Original Articles

Risk factors associated with tobacco habits among adolescents: A cross-sectional school-based study

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ABSTRACT

Background. The increase in tobacco use among adolescents in India is fraught with serious public health implications. The knowledge of factors which influence this habit could assist in tackling this problem. Hence, we aimed to determine factors associated with tobacco use among school students.

Methods. Data on determinants of tobacco use were collected from 4786 students of classes VII to XII (age 11–19 years) studying in the schools of Noida city, using a self-administered questionnaire. A cluster sample design was used to produce a representative sample of schools. The classes were randomly selected and from each selected class, all students of every alternate section were included. Differences in proportions between the various groups were tested using Pearson chi-square test or Fisher exact test.

Results. Of the 4786 students, 'current tobacco use' was reported by 197 (4.1%) students; 107 (2.2%) were exclusive smokers, 49 (1%) were exclusive tobacco chewers and 41 (0.9%) used both forms of tobacco. Tobacco use was less frequent among children of white collar than blue collar fathers (p<0.05) and also among children of more educated than less educated mothers (p<0.05). Tobacco use of father, mother, siblings and friends had a significant association with the student's tobacco use. The habits were 10.6-, 6.4-, 3.1-fold higher among students if they bought tobacco for teachers, brothers, father/relatives, respectively. Among tobacco users, 31.5% adopted these habits to refresh themselves, 45.9% preferred smoking outside home and 61% were influenced by actors smoking in films.

Conclusions. Socioeconomic status, family and peer influence play an important role in students using tobacco.

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INTRODUCTION

Tobacco addiction among adolescents in India is assuming epidemic proportions and has dire public health implications.[1] The Global Youth Tobacco Survey (GYTS)[2] and Global Tobacco Surveillance System (GTSS)[3] collaborative group have reported that a large number of schoolchildren between 13 and 15 years of age are currently using or have used tobacco (both cigarette and smokeless tobacco). Each day, an estimated 5500 youth start using tobacco, contributing to predictions that by 2020, tobacco will account for 13% of all deaths in India.[4] The prevalence of current tobacco use among schoolchildren in India has been reported to vary from one state to another (2.1%–63%).[5–16] Tobacco smoking among adolescents is a public concern because of immediate and long-term adverse health consequences such as asthma, chronic cough, cancers, chronic obstructive airways disease and cardiovascular diseases.[17–19] Studies among youth in the general population indicate that current tobacco use is associated with peer and family influences.[20–23]

The data on tobacco use and its correlates among schoolchildren in India are inadequate. Assessing the factors associated with the risk of tobacco use in adolescence can provide key insights into developing more effective prevention strategies and targeted interventions. We aimed to ascertain the correlates of tobacco use among adolescent students in Noida, a part of the National Capital Region of Delhi, India.

METHODS

Data on tobacco use were collected from 5646 students of classes VII to XII (age 11–19 years) studying in different schools (government 6, private 11) of Noida through a pre-tested, closed and open-ended self-administered questionnaire distributed during July–December 2005. The study was approved by the Institute's ethics and review committee. The detailed methodology has been provided elsewhere.[5]

The information on sociodemographic profile, occupation and literacy status of the students' parents was recorded. The parents' level of education was divided into six categories: illiterate, primary, middle, high school, technical/graduation/university degree and postgraduation. The parents' occupation was classified as blue collar (doing manual labour and earning hourly wages such as farmers and labourers) and white collar (professionals, employed in service, irrespective of ranks). These categories were chosen as socioeconomic indicators to identify an approach to

reduce tobacco use among children of parents with lower occupational ranks.[24] Data were also collected on variables such as type of tobacco, age at initiation, tobacco use of parents and siblings, peer influence, reason of initiation of tobacco, places of tobacco consumption, exposure to tobacco advertisements, attitudes and beliefs towards tobacco, access to tobacco products, school tobacco control programmes, and purchase of tobacco for others. Students who had used tobacco on one or more days during the previous 30-day period were labelled as 'current tobacco users'. Tobacco consumption among current users was classified as 'exclusive smoking', 'exclusive tobacco chewing', or 'both forms of tobacco use' (smoking as well as chewing tobacco).

Statistical analysis

Multiple logistic regression was used to find factors associated with tobacco use. Data were analysed using Epi-info 6.04 Dos version (free software downloaded from internet, CDC, Atlanta, GA, USA) and SPSS (version 11). Differences in proportions between various groups were tested using Pearson chi-square test or Fisher exact test, as appropriate along with odds ratio and 95% confidence intervals (CIs). Continuous variables are presented as mean and standard deviation. For all the statistical tests alpha was set at 0.05. The reference group comprised students who were not tobacco users. All variables that showed significance at $p \leq 0.2$ in the univariate analyses were included in the multivariate analysis. Stepwise forward logistic regression modelling was used to assess the association between significant independent variables and tobacco use, as described above. Thus, the variable whose p value was ≤ 0.05 was considered statistically significant in relation to the reference category.

RESULTS

A total of 4786 students (85% response) completed the questionnaire. The mean (SD) age of the students was 14.8 (1.6) years with an almost equal number of boys (49.3%) and girls (50.7%).

Prevalence and age at initiation of current tobacco use (Table I)

Current tobacco use in any form (smoking or chewing) was present in 197 (4.1%) students; 107 (2.2%) were exclusive smokers, 49 (1%) were exclusive tobacco chewers and 41 (0.9%) used both forms of tobacco. Current tobacco use and current tobacco chewing was significantly more among boys than girls (5% v. 3.2%; and 2.8% v. 1%, respectively; p<0.001). There were no significant gender differences in the exclusive smoking group (2.3% v. 2.2%, p>0.05). The mean age of initiation of tobacco was 13.2 years and there was no gender difference. Nearly 23% of boys and 30% of girls started using tobacco before 11 years of age.

Correlates of current tobacco use

Occupation and education of parents (Table II). There was no difference in tobacco use among schoolchildren irrespective of whether their mothers were working or housewives. Children of blue collar fathers reported a significantly higher tobacco use than white collar fathers (5.6% v. 3.9%, p<0.05).

Children of less educated mothers had a significantly higher tobacco use in comparison to children of highly educated mother (postgraduation; p<0.05, OR 1.9, CI 1.0–3.62).

Source, place of smoking, reasons to adopt the habit (Table III). Among current tobacco users, nearly 37% spent all or part of their pocket money on buying tobacco products and almost 21%

TABLE I. Current tobacco use among boys and girls

Habit	Boys (%) (*n*=2360)	Girls (%) (*n*=2426)	Total (*n*=4786)	p value	OR (95% CI)*
Smokers only (A)	54 (2.3)	53 (2.2)	107 (2.2)	>0.05	0.8 (0.42–1.31)
Tobacco chewers only (B)	37 (1.6)	12 (0.5)	49 (1.0)	>0.05	2.1 (0.32–13.80)
Smoking and chewing tobacco (C)	28 (1.2)	13 (0.5)	41 (0.9)	>0.05	1.5 (1.0–2.31)
Current smokers (A+C)	82 (3.5)	66 (2.7)	148 (3.1)	>0.05	1.3 (0.91–1.82)
Current tobacco chewers (B+C)	65 (2.8)	25 (1.0)	90 (1.9)	<0.001	2.7 (1.67–4.47)
Current tobacco users (smoking, chewing or both) (A+B+C)	119 (5.0)	78 (3.2)	197 (4.1)	<0.001	1.6 (1.18–2.17)
Never tobacco users	2241 (95)	2348 (96.8)	4589 (95.9)		

* prevalence in girls taken as reference category

TABLE II. Tobacco habits among students according to the occupation and education of parents

Tobacco habit	Father's occupation				Mother's occupation			
	Blue collar	White collar*	Total	p value, OR (CI)	Working	Housewife*	Total	p value, OR (CI)
Yes	33 (5.6)	164 (3.9)	197 (4.1)	0.045, 1.5	159 (4.3)	38 (3.4)	197 (4.1)	0.15, 1.3
No	550 (94.3)	4039 (96.1)	4589 (95.9)	(1.00–2.20)	3498 (95.7)	1091 (96.6)	4589 (95.9)	(0.89–1.91)
Total	583 (13.2)	4203 (87.8)	4786		3657 (76.4)	1129 (23.6)	4786	

Tobacco habit	Father's education				Mother's education			
	Postgraduate				Postgraduate			
	No	Yes*	Total	p value, OR (CI)	No	Yes*	Total	p value, OR (CI)
Yes	160 (4.2)	37 (3.8)	197 (4.1)	0.53,† 1.1	186 (4.3)	11 (2.4)	197 (4.1)	0.046, 1.9
No	3642 (95.8)	947 (96.2)	4589 (95.9)	(0.77–1.65)	4136 (95.7)	453 (97.6)	4589 (95.9)	(0.97–3.62)
Total	3802 (79.4)	984 (20.6)	4786		4322 (90.3)	464 (9.7)	4786	

* taken as reference category   † significant   Figures in parentheses indicate percentages   OR (CI) Odds ratio (95% confidence interval)

had procured the tobacco products from friends. Nearly 10% of boys and 15% of girls received the tobacco products either from relatives, siblings or friends. Nearly half the children (45.9%) preferred to smoke in public places, 28.4% preferred their homes, while only 8.9% students smoked in school premises. One-third of the boys (33.6%) and 28.2% of girls adopted these habits to refresh themselves, whereas 13.7% and 15.2% of the students smoked or chewed to make friends and to look smart, respectively.

TABLE III. Gender-wise distribution of reasons to adopt tobacco use, sources to procure these products and preferred places to smoke

Variable	Tobacco habit		
	Boys (%)	Girls (%)	Total (%)
Source			
Pocket money	38 (31.9)	35 (44.9)	73 (37.1)
Relatives (father, uncle, grandfather)	35 (29.4)	12 (15.4)	47 (23.9)
Siblings	8 (6.7)	4 (5.1)	12 (6.1)
Friends	26 (21.8)	15 (19.2)	41 (20.8)
Multiple sources	12 (10.1)	12 (15.4)	24 (12.2)
Reasons			
To look smart	18 (15.1)	12 (15.4)	30 (15.2)
Make friends	14 (11.8)	13 (16.7)	27 (13.7)
Concentration	13 (10.9)	4 (5.1)	17 (8.6)
Increase working capacity	6 (5.0)	5 (6.4)	11 (5.6)
To refresh	40 (33.6)	22 (28.2)	62 (31.5)
Multiple reasons	28 (23.5)	22 (28.2)	50 (25.4)
Total	119 (60.4)	78 (39.6)	197
Place of smoke			
Home	24 (29.3)	18 (27.3)	42 (28.4)
Outside	33 (40.2)	35 (53.0)	68 (45.9)
At school	10 (12.2)	2 (3.0)	15 (8.9)
Friend's home	7 (8.5)	4 (6.1)	11 (6.5)
Multiple places	8 (9.8)	7 (10.6)	16 (19.5)
Total	82 (55.4)	66 (44.6)	148

Accessibility of tobacco products from street vendors. Among 511 (38.1%) students who visited the street vendor, 73.8% were not denied tobacco products because of their age (<18 years) and among them nearly 26% started smoking regularly (p<0.001).

Tobacco use of family members and friends. Tobacco use of father (OR 3.0, CI 2.24–4.09), mother (OR 7.2, CI 4.21–12.14), siblings (OR 2.3, CI 1.51–3.48) and friends (OR 8.6, CI 6.25–12.02) had significant association with student's tobacco use. Almost 3 of 5 (57.4% [113/197]), 1 of 9 (11.2% [22/197]), and 1 of 6 (16.2% [32/197]) students adopted the habit of tobacco use if their father, mother or siblings, respectively had a similar habit. The influence of friends was a major determinant for adopting use of tobacco (70% [139/197]; Table IV).

Buying tobacco for others. Buying tobacco products for others such as parents, uncle, grandparents, siblings and teachers had a major contribution towards uptake of tobacco use among school students. The use of tobacco was 10.6-, 6.4- and 3.1-fold higher among students if the products were bought for teachers, brothers, father or relatives, respectively and 48-fold higher if the products were bought for more than one person (Table IV).

Influence of actors/role models. As many as 60.9% (120/197) of tobacco users liked and adopted the habit by watching actors smoking or chewing tobacco in films (Table V).

Awareness of harmful effects of tobacco. Of 197 tobacco users, 78.2% were aware of the harmful effects of tobacco on health, mainly through classroom teaching and media campaigns. Over one-third (1747/4786) of the students reported being taught, in classrooms during the past year, the harmful aspects of tobacco use and among them 5% (87/1747) were currently using tobacco (Table V).

Use of tobacco in the future. Among current tobacco users, the majority (55.3%) wished to quit using tobacco in the future, while 19.8% were undecided (Table V).

Most factors considered in the study except mother's occupation and father's education were significantly associated with tobacco use in the univariate analyses. The results of multivariate logistic

TABLE IV. Distribution of tobacco using students with reference to tobacco habit of parents/siblings/friends and buying tobacco products for others

Tobacco habit	Habit of smoking/chewing											
	Father			Mother			Siblings/cousins			Friends/classmates		
	Yes	No *	p value, OR (CI)	Yes	No *	p value, OR (CI)	Yes	No *	p value, OR (CI)	Yes	No *	p value, OR (CI)
Yes (n=197)	113 (7.4)	84 (2.6)	<0.001, 3.0, 2.24–4.09	22 (21.8)	175 (3.7)	<0.001, 7.2, 4.21–12.14	32 (8.2)	165 (3.2)	<0.001, 2.3, 1.51–3.48	139 (12.2)	58 (1.6)	<0.001, 8.6, 6.25–12.02
No (n=4589)	1413 (92.6)	3176 (97.4)		79 (78.2)	4510 (96.3)		357 (98.1)	4232 (96.2)		998 (87.8)	3591 (98.4)	
Total	1526 (31.9)	3260 (68.1)		101 (2.1)	4685 (97.9)		389 (8.1)	4397 (91.9)		1137 (23.8)	3649 (76.2)	

Tobacco habit	Buying tobacco products for others											
	Father/relative			Brother			Teacher			Multiple persons		
	Yes	No	p value	Yes	No	p value	Yes	No	p value	Yes	No	p value
Yes (n=197)	69 (9.2)	128 (3.2)	<0.001, 3.1, 2.25–4.23	15 (20.5)	182 (3.9)	<0.001, 6.4, 3.40–12.01	12 (30.0)	185 (3.9)	<0.001, 10.6, 4.95–22.19	6 (66.7)	191 (4.0)	<0.001, 48.0, 10.5–246.81
No (n=4589)	682 (90.8)	3907 (96.8)		58 (79.5)	4531 (96.1)		28 (70.0)	4561 (96.1)		3 (33.3)	4586 (96.0)	
Total (n=4786)	751 (15.7)	4035 (84.3)		73 (1.5)	4713 (98.5)		40 (0.8)	4796 (99.2)		9 (0.2)	4777 (99.8)	

OR (CI) Odds ratio (95% confidence interval)   * reference category

TABLE V. Distribution of tobacco users with reference to awareness of its harmful health effects and intention to quit in future

Tobacco user	Knowledge of health hazards due to smoking/ tobacco chewing			
	No (%)	Yes (%)*	p value	OR (95% CI)
Yes	43 (21.8)	154 (78.2)	<0.001	5.6 (3.79–8.10)
No	220 (4.8)	4369 (95.2)		
Total	263 (5.5)	4523 (94.5)		
	Taught in the school			
Yes	110 (55.8)	87 (44.2)	<0.001	2.3 (1.69–3.07)
No	1637 (35.7)	2952 (64.3)		
Total	1747 (36.5)	3039 (63.5)		
	Like actors smoking/chewing			
	Yes (%)	No (%)*		
Yes	120 (60.9)	77 (39.1)	<0.001	3.5 (2.55–4.67)
No	1428 (31.1)	3161 (68.9)		
Total	1548 (32.3)	3238 (67.7)		
	Use of tobacco in the future			
	Yes (%)	No (%)*	Not sure (%)	
Yes	49 (24.9)	109 (55.3)	39 (19.8)	
No	163 (3.6)	3843 (83.7)	583 (12.7)	
Total	212 (4.4)	3952 (82.6)	622 (13.0)	

* reference category   OR (95% CI) Odds ratio (95% confidence interval)

regression models with and without possible confounders were similar to the univariate analysis. On multivariate analysis, use of tobacco was significantly higher among students whose friend (adjusted OR 6.9, 95% CI 5.0–9.4), father (adjusted OR 1.8, 95% CI 1.3–2.4), mother (adjusted OR 2.0, 95% CI 1.2–3.4) or sibling (adjusted OR 3.8, 95% CI 2.6–5.7) used tobacco. It was also significantly higher among children if they bought tobacco for their father, brother or teacher (adjusted OR 1.9, 95% CI 1.4–2.6; adjusted OR 3.2, 95% CI 1.8–5.9; adjusted OR 3.4, 95% CI 1.7–6.9, respectively). Tobacco use was 1.8 times more likely if students had seen their favourite actors smoke in films. However, on multivariate analysis education of mother was not significantly associated with tobacco use (Table VI).

DISCUSSION

The importance of predictors of tobacco initiation such as social bonding, social learning, refusal skills, knowledge, risk-taking attitudes and intentions has been highlighted in the literature from India and abroad. Our study associated tobacco use and factors responsible for its uptake by schoolchildren in an Indian city.

According to India GYTS 2006, the proportion of any tobacco use by students in the 13–15 years age group was reported to be 14.1.[25] The majority of studies from other parts of the world have found a higher prevalence of tobacco use (8.8%–50%).[20,26–31] Tobacco use among girls was also found to be high; it was only 1.6 times higher among boys as compared to girls, which is consistent with other reports from India.[32]

We also found a significant positive association of mother's low education, father's occupational status (blue collar worker) and tobacco use with the tobacco behaviour among children. Similar findings have been reported in other studies.[33–36] The occupation of the father is likely to influence the lifestyle of children. It is possible that children belonging to low socioeconomic status live in a social environment in which smoking is more prevalent and more acceptable. Also, children of a less educated mother may be less informed about lifestyle risk factors and their potential consequences and are therefore more likely to adopt this habit.

A positive correlation was observed between tobacco use by parents/friends/siblings and adolescents experimenting with tobacco products. Parental tobacco use has been reported to be 2–3 times and use by friends 8.6 times more often by tobacco using students compared to never users.[14] Tobacco use by family members is also likely to influence adolescents as it grants them easy access to tobacco products and they are more likely to perceive tobacco use as acceptable behaviour.[14,26,37] In studies from other parts of India, use of tobacco by friends has been reported 5–7 times more often by tobacco using adolescents than never users.[14,15] Sociocultural factors, including the media and family, play an important role in introducing and reinforcing pro-smoking intentions.[38]

In India, parents, relatives and even teachers often ask children to buy tobacco for them. One-tenth, one-fifth and nearly one-third (30%), of students in this study who were asked by their parents, brothers and their teachers, respectively to buy tobacco products for them, developed the habit of using tobacco. This behaviour of

TABLE VI. Results of step-wise forward logistic regression analysis

Factors	Wald	p value	Adjusted odds ratio	95% CI	
				Lower	Upper
Occupation of father	5.006	0.025	1.474	1.049	2.070
Education of mother (postgraduate)	0.640	0.424	1.220	0.750	1.985
Knowledge of tobacco	34.340	0.000	3.318	2.221	4.955
Taught in school	12.943	0.000	1.699	1.273	2.268
Watching actors use tobacco	16.351	0.000	1.799	1.353	2.392
Tobacco habit among					
Friends	143.9	0.000	6.867	5.013	9.408
Siblings	44.00	0.000	3.815	2.568	5.666
Father	15.20	0.000	1.798	1.339	2.415
Mother	6.275	0.012	1.978	1.160	3.373
Bought tobacco for					
Father	15.44	0.000	1.873	1.370	2.561
Brother	14.72	0.000	3.242	1.778	5.910
Teacher	11.72	0.001	3.408	1.689	6.873
Multiple persons	24.39	0.000	16.255	5.375	49.159

adults is a strong predictor of tobacco use among children.[8,26,39] In the present survey, nearly one-third of tobacco users reported spending part or all of their pocket money on buying tobacco products. Having spare money may influence adolescents to spend it on buying tobacco products.[8,9] The majority of students who visited street vendors/stores were not refused tobacco products despite a governmental ban on the sale of these products to children below 18 years of age. Other researchers from India have made similar observations indicating that laws restricting access of tobacco products to minors are not enforced strictly.[7,8,14,15]

Tobacco marketing and advertisement by celebrities has been a major contributory factor in initiating tobacco use by adolescents. Tobacco users in our study reported being influenced by watching film actors using tobacco. By depicting positive images of tobacco use, movies have the potential to influence adolescent tobacco use as much as any other environmental exposure, such as tobacco use by family or friends.[9,10,15,40]

Nearly 95% students were aware that tobacco consumption is injurious to health. This finding is consistent with studies from other parts of India.[6,9,15,26] More than half the students in the present study wished to quit tobacco use in the future whereas intermediate outcomes from project MYTRI (Mobilizing Youth for Tobacco-Related Initiatives in India) indicate that fewer students in the intervention group intend to use tobacco in the future as compared to those in the non-intervention group.[23] About one-third of students reported having been taught in school over the past year about the dangers of tobacco use and among these only 5% were currently using tobacco. Classroom teaching on harmful effects of tobacco has been reported by a varying percentage of students (20%–50%) in other studies.[14,15] The present teaching curriculum does seem to be effective as students are getting more aware of health hazards associated with tobacco use and more than half of them intend to quit its use in the future. However, teaching needs to be strengthened to further bring down the prevalence of tobacco use and its associated morbidity among students.

Strengths and limitations

The strengths of our survey include a randomly selected class sample and that all students of a selected class were asked to participate. The appropriate sample size and valid measures of tobacco use further add to the credibility of the study. The study also has some weaknesses. A major limitation is that tobacco use was self-reported. Poor memory, misunderstanding questions or intentional deception can interfere with the results in such a study. The actual prevalence of tobacco use in the study was less than anticipated, probably due to fewer than estimated number of responders.

Conclusions

Our study highlights tobacco use among adolescents in Noida and brings forth various correlates of tobacco use in this vulnerable age group. Our findings warrant that tobacco prevention and control measures should preferably be directed at the primary education level. To be maximally effective, any tobacco prevention/control programme in children should involve friends, peer groups, schools, teachers and parents. The factors reported in the current study might prove beneficial in designing public health interventions aimed at youth targeted tobacco control.

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