Secondhand Smoke Exposure in Waterpipe Venues in Turkey

Fact Sheet

Waterpipe tobacco smoking (also known as *nargile*, hookah or shisha) is growing worldwide.[1] In Turkey, 400,000 adults regularly smoked waterpipes in 2012. Prevalence of regular use among 15- to 24-year-olds is almost twice as high as in the overall population.[2] The most common place for smoking waterpipes was waterpipe cafes.[2]

There is a common misperception that waterpipe tobacco smoking is less harmful than cigarette smoking.[3] In 2009, Turkey banned the use of tobacco products in hospitality venues. In April 2013, a ban on waterpipe smoking in indoor public places was specifically added to the legislation, with a six-month compliance period. This study quantifies the magnitude and content of tobacco smoke exposure from waterpipes and demonstrates the need for continued consideration of waterpipe venues in smoke-free legislation.

Methods

To evaluate exposure to waterpipe tobacco smoking in the environment and by employees, researchers conducted a survey of waterpipe venues and their employees in Istanbul, Turkey between January and May 2013. Venues were required to have at least one non-smoking employee. Air samples in the venues and biomarkers from employees were collected and analyzed (Table 1).

Table 1. Secondhand Smoke Constituents Measured in Air and Exposure Biomarkers Measured in Venue Employees

Air Markers	Exposure Biomarkers
Nicotine	Nicotine (*hair*) Cotinine (*urine, saliva*)
Polycyclic aromatic hydrocarbons (PAHs)	1-hydroxypyrene (1-OHPG) (*urine*)
Carbon monoxide (CO)	Carbon monoxide (CO) (*exhaled breath*)
Nicotine-derived nitrosamine ketone (NNK)	Nicotine-derived nitrosamine alcohol (NNAL) (*urine*)
Particulate matter <2.5 µm ($PM_{2.5}$)	

Venue and Employee Characteristics

Fieldworkers observed venue characteristics during peak business activity and asked about smoking histories of employees and other factors that may contribute to biomarker levels (Table 2). Venue and employee participation rates were 32 and 96 percent, respectively.

Table 2. Venue and Employee Characteristics

Venue Characteristics	(N = 9)
Indoor smoking policy	
Not allowed indoors, enforced	44%
Not allowed indoors, not enforced	22%
Allowed in some indoor areas	33%
Customers smoking waterpipe inside	
<24%	56%
25-49%	44%
Observations during peak activity	
# people, mean (SD)*	19 (11)
# cigarette smokers, mean (SD)	5 (5)
# waterpipe smokers, mean (SD)	5 (6)

* SD = standard deviation

Employee Characteristics	(N = 71)
Age, mean (SD)	34 (13)
Male	90%
<high school education	61%
# hours worked/week, mean (SD)	64 (16)
Current waterpipe smoker√	65%
Smoking status	
Current smoker†	92%
Former smoker‡	7%
Never smoker	1%

√ Reported waterpipe smoking in the past three months (daily, <daily or "just a few puffs")
† Reported cigarette, waterpipe or pipe smoking in the past three months (daily, <daily or "just a few puffs")
‡ Reported tobacco use >3 months ago

Air Markers

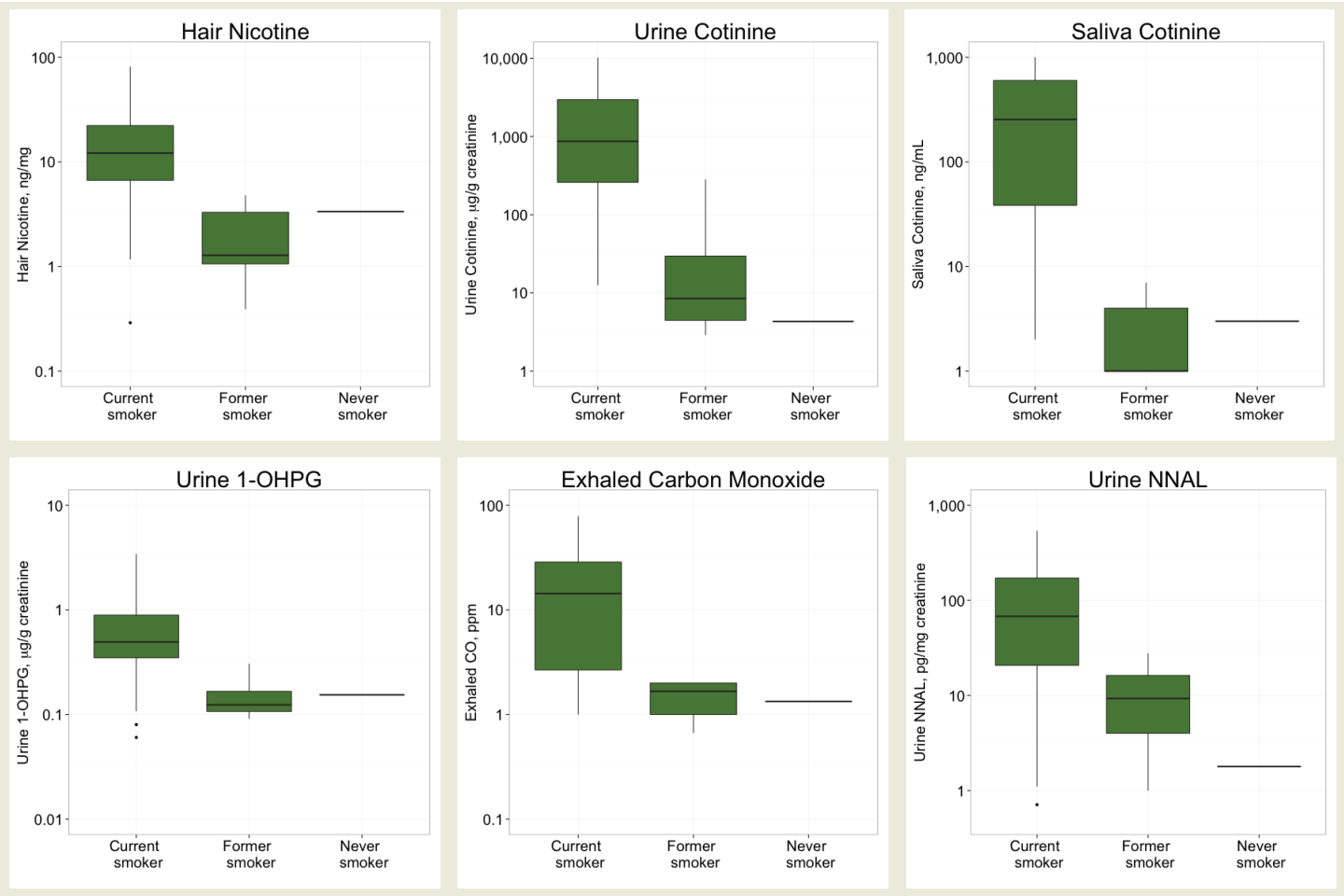
- The median $PM_{2.5}$ level was 162 µg/m^3, exceeding the World Health Organization (WHO) 24-hour $PM_{2.5}$ standard of 25 µg/m^3.
- The median CO level was 4 ppm, below the Environmental Protection Agency (EPA) 8-hour standard of 10 ppm but still moderately elevated.
- The median PAH level was 9 ng/m^3.
- The median air nicotine level was 14 µg/m^3, ranging from 0.02 µg/m^3 to 20 µg/m^3.
- Median NNK concentration was 0.19 ng/m^3, ranging from 0.19 ng/m^3 to 2.52 ng/m^3.
- There are no standards for PAH, air nicotine and NNK, but the concentrations found were consistent with substantial exposure to tobacco smoke.[4]

[1] Maziak W, Taleb ZB, Bahelah R, Islam F, Jaber R, Auf R, Salloum RG. The global epidemiology of waterpipe smoking. *Tobacco Control*. 2014 October 8; [Epub ahead of print]; doi: 10.1136/tobaccocontrol-2014-051903.
[2] Global Adult Tobacco Survey Turkey 2012. Republic of Turkey Ministry of Health. Publication No 948, Ankara, 2014. http://www.who.int/tobacco/surveillance/survey/gats/report_tur_2012.pdf?ua=1
[3] American Lung Association. An emerging deadly trend: Waterpipe tobacco use. Washington: American Lung Association, 2007. http://www.lungusa2.org/embargo/slati/Trendalert_Waterpipes.pdf
[4] Jones MR, Wipfli H, Shahrir S, Avila-Tang E, Samet JM, Breysse PN, et al. Secondhand tobacco smoke: An occupational hazard for smoking and non-smoking bar and nightclub employees. *Tobacco Control*. 2013; 22(5):308-314.

Biomarkers in Venue Employees

Ninety-two percent of venue employees were current smokers, 7 percent were former smokers and 1 percent never smoked (Table 2). While current smokers always had significantly higher biomarker concentrations compared to former and never smokers, the differences between former and never smokers were not statistically significant.

- Median hair nicotine levels were 12.1 ng/mg for current smokers, 1.3 ng/mg for former smokers and 3.4 ng/mg for never smokers.
- Median urine cotinine levels were 867 µg/g creatinine for current smokers, 9.6 µg/g for former smokers and 4.3 µg/g for never smokers.
- Median saliva cotinine levels were 280 ng/mg for current smokers, 1 ng/mg for former smokers and 3 ng/mg for never smokers.
- Median urine 1-OHPG levels were 0.494 µg/g creatinine for current smokers, 0.124 µg/g for former smokers and 0.154 µg/g for never smokers.
- Median exhaled CO levels were 14.3 ppm for current smokers, 1.7 ppm for former smokers and 1.3 ppm for never smokers.
- Median urine NNAL levels were 68 pg/mg for current smokers, 10 pg/mg for former smokers and 1.8 pg/mg for never smokers.



Conclusion

There were high concentrations of $PM_{2.5}$, CO, PAHs, air nicotine and NNK in waterpipe venues. Nicotine was measured in the air, indicating exposure to tobacco smoke in waterpipe venues. The combined active smoking status and elevated occupational exposure of waterpipe employees resulted in extremely high levels of tobacco-related biomarkers in waterpipe employees.

These results confirm the importance of including waterpipe tobacco in smoke-free legislation and provide a baseline to evaluate the impact of the 2013 extension of the smoke-free legislation to waterpipe venues in Turkey. Additional analyses will evaluate the relationship between air markers and biomarkers of secondhand smoke in waterpipe venues.

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