Tobacco use in late adolescence among rural Sri Lankans

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Objective: To determine the prevalence of, and factors associated with, tobacco use among 16-19 year old students from rural Sri Lanka. ***Basic research design:*** A cross-sectional study where the data were collected by means of a pre-tested self-administered questionnaire. ***Participants:*** 390, 16-19 year old students selected from 9 schools in Ampara education zone. ***Results:*** Nearly 22% of the sample had used tobacco during their life and the prevalence of ever smokeless tobacco use (19%) was higher than the prevalence of ever smoking (10%). The prevalence of current smoking was 16% in males and 1% in females while 23% and 3% of males and females were current smokeless tobacco users respectively. Current smoking was independently associated with gender and having a smoker at home while current smokeless tobacco use was significantly associated with gender, maternal education and paternal occupation. ***Conclusion:*** The prevalence of tobacco use was high in these rural students

Key words: *smoked tobacco, smokeless tobacco, rural Sri Lanka, late adolescence*

Introduction

Tobacco use is the single most preventable cause of death globally and kills around six million people each year. It is used both in smoked and smokeless forms. Tobacco that is not smoked but used in other forms such as chewing tobacco or snuff is termed smokeless tobacco. The use of both forms not only affects the general health of a person but there is overwhelming evidence to indicate that they cause adverse oral health outcomes including oral cancer, oral mucosal lesions and periodontal disease (Johnson and Bain, 2000). There are nearly one billion smokers in the world at present and 80% of them live in low- and middle-income countries (World Health Organization, WHO, 2015). Further, over 300 million people in at least 70 countries use smokeless tobacco (CDC, 2014).

The Global Youth Tobacco survey (GYTS) conducted by the WHO collects information on tobacco use among 13-15 year olds at regular intervals These surveys indicate that tobacco use is more common among boys than girls but the gap is narrowing and in many countries there is no gender difference in cigarette smoking and use of tobacco products other than cigarettes (Warren *et al.,* 2008). Sri Lanka has participated in the GYTS since 1999 and their data indicate that current cigarette smoking has decreased from 4.0% in 1999 to 1.2% in 2007 while current use of tobacco products other than cigarettes has increased from 7.2 to 8.6% over that period (CDC, 2008). However the GYTS 2011 found that the prevalence of current cigarette smoking and current use of tobacco products other than cigarettes is 1.5 and 10% respectively (WHO, 2011) indicating that tobacco use among adolescents has increased in Sri Lanka since 2007. This is of concern to policy makers and health care personnel including oral health care workers as tobacco use could lead to both long and short-term health consequences including oral problems in young people (Ditmyer *et al.,* 2013; USDHHS, 2012)

Tobacco use is more common during late adolescence than in middle adolescence (Pradhan *et al.,* 2013; Sharma *et al.,* 2010) and in many Asian countries adolescents are influenced by institutional norms that prevent deviant behaviours such as smoking and alcohol consumption until late adolescence (Tsai *et al.,* 2014). Therefore it is important to assess tobacco use in late adolescence as well. As empirical data on tobacco use is lacking for Sri Lankans in their late adolescence, the aim of this study was to determine the prevalence and factors associated with tobacco use among 16-19 year old students from rural Sri Lanka.

Method

Ethical clearance for the present study was obtained from the Ethical Review Committee of the Post Graduate Institute of Medicine, University of Colombo. Permission was obtained from the Zonal Director of Education, Ampara and the principals of the respective schools. Written assent was obtained from students while written informed consent was obtained from their parents. Students who were mentally challenged were excluded.

This cross-sectional study was conducted among 16-19 year old students attending schools in Ampara Education Zone which is part of Ampara district of Sri Lanka. The sample size was calculated using the formula for calculating a population proportion with absolute precision. A search of the literature indicated that there were no data pertaining to tobacco use among 16-19 year olds in Sri Lanka. Therefore, the prevalence of tobacco use (16%) among 13-15 year old Sri Lankan male students reported in the GYTS 2011 was used to calculate the sample size (WHO, 2011). Accordingly the sample size required for the present study using a prevalence of 16% at 95% confidence level, accepting a sampling error of 4% and 20% compensation for non-responses was 387. This was increased to 390 for practical purposes.

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According to education authorities 16-19 year old students attend grade 12 and 13 classes and there are nine schools with grade 12 and 13 classes in Ampara education zone. A total of 910 students (342 males, 568 females) are enrolled in these classes. Based on the male to female ratio, it was decided to include 146 male and 244 female students in the sample. The sample's 390 places were allocated to the nine schools in proportion to their total number of grade 12 and 13 students. The number of male and female students to be selected from the corresponding classes was then calculated based on the ratio of males to females in each class. The required number of students from each class was selected using systematic sampling and the class attendance register which contained separate lists of male and female students was used for this purpose.

Data were collected by means of a self-administered, pre-tested questionnaire based on the GYTS questionnaire (GYTS group, 2012). The original GYTS questionnaire was not used as some items of it were not relevant to the objectives of present study as well as culturally not acceptable in the Sri Lankan context. The questionnaire was originally prepared in English then translated into Sinhala language. It was re-translated into English by two independent persons who were proficient in both English and Sinhala to ensure accuracy. The questionnaire was pre-tested in a convenience sample of 15, grade 12 and 13 students from a school located in a different but nearby administrative area. Based on the findings minor modifications were made to the questionnaire. The questionnaire consisted of items to obtain information on socio-demographic factors, smoked/smokeless tobacco use, knowledge of harmful effects of tobacco use (ten items) and attitudes to tobacco use (five items). The respondent was requested to indicate the response to knowledge and attitude items on a five point scale; strongly agree, agree, don't know, disagree and strongly disagree. Each item was scored out of five and the total knowledge and attitude scores for a respondent were obtained by summing up the scores for the ten knowledge and five attitude items separately. To minimize response fix, both negatively and positively worded items were included to assess knowledge and attitudes. However all negatively worded items were recorded prior to data entry. The total knowledge score ranged from 5 to 50 while the total attitude score ranged from 5 to 25. Higher scores indicated that the respondent was aware of the harmful effects of tobacco and had a negative attitude towards tobacco use.

Analyses used SPSS v.22.0. The GYTS classification was used to categorize smoked vs. smokeless tobacco use; ever smokers/smokeless tobacco users (smoked/used a smokeless tobacco product at least once during life time), current smokers/ smokeless tobacco users (smoked/used a smokeless tobacco product in the month preceding data collection) and never smokers/smokeless tobacco users (never smoked/used a smokeless tobacco product during lifetime). Binary multiple logistic regression analyses were carried out to determine factors associated with current smoked and smokeless tobacco use. Only those independent variables that were significant at p<0.05 level in the unadjusted models were included in the adjusted model. Knowledge and attitude scores were added as continuous variables to the models.

Results

Of the 390 students selected, 388 responded to the question-naire giving a response rate of 99.5%. The mean age of the sample was 16.9 years (SD 0.8 years) and 62% were females. The mean knowledge and attitude scores were 34.9 (SD 3.3) and 17.8 (SD 3.0) respectively.

Nearly 22% (n=87) of the sample had used tobacco during their life and the prevalence of ever smokeless tobacco use (19%) was higher than the prevalence of ever smoking (10%). Nearly 13% of the sample currently used tobacco. The prevalence of current smoking was 16% in males and 1% in females while 23% and 3% of males and females were current smokeless tobacco users respectively (Table 1)

Table 2. Distribution of sample according to tobacco use characteristics

Tobacco use characteristics	Smoked tobacco		Smokeless tobacco	
	N	%	N	%
Type of tobacco product ever used	**37**		**75**	
Cigarette	36	97.3		
Beedi	1	2.7		
Tobacco in betel quid			75	100.0
Age when first used	**37**		**75**	
≤11 years	5	13.5	11	14.7
>11-15 years	13	35.1	35	46.7
≥16 years	19	51.4	29	38.6
Place where tobacco is used	**37**		**75**	
Home	2	5.4	37	49.3
Tuition classes	1	2.7	3	4.0
Friend's place	12	32.4	8	10.7
Social events	20	54.1	25	33.3
On the way to school	2	5.4	2	2.7
Source of tobacco [2]	**27**		**42**	
Bought from a shop	7	25.9	18	42.8
Someone bought it for me	7	25.9		
Got from a friend/relative	10	37.1	23	54.8
Other	3	11.1	1	2.4
Type of tobacco product used [2]	**27**		**42**	
Cigarette	27	100.0		
Tobacco with betel quid			42	100.0

[2] During the past 30 days and for current smoker/smokeless tobacco users only

Table 1. Distribution of sample according to tobacco use

Status	Smoked tobacco						Smokeless tobacco						Any tobacco product	
	Male (n=146)		Female (n=242)		Total (n=388)		Male (n=146)		Female (n=242)		Total (n=388)		Total sample (n=388)	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Never	112	76.7	239	98.8	351	90.5	87	59.6	226	93.4	313	80.7	301	77.6
Ever[1]	34	23.3	3	1.2	37	9.5	59	40.4	16	6.6	75	19.3	87	22.4
Current	24	16.4	3	1.2	27	7.0	34	23.3	8	3.3	42	10.8	50	12.9

[1] Includes both current and past smokers/smokeless tobacco users

Tobacco use characteristics of the sample are shown in Table 2. Except one who had smoked bidi; a common form of smoked tobacco in South Asia, all ever smokers had smoked cigarettes while all ever smokeless tobacco users had used tobacco with betel quid. About half the ever smokers (51%) had first smoked at the age of 16 years or above while nearly 47% of the ever smokeless tobacco users had first used smokeless tobacco between 12-15 years of age. Most of the ever users cited "social events" and "home" as the usual place of smoking and smokeless tobacco use respectively. Further a majority of both current smokers and current smokeless tobacco users had obtained tobacco from friends/relatives.

The unadjusted and adjusted logistic regression models for current smoking are presented in Table 3. According to the unadjusted model males, students whose parents had under 11 years of education and those having a smoker at home were more likely to be current smokers than females, students whose parents were better educated and who did not have a smoker at home. Also as knowledge and attitude scores increased the likelihood of being a current smoker decreased. However according to the adjusted model current smoking was independently associated with gender (OR for female=0.11; 95%CI 0.03, 0.40) and with having a smoker at home (OR=4.30; 95%CI 1.14,16.18).

Gender, age, both parental educations, father's occupation and attitude score were significantly associated with current smokeless tobacco use in the unadjusted logistic regression model. But according to the adjusted model only gender (OR for female=4.30; 95%CI 1.14,16.18), mother's education (≥11 years of education OR=0.34; 95%CI 0.14,0.86) and father's occupation (non-manual OR=0.39; 95%CI=0.15,0.98) were significantly associated with current smokeless tobacco use (Table 4).

Table 3. Binary logistic regression analysis of factors associated with current smoking

Variable	unadjusted			adjusted		
	OR	95% CI	p value	OR	95% CI	p value
Gender						
Female (ref. Male=1)	0.06	0.02, 0.22	<0.001	0.11	0.03, 0.40	0.001
Age	1.60	0.98, 2.62	0.06			
Maternal level of education in years						
≥ 11 (ref. <11=1)	0.26	0.11, 0.61	0.002	0.37	0.10, 1.35	0.13
Paternal level of education in years						
≥11 (ref. <11=1)	0.39	0.17, 0.87	0.02	0.69	0.21, 2.30	0.55
Paternal occupation						
Non-manual (ref. Manual=1)	0.50	0.20, 1.29	0.15			
Knowledge score	0.87	0.77, 0.98	0.032	0.92	0.79, 1.07	0.28
Attitude score	0.81	0.71, 0.93	0.003	0.89	0.75, 1.07	0.21
Smoker at home						
Yes (ref. No=1)	4.90	1.40, 17.13	0.013	4.30	1.44, 16.18	0.031

OR=odds ratio, CI=Confidence interval

Table 4. Binary logistic regression analysis of factors associated with current smokeless tobacco use

Variable	Unadjusted model			Adjusted model		
	OR	95%CI	p value	OR	95%CI	p value
Gender						
Female (ref. Male=1)	0.11	0.05, 0.25	<0.001	0.13	0.00, 0.31	<0.001
Age	1.65	1.10, 2.48	0.016	0.97	0.57, 1.64	0.90
Maternal level of education in years						
≥11 (ref. <11 = 1)	0.27	0.13, 0.56	<0.001	0.34	0.14, 0.85	0.02
Paternal level of education in years						
≥ 11 (ref. ≤11 = 1)	0.30	0.15, 0.58	<0.001	0.57	0.25, 1.29	0.18
Paternal occupation						
Non-manual (ref. Manual=1)	0.32	0.14, 0.74	0.008	0.39	0.15, 0.98	0.04
Knowledge score	0.91	0.82, 1.01	0.065			
Attitude score	0.82	0.73, 0.92	0.001	0.90	0.80, 1.03	0.11
Smokeless tobacco user at home						
Yes (ref. No=1)	1.95	0.83, 4.60	0.13			

OR=odds ratio, CI=Confidence interval

Discussion

The present study was conducted among students in their late adolescence residing in a rural area of Sri Lanka. It was evident that the prevalence of ever tobacco use was 22% and higher than what has been reported for adolescents from other South Asian countries. For example the prevalence of ever tobacco use was 14 to 20% in Nepalese students (Pradhan *et al.,* 2012; Sreeramareddy *et al.,* 2008) while according to Indian studies around 11 to 16% of students had used tobacco sometime in their life (Kumar *et al.,* 2014; Narain *et al.,* 2011). Also the prevalence of ever smokeless tobacco use (19%) was higher than the prevalence of ever smoking (10%). In contrast some studies have reported that the prevalence of ever smoking is higher than the prevalence of ever smokeless tobacco use (Narain *et al.,* 2011; Sharma *et al.,* 2010). The high prevalence of smokeless tobacco use among the sample might be an indication of the strong cultural acceptance and lack of legal and social restrictions imposed on its use by young people. Furthermore the high prevalence of smokeless tobacco use is a matter of concern as it has been shown that individuals change over from smokeless forms of tobacco to smoking over a period of time (Haddock *et al.,* 2001). Only 7% of the present sample were current smokers. However slightly higher current smoking rates have been reported for this age group from other South Asian countries (10%) (Kumar *et al.,*2014; Sreeramareddy *et al.,* 2008). It is alarming that the current rates of smoking in both male and female students were almost double the current smoking rates reported for male and female students of a similar age from Colombo district of Sri Lanka (Katulanda *et al.,* 2015). The prevalence of current smokeless tobacco use was higher in this sample than in other studies, 11% vs. 2-9% (Kumar *et al.,* 2014; Narain *et al.,* 2011; Sharma *et al.,* 2010; Sreeramareddy *et al.,* 2008). The variations in the reported prevalence rates between studies may be due to the age differences in the study samples as some included students from both mid- and late adolescence. The prevalence of current smoking in the present sample was higher than the 1.5% prevalence of current cigarette smoking reported in the GYTS of 2011 for Sri Lanka (WHO, 2011). As tobacco use is more common in late adolescence than early or mid adolescence (Pradhan *et al.,* 2012; Sharma *et al.,* 2010) this finding is to be expected. Use of both smoked and smokeless tobacco was more common among males than in females and is in agreement with the findings of other South Asian studies (Sreeramareddy *et al.,* 2008). However, a study conducted among 13-17 year old students from Kerala, South India found that none of the female students used any form of tobacco (Muttapppallymyalil *et al.,* 2010).

Patterns of tobacco use vary from population to population. With the exception of one student who had smoked bidi, all others in the present study have smoked cigarettes. On the other hand it has been reported that adolescent students in Sri Lanka and other South Asian countries smoke cigars, beedi and hukka in addition to cigarettes (Katulanda *et al.,* 2015; Pradhan *et al.,* 2012; Sharma *et al.,* 2010). All smokeless tobacco users in the present study had used it in the betel quid; a mixture of areca, slaked lime and tobacco wrapped in betel leaf and in fact it is the most common form of smokeless tobacco use in Sri Lanka (Somatunga *et al.,* 2012). In contrast adolescents from South Asian countries mainly use commercially available smokeless tobacco products (Narain *et al.,* 2011; Pradhan *et al.,* 2012). A majority of ever smokers of the present study had first smoked at the age of 16 years or older and consistent with the findings of a previous study from Sri Lanka (Katulanda *et al.,* 2015). However, many reports have shown that adolescents from South Asian countries start the tobacco habit at a relatively younger age; 12-13 years (Kumar *et al.,* 2014; Narain *et al.,* 2011). According to the present study, tobacco chewing is most commonly practiced at home. In Sri Lanka, tobacco is a common constituent in the betel quid and if a betel quid chewer is at home it may be readily available and within easy reach for most students. A majority of students have smoked at social events whereas Nepalese students mostly smoke in restaurants (Sreeramareddy *et al.,* 2008). It was evident that the current smokers used various commercial and social sources to obtain their cigarettes and the main source was a friend or relative. The sale of tobacco products to individuals under the age of 21 years is prohibited in Sri Lanka but some current smokers have stated that they buy their own cigarettes. This indicates flaws in the tobacco control regulations in Sri Lanka. However, according to Jones *et al*. (2002) the effectiveness of laws imposing restrictions on the sale of tobacco to minors could be undermined by social sources of cigarettes. In fact 74% of the current smokers in the present study obtained cigarettes from social sources. Similar findings have been reported elsewhere (Jones *et al*., 2002)

According to the multivariate logistic regression model gender was independently associated with current smoking. Female students were less likely to be current smokers than male students, a finding consistent with other studies from South Asia (Binu *et al.,* 2010). This could be due to South Asian countries including Sri Lanka, considering smoking a predominantly male behavior socio-culturally unacceptable for females. In addition presence of a smoker at home; a parent, sibling or extended family member was also associated with current smoking. As found in other studies the presence of a smoker in the household may act as a trigger for smoking initiation and sustenance in adolescents (Katulanda *et al.,* 2015; Sharma *et al..,* 2010). In fact an intergenerational effect of parental smoking on adolescents smoking behavior has been observed (Gohlmann *et al.,* 2010). Joffer *et al*. found that having negative attitudes to smoking was a predictor of not smoking in adolescents. Although there was a significant positive association between low attitude scores and current smoking in the univariate analysis, it lost its significance in the multivariate analysis suggesting confounding effects of other variables on the association between these two variables. With regards to smokeless tobacco use, females were less likely to be current users than males. However according to Subba *et al.* (2011) gender is not associated with smokeless tobacco use. Also maternal education and paternal occupation were inversely associated with current smokeless tobacco use. Education and occupation status are indicators of socio-economic status and the findings therefore suggest that smokeless tobacco use is commonly associated with lower socio-economic classes.

There are a few limitations to the present study. Due to time constraints the study had to be confined to a relatively small geographical area thus limiting the generalization of the findings to the wider population. Also as tobacco use is considered an undesirable behavior, there is a possibility that the respondents may have selectively under-reported its use. It is noteworthy that the present study is one of the few studies that assessed factors associated with both smoked and smokeless tobacco in the sample. As the patterns of use and the predictors of smoked and smokeless use differ it highlights the need to consider the two entities separately in future research.

In conclusion the prevalence of tobacco use particularly smokeless tobacco was relatively high in these rural students. Also current smoking rate was higher than previously reported data. Therefore it is important that tobacco control programs consider both smoked and smokeless forms of tobacco. Regulations should extend to encompass smokeless tobacco products as well while measures should be taken to overcome barriers posed by the strong cultural acceptance of smokeless tobacco use, particularly in the form of betel quid.

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