Tobacco smoking among Portuguese high-school students

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The aim of this study was to evaluate the prevalence, behavioural patterns, and determinants of smoking among a large sample of high-school students from Porto, the second largest city in Portugal. Information on sociodemographic characteristics and personal history of tobacco, alcohol, coffee, and illicit drug use was obtained from 2974 students, aged 12–19 years (48.7% female, 51.3% male), using an anonymous self-administered questionnaire. Crude and adjusted odds ratios (OR) were calculated by logistic regression analysis to estimate the association between smoking and the characteristics evaluated.

Overall, 35.8% students had never smoked, 39.4% had tried it (''experimental'' smokers) but were not smokers, 3.3% were former smokers, 6.6% occasional smokers, and 14.9% regular smokers. The mean age for starting smoking was 13.4 $\pm$ 2.1 years for males and 13.4 $\pm$ 1.6 years for females. The prevalence of current smoking was higher among males than females, but the difference was not significant. Male students were significantly more likely to smoke more cigarettes per day than were females. The prevalence of smoking was significantly associated with the following variables: being aged > 12 years; having parents who had attended school for < 4 years; having a mother (OR = 1.88), siblings (OR = 1.96) or friends (OR = 1.75) who smoked; low academic performance (OR = 1.74 for one or two failures and OR = 2.27 for more than two failures at school); and consumption of coffee (OR = 2.90), alcohol (OR = 3.53), or illicit drugs (OR = 6.69).

The prevalence of smoking among adolescents increased with age. There is therefore a need for school-based tobacco prevention programmes which also deal with family influences on smoking.

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Introduction

Although it is commonly reported that children smoke their first cigarette while attending primary school, smoking is most likely to begin during adolescence (*1–4*), when various factors, such as peer pressure, family influence, social class and other psychosocial determinants, influence an individual to start and maintain the habit (*1*). Currently, among students in developed countries there tend to be more female than male smokers, while the rates of smoking initiation are also higher for females (*5*). However, in most developing countries there is still a higher prevalence of male smokers (*6, 7*).

Smoking by adolescents has been studied in several developed countries (*1, 2, 8, 9*), but in Portugal no data are available on the determinants and prevalence of smoking among adolescents. Recent changes in the social and economic situation in Portuguese society could have had an effect on smoking patterns and future trends in a country where the mortality due to smoking-related diseases is very high (*10*).

In this study we evaluated the prevalence, behavioural patterns and determinants of smoking in a large sample of high-school students in Porto, the second largest city in the country.

Participants and methods

The study sample comprised students from seven of the 11 public high-schools in Porto. Although it was intended to include all the schools, the headmasters of four of them refused permission to approach their students. Classes in each school were recruited according to schedule convenience, including all classes that were working when the interviewers were present. In each class we asked for the participation of all the students.

Data collection took place from March to May 1996. Students answered an anonymous questionnaire administered in the classroom. A student from the University of Porto Medical School explained the purpose of the survey to the students and strongly emphasized the anonymous nature of the questionnaire, which minimized underreporting. In addition to collecting data on sociodemographic characteristics, the questionnaire contained several items covering consumption of tobacco, alcohol, coffee and illicit drugs.

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Although 3065 adolescents were selected, analysis was restricted to 2974 because 16 refused to participate, three gave inconsistent answers, and 72 were aged > 19 years. The study participants were aged 12–19 years (mean ± S.D. = 15.8 ± 1.7 years); 48.7% were females and 51.3% males.

Based on responses to the questionnaire, we defined five patterns of smoking, as outlined below.

- Never smokers — "I have never tried smoking".
- Experimental smokers — "I don't smoke but I have tried".
- Former smokers — "I have quit smoking".
- Occasional smokers — "I smoke, but not every day".
- Regular smokers — "I smoke at least one cigarette a day".

The smoking patterns referred to in the questionnaire covered only cigarette smoking and were noted with the students' age and sex. For further analysis we defined current smokers as occasional or regular smokers, and nonsmokers as never, experimental or former smokers. Current smoking prevalence was determined by the school attended by the students, their age, sex, parents' education level, type of family, and parents' smoking status, smoking among siblings, friends' smoking status, opinion about smoking, academic performance, and consumption of coffee, alcohol and illicit drugs. Parents' education level was classified in terms of the number of years of schooling of either the father or the mother, whichever was greater. The family was classified as nuclear or monoparental according to whether the parents lived together or not. Individual academic performance was classified in three levels: "never failed at school", "failed once or twice", and "failed more than twice" (each failure refers to having to repeat one year at school). The parents' attitude towards their children smoking (as stated by the children) was highly correlated with their own smoking status; since the children's answers to the latter item were likely to be more reliable, we used it as a surrogate for the former in the multivariate analysis.

A database was set up using EpiInfo. The χ^2 test was used to compare proportions, and the association between independent variables and smoking status was estimated by means of crude and adjusted odds ratios using unconditional logistic regression analysis (Egret).

Results

Overall, 35.8% of the high-school students had never smoked, 39.4% were experimental smokers, 3.3% were former and 6.6% were occasional smokers, while 14.9% were regular smokers.

The proportion of regular smokers increased significantly with age (Pearson $r = 0.95$, $P < 0.0005$). There was a significant decrease by age in the proportion of never smokers (69.5% at 12 years to 22.8% at 19 years). Former smokers were rare at any age (always <5%), except for 19-year-olds (almost 6%). The mean age for starting smoking was 13.4 ± 1.6 years for females and 13.4 ± 2.1 years for males. Males were more likely either to have never tried smoking or to be current smokers; females were more likely to have only experimented with smoking or to be former smokers (Table 1).

There were significant differences between males and females according to the number of

Table 1. **Smoking patterns, by age and sex, among the study students, in Porto, Portugal**

	No.	Never smoked (%)	Experimental smokers (%)	Former smokers (%)	Current smokers	
					Occasional (%)	Regular (%)
Total	**2 974**	**35.8**	**39.4**	**3.3**	**6.6**	**14.9**
Age (years):[a]						
12	98	69.5	26.3	0	2.1	2.1
13	232	52.9	32.9	3.6	7.1	3.6
14	307	44.6	35.7	4.1	6.5	9.2
15	578	36.7	42.9	3.9	5.8	10.6
16	664	35	39.3	2.7	6.7	16.4
17	625	28.7	40.8	3.1	6.6	20.8
18	330	24.8	40.8	3.1	7.8	23.5
19	140	22.8	44.1	5.9	7.4	19.9
Sex[b]						
Female	1 449	34.5	41.5	4	6	14
Male	1 525	36.9	37.4	2.8	7.1	15.9

[a] $P < 0.00005$ (χ^2 test).

[b] $P = 0.05$ (χ^2 test).

cigarettes smoked daily. Among males, 34.5% smoked 1–5 cigarettes per day; 31.0% smoked 6–10; 29.8% smoked 11–20; and 4.8% smoked >20. Among females, 39.7% smoked 1–5; 36.8% smoked 610; 22.2% smoked 11–20; and 1.3% smoked >20 cigarettes per day (P <0.0001).

A significantly higher risk of smoking was associated with the following: increasing age, monoparental families, smoking by parents (or only the mother), smoking by siblings or friends, belief that smoking is harmless, low academic performance, and consumption of coffee, alcohol or illicit drugs (Table 2). The prevalence of smokers varied significantly between the different schools. When the findings were adjusted for variables that presented a significant univariant association with smoking, belonging to a monoparental family and having smoking friends were no longer significantly associated with a higher risk for smoking. Comparison of the crude and adjusted odds ratios for age suggests that the strong crude association between age and the prevalence of smoking was largely dependent on the effect of confounding variables.

Smokers were significantly more likely to drink alcohol (78.5% vs. 41.1% of nonsmokers, P<0.0001) and coffee (86.5% vs. 59.2% of nonsmokers, P <0.0001) and to use illicit drugs (16.8% vs 1.5% of nonsmokers, P <0.0001), and there was an independent association between these habits and smoking (Table 2). Of the smokers and illicit drug users, 77.2% first started to smoke before they used illicit drugs.

A total of 43.5% of the study participants reported that school was where they smoke most often, followed by cafés (20.4%) and discotheques (15.4%).

Discussion

In this study we examined the prevalence of cigarette smoking in a large sample of high-school students in Porto, Portugal, and found that 21.5% of the participants were current smokers. The significantly higher smoking prevalence was independently associated with age over 12 years, having parents whose education level was less than four years in school, having a family (mother and siblings) or friends who smoked, low academic performance, and consumption of coffee, alcohol or illicit drugs.

Some of the study's shortcomings need to be considered. Since the reported smoking status was not confirmed by means of cotinine or carbon monoxide measurements, there could be some underreporting. However, several studies in other populations have shown that data collected from adolescents by self-reporting are reliable (*11–13*) and, once the confidentiality of the data is assured, can be accepted as valid. Since four (out of 11) schools refused to participate in the study, we cannot extrapolate our findings to the whole population of high-school students in Porto. Different patterns of behaviour among students attending the nonparticipating schools could change our results, but as the smoking risks among participating schools (after adjusting for other variables) were similar, the role of participation bias is probably minimal. Also, the sampling frame excluded a significant proportion of over-15-year-olds who may have left school, being above the age limit for compulsory education. Our results could be an underestimate of the magnitude of the problem because dropping out of school is among the strongest predictors of adolescent tobacco smoking (*14, 15*).

It is not easy to compare our findings with those from other countries owing to the different methodologies used. However, the smoking prevalence in our sample was much lower than that reported in a sample of 12–18-year-old French adolescents, 35.1% of whom smoked at least once in a while (*16*), compared with the 21.5% who were at least occasional smokers in our study. Also, in a sample of high-school students from Brazil, another Portuguese-speaking country, 37.7% had used tobacco at some time in their lives (*17*), compared with 24.8% in our sample if we combine former and current smokers. In Chile, the prevalence of smoking was 15.4% among adolescent students aged 13–15 years and 36.9% among those aged $\geqslant$16 years (*18*), levels which are, respectively, lower and higher than those in our sample (Table 1); compared with our results, the smoking prevalence was higher among Chilean females than males.

In contrast with most developed countries (*19, 20*), tobacco smoking in Portugal does not seem to be decreasing, and this is not likely to change if the observed trend towards an age increase in the prevalence of smoking is not reverted. The prevalence of smoking among female adolescents in Porto has increased from 15.5% to 20.2%, while in males it slightly decreased from 24.7% to 23.1% over three years (*21*). Thus although the prevalence of smoking is still higher among males than females, as is the case in most developing countries (*6, 7*), the difference is narrowing and the rate at which female students are taking up smoking is higher than that of males, as is the case in developed countries (*5*).

A lower educational level is an independent predictor of smoking in adult populations, one that is currently even stronger than gender, although the reasons for this are not yet clear (*22*). In our study sample, students whose parents belonged to the least educated class had a significantly higher risk for smoking, irrespective of whether or not the parents themselves were smokers.

Since the increase in the risk of taking up smoking when both parents smoke is similar to that when only the mother smokes, the mother's smoking status is probably the main determinant. Parent and sibling smokers provide early negative role models for children as much as parent and sibling nonsmokers and ex-smokers provide positive role models, independently of other social or demographic characteristics. Thus, smoking control pro-

Table 2. **Prevalence and relative risk (odds ratio) of smoking, according to demographic, social and behavioural characteristics, among adolescents in seven schools in Porto, Portugal**

	No.	Smokers (%)	Odds ratio (OR)	Adjusted OR
School				
1	639	19.3	1[a]	1[a]
2	392	15.8	0.78 (0.56–1.10)[b]	0.61 (0.40–0.94)[b]
3	204	20.5	1.08 (0.72–1.61)	1.34 (0.80–2.24)
4	353	34.4	2.20 (1.63–2.96)	1.48 (1.01–2.18)
5	461	25.2	1.41 (1.05–1.89)	1.06 (0.73–1.53)
6	431	14.7	0.72 (0.51–1.01)	0.88 (0.58–1.34)
7	494	23.6	1.30 (0.97–1.73)	1.31 (0.91–1.90)
Age (years)				
12	98	4.2	1[a]	1[a]
13	232	10.8	2.74 (0.92–8.14)	3.04 (0.81–11.4)
14	307	15.8	4.27 (1.50–12.2)	3.08 (0.84–11.2)
15	578	16.6	4.53 (1.62–12.6)	2.76 (0.78–9.77)
16	664	23.2	6.86 (2.48–19.0)	3.07 (0.87–10.8)
17	625	27.6	8.68 (3.14–24.0)	3.64 (1.03–12.9)
18	330	31.4	10.4 (3.73–29.2)	3.40 (0.94–12.3)
19	140	27.2	8.50 (2.92–24.8)	2.20 (0.57–8.48)
Sex				
Female	1 449	20.2	1[a]	1[a]
Male	1 525	23.1	1.18 (0.99–1.41)	1.04 (0.82–1.30)
Parents' education (years)				
<4	267	28.0	1[a]	1[a]
4	807	20.9	0.68 (0.49–0.94)	0.61 (0.40–0.94)
5–12	1 304	20.9	0.68 (0.50–0.92)	0.57 (0.38–0.84)
>12	573	21.6	0.71 (0.50–1.00)	0.61 (0.39–0.95)
Type of family				
Nuclear	2 402	20.4	1[a]	1[a]
Monoparental	528	27.0	1.44 (1.16–1.80)	1.27 (0.96–1.68)
Parents' smoking status				
Neither	1 340	18.3	1[a]	1[a]
Only father	886	23.4	1.37 (1.11–1.69)	1.29 (1.00–1.66)
Only mother	185	32.6	2.16 (1.54–3.04)	1.88 (1.21–2.92)
Both	349	31.4	2.04 (1.56–2.67)	1.76 (1.26–2.48)
Smoking among siblings				
None	2 255	19.5	1[a]	1[a]
At least one	502	36.5	2.38 (1.92–2.94)	1.96 (1.51–2.55)
Friends' smoking status				
Nonsmokers	139	5.9	1[a]	1[a]
Smokers	2 634	23.6	4.95 (2.41–10.2)	1.75 (0.80–3.85)
Opinion about smoking				
Harmless	42	51.3	1[a]	1[a]
Harmful	2 740	21.9	0.27 (0.14–0.50)	0.36 (0.16–0.80)
Academic performance				
Never failed	1 738	16.8	1[a]	1[a]
Failed once or twice	1 047	28.7	1.99 (1.65–2.40)	1.74 (1.34–2.25)
Failed more than twice	127	33.6	2.50 (1.67–3.73)	2.27 (1.31–3.96)
Coffee drinkers				
No	994	8.5	1[a]	1[a]
Yes	1 884	29.0	4.42 (3.45–5.65)	2.90 (2.16–3.88)
Alcohol drinkers				
No	1 439	9.3	1[a]	1[a]
Yes	1 400	34.9	5.21 (4.23–6.42)	3.53 (2.75–4.54)
Illicit drug users				
No	2 700	19.1	1[a]	1[a]
Yes	138	75.6	13.1 (8.72–19.6)	6.69 (4.07–11.0)

[a] Reference class.

[b] Figures in parentheses are 95% confidence intervals (estimates obtained using logistic regression).

jects will probably not be effective if targeted only at the children or the adolescent without involving the family.

A low academic performance appears to be a risk factor for smoking because among students who both smoke and failed at school, more than two-thirds started smoking after their first failure (data not shown). This observation is in accord with results from the USA which showed that the onset of tobacco use was related to poor academic achievement: 21% of below-average students were heavy smokers compared with 7% of above-average students (*2*).

In various populations, a higher rate of alcohol and drug use has been reported among smokers than nonsmokers, and multiple longitudinal studies conclude that cigarette smoking is a risk factor for illegal drug use (*2*). Although our study was not designed to evaluate the hypothesis of a relation between smoking and later dependence on other types of drugs, we found that 75% of drug-abusers started with cigarette smoking.

It is widely recognized that knowledge about the side-effects of smoking and beliefs about the social image of tobacco might influence an adolescent on whether to begin smoking (*1, 3*). Our study showed that very few students considered smoking to be harmless to their health, but those who did so were significantly more likely to be smokers. Since most people are aware that smoking is deleterious, there is a need to change the content of preventive messages. School is expected to be the favoured vehicle for health promotion, for example, by providing a smoking-free environment. In Portugal the role played by schools in preventing smoking seems, however, to be inefficient or at least still not effective, because the prevalence of smoking increases with age and length of schooling, and especially because 43.5% of the students who smoked stated that they did so mostly in school.

The results of this study suggest the need for school-based tobacco prevention programmes, which have been reported to be successful in reducing adolescent use of tobacco (*2, 23*), and to address family influences on adolescent smoking. Since adolescent smokers are highly likely to become adult smokers, this might be an efficient approach to help reduce smoking in the future. ■

Résumé

Le tabagisme chez des lycéens portugais

Le but de cette étude était de déterminer la prévalence, les modes de comportement et les déterminants du tabagisme dans un large échantillon de lycéens de Porto, la deuxième ville du Portugal. Des données sur les caractéristiques sociodémographiques et les antécédents individuels de tabagisme, de consommation d'alcool, de café et de drogues illicites ont été obtenues auprès de 2974 élèves âgés de 12 à 19 ans (filles 48,7%, garçons 51,3%) au moyen d'un questionnaire anonyme auto-administré. On a calculé l'*odds ratio* brut et ajusté (OR) par analyse de régression logistique afin d'évaluer l'association entre le tabagisme et les caractéristiques étudiées.

Dans l'ensemble, 35,8% des lycéens n'avaient jamais fumé, 39,4% avaient essayé (fumeurs «expérimentaux») mais n'étaient pas devenus fumeurs, 6,6% étaient des fumeurs occasionnels et 14,9% fumaient régulièrement. L'âge moyen auquel ils avaient commencé à fumer était de $13,4 \pm 2,1$ ans pour les garçons et de $13,4 \pm 1,6$ ans pour les filles. La proportion actuelle de fumeurs était plus élevée chez les garçons que chez les filles, sans toutefois que la différence soit significative. Les garçons étaient sensiblement plus enclins à avoir une consommation quotidienne de cigarettes supérieure à celle des filles. On a constaté l'existence d'une association significative entre le tabagisme et les variables suivantes : âge supérieur à 12 ans, parents ayant fréquenté l'école moins de 4 ans, mère (OR = 1,88), frères et sœurs (OR = 1,96) ou amis (OR = 1,75) fumeurs, résultats scolaires médiocres (OR = 1,74 pour un ou deux échecs et OR = 2,27 pour plus de deux échecs scolaires), consommation de café (OR = 2,90), d'alcool (OR = 3,53) ou de drogues illicites (OR = 6,69).

La prévalence du tabagisme augmentait avec l'âge chez ces adolescents. D'où la nécessité de mettre en place des programmes de prévention en milieu scolaire qui prennent aussi en compte l'influence de la famille.

Resumen

Consumo de tabaco entre los estudiantes de secundaria portugueses

El objetivo de este estudio consistió en evaluar la prevalencia, las pautas de comportamiento y los determinantes del consumo de tabaco en una gran muestra de estudiantes de secundaria de Oporto, la segunda ciudad de Portugal. Se obtuvo información sobre las características sociodemográficas y los antecedentes de consumo de tabaco, alcohol, café y drogas ilícitas de 2974 estudiantes de 12 a 19 años de edad (el 48,7% mujeres, y el 51,3% hombres), utilizando para ello un cuestionario anónimo voluntario. Se calcularon las razones de posibilidades (OR) brutas y ajustadas mediante un análisis de regresión logística a fin de estimar la relación entre el tabaquismo y las características evaluadas.

Los resultados globales mostraron que el 35,8% de los estudiantes no habían fumado nunca, el 39,4% habían probado el tabaco (fumadores «experimentales») pero no eran fumadores, el 3,3% eran ex

fumadores, el 6,6% eran fumadores ocasionales, y un 14,9% fumaba regularmente. La edad media a la que habían empezado a fumar era de 13,4 ± 2,1 años entre los hombres y 13,4 ± 1,6 años entre las mujeres. La prevalencia del tabaquismo en el momento de realizar el estudio era mayor entre los varones que entre las mujeres, pero la diferencia no era significativa. Los muchachos tendían a fumar diariamente un número significativamente mayor de cigarrillos que las muchachas. La prevalencia del consumo de tabaco estaba relacionada de forma significativa con las siguientes variables: edad >12 años; progenitores con menos de cuatro años de escolarización; madre (OR = 1,88), hermanos (OR = 1,96) o amigos (OR = 1,75) fumadores; bajo rendimiento académico (OR = 1,74 para uno o dos fracasos y OR = 2,27 para más de dos fracasos en la escuela); y consumo de café (OR = 2,90), alcohol (OR = 3,53) o drogas ilícitas (OR = 6,69).

La prevalencia del tabaquismo entre los adolescentes aumentaba con la edad. Así pues, son necesarios programas escolares de prevención del consumo de tabaco que aborden también las influencias familiares en ese hábito.

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