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SHORT COMMUNICATION

Tobacco-free School Training Program for Teachers and Tobacco-use among Adolescent Students in the Rural Indian Context: A Quasi-experimental Study

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Abstract

Introduction: The Indian government has implemented laws banning tobacco sales and advertising to children and adolescents and also mandated guidelines for a tobacco-free school (TFS) to create tobacco-free environments. This study investigated the impact of creating tobacco-free schools on actual tobacco use by students. **Methods:** The study, using a post-only quasi-experimental design, was conducted in four rural districts of Maharashtra state in western India. Teachers in two intervention districts received annual TFS training for five years, while two comparison districts did not. A cross-sectional survey was conducted in 41 schools, at the end of the five-year period, with 536 students in intervention districts and 516 in comparison districts. **Results:** Intervention schools reported lesser tobacco use with 14.7% of students self-reporting tobacco use versus 24.2% of students in comparison schools. Logistic regression analysis revealed that lower exposure to TFS, greater peer pressure, and presence of adults using-tobacco at home predicted adolescent tobacco use ($p<.001$). **Conclusion:** Creating a tobacco-free school environment seems to positively impact student tobacco-use behavior. However, combining TFS with assertiveness, refusal, and life-skills training to resist peer pressure and involvement of families will be required for successful tobacco-use prevention.

Keywords: Tobacco- adolescents- schools- tobacco-free school environment- smoke-free school- teacher-training intervention

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Introduction

Tobacco use is responsible for over a quarter (27%) of all cancer cases in India [1]. Tobacco-related conditions lead to almost a million preventable deaths annually [2]. Smoking and use of other forms of tobacco frequently begins in adolescence, leading to greater tobacco use in adulthood. Those who start using tobacco early and continue for an extended period face the highest risks of tobacco-related diseases [3].

India has about 253 million adolescents. Approximately one in eight tobacco users in India starts before the age of 18 [4]. According to the Global Youth Tobacco Survey (GYTS), 8.5% of adolescents aged 13-15 years used tobacco [4]. About 11.9% of youth aged 15-24 years used tobacco, with 5% smoking, 10.9% using smokeless tobacco, and 2% of respondents reporting dual usage according to the Global Adult Tobacco Survey (GATS) [5]. However, other school-based studies from the past decade have reported tobacco-use prevalence ranging from 11% to 45% among adolescents [6, 7]. Additionally, the national mean age for tobacco initiation decreased from 18.5 years (2009-2010) to 17.4 years (2016-2017) [8]. In order to prevent addiction and reduce the impact of tobacco-related health issues, strong efforts to combat tobacco use among adolescents are critical.

Comprehensive tobacco-control programs and promotion of smoke-free environments have proven effective in reducing tobacco use among both young people and adults. These programs contribute to increased quitting rates and play a crucial role in lowering tobacco-related diseases and deaths. The well-established harmful effects of secondhand smoke on non-users' health further emphasize the importance of smoke-free policies. World Health Organization's recommends the implementation of smoke-free public spaces at the national

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level. Enforcing comprehensive tobacco-free school policies at both national and state levels has demonstrated significant reductions in tobacco use among adolescents and young individuals [9-12].

India enacted the Cigarettes and Other Tobacco Products Act (COTPA) in 2003. COTPA regulates the trade and commerce, advertising, production, supply and distribution of cigarettes and other tobacco products. Two provisions of COTPA are directed at adolescent: ban on sale of tobacco products to and by minors, and prohibition of sale of any kind of tobacco products within 100 yards of all educational institutions. Comprehensive guidelines for creating tobacco-free environments in educational institutions through specific criteria and activities have been established [13, 14].

Research in India has found that interventions to help schools implement tobacco-free school guidelines does help in creating a tobacco-free environment [15]. However, studies that examine the effect of a tobacco-free school environment on the actual tobacco-use behavior of students in the Indian context are scarce. The present study examined the effect of tobacco-free school intervention and the desired tobacco-free school environment on students' tobacco-use behavior.

Materials and Methods

Study setting and design

This study was conducted in the state of Maharashtra in western India. It is the second most populous state in India with 16.7% of total agricultural land (1,950 hectares) under tobacco cultivation [15]. Although the overall tobacco-use prevalence among all adults in Maharashtra dropped from 31.4% in 2009-2010 to 26.6% in 2016-2017, the prevalence among youth reportedly increased by 3% in the same period [8]. Maharashtra has 35 administrative districts, which are further divided into administrative blocks and Gram Panchayats (village units). There are slightly more than 100,000 schools in the state, of which two-thirds are managed by the government with roughly 13,721,520 enrolled students, mostly from the lower-socioeconomic and rural social groups. The government schools have a rigid bureaucratic structure, inadequate infrastructure, low teacher motivation that translates into lower expectancy from students, thus adversely affecting school performance. They are expected to comply with existing tobacco control laws and tobacco-free school (TFS) guidelines; however, most schools have struggled with implementation and achieving tobacco-free status [16].

A post-test only quasi-experimental design, with intervention and comparison condition, was used to evaluate whether implementation of the tobacco-free school guidelines and creating a tobacco-free environment in the school had an effect on student tobacco-use behavior. Four predominantly rural districts, of which two each were in the intervention and comparison condition respectively, comprised the setting for the study. Data were gathered at one-point in time only after the intervention from students between grades six and ten in randomly selected government schools in four districts in Maharashtra.

The intervention was conducted in collaboration with the Maharashtra State Education Department. Teachers from government-schools were imparted training to understand and implement the tobacco-free school criteria, which mainly focus on creating a tobacco-free environment in the school [15]. In the two intervention districts combined, teachers from 2188 upper-primary and secondary schools received a TFS-training intervention, once every year for a five-year period. In the two comparison districts combined, 1707 upper-primary and secondary schools did not get any formal TFS intervention. A quasi-experimental design was used because it was not possible to randomly assign schools to intervention and comparison conditions. Training was offered universally at the district level, and the entire pool of upper-primary and secondary schools in intervention condition districts were allocated to the intervention. It was also not possible to randomly assign districts as they were selected by the administration; however, the decision to conduct training in phases led to the circumstances for a natural experiment, when it was found that the two comparison districts would not receive the training for a few years.

Intervention process

An official letter from the Department of Education requested school principals or headmasters to designate one teacher, who was not a tobacco-user and had demonstrated motivation to work on health and school-development activities, to attend a one-day training to learn to fulfill TFS criteria mandated by the government and become a point-person for TFS implementation and monitoring in the school. The training-intervention educated the teacher about the harms of tobacco, importance of making schools tobacco-free, existing laws and how to make the school environment tobacco-free by implementing TFS criteria which consists of activities such as: placing signage or posters at appropriate points in the school, ensuring that no one in the school uses tobacco; ensuring that tobacco products are not sold within a 100-yard radius of the school; school stationery has tobacco-free school stamped on it; setting up a tobacco-control committee in the school; ensuring that the COTPA law is available in print; and encouraging students to make posters which are then put up in the school. Many rural schools also conducted tobacco-related educational sessions in the school, and events and village-level rallies on special days such as the country's Independence Day, Republic Day, and festivals.

Sampling and data collection

After the TFS-training intervention, two trained research-facilitators administered a survey to students in 41 randomly selected eligible schools, 28 in two intervention districts and 13 in two comparison districts. Two blocks, one around the district headquarters, and the second block geographically distant from the headquarters, were identified in each district. From the eligible list of schools in these two blocks in each district, the facilitators were provided a short-list of randomly selected schools. The facilitators visited these schools until they had collected

information from nearly 500 students in both conditions.

Student participants completed a self-administered structured questionnaire in their respective classrooms, in the absence of teachers, during a specified class-period within school-hours. The questionnaire was in Marathi language, the medium of instruction in these schools. As the facilitator read out each item loudly, respondents marked their responses on the corresponding item in the pen-and-paper questionnaire. Facilitators were trained in rapport-building with adolescents, standardized techniques of introducing and explaining questions to the students, maintaining confidentiality of respondents and scrutinizing filled-out questionnaires for completeness. Ethical consent for the study was taken at different levels. First, an internal review committee of Salaam Mumbai Foundation scrutinized the study. Then, approvals were taken from the District Education Officers in each district; followed by consent from the principal or headmaster of each school; then, parental permission was sought through an informed consent form; and finally each student gave informed assent prior to administration of the questionnaire.

Study instrument

In addition to measuring self-reported tobacco-use, in any form, in the past 30 days, the study instrument also gathered data on age and gender; tobacco-related behaviors of peers; tobacco-related behaviors of adults at home. Exposure of the student to activities related to tobacco-free school intervention at the school level was measured as Yes/No dichotomous responses to six items: Are there any posters in your school about the harms of tobacco use?; Has there ever been any activity in your school aimed at tobacco prevention?; Are you aware of any rule that prohibits students from smoking or chewing tobacco inside the school premises?; Is there a tobacco control committee in your school?; Have you ever attended any session about the harms of tobacco use?; and Have you been part of any rally, event or campaign on tobacco control and prevention that was conducted in your school, village or community?

Data analysis

Microsoft Excel was used to enter the data and SPSS software version 16.0 helped to analyze the data. Descriptive frequencies for all variables were generated. A new variable 'Exposure to TFS criteria,' with maximum possible score of 6 and minimum of 0, was computed by adding each of the 6 dichotomous items that measured TFS criteria related activities in the school. Bivariate analysis was conducted to compare differences between participants from intervention and the comparison schools for independent variables such as age, gender, exposure to TFS criteria or activities, tobacco-related behaviors of peers, tobacco-related behaviors of adults at home, and the outcome variable of tobacco use. All nominal variables were tested using the chi-square statistic; the t-test was employed for the interval-level variables of age and TFS exposure score. Finally, independent variables statistically significant at the 5% level in the bivariate analysis were included in a logistic regression model with tobacco use as the dependent variable. Rather than merely being in intervention or comparison condition, the exposure of student to TFS activities was considered a better marker for measuring effect of TFS intervention on student outcome of tobacco use. A two-sided p-value of .05 or lower was considered statistically significant.

Results

A total of 1052 students, 536 from schools which had received the intervention and 516 from schools in comparison condition, completed the survey. Slightly more than half the sample (51.2%, n=539) were male. The mean age of participants was 13.35 years; slightly more than a fifth (21.5%, n=226) were aged 11 to 12 years; slightly more than three-fifths (62.4%, n=656) were 13 to 14 years old; and less than one-fifth (16.1%, n=170) of the sample was 15 years old.

Bivariate analysis (Table 1) showed that participants in the comparison group were slightly older with mean age of 13.53 years compared to 13.19 in intervention group. Nearly a fourth (24.2%) of the comparison group participants used tobacco compared to 14.7% in the intervention group. A greater percentage (11.8%) of participants from the comparison schools reported being asked by friends to use tobacco ($p<.05$), and also adults using tobacco in their households ($p<.001$) compared to intervention school participants.

A binomial logistic regression model (Table 2) ascertained the effects of gender, age, exposure to TFS-criteria, friends asking respondent to use tobacco, and respondent having adult in household use tobacco, on the likelihood of tobacco-use among participants. Controlling for age and gender, greater level of exposure to TFS activities was associated with decreased tobacco use. However, friends asking participant to use tobacco and adults in the household using tobacco increased the likelihood of adolescent's tobacco use. Participants whose friends asked them to use tobacco were almost four times as likely and those who reported adults in the household using tobacco were nearly three times as likely to use tobacco ($p<.001$).

Discussion

This quasi-experimental, post-test-only, study examined whether a tobacco-free school (TFS) intervention, implemented through trained teachers, had an effect on actual tobacco use among adolescent students from government-aided schools in four rural districts in India. Adolescents either belonged to schools in districts where a TFS-intervention trained designated teachers from each school to conduct specified activities, compliant with government guidelines, and make the school environment tobacco-free, or to schools in comparison districts where, to the best of our knowledge, no formal TFS intervention was offered.

This study found that students reporting no or less exposure to TFS activities, which were indicative of

Table 1. Comparison of Students from Intervention and Comparison Schools on Sociodemographic Variables, Tobacco Use, Exposure to Intervention, and Tobacco Use among Adults in the House

Variable	Total (N=1052)	Intervention (N=536)	Comparison (N=516)	p-value
Gender				
Male	539 (51.2)	283 (52.8)	256 (49.6)	0.301
Female	513 (48.8)	253 (47.2)	260 (50.4)	
Age (mean)	13.35 (± 1.065)	13.19 (± 0.947)	13.53 (± 1.151)	0
11 to 12 years	226 (21.5)	121 (22.6)	105 (20.3)	0
13 to 14 years	656 (62.4)	363 (67.7)	293 (56.8)	
15 years	170 (16.1)	52 (9.7)	118 (22.9)	
Exposure of the student to various TFS intervention activities (Responses for "Yes")				
Are there any posters in your school about the harms of tobacco use?	641 (64.7)	416 (82.1)	225 (46.5)	0
Has there ever been any activity in your school aimed at tobacco prevention?	627 (64.2)	395 (80.0)	232 (48.0)	0
Have you ever attended any session in school about the harms of tobacco use?	601 (61.6)	367 (74.0)	234 (48.8)	0
Are you aware of any rule that prohibits students from consuming tobacco inside school premises?	837 (84.7)	453 (90.1)	384 (79.2)	0
Is there a tobacco control committee in your school?	428 (43.9)	274 (55.4)	154 (32.1)	0
Have you been part of any rally, event or campaign on tobacco control and prevention that was conducted in your school, village or community?	600 (62.8)	360 (75.2)	240 (50.3)	0
TFS Exposure Score (out of 6)	3.55	4.23	2.85	0
Used tobacco (in any form) in past 30 days				
Yes	204 (19.4)	79 (14.7)	125 (24.2)	0
No	848 (80.6)	457 (85.3)	391 (75.8)	
Has any friend asked you to use tobacco?	104 (9.9)	43 (8.0)	61 (11.8)	0.025
Does any adult in your home use tobacco?	618 (58.7)	283 (52.8)	335 (64.9)	0

lack of implementation of TFS intervention in the school, were more likely to report tobacco use. The study findings seem to indicate that implementing TFS intervention at the school-level and making the school environment tobacco-free likely reduces student tobacco-use in the rural Indian context. Other studies in India have demonstrated that school-based prevention and cessation programs do have an influence on adolescent tobacco-use behaviors [17, 18]. However, the critical difference is that these studies evaluated urban-setting programs that directly provided educational intervention to students, and did not focus on creating a tobacco-free school through implementation of mandated guidelines. The present study which focused on the tobacco-free school intervention tested a rural intervention that aimed to change the school environment with respect to tobacco use and acceptability. The TFS intervention, essentially a one-day teacher-training program that caters to a large number of teachers, is relatively low-cost as compared to reaching schools and students directly through facilitators especially in rural areas with access issues and vast geographical distance. The TFS intervention, however, requires coordination with the education department and some amount of teacher interest and motivation.

This study found that being exposed to a TFS intervention that aims to make the school environment tobacco-free most likely helps to reduce tobacco-use behavior among students. However, other factors such as peer pressure, being asked by friends to use tobacco, and tobacco-use by adults at home influenced greater tobacco use among adolescents. Systematic reviews have established that not having friends who smoke and resisting peer pressure to smoke are two of five factors that robustly predict quitting across studies [19]. Studies in diverse settings have documented that adolescents who face greater peer pressure have higher rates of tobacco use; and that parental or adult tobacco use at home also influences adolescent tobacco-use behavior [19, 20].

The implication of these findings is that environment-level school-based interventions such as TFS have to include student skills-training sessions to help adolescents resist peer pressure to use tobacco. And in order to counter negative influences at home, parental education and involvement is needed. Previous studies in western countries have shown that community-based efforts and mass media programs, in addition to school-based programs, are effective in reducing and preventing tobacco use among adolescents [9].

Despite the presence of a comparison group, the post-only evaluation design of this study lacks a pre-test with which to compare the post-test findings. It is possible that intervention schools started with high proportions of students who did not use tobacco. Furthermore, we cannot confirm with absolute certainty that the comparison schools did not receive any other intervention. To the best of our knowledge, and according to the school

Table 2. Summary Table of the Logistic Regression Analysis

Covariate	Exp (B)	95% confidence interval for Exp (B)	p-value
Gender			
Female	[ref]		
Male	1.244	0.893 - 1.733	0.197
Age	0.975	0.840 - 1.132	0.74
Exposure to TFS activities	0.849	0.780 - 0.923	<.001
Has a friend asked you to use tobacco?			
No	[ref]		
Yes	3.975	2.552 - 6.192	<.001
Does any adult in your household use tobacco?			
No	[ref]		
Yes	3.436	2.305 - 5.121	<.001

headmasters, the comparison schools did not receive formal TFS-related training. Tobacco-use data are based on self-reports by students who completed questionnaires in the presence of a trained facilitator. This might be a source of error, especially from an improper understanding of the questions, social desirability bias, or the teachers, who underwent TFS training, influencing the students to give socially desirable responses. Training and supervision of observers during data collection attempted to address these possible sources of bias. The data in this study were collected from students attending government-run schools in rural areas of Maharashtra. This group has specific linguistic and socio-economic characteristics which makes it difficult to generalize findings across the diverse country of India.

In conclusion, India has a large adolescent population, a large share of cancer burden as well as risk factors for cancer such as tobacco use. In order to protect adolescents, the Indian government has passed relevant laws regarding sale, distribution and advertising, and mandated schools to create a tobacco-free environment. This study finds that implementation of TFS-guidelines and creating a tobacco free environment in school influences students to use less tobacco. Government agencies should continue to monitor the implementation of tobacco-free school guidelines.

The study also shows that despite the positive effects of a school-based intervention, peer pressure and adults using tobacco at home continue to influence greater adolescent tobacco-use. Research has found that multi-component community programs that have a school program component along with parent, media, and community organization components, have shown the most sustained effects on tobacco use. Successful tobacco prevention interventions for adolescents in India have to be comprehensive and multi-pronged: create tobacco-free school environments, provide assertiveness and skills-training to students to resist peer pressure, and use strategies to encourage tobacco reduction and prevention in the family, home, and community environments.

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Conflict of Interest

The authors declare no conflict of interest.

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