

Evaluation of the Influence of Medical Education on the Smoking Attitudes of Future Doctors

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OBJECTIVE: To evaluate whether medical education influences the prevalence, awareness of, and attitudes to smoking of medical students in the first 3 years of their degree.

MATERIAL AND METHODS: In this descriptive longitudinal questionnaire-based study of university students, data for medical and veterinary students in their first 3 years were compared.

RESULTS: Of the 226 registered first-year medical students, 181 (80%) returned the questionnaire. Of the 180 first-year veterinary students, 161 (89%) replied to the questionnaire. In the third year, 151 questionnaires from medical students and 139 from veterinary students were returned. There were no differences in age or sex between the 2 groups, and both had more women. The prevalence of smokers increased between the first year and the beginning of the third (from 20% to 31% among medical students and from 28% to 32% among veterinary students). An improvement in the awareness of smoking as a risk factor was observed for medical students, but no change in attitude was observed.

CONCLUSIONS: The influence of medical education on this health concern is limited as there is no reduction in the prevalence of smoking. Medical education also seems unable to change attitudes to smoking. More students relate smoking to risk factors for certain diseases, showing greater awareness of the health problems caused by smoking.

Key words: *Medical students. Smoking. Medical education.*

Evaluación de la influencia que ejerce la facultad de medicina en los futuros médicos respecto al tabaquismo

OBJETIVO: Evaluar la influencia que ejerce una facultad de medicina en sus alumnos, durante el primer ciclo de la carrera, respecto a la prevalencia, los conocimientos y las actitudes hacia el tabaquismo.

MATERIAL Y MÉTODOS: Estudio longitudinal descriptivo mediante encuesta, en estudiantes universitarios, en el que se compararon los datos obtenidos en medicina y veterinaria durante el primer ciclo de la licenciatura.

RESULTADOS: En el primer curso, el número de matriculados en medicina era de 226 y se realizaron 181 encuestas (80%); en primero de veterinaria la cifra era de 180 y se llevaron a cabo 161 encuestas (89%); en tercer curso se efectuaron 151 encuestas en medicina y 139 en veterinaria. Las 2 muestras no presentan diferencias respecto a la edad ni en la distribución por sexo, y hay un predominio de mujeres en ambos grupos. En la evolución de la prevalencia de fumadores desde el primer curso hasta principios de tercero, observamos un incremento (pasó de un 20 a un 31% en el caso de medicina y de un 28 a un 32% en el caso de veterinaria). Se observa una mejoría en los conocimientos sobre el tabaquismo como factor de riesgo en los alumnos de medicina, pero en las actitudes no se objetivan cambios significativos.

CONCLUSIONES: La influencia de la facultad de medicina en este problema de salud es escasa. No ejerce cambios positivos en la prevalencia del tabaquismo. Respecto a las actitudes tampoco genera cambios; en cuanto a los conocimientos se observa un incremento de alumnos que relacionan el tabaquismo como factor de riesgo de determinadas enfermedades.

Palabras clave: *Estudiantes de medicina. Tabaquismo. Educación médica.*

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Introduction

The number of studies on smoking habits of medical students published in international journals has been increasing in recent years.¹⁻⁵ This may reflect a growing concern for the influence medical schools have on smoking. In Spain, the number of such studies remains

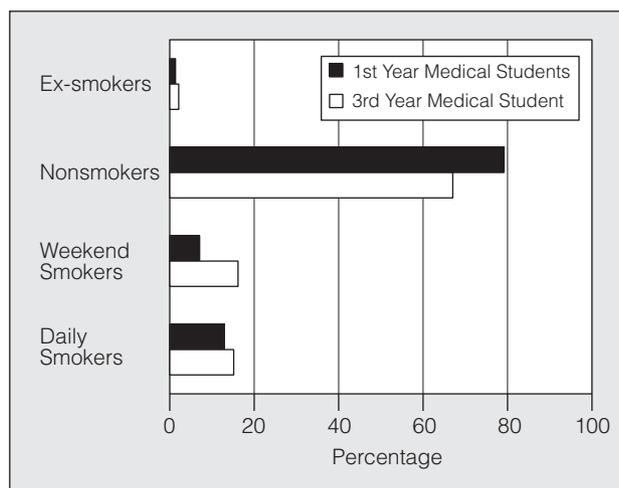


Figure 1. Prevalence of smoking among medical students. The increase in weekend smokers is statistically significant ($P<.05$).

low, and those that have been published are descriptive, analyzing prevalence, awareness, and attitudes towards smoking.⁶⁻¹¹ Studies of medical students and students of other health sciences have shown a lower prevalence of smoking among students at the beginning of their courses compared to prevalence among health care professionals.¹² Studies also show that smoking is more common at the end of a degree course than at the beginning, that is, medical schools not only train doctors, they also produce smokers.¹³

Several authors have highlighted medical education as an important tool in the control and prevention of smoking, a tool that has been underused until now in most countries.¹³⁻¹⁵ In view of this, we thought it appropriate to investigate the prevalence, awareness, and attitudes towards smoking of medical students, and to assess how these changed during the first 3 years of their degree course. Thus, the objective of this study was to evaluate the influence of medical school on the smoking habits of future doctors during the first 3 years of the degree course, and whether students who smoke and those who do not have different attitudes towards and knowledge about smoking.

TABLE 1
Number of Students Enrolled and Number Who Responded

Population	No. of Students Enrolled	Estimated Sample Size	Students Who Responded
1st year medical students (Year 1997-1998)	226	142	181
3rd year medical students (Year 1999-2000)	203	133	151
1st year veterinary students (Year 1997-1998)	180	125	161
3rd year veterinary students (Year 1999-2000)	190	129	139

Material and Methods

The influence of the medical school on students was assessed by questionnaires in the first year of the degree course, with subsequent follow up in the third year. This same process was repeated in veterinary students, who formed a control group for comparison of results. Thus, changes found in medical students that did not appear in veterinary students could be attributed to studying for a degree in medicine. In both groups, the questionnaire was filled out by the students. The first questionnaire was completed when the students registered for their first-year course, whereas the second questionnaire, corresponding to the third year, was answered in class.

Prevalence, awareness, and attitudes towards smoking were investigated using a questionnaire with 26 questions. The questionnaire had been piloted with 20 students for potential problems. Each questionnaire was identified with a 6-digit code. The first fields were general ones—identification code, sex, and age of the respondent. The remaining questions addressed prevalence and characteristics of smoking among students, awareness of smoking, and attitudes towards this health concern. Age and number of cigarettes/day were treated as quantitative variables. The remaining questions had multiple choice answers, mostly with two possibilities. If more than two possibilities were available, a 4-point Likert Scale (0 to 3) was used, with different categories according to the question. The reliability of the results, indicated by their reproducibility, has been investigated in a previous study.¹⁶

The sample size was calculated based on the number of students registering in both schools—medicine and veterinary medicine—with a 95% confidence level for the least favorable case (that is, $P=q=.5$) and an estimated error of 5%.

The SPSS statistical package for Windows was used for tabulation and analysis of the data. The χ^2 test was used to determine the degree of statistical significance between the differences in percentages observed, with statistical significance for the test set at .05 (95% confidence level).

Results

The number of questionnaires returned from both medical and veterinary students exceeded the calculated sample size for both the first and third years (Table 1). Of the medical students surveyed in the first year, 48 (27%) were men and 133 (73%) were women. Mean (SD) age was 18.06 (0.97) years, median age was 18 years.

The prevalence of smoking among first-year medical students was as follows: 13% smoked daily, 7% smoked on weekends, 1% were ex-smokers, and 79% were nonsmokers (Figure 1). Students smoked a mean of 3.61 (5.16) cigarettes/day (including weekend smokers). Among the smokers, 57% were dissonant (wanted to stop smoking). More women were smokers than men among first-year students, but the difference was not statistically significant (Table 2).

In the section on awareness of diseases caused by smoking, 95% of first-year medical students thought that smoking seriously harmed health, whereas the rest thought smoking not so harmful or smoking few cigarettes (<10/day) was not harmful. The awareness of

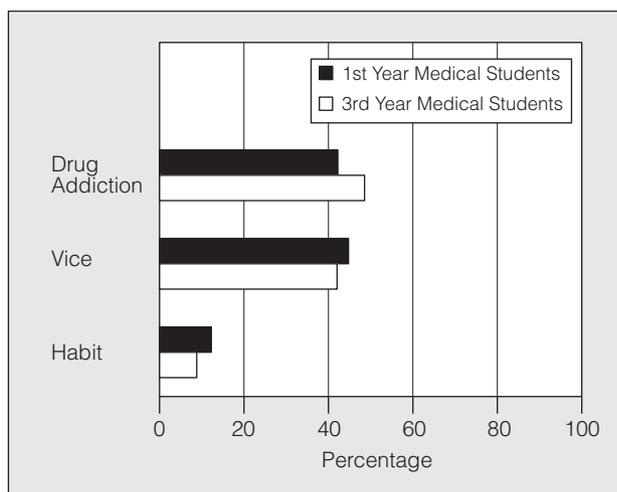


Figure 2. Assessment of smoking as a drug addiction among medical students. Response to the question “Do you consider smoking as...?” The differences in consideration of smoking as a drug addiction between the first- and third-year medical students are not statistically significant ($P>.05$).

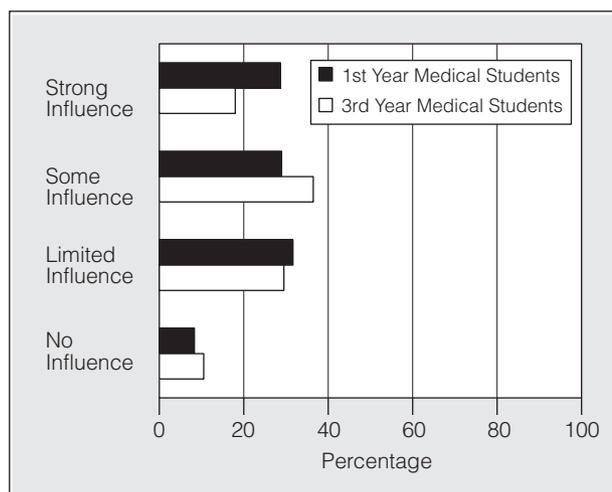


Figure 3. Assessment by the medical students of the physician as a role model. The differences between first- and third-year medical students are not statistically significant ($P>.05$).

smoking as a risk factor for a series of health concerns is presented in Table 3. Table 4 shows students' responses to additional questions to further define what they thought of the relationship between smoking and certain diseases, and to determine other attitudes to smoking such as whether damage is reversible and what the dangers of passive smoking are. When asked whether they considered smoking a form of drug addiction, 42% agreed, 13% considered smoking a habit, and 45% a vice (Figure 2). However, when asked whether they thought that smoking could cause addiction, 98% of the students agreed. Forty-one percent of the medical students thought they knew the current legislation on smoking in educational facilities.

TABLE 2
Prevalence of Smoking by Sex*

Responder Group	Daily Smokers	Weekend Smokers	Nonsmokers
1st year medical students (Year 1997-1998)			
Men	4 (8%)	3 (6%)	41 (86%)
Women	19 (14%)	9 (7%)	105 (79%)
3rd year medical students (Year 1999-2000)			
Men	1 (2%)	8 (20%)	31 (78%)
Women	22 (20%)	16 (15%)	71 (65%)
1st year veterinary students (Year 1997-1998)			
Men	5 (10%)	8 (16%)	38 (74%)
Women	14 (13%)	18 (16%)	78 (71%)
3rd year veterinary students (Year 1999-2000)			
Men	5 (11%)	8 (18%)	32 (71%)
Women	20 (21%)	11 (12%)	63 (67%)

*Differences between sexes are not statistically significant (χ^2 test and Fisher exact tests).

In the section on attitudes, 60% of medical students thought that the physician was an important role model for the patient regarding smoking (Figure 3). Most students (72%) considered smoking to be a high-priority health concern, whereas 10% thought it had low priority.

TABLE 3
Change in Smoking Awareness in Medical Students From the First to Third Years

	1st Year Medical Students	3rd Year Medical Students	χ^2	P
Heart failure				
No	76	19	33.690	.000
Yes	105	129		
Lung disease				
No	2	0	1.645*	.200
Yes	179	148		
Ulcer				
No	140	98	5.043	.025
Yes	41	50		
Early menopause				
No	163	117	7.774	.005
Yes	18	31		
High blood pressure				
No	89	33	25.204	.000
Yes	92	115		
Osteoporosis				
No	169	132	1.828	.176
Yes	12	16		
Bladder cancer				
No	157	118	2.917	.088
Yes	24	30		
Esophageal cancer				
No	92	58	4.447	.035
Yes	89	90		

*Two fields have an expected frequency less than 5. The minimum expected frequency is 0.90.
†Fisher exact test.

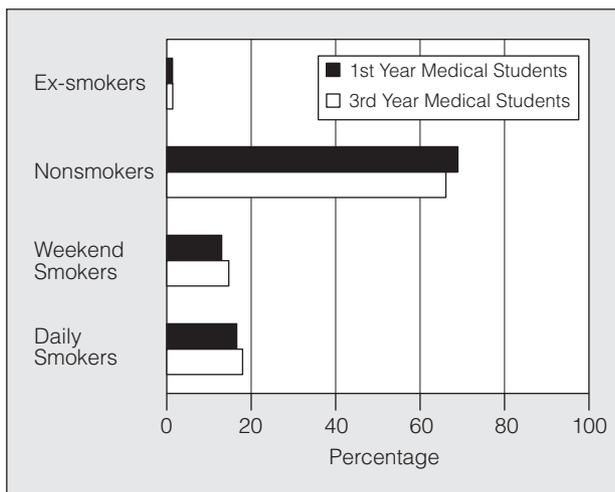


Figure 4. Prevalence of smoking among veterinary students. The differences between first- and third-year students are not statistically significant ($P>.05$).

Two years later, the same questionnaire was distributed at the beginning of the third year to medical students in the general pathology class. Of the students who responded, 40 (27%) were men and 109 (73%) were women (2 questionnaires were rejected because they belonged to students who were not in their third year of study). The mean age was 20.16 (1.16) years,

TABLE 4
Opinions of Medical Students on the Health Repercussions of Smoking

List of Proposed Affirmations	Students Who Agree	
	1st Year Medical Students	3rd Year Medical Students
Smokers tend to die younger than nonsmokers	95 (52%)	90 (60%)
The majority of smokers with lung cancer are or have been smokers*	165 (91%)	144 (97%)
There are cigarettes that are less dangerous than others	51 (28%)	31 (21%)
Smoking is only bad for patients who already have some disease	2 (1%)	0
The damage caused by smoking is reparable, reversible	31 (17%)	31 (21%)
Passive smoking is a health risk	170 (94%)	142 (96%)

*The difference between first- and third-year medical students is statistically significant ($P<.05$).

TABLE 5
Changes in Attitudes of First- and Third-Year Medical Students Towards the Exemplary Role of the Faculty*

	0	1	2	3	χ^2	P
1st year medical students	14	57	55	55	8.519	.036
3rd year medical students	27	45	41	36		

*On the Likert Scale, 0 indicates disagree; 1, do not completely agree; 2, more or less agree, and 3, totally agree.

with a median age of 20 years. The prevalence of smoking among third-year medical students was as follows: 15% smoked daily, 16% smoked on the weekend, 2% were ex-smokers, and 67% were nonsmokers. Comparison of the prevalence and characteristics of smoking between the first- and third-year medical students shows an increase in the number of smokers due mainly to an increased number of weekend smokers (Figure 1). No statistically significant differences were observed for other characteristics. The mean number of cigarettes smoked per day was 4.29 (4.17) (including weekend smokers). Among the smokers, 52% were dissonant (wanted to stop). As before, more women than men were smokers, and a higher percentage smoked daily, although the differences between the first and third years were not statistically significant (Table 2). A higher percentage of students associated smoking with the diseases named in the questionnaire (Table 3).

In the third year, no changes in the variables that assessed attitudes were found with respect to the first year of the medical degree program, apart from the students' opinion on the importance of the medical school faculty as role models (Table 5)—students considered the example of teaching staff of less value.

Comparison of the data obtained for first-year medical students with those for first-year veterinary students showed no differences in the variables that assess the prevalence and characteristics of smoking (Figures 1 and 4). The only differences in the variables that measure awareness appeared in the assessment of smoking as a drug addiction. More first-year medical students identified smoking as a drug addiction (42%) compared to veterinary students (29%) ($P=.030$). The remaining variables that assessed smoking as a risk factor or knowledge of current legislation were not different between the 2 groups of first-year students.

First-year medical students considered it more important for a physician to be a nonsmoker, and more conceded that the physician acts as a role model for patients regarding smoking (52% of medical students compared to 32% of veterinary students—a statistically significant difference: $P=.045$). No other differences were observed for the variables that assess the students' opinion of smoking in educational and health care centers or smoking among health care professionals and teaching staff.

The only difference in changes from the first to third year in the 2 groups was a greater increase in awareness of smoking as a risk factor among medical students compared to veterinary students (Table 3). That increased awareness of smoking as a risk factor did not occur among third-year veterinary students, who had not changed with respect to the first-year assessment (Table 6).

Comparing third-year medical students who were smokers with those who were nonsmokers, we saw no differences in perceived association between certain diseases and smoking in the section on awareness. In

TABLE 6
Changes Between First- and Third-Year Veterinary Students in Awareness of Smoking

	1st Year Veterinary Students	3rd Year Veterinary Students	χ^2	P
Coronary heart failure		3.071		.080
No	74	50		
Yes	87	89		
Lung disease			2.332*	.127
No	0	2		
Yes	161	137		
Ulcer			0.389	.533
No	132	110		
Yes	29	29		
Early menopause			1.346	.246
No	140	11		
Yes	20	24		
High blood pressure			0.066	.797
No	81	72		
Yes	80	67		
Osteoporosis			0.911	.340
No	143	128		
Yes	18	11		
Bladder cancer			0.013	.909
No	142	122		
Yes	19	17		
Esophageal cancer			0.325	.569
No	70	65		
Yes	91	74		

*Two fields have an expected frequency less than 5. The minimum expected frequency is 0.93

contrast, when asked whether the damage produced by smoking is reversible, more of the students who were smokers thought that the damage caused by smoking is reversible (32% for smokers vs 16% for nonsmokers; $P=.023$). Likewise, a greater percentage of students who were smokers did not think passive smoking caused disease (13% vs 1% of nonsmokers; $P=.002$). A higher proportion of students who were smokers thought that smoking a limited number of cigarettes (<10 cigarettes/day) is not harmful (14% vs 1% of nonsmokers; $P=.001$). Fewer students who smoked considered smoking as a drug addiction (25%) compared to their fellow nonsmokers (60%) ($P=.001$)—smokers considered smoking more a habit (11%) or a vice (64%). However, when asked whether they thought smoking addictive, the response was similar in both groups (98% thought it causes addiction). In the questions on attitudes towards smoking, substantial differences between smokers and nonsmokers were seen. Nonsmokers had a higher regard for the example set by health care professionals and teaching staff than did their fellow smokers. Thus, 66% of nonsmokers thought that health care staff were an important role model, compared to 38% of smokers ($P=.004$), and 68% of nonsmokers compared to 38% of smokers considered the example set by the medical school faculty was important ($P=.018$). In addition, students who were nonsmokers were more inclined to

emphasize awareness of smoking in the training of health care professionals and were more restrictive than smokers regarding smoking in health care and educational facilities. Both smokers and nonsmokers coincided in the medical advice they thought they would give the patient, and in the degree of priority given to smoking as a health concern.

Discussion

The 2 populations of the first-year medical and veterinary students were similar with regard to age and sex distribution, with more women in both groups.

First-year medical students and first-year veterinary students showed similar prevalence, awareness, and attitudes towards smoking. We can therefore assume that changes that occur for medical students but not for veterinary students are a result of studying in the medical school. This allows us to assess the influence of the medical school on smoking among students during the first 3 years of their degree. Moreover, the characteristics of the veterinary student population are very similar to those of the medical student population: both need similar grades to be allowed to enroll in the degree course, the number of places is similar, and veterinary students, like medical students, are interested in biological sciences. Thanks to these characteristics, the veterinary student population forms a reference group for comparison with the results obtained from the medical school and acts as a control.

The prevalence of smokers increased from 20% in the first year to 31% at the start of the third year of medical school, compared to a corresponding increase of 28% to 32% among veterinary students. In the medical school, there was a statistically significant increase in smokers due mainly to an increased number of weekend smokers, whereas corresponding differences among veterinary students were not statistically significant. This suggests that the medical school does not have a positive influence on smoking habits by decreasing the prevalence of smoking. In fact, the increase in the number of smokers from the first to the third year is larger in the medical school, particularly among weekend smokers. This increase may be partly explained by occasional smokers becoming daily smokers and by more students becoming weekend smokers.

The prevalence of smokers in our study was very much lower than that found in studies of the general population. A survey in 1996 among young people in Aragon¹⁷ found a prevalence of smoking of 57.1% for subjects aged between 18 and 20 years. This same survey found that the prevalence of smoking among subjects in higher education was 50.5%, somewhat less than among young working people (65.4%). In our study, the percentage of smokers is lower than in the group of students in Aragon, and lower than in the Health Survey of 1997,¹⁸ which reported a prevalence of smoking among 16 to 24 year-olds of 40%.

Our study also shows a somewhat lower prevalence of smoking compared with studies reported by other authors for health science students in Spain.^{6,11} A tendency towards a long-term decrease in the prevalence of smokers due to anti-smoking policies has been seen both in Spanish studies and in studies performed in other countries. This would explain why the prevalence from our study is somewhat lower. In fact, the study with the prevalence closest to ours is the 1997 study of medical students in the University of Navarre,¹⁹ in which the prevalence of smokers was 22.9% among male students and 28.2% among female students.

We found an increase in the number of smokers as the degree course advanced, something which has been described in other studies,²⁰ highlighting how little the medical school influences smoking habits toward improvement.

With regard to awareness of smoking as a risk factor, there was an increase in the number of third-year medical students who related smoking with the indicated diseases, whereas third-year veterinary students showed no change in awareness with respect to the first year.

The only change in attitudes observed was an increase in the positive assessment of the physician as a role model, but this change cannot be attributed to the influence of the medical school as this tendency was also observed among veterinary students.

The influence of the medical school on this health concern is limited. The study of medicine does not reduce the prevalence of smoking, and does not appear to alter attitudes and awareness either, except for an increased number of students who associate smoking with risk factors for certain diseases. In view of the results, and in agreement with other authors,^{21,22} we can conclude that that smoking education received by medical students is inappropriate. Very few students acquire sufficient awareness and appropriate attitudes towards smoking to allow them to face the problems that smoking may bring them in their future professional career.

Comparison of the results between students who smoke and those who do not shows that most students are sufficiently aware of the harmful effects of smoking on health. Notwithstanding, the best advice a physician can give a patient is not to smoke him or herself, but this message fails to reach future physicians during their studies, particularly if they are smokers. We therefore agree with other authors²³⁻²⁵ in that current medical training does not manage to reduce the number of smokers among health care professionals and that awareness of the harmful effects of smoking has little effect on the students' behavior. It may therefore be appropriate to introduce specific training on smoking during the degree course, because once students have finished their university studies, it may be too late. This, along with the clear differences found in the attitudes and awareness of smoking as a drug addiction,

and the limited positive influence of the medical school on the prevalence of smokers among its students, fully justifies the need to draw up smoking prevention programs for medical students.

The results obtained indicate that the medical students' time at university is a lost opportunity in the fight against smoking. More resources may therefore be needed for training and informative activities about smoking to address this health concern.

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