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Original Article

Factors associated with smoking among adult males in Sri Lanka - a cross sectional analytical study

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Abstract

Background and Objectives

Studies in developing and developed countries have assessed only a limited number of factors for their association with smoking. However, the literature indicates that factors are better assessed using a comprehensive model (PRECEDE) to identify predisposing, reinforcing and enabling factors which initiate and maintain the smoking behaviour. This study aimed to determine the factors associated with smoking based on the PRECEDE model

Methods

The two groups of ever smoker (n=624) and never smoker (n=530) males aged 20-59 years were identified in a community based household survey in the Colombo District of Sri Lanka. Post hoc sample size estimation indicated a power of 82% for the smallest factor which showed a significant association. The information on predisposing, reinforcing and enabling factors associated with smoking was gathered using an interviewer-administered questionnaire designed using on the PRECEDE model.

Results

Age more than 40 years ($p<0.01$), a low educational level ($p<0.001$), being married ($p=0.002$) or unemployed ($p<0.01$) and unfavourable attitudes that promote smoking ($p=<0.001$) were found to be significant predisposing factors associated with smoking. Paternal smoking ($p<0.001$), having a family member who smokes ($p=0.004$), having a close friend who smokes regularly ($p<0.001$), being offered tobacco products ($p<0.001$) and getting frequent invitations to parties where friends smoke ($p<0.001$) were factors that reinforced the smoking habit of adult males when they were younger.

Enabling factors assessed among ever smokers indicated that a majority (92%) who started smoking at a younger age had bought the tobacco products themselves and 13.4% have bought the tobacco products as packets while 91.4% have bought them as single/multiple sticks. Most of the ever smokers (93.7%) stated that there was a place to buy tobacco products near their house/ school/ work place.

Conclusions

Factors that were found to be associated with smoking among adult males in Sri Lanka were mostly modifiable. The study recommends comprehensive intervention programs to prevent smoking, targeting adult males and addressing the modifiable factors.

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Introduction

One of the leading causes of death, globally, is non-communicable disease (NCD). Tobacco usage, an unhealthy diet, insufficient physical activity and the harmful use of alcohol are the major risk factors for NCD [1]. Tobacco smoking is not only associated with ill-health, disability and death from NCD, but also with an increased risk of death from communicable diseases [2]. Manufactured cigarettes represent the major form of smoked tobacco in the world [1]. The World Health Organisation has estimated that tobacco use (smoking and smokeless) is currently responsible for about six million deaths across the world annually and that most of these deaths occur prematurely [2].

Smoking initiation occurs primarily through the dynamic interplay of several factors such as socio-demographic, environmental, personal and behavioural factors [3]. There is evidence that most first smoking occurs before high school graduation i.e. before the age of 21 years. As nicotine is addictive, adolescents who smoke regularly are likely to become adult smokers [3]. Many studies have confirmed that those who initiated smoking during adolescence are more likely to continue smoking and young adults who are smokers have a lesser likelihood of quitting smoking [4,5,6].

Many efforts have been made to produce either a theoretical basis or an integrated framework for examining factors associated with smoking initiation. Petraitis and Flayand (1995) suggested that three distinct types of factors, namely, social, cultural, and personal, underlie existing theories of the initiation of smoking. Social factors include the characteristics, beliefs, attitudes, and behaviours of the persons, such as family and friends, who make up the support systems of an individual. Cultural factors include the practices and norms of the broader social environment, such as the community, neighbourhood, and school [7]. Personal factors associated with initiation of smoking, as revealed by research, are a person's positive or negative beliefs about smoking, imitation of peer or parent's behaviours, self-efficacy, education and marital status [8, 9,10,11].

The PRECEDE model offers another framework for identifying factors associated with initiation and maintenance of the smoking behaviour. It is the most widely used model in research [12,13,14,15,16]. The PRECEDE model suggests that smoking (or any other behaviour), is influenced by predisposing factors (factors that motivate and lead to a behaviour, including knowledge and beliefs), enabling factors (factors that facilitate or are necessary to carry out the behaviour, such as personal skills or environmental resources) and reinforcing factors (rewards or punishments) [14, 17].

The latest estimate of prevalence of tobacco smoking among adult males in Sri Lanka, as assessed by the STEPs survey among a representative sample of 2026 males aged 18 -69 years, was found to be 29.4% (95% CI 26.8-31.9). The mean age of initiation of smoking was recorded as 20.5 years (95% CI 20.0-20.9). This shows the importance of taking measures to prevent initiation as well as promote quitting in Sri Lanka to reduce the burden of smoking among adult males in the country.

In this backdrop, the present study used the PRECEDE model to examine demographic factors, predisposing factors, reinforcing factors and enabling factors associated with smoking among adult males in the District of Colombo, Sri Lanka.

Methods

The study utilised a community based, cross-sectional analytical design. A community based household survey recruited adult males aged 20 to 59 years residing in the Colombo District for at least for six months and identified two groups, ever smokers (n=624) and never smokers (n=530), which were used to explore factors associated with smoking. Based on Centre for Disease Control, Atlanta, United States (CDC) criteria [18], an ever smoker was defined as an adult who had smoked more than 100 cigarettes or tobacco products in their entire lifetime while a never smoker was defined as an adult who never smoked or had smoked fewer than 100 cigarettes or tobacco products in their entire lifetime. Post-hoc determination of the power of the study to determine factors associated with smoking using the identified ever smokers (n=624) and never smokers (n=530) indicated a power of 82% for the smallest factor which showed a significant association with smoking. The details of the methods adopted in sampling and data collection in the community based survey were reported previously [19]).

Information on factors associated with smoking was obtained using a pre-tested structured interviewer administered questionnaire, administered by four trained pre-intern medical officers. The factors to be assessed were conceptualized based on the PRECEDE model[13, 20, 21]. Predisposing, enabling, and reinforcing factors specific to the Sri Lankan context were identified and operationalized in the questionnaire by a panel of experts.

Knowledge on health harms of smoking, health effects of second hand smoking, health advantages of quitting, toxicity of tobacco products and laws related to smoking in the country and attitudes to smoking were the predisposing factors considered. Rewards or punishments, following or anticipated as a consequence of the smoking behavior and the influence of family or friends to initiate smoking when the respondent was young were considered as reinforcing factors.

Accessibility and availability to/of smoking products (cigarettes/ bidi/ cigars) were the enabling factors assessed and were assessed only among ever smokers as they were relevant only to smokers. The reliability of the questionnaire to assess predisposing, reinforcing and enabling factors was assessed by the test –retest method among a subsample of 50 study units and it was found to have good reliability (Cohen's kappa coefficient predisposing-0.89; reinforcing factors 0.81; enabling factors- 0.84).

Ethics approval for the study was granted by the Ethics Review Committee, Faculty of Medicine, University of Colombo, Sri Lanka. Data collection was during the period of February to July 2013.

For data analysis, potential factors were treated as categorical variables and dichotomized by amalgamating different levels into two. The categorization of knowledge on health harms of smoking, health effects of second hand smoking, health advantages of quitting, toxicity of tobacco products and laws related to smoking in the country into "good" and "poor" were based on a score, where for each question, the correctly answer was given a score of one while incorrect and 'do not know' responses were given a score of zero. The maximum possible score was 20 and a score of ≥14 was considered as good knowledge. This predetermined cutoff level was decided by a panel of experts, based on the level of knowledge expected in the target group.

Attitudes of the participants to smoking behavior were assessed using 15 statements and a Likert scale with five responses. These were "strongly agree", "agree", "uncertain", "disagree" and "strongly disagree" and scores ranging from one to four were given in a manner that responses showing favorable attitudes that reject smoking were given higher scores and responses indicating unfavorable attitudes that promote smoking were given a lower score. The response "uncertain" was given a score of zero. The maximum one could score was 60 and those with 45 marks or more were predetermined by a panel of experts as having 'favorable' attitudes that reject smoking while those with less than 45 marks were considered as having 'unfavorable' attitudes that promote smoking.

Data entry was carried out using the Epidata software (version 3.1) and statistical analysis was done employing the evaluation version of the software package SPSS- Statistical Package for Social Sciences (Version 20). Descriptive statistics were used to describe the demographic variables of the sample. Chi square test was applied to test differences of putative associated factors (predisposing and reinforcing) based on smoking status. Statistical significance was defined as $p < 0.05$. Enabling factors were described by counts and percentages among ever smokers only.

Results

Among the socio-demographic characteristics, age more than 40 years ($p<0.01$), educational level equal to or less than GCE Ordinary Level ($p<0.001$), being married ($p=0.002$) and being unemployed ($p<0.01$) were shown to predispose adult males to smoke (Table 1).

Table 1. Comparison of socio-demographic factors predisposing to smoking between ever smokers and never smokers

		Ever smoker (n=624) (%)	Never smoker (n=530) (%)	Significance
Age	Age 40 or less	248 (46.8)	282 (53.2)	$\chi2$ =20.92 df=1 p<0.001
	Age more than 40	376 (60.3)	248 (39.7)	
Highest Educational Level	Having passed*GCE Ordinary level or less	452 (63.2)	26 (36.8)	$\chi2$ =63.28 df=1 p<0. 001
	up to GCE Advanced level or higher	172 (39.2)	267 (60.8)	
Marital status	Ever Married **	508 (56.5)	391 (43.5)	$\chi2$ =9.71 df=1 p=0.002
	Never married	116 (45.5)	139 (54.5)	
Nature of the employment	Employed	546 (55.8)	433 (44.2)	$\chi2$ =7.49 df=1 p=0.006
	Not Employed (Retired/Other)	78 (62.4)	97 (55.4)	

*GCE= General Certificate of Examination ** (Currently married/divorced/separated/ widowed)

Similar proportions of ever smokers and never smokers had a 'good' level of knowledge (p=0.26). Among ever smokers, the proportion with unfavourable attitudes that promote the smoking habit was 12.3% while the corresponding proportion among never smokers was 3.6%. Therefore, having unfavourable attitudes that promote the smoking habit was significantly associated with being an ever smoker (p=0.001). (Table 2).

Table 2. Comparison of factors predisposing to smoking between ever smokers and never smokers

Factors		Smoking status		Significance
		Ever smoker N(%)	Never smoker N(%)	
Knowledge	Good	412(66.6)	334(63.4)	$\chi2$ =1.27 df=1 p=0.26
	Poor	207(33.4)	193(36.6)	
Attitude	Favourable that reject smoking	547(87.7)	511(96.4)	$\chi2$ =28.8 df=1 p=0.001
	Unfavourable that promote smoking	77(12.3)	19(3.6)	

History of paternal smoking (p<0.001), having had a family member smoking in the presence of the respondent when the respondent was young (p= 0.004.), having had a close friend who smoked regularly when the respondent was young (p< 0.001), having had a close friend offering cigarette/ bidi/other tobacco products to the respondent when the respondent was young (p<0.001) and getting frequent invitations to parties where friends smoked when the respondent was young (p< 0.001) were found to be significant factors reinforcing the smoking habit (Table 3).

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Table 3: Comparison of factors reinforcing smoking between ever smokers and never smokers

Factors		Smoking status		Significance
		Ever smoker	Never smoker	
History of paternal smoking when the respondent was young	yes	327 (62.0)	216 (49.0)	χ^2 =16.6 df=1 p<0.001
	no	200 (38.0)	225 (51.0)	
Father smoking in the presence of the respondent when he was young (among those who reported paternal smoking)	Yes	274 (83.5)	172 (80.0)	χ^2 =1.11 df=1 p=0.29
	No	54 (16.5)	43 (20.0)	
Any family member smoking in the presence of the respondent when he was young	Yes	401 (64.3)	297 (56.0)	χ^2 =8.11 df=1 p=0.004
	No	223 (35.7)	233 (44.0)	
Having a close friend who smoked regularly when the respondent was young	Yes	587 (94.1)	418 (78.9)	χ^2 =58.9 df=1 p<0.001
	No	37 (5.9)	112 (21.1)	
Close friend urging to smoke when the respondent was young	Yes	127 (21.7)	107 (25.5)	χ^2 =2.04 df=1 p=0.15
	No	459 (78.3)	312 (74.5)	
Close friend offering cigarette/ bidi/other tobacco products to the respondent when the respondent was young	Yes	366 (62.5)	164 (39.1)	χ^2 =52.3 df=1 p<0.001
	No	220 (37.5)	255 (60.9)	
Frequent invitations to parties where friends smoked when the respondent was young	Yes	583 (93.4)	447 (84.3)	χ^2 =24.7 df=1 p<0.001
	No	41(6.6)	83 (15.7)	

While 549(92%) of the ever smokers who started smoking between 20 to 30 years of age bought the tobacco products by themselves, approximately one third, (n=236, 33.9%) had received tobacco products from their friends, 9(1.5%) had received them from a family member and 10 (1.7%) had asked someone to buy the tobacco products for them. Seventy-nine (13.4%) had bought the tobacco products as packets and 540 (91.4%) had bought them as single or multiple sticks. Twelve (2%) had received the cigarettes free of charge. Most of the ever smokers (554, 93.7%) reported that there was a place to buy tobacco products near their house/ school/ work place and a majority, (513, 86.8%) stated that they could reach a shop where tobacco products were available within 10 minutes (Table 4).

Table 4: Distribution of ever smokers by factors enabling smoking

		Ever smoker (n=591) N (%)
Bought tobacco products for own consumption when the respondent was young	Yes	549(92)
	No	42(7.1)
Got tobacco products from friend/s when the respondent was young	Yes	236(33.9)
	No	355 (60.1)
Got the tobacco products from a family member when the respondent was young	Yes	9(1.5)
	No	582(98.5)
Got the tobacco products from someone requested by the respondent when he was young	Yes	10(1.7)
	No	581(98.3)
Having bought tobacco products in whole packs when the respondent was young	Yes	79(13.4)
	No	512(86.6)
Having bought tobacco products in individual sticks when the respondent was young	Yes	540(91.4)
	No	51(8.6)
Received free of charge when the respondent was young	Yes	12(2.0)
	No	579(98.0)
Presence of a shop which sold tobacco products near/school/ work station when the respondent was young	Yes	554(93.7)
	No	30(5.1)
	Can't remember	7(1.2)
Tobacco products available within 10 minutes' reach when the respondent was young	Yes	513(86.8)
	No	78(13.2)

Discussion

A cross-sectional, analytical study design was used to identify the factors associated with smoking among adult males aged 20-59 years, as it is the most feasible design. [22]. The most acceptable classification of smoking categories, the Centre for Disease Control, Atlanta, United States (CDC) criteria, were used to identify ever smokers and never smokers, ensuring the validity of the results. Adult males in the age group 20 to 59 years of age were selected as evidence shows that this population has a higher vulnerability to initiate and maintain the smoking habit.

The study utilized the 4th phase of the PRECEDE model to categorise factors associated with smoking as predisposing factors reinforcing factors and enabling factors. This model has been used in many previous studies on factors associated with smoking [13, 16]. Use of the PRECEDE model has allowed the comprehensive determination of factors associated with smoking.

Predisposing factors associated with smoking

A literature search of studies in similar age groups revealed conflicting findings in relation to age as a factor associated with smoking. Friis et al. (2006), in their study in Cambodia, identified smokers to be older people while Peixoto et al. (2005) in Brazil identified that a higher percentage of smokers were younger than 40 years of age. Similar to the present study, many studies have found that a higher percentage of smokers have a low educational background [8, 23, 24, 25,26]. It is likely that people with better education are able to understand health information and translate that into action.

The present study revealed that the majority of both ever and never smokers had a good knowledge on smoking, and that a lack of knowledge was not a predisposing factor for initiation and maintenence of smoking among the study population (p=0.26). While some previous studies showed similar findings [13], others revealed that knowledge of the health hazards of smoking was a protective factor [27]. Possessing unfavorable attitudes that promote smoking was found to be a significant predisposing factor (p= <0.001) and this finding is consistent with other studies [13, 28, 29]. Thus, it is important to inculcate favourable attitudes that promote rejection of smoking.

Reinforcing factors associated with smoking

The reinforcing factors that were assessed comprised the different influences of family and friends on the respondent when he was young. Paternal smoking, during childhood (p<0.001) was one of the factors associated with smoking in the present study. An association between the smoking behaviour of fathers and initiation of smoking has been confirmed by several studies [13, 27, 30, 31, 32]. Like many Asian countries, there is a closely bound family structure in Sri Lanka. Most children follow their parent's habits. Especially, sons follow their father's habits and daughters follow their mother's habits [31]. As the father takes a leading role in the family, sons try to imitate them. This could be the reason for the association of fathers' smoking habits with initiation of smoking, in the present study. Having close friends who smoke regularly (p<0.001) or having a close

friend offering cigarette/ bidi/other tobacco products to the respondent when they were young ($p<0.001$) were found to be reinforcing factors associated with smoking in the present study. A study done in Taiwan also identified that peer pressure was important in imitating and maintaining smoking status of children [33]. There is much evidence that children, especially boys, prefer to gather and communicate in the groups and this may lead to the adoption of many unhealthy habits.

Enabling factors associated with smoking

Availability and accessibility to cigarettes/ bidi/ cigars were considered as the factors enabling smoking and these factors were assessed only among ever smokers. According to the present study, 92% of the ever smokers who started smoking between 20 to 30 years of age bought the tobacco products themselves. Some received tobacco products from their friends and a few received them from one of their family members. A similar picture can be seen in other studies. Martni and Sulistyowati (2005) describe that 30% of students reported that it was easy to get cigarettes whenever they wanted them and 45% of students said they could get cigarettes anytime and anywhere they wanted. The main source of cigarettes in the home were from other family members.

The participants of the present study were between 20 -59 years of age. Since the study was conducted in 2013, a majority of them would have been more than 20 years of age when the NATA act was enacted. Therefore, they had no restrictions on purchasing cigarettes at the age of initiation. It appears that tobacco products were freely available to the study population as 13.4% have bought the tobacco products as packets and 91.4% have bought as single or multiple sticks. A further 12% had received the cigarettes free of charge. According to Zaw (2008), a majority of smokers bought cigarettes as single sticks from groceries as they were more convenient to purchase and a majority of the smokers smoked 1-4 cigarettes per day. Martni and Sulistyowati (2005) described schools as an important source of cigarettes, mainly through friends who smoke and/or who offer cigarettes.

One of the limitations of the present study was that assessment of reinforcing factors for smoking involved inquiring into the past influence of family and friends with the possibility of recall bias.

Conclusion and Recommendation

Factors that were found to be associated with smoking in adult males in Sri Lanka were mostly modifiable. A low educational level, unemployment and unfavourable attitudes that promote smoking were the principal modifiable predisposing factors for being an ever smoker. The modifiable reinforcing factors identified were having a father and/or relative who smoked, having friends who smoked and having frequent invitations to parties where smoking took place during the participant's youth. Easy accessibility to tobacco products was identified as an enabling factor that can be easily modified to prevent smoking among adult males of Sri Lanka. The study recommends that a

comprehensive intervention programme targeting adult males, addressing the factors that have been identified to predispose, reinforce and enable smoking behaviour be introduced to reduce the incidence and prevalence of smoking in this vulnerable group.

Abbreviations

PRECEDE- Predisposing, Reinforcing and Enabling Constructs in Educational Diagnosis and Evaluation, NCD- Non- Communicable Diseases, WHO-World Health Organisation, CDC- Centre for Disease Control, NATA- National Authority of Tobacco Alcohol

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Authors' contributions

PUC analysed the data and wrote the paper. PUC, NSG and AdS enrolled participants and collected data. PUC and NSG were responsible for designing the study and performing data analyses. All the authors contributed to the interpretation of data and critical revision and approval of the article. All authors read and approved the final manuscript.

Ethics approval and consent to participate

The study was approved by the Ethics Committee of Faculty of Medicine, University of Colombo, Sri Lanka (EC/12/197). All steps of the study were performed in accordance with ethical standards. Written consent was obtained from all participants after they had been informed of the objectives, benefits, and confidentiality regarding their personal information.

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