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

**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