PREVALENCE AND FACTORS ASSOCIATED WITH CURRENT SMOKING AMONG HIGH SCHOOL ADOLESCENTS IN KARACHI, PAKISTAN

Shafquat Rozi[1], Saeed Akhtar[1], Sajid Ali[1] and Javaid Khan[2]

[1]Department of Community Health Sciences, [2]Department of Medicine, Aga Khan University, Karachi, Pakistan

Abstract. Our objective was to estimate the prevalence and evaluate factors associated with smoking among high school adolescents in Karachi, Pakistan. A school-based, cross-sectional survey was conducted in three towns in Karachi, namely, Gadap Town, Bin-Qasim Town and Malir Town, from January through May 2003. Two-stage cluster sampling stratified by school type was employed to select schools and students. We recruited and interviewed 772 male students regarding socio-demographic factors, smoking history of students, their families/friends, number of siblings, and place of residence. The prevalence of smoking (30 days) among adolescents was 13.7%. Final multiple logistic regression analysis showed that after adjusting for age, ethnicity, and place of residence, being a student at a government school (OR=1.6; 95%CI: 1.0-2.7), parental smoking (OR=1.7; 95%CI: 1.1-2.8), uncle smoking (OR=1.7; 95%CI: 1.2-2.8), peer smoking (OR=6.2; 95% CI: 3.9-9.9), and spending leisure time outside home (OR=3.9; 95%CI 1.2-13.2) were significantly associated with adolescent smoking.

INTRODUCTION

Tobacco is the single most important preventable cause of disease and premature death in the world today. Tobacco causes about three and a half million deaths throughout the world and kills nearly 10,000 people worldwide every day (WHO, 2002a). Tobacco is a known cause of about 25 diseases and its impact on global disease burden is increasing continuously (WHO, 2002b).

The World Health Organization (WHO) currently estimates that there are 1.1 billion smokers presently in the world (WHO, 2002b). Globally, approximately 47% of males and 12% of females are smokers. In developing countries, 48% of males and 7% of females smoke, whereas, in developed countries, 42% of males and 24% of females smoke (ALA, 2002). Pakistan ranks 10th among tobacco producing countries (CDC, 2001). A population-based study during 1990-1994 reported a 21.6% prevalence of smoking in the Pakistani population aged 15 years and above (Alam, 1998). According to the National Health Survey of Pakistan (NHSP) 1998, about 34% of males and 12.5% of females use tobacco in different forms (PMRC, 1998). A survey conducted in Islamabad showed that 27% of children aged 10-14 years were smokers (Anonymous, 2002).

Researches suggest that tobacco use is often initiated during adolescence (Sinha *et al*, 2002). Tobacco affects adolescents in a number of ways. Active smoking by young people is associated with significant health problems. At present, 150 million adolescents use tobacco worldwide (WHO, 2002c). Approximately 90% of smokers begin smoking before the age of 21 years (ALA, 2002). By the age of 11 years one-third of children, and by the16th year, two-thirds of children have experimented with smoking (National Statistics, 2000).

Factors that commonly play a role in the initiation of smoking among adolescents include social factors (high levels of social acceptability, marketing efforts, role modeling by parents and other family members (Avenevoli and Merikangas, 2003; Komro *et al*, 2003), peers (Sussman *et al*, 1990; Zhang *et al*, 2000), teachers (Poulsen *et al*, 2002), personal factors (psy-

Correspondence: Shafquat Rozi, Division of Epidemiology and Biostatistics, Department of Community Health Sciences, Aga Khan University, Stadium Road, PO Box 3500, Karachi-74800, Pakistan.
Tel: +9221-4930051 ext 4918
E-mail: shafquat.rozi@aku.edu

chological (Supranowicz, 1998), relaxation, pleasure (Ahmadi *et al*, 2001), and self confidence (Sieminska *et al*, 2000)), and economic factors [price is recognized as a major determinant of cigarette consumption (Townsend, 1998)].

As smoking is usually initiated during adolescence, it should be a public health priority to educate this group regarding the hazards of smoking, so that their behavior can be modified. Before initiating such awareness programs, it is important to understand the factors contributing to adolescent smoking and design effective interventions to prevent it. One of the most important commitments a country can make for future economic, social, and political progress and stability is to address the health and development needs of its adolescents. Therefore, the objective of this study was to estimate the prevalence of and identify the factors associated with the smoking status of school-going adolescents in Karachi, Pakistan.

SUBJECTS AND METHODS

This cross-sectional study was conducted from January through May 2003 at government and private schools in Karachi, the largest city in Pakistan, with a population of 9.8 million (PCO, 2000). Karachi has been demarcated into 18 administrative towns with 178 union councils (CDGK, 2003). We selected three towns for our research study: Gadap Town, Bin-Qasim Town, and Malir Town. There is an ethnic mix of people residing in these three towns. Socio-economically, the population belongs to the upper, middle, and lower middle classes. The population of these three towns in this survey was therefore considered to be representative of the population of Karachi.

Selection of schools and subjects

A two-stage cluster sampling with stratification based on school type (government or private) was employed for the selection of schools and recruitment of adolescents. We recruited 772 male secondary schoolstudents. In three selected towns, there were 79 registered government and private schools (CDGK, 2003). Each school was treated as a cluster, and 33 of 79 were selected randomly proportionate to the number of types of schools; 17 of them were government and the rest of them were private schools. Of the students present on the day of

our visit, an average of twenty-five students from each government school and twenty students from each private school were selected systematically on the basis of their seating arrangement.

Data collection

Written permission was taken from Nazim, an administrative official in charge of towns, and from a district education officer, to conduct research in schools in their region. Three days of training for five data collectors was carried out prior to data collection. Training was comprised of questionnaire and field test explanations. Field staff were able to communicate in the local and the English language. A field supervisor was responsible to make spot checks and discuss issues and problems of field sites. Written consent was also taken from individual school authorities for interviewing their school students. At each selected school, after explaining the purpose of the study, verbal consent was taken from the students and a structured questionnaire was administered. The academic schedule of the students was taken into account and interviews were conducted during recess/lunch time or during free periods in school hours.

Questionnaire

The questionnaire included questions on socio-demographic factors, including age, ethnicity, religion, highest level of parental education, occupation of parents (proxy indicators for socio-economic status), smoking history of family/friends, number of siblings, and place of residence. The smoking behavior of the student was assessed by asking whether the individual had smoked in his life or not, and the age and particular reasons for initiation of smoking. We also asked about the frequency of smoking.

Definition of a smoker

The outcome variable smoking status (smoker or non-smoker) was assessed based on 30-days prevalence of cigarette smoking (that is whether or not one had smoked a cigarette in the past 30 days) (Unger *et al*, 2000; Davis *et al*, 2001; Rigotti *et al*, 2002; Lantz, 2003) and used for analysis. For smokers, current frequency of smoking was further categorized as daily, weekly, monthly, and occasional smoker.

Statistical analysis

Descriptive statistics included means (± standard deviation) for continuous, and pro-

portions for categorical variables. To identify the factors associated with smoking among school-going adolescents, associations between outcome variables (smoker and non-smoker) and independent variables were sought. Crude odds ratio (OR) and their 95% confidence intervals (CI) were calculated by univariate logistic regression analysis. Variables with p ≤ 0.25 or biologically meaningful were selected for multivariate analysis (Hosmer and Lemeshow, 1996). To assess the independent effect of individual factors, potential confounders were controlled by means of multiple logistic regression analysis and adjusted OR (AOR) with their 95%CI . After the main effect model, plausible interactions were evaluated for inclusion in the multivariate model. The statistical package Epi-Info version 6 was used to enter the data, Fox-pro version 6 for data cleaning and analysis was performed by using SPSS version 10.

RESULTS

Table 1 gives the demographic characteristics of the respondents. We interviewed 772 male students from both government and private schools, with a response rate of 100%. Of 772 adolescents, 427 (55.3%) were from government and 345 (44.7%) were from private schools. The mean (±SD) age (yrs) of students in both the government and private schools was 14.8 (±0.1). Seven hundred sixty-four students (99%) were found to be Muslim, 100% of them were enrolled in the Pakistani education system. The prevalences of smoking among the government school and private school male students were 78 (18.3%) and 28 (8.1%), respectively, and the overall prevalence among the school-going male adolescents was (13.7%).

Regarding the educational status of the respondent's father, 29.1% had no formal education, 15.5% had primary, 7.3% middle, 19.3% matric, and 28.8% had intermediate or above levels of education. The majority of the mothers (65.5%) had no formal school education and only 6.5% were employed in paid jobs. About 24.6% of adolescents stated that their fathers were government employees, whereas 18.3% stated that their fathers had their own businesses.

Of 772 adolescents, 47.4% were residents of Bin Qasim Town and 26.3% were residents of either Malir or Gadap Town. Sixty-two percent

Table 1

Socio-demographic characteristics, history of smoking in respondents, and their family and friends, living in Karachi, Pakistan.

Characteristics	Frequency	Percentage
Type of schools		
Government	427	55.3
Private	345	44.7
Age of the respondent		
<13	102	13.2
≥13	670	86.8
Average age of respondent (S.E)	14.8 (0.1)	
Residential area of respondent		
Gadap Town	203	26.3
Bin Qasim Town	366	47.4
Malir Town	203	26.3
Mother tongue of respondent		
Urdu	159	20.6
Sindhi	306	39.6
Punjabi	54	7
Balochi	189	24.5
Others	64	8.3
[a]Family and friends history of smoking		
Parent smokes	244	31.6
Brother smokes	61	7.9
Uncle smokes	346	44.8
Grandparents smoke	26	3.4
Friends smoke	143	18.5
Number of siblings		
0-3	181	23.5
4-7	460	59.6
8 or above	131	16.9
Average no. of siblings (S.E)	5.3 (8.6)	
[a]Spend leisure time with		
Books	480	62.2
Play	410	53.1
Television	451	58.4
Work	97	12.6
Learning	34	4.4
Outings	15	1.9
Ever smoked		
No	606	78.5
Yes	166	21.5
Age of starting smoking (n=166)		
8-10	35	21.0
11-13	44	26.5
14-16	131	78.9
Average age of starting smoking (S.E)	13.1 (0.2)	
[a]Usually smoke at (n=166)		
Home	8	7.5
School	2	1.9
Friend	65	61.3
Social event	15	14.2
Public place	19	17.9
Work place	23	21.7

[a]Multiple responses

Table 2
Univariate analysis of factors associated with smoking among high-school-going adolescents in Karachi, Pakistan.

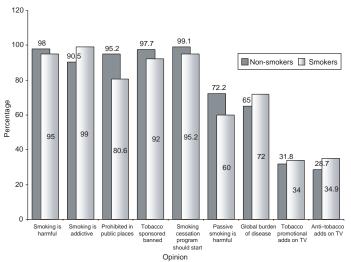| Characteristics	Smoking status		Crude odds ratio	95%CI
	Smoker n=106	Nonsmoker n=666		
Type of school				
Private	28 (26.4)	317 (47.6)	1.0	-
Government	78 (73.6)	349 (52.4)	2.5	(1.6 - 3.9)
Age of the respondent				
Average age of respondent (S.E):	15.3 (1.2)	14.8 (1.2)	1.4	(1.2 - 1.7)
Education of the respondent's father				
Intermediate or above	18 (17.0)	204 (30.6)	1.0	-
Matric	15 (14.2)	134 (20.1)	1.3	(0.6 - 2.6)
Middle	9 (8.5)	47 (7.1)	2.2	(0.9 - 5.1)
Primary	22 (20.8)	98 (14.7)	2.5	(1.3 - 4.9)
No schooling	42 (39.6)	183 (27.5)	2.6	(1.4 - 4.7)
Occupation of the respondent's father				
Professional	7 (6.6)	54 (8.1)	1.1	(0.4 - 2.5)
Service	17 (16.0)	127 (19.1)	1.2	(0.5 - 2.1)
Business	16 (15.1)	125 (18.8)	1.6	(0.5 - 2.0)
Agriculture and forestry work	18 (17.0)	61 (9.2)	2.3	(1.1 - 4.7)
Production and related work	30 (28.3)	160 (24.0)	1.4	(0.8 - 2.7)
Others	18 (17.0)	139 (20.8)	1.0	-
Education of respondent's mother				
Schooling	19 (17.9)	250 (37.5)	1.0	-
No schooling	87 (82.1)	416 (62.5)	2.6	(1.6 - 4.6)
Mother tongue of respondent				
Urdu	9 (8.5)	150 (22.5)	1.0	-
Sindhi	56 (52.8)	250 (37.5)	3.7	(1.8 - 7.7)
Punjabi	5 (4.7)	49 (7.4)	1.7	(0.5 - 5.3)
Balochi	25 (23.6)	164 (24.6)	2.5	(1.1 - 5.6)
Others	11 (10.4)	53 (8.0)	3.4	(1.3 - 8.8)
Residential area of respondent				
Malir Town	9 (8.5)	194 (29.1)	1.0	-
Bin Qasim Town	45 (42.5)	321 (48.2)	3.0	(1.4 - 6.3)
Gadap Town	52 (49.0)	151 (22.7)	7.4	(3.5 - 15.5)
Parents smoke				
No	69 (65.1)	510 (76.6)	1.0	-
Yes	37 (34.9)	156 (23.4)	1.7	(1.2 - 2.7)
Uncle smokes				
No	42 (39.6)	384 (57.7)	1.0	-
Yes	64 (60.4)	282 (42.3)	2.1	(1.4 - 3.2)
Friend smokes				
No	50 (47.2)	579 (86.9)	1.0	-
Yes	56 (52.8)	87 (13.1)	7.4	(4.8 - 11.6)
No. of siblings				
Average no. of siblings (S.E):	5.8 (2.4)	5.2 (2.4)	1.1	(1.1 - 1.2)
Spend leisure time with books				
Yes	58 (54.7)	422 (63.4)	1.0	-
No	48 (45.3)	244 (36.6)	1.4	(0.9 - 2.2)
Spend leisure time with books				
Yes	58 (54.7)	422 (63.4)	1.0	-
No	48 (45.3)	244 (36.6)	1.4	(0.9 - 2.2)
Spend leisure time at play				
Yes	49 (46.2)	361 (54.2)	1.0	-
No	57 (53.8)	305 (45.8)	1.4	(0.9 - 2.1)
Spend leisure time with work				
No	83 (78.3)	591 (88.7)	1.0	-
Yes	23 (21.7)	75 (11.3)	2.2	(1.3 - 3.7)
Spend leisure time on outing				
No	101 (95.3)	656 (98.5)	1.0	-
Yes	5 (4.7)	10 (1.5)	3.3	(1.2 - 9.7)

Fig 1–Factors regarding knowledge of smoking among high-school-going adolescents.

Table 3
Multivariate analysis of factors associated with smoking among high school going adolescents in Karachi, Pakistan.

Variable	Adjusted odds ratio	95 %CI
Type of school		
Private	1.0	-
Government	1.6	(1.0 - 2.7)
Age of the respondent	1.3	(1.1 - 1.7)
Mother tongue of respondent		
Urdu	1.0	-
Sindhi	2.1	(1.1 - 5.2)
Punjabi	1.2	(0.5 - 4.2)
Balochi	1.1	(0.5 - 3.1)
Others	2.5	(1.2 - 8.4)
Residential area of respondent		
Malir Town	1.0	-
Bin Qasim Town	2.6	(1.2 - 5.9)
Gadap Town	4.9	(2.1 - 11.7)
Parents smoke		
No	1.0	-
Yes	1.7	(1.1 - 2.8)
Uncle smokes		
No	1.0	-
Yes	1.7	(1.2 - 2.8)
Friend smokes		
No	1.0	-
Yes	6.2	(3.9 - 9.9)
Spend leisure time on outings		
No	1.0	-
Yes	3.9	(1.2 - 13.2)

of adolescents stated enjoyment as the reason for initiating smoking and 18% said advertisements. Fifty percent smoked cigarettes by purchasing, and 50% borrowed from their friends. The majority of the respondents (smokers and non-smokers) knew that smoking was harmful for their health and a substantial proportion of the students thought that a smoking cessation program should be launched in our country (Fig 1).

The results of univariate analysis are presented in Table 2. Adolescent smoking status was significantly associated with type of schools, age of the respondents, parental education, father's occupation, mother tongue, residential area, family and friend's smoking habits, number of siblings, and how they spent their leisure time (p ≤ 0.025).

The final multiple logistic regression analysis (Table 3) showed that after adjusting for age, ethnicity and place of residence, school types (adjusted OR=1.6; 95%CI: 1.0-2.7), parental smoking (adjusted OR=1.7; 95%CI: 1.1-2.8), uncle smoking (adjusted OR=1.7; 95%CI: 1.2-2.8), peer smoking (adjusted OR=6.2; 95%CI: 3.9-9.9) were factors which were significantly associated with adolescent smoking. Boys who spent most of their leisure time outside home were more likely to smoke (adjusted OR = 3.9; 95%CI: 1.2-13.2).

DISCUSSION

Our study found a 13.7% prevalence of smoking among school-going adolescents in three towns in Karachi, Pakistan based on the criteria used by others (30-days prevalence (Unger *et al*, 2000; Davis *et al*, 2001; Rigotti *et al*, 2002; Lantz, 2003). According to the WHO standard criteria, a person is labeled as smoker, if he/she has smoked 100 cigarettes in their life (WHO, 1998).

A previous study showed that in the West, most smokers start smoking in early teens and in developing countries most smokers begin smoking in their late teens or early twenties (Agha

and Sadaruddin, 1996).Our results showed that the average age of starting to smoke was 13.1 years. This may be due to the fact that children have easy access to tobacco products in developing countries because there are no restrictive laws against the sale of cigarettes to minors.

Smoking prevalence was higher among government schoolstudents compared to private schoolstudents. This may be due to better educational activities or a close monitoring system and restriction to the use of tobacco in private schools, more than government schools, and may also be due to social class differences between the school populations. Our study also found that subjects belonging to Gadap and Bin-Qasim Towns were more likely to be smokers compared to those residing in Malir Town. This association indicates that people in some localities are more prone to smoking. Parental and uncle smoking were found to be highly significant. When adolescents are exposed to the tobacco habits of family members, they have easy access to use it, which helps them to develop personal beliefs about tobacco use. Adolescent students with friends who used tobacco were more likely to smoke compared to those with no smoking peers. The average age of tobacco use among the study subjects was 13.1 years. At this age, peer pressure or peer relationships becomes stronger than family relationships, so adolescents are more likely to be influenced by the behavior of friends. Our findings are consistent with other studies conducted regarding adolescent smoking behavior in various parts of the world, which showed that parents, siblings, and peers are powerful influences for adolescent smoking (Sussman *et al*, 1990; Zhang *et al*, 2000; Avenevoli and Merikangas, 2003; Komro *et al*, 2003).

We did not find any significant association between adolescent smoking and television tobacco promotional advertisements. This result is not consistent with the findings of an earlier study which showed that youth who were exposed to advertisements were more likely to smoke (NIH, 2002a,b). This may be due to the fact that these subjects also see anti-tobacco advertisements in electronic and printed media.

The majority of respondents (both smokers and non-smokers) had a good knowledge of the health hazards of smoking. These results indicate that a knowledge of the hazards of tobacco use did not influence their decision to initiate smoking. The reasons for this gap between knowledge and behavior need to be further explored.

Our study was based on self-reported smoking information. Though a number of students reported that many of their schoolfriends who had smoked did not admit it at the time of the survey, the chances of underreporting smoking status is probably lower in school-based surveys than in community-based surveys (WHO, 1998; Won *et al*, 2001) because of a fear that their smoking status will become known to their parents and they may have imposed on them monetary or social restrictions. To maintain confidentiality, the class was not asked, therefore, the rate of smoking by class was not assessed. Another limitation of the study was that we could not make any biomedical validations of the self-reported current smoking status of each subject.

The prevalence of smoking among school-going adolescents is alarming, and is higher among government schoolstudents than private schoolstudents. This study revealed that an increase in the initiation of smoking among adolescents is significantly associated with the smoking habits of family members and peers. The results of this study point out the need for an effective tobacco control program in this country, especially among adolescents, keeping in mind that a large majority of adolescents are not enrolled in school. Parental counseling about the influence of family tobacco use on their children may bring about encouraging results. In Pakistan, very few studies on smoking have been conducted on school-going adolescents. Therefore, the results of our study should be helpful for planning effective health education interventions in this target group.

ACKNOWLEDGEMENTS

We are indebted to the District Officer of Education, City District Goverment. Karachi and Town Municipal Administration Malir, Bin-Qasim and Gadap Towns for their support in conducting the survey. We acknowledge all the selected goverment and private schools for their participation. We would like to thank the study field team, especially Mr Rashid Baloch and Ms Naila

Jamshed, for their assistance; Mr Iqbal Azam (assistant professor, CHS, AKU) and Ms Bilquis Sana Khan (senior instructor, CHS, AKU) for providing valuable support and guidance.

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