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## Prevalence of smoking among middle and high school students in Khemisset province, Morocco

Lamyaa Ben El Jilali\*, Bouchra Benazzouz, Aboubaker El Hessni, Ali Ouichou and Abdelhalem Mesfioui

Laboratory of Genetics – Neuroendocrinology and Biotechnology, Department of Biology, University Ibn Tofail, Faculty of Sciences Kenitra, B.P 133, 14000 Kenitra, Morocco

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### ABSTRACT

The consumption of tobacco is a major public health problem growing rapidly around the world. The main goal of this study is to determine the prevalence of tobacco consumption, evaluate the degree of dependence to nicotine and measure the intentions of quitting smoking in a scholar environment of teenagers. In this work, a transversal investigation was made from Mars to June 2013, among a sample of 1236 middle and high school students by the mean of a survey employing two measures of tobacco dependence (test of Fagerström and test of Hooked On Nicotine Check-list : HONC). The results showed that tobacco consumption in the moment of the study was reported by 18.1% of the surveyed subjects. The test of Fagerström noted that 51.7% of smokers have a strong dependence, the prevalence of the medium and low dependence achieved 20.4% and 25.9% respectively. According to the HONC test, 64.7% of smoking students have lost control over the consumption of tobacco. This study shows the risks of tobacco consumption adopted by high and middle school students and suggests to promote preventive and therapeutic actions.

**Key words :** smoking, dependence, teenager, scholar environment

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### INTRODUCTION

Smoking constitutes a real public health problem and one of the causes of death in worldwide. According to the World Health Organization (WHO), tobacco provokes each year the death of more than 5 million people with 80% from developing countries. This figure is predicted to reach 8 million deaths each year by 2030 [1]. In general, the behavior of smoking settles in the teenage years in the majority of the cases, 80% of smoking adults have started smoking before the age of 18 years old [2].

The Global youth tobacco survey «GYTS» among young students of 13 to 15 years old initiated by the WHO, UNICEF and CDC Atlanta, which was conducted in 140 countries between 1999 and 2007, showed that the proportion of young consumers of tobacco varies between a maximum of 30% to a minimum of 4.9% [3].

In Morocco, the Global youth tobacco survey «GYTS» which was conducted in 2012, showed that prevalence of cigarette smoking is 2,8%, This percentage is higher among boys than girls (2.8% versus 2.3%) [4]. A survey on 9195 subjects aged of more than 15 years old showed a smoking consumption prevalence of 18% : 31.5% among men and 3.3% among women [5]. According to the national alliance against drugs, 7 million Moroccan are smokers, 500 000 among them are minors and this figure is in rise [6].

The given informations on tobacco consumption by teenager constitute an essential element in setting better preventive measures of control, and thus succeeding in the fight against the use of tobacco.

Only a few studies are made on the prevalence of smoking among teenagers in Morocco. It is in this insight that we have carried out this work in the main goal of defining the prevalence of smoking among middle and high school students of the province of Khemisset, defining the interfering factors in the smoking of youth students and evaluating their intentions of quitting smoking in order to elaborate a strategy to prevent and fight smoking in schools.

## MATERIALS AND METHODS

### Study area and population

The region of Khemisset belongs to the Moroccan central plateau bounded on the west by the Atlantic Ocean, to the east by the Middle Atlas, to the north by the Gharb plain and to the south by the Phosphates Plateau [7]. Khemisset province covers an area of 8305 km<sup>2</sup> within Rabat-sale- Kenitra region and According to the General Census of Population and Housing (RGPH) of 2004 in Morocco, it has 521,815 inhabitants [8].

It is about a descriptive transversal investigation, realized between March and June 2013 with the help of an anonym self-administered survey in 6 middle schools and 4 high schools in Khemisset province by 1236 students.

### Data collection and measurement

The survey includes two parts, the first set of questions is about sociodemographic data of the subject (age, sex, scholar environment, level of study, etc.). The second set involves a set of questions concerning the consumption and the dependence risk of tobacco. The dependence to nicotine was evaluated by the Fagerström test which allows to precise the degree of dependence. It includes 06 dichotomous (yes, no) items. The response options and corresponding coding are shown in (Table 1). The total scale score was computed as the sum of the individual item response coding, and it allows to measure dependence: Score between 0 and 2: no dependence, score between 3 and 4: low dependence, score between 5 and 6: Average dependence, score between 7 and 8: high dependence and score between 9 and 10: very high dependence [9].

The retained survey for evaluating the loss of control in the consumption of tobacco is the Hooked on Nicotine Check-list (HONC). Participants were assigned a score of 0 if they did not endorse any symptom and 1 if they endorsed one or more items on either administration. In addition, the number of positive criteria was summed and Loss of autonomy over tobacco use is indicated by endorsement of at least one HONC item (figure 1) [10].

The survey was conducted in targeted schools with the approval of the administration and in accordance with the authorities concerned, following a letter that was destined to the provincial director of National Education and Professional Training of Khemisset.

**Table 1. Items and scoring for Fagerström Test for Nicotine Dependence [11]**

Questions	Answers	Points
How soon after you wake up do you smoke your first cigarette?	Within 5 minutes	3
	6-30 minutes	2
	31-60 minutes	1
	After 60 minutes	0
Do you find it difficult to refrain from smoking in places where it is forbidden e.g. in church, at the library, in cinema, etc.?	Yes	1
	No	0
Which cigarette would you hate most to give up?	The first one in the morning	1
	All others	0
How many cigarettes/day do you smoke?	10 or less	0
	11-20	1
	21-30	2
	31 or more	3
Do you smoke more frequently during the first hours after waking than during the rest of the day?	Yes	1
	No	0
Do you smoke if you are so ill that you are in bed most of the day?	Yes	1
	No	0

1. Have you ever tried to quit but couldn't?
  2. Do you smoke *now* because it is really hard to quit?
  3. Have you ever felt like you were addicted to tobacco?
  4. Do you ever have strong cravings to smoke?
  5. Have you ever felt like you really needed a cigarette?
  6. Is it hard to keep from smoking in places where you are not supposed to, like school?
- When you tried to stop smoking (or when you haven't used tobacco for a while)
7. Did you find it hard to concentrate because you couldn't smoke?
  8. Did you feel more irritable because you couldn't smoke?
  9. Did you feel a strong need or urge to smoke?
  10. Did you feel nervous, restless, or anxious because you couldn't smoke?

Figure 1. The Hooked on Nicotine Checklist [12]

**Data analysis**

The results were analyzed with the SPSS software, version 20. The qualitative variables were compared using the statistic test of chi2. The threshold of statistical significance was fixed at  $p < 0,05$ .

**RESULTS****Sociodemographic data**

The sociodemographic data of the studied population is indicated in (Table 2). The majority of the interviewed population is of a male gender (56,7%). The average age is 16,89 years old with a median of 17 years old. In this descriptive analysis, we have found that the rate of grade retention is high (43,6%). 88,8% of the subjects of our sample have declared that their parents live together, 88,9% live with both their parents or one of them, 7,7% live with another family member and 4,4% were residential students.

Table 2. Sociodemographic characteristics of students

Variable	n=1236	%
Sex		
Male	701	56,7
Female	535	43,3
Age		
12-14 years' old	319	25,8
15-18 years' old	629	50,9
> 18 years' old	288	23,3
Scholar environment		
Urban	766	62
Rural	470	38
Level of study		
1 <sup>st</sup> year of secondary school	162	13,1
2 <sup>nd</sup> year of secondary school	90	7,3
3 <sup>rd</sup> year of secondary school	196	15,9
Common core	118	9,5
1 <sup>st</sup> year of baccalaureate	282	22,8
2 <sup>nd</sup> year of baccalaureate	388	31,4

**Characteristics of smokers**

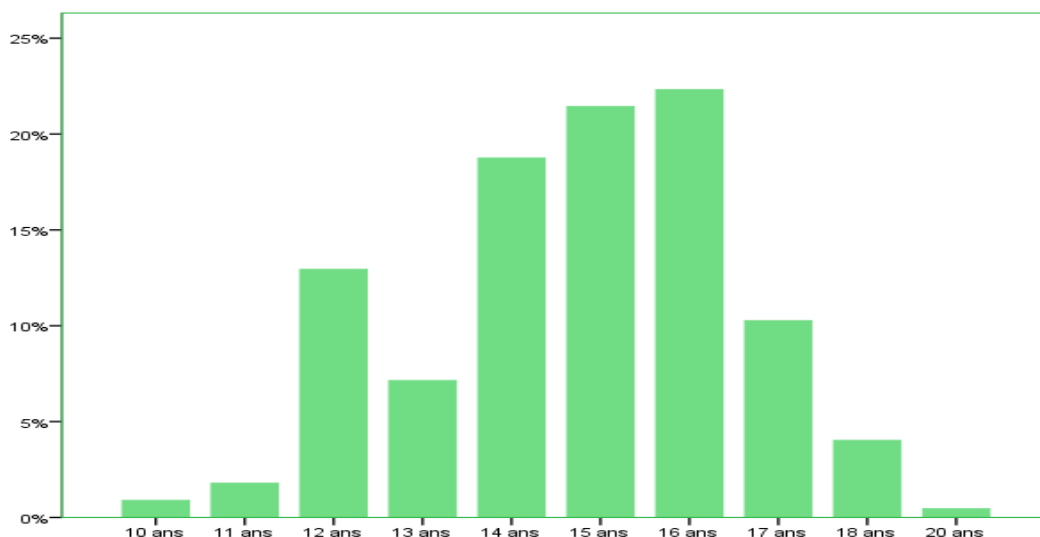
In the studied population, 18.1 % of students revealed being smokers. The consumption of tobacco among students varies between males and females (16.8% of girls versus 19.8% of boys,  $p < 0.001$ ) (table 3). The average age of starting using of tobacco is 14.5 years old with the extremes of 11 and 22 years old. The histogram of ages in the moment of starting the consumption of cigarettes is represented in (figure 2). The percentage of consumers of cigarettes in the urban areas is significantly higher than in the rural areas (22.3% versus 11.3%;  $P < 0.001$ ). The majority of smokers (84.1%) are daily consumers.

In this investigation we have found that 67.4% of smokers have been through a grade retention at least one time. The distribution of smokers according to level of study shows 4% in 1st year of middle school, 4.5% in 2nd year and 17.4% in 3rd year. Concerning high school students, the percentage was of 16.5%, 21% and 36.6% in 1st, 2nd and 3rd year respectively ( $P < 0.001$ ).

The test of Fagerström shows a low dependence (score of 3 to 4) for 25.8% of smoking students, average (score of 5 to 6) for 20.4% and high (score of 7 to 10) for 51.7% of smokers in this sample. We found no significant difference concerning the dependence between sexes (table 4). 45.9% of smokers said that they smoke their first cigarette in the first half-hour following sunrise. 49.3% smoke even though they were sick. 72% found it difficult not to smoke in the prohibited places (movie theater, etc.). The average score of Fagerström was 3.4 (standard deviation: 1.3). The score in the test of Fagerström was negatively correlated at the age of beginning the consumption ( $r = -0,7$ ;  $p = 0,4$ ). The presentation of the consumption of tobacco in function of sex shows the absence of significant differences between girls and boys. 64.7% of smoking students had a score of dependence (HONC) at least a positive criterion. Among them, 81.5% had a score higher of equal to 5 (table 4).

**Table 3. Modes of Consumption of tobacco according to sex**

	Boys		Girls		P
	n	%	n	%	
Cigarettes					
Smokers	118	19,8	106	16,8	
Non-smokers	583	80,2	429	83,2	0,1
Total	701	100	535	100	
Narguile	86	12,3	55	10,3	0,4
Chewing tobacco	62	8,4	45	8,8	0,4



**Fig 2. Histogram of ages in the moment of starting the consumption of cigarette**

**Table 4. Repartition of smoking according to sex**

	Boys n=701		Girls n=535		P
	n	%	n	%	
Number of consumed cigarettes /day					
Consumption $\leq 10$ cig/day	43	57	35	48,9	
Consumption $> 10$ and $\geq 20$ cig/day	25	33,6	34	48,1	0,1
Consumption $> 20$ and $\geq 30$ cig/day	6	8,4	2	3	
Consumption $> 30$ cig/day	1	8,4	0	0	
Type of smoking					
Daily	63	84,1	66	93,2	0,09
Occasional	12	15,9	5	6,8	
Scores of HONC (score of dependence from 0 to 10 with 0 = non dependent 10 = very dependent)	75	10,7	71	13,3	0,1
Test of Fagerström					
No dependence	3	4	0	0	
Low dependence	19	25,4	19	26,4	0,6
Average dependence	14	18,6	16	22,2	
High dependence	39	52	37	51,4	

### Characteristics of parents

In our study, 70.9% of interviewed students have at least one smoking parent. Also, half (about 47.7%) of the interviewed subjects have a smoking member of their siblings. We have found a significantly statistic influence of the familial use of tobacco to the scholar retention and of the interviewed smoking students. Also, the data show a significant statistical relationship between socioeconomic status of parents and the prevalence of smoking among students. Thus, most parents were educated with easy economic income, more children were smoking ( $p < 0.02$ ).

### Intentions of quitting

Among the smoking students, 133 subjects (89.9%) wish to quit smoking (boys: 93.2%, girls: 86.7%;  $\chi^2=0,54$  non significant). This wish was more expressed by students of 15-18 years old (60.9%) ( $p < 0.001$ ). A significant difference was demonstrated between the factors: age and level of study (table 5).

**Table 5. Intentions of quitting smoking according to age and level of study**

	Intentions of quitting				P
	Yes (n=131)		No (n=15)		
	n	%	n	%	
Age					
between 12-14	4	3	2	13,3	
between 15-18	81	60,9	9	60	<0,001
>18	48	36,1	4	26,7	
Level of study					
1 <sup>st</sup> year of middle school	2	1,5	1	6,7	
2 <sup>nd</sup> year of middle school	6	4,5	0	0	
3 <sup>rd</sup> year of middle school	27	20,3	2	13,3	<0,001
Common core	22	16,5	5	33,3	
1 <sup>st</sup> year of baccalaureate	24	18	0	0	
2 <sup>nd</sup> year of baccalaureate	52	39,1	7	46,7	

## DISCUSSION

In our study, it has been proven that the prevalence of smoking in an effective of 1236 students in the province of Khemisset is of 18.1%. This prevalence was found more important than the one found in studies conducted among high and middle school students in various Moroccan cities varying between 8.8% to 15.4% [13, 14, 15]. A national survey «GYTS» demonstrated that 2,8% of young students of 13 to 15 years old are smokers. Another recent study demonstrated that 6.5% students smoke [3]. Our investigation shows a significant overrepresentation of smoking boys with a percentage of 19.8% versus 16.8% of girls, similar results were reported by Bensalah (21.7% of boys versus 5.7% of girls) [15] and Kaoutar (8,6% of boys versus 4,8% of girls) [3]. The low smoking prevalence of girls might be explained by sociocultural or religious considerations which made female smoking a taboo and unacceptable. This difference of repartition is less obvious in other countries of cultural differences; which is the case of occidental Europe where the low smoking prevalence among girls is non-existent [16].

Our results confirm that the smoking prevalence in the urban areas is overrepresented versus in the rural areas (22,3% in the urban areas versus 11,3% in the rural areas), which could be due to some conservative values which considers smoking as a taboo. Fakhfakh et al reported similar results [2].

Our study proves that the consumption of tobacco increases with the age among smoking students of 15-18 years old with 62.5% versus 7.14% among students of 12-14 years old. Those results are in good agreement with those reported by El mouhtadi (24.1% for 11-15 years old versus 67.7% for 16-19 years old), and by Louasté (19% for 17-18 years old versus 6% for 13-14 years old) [17, 18]. The consumption of narguile was more important among boys (12.3% of boys versus 10.3% of girls). Concerning the use of chewing tobacco, we have not found a significant difference between both sexes (8,4% of boys versus 8,8% of girls). Our results are consistent to those noted by slama et al [19].

Our investigation confirms that 70.6% of smoking students have a score of Fagerström higher or equal to 5. Thus, they are moderately to strongly dependent to nicotine. Hastier et al have noted that 48.3% of smokers present an average to strong dependence [9]. Khfacha Aissa et al have reported that 48.9% of the dependence to nicotine, defined by superior scores to six in the survey of Fagerström [20]. Wayzani et al have found, among a sample of subjects in school from 12 to 23 years' old, that the dependence to nicotine was between average to high among 35.3% of smokers [21].

The tobacco dependence is inversely correlated at the age of beginning the consumption, this can be explained by the fact that more the beginning of the consumption of tobacco is precocious more the dependence is strong. This

given data is interesting and suggests the promotion of relative actions to the prevention of smoking in order to aim the delay of the consumption. This result is similar to the one noted by Chabrol *et al* who observed that the precocious beginning is associated to a much higher consumption [22].

A study executed by our university (University Ibn Tofail-Kenitra) among 219 students smokers showed that 29.3% present an average to strong dependence [23]. Another study conducted by our laboratory (Laboratory of Genetics – Neuroendocrinology and Biotechnology) among 1000 high school adolescents in Rabat-Sale Kenitra region showed that 11.1% of students are smokers [24].

In this sample, most of the actual smokers are considering quitting smoking (89.9%). This percentage is clearly superior to the one found by Wayzani in Senegal (40%) [21]. In Morocco, Hinaje corroborates our results by showing that 95.38% wish to quit smoking, Harbouz found a closer value (76.9%) to our study [25, 26]. In addition, we have noted that according to the HONC test, 64.7% of smoking students have lost control over the consumption of tobacco, this value is clearly inferior to the one noted by Chéron-Launay (93,8%) [27]. We have found in another study that the smoking prevalence increases according to level of study between 1st year of middle school and 3rd of high school, with the respective values of 4% and 36.6%. Those results are in good agreement with a similar American study [28]. We have found a significant relation between the smoking habits of parents and their interviewed teenagers. 70.9% of the interviewed subjects have at least one smoking parent and about half (47.7%) of them have smoking members as a siblings. This can be explained by the influence of the familial entourage.

Many factors influence the smoking habits of teenagers. In fact, various studies have noted the influence of the environmental factor on the consumption of tobacco among youth [29, 21]. Also, the majority of studies have recognized the influence of parental smoking on the behavior of their children, especially at the age of adolescence [30, 31, 32].

### CONCLUSION

The prevalence of smoking among middle and high school students of Khemisset province which belongs to the Moroccan central plateau bounded on the west by the Atlantic Ocean, to the east by the Middle Atlas, to the north by the Gharb plain and to the south by the Phosphates Plateau, was elevated. This strong extent to smoking encourages us to elaborate a prevention and intervention program to teenagers, and leads us to reinforce the politics in the fight against tobacco by the sensitization in schools, the formal prohibition of direct and indirect publicity and by setting help centers to the weaning of tobacco.

### *Conflict of interest*

None of the authors have any conflicts of interest to disclose associated with this manuscript.

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