waterpipe smoking is designed in this way, and thus the length of smoking is longer, often more than an hour (8).

Waterpipe smoke contains various unhealthy components such as nicotine, polycyclic aromatic hydrocarbons, volatile aldehydes, nitric oxide, nicotine, furanic and phenolic compounds, nanoparticles, heavy metals, ammonia, and carbon monoxide (5). These components may contribute to cancers, cardiovascular and lung disease, as well as many other diseases.

Shihadeh et al (9) found that aromatic waterpipe products containing no nicotine are also dangerous to health. They contain almost the same amounts of carbon monoxide, aldehydes, and polycyclic aromatic hydrocarbons suggesting that “the same flavorful smoke found in other waterpipes without the harmful effects of tobacco” is misleading.

This period of life is unique because behaviors are intensely developed, and influenced by numerous factors, changes, and the formation of numerous life habits, all of which are important in the life of each individual. Schoolchildren’s knowledge, attitudes, and behavior have an impact on their health, both in childhood and later in life. Waterpipe smoking is undoubtedly one of the most undesirable habits. The development of this habit reinforces the incorrect belief in this population that this type of smoking is less harmful than traditional cigarette smoking (8).

The increasing trend and popularity have been recorded in a growing number of countries globally so waterpipe use deserves emphasized public health attention. Vapljanin et al (10) analyzed the factors influencing waterpipe smoking among Serbian adolescents and proposed further research into the impact of social factors on waterpipe use in this population.

The primary aim of this study was to determine the factors influencing waterpipe use among adolescents, related to sociodemographic factors, attitudes, and waterpipe use patterns among fifteen-year-old adolescents in the Republic of Serbia, as well as to propose feasible preventive activities.

Methods

This study was a secondary analysis using data obtained from the study "Health behavior in school-aged children survey in the Republic of Serbia 2017/2018", conducted by the Institute of Public Health of Serbia "Dr Milan Jovanovic Batut", with the support of the Ministry of Health of the Republic of Serbia and the Ministry of Education, Science and Technological Development of Serbia and the World Health Organization (WHO). A standardized international research protocol was used to collect data on the health behavior of school children (9). High schools in Serbia were used as a sampling frame. The main sample in the research consisted of 38 high schools. Schools were selected using the Probability Proportional to Size algorithm. Four statistical regions have been defined as geographical areas of research: Belgrade, Vojvodina, Šumadija and Western Serbia, and Southern and Eastern Serbia. The fieldwork was conducted by 40 trained interviewers, under the

supervision of the research team of the Institute of Public Health of Serbia "Dr. Milan Jovanovic Batut", in the period from May 3 to June 8, 2017. A total of 74 questions about health and health behavior were asked. The target population was 15-year-old students. The survey was voluntary and anonymous, with students completing the survey questionnaire themselves. For this study, data concerning the listed types of behavior and/or habits were analyzed by territorial distribution as well as gender.

Predictors included gender, school, feeling depressed or nervous, frustration with physical appearance, region/municipality, father knowing how to spend money, ability to talk about problems with friends, having been bullied in the past months, serious conflict with family or friends and mother knowing how to spend money. The dependent variable was the at least once in life and the period of the last 30 days of waterpipe use among 15-year-old children.

All data were statistically processed in SPSS 22.0 software. The $\chi 2$ test was used to determine the significance of response frequency. The difference was defined as significant at the level of $p < 0.05$. The multiple linear regression method was used to estimate the relationship between independent variables and dependent variables. The results are presented in the following tables.

The Ethics Board of the Institute of Public Health of Serbia "Dr. Milan Jovanovic Batut" approved the study protocol and provided written informed consent, and informed consent from the parents and children was also obtained.

Results

A nationally representative sample consisted of 1605 students from 38 high schools.

The school response rate was 75.43%. The school children analyzed in this research, aged 15, are mostly from Šumadija and Western Serbia 537 (33.46%), from Vojvodina 496 (30.92%), Belgrade 319 (19.86%) while the smallest sample included in the research was from the territory of South and Eastern Serbia 253 (15.76%). Regarding gender, 798 (47.7%) participants were male, and 807 (52.3%) were female.

The response rate on the smoked waterpipe variable was 98.44% (1580 students). Descriptive statistics according to at least once in life and the period of the last 30 days of waterpipe use are given in tables 1 and 2.

Table 1. Descriptive statistics according to the last 30 days of smoked waterpipe
Tabela 1. Deskriptivna analiza korišćenja nargila za poslednjih 30 dana

Smoked waterpipe at least once-in-life	Statistic	Std. Error
Mean	1.37	.027
95% Confidence Interval for Mean	1.32	
Lower Bound	1.43	
Upper Bound	1.17	
5% Trimmed Mean	1.00	
Median	1.144	
Variance	1.070	
Std. Deviation	1	
Minimum	7	
Maximum	6	
Range	0	
Interquartile Range	3.572	.062
Skewness	13.325	.123
Kurtosis		

Table 2. Descriptive statistics according to at least once in-life smoked waterpipe
Tabela 2. Descriptivna analiza korišćenja nargila bar jednom u životu

Smoked waterpipe at least once-in-life	Statistic	Std. Error
Mean	1.78	.039
95% Confidence Interval for Mean	1.70	
Lower Bound	1.86	
Upper Bound	1.54	
5% Trimmed Mean	1.00	
Median	2.484	
Variance	1.576	
Std. Deviation	1	
Minimum	7	
Maximum	6	
Range	1	
Interquartile Range	2.235	.061
Skewness	4.052	.123
Kurtosis		

Table 3 shows the frequency and percentages of waterpipe smoke in the last 30 days.

Table 3. Frequency of waterpipe smoke last 30 days in children aged 15
Tabela 3. Učestalost korišćenja nargila u uzrastu 15 godina u poslednjih 30 dana

Waterpipe smoked last 30 days	Frequency	Percent	Valid Percent
Never	1318	33.5	83.4
1-2 days	129	3.3	8.2
3-5 days	47	1.2	3.0
6-9 days	30	0.8	1.9
10-19 days	26	0.7	1.6
20-29 days	5	0.1	0.3
30 days or more	25	0.6	1.6
Total	1580		100.0

Table 4 shows the results of our analysis of the experience of waterpipe smoking by region.

Table 4. Experience of waterpipe smoking at the age of 15 in regions
Tabela 4. Korišćenje nargila u uzrastu 15 godina u regionu

Region	Waterpipe smoking (days)						
	Never	1-2	3-5	6-9	10-19	20-29	≥30
Belgrade	55.8%	17.0%	6.6%	3.8%	6.3%	1.6%	8.8%
Vojvodina	71.5%	11.2%	3.9%	4.1%	2.4%	1.6%	5.3%
Šumadija/Western Serbia	77.2%	10.9%	3.7%	2.8%	2.2%	0.4%	2.8%
South/Eastern Serbia	74.1%	11.6%	5.6%	3.6%	2.0%	0.0%	3.2%

Adjusted R Square is 0.194. The greatest contribution was made by smoking (β=0.381), followed by the region/municipality in which the children live (β=0.125), both of which were statistically significant (0.00). The correlation between cigarette smoking and at least once-in-life waterpipe use is statistically significant (0.00) (Table 5).

Table 5. Multiple regression analysis of predictors for at least once in life smoked waterpipe
Tabela 5. Predviđajući faktori za korišćenje nargila bar jednom u životu

Smoked waterpipe at least once-in-life		Collinearity statistics		Standardized coefficient	Significance
Predictors	Pearson correlation	Tolerance	VIF	Beta	Sig.
Region/municipality	-.104	.972	1.029	-.125	**.000**
School	-.015	.983	1.017	.003	.930
Gender	-.031	.855	1.170	-.061	.066
Feeling nervous	-.107	.733	1.365	-.041	.257
Days smoked at least once in their life	**.406**	.822	1.216	**.381**	**.000**
Been bullied past months	-.035	.908	1.101	-.062	.054
Can talk about problems with friends	.062	.920	1.087	.052	.107
Talk about problems	-.068	.803	1.245	-.028	.418
Frustrated with physical appearance	-.036	.901	1.110	-.062	.055
Serious conflict with a family of friends	.110	.940	1.064	.079	.014
Mother knows how spending money	.087	.840	1.191	-.006	.852
Father knows how spending money	.127	.833	1.200	.055	.101
I felt depressed	.046	.744	1.344	-.016	.650
Feeling nervous	.176	.834	1.199	.052	.124

Dependent variable: At least once in life waterpipe smoking

This model accounts for 13.6% of the variance. The most statistically significant (0.00) contributions were made by smoking (β=0.271) and feeling nervous by the school children (β=0.150). The correlation analysis is given in Table 6.

Table 6. Multiple regression analysis of predictors for smoked waterpipe last 30 days
Tabela 6. Predviđajući faktori korišćenja nargila u poslednjih 30 dana

Smoked waterpipe last 30 days		Collinearity statistics		Standardized coefficients	Significance
Predictors	Pearson correlation	Tolerance	VIF	Beta	Sig.
Region/municipality	-.029	.927	1.079	-.070	**.001**
School	.032	.946	1.058	.022	.293
Gender	-.037	.854	1.171	-.027	.222
Feeling nervous	-.070	.752	1.330	-.006	.784
Days smoked at least once in their life	.313	.796	1.257	.271	.000
Been bullied past months	.046	.898	1.114	-.001	.971
Can talk about problems with friends	-.065	.920	1.087	-.069	.001
Talk about problems	-.073	.804	1.244	-.017	.453
Frustrated with physical appearance	-.005	.913	1.095	-.023	.272
Serious conflict with a family of friends	.114	.932	1.072	.071	.001
Mother knows how spending money	.088	.816	1.225	-.012	.587
Father knows how spending money	.096	.817	1.224	.043	.055
I felt depressed	.015	.761	1.314	-.070	.003
Feeling nervous	.243	.813	1.230	.150	.000

Dependent variable: Smoked waterpipe 30 days

There was a highly statistically significant difference ($\chi 2$ = 64.98; dF = 18; p = 0.000) in the frequency of waterpipe smoking, whether it is at least once in life (17.0%) or repeated experience (6.3% and 8.8 %) in Belgrade versus all other regions.

Discussion

Waterpipe use is popular among youth around the world. All forms of tobacco use are popular among the youth because of promotion through the internet, social networks, and aggressive advertising (10). Available research has emphasized the dangers of waterpipe smoking which differs slightly from cigarette smoking, as well as that it can serve as an introduction to smoking traditional cigarettes (11). Waterpipe smoke consists of different types of carcinogenic substances such as carbon monoxide, nitrosamines, benzene, polycyclic hydrocarbons, nitric oxide, formaldehyde, and different types of heavy metals (12). Adolescent waterpipe smokers can invoke additional harm to their health since they show a tendency to expose themselves to other substances like cigarettes or marijuana (13). Numerous harmful effects of waterpipe smoking include impaired brain development and a lowered level of neurotrophic factor, which is important for behavior and cognition (14). It has also been proven that extensive waterpipe smoking increases the risk of various types of tumor occurrence, including the respiratory and digestive tract (oral cavity and esophagus) (3). The impact of waterpipe smoking has the same effect on the heart and blood vessels as traditional cigarette smoking (15).

It was estimated that 1.6 million younger adolescents were current waterpipe users in 2014, with a rising trend (16). According to Warren et al (19), the prevalence of waterpipe smoking among adolescents 13-15 years old ranges from 6 to 34%, indicating that our adolescents fit global statistics. Among the people living in the Middle and the Far East, waterpipe smoking is part of the tradition and its prevalence is higher (11). Lebanon has the highest reported rate (37%) (2). Anjum et al (20) found in a Pakistan study 27% at least once in their life waterpipe use and 17% current among adolescents 14-19 years of age. They found no significant relationship between current traditional cigarettes and waterpipe smoking, in contrast to our findings. The same results Wong et al (8) found in Malaysia. In a study conducted by Ramic-Catak et al (21), in the Federation of Bosnia and Herzegovina, where waterpipe smoking is a cultural practice, 14.1% of male and 15.5% of female students 14-15 years of age are current waterpipe smokers, which is higher than in our findings.

The prevalence of current (last 30 days) waterpipe use is 5–17% among American adolescents (11). Agaku et al (22) found at least once their life prevalence of 10.5% and a current (any last 30-days) prevalence of 3.6% waterpipe smoking among US youth. In the same study, the overall prevalence of 15-year-olds was 8.0%, and the current (last 30 days) prevalence was 3.0% (17). Arrazola et al (18) found among adolescents in the USA that current waterpipe smoking (last 30 days) was 9.4%. Our findings show similar results (8.8%). When we analyze European findings, 12% of 15-year-old adolescents reported having tried waterpipe. The results are far higher in Sweden, where 27% of 15-year-olds reported having tried waterpipes at least once in their lives, with one quarter reporting current waterpipe smoking (18). Our findings did not support the mentioned studies. Orth et al (24) found among adolescents in Germany that the exclusive use of waterpipes, e-cigarettes, or e-waterpipes was more prevalent in 2016 than tobacco

use in the form of cigarettes. In Estonia, 21.9% of people are waterpipe smokers while in the Czech Republic and Latvia it was 22.7% (2).

A study conducted by Aboaziza (18) showed that addiction develops quickly, even after the first waterpipe use making quitting smoking more difficult. Some authors argue that waterpipe use is more addictive than cigarette smoking (2). We found that cigarette smoking was one of the most robust and consistent risk factors for waterpipe use, as in research by Palamas et al (7). Vapljanin et al (10) identified that the most important reason for waterpipe smoking is the desire for social acceptance. Our findings are consistent with a Syrian survey that smoking waterpipe relieves stress (male 19% and female 8%), and helps deal with pressure (11%) and being depressed, like among Swedish adolescents (18–20).

Our research confirms that smoking waterpipe among the youth is an increasingly common public health problem. According to Atanasova et al (27) smoking waterpipe could be a goal in public health for issue-specific health literacy. Understanding the reasons for and patterns of waterpipe use will lead to more effective control strategies. Comprehensive national strategies for the control and prevention of tobacco use among adolescents should include all tobacco product modalities, not just cigarettes, as well as nicotine-free products.

Some of the strategies are increasing tobacco product prices, clear and compatible smoke-free laws, inspection monitoring facilities that serve waterpipes, particularly for customers under the age of 18, monitoring of enclosed public places offering waterpipes, prohibition on advertising water pipes in media and social networks, and national public education media campaigns.

The development of strict waterpipe smoking control strategies should be a public health priority. The results based on attitudes, behavior, and predictors for smoking waterpipes can affect the improvement and innovation of health education programs, smoking prevention programs, educational public campaigns, and shaping policies for better future control, resulting in long-term efficiency and behavior change.

The limitation of our study is the socio-demographic characteristics of the respondents. Self-report studies carry the risk of bias. The results of a single-method study are less generalizable. Other limitations could be insufficient analysis of the factors influencing the choice of waterpipe as a method of smoking. We propose a longitudinal study with follow-up on the acute and chronic negative impact on the respiratory, cardiovascular, and nervous systems.
We also propose more longitudinal studies to gain a better understanding of trends, sociodemographic parameters which influence waterpipe use, and the overall impact on adolescents' health.

Conclusion

This study highlights the worrying prevalence of waterpipe smoking among Serbian adolescents. Cigarette smoking was one of the most robust and consistent risk factors for waterpipe use, as well as anxiety signs like feeling nervous. Findings from this study indicated highly statistically significant in the frequency of waterpipe smoking, whether it is at least once in life or repeated experience in urban areas such as Belgrade city versus all other regions. Findings indicate that waterpipe smoking among school-aged children necessitates a serious approach to the public health system's activity action.

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