

ORIGINAL ARTICLE

School-based anti-smoking intervention for physiotherapy students: a three-year non-randomized trial

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Keywords

Tobacco • Smoking habits • Education • Healthcare students • School-based intervention

Summary

Introduction. The aim of the study was to assess the efficacy of a school-based intervention for reducing tobacco consumption among physiotherapy students.

Materials and methods. This controlled trial involved two groups of physiotherapy students: a treatment group (A) and a control group (B). Treatment consisted of a seminar on smoking-related diseases (3 hours) and training (at least 10 months) in a respiratory diseases or thoracic surgery unit. The control group (B) did not undergo any treatment. The main outcome was the prevalence of smokers. Follow-up lasted 3 years.

Results. Groups A and B comprised 78 and 72 students, respectively. The two groups did not differ in terms of gender distribution, mean age, prevalence of smokers and nicotine dependence.

In group A, the prevalence of smoking declined from 36% to 33% between T0 and T1 (3 years), the relative risk (RR) at T1 being 0.93 (95% CI: 0.6-1.44). In group B, the prevalence increased from 28% to 35% between T0 and T1, with a RR at T1 of 1.26 (0.76-2.11). The prevalence reduction "attributable" to the intervention in group A 7.7%, while a 27.8% increase in prevalence "attributable" to the absence of intervention was found in group B. However, the differences were not statistically significant.

Conclusions. School-based interventions seem to be effective in reducing the prevalence of smoking among healthcare students. Further studies on larger samples and with standardized methodology are required in order to confirm these preliminary findings.

Introduction

Reducing tobacco consumption is a public health priority at the international and national levels. According to the WHO, smoking kills nearly 6 million people each year [1].

Although the prevalence of smokers has declined by more than 4 percentage points in Italy in the last 20 years, it began to increase again between 2013 and 2014 [2]. Among Italian hospital personnel, including physician, healthcare workers, nurses and students, the prevalence of smokers is, paradoxically, higher than in the general population. According to recent surveys, about 44% of health professionals smoke, which is almost twice the prevalence in general population [3, 4]. Similar rates have been shown by a survey conducted among more than 800 nursing students, 42% of whom currently smoke [5]. The majority of hospital workers who smoke do so in the hospital, and more than 90% of healthcare workers have seen colleagues smoking cigarettes inside the hospital at least once (47.4% in staff toilets, 33.4% in kitchens and 4.7% in patients' rooms) [3].

Physicians and healthcare workers should play a key role in encouraging smokers to quit and to achieve long-term abstinence. Their behaviors can set an example and contribute to the spread of healthy lifestyles [6]. Thus, it

is crucial that they receive good training on smoking-related diseases and smoking prevention. However, this is uncommon; for instance, UK Medical Colleges include factual knowledge of nicotine addiction and withdrawal symptoms in only 50% of curricula [7]. In Italy, although 90% of medical residents in Public Health report hearing about smoking-related issues during their undergraduate courses, only 17% claim to have received specific smoking cessation training during specialization [8]. Surveys conducted among Italian Health Professional School students reveal that 94.3% of the respondents should receive specific training to quit smoking, but that only 21.3% do so during their study courses [9].

School-based interventions to reduce and prevent smoking have been widely implemented and results have been summarized in a systematic review by Murphy-Hoefer that concludes that, while some promising results have been achieved, rigorous evaluation of a wider range of programs is needed [10].

The present study aims to contribute to the international debate on school-based anti-smoking interventions by evaluating the efficacy of a school-based intervention in reducing the prevalence of smokers among physiotherapy students.

Materials and methods

STUDY DESIGN

A non-randomized trial with two independent arms was carried out between 2008 and 2013.

Sample and setting

Students on two different physiotherapy courses at a teaching hospital in Rome were enrolled for the study: course A students participated in a seminar on smoking-related diseases and were enrolled for training in respiratory and thoracic surgery units. Course B students constituted a control group and did not receive any treatment. All students were in their first academic year, and were followed up for three consecutive years. To calculate the sample size, we assumed a 35% prevalence of smokers in the experimental group and a prevalence reduction of 15%. In order to obtain a power of 80% with α set at 0.05, we had to enroll at least 72 subjects in the experimental group.

INTERVENTIONS

Group A underwent two different treatment steps:

1. Seminar on smoking-related diseases.

The seminar took place during the first semester of training and lasted three hours. Contents regarded individual and community risks and the costs of tobacco consumption in terms of health, life quality and economic aspects.

2. Training in respiratory and thoracic surgery units.

Training lasted at least 6 months in clinical units and four months in surgical units. Each student treated attended at least 10 months of training in services dealing with tobacco-related diseases.

OUTCOME AND QUESTIONNAIRE

An anonymous questionnaire was administered to all participants of both courses in the first year (T0) and the third and last year of their university studies (T1). Personal data were collected: age and gender, smoking (yes/no), number of family members who smoked (asked only in the first year). Students who smoked were asked about their own level of nicotine addiction (*Fagerström score*) [11] at T0. On this test, subjects who scored 1 or 2 were considered to have low addiction to nicotine, while those who scored 3 or more were considered to be from moderately to highly addicted.

STATISTICAL ANALYSIS

The demographic characteristics of both groups were recorded, and differences between the groups at T0 and at T1 were evaluated by means of Pearson's chi2 test for qualitative variables and the Student's t-test for quantitative variables.

The prevalence of smokers in the two groups at T0 and T1 was calculated. The relative risk (RR) of smoking at T0 and T1 and the 95% confidence interval (95% CI) were calculated in both groups. The attributable risk (AR) of smoking was calculated for both groups. In this study, AR was used to quantify the risk attributable

to treatment (group A) or to the lack of the treatment (group B).

ETHICS

The study was performed in accordance with the principles of the Declaration of Helsinki [12]. The research protocol was submitted to the research ethics committee concerned for consideration, comment, guidance and approval, and informed consent was obtained from all subjects enrolled.

Results

At T0 (before intervention), the treated group (A) was composed of 43 males and 35 females, with an average age of 22 years, 36% of whom smoked; group A subjects had an average of 1.2 smoking relatives. At T0, the control group (B) was made up of 75 members, 39 males and 33 females, with an average age of 22.5 years and an average of 0.9 smoking relatives; only 28% of group B subjects smoked at T0. The level of nicotine dependence estimated by means of the *Fagerström score* at T0 was low among smokers in both groups. No statistically significant differences in demographic factors or the level of nicotine dependence emerged between the two groups at T0.

After the intervention (T1), group A comprised 75 participants, 38 males and 37 females, with an average age of 25 years. The percentage of smokers was seen to have decreased over time, from 36 (T0) to 33 (T1). At T1, group B counted 57 participants, 28 males and 29 females, with an average age of 25 years. In this group, the percentage of smokers increased from 28% (T0) to 39% (T1).

In group A, only three participants were lost between T0 and T1 (4%), while in group B 15 participants were lost (21%).

The table above shows four comparisons and the relative risks that emerged. The first comparison is between the prevalence of smoking in groups A and B before the intervention. The prevalence was higher in group A than in group B at T0 (A: 36% vs B: 28%). The relative risk (RR) for group A was 1.29 (95% CI: 0.8-2.1). The second comparison shows an inversion in the prevalence of smokers between the two groups after the intervention: 35% in group B and 33% in group A; the RR of group A compared with group B was 0.95 (95% CI: 0.59-1.53). On comparing the prevalence of smokers in group A between T0 and T1, a decrease from 36% to 33% was seen, the RR at T1 being 0.93 (95% CI: 0.6-1.44). In group B, the prevalence increased from 28% to 35% between T0 and T1, with a RR of 1.26 (0.76-2.11) at T1.

Table III shows the Attributable Risks (AR%) of smoking in the two groups: the first AR indicates the percentage of students in the treated group who stopped smoking because of the intervention; the second AR indicates the percentage of group B students who started smoking that can be attributed to the lack of intervention. In group A, the reduction in smoking prevalence "attrib-

Tab. I. Demographic characteristics and smoking behaviors of participants.

Demographic characteristics and smoking behaviors		T0				T1			
		A	B	Tot	P	A	B	Tot	P
Gender	M (%)	43 (55)	39 (54)	68 (45)	0.91	38 (51)	28 (49)	66 (50)	0.86
	F (%)	35 (45)	33 (46)	82 (55)		37 (49)	29 (51)	66 (50)	
Age	Mean (SD)	21.8 (6.0)	22.5 (5.5)	22.1 (5.8)	0.46	25.3 (6.5)	25.3 (5.3)	25.3 (6.0)	0.99
Smoker	Yes (%)	28 (36)	20 (28)	48 (32)	0.29	25 (33)	22 (39)	47 (36)	0.53
	No (%)	50 (64)	52 (72)	102 (78)		50 (67)	35 (61)	85 (64)	
N° of smokers in family	Mean (SD)	1.2 (1.6)	0.9 (0.9)	1.1 (1.3)	0.16	-	-	-	-
Nicotine dependence: Fagerström's score	Mean (SD)	1.25 (1.8)	1.55 (1.9)	-	0.58	-	-	-	-

T0 = baseline, first academic year

T1 = three years later, last academic year

Not asked

Tab. II. Relative risk of smoking, stratified by intervention and group (A versus B) and times (T0 versus T1).

Group and time	Non smokers (%)	Smokers (%)	RR	95% CI
Bt0	52 (72.2)	20 (27.8)	1	0.8-2.1
At0	50 (64.1)	28 (35.9)	1.29	
Bt1	37 (65.0)	20 (35.0)	1	0.59-1.53
At1	50 (66.7)	25 (33.3)	0.95	
At0	50 (64.1)	28 (35.9)	1	0.66-1.44
At1	50 (66.7)	25 (33.3)	0.93	
Bt0	52 (72.2)	20 (27.8)	1	0.76-2.11
Bt1	37 (65.0)	20 (35.0)	1.26	

Tab. III. Percent smoking prevalence attributable (AR%) to the presence or absence of intervention.

Groups	T0	T1	AR%	95% CI (AR%)
Smokers A (N _{group A})	28 (78)	25 (75)	-7.69*	-52.93;37.55
Smokers B (N _{group B})	20 (72)	20 (52)	27.78**	-15.57;71.13

* -7.69% is the decrease in smoking prevalence which can be attributed to the intervention

** 27.78 % is the amount of smoking prevalence which can be attributed to lack of intervention

utable” to the intervention amounted to 7.7%, while a 27.8% increase in smoking prevalence “attributable” to the lack of intervention was found in group B.

The difference between the AR of group A and the AR of group B provides a measure of the effectiveness of the intervention in reducing the risk of smoking. None of the risk measures calculated was statistically significant.

Discussion

The intervention seems to have been effective in reducing the risk of smoking in the experimental group, especially in comparison with the control group, in which the prevalence of smoking increased in the absence of intervention. At the international level, evidence of the effectiveness of school-based interventions against smoking is not homogeneous. While the latest systematic reviews on the issue are controversial, there is a consensus that results in terms of reducing or preventing smoking mainly depend on the approach of the intervention implemented. Thomas reports that school-based interventions that combined social competence and social

influences showed a significant effect both at one year and over longer follow-up. By contrast, studies adopting a social-influences program alone showed no overall effect at any time point, and multimodal interventions and those with an information-only approach proved similarly ineffective. He argues that interventions involving social competence and those combining social competence and social influences have yielded positive results [13]. Santon agrees that complex approaches show promise, with some persistence of abstinence (30 day prevalence of abstinence or continuous abstinence at six months), especially those that incorporate elements sensitive to the stage of change and use motivational enhancement and CBT [14]. Carson concludes his systematic review by claiming that there is some evidence to support the effectiveness of community (including school-based) interventions in reducing the number of young people who take up smoking. However, the evidence is not strong and the studies reviewed contain a number of methodological flaws [15].

This study has several limitations.

First, the small sample size did not allow us to obtain statistical significances in the analysis performed. Sec-

ond, the intervention was not standardized and consisted of two different activities (seminar and practical training); it is therefore unclear which part of the intervention mostly contributed to the results obtained. Third, the percentage of group B subjects who were lost to follow-up was high; failure to investigate the reason for this phenomenon could have introduced a bias into the findings of the study. Fourth, as the T0 and T1 data were not paired, it is likely that the statistical analysis was not very accurate. Fifth, the data collected were insufficient to enable us to determine whether other important factors, in addition to the intervention, may have influenced the prevalence of smoking. Finally, the fact that the study was neither randomized nor blind could reduce the reliability of the results.

Nevertheless, the study suggests that the intervention was effective. Further studies with larger samples and better defined intervention should be conducted in order to assess the impact of campaigns to improve awareness and prevention among young adults enrolled in health-care training.

Conclusions

School-based interventions could play a key role in the global fight against smoking. Moreover, education and training on tobacco-related diseases could improve awareness and promote healthy behaviors among health-care practitioners, who have a leading role to play in fostering healthy lifestyles in the community. However, as evidence of the success of anti-smoking initiatives is not strong, further research on the efficacy and cost-effectiveness of school-based interventions should be undertaken.

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Authors' contributions

DM designed the study, performed the statistical analyses and wrote the manuscript, AM collected data, optimized the informatics database and performed the statistical analyses. CP conceived the study and realized the intervention, GLT conceived the study and coordinated the research group.

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DM, AM, CP and GLT evaluated the results. All Authors revised the manuscript and gave their contribution to improve the paper. All authors read and approved the final manuscript.

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