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ORIGINAL PAPER

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# Water Pipe as Growing Public Health Challenge Among School Children in the Federation of Bosnia and Herzegovina

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## ABSTRACT

**Introduction:** The water pipe is a form of tobacco smoking that recently become very popular among youth in many countries all over the globe. **Aim:** To highlight recent data collected through Global Youth Tobacco Survey (GYTS) in the Federation of Bosnia and Herzegovina (FBiH) 2019, related to knowledge, attitudes and behavior of school children and youth to water pipe consumption.

**Methods:** The GYTS questionnaire for the Federation of BiH 2019 contained 60 multiple-choice questions. The GYTS 2019 in the Federation of BiH was conducted in a total of 73 of the 75 sampled primary and secondary schools with a school response rate of 97.3%. From the 6,972 sampled students a total of 6,415 participated as eligible students in grades 8-9 of primary and 1<sup>st</sup> grade of secondary school, with a response rate for students of 92.0%. **Results:** Survey findings show that almost half (44.1%) of the school children confirm ever smoking the water pipe, while Current smoking of water pipe is confirmed by 16.1% school children. **Conclusion:** There is a substantial need for implementing of systematic and inter sectorial tobacco control measures that involves a water pipe as new public health challenge among youth.

**Keywords:** public health, GYTS, smoking.

## 1. INTRODUCTION

The water pipe is not a new tobacco product, it is present in the society since centuries under different names: “narghile” in East Mediterranean countries including Turkey and Syria, “shisha” in Egypt and North African countries and

“hookah” in India, or “water pipe” frequently used in World Health Organization documents (1). After so many surveys and evidence based proofs on all health consequences caused by water pipe, there are still belief widespread among water pipe consumers that smoking water pipe is safe or less harm than other tobacco products (2). While consumption of cigarettes among adolescents decreases in several countries, consumption of other tobacco products increase, particularly water pipe, that become global public health issue which have to be considered as priority in the planning and design of national and international tobacco control measures (3).

Regionally, there are some historical or cultural differences in water pipe design device, but all water pipes have similar segments: a head, body, water bowl, hose and mouthpiece. In the bottom of the head there is holes that allow smoke to pass into to body central conduit, submerged in the water in the water bowl (4). It is proof that smoking of one cigarette take usually 5 to 7 minutes, with 40 to 75 ml puffs and inhale 0, 5 liters of smoke while water pipe smoking takes 20 to 80 minutes, with 50 to 200 puffs and inhale 0,15 to 1,0 liters of smoke. This is reason for statement that related to quantity of inhaled tobacco smoke, consumption of one water pipe is equal to 100 or more cigarettes (5).

Laboratory analyzes of water pipe smoke revealed measurable levels of carcinogenic compounds such as: nitrosamines, polycyclic aromatic hydrocarbons (PAHs), formaldehyde, benzene, toxic compounds nitric oxide and heavy metals, and high concentrations of car-

bon monoxide (6).

In comparison to cigarette smoke, water pipe smokers consume higher amounts of arsenic, lead and nickel, 36 times more tar, 15 times more carbon monoxide and polycyclic aromatic hydrocarbons (PAH) (7, 8).

The water pipe smoking acutely leads to increased heart rate, increase of blood pressure, impaired pulmonary functions and carbon monoxide infections (9, 10). Long term complications of water pipe smoking is associated with chronic bronchitis, emphysema, lung, gastric and oesophageal cancer, obstetrical complications, coronary artery disease and mental health problems (11, 12). Water pipe smoking is hazard to oral health and has been associated with periodontitis, dry socket, premalignant lesions and oral cancer (13).

Consumption and sharing of water pipe among consumers could be connected with wide spreading of different communicable diseases, due to lack of disinfection and properly cleaning of a hose. There are many surveys that show the water pipe smoking has been associated with tuberculosis, herpes, hepatitis, infection with *H. pylori*, toxoplasmosis, as well lymphocytic dysfunction (14).

Until recently, national surveys of tobacco use rarely involved water pipe smoking prevalence. Surveillance of web-based searches show that popularity of water pipe smoking increased over the past decade in the USA, Australia, Canada and UK (15, 16). International studies indicate that adolescent consumption of other tobacco products than cigarettes particularly water pipe increased in last two decades, in several European countries, also in the United States, Canada and Australia. About 30% of college students in USA have smoked water pipe currently smokers 12,4% (17).

## 2. AIM

Aim of this paper is to highlight recent data collected through Global Youth Tobacco Survey (GYTS) in the Federation of BiH 2019, related to water pipe consumption among school children and suggest some preventive measures.

## 3. METHODS

The United States Centers for Disease Control and Prevention (CDC) together with World Health Organization (WHO) developed the Global Youth Tobacco Survey (GYTS) to present comprehensive tobacco prevention and control information on young people. The GYTS is a nationally representative comprehensive school-based survey related to smoking knowledge, attitudes and behavior in school-children of eligible classes age 13-15 (18).

GYTS was conducted four times in the Federation of BiH, in the year 2003, 2008, 2013 and 2019 with the support of the Federal Ministry of Health who authorized the surveys. All four GYTS surveys in the Federation of BiH were conducted by the Institute for Public Health of the Federation of Bosnia and Herzegovina as the implementing agency (19). For the purpose of this article, were used data collected from last GYTS survey in the Federation of BiH 2019.

The GYTS questionnaire for the Federation of BiH 2019 contained 60 multiple-choice questions, included all 43 core questions from the GYTS Standard Core Question-

naire and 17 questions added from the optional modules. Within questions from the optional modules, 11 questions related to attitudes and behavior of school children in line to water pipe were added.

The GYTS is a school-based survey, which involve a two-stage cluster sample designed to produce a representative sample of students in 8<sup>th</sup> and 9<sup>th</sup> primary school grades and 1<sup>st</sup> grade of secondary school. In the Federation of BiH two-stage cluster sample design was used to produce a representative sample of students. Schools were selected with probability proportional to school enrollment size. All classes in the selected schools were included in the sampling frame. All students in the selected classes were eligible to participate in the survey.

The GYTS 2019 in the Federation of BiH was conducted in a total of 73 of the 75 sampled primary and secondary schools with a school response rate of 97.3%. All of the 290 sampled classes participated in GYTS resulting in a 100.0% response rate. From the 6,972 sampled students a total of 6,415 participated as eligible students in grades 8-9 of primary and 1<sup>st</sup> grade of secondary school, with a response rate for students of 92.0%. Finally, the overall response rate was 83,3%.

A weighting factor was applied to each student record to adjust for probability of selection, non-response, and post-stratification adjustment to population estimates. SUDAAN, a software package for statistical analysis of complex survey data, was used to calculate weighted prevalence estimates and standard errors (SE) of the estimates (95% confidence intervals [CI] were calculated from the SEs). A weight has been associated with each questionnaire to reflect the likelihood of sampling each student and to reduce bias by compensating for differing patterns of no response.

## 4. RESULTS

Almost half (44.1%) of the school children confirm ever smoking the water pipe, this is more common among boys (48.6%) than girls (39.90%) (Table 1). Current smoking of water pipe is confirmed by 16.1% school children, 17.7% of boys and 14.4% of girls (Table 2). Survey findings show early initiation of smoking the water pipe among schoolchildren in the Federation of BiH. Over third of ever smokers (35.7%) start to smoke at the age of 12 to 15 (Table 3).

Only 5.4% school children are refused to get water pipe because their age, more likely boys (7.0%) than girls (3.6%)

	Total	Male	Female
%	44.1	48.6	39.9
Lower 95% limit	40.7	44.8	36.2
Upper 95% limit	47.6	52.3	43.6

Table 1. Percentage of school children ever smoked water pipe, Federation of BiH, 2019

	Total	Male	Female
%	16.1	17.7	14.4
Lower 95% limit	13.7	14.5	12.1
Upper 95% limit	18.9	21.3	17.1

Table 2. Percentage of school children who currently smoke water pipe, Federation of BiH, 2019

	Total	Male	Female
Never smoke water pipe			
%	57.1	52.9	61.4
Lower 95% limit	53.7	49.2	57.5
Upper 95% limit	60.5	56.4	65.1
7 years old or younger			
%	1.4	1.9	0.9
Lower 95% limit	1.1	1.3	0.6
Upper 95% limit	1.9	2.8	1.4
8 or 9 years			
%	1.3	2.1	0.6
Lower 95% limit	1.0	1.5	0.3
Upper 95% limit	1.7	2.8	1.1
10 or 11 years			
%	4.5	5.5	3.6
Lower 95% limit	3.5	4.2	2.6
Upper 95% limit	5.7	7.0	4.9
12 or 13 years			
%	20.6	23.3	17.8
Lower 95% limit	18.5	20.8	15.5
Upper 95% limit	22.8	26.1	20.4
14 or 15 years			
%	14.8	14.1	15.5
Lower 95% limit	12.4	11.3	12.9
Upper 95% limit	17.5	17.4	18.5
16 years or older			
%	0.2	0.2	0.2
Lower 95% limit	0.1	0.1	0.1
Upper 95% limit	0.4	0.4	0.4

Table 3. Age when start to smoke water pipe, Federation of BiH, 2019

	Total	Male	Female
Did not try to get water pipe in last 30 days			
%	77.3	75.0	79.7
Lower 95% limit	74.6	71.6	76.8
Upper 95% limit	79.8	78.1	82.3
Refused because their age in last 30 days			
%	5.4	7.0	3.6
Lower 95% limit	4.6	5.8	2.8
Upper 95% limit	6.2	8.4	4.6
Age did not keep them from being served water pipe in last 30 days			
%	17.3	18.0	16.7
Lower 95% limit	15.1	15.3	14.1
Upper 95% limit	19.9	21.0	19.5

Table 4. Percentage of school children have been refused to serve them water pipe, Federation of BiH, 2019

Almost 2 in 10 schoolchildren (17.3%) confirm age did not keep them from being served water pipe in last 30 days, more boys (18.0%) than girls (16.7%) (Table 4).

Almost half of all children surveyed (46.7%) definitely think other people's water pipe smoke is harmful to their

	Total	Male	Female
Definitely not			
%	6.3	8.6	3.8
Lower 95% limit	5.5	7.2	3.0
Upper 95% limit	7.1	10.1	4.7
Probably not			
%	8.9	9.2	8.5
Lower 95% limit	7.8	7.8	7.4
Upper 95% limit	10.0	10.8	9.8
Probably yes			
%	38.1	35.5	40.8
Lower 95% limit	36.3	33.2	37.8
Upper 95% limit	40.1	38.0	43.9
Definitely yes			
%	46.7	46.7	46.9
Lower 95% limit	44.8	44.3	43.8
Upper 95% limit	48.7	49.0	50.1

Table 5. Percentage of school children who think other people's water pipe is harmful for them, Federation of FBiH, 2019

	Total	Male	Female
More comfortable			
%	46.2	51.4	41.1
Lower 95% limit	44.4	48.8	38.7
Upper 95% limit	48.1	53.9	43.6
Less comfortable			
%	10.1	10.9	9.3
Lower 95% limit	8.5	9.1	7.3
Upper 95% limit	12.1	13.0	11.9
No difference			
%	43.6	37.8	49.5
Lower 95% limit	41.9	35.4	47.0
Upper 95% limit	45.4	40.2	52.1

Table 6. Percentage of school children who think smoking water pipe helps people feel more or less comfortable, Federation of BiH, 2019

health, without any difference among boys and girls, while over third of them (38.1%) think that other people's water pipe smoke is probably harmful for them, more likely girls (40.8%) than boys (35.5%) (Table 5).

Almost a half of all children surveyed (46.2%) think that smoking water pipe helps people feel more comfortable at celebrations, parties and social gatherings, this opinion was more common among boys (51.4%) than girls (41.1%) (Table 6).

## 5. DISCUSSION

This is the first longitudinal study comparing cigarette and water-pipe smoking among young adolescents in a Middle Eastern setting. This study shows that smoking is widespread and quickly increasing among this young population. The Global Youth Tobacco Survey (GYTS) performed in the Federation of BiH in 2019 shows that smoking of water pipe among school children become a significant public health challenge.

Almost half (44.1%) of the school children confirm ever smoking the water pipe, more common among boys (48.6%) than girls (39.90%), while current smoking of water pipe is confirmed by 16.1% school children, 17.7% of boys and

14.4% of girls. Results collected through GYTS in the Federation of BiH are similar to trends of water pipe smoking in several European countries, including the United States (20). Also, water pipe smoking is now more likely in younger age groups, particularly adolescents. Findings from cross-sectional survey conducted 2014 on a random sample of 4,576 schoolchildren in Australia aged 12-17, show 13% of adolescent had used the water pipe, with 2% using the water pipe exclusively while 67% of water pipe consumers had also used cigarettes (21). Data from surveys conducted in Germany show that in period between 2007 and 2016 decrease of consumption of cigarettes among adolescents and increase of water pipe consumption (22).

Through GYTS findings 46.7% school children in the Federation of BiH definitely think other people's water pipe smoke is harmful to their health, while many international studies show belief among youth that smoking water pipe is safe or less harm than other tobacco products (23-25). GYTS findings in the Federation of BiH show only 5.4% school children are refused to get water pipe because their age, and 17.3% confirm age did not keep them from being served water pipe in last 30 days, that is contrary to the last tobacco control law in the Federation BiH that bans the sale of tobacco products to minors still under age 15 (26)

In looking for real predictors for water pipe popularization among youth in the Federation of BiH, more attention should be raised on social image of water pipe smoking, as 46.2% school children think that smoking water pipe helps people feel more comfortable at celebrations, parties and social gatherings, similarly to other survey results conducted in Sweden (27) and the United States (28).

## 6. CONCLUSIONS

The water pipe consumption among school children is new public health challenge in the Federation of BiH.

Related to smoking prevention of water pipe, a variety of measures needed from policy-level interventions, such as enforcement of new tobacco control law that enrolled water pipe as any other tobacco products, ban of smoking of water pipe in enclosed public places, regulatory inspection monitoring of facilities that serves water pipe, ban of serving water pipe to minors under age of 18, ban of advertisement and promotion of water pipe in media, social network and public events. There should be greater focus on effective water pipe smoking prevention programs particularly in earlier grades of primary and secondary schools as a part of regular school curriculum with more youth sensible information's on health consequences of water pipe.

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## REFERENCES

1. Maziak W. et al. Tobacco smoking using a water pipe: a re-emerging strain in a global epidemic. *Tobacco Control*, 2004, 13: 327-333.
2. Maziak W. Eissenberg T, Ward KD, Water pipe use and dependence: implications for interventions developments. *Pharmacology, Biochemistry and Behavior*. 2005; 80: 173-179.
3. Bou Fakhreddine HM, Kanj AN, Kanj NA, The growing epidemic of water pipe smoking :health effects and future needs. *Respir Med*. 2014 Sep; 108(9): 1241-1253.
4. Water pipe Tobacco Smoking: health effects, research needs and recommended actions by regulators, WHO Study Group on Tobacco Product Regulation, WHO, 2005, <http://www.tobacco.who.int>.
5. Shidadeh A. et al. Towards a topographical model of narghile water pipe café smoking: a pilot study in a high socioeconomic status neighborhood of Beirut, Lebanon. *Biochemistry, Pharmacology and Behavior*, 2004, 79(1): 75-82.
6. WHO, Fact sheet: Water pipe, WHO Advisory Note: Waterpipe Tobacco Smoking: Health effects, Research Needs and Recommendations Actions by Regulators, WHO, 2005.
7. Jacob P, Raddaha AHA, Demsey D, Havel C, peng M, Yu Le. et al. Comparasion of nicotine and carcinigen exposure with waterpipe and cigarette smoking. *Cancer Epidemiol Biomarkers Prev*. 2013; 22: 765-772
8. Hammal F, Chapel A, Wild TC, Kindziarski W, Shihadeh A, Vanderhoek A. et al. Herbal but potentially hazardous: an analysis of the constituents and smoke emissions of tobacco-free waterpipe products and the air qulity in the caffes where they are served. *Tob Control*. 2013.
9. El-Zaatari ZM,Chami Ha, Zaatari GS, Health effects associated with water pipe smoking. *Tob Control*. 2015 Mar; 24(Suppl 1): i31-i43.
10. Sekine Y, Katsura H, Koh E, Hiroshima K, Fujisawa T, Early detection of COPD is important for lung cancer suirvellence. *Eur Respir J*. 2012; 39: 1230-1240.
11. Quasim H, Alarabi AB, Alzoubi KH, Karim ZA, Alshbool FZ, Khasawneh FT, The effects of hookah/water pipe smoking on general health and the cardiovascular system, *Environ Health Prev Med*. 2019 Sep 14; 24(1): 58.
12. Primack BA, Land SR, Fan J, kim KH, Rosen D. Assosiation of mental health problems with waterpipe tobacco and cigarette smoking among college students *Subst Use Missue*. 2013; 48: 211-219.
13. Ramoa CP, Eissenberg T, Sahingur SE, Increasing popularity of water pipe tobacco smoking and electronic cigarette use: implications for oral healthcare, *J Peridontal Res*. 2017 Oct; 52(5): 813-823.
14. Corral S, Albear S, Salim M, Bozyk P.D. Swanberg S.M. The association between hookah smoking and infectious diseases: a systematic review. *ATS Conference 2018, San Diego, USA*.
15. King BA, Dube SR, Tynan MA. Current tobacco use among adults in the United States:findings from national Adult Tobacco Survey .*Am J Public Health*. 2012; 102: e93-100.
16. Giovino GA, Mirza SA, Samet JM. et al. Tobacco use in 3 billion individuals from 16 countries: an analysis of nationally representative cross-sectional household surveys. *Lancet*. 2012; 380: 668-679.
17. Salloum RG, Osman A, Maziak W. Thrasher JF. How popular is waterpipe tobacco smoking Findings from internet search queries. *Tob Control*..2015 Sep; 24(5): 509-513.
18. Global Tobacco Control GTSS-Smoking &Tobacco use, [www.cdc.gov/tobacco/global](http://www.cdc.gov/tobacco/global).
19. Global Youth Tobacco Survey GYTS in the Federation of Bosnia and Herzegovina, Federal Ministry of Health, 2008-2013, Institute for Public Health of the Federation of BiH [www.institut-zdravlje.gov.ba](http://www.institut-zdravlje.gov.ba).

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20. Gaithuru IM, Tarter RE, Klein-Fedyshin M. Review of hookah tobacco smoking among college students: policy implications and research recommendations. *Am J Drug Alcohol Abuse*. 2015; 41(4): 272-280.
21. Williams T, White V. What factors are associated with electronic cigarette, shisha-tobacco and conventional cigarette use, findings from a cross sectional survey of Australian adolescents, *Subst Use Misuse*. 2018 Jul 29; 53(9): 1433-1443, <http://www.ncbi.nlm.nih.gov/pubmed>
22. Orth B, Merkel C, The decline of cigarette smoking among adolescents and young adults in Germany and the rising relevance of water pipes, e-cigarettes e-hookahs, *Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz*, 2018 Nov; 61(11): 1377-1387, <http://www.ncbi.nlm.nih.gov/pubmed>
23. Jawad M, Wilson A, Lee JT, Jawad S, Hamilton FL, Millet C. Prevalence and predictors of water pipe and cigarettes smoking among secondary school students in London. *Nicotine Tob Res*. 2013; 15: 2069-2075
24. Primack BA, Rice KR, Shensa A, Carroll MV, DePenna EJ, Nakkash R et al. US hookah tobacco smoking establishments advertised on the Internet *Am J Prev Med*. 2012; 42: 150-
25. Noland M, Ickes MJ, Rayens MK, Butler K, Wiggins AT, Hahn EJ. The global epidemiology of water pipe smoking. *Tob Control*. 2015; 24: i3-i12.
26. The Law on limited use of tobacco products (Official Gazette of the FBiH, no. 6/98, 35/98, 11/99)
27. Ramji R, Arnetz J, Nilsson M. et al. Determinants of water pipe use among adolescents in Northern Sweden: a survey of use pattern, risk perception and environment factors. *BMC Res Notes*. 2015; 8: 441.
28. Kothari S, Berg CJ. Reasons for use, potential use or discontinued use of hookah among US young adults college students. *Tob Prev Cessat*. 2018 Jan; 4.