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## Prevalence and risk factors of smoking among high school female students in Arar, Saudi Arabia

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### Abstract

**Introduction:** Smoking is the leading global cause of preventable deaths. Studies have shown that smoking initiation during childhood increases the likelihood of continued smoking during adulthood and decreases the chance of quitting. Many previous researches have been conducted in different regions of Saudi Arabia to identify the prevalence of smoking among males; few studies included females in different area but no studies have been conducted among female at northern border of KSA. This study aimed to determining the prevalence of smoking and identify risk factors among high school female students in Arar, KSA 2018.

**Methods:** This cross sectional study Included 365 female students from high schools in Arar city selected randomly. The age of the students ranged from 14 to 17 years. Data was collected by an Arabic questionnaire and was analyzed by using statistical package of social science (SPSS) version 25.

**Results:** The results showed that the percentage of students who had previously smoked cigarettes was 19.2% (70 students out of 365) 92.8% of them were Saudis. As the most important age to start smoking is at 17 years and older most of them on grade 11. Over half of the smokers participants 46 of 70 (65.7%) have a relative who smoke at home. Unfortunately, 81.5% of the smoker students attempted to quit smoking.

**Conclusion:** there is need to increase the level of awareness as well as smoking cessation programs directed the adolescents to cub the problem of smoking in this region.

**Keywords:** Smoking prevalence, female, girl, high school students, Arar, Saudi Arabia

### Introduction

Tobacco smoking is one of the biggest public health problems in the world with more than 6 million deaths a year as result of direct tobacco use and around 890 000 deaths a year as result of non-smokers being exposed to second-hand smoke <sup>[1]</sup>. WHO estimates that 80% of the world's 1.1 billion smokers live in low- and middle-income countries <sup>[1]</sup>. However, in developing countries, tobacco consumption continues to increase by approximately 3.4% annually <sup>[11, 12]</sup>. Tobacco use is the leading global cause of preventable Deaths <sup>[1]</sup>. As is the primary risk factor of premature death in males and second in females among medial age <sup>[13]</sup>.

In Saudi Arabia the majority of studies done among male school student in different regions at different level of school show an increased level of smoking in this teenage group. Moreover, most teenage smokers quickly become addicted to nicotine <sup>[10]</sup>.

It is interesting to note how a conservative society such as Saudi Arabia, where smoking was socially, traditionally, and above all religiously banned, has a share in the tobacco smoking pandemic to achieve unprecedented levels of smoking prevalence <sup>[2]</sup>. A latest study in Saudi Arabia among adults aged 18 years or older in 2018 showed that the prevalence of cigarette smoking was 21.4% of the population. The prevalence of cigarette smoking was found to be relatively high among males, those aged 25–44-year-old, and those who live in the northern regions <sup>[14]</sup>. To our knowledge no studies have been conducted among adolescent females from the northern region of KSA.

Published studies were found about the prevalence of smoking among high and secondary school; Algabbani, *et al.* (2018) <sup>[14]</sup>. did a cross-sectional survey of the prevalence of cigarette smoking in Saudi Arabia in 13 regions from adults aged 18 years or older (total of 7,317 adults) and found that the prevalence of smoking was 21.4% and the prevalence of smoking among males was 32.5% and 3.9% among females.

The prevalence of smoking differed from region to another as they found that Aljwaf, Northern Borders regions have the highest prevalence while the lowest prevalence was found from adults who live in Aseer Jizan and Albaha.

In Hail, a study by Algorinees *et al.* (2016) [15]. To assess the prevalence of smoking among the male secondary school students found that 19.5% of students were current smokers. In that study, 79% of the smokers reported that they started smoking because they imitated the adult. In addition 27% of smoker participants reported that their families know that they smoke.

In another study in Makkah by Al-Maimani (2016) [6]. To assess the prevalence of smoking among male secondary school students and to try to explore its causes reported that 79.8% of students were non-smokers. Twenty percent of the smokers reported that they started smoking because they have smoker friends, while about 19% of the smokers reported that they started smoking because they have one or two smokers in their family.

Mohamed, (2010) [3]. in their cross sectional study about Predicting tobacco use among high school students by using the global youth tobacco survey in Riyadh, Saudi Arabia stated that about 56.7% never smoked, 43.4% ever smoked (31.3% female, 65.4% male) and the highest prevalence was found in private schools. Using a logistic regression to see the relationship between the dependent variable and independent factors indicated that the main risk factor among male is by present someone close to the student smoke i.e. either parents, or one member of family and close friend and there were no differences among grade or region. Hashim, (2012) [4]. In their study about Prevalence of smoking among secondary school male students in Jeddah, Saudi Arabia stated that 37.1% of students ever smoked and 83.7% of them had started smoking at the age of 14 years or less. The significant factor was the parents' education level. In this study 42% of student smokers their father had only attained secondary education or less compared to 34% of student smokers who their father's had at least a university-educated or more. It was also shown that 40% of students with a less-than-university-level-educated mother were smokers compared with 31.3% with a university educated mother. Sultan Al Nohair (2009) [5]. did a study on students in National Guard area (n=255 students) on the prevalence of smoking and its related behaviors and beliefs among secondary school students in Riyadh, Saudi Arabia and found the rate of Current smokers at 28.6% and the most common reasons for smoking were having free time, 81.6%, for the relief of stress (63.2%) and seeing some of their teachers smoking (61.8%). 42.2% of the students had shown the desire to start smoking in future. Religion was also found to be the most important reason for not smoking among non-smokers.

Hossain, (2013) [7]. Did a qualitative study for understanding smoking behavior among secondary school students in Amman, Jordan aged between 16-18 years from public and private schools. He reported that 40% of the students were current smokers, and 66.7% of these were males who had indicated starting the habit as early as 11 among males and 16 among females. This study also found that stress was the main reason for participants to start and/or continue smoking, followed by 'peer pressure' and 'being cool'.

Kamrun, (2013) [8]. In a global youth tobacco survey in Bangladesh found that 18.6% of students had ever used any tobacco product, 56.4% were initiated into smoking at the

age 12-13 years and 65.9% of the smokers smoked 2-5 times per day. It was reported in this study that easy accessibility and availability of tobacco played an important role in their smoking. With this background, the objective of our study was to determine the prevalence of smoking and identify risk factors of smoking among high school female students in Arar, KSA 2018.

## Methods

### Study design: a cross-sectional study

Study population: high school female students in Arar, KSA. The city has 22 governmental female high schools, with student number 4108. This area has also a single private school. The study was applied on female students in a governmental High school, age group 14-17 years old, grade 10, 11, 12 In Arar from september 2018 to April 2019.

### Sample size and selection

The sample size for the study was calculated by using the following formula:  $\sum z^2 p(1-p) / \delta^2 + 10\%$

Where:

$\sum$  Summation, Z target population = (1.96) = 95%

P prevalence= depending on the prevalence of smoking among high school female students in Riyadh 31.3%.  $\delta$  error= (0.05) 10%= non-response adjustment and in case of lost or missing data.

Sample size=  $(1.96)^2 (0.313) (0.687) / (0.05)^2 = 330 + (10\%) = 365.4 \approx 365$

Sample size was 365 Schools five high schools from different social classes were selected according to the simple random sample technique. five High schools from different region was selected one school from each region randomly, and then selected one class randomly from each grade ten, eleven and twelve, since the average number of students in each class is 25 students, to ensure representative ness of the sample to all Arar schools. After take permission from the school administrators, the questionnaire was administered to a total of 365 Students absence of the classroom teachers to ensure confidentiality of the students.

Data collection tool: Self-administered questionnaire was used in the study was in Arabic language under supervisor author in absent of teachers to maintain confidential. The questionnaire included 18 Variables from which is a Global Standard School-Based (GYTS) for systematically monitoring tobacco use among youth and tracking key tobacco control indicators, It includes 56 questions designed, certain questions selected to cover the objective of this study.

Data analysis: Data will be analyzed using the Statistical Package for Social Sciences, v.25 (SPSS).

## Results

The data were collected from 365 students, whose ages ranged from 14 to 17 years. A total of 70 students (19.2%) were smokers and 295 students representing 80.8% were non-smokers (Figure 1).

The majority of the participants indicated not to have smoked any cigarettes during the past 30 days. One third (66.6%) of the participants were in favor of banning smoking in public places. The majority (84.4%) of the

participants' closest friends do not smoke cigarette. Under two third (63.3%) participants parents do not smoke cigarettes. Around 41.4% of those in the participants' house other than the parents smoke cigarettes.

The majority (87.9%) reported that they think they will definitely not use any form of tobacco in the next 12 months. The majority think smoking is definitely harmful to their health (86.3%) and the smoke from other people's tobacco smoking is definitely harmful to them (83.0%). The majority (96.2%) did not try to buy cigarettes during the past 30 days. Over half of the participants (57.8%) reported that during the past 12 months, they were taught in their classes about the dangers of tobacco use (Table 2).

The majority of the participants were Saudi nationals (92.3%, n=337). Among those who were smoking, 65 (92.8%) were Saudis and 5 (7.2%) were not (Figure 2). as 57.1% were smoking in grade 11.

Current smoker (who smoked during the past 30 days even 1 or 2 days) was 17 participants 24.3%. Unfortunately, 81.5% of the smoker students attempted to quit smoking, while 18.5% of them did not attempt to do so. As Over half of the smokers participants 46 of 70 (57.8%) reported they have other than the parents smoke cigarettes in their house.

Logistic regression: A logistic regression was performed to ascertain the effects of factors on the likelihood that participants are smokers. The logistic regression model was statistically significant ( $p < .05$ ).

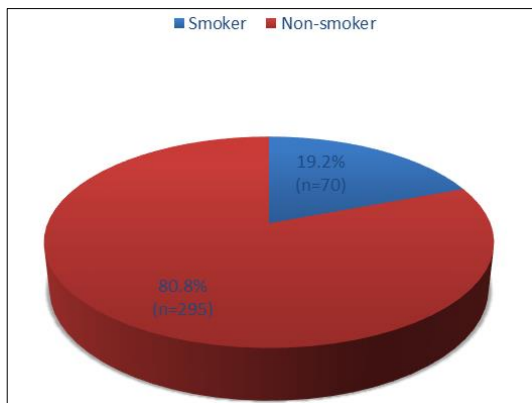


Fig 1: Cigarette smoking status among female students in Arar 2018.

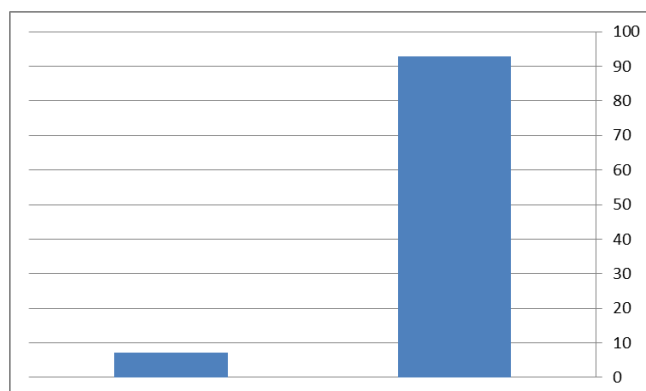


Fig 2: Percentage of the Saudi female smokers among the smoker participants.

**Discussion**

One of the common problems that start at school age and continue during adulthood is smoking. As the student spend six hours or more a day in school – schooling has a

significant impacting on their behavior, personality, thinking and habits. A previous study done on adult of 18 years and older in 13 regions of Saudi Arabia showed that the prevalence of smoking was 21.4% with the Aljwaf, Northern Borders regions recording the highest prevalence [14].

So, in this study, we aimed to identify the prevalence of smoking among the female high school students in Arar aged 14 to 17 years and it was found that 19.2% of the participants were smokers. The findings of our study are in close agreements with results from previously studies which reported that in Hail the prevalence of smoking was 19.5%. Although the study was done only among males, similarities can be drawn between the two cities both located in the north and share similar cultural, and socioeconomic factors [15].

We considered this prevalence lower when compared to 31.3% that was in Riyadh among female high school students [3]. This difference could be attributed to the fact that the study conducted at Riyadh was 9 years prior to this study, presenting the risk of influence from external social, and economic factors not consistent between the two studies.

Not only in Riyadh, but also in Jeddah, the prevalence of cigarette smoking was 37.1% relatively high [4]. this difference may related to difference gender between two studies as female smoking consider as social stigma.

It is still considered quite possible that the prevalence of smoking when compared with other studies was done in other regions of Saudi Arabia among adolescent and this may be due to different gender this may play main role in the different between result add to this pressure from social, culture and religious factor and as we know Saudi is conservative society. Our results suggest the strongest factor to begin smoking was related to friends and some relatives smokers at home other than parents. The peer pressure was also identified to contribute significantly in making the decision of being a smoker which is consistent with other studies; such as that carried out in in Jeddah which suggested that one of the influencing factor is level of education of parents [4]. And as in National Guard area in Riyadh suggesting that one of the main factor is having free time and relief from stress [5].

Furthermore, over half of the smoker participants attempted to quit smoking if post-smoking support was accorded to them appropriately.

There were some limitations however in our study. Our survey was only among female students, this may in future encourage physicians to do studies among male students as well.

**Table 1:** Demographic characteristics of the 365 students who participated in the study:

		Frequency (n)	Percent (%)
Age	14 years	5	1.4
	15 years	89	24.4
	16 years	144	39.5
	17 years	127	34.8
Nationality	Saudi	337	92.3
	Non-Saudi	28	7.7
Level/Grade in school	Ten	165	45.2
	Eleven	129	35.3
	Twelve	71	19.5

**Table 2:** Characteristics of the 365 students who participated in the study:

		Frequency (n)	Percent (%)
During the past 30 days, on how many days did you smoke cigarettes?	0 days	348	95.3
	1 or 2 days	14	3.8
	3 to 5 days	2	.5
	6 to 9 days	1	.3
Are you in favor of banning smoking in public places?	Yes	243	66.6
	No	122	33.4
If one of your friends offered you a tobacco product, would you use it?	Definitely not	308	84.4
	Probably not	23	6.3
	Probably yes	29	7.9
	Definitely yes	5	1.4
Do any of your closest friends smoke cigarettes?	None of them	308	84.4
	Some of them	48	13.2
	Most of them	7	1.9
	All of them	2	.5
Do your parent smoke cigarettes?	Neither of them	231	63.3
	Both	4	1.1
	Father only	118	32.3
	Mother only	6	1.6
	I don't know	6	1.6
Does anyone in your house other than your parents smoke cigarettes?	Yes	151	41.4
	No	214	58.6
At any time during the next 12 months do you think you will use any form of tobacco?	Definitely not	321	87.9
	Probably not	21	5.8
	Probably yes	23	6.3
	Definitely yes	0	0
Do think it is safe to smoke a year or two as long as you quit after that?	Definitely not	248	67.9
	Probably not	28	7.7
	Probably yes	50	13.7
	Definitely yes	39	10.7

**Table 3:** Characteristics of the 365 students who participated in the study (continue):

		Frequency (n)	Percent (%)
Do you want to stop using cigarettes smoking now?	I have never used cigarettes smoking	295	80.8
	Yes	57	16.8
	No	13	2.4
Do you think smoking is harmful to your health?	Definitely not	12	3.3
	Probably not	9	2.5
	Probably yes	29	7.9
	Definitely yes	315	86.3
Do you think the smoke from other people's tobacco smoking is harmful to you?	Definitely not	18	4.9
	Probably not	2	.5
	Probably yes	42	11.5
	Definitely yes	303	83.0
During the past 30 days, did anyone refuse to sell you cigarettes because of your age?	I did not try to buy cigarettes during the past 30 days	351	96.2
	Yes, someone refused to sell me cigarettes because of my age	2	.5
	No, my age did not keep me from buying cigarettes	12	3.3
During the past 12 months, were you taught in any of your classes about the dangers of tobacco use?	Yes	211	57.8
	No	95	26.0
	I don't know	59	16.2

**Table 4:** Demographic characteristics of "ever smoked" vs "never smoked":

		Smoker		Non-smoker		P value
		n	%	n	%	
Age	14 years	0	0.0	5	1.8	0.001
	15 years	13	18.6	76	25.7	
	16 years	18	25.7	126	42.7	
	17 years	39	55.7	88	29.8	
Nationality	Saudi	65	92.8	272	92.2	1.000
	Non-Saudi	5	7.2	23	7.8	
Level/Grade in school	Ten	13	18.5	152	51.5	0.000
	Eleven	40	57.1	89	30.1	
	Twelve	17	24.4	54	18.3	

**Table 5:** Characteristics of “ever smoked” vs “never smoked”:

		Smoker		Non-smoker		p value
		N	%	n	%	
During the past 30 days, on how many days did you smoke cigarettes?	0 days	53	75.7	295	100	na
	1 or 2 days	14	20	0	0.0	
	3 to 5 days	2	3	0	0.0	
	6 to 9 days	1	1.3	0	0.0	
Are you in favor of banning smoking in public places?	Yes	42	60	201	68.1	.206
	No	28	40	94	31.9	
If one of your friends offered you a tobacco product, would you use it?	NO (Probably, definitely)	52	74.3	279	94.6	0.000
	YES (Probably, definitely)	18	25.7	16	5.4	
Do any of your closest friends smoke cigarettes?	None of them	48	68.6	260	88.1	0.000
	YES (some or most of them)	22	31.4	35	11.9	
Do your parent smoke cigarettes?	NO (norther or I don't know)	34	48.6	203	68.8	0.002
	Yes (both or either)	36	51.4	92	31.2	
Does anyone in your house other than your parents smoke cigarettes?	Yes	46	65.7	105	35.6	.000*
	No	24	34.3	190	64.4	
At any time during the next 12 months do you think you will use any form of tobacco?	NO	57	81.4	285	96.6	0.000
	YES	13	18.6	10	3.4	
Do think it is safe to smoke a year or two as long as you quit after that?	NO	52	74.3	224	75.9	.836
	YES	18	25.7	71	24.1	

**Table 6:** Characteristics of “ever smoked” vs “never smoked” (continue):

		smoker	%	Non-smoker	%	p-value
Do you want to stop cigarettes smoking now?	I have never used cigarettes smoking	0	0	295	100	Na
	Yes	57	81.5	0	0	
	No	13	18.5	0	0	
Do you think smoking is harmful to your health?	NO	5	7.1	16	5.4	0.571
	YES	65	92.2	279	94.6	
Do you think the smoke from other people smoking is harmful to you?	NO	2	2.9	18	6.1	0.389
	YES	68	97.1	277	93.3	
During the past 30 days, did anyone refuse to sell you cigarettes because of your age?	I did not try to buy cigarettes during the past 30 days	64	91.4	287	97.3	0.018
	Yes, someone refused to sell me cigarettes because of my age	0	0.0	2	0.7	
	No, my age did not keep me from buying cigarettes	6	8.6	6	2	
During the past 12 months, were you taught in any of your classes about the dangers of tobacco use?	Yes	43	61.4	168	56.9	.242
	No & I don't know	27	38.6	127	43.1	

**Table 7:** Logistic regression Analysis for risk to smoke among students as a dependent variable

		B	S.E.	Wald	df	Sig.	Exp. (B)	95% C. I. for EXP(B)	
								Lower	Upper
Step 1 <sup>a</sup>	Friend offer smoke(1)	1.419	.423	11.273	1	.001	4.132	1.805	9.459
	Friend smoke(1)	.925	.361	6.555	1	.010	2.521	1.242	5.118
	Parents smoke(1)	.930	.299	9.644	1	.002	2.535	1.409	4.559
	Relative smoke(1)	.933	.298	9.789	1	.002	2.541	1.417	4.558
	Not allow to sale(1)	-20.436	25607.309	0.000	1	.999	0.000	0.000	.
	Allow to sale(2)	1.311	.702	3.486	1	.062	3.710	.937	14.693
	Constant	-2.712	.279	94.390	1	.000	.066		

Probability of developing smoking = -2.7 + friend offer smoke \*1.4 + friend smoke\*0.925 + parents smoke \*0.930 + relative smoke \* 0.933 + allow to sale\* 1.31 The Probability of developing smoking is increased with present risk factors the most effect factor is friend offer smoke.

**Conclusion and Recommendation**

We need to increase level of Awareness as well as, smoking cessation programs directed the adolescents are urgently needed in this region. As in this study show the most important age to start smoking is at 16-17 years and older most of them on grade 11, so it should prompt the health education to start advising about the harmful effects of smoking in intermediate school classes.

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