

Evidence from the Lebanon Global School-based Student Health Survey on *midwakh* tobacco smoking in school students: a harbinger of the next global tobacco pandemic?

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Abstract

Background: Cigarette smoking is the most common form of tobacco consumption but other methods have grown in popularity. In the United Arab Emirates and other Gulf countries, smoking *dokha*, a form of tobacco mixed with herbs and spices in a *midwakh* pipe, is common.

Aims: The aim of this study was to determine the prevalence of *midwakh* use in school students in Lebanon and factors associated with its use.

Methods: Data on tobacco use from the Lebanon Global School-based Student Health Survey (GSHS), 2017 were analysed, including current *midwakh* use (defined as *midwakh* use at least once in the 30 days before the survey). The survey includes school students in grades 7–12 (12–18 years). Current *midwakh* use was analysed according to sociodemographic and tobacco-related variables using bivariate and logistic regression analyses.

Results: Of the 5590 students included in the analysis, 4.6% were current *midwakh* users. Current *midwakh* use was significantly more prevalent in students 13 years and older and in male students ($P < 0.01$). Current use was also statistically significantly more prevalent in students in public than private schools. Current cigarette smoking (OR = 15.22; 95% CI: 11.08–20.90), ever use of a waterpipe (OR = 9.61; 95% CI: 6.66–13.86) and parental smoking (OR = 1.56; 95% CI: 1.05–2.31) were also significantly associated with current *midwakh* use.

Conclusion: Although *midwakh* use is low in Lebanon, the patterns of association of *midwakh* use are similar to those of cigarette and waterpipe smoking in young people. Further research is needed to understand the context of *midwakh* use and prevent it from spreading.

Keywords: tobacco use, smoking, *midwakh* pipe, students, Lebanon

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Introduction

Although tobacco use globally is decreasing, it is on the rise in Africa and the Eastern Mediterranean Region. It kills 6 million people every year worldwide, and this number is predicted to increase to 8 million each year by 2030 (1–3). Cigarettes are the most common type of tobacco consumed globally; however, other types of consumption – often called alternative tobacco products – have increased in popularity, such as waterpipe smoking (1).

In the Arab world, consumption of alternative tobacco products, including waterpipe smoking, has increased rapidly, particularly among young people (4). *Dokha* – an Arabic word meaning dizziness – is another alternative tobacco product that is gaining popularity in the Arab world (5). *Dokha* is a form of tobacco leaves mixed with dried fruits, herbs, bark, spices, and dried flowers, which is smoked using a narrow pipe called a *midwakh* (5). About 0.5 g of *dokha* is placed in the *midwakh*, one or two deep

inhalations are taken to burn the *dokha*, and this is done an average of 12 times a day (6). *Dokha* is available in different strengths ranging from mild to strong (4).

Little research has been done on *dokha* smoking using a *midwakh*, with most published reports coming from the United Arab Emirates and anecdotal reports coming from elsewhere in the Gulf region. Emerging evidence suggests that *dokha* is not a safe alternative to traditional cigarette smoking. Acute effects of smoking *dokha* include increased systolic blood pressure, heart rate and respiratory rate (4,5,7,8). Chronic use of *dokha* can result in excessive stimulation of the sympathetic nervous system leading to increases in heart rate and cardiac output which can damage blood vessels (8). The nicotine in *dokha* can also cause constriction of the airways resulting in shortness of breath or tachypnoea (8). Median carbon monoxide and salivary cotinine levels in *midwakh* smokers were similar to those of cigarette smokers and higher than those of non-smokers (9).

The negative health outcomes of *dokha* smoking are particularly concerning given its increasing prevalence and popularity, especially among young people (6,10). *Dokha* is preferred to cigarettes and other alternative tobacco products such as waterpipe (hookah) because it: produces a strong light-headed sensation, satisfies nicotine craving more quickly, produces less second-hand smoke, has no smell, does not stain the lips, is less bulky than a waterpipe and even a cigarette packet, and is relatively cheap (6,10). About 89% of the population of the United Arab Emirates are non-nationals, including nationals of the United States of America (USA) and other high-income countries. A study of ninth-grade male expatriate school students, found that 15% had used a *midwakh* at least once in the previous 30 days, with an average of 25 days of use, and 2–3 times a day (11). A more recent study found that the prevalence rates of ever and current smoking with a *midwakh* in expatriate school students (North American, Australian and/or European) in the United Arab Emirates were not significantly different from those of Emirati students (12). Therefore, while *midwakh* use has been most popular in the United Arab Emirates and other Gulf countries, this alternative tobacco product threatens to spread within and beyond the Arab world (5,12,13).

The objective of our study was to assess the prevalence of *midwakh* smoking in middle- and high-school students in Lebanon, and to explore sex and age differences and associations with smoking other tobacco products.

Methods

The Global School-based Student Health Survey (GSHS) is a surveillance tool developed by the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC), and conducted in collaboration with ministries of health and education (14). It is a school-based survey conducted mainly among a representative sample of adolescents in grades 7 through 12 (about ages 13–18 years).

Sampling procedures

Centers for Disease Control and Prevention determined the sample size and sampling procedures using a sampling frame provided by the Ministry of Education and Higher Education in Lebanon. In order to get representative data with a 5% error, the minimum sample size was calculated to be 1534 students. A two-stage cluster sample design was used to select a representative sample of students in grades 7–12 in schools in Lebanon. The first stage was a systematic sampling of schools with probability proportional to school enrolment size. A total of 64 schools were selected. The second stage was equal probability sampling of classrooms: all classes with most of the students in grades 7–12 were included in the sampling frame. The list of selected schools and classrooms was shared with the Ministry of Education and Higher Education for data collection. All students in the sampled classrooms were eligible to participate in the survey. Out of the 64 selected schools, 56 agreed to participate, giving

a school response rate of 88%. Of the 6152 students selected, 5717 completed the survey, giving a student response rate of 93%. Hence, the overall response rate was 82% ($0.88 \times 0.93 \times 100$). Of the completed surveys, 5708 were usable after data cleaning.

GSHS questionnaire and main measures

The 2017 GSHS conducted in Lebanon used an 88-item questionnaire: 54 core questions and 34 core-expanded or Lebanon-specific questions. The questionnaire was developed in English and Arabic and students were allowed to choose which language they wanted to complete it in.

For the purpose of our analysis, we included the following measures:

Sociodemographic data: age (≤ 12 years, 13–15 years, 16–17 years and ≥ 18 years), sex (male/female), school grade (7–12) and type of school (private/public).

Tobacco use: Our main outcome was current *midwakh* use (yes/no), which was assessed by the following question: “During the past 30 days, on how many days did you smoke a *midwakh* or smoking pipe?” We categorized a response of 0 days as non-current *midwakh* use and all other responses as current *midwakh* use. Only 5590 students answered this question. Further analyses (results available on request) showed that the students who did not respond to the *midwakh* question did not differ significantly from those who did answer this question in terms of sociodemographic and other tobacco use variables. Therefore, the data are missing at random and less likely to introduce bias and affect our results. Other questions on tobacco use included: age at which students first tried cigarettes; waterpipe use (ever/never); number of days they had smoked cigarettes in the 30 days before the survey; exposure to second-hand smoke in the 7 days before the survey, including any form of smoked tobacco use by parents or guardians.

Data collection

The survey is self-administered and students answered it in school during school hours. Students were informed about the survey and its content, their rights and the voluntary nature of participation. Students recorded their answers on an answer sheet that could be scanned by computer. Survey procedures were designed to protect the students' privacy and allow for anonymous and voluntary participation.

Data analysis

Epi Info and Stata software was used for data analyses. To ensure the data were representative of all students in grades 7–12, a weighting factor was applied to each student record to adjust for non-response and for the varying probabilities of selection. Univariate and bivariate analyses were performed, and also adjusted logistic regression analyses to control for age, sex and school type (these three variables were statistically significantly associated with *midwakh* use in the bivariate analysis). Data are reported as frequencies and odds ratios (ORs) and 95% confidence intervals (95% CIs).

Results

A total of 5590 students were included in the analysis. Of these students, 3309 (59.2%) were female, 3597 (64.3%) were in public schools, 3341 (59.8%) were aged 15 years or younger and 2326 (41.6%) were in grades 7 or 8 (Table 1).

Overall, 275 (4.6%) students were current *midwakh* users – had used a *midwakh* at least once in the 30 days before the survey. Current *midwakh* use was significantly more prevalent in students 13 years and older and in male students ($P < 0.01$) (Table 1). Current use was also statistically significantly more prevalent in students in public than private schools (Table 1).

Current *midwakh* use was significantly associated with current cigarette smoking (OR = 15.22; 95% CI: 11.08–20.90, $P < 0.001$) and starting cigarette smoking younger than 14 years of age among cigarette smokers (OR = 2.34; 95% CI: 1.49–3.68, $P = 0.001$), after adjusting for age, sex and school type. *Midwakh* use was also significantly associated with ever smoking a waterpipe (OR = 9.61; 95% CI: 6.66–13.86, $P < 0.001$) and parental smoking (OR = 1.56; 95% CI: 1.05–2.31, $P = 0.029$) after controlling for age, sex and school type (Table 2). Exposure to second-hand smoke was not significantly associated with current *midwakh* use ($P = 0.128$).

Discussion

Our study provides prevalence rates of *midwakh* use outside the United Arab Emirates and other Gulf areas, where

it has been mostly confined. We also explored sex and age differences, and associations with smoking other tobacco products. Overall, 275 (4.6%) of students in grades 7–12 currently smoked *midwakh*; current use ranged between 2.4% in students 12 years or less to 8.6% in students aged ≥ 18 year or more. In secondary-school students (grades 10–12, ages 15–17 years), *midwakh* use ranged from 4.2% to 5.4% of students. These rates are substantially lower than those reported by secondary-school students in the United Arab Emirates (24%) (7). To our knowledge, no other studies have reported the prevalence of *midwakh* use in middle-school students.

Although the prevalence of *midwakh* use is still low in Lebanon, *dokha* use by young adolescents is still concerning, particularly in view of the associations we found with cigarette and waterpipe smoking and parental smoking. Our findings concur with previous evidence on the determinants of smoking in young people (15–17). This situation is of concern because, despite the existence of tobacco control policies at the national level in Lebanon, the overall policy environment in Lebanon – that is, lack of effective enforcement of existing policies (law 174 banning indoor smoking and smoking in public areas) and absence of other regulatory policies (taxation) – is still conducive to tobacco use (18). In addition, government commitment to tobacco product regulation and restrictions on access for young people is lacking, which enables the sale and promotion of tobacco products in this age group.

Table 1 Sociodemographic characteristics of the sample overall and by current *midwakh* use (smoked *midwakh* on one or more days in the past 30 days)

Variable	Students No. (%)	Midwakh use Weighted % (95% CI)	OR (95% CI)	P-value
Total	5590 (100)	4.6 (3.5–5.9)	–	
Sex				
Male	2273 (40.7)	6.7 (5.1–8.8)	1 (–)	
Female	3309 (59.2)	2.7 (1.9–3.7)	0.38 (0.27–0.53)	< 0.001*
Age (years)				
≤ 12	660 (11.8)	2.4 (1.4–3.9)	1 (–)	
13–15	2681 (48.0)	4.5 (3.2–6.2)	1.91 (1.32–2.77)	0.002*
16–17	1805 (32.3)	5.1 (3.6–7.2)	2.21 (1.40–3.47)	0.002*
≥ 18	428 (7.7)	8.6 (5.7–12.7)	3.85 (2.34–6.32)	< 0.001*
Grade				
7	1227 (21.9)	5.1 (2.9–9)	1 (–)	
8	1099 (19.7)	4.1 (2.9–5.7)	0.79 (0.40–1.53)	0.458
9	768 (13.7)	3.9 (2.9–5.2)	0.75 (0.37–1.53)	0.408
10	942 (16.9)	4.2 (2.7–6.6)	0.81 (0.54–1.23)	0.301
11	694 (12.4)	4.7 (2.5–8.8)	0.92 (0.47–1.80)	0.792
12	836 (15.0)	5.4 (4.1–7.0)	1.05 (0.65–1.70)	0.836
Type of school				
Public	3597 (64.3)	6.3 (4.1–9.7)	1 (–)	
Private	1993 (35.7)	3.6 (2.7–4.7)	0.54 (0.31–0.96)	0.037*

OR: odds ratio; CI confidence intervals.

*Statistically significant at $P < 0.05$.

Table 2 Association of current *midwakh* use with other variables related to tobacco uses: logistic regression analyses

Variable	Midwakh use No. (%)	OR (95% CI)	P-value	ORa (95% CI)a	P-value
Tried a cigarette before age 14 years (of those who ever tried a cigarette)					
No	39 (7.5)	1 (-)		1 (-)	
Yes	138 (15.7)	2.31 (1.53–3.49)	0.001*	2.34 (1.49–3.68)	0.001*
Current cigarette smoker					
No	90 (1.6)	1 (-)		1 (-)	
Yes	161 (21.6)	16.61 (12.21–22.58)	< 0.001*	15.22 (11.08–20.90)	< 0.001*
Waterpipe use					
Never	34 (1)	1 (-)		1 (-)	
Ever	228 (9)	9.89 (6.78–14.45)	< 0.001*	9.61 (6.66–13.86)	< 0.001*
Parent/guardian smokes (any type)					
No	86 (3.3)	1 (-)		1 (-)	
Yes	168 (5.2)	1.61 (1.13–2.29)	0.011*	1.56 (1.05–2.31)	0.029*
Exposure to second-hand smoke					
No	59 (3.6)	1 (-)		1 (-)	
Yes	206 (4.8)	1.37 (0.94–2.0)	0.097	1.32 (0.91–1.92)	0.128

OR: unadjusted odds ratio; ORa: adjusted odds ratios; CI confidence intervals.

^aControlling for age, sex and school type.

*Statistically significant at $P < 0.05$.

Exposure of young non-nationals living in the Gulf to *midwakh* use can help spread this practice globally. More than 15% of ninth-grade male expatriate students in the United Arab Emirates were current smokers of *midwakh* and smoked it regularly (25 out of 30 days on average) and often (2–3 times a day) (11). In addition, data from the Global Youth Tobacco Survey on students in grades 10–12 in the United Arab Emirates indicated that about 21% had ever smoked *midwakh*, with no difference between national and expatriate students from the USA, Europe or Australia (12). At least two American websites offer access to *midwakh* products (19,20). The results in this study indicate that *midwakh* smoking is now present among young people in Lebanon. This situation calls for urgent global attention to prevent *midwakh* smoking from spreading further among young people and undermining tobacco control efforts.

Limitations

Only one question was asked on *midwakh* smoking in the 2017 GSHS in Lebanon, which limits a broader

understanding of the pattern of use of this product in students in grades 7–12.

Conclusion

Global and regional research on *midwakh* smoking is just beginning. However, as with other tobacco products, understanding the patterns of *midwakh* use and the development of interventions to reduce its use requires research across different disciplines, such as epidemiology, health promotion, economics, engineering, medicine, chemistry, psychology, policy and others. A recent meeting in the United Arab Emirates – hosted by New York University, Abu Dhabi – brought together researchers on *midwakh* use and experts on alternative tobacco products used in the Arab region to draft a research agenda (21). We urge relevant regional and global organizations with an interest in reducing tobacco use (excluding the tobacco industry and foundations financed by the tobacco industry) to support research on *midwakh* before it becomes the next global tobacco pandemic(22,23).

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Competing interests: None declared.

Bases factuelles tirées de l'Enquête mondiale en milieu scolaire sur la santé des élèves au Liban sur le tabagisme par midwakh : signe avant-coureur de la prochaine pandémie mondiale de tabagisme ?

Résumé

Contexte : Le tabagisme par cigarettes est le premier mode de consommation du tabac, mais d'autres méthodes ont gagné en popularité. Aux Émirats arabes unis ainsi que dans d'autres pays du Golfe, il est courant de consommer la *dokha*, un type de tabac mélangé à des herbes et des épices, au moyen d'une pipe appelée « *midwakh* ».

Objectifs : La présente étude avait pour objectif de déterminer la prévalence de l'utilisation de la *midwakh* parmi les élèves libanais ainsi que les facteurs qui y sont associés.

Méthodes : Les données sur le tabagisme issues de l'Enquête mondiale en milieu scolaire sur la santé des élèves au Liban en 2017 ont été analysées, y compris l'utilisation de la *midwakh* au moment de l'enquête (définie comme l'utilisation de cette dernière au moins une fois dans les 30 jours ayant précédé l'enquête). L'enquête incluait des collégiens et des lycéens (âge compris entre 12 et 18 ans). En réalisant des analyses bivariées et de régression logistique, nous avons analysé l'utilisation de la *midwakh* au moment de l'étude en fonction des variables sociodémographiques et liés au tabagisme.

Résultats : Sur les 5 590 élèves inclus dans l'analyse, 4,6 % étaient des utilisateurs de la *midwakh* au moment de l'étude. L'utilisation de la *midwakh* était significativement plus fréquente chez les élèves de 13 ans et plus et chez les élèves de sexe masculin ($p < 0,01$). L'utilisation de la pipe était statistiquement plus répandue, de façon significative, chez les élèves des écoles publiques par rapport à ceux des écoles privées. Le tabagisme par cigarettes (odds ratio (OR) = 15,22 ; intervalle de confiance à 95 % (IC) : 11,08-20,90), le fait d'avoir déjà fumé le narguilé (OR = 9,61 ; IC à 95 % : 6,66-13,86) et le tabagisme des parents (OR = 1,56 ; IC à 95 % : 1,05-2,31) étaient également fortement liés à l'utilisation de la *midwakh* au moment de l'étude.

Conclusion : Bien que l'utilisation de la *midwakh* soit peu répandue au Liban, les schémas d'association de son utilisation sont analogues à ceux du tabagisme par cigarettes et par narguilé chez les jeunes. Des recherches supplémentaires sont nécessaires pour comprendre le contexte de l'utilisation de la *midwakh* et pour éviter sa propagation.

تعاطي التبغ باستخدام المدواخ بين طلاب المدارس في لبنان: تحليل البيانات من المسح العالمي لصحة طلاب المدارس

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الخلاصة

الخلفية: يُعتبر تدخين السجائر من أكثر طرق تعاطي التبغ شيوعاً، ولكن ثمة طرقاً أخرى آخذة في الانتشار انتشاراً كبيراً. ففي الإمارات العربية المتحدة وبعض بلدان الخليج الأخرى، أصبح شائعاً تدخين الدوخة بالمدواخ، وهي نوع من التبغ مخلوط مع أعشاب وتوابل.

الأهداف: هدفت هذه الدراسة إلى الوقوف على مدى انتشار استخدام المدواخ بين طلاب المدارس في لبنان والعوامل المرتبطة بذلك.

طرق البحث: حُللت بيانات بشأن تعاطي التبغ من المسح العالمي لصحة طلاب المدارس في لبنان لعام ٢٠١٧، وتضمنت الاستخدام الحالي للمدواخ (عُرف بأنه استخدام المدواخ مرة واحدة على الأقل خلال الثلاثين يوماً السابقة للمسح). وشمل المسح طلاب المدارس في الصفوف من ٧-١٢ (١٢-١٨ عاماً). وقد حللنا استخدام المدواخ في الوقت الحالي وفقاً للمتغيرات الاجتماعية السكانية وتلك المرتبطة بالتبغ باستخدام تحليل ثنائي المتغير وتحليل الانحدار اللوجستي.

النتائج: تبين أن ٦,٤ % من الطلاب الذين شملهم التحليل وعدددهم ٥٥٩٠ طالباً من مستخدمي المدواخ في الوقت الحالي. وكانت نسبة مستخدمي المدواخ في الوقت الحالي أعلى كثيراً في الذكور، والطلاب البالغين ١٣ عاماً فما فوق، وطلاب المدارس العامة. وقد ارتبط ارتباطاً قوياً باستخدام المدواخ في الوقت الحالي: تدخين السجائر حالياً (نسبة الأرجحية المُصححة = ١٥,٢٢؛ فاصل الثقة ٩٥٪: ١١,٠٨، ٢٠,٩٠)، وأي استخدام للنجيلة: نسبة الأرجحية المُصححة = ٩,٦١؛ فاصل الثقة ٩٥٪: ٦,٦٦، ١٣,٨٦)؛ وتدخين الآباء (نسبة الأرجحية المُصححة = ١,٥٦؛ فاصل الثقة ٩٥٪: ١,٠٥، ٢,٣١).

الاستنتاج: على الرغم من انخفاض استخدام المدواخ في لبنان، إلا أن النماذج المرتبطة باستخدامه مشابهة لتلك المرتبطة بتدخين السجائر والنجيلة في صفوف الشباب. ويلزم إجراء مزيد من البحث لفهم سياق استخدام المدواخ والحيلولة دون انتشاره.

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