Smoking among medical students: temporal trends and related variables*

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Introduction: Although the prevalence of smoking among medical students declined steadily between the 1960s and 1980s, it seems to have stabilized in recent years.
Objectives: To evaluate temporal trends, over the last 17 years, in the smoking habits of medical students at the Universidade Federal de Pelotas (UFPel), in the state of Rio Grande do Sul, Brazil, and to identify some possible risk factors for smoking.
Method: Cross-sectional surveys employing comparable methodologies were conducted in 1986, 1991, 1996 and 2002. Self-administered questionnaires were used. Smokers were defined as those who were smoking at least one cigarette per day for at least one month. Descriptive analyses were carried out, as well as rough evaluations using chi-square tests for heterogeneity and linear trend. In addition, Poisson regression, adjusted for age, was used in order to evaluate the effect of medical school class year on the incidence of smoking.
Results: The prevalence of smoking among UFPel medical students was 10.1%, statistically similar to values found in 1991 and 1996. No differences in smoking frequency were found relating to sex, age, or parental smoking. The prevalence of smoking was found to increase progressively over the course of medical school.
Conclusions: The downward trend in smoking prevalence among UFPel medical students is being replaced by a stable rate of approximately 10-15%. Anti-smoking campaigns are still necessary in university environments, especially in medical schools.

Key words: Smoking/trends. Smoking/epidemiology. Medical students/tobacco use cessation. Cross-sectional studies. Questionnaires.

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INTRODUCTION

Recent studies have demonstrated high rates of smoking within various populations. There are an estimated one billion male smokers worldwide, and approximately 50% of those live in developing countries.[1] In both developed and developing countries, there has been a slight, gradual decline in the prevalence of smoking among men. In contrast, the prevalence of smoking among women is increasing, especially in developing countries.[2]

In the literature, no other risk factor has been so clearly implicated in high rates of morbidity and mortality as has smoking. Menezes et al.[3] reported population attributable risks of smoking-related lung cancer and larynx cancer of 71% and 86%, respectively.

In 2000, it was reported that the prevalence of smoking among male physicians ranged from 3% (in India) to 50% (in Bosnia).[1,2] In the Latin American countries of Colombia and Chile, this rate was 21% and 40%, respectively.

Studies conducted between 1980 and 1990 showed a significant decrease in smoking among medical students in general, although this decline has become less pronounced over the last decade.[1,2] A study carried out in Croatia demonstrated no significant difference between 1989 smoking rates among Croatian medical students (31%) and those seen in 2000 (29%).[4] Similarly, a study conducted in Slovakia showed that the percentage of Slovakian medical students who were smokers did not decrease from 1995 to 1999.[5]

There is considerable variation in reported rates of smoking among medical students. An American study[6] stated that only 3.3% of medical students were smokers. In contrast, it has been reported that, among Greek medical students, 33.2% of males and 28.4% of females are smokers.[7] In Germany, the prevalence of smoking among medical students was 23.7% and was found to be associated with maternal smoking but not with paternal smoking.

Various studies have reported an increased prevalence of smoking over the course of medical school.[9,10,11,12] Other studies, however, have found no such trend.[13,14]

Studies conducted in Brazil show that the current prevalence of smoking among medical students ranges from 10% to 20%.[15,16] The same studies show a gradual decline in this index, although the rate of decline has decreased in recent years. Notably, smoking among Brazilian medical students appears to increase progressively over the course of medical school.[15] This finding is in accordance with those from the majority of international studies.

It is well known that health professionals serve as role models for the population in general and that they are the ones who will determine health policies for the primary prevention of disease. Due to the gravity of the problem of smoking, medical students have been used as “markers” in order to determine the

effectiveness of medical school teaching techniques, as well as how those students will conduct themselves when dealing with patients who smoke.

The main objective of this study was to evaluate temporal trends, over the past 17 years, in the smoking habits of medical students at the Universidade Federal de Pelotas (UFPel). In addition, the data collected was used to identify some possible risk factors for smoking.

METHOD

Cross-sectional surveys were conducted in 1986, 1991, 1996 and 2002, including all students from the first to the fifth year at the UFPel School of Medicine. There was a greater interval between 1996 and 2002 due to teacher strikes during that period.

Self-administered, confidential questionnaires were used in all surveys. Six medical students were charged with distributing the questionnaires in the classrooms, giving general instructions on how to complete the questionnaires and sorting the completed questionnaires by class year. In addition to questions regarding demographic data such as gender and age, the questionnaires included questions regarding the number of cigarettes smoked, age at smoking initiation and cessation, marijuana use and parental smoking history, as well as the presence of symptoms such as dry cough, productive cough and wheezing. As students handed in the questionnaires, they were asked to sign an attendance sheet. This was done with the aim of later locating absentee students and inviting them to participate.

Students were defined as smokers if they reported "having smoked one or more cigarettes per day for at least one month", and ex-smokers were defined as those reporting "having quit smoking at least one month ago".[17] Questions related to respiratory symptoms referred to symptoms occurring over the last twelve months and excluded transient symptoms resulting from cold or flu.

Data gather from the questionnaires were reviewed and twice entered into an Epi-Info database. Subsequent analysis was performed using the Stata program. Trend tests were used for comparison with previous studies. To determine correlations between risk factors and smoking prevalence, as well as to evaluate heterogeneity, chi-square tests were used. In addition, Poisson regression, with robust variance estimates, was used in order to adjust for age and thereby evaluate the effect of medical school class year on the prevalence of smoking.

The Ethics Research Committee of the UFPel School of Medicine approved the project.

RESULTS

In the 2002 survey, 450 UFPel medical students were eligible for the study, and 447 (99.3%) students completed the questionnaire. On any given questionnaire, the percentage of unanswered questions never exceeded 5%, and the question regarding "maternal smoking" was the question most frequently unanswered (4.9%).

The percentage of current smokers was 10.1%, and 9.8% of participants were considered ex-smokers. Among current smokers, 72.5% reported smoking more than 10 cigarettes per day, and only 2.5% reported smoking more than 20 cigarettes per day.

Temporal trends in smoking among UFPel medical students over a 17-year period, stratified by gender, are shown in Figure 1. No statistically significant differences in prevalences were found among the last three surveys. Smoking prevalence in students declined by 31% from 1986 to 1991 ($p < 0.01$), by 22% from 1991 to 1996 ($p = 0.14$), and by only 13% from 1996 to 2002 ($p = 0.47$). No gender-related differences were found in any of the studies, and trends were similar for both genders.

Among the current smokers, 11.1% started smoking between the ages of 10 and 14, 67.9% between the ages of 15 and 19, and 21.0% after the age of 20. Among those classified as ex-smokers, two-thirds quit smoking before the age of 20.

The prevalence of paternal and maternal smoking was found to be significantly higher (22.1% and 15.9%, respectively) in 2002. When compared to the percentages of fathers and mothers who had never smoked (36.8% and 60.5%, respectively), this difference is even more evident ($p < 0.001$).

Table 1 shows the 2002 sample of students in relation to the independent variables collected. There was a higher proportion of males among the students, but this difference is lower than that found in the 1996 study (57.9% males).[15] In 2002, mean age was 22.6, with standard deviation of 2.8 years, which is quite similar to that found in the 1996 study (22.4 ± 3.4).[15] The prevalence of respiratory symptoms was higher in 2001, considering the similarities in age between the groups studied in 1996 and 2002.[15]

Figure 1. Temporal trends in smoking among medical students of the Universidade Federal de Pelotas, stratified by gender.

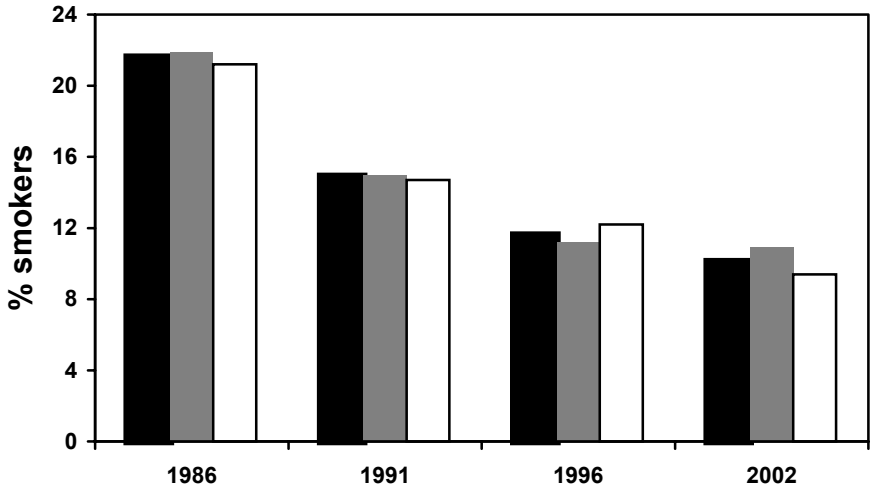


Table 2 shows correlations between current smoking and independent variables. There were no stastically significant correlations between present smoking and gender, age, paternal smoking, maternal smoking or wheezing. There was a positive correlation between current smoking and cough (dry or productive).

Figure 2 shows the positive correlation found between prevalence of smoking and medical school class year, similar to that found in the 1991 and 1996 studies.[15] However, since it is known that class year can be confused with age, multivariate analysis was performed to adjust for the effect of age on the results. The results show that age was negatively skewing the relationship between smoking and school class year, since the adjusted prevalence ratios were farther from the normal distribution than were the non-adjusted ratios (Table 3).
Prior use of marijuana was reported by 6.3% of the students. In 1996, that percentage was 4.2% (p = 0.16).

DISCUSSION

Results show an initial downward trend, followed by a levelling off. The decline observed in the first surveys has been replaced by a stable rate of approximately 10% to 15%.
In this study, the prevalence of smoking among medical students was found to be consistently lower than that of the urban population of the area in general.

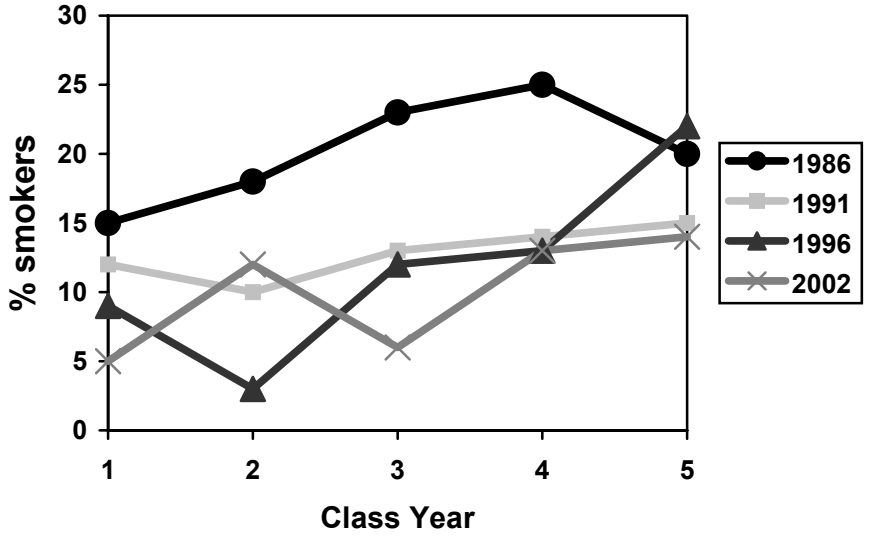
This is in accordance with the findings of other studies in the literature. Population-based studies among adults in the city of Pelotas have revealed smoking prevalences of 33% in 1988, 31% in 1994 and 28% in 2002 (higher than those found among medical students).[18,19,20]

Results from other studies involving Brazilian medical students are similar to those from our study of medical students at the UFPel School of Medicine. In a 1989 study involving medical students in the city of Sorocaba (in the state of São Paulo), the prevalence of smoking was found to be 17.5%, a significant decline in relation to that found in 1969.[16]

However, these results must be carefully interpreted. The fact that health professionals smoke less than the population in general may "mask" a significant prevalence of smoking within this group. Moreover, unlike the population in general, physicians play an important role in smoking prevention and smoking cessation in the community. Therefore, the prevalence of smoking among medical students and physicians should be even lower than it is.

The direct linear relationship between smoking and class year, even when adjusted for age, should be the starting point for critical considerations on the role of medical schools in the shaping the behavior of students. Similar trends were revealed in the three previous studies, reducing the possibility that this result was obtained at random. Although the reasons for this behavior are not yet clear, the same has been reported in the literature.[9,10,11,12] A possible explanation is that the knowledge passed to the students may be limited and inefficiently presented. In addition, models of behavior among friends, family, or even health professionals, may be inappropriate.

Figure 2. Temporal trends in the prevalence of smoking by class year.



Some methodological aspects of the present study should be discussed. The low rates of unanswered questions in all four studies reduce the possibility of selection bias. In addition, the consistency found in factors related to smoking reduces the possibility that such correlations were drawn at random.

Reverse casuality, which is common in cross-sectional studies, may affect the correlation between smoking and respiratory symptoms, since smoking may cause respiratory symptoms and the presence of these symptoms may discourage smoking. The criteria used in defining smokers, ex-smokers, and nonsmokers is in accordance with those recommended by the World Health Organization.[17] The lack of standardization in these criteria is known to be one of the reasons for the discrepancies in smoking prevalences found in the literature.

The size of the sample was not specifically designed to evaluate temporal trends in marijuana use. This may explain why no significant difference was found between the 1996 and 2002 studies. In Croatian medical students, the prevalence of marijuana use was found to increase from 14% in 1989 to 35% in 2000.[3] Since no such trend was found among Brazilian medical students, further studies are warranted.

Among methodological strategies used in studies, monitoring temporal trends in smoking through periodic studies with comparable delineation stands out. Very few studies conducted in developing countries have used this methodology to show temporal trends in the prevalence of smoking among students over periods of more than 10 years.

Several strategies have proven effective in reducing the smoking habit, both at the individual and population level. These include prevention campaigns, limiting access to cigarettes and increasing the price of cigarettes.[21]

Smoking eradication among health professionals should be presented as a duty that these professionals owe to society. Medical school faculty should reflect upon the knowledge they pass to their students and on ways to be more efficacious in combatting this addiction.

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TABLE 1
Profile of the sample of medical students at the Universidade de Medicina de Pelotas

Characteristic	Proportion (*n*)
Gender	
Male	**53.1% (229)**
Female	**46.9% (202)**
Age	
< 20	**9.9% (44)**
20-24	**72.6% (324)**
25-29	**15.7% (70)**
> 30	**1.8% (8)**
Dry cough	
No	**76.7% (340)**
Yes	**26.3% (103)**
Productive cough	
No	**86.2% (382)**
Yes	**13.8% (61)**
Wheezing	
No	**88.7% (393)**
Yes	**11.3% (50)**

TABLE 2

Prevalence of smoking according to gender, age, parental smoking and respiratory symptoms

Characteristic	% of smokers	Prevalence ratio (95% CI)	*p* value
Gender			**0.61***
Male	**10.9%**	**1.16 (0.66–2.04)**	
Female	**9.4%**	**1.00**	
Age			**0.18****
< 20	**11.4%**	**2.22 (0.63–7.83)**	
20-24	**11.1%**	**2.17 (0.79–5.91)**	
> 25	**5.1%**	**1.00**	
Paternal smoking			**0.98***
No	**10.3%**	**1.00**	
Yes	**10.4%**	**1.01 (0.52–1.96)**	
Maternal smoking			**0.56***
No	**9.4%**	**1.00**	
Yes	**11.8%**	**1.25 (0.60–2.57)**	
Dry cough			**0.005***
No	**7.9%**	**1.00**	
Yes	**17.5%**	**2.20 (1.26–3.83)**	
Productive cough			**0.002***
No	**8.4%**	**1.00**	
Yes	**21.3%**	**2.54 (1.42–4.57)**	
Wheezing			**0.65***
No	**9.9%**	**1.00**	
Yes	**12.0%**	**1.21 (0.54–2.71)**	

***Chi-square test for heterogeneity**

****Chi-square test for linear trend**

95% CI, 95% confidence interval

TABLE 3

Unadjusted and adjusted 2002 smoking prevalence ratios by class year

Class year	Unadjusted ratio	Adjusted ratio	*p* value*
First	1.00	1.00	0.02
Second	2.57 (0.85–7.76)	2.91 (0.90–9.42)	
Third	1.22 (0.34–4.40)	1.53 (0.40–5.90)	
Fourth	2.71 (0.91–8.01)	3.84 (1.02–14.39	
Fifth	2.90 (0.98–8.57)	4.69 (1.20–18.27)	

*Wald test for linear trend (analysis adjusted for age)
95% CI, 95% confidence interval