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Tobacco and energy drink, emerging health risk among Palestinian adolescent females, a cross-sectional study: Call for action

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Abstract
A cross-sectional study was conducted in 2017 in the West Bank, Palestine to examine the prevalence and the risk factors associated with tobacco smoking and energy drink (ED) intake among 10th grade female students. 382 participants were randomly selected; 16.2% were current tobacco smokers (18.1% cigarette smokers, 36.1% waterpipe smokers), 41.4% were current ED consumers, 29.7% were current tobacco smokers and ED users,15.7% intended to smoke tobacco, and 29.2% intended to consume ED. Most of the adolescents (93.3%) were knowledgeable about the dangers of smoking cigarettes, but not as informed surrounding waterpipe (45.7%) and ED (36.2%) risks. The majority of girls disagreed with banning waterpipe (83.4%) and ED (74.3%). Curiosity was the most frequent motivation for use. Girls who consumed ED were more likely to smoke cigarettes (Odds Ratio (OR:7.2)) and waterpipe (OR:7.6) than non-users. The mean initiation age was 12.6 years for EDs intake, and was associated with the initiation of cigarette smoking (13.6 years) and waterpipe smoking (14.0 years). This study indicates an alarming situation concerning ED intake and tobacco smoking among Palestinian female adolescents. Regular intake of ED was common and strongly associated with tobacco smoking, raising concerns about possible adverse effects, including related risk behaviors. Prevention and cessation strategies are recommended.

Key words: *energy drink; tobacco smoking; waterpipe; non-communicable diseases; female adolescents*

المخاطر الصحية الناتجة عن التدخين وتناول مشروبات الطاقة لدى المراهقات الفلسطينيات، دراسة مقطعية

ملخص

تم إجراء الدراسة الحالية في الضفة الغربية خلال العلام العام 2017، وذلك بهدف فحص مدى إنتشار وعوامل الخطورة المرتبطة بتدخين التبغ وتناول مشروبات الطاقة لدى طالبات الصف العاشر. من بين 352 فتاة تم إختيارهم للمشاركة بالدراسة من خلال الطريقة العشوائية، أظهرت النتائج أن(16%) منهن يدخن التبغ، و(18.1) مدخنات للسجائر، و (36.1) يدخن النرجيلة، وما نسبته(41.4%) يستخدمن مشروبات الطاقة، و(29.7%)منهن يدخن ويشرين مشروبات الطاقة معاً . كما أشارت النتائج أن ما نسبته (93.3%) من المشاركات بالدراسة على دراية بالأثار السلبية المرتبطة بالتدخين، وأن ما نسبته(83.4%)من الفتيات المشاركات بالدراسة كن ضد فكرة حظر الأرجيلة، وما نسبته(74.3) منهن ضد حظر مشروبات الطاقة. كما أظهرت النتائج أن الفضول كان الدافع الأكثر شيوعاً للإستخدام، وأظهرت النتائج أيضاً أن الفتيات اللواتي يتناولن مشروبات الطاقة أكثر ميلاً لتدخين السجائر بنسبة (7.2) عند المقارنة بالفتيات اللواتي لا يتناولن مشروبات الطاقة، وهن اكثر ميلاً لتدخين الأرجيلة بنسبة (7.6) مقارنة بالفتيات اللواتي لا يتناولن مشروبات الطالقة. وأشارت النتائج أيضاً متوسط العمر عن البدء بتناول المشروبات المنشطة بلغ(12.6) سنة، والذي إرتبط ببدء تدخين السجائر في عمر (13.6) سنة، والأرجيلة في عمر (14.00) سنة. تشير هذه الدراسة إلى حالة مثيرة للقلق بشأن تناول مشروبات الطاقة وتدخين التبغ بين المراهقات الفلسطينيات. كان الاستخدام المنتظم لمشروبات الطاقة شائعًا ومرتبطًا بشدة بتدخين التبغ ، مما يثير مخاوف بشأن الآثار الضارة المحتملة، بما في ذلك السلوكيات الخطرة ذات الصلة. توصى الدراسة بتبني استراتيجيات الوقاية والاقلاع عن التدخين وتناول مشروبات الطاقة.

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Introduction

Tobacco use among adolescents is a significant public health concern, as experimentation with smoking often begins during adolescence (Hwang & Park, 2014). Waterpipe (WP) smoking is considered as a global public health threat (Pärna, Usin, & Ringmets, 2008). Recent epidemiological trends have established an increasing prevalence of waterpipe smoking, especially in the Middle East, European countries, and the United States, particularly among adolescents (Jawad, McEwen, McNeill, & Shahab, 2013; World Health Organization, 2015).

Tobacco smoking is a growing problem, particularly among adolescents and young adults in the West Bank-Palestine (Damiri, Salahat, & Aghbar, 2018; Damiri, Sandouka, Janini, & Yaish, 2019; Damiri, Sayeh, Odeh, & Musmar, 2018; Massad, 2016). Tobacco smoking is a major single cause of preventable morbidity and premature mortality (Samet, 2013). In 2010, the percentage of smokers between the ages of 15-29 years in the West Bank reached 38.1% for males compared to 1.4% for females (Palestinian Central Bureau of Statistics, 2013). Between the ages of 15-65 years, the percentage of male smokers in the West Bank had reached 43.6%, compared to 4.0% for females (Palestinian Central Bureau of Statistics, 2012). In 2016, the prevalence of smoking cigarettes and WP amongst 10th-grade Palestinian male students had reached an alarming rate (Damiri, Salahat, et al., 2018). Roughly 40.6% of adolescents surveyed were current WP smokers and 59.7% had tried WP at least once in their lifetime (Damiri, Salahat, et al., 2018).

Tobacco smoking is playing a direct role in the incidence of lung cancer among Palestinians. Lung cancer was rated second in reported cancer cases (10.8% of total reported cancer cases), and was ranked as the first most reported among males (17.3%) and the fourth among females (5.1%) (Palestinian Central Bureau of Statistics, 2012).

Smoking cigarettes and WP use have been bound by the social and cultural stigma that condemns these behaviors for females, particularly at an early age (Abu Shomar, Lubbad, El Ansari, Al-Khatib, & Alharazin, 2014). Moreover, rural areas are generally considered to have strong proscriptive norms against tobacco smoking in all its forms for females, compared to urban areas (Abu Seir, Kharroubi, & Ghannam, 2020). Compared to male smoking patterns, smoking amongst females is less common, varies more between countries, and exhibits a different age-specific pattern (Gilmore et al., 2004). The ratios of female-to-male smoking prevalence rates vary dramatically across countries. It is estimated that men smoke nearly five times as much as women, especially in countries with lower rates of female empowerment. The gap narrows within countries with relatively high female empowerment, such as Australia, Canada, and the United States (Lopez, Collishaw, & Piha, 1994; Pampel, 2006), with women smoking almost as much as men. Due to the economic and political status, the female-to-male ratio in smoking prevalence could rise in many low- and middle-income countries, where females currently smoke at much lower rates than males (Lopez et al., 1994).

Due to the restrictions that eastern culture imposes on females, males are more likely to smoke than females in the West Bank (Abu Seir et al., 2020; Abu Shomar et al., 2014; Damiri, Salahat, et al., 2018; Damiri et al., 2019; Damiri, Sayeh, et al., 2018; Massad, 2016). However, several factors could drive an increase in smoking among females, similar to other developing countries. This includes promoting women's empowerment and female autonomy, which make cigarettes more affordable (Lopez et al., 1994; Pampel, 2006). In addition, social and cultural norms that have traditionally prevented women from smoking in many countries are weakening, rendering smoking among women more socially acceptable (World Health Organization, 2007) WP smoking has recently been considered culturally and socially accepted among Palestinian females (Tucktuck, Ghandour, & Abu-Rmeileh, 2017). Women who smoke are at higher risk of estrogen deficiency, which can delay conception due to increased risk of early onset menopause, osteoporotic fracture, and menstrual irregularity (Baird & Wilcox, 1985; Holland, 2015). Moreover, the risk of cervical and vulvar cancer increases among women who smoke (Holland, 2015).

Energy drinks (ED) are increasingly consumed by young adults (Arria et al., 2011; Higgins, Tuttle, & Higgins, 2010; J. L. Reid et al., 2017). Concerns regarding the caffeine content of ED is prompted by the potential adverse consequences of caffeine use, such as caffeine intoxication, particularly among vulnerable groups and young people (Kerrigan & Lindsey, 2005; J. L. Reid et al., 2017; Tamara Van Batenburg-Eddes, Nikki C. Lee, Wouter D. Weeda, Lydia Krabbendam, & Mariette Huizinga, 2014). Different studies have examined the positive association between smoking and caffeine intake, as well as the potential health risks of combining nicotine and caffeine (Davison, Shoben, Pasch, & Klein, 2016; Kroon, 2007; Swanson, Lee, & Hopp, 1994; Treur et al., 2016; Wolk, Ganetsky, & Babu, 2012).

While the use of tobacco and the intake of ED is a growing problem among Palestinian, little is known about the prevalence, patterns of intake, and risk factors associated with their use among female adolescents in the West Bank (Damiri et al., 2019). Research into intake patterns could help governments take more effective action and reduce intake rates for ED and smoking among females in the future. This study is part of ongoing research that aims to explore risk factors associated with psychoactive substance use among Palestinians. This study aims to examine the prevalence of ED and tobacco smoking among 10th grade female students, and examine the risk factors associated with their use. A specific objective is to describe knowledge, attitudes, and motivations associated with their use.

Materials and methods

Study design and tool

A cross-sectional study was conducted from 2016-2017 in the north of the West Bank, Palestine, to examine the prevalence, patterns, and risk factors associated with tobacco smoking and ED intake among 10th grade female students, as well as to describe knowledge, attitudes, and motivations associated with their use. The current study used a modified version of the European School Survey Project on Alcohol and other Drugs and the Monitoring the Future Study questionnaire (Johnston, O'Malley, Bachman, & Schulenberg, 2003; The European Monitoring Centre for Drugs and Drug Addiction, 2009). The questionnaire was translated into the Arabic language, as it is considered the native official language in Palestine, and then translated back to English. The questionnaire was divided into four sections. The first section consisted of socio-demographic information. The second section assessed the intake of ED and tobacco smoking in the forms of cigarettes and WP for the respondents and their close contacts. The third section included patterns of use and initiation ages. The fourth section assessed knowledge, attitude, and motivation towards using tobacco and ED. In this study, ED included imported and locally manufactured products available for purchase in Palestine at the time of the study.

Characteristics of the participants

The total number of female students in the 10th grade was 1668 students in the 2016 academic year in Tulkarm Governorate. The study area was divided into three clusters depending on school locations: city, township, and villages. A proportional sample size was calculated for each location. Schools were then selected randomly from each location, and all the 10th grade female students were chosen in the selected schools. The total number of recruited students was 403 students.

Operational definitions

A current user, as defined in this study, is an adolescent female who has used ED, smoked cigarettes, or smoked WP at least once in the past 30 days. An ever user is an adolescent female who has consumed ED, smoked either cigarettes or WP at least once during her lifetime. Parental education refers to the education levels of the parents. This includes a low level of education (high school or less), and a high level of education (undergraduate or more). An employee is any person who works in governmental or private sector and earns a regular monthly salary.

Data analysis

Statistical Package for Social Sciences (SPSS) version 22 (IBM, Armonk, NY, USA) was used for data entry and analysis. Differences in the means between groups were assessed using the independent samples t-test and analysis of variance (ANOVA), and Pearson's $\chi 2$ or Fisher's exact test was used for categorical variables. A binary logistic regression analysis was conducted to evaluate the relative risk by

generating the odds ratios (ORs) and 95% confidence intervals (CIs) for risk factors. A P-value of <0.05 was considered statistically significant.

Ethical consideration

The Institutional Review Board (IRB) approval was obtained from An-Najah National University, and access to the schools was granted. Due to the stigma surrounding female cigarette tobacco use, confidentiality was highlighted in all written and oral communications. Informed consent was obtained. Participation in this study was voluntary and the confidentiality of the students was ensured: the questionnaire was anonymous, and did not include any questions that would lead to personal identification.

Results

The response rate was high (95%). 403 questionnaires were distributed among 10th grade female students in the north of the West Bank, and 386 questionnaires were retrieved; four questionnaires were excluded as they were incomplete.

General characteristics

Out of 382 respondents, 100% were Muslims and the majority (56.8%) were village dwellers. Only 23.7% of respondents' fathers and 16.3% of their mothers had finished an undergraduate degree. The majority of the adolescents mothers were unemployed (79.5%), while only 6.2% of their fathers were unemployed (Table 1).

Table 1

Socio-demographic characteristics of 10th-grade female students

	n (%)	
City	165(43.2)	
villages	217 (56.8)	
Religion -Muslim	382 (100)	
Parental education	**Father n (%)**	**Mother n (%)**
Illiterate	7(1.8)	4(1.1)
Elementary school	88(23.2)	80(21.4)
High school	194(51.2)	229(61.2)
Diploma/graduate	90(23.7)	61(16.3)
Parental occupation		
Unemployed	23(6.2)	295 (79.5)
Worker	185(50)	10(2.7)
Employed	80(21.6)	32(8.6)
Others	82 (22.2)	34(9.2)

Tobacco and energy drink pattern of use among respondents and their close contacts

Roughly 18.9% of the adolescents were current cigarette smokers, 36.6% were current waterpipe smokers, and 41.4% were current ED consumers (Table 2). At least once in their lifetime, 21.5% and 39.0% of the girls had tried smoking cigarettes and WP respectively, with no significant differences between urban and rural adolescents (P-value ≥0.05). At least once in their lifetime, 60.0% of girls had tried ED, with increased intake among urban girls (70.5%) compared to rural girls (57.8%) (P-value=0.028, OR=1.744, 95%CI (1.059-2.874)). Around 29.7% of the girls were current tobacco and ED users, and 57.5% were ever users for both tobacco and ED. In addition, 15.7% of respondents intended to smoke cigarettes, 27.2% intended to smoke waterpipe, and 28.5% intended to use ED. The mean initiation age was 12.6 years old for ED, 13.6 years old for cigarette smoking, and 14.0 years old for WP smoking. Around 11.5% of cigarette smokers, 27.0% of WP smokers, and 23.8% of ED users were using these substances daily (Table 2). Fathers, (59.9%) followed by relatives (46.1%) were the closest contacts who smoked cigarettes, while close friends, (40.5%) followed by relatives (37.7%) were the closest contacts who smoked WP. Close friends (30.4%) followed by relatives (24.9%) were the closest contacts who consumed ED. Relatives, (23.0%) followed by close friends (5.9%) were the closest contacts who offered cigarettes, while relatives, (21.7%) followed by mothers were the closest contacts who offered WP and ED to the adolescents. (Table 2).

Table 2

Patterns of tobacco smoking, (cigarettes and waterpipe), and energy drink intake among adolescents and their close contacts

		Cigarettes n (%)	**Water pipes n (%)**	**Energy drink n (%)**
History of use	Current user	72(18.9)	(36.6)	158 (41.1)
	Ever-tried	82(21.5)	149(39.0)	233(61.0)
	Ex-user	10(2.5)	9(2.4)	75(19.6)
Pattern of use	Daily	44(11.5)	103(27.0)	91(23.8)
	2-3 times / week	26(6.8)	31(8.1)	61(16.0)
	Several times / month	10(2.6)	9(2.4)	39(10.2)

	Several times / year	2(0.5)	6(1.6)	47(12.3)
	Units/day	1-3 cigarettes 66(17.3)	1shared-head 118(30.9)	1 can 200(52.4)
	Initiation age Mean ±SD	13.68±1.78	13.88±1.54	12.60±1.98
Location	City	26(27.4)	43(45.3)	67(70.5)
	village	56(19.6)	104(36.2)	166(57.8)
For non-users	Intention to use	60(15.7)	104(27.2)	109(28.5)
Family history use of the substance	Father	229(59.9)	63(16.5)	74(10.2)
	Mother	31(8.1)	62(16.3)	63(16.5)
	Close friend	42(11.0)	40(40.5)	116(30.4)
	Relative	176(46.1)	144(37.7)	95(24.9)
Family history offer the substance	Father	7(1.8)	23(6.0)	39(10.2)
	Mother	15(3.9)	40(10.5)	15(39)
	Close friend	22(5.9)	22(5.8)	62(16.2)
	Relative	88(23.0)	83(21.7)	84(22.0)

Knowledge, attitudes, and motivation for tobacco smokers and energy drink users

Most respondents were knowledgeable about the dangers of using cigarettes (85.6%) but lacked knowledge about the dangers of WP (45.5%) and ED (35.1%) (Table 3). Most of the adolescents had been informed about the dangers of tobacco (90.6%), but not WP (2.9%) and ED (9.2%). 62.3% of the adolescents agreed that smoking tobacco should be banned, while 16.0% and 24.6% of adolescents agreed that WP smoking and ED intake should be banned, respectively (Table 3). The majority of participants also agreed that it is easy to access WP (69.9%) and ED (90.8%), while 49.5% agreed it is easy to access cigarettes. The majority of participants had accepted one of their family members or friends to be a tobacco smoker and ED consumer. Curiosity, coping with friends, and running from problems were the most frequent motives for smoking tobacco. Curiosity, addiction, and to feel energized were the most frequent motives for using ED (Table 3).

Table 3

Knowledge, attitudes and motives for tobacco smoking (cigarettes and waterpipe)s, and energy drink intake among respondents

	Yes
Knowledge for all respondents	**n (%)**
I know that cigarette smoking is harmful	327(85.6)
I know that waterpipe smoking is harmful	174(45.5)
I know that energy drink use is harmful	134(35.1)
I was informed about the danger of smoking cigarettes	346(90.6)
I was informed about the danger of smoking waterpipe	11(2.9)
I was informed about the danger of energy drinks	35(9.2)
Attitude for all respondents	
I agree that cigarettes should be banned	238(62.3)
I agree that waterpipe should be banned	61(16.0)
I agree that energy drinks should be banned	94(24.6)
I accept one of my family members or friends to smoke cigarettes	217(56.8)
I accept one of my family members or friends to smoke waterpipe	248(64.9)
I accept that one of my family members or friends to use energy drinks	252(66.0)
It is easy to get access to cigarettes	189(49.5)
It is easy to get access to waterpipes	267(69.9)
It is easy to get access to energy drinks	347(90.8)
I care about my health	298(78.0)
Nobody cares if I smoke tobacco	88(23.0)
Motives for cigarettes and waterpipe smoking	
I smoke for curiosity	87(22.8)
I smoke to have fun	67(17.5)
I smoke to socialize with my friends	73(19.1)
I smoke to feel good	61(16.0)
I smoke to relax	53(13.9)
I smoke to run away problems	57(14.9)
I smoke to cope with anger	47(12.3)
I smoke because of addiction	25(6.5)
I sometimes smoke for no reasons	36(9.4)
I do not know why I smoke	27(7.1)
Motives for energy drink (ED) intake	
I drink ED for curiosity	66(16.3)
I drink ED for its taste	28(7.3)
I drink ED to socialize with my friends	50(13.1)
I drink ED to feel energy	75(19.6)
I smoke to feel good	60(15.4)
I drink ED to because of addiction	59(15.4)
I sometimes drink ED for no reasons	53(13.9)

Risk factors associated with waterpipe use

The Logistic-Regression Model identified cigarette smoking (P-value<0.001, Odds ratio=24.92) or ED intake (P-value<.001, Odds ratio=2.895) by adolescents to be significantly associated with WP smoking. Adolescents that had a father who smoked cigarettes were more likely to smoke WP than those whose father did not smoke (P-value<0.025, Odds ratio=2.151). Moreover, girls who were offered WP by their father (P-value=0.003, Odds ratio=7.667) or their mother (P-value<0.001, Odds ratio=55.185) were more likely to smoke WP than those who were not offered (Table 4).

Table 4

Binary logistic regression for factors associated with smoking waterpipe

		OR	95%(CI)	P-Value
Ever smoked cigarettes	Yes No: Reference group	24.922	99.800-63.376	<0.001
Ever used ED	Yes No: Reference group	2.895	1.502-5.582	0.002
Father smoked waterpipe	Yes No: Reference group	1.062	0.440-2.565	0.894
Father smoked cigarettes	Yes No: Reference group	2.121	1.100-4.089	0.025
Mother smoked waterpipe	Yes No: Reference group	1.062	0.440-2.57	0.894
Mother smoked cigarettes	Yes	0.609	0.239-1.547	0.297

	No: Reference group			
Friend smoked waterpipe	Yes	1.478	0.485-4.501	0.492
	No: Reference group			
Friend smoked cigarettes	Yes	0.847	0.409-1.758	0.657
	No: Reference group			
Relative smoked waterpipe	Yes	1.352	0.643-2.841	0.426
	No: Reference group			
Relative smoked cigarettes	Yes	0.847	0.409-1.758	0.657
	No: Reference group			
Father offered waterpipe	Yes	7.667	2.002-29.364	0.003
	No: Reference group			
Mother offered waterpipe	Yes	55.185	6.974-436.702	<0.001
	No: Reference group			
Close friend offered waterpipe	Yes	1.47	0.321-6.954	0.624
	No: Reference group			
Relative offered cigarettes	Yes	1.449	0.682-3.042	0.339
	No: Reference group			

Note. OR: Odds Ratio; CI: Confidence Interval

Discussion

The results of this study indicate that cigarette smoking and ED intake is common among 10th grade female Palestinian students, and more so for urban adolescents than rural adolescents. Moreover, ED intake is co-occurring with substance use and other forms of risky behaviours (Miller, 2008; J. L. Reid et al., 2017). Around 41.1% of the adolescents were current ED users. Previous studies indicate that adolescents with a high intake of ED reported specific side-effects, including jitteriness, nervousness, dizziness, inability to focus, difficulties with concentration, gastrointestinal upset, and insomnia (Musaiger & Zagzoog, 2014). The observed associations between regular intake of ED, even in moderate amounts, may have a negative impact on daily life behaviors in adolescents (T. Van Batenburg-Eddes, N. C. Lee, W. D. Weeda, L. Krabbendam, & M. Huizinga, 2014). Consumers who reported the life history of ED use were also more likely to manifest violent behavior (Miller, 2008; S. Reid & Gentius, 2018). Emerging evidence has linked ED intake with several negative health consequences, as ED users are more likely to combine caffeine and nicotine (Davison et al., 2016; Kroon, 2007; Swanson et al., 1994; Treur et al., 2016; Wolk et al., 2012). Around one-quarter of ED users had consumed ED daily, with at least one can per day. Moreover, one-third of ED consumers had combined ED with tobacco, indicating that ED intake possesses a potential risk for the girls' health. In addition, the initiation age of ED intake among respondents was earlier than the initiation of cigarettes and WP smoking. Many studies have demonstrated that caffeine serves as a gateway to other forms of drug dependence, such as nicotine and alcohol; however, this subject remains controversial and needs more investigation (Collins, Graham, Rousculp, & Hansen, 1997; Pallanti, Bernardi, & Quercioli, 2006). Adolescents who were ever users of ED were twelve times more likely to be cigarette smokers and seven times more likely to be WP smokers. Therefore, it is recommended to avoid consuming ED due to the potential for excess risk (Kerrigan & Lindsey, 2005; Reissig, Strain, & Griffiths, 2009; Seifert, Schaechter, Hershorin, & Lipshultz, 2011).

Tobacco smoking has additional risks and threats to women compared to men. Today, women's risk of developing smoking-related heart disease or dying from chronic obstructive pulmonary disease (COPD) exceeds men's risk (McAfee & Burnette, 2014). Greater pain was significantly associated with greater cigarette dependence, greater perceived barriers to cessation, and greater cessation-related problems among female smokers, but not males (Smit et al., 2019). The prevalence of smoking among Palestinian female youth appears to be on the rise, and the ratio of male-to-female smoking prevalence rate has decreased in the West Bank. The prevalence of WP smoking (36.6%) has surpassed the current prevalence of cigarette smoking (16.2%). This gap between cigarette and WP percentages is also found when analyzing the mothers of the participants, indicating that WP smoking has reached alarming rates among Palestinian women (Tucktuck et al., 2017). This could be due to restrictions that eastern culture imposes on female cigarette smoking but not WP, which is culturally accepted. Most females had indicated that it is easy to access WP in their communities, while it is difficult to access cigarettes. The results of this study indicate an alarming situation among adolescent female Palestinians concerning tobacco smoking and specifically WP smoking. Regular cigarette smoking was strongly linked to WP smoking, raising concerns about possible adverse effects and barriers to cessation.

Many factors could influence tobacco smoking in general, and WP specifically, among Palestinian adolescent females, including knowledge,

attitudes, and motivation. Limited knowledge of the consequences of substance use predisposes teenagers to experiment (Ali et al., 2011). WP smoke contains significant levels of toxins, some of which are known to be carcinogenic to humans. Their health effects are emerging despite evidence that the use of WP is perceived by users as less harmful than cigarette smoking (Jawad et al., 2013). Although the majority of the girls were knowledgeable about the harmful effects of tobacco cigarette smoking, the majority disagreed with banning WP and ED. This may be due to the notion that the health impact of WP smoking takes more time to manifest, which makes it easier for people to underestimate the burden of such a hazardous habit. Moreover, the name of WP tobacco in Arabic (Massil) does not indicate that it is tobacco. For those who believe it is tobacco, they believe it has a minimum amount of nicotine. Therefore, the majority disagreed with banning WP smoking. These findings support the important role of the educational system in incorporating the adverse effects of WP and cigarette smoking on health within the curriculum (Tucktuck et al., 2017). Moreover, most WP tobacco users do not show signs of nicotine dependence unless smoking more than several times each week (Maynard, Gage, & Munafò, 2013). The findings of this study indicate that one-quarter of the adolescents use waterpipes daily. Therefore, WP smoking represents a potential public health concern. It is expected to account for an increasing chronic disease burden.

Smoking among males exceeded that of females by about 17.7 times in the West Bank in 2010 (Palestinian Central Bureau of Statistics, 2013). In a study implemented in 2004, around 23.3% of Palestinians aged 14 years old in the West Bank were smokers, with higher prevalence among males (39.1%) compared to females (2.3%) (Husseini, 2008). The prevalence of smoking between the ages of 15-29 years in the same governorate in the year 2010 was 26.3%, with 51.2% among males and 1.2% among females (Palestinian Central Bureau of Statistics, 2012, 2013). These findings indicate that tobacco smoking among adolescent females in the West Bank has increased sharply within the last 15 years. These findings also agree with global findings in which male smoking rates have either reached a plateau or are in a slow decline, while the prevalence of tobacco use among women is increasing (Lopez et al., 1994). In a study implemented in 2016, the prevalence of 10th grade males who smoked tobacco, with the same age group, governorate and year, was estimated to be 59.7% (Damiri, Salahat, et al., 2018). Moreover, 40.4% of those males were current smokers. In this study, smoking among males exceeded that among females of about only 1.5 times for those who ever tried smoking and 2.5 times for current smokers. The gender gap in current smoking prevalence can also be found in the parental smoking prevalence rate (fathers smoke 7.1 times more than mothers). This data also agrees with data from the Global Youth Tobacco Survey, which showed that worldwide smoking rates among boys and girls resemble each other more than smoking rates among adult women and men, with boys between the ages of 13 and 15 years smoking only 2 to 3 times more than girls (Warren, Jones, Eriksen, & Asma, 2006). Tobacco control, preventing initiation, and smoking cessation are the most important actions that should be taken. Quitting Tobacco has health benefits; it increases the life expectancy across all age groups and reduces the risk of cancer, heart disease, stroke, and respiratory diseases (Singh & Purohit, 2011).

Many factors contributed to substance initiation among teenagers and young Palestinians. This includes easy access to substances and individual attitudes and beliefs surrounding substance use, which often arise from their environment, such as the attitude of family and friends (Damiri, Salahat, et al., 2018; Jorge et al., 2018; Neiderhiser, Marceau, & Reiss, 2013). Other factors include the nature of family relations and substance use by other family members (Damiri, Salahat, et al., 2018; Ghosh, 2016; Neiderhiser et al., 2013; Whitesell, Bachand, Peel, & Brown, 2013). Our results demonstrated that adolescent females were more likely to be smokers when their parents smoked. This likelihood was higher for daughters who were offered waterpipe by their mothers. This emphasizes the role of mothers' effect on their daughters' behavior in this population. Around one-quarter of the adolescents believed that nobody cared if they smoked, and curiosity was the major motivator for smoking. It is important to increase public awareness campaigns about the dangers of tobacco and ED use (World Health Organization, 2011). These findings show the need for authorities to act quickly to restrain smoking rates among young Palestinian females. Strict ED and

tobacco control legislation that limits the sale of ED and cigarettes to minors and restricts smoking in public places are important strategies that could decrease the potential of youth experimenting with these substances (Botello-Harbaum et al., 2009).

Strengths and limitations

This is the first study that was conducted to investigate tobacco smoking and ED intake in a vulnerable group in the West Bank, specifically among females. This study has a number of limitations. While this is a representative sample of adolescent females from the north of the West Bank, it does not necessarily indicate the national numbers of the general Palestinian population. However, it gives an idea about the current behaviours of tobacco smoking and ED intake. In light of higher rates of tobacco smoking and ED intake in adolescent females, more research is needed for other locations and different age groups.

Conclusion

Tracking tobacco smoking and ED in a society, especially for adolescents, is important for policymakers in order to investigate the consequences and impact of these substances. The prevalence of smoking among youth appears to be on the rise in the West Bank. The findings of this study showed that ED intake, waterpipe smoking, and cigarette smoking highlights a new epidemic among adolescent females in the West Bank. Many factors determined the dangers of using ED by young Palestinian female adolescents, including the initiation age, frequency of use, and combination of tobacco smoking and ED intake. Factors contributing to tobacco smoking and ED intake among adolescent females were social/peer interactions. There is an association between parental use of these substances and their use in this age group. Due to the unique health risks associated with female smokers, strong tobacco control measures are needed. Female adolescent's awareness of caffeine intoxication, withdrawal, and dependence should be increased. Health care professionals, clinicians, and ministries of education and health have key responsibilities in preventing tobacco smoking and ED intake among young adults, and need to develop effective prevention and cessation strategies. The Palestinian National Authority needs to make more efforts in ED and smoking legislation regulating the age of access and use for youth and adults.

Declarations

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Ethics approval and consent to participate

The study was carried out following the ethical standards according to the Declarations of Helsinki. Approval was obtained from the Institutional Review Board (IRB) at An-Najah National University (ANU) in Palestine prior to the research. All study participants freely accepted to participate in the study. All data was collected and treated confidentially and were available for the researchers only.

Consent for publication:

Not applicable.

Competing of interests

The authors declare that they have no competing interests.

Availability of data and materials

Most data generated or analyzed during this study is included in this manuscript. Other data that support the findings of this study and/or was analyzed during the current study are available from the corresponding author on reasonable request.

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Authors' contributions

BD wrote the initial and final draft of the manuscript, study design, contributed to data collection and analysis and results interpretation. HI, MK, RM, and SI contributed to data analysis. The final draft of the manuscript was reviewed by all authors.

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