ORIGINAL ARTICLE

Prevalence of Smoking and Its Associated Risk Factors Among Secondary School Students in Kelantan, Malaysia

Lim Hui Li[1], Heng Pei Pei[2], Teh Chien Huey[2], Kee Chee Cheong[2], Sumarni Mohd Ghazali[2], Lim Kuang Hock[2], Lim Jia Hui[3]

[1] Hospital Sultan Haji Ahmad Shah, Jalan Maran, 28000, Temerloh, Pahang Darul-Makmur
[2] Institute for Medical Research, Jalan Pahang, 50588, Kuala Lumpur.
[3] Monash University Malaysia,Jalan Lagoon Selatan,47500 Bandar Sunway,Selangor Darul Ehsan,

ABSTRACT

Introduction: Minimizing smoking initiation among adolescents has been identified as a strategy to reduce the prevalence of tobacco induced diseases among Malaysian adults. The aims of this study were to investigate the prevalence and factors associated with smoking among secondary school- going adolescents in the state of Kelantan, Malaysia. **Methods:** A school-based survey was carried out in Kelantan to determine the prevalence and associated factors of smoking among Kelantanese adolescents. Two-stage cluster sampling was used to ensure the representativeness of the sample. A self-administered validated questionnaire was utilised to obtain data from the selected respondents. Multiple logistic regression analysis was used to determine the factors associated with smoking behaviour among school-going adolescents. **Results:** The study revealed that 10.1% (95 CI 8.5-11.9%) of the selected respondents were current smokers. The prevalence of male who smoked was significantly higher compared to female. MLR revealed that, males, respondents with at least one smoking parent/guardian, as well as the respondents with less supportive parents/ guardian were more likely to smoke. However, by having a few numbers of close friends and helpful peers in the school had shown no significant association for being the current smokers. **Conclusion:** The study showed that the prevalence of smoking was a bit lower than the national prevalence, and smoking behaviour was predominant among male adolescents in Kelantan state. Comprehensive measures with the involvement of parents/guardians were imperative to tackle smoking habits among adolescents by targeting high-risk groups identified in the study.

Keywords: Secondary school going adolescents, smoking, Global School Health survey-Malaysia (GSHS-M), Kelantan.

Corresponding Author:
Lim Kuang Hock, MSc
Email: limkh@imr.gov.my
Tel: +603-26162666

INTRODUCTION

Studies have revealed that adult smokers learn and initiate smoking during adolescence (1, 2). The association between cigarette smoking and adverse health outcomes is mainly dose-dependent. Meaning if an individual initiated smoking earlier in the life, he/she is more at risk of smoking related diseases (3). In addition, smoking has also been identified as a "soft drug" for future abuse of illicit drugs such as cannabis, as posited by the gateway drug theory that posits that the use of a psychoactive drug can be linked to an increased probability of the use of stronger drugs (4). Furthermore, adolescents who smoke have higher risk of involvement in other risk behaviours such as unprotected sex and truancy (5, 6). Thus, prevention smoking among adolescents is of paramount importance to reduce the prevalence of tobacco induced diseases among Malaysian adults (7).

The Malaysian government has introduced numerous anti-smoking measures to reduce smoking initiation among adolescents: enhancing health promotion activities with focus on adolescents, declaring schools as smoke-free areas (8), raising the price of cigarettes (1) and prohibiting the possession and use of cigarettes among teens below 18 years of age, (8). Periodic surveys at the national level to measure the effectiveness of anti-smoking measures and policies have likewise been implemented (9-10).

Numerous studies on smoking among adolescents have been conducted, and identified intra- and inter-personal factors related to smoking among adolescents. The risk factors for smoking include having family members who smoke (1, 11), having peers who smoke (11-13), poor academic achievement (1), low self-esteem (14), and positive attitude towards smoking practices (11) and perception of higher smoking prevalence among peers (15). Although nationwide and localised studies of smoking among adolescent have been carried out in the past three decades in Malaysia (1, 11-13), no such study has been conducted in Kelantan state. Kelantan

is located on the East Coast of Peninsular Malaysia, whose population is mainly (more than 90%) of Malay ethnicity, compared to states on the West coast which are more ethnically diverse with larger proportions of Chinese (30%) and Indians. Thus, findings from national studies may not be applicable to states such as Kelantan. In addition, differences in economic status between Kelantan and the other states in Malaysia might result in different factors associated with adolescents smoking. In view of the higher prevalence of smoking among adults in Kelantan since the past 20 years (16-18) and as most smokers start smoking in adolescence, it is timely to investigate the smoking behaviour of adolescents in Kelantan. The studies in the past few decades have focused on small population subgroups. For example, Naing et al., (19) Shamsuddin and Harris,(20) Norhayati et al (21), Fadhli et al (22) conducted a study among form four (equivalent to the 10th grade in the United States) secondary schools students in Kota Bharu, Kelantan, and Norbanee et al., (23) among Malay primary school children in Tumpat. Therefore, the results can only be generalised to the respective age groups in the respective localities. This again shows the incomplete information on smoking behaviour among school-going adolescents in Kelantan. In view of the importance of basic data and to obtain an understanding of the factors associated with smoking as essential elements in developing effective measures and smoking prevention programmes, this study was carried out to address the existing gap by describing the prevalence and factors associated with smoking among secondary school-going adolescents in the state of Kelantan, Malaysia.

MATERIALS AND METHODS

Study design

In this cross-sectional study, two-stage cluster sampling was employed to select a representative sample of students from Forms 1 to 5 (students aged 13-17 years, equivalent to grades 7-11 in the US) based on the latest sampling frame provided by the Ministry of Education Malaysia (MOE). The minimum sample size required for the study was 1500 students with an additional 200 to cater for non-response. The first-stage sampling was the selection of schools based on probability sampling proportional to school enrolment size. Based on an average of 100 respondents from each school, a total of 17 schools were selected in the Kelantan Global School Health Survey (GSHS). This was followed by selection of classrooms from each selected school using the systematic random sampling, wherein the first class was randomly selected by random number generated in EpiInfo software, and subsequently, one of every three classrooms was selected thereafter. All students from the selected classroom were invited to participate in this study. Ethical approval for the study was granted by the Medical Research and Ethics Committee, Ministry of Health Malaysia and the ethics committee of the Ministry of Education. The details of the study can be found in GSHS Kelantan report 2012 (24).

Study instrument and measures

The instrument used in the study was adapted from the Global School Health Survey questionnaire, which was forward and backward translated by a panel of experts. The questionnaire was pre-tested and minor modifications made to the original question prior to use in the survey. The questionnaire consisted of 11 modules, namely, social demographic, alcohol use, dietary behaviour, drug use, hygiene, mental health, physical activity, protective factor, sexual behaviours related to HIV infection, other sexually-transmitted infections, and unintended pregnancy, tobacco use, violence and unintentional injury. "Self-administered" approach was used to obtained data from the selected respondents who had permission from their parents/ guardian to participate in the study. Prior to the data collection session, research team members briefed respondents on the items in the questionnaire. During the data collection session, respondents who had difficulty understanding any of the questions were assisted by the research team members. Completed questionnaire were collected and sealed in a envelope in front of the respondents. No teacher or staffs were present at the data collection venue during the data collection session. The dependent variable was smoking status (current smokers/non current smoker). Respondents who never smoked were classified as non-smokers. While those who had ever smoked but did not smoke in the past 180 days or more were categorised as ex-smokers. In the analysis, non-smokers and ex-smokers were merged as a single category of non-smokers. Independent variables were socio-demographic characteristics (gender, age), parents'/s' smoking status (none, at least one smoked), number of close friends (0, 1, 2, 3), peers helpful at school (yes/no), parents know what respondents do during their free time (yes/no).

Statistical analysis

Data were cleaned and weighted on the complex study design and response rate prior to analysis. Descriptive statistics were utilized to describe the socio-demographic characteristics of the respondents, the association between smoking status and independent variables was determined by chi-square analysis. Independent variables associated with smoking status at p value less or equal to 0.25 were included in a multivariable logistic regression (MLR) model to adjust for confounding. SPSS statistical software version 22 with complex samples analysis capabilities were used to carried out all statistical analysis. All possible two-way interaction in the final MLR model revealed no significant two-ways interaction was presented (0.05). All statistical analysis were carried out at alpha=0.05.

Definitions

Current smoker - Smokes at least once puff in the last 30 days.

Non-smoker - Have never smoked
Ex-smokers - Ever smoked, but did not smoke in the past 6 months
Public examination – Lower Certificate Examination which is compulsory for Malaysian secondary school students aged 15 years.

RESULTS

The overall response rate was 91.1% (n= 1515/1663). Male and female respondents were in approximately equal proportions (male 50.3%, female 49.7%). Similarly by age, respondents were equally distributed (13 years (20.0%), 14 years (20.5%), 15 years (20.0%), 16 years (20.0%) and 17 years (19.5%). The study showed that 136 adolescents 10.1% (95% CI 8.5-11.9%) were current smokers (estimated population=14,990). The prevalence of smoking was significantly higher among male (19.4%, 95% CI 16.4-22.8) compared to female (0.7%, 95% CI 0.3-1.6) respondents. Significantly higher prevalence of smoking was found among respondents with at least one guardian/parent who smoked, parents know what the respondents did during the last one month and among those aged 16 and 17 years (Table I).

Almost two thirds of current smokers started smoking before the age of fourteen years old and a quarter of the current smokers were frequent smokers (smoked 20 days or more in a month) (Figure 1 and 2).

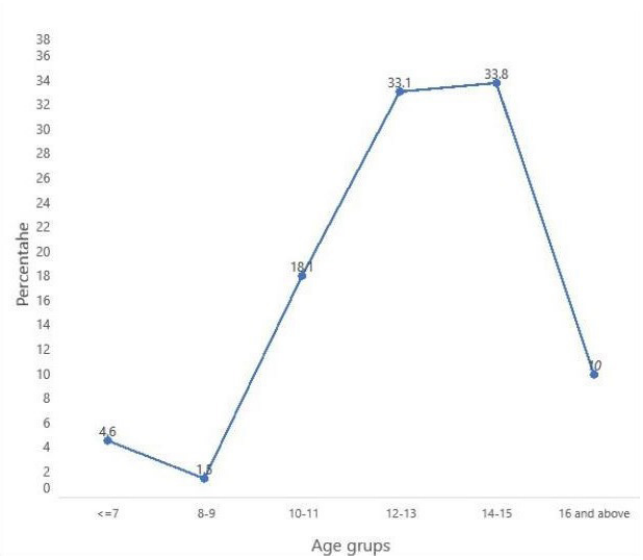

Figure 1: Age of smoking initiation among current smokers

MLR showed that males with (AOR 32.25, 95% CI 13.66-76.15) those with at least one smoking parent/ guardian (AOR 1.74, 95% CI% 1.13-2.70), as well as the respondents with less supportive parents/ guardian (AOR 2.00, 95% CI 1.27-3.16) were more likely to smoke. The odds of being a smoker increased in tandem with age. However, the number of close friend/s and helpful peers in school were not significantly associated with current smoking (Table II).

Table 1: Smoking status by social-demographic status among secondary school going adolescents in Kelantan.

Variable	Current smokers					Non-smoker					p value
	N	n	%	95 CI		N	n	%	95 CI		
				Lower	upper				Lower	upper	
Gender											
Male	14391	129	19.4	16.4	22.8	59671	594	82.6	78.2	83.6	<0.001
Female	516	6	0.7	0.3	1.6	73825	773	99.3	98.4	99.3	
Age (years)											
13	1449	19	4.8	3.2	7.6	27872	332	95.1	92.4	96.8	<0.001
14	3038	22	9.9	6.6	14.7	27533	208	90.1	85.3	93.4	
15	1711	21	5.8	3.8	8.7	27901	336	94.2	91.3	96.2	
16	4265	47	14.4	11.0	18.6	25341	305	85.6	81.4	89.0	
17	4169	25	14.4	9.8	20.6	24783	184	85.6	79.4	90.2	
Parental smoking status											
None	5105	49	7.6	5.7	10.0	62047	631	92.4	90.0	94.3	0.03
At least One	8177	72	11.3	8.9	14.2	64049	656	88.7	85.8	91.1	
Number of close friends											
None	1226	14	13.7	8.1	22.3	7727	77	86.3	77.7	91.9	0.672
One	1220	10	10.5	5.3	19.8	10430	108	89.5	80.2	94.7	
Two	11902	105	9.0	7.9	11.6	11221	1150	90.4	88.4	92.1	
Peers always helpful											
Yes	6425	52	9.7	7.3	12.8	59773	607	90.3	87.2	92.7	0.674
No	8486	83	10.4	8.4	12.9	73025	753	89.6	87.1	91.6	
Parents characteristic											
- Know what I am doing											
Yes	4564	40	7.1	5.1	9.9	59342	601	92.9	90.1	94.9	0.004
No	10293	95	12.3	10.1	15.0	73287	755	87.7	85.0	89.9	

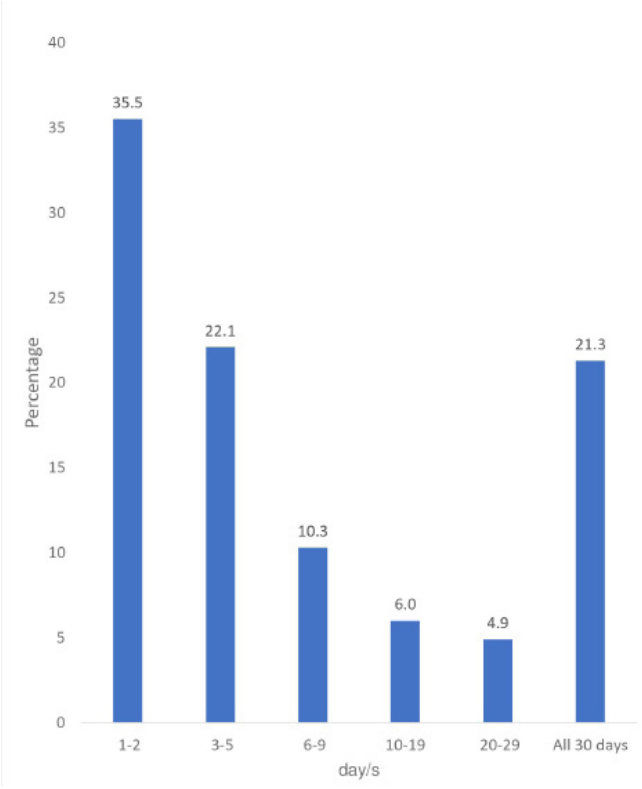

Figure 2: Frequency of smoking during the last one month

Table II: Multivariable Logistic Regression to determine the association between smoking and social-demographic status

	Adjusted Odd Ratio (AOR)	95% CI	
		Lower	Upper
Gender			
Male	33.77	14.31	79.73
Female	Ref		
Age (years)			
13	Ref		
14	2.34	1.12	4.88
15	1.31	0.63	2.70
16	3.54	1.92	6.87
17	3.68	1.78	7.60
Parental smoking status			
None	Ref		
At least One	2.14	1.32	3.47
Parents characteristic			
Know what I am doing			
Yes	1		
No	1.77	1.14	2.72

Nagelkerkerke R square – 0.286

DISCUSSION

This study found that 1 in 10 adolescents were current smokers; the prevalence of 12.9% in Kelantan was 1.4% less than the national rate of 11.5% (13). However, it was higher compared to the prevalence of 5.8% among adolescents in Thailand (25), and slightly lower than 13.6% among adolescents from 68 low and middle countries (LMIC) reported by Xi et al (26). The finding indicates that the prevalence of adolescents smoking in Kelantan was almost similar to the national and LMIC level, therefore more pro-active measures should be planned to reduce smoking among school-going adolescents.

Approximately one fifth (19.2%) of male adolescents were smokers almost twenty times the rate among female adolescents. This finding is consistent with previous findings from local and national studies (11-13), which revealed significantly higher prevalence of smoking among male compared to female adolescents. The reason may be because smoking among females is considered unacceptable in Kelantanese society (19). Malay customs are still widely adhered to and community values take precedence over personal values. Societal norms are much respected by individuals in the community. Another possible explanation is the high prevalence of smoking among adult males in Kelantan. Male adults serve as role models for male adolescents. According to social learning theory, the learning process is more effective among the same gender (27), therefore, male adolescents have a higher tendency to smoke if they are exposed to a high prevalence of male adults who smoke. Furthermore, in Malaysian culture, female adolescents are given more attention and protection, (1) while male adolescents are given more autonomy in view of their respective roles in the context of family and society which may have an influence on their risk for smoking. But, these hypotheses need to be verified through quantitative or qualitative investigations.

Having a parent or guardian who smokes increased the risk for adolescents to smoke. The finding is in agreement with a longitudinal study by Lim et al. among school-going adolescents in Kota Tinggi, Johor (11) and Peninsular Malaysia (1). The finding in this study might be explained by Bandura's social learning theory, i.e. adolescents may learn to smoke from daily observation of a parent/guardian smoking and frequent exposure would expedite the process of behaviour-copying. The smoking behaviour among parents/guardian may give the youth the impression that smoking is a social norm which is accepted by society. Therefore, this increases adolescents' susceptibility to smoking. Furthermore, parents who smoke are usually less likely to prohibit their children from smoking because they themselves smoke. And even if they do (prohibit smoking), the prohibition will not be as effective as they themselves are smokers (1).

The study showed that smoking prevalence was significantly higher among older (upper secondary school) students, consistent with research findings conducted locally and abroad (13, 28). However, the prevalence of smoking among those in Form three (15 years old) was similar to those in Form 1(3 years old) and lower than Form 2 (14 years), the finding was in contrast to Tee and Gurpreet (13), and Hammond et al (29), all of

whom reported a positive linear relationship between age and prevalence of smoking. We hypothesize that this might be because Form three (15 years old) students have to face a major public examination at the end of the year and most are likely busy preparing for them. Time allocated for studying and attending extra classes either in or after school might reduce their risk for involvement in smoking. Also, Malaysian parents in general are greatly concerned for their children's academic achievement (30), and would give more attention to their children who are taking exams. Previous studies have shown that parent attention is one of the factors that protect against smoking (1). Our study also found lower prevalence of smoking among male respondents in Form 4 compared to previous studies conducted in Kelantan, namely, Naing et al. (19) who reported prevalence of male smoking of 35.9%, 33.2% reported by Harris and Shamsuddin (20), and 34.6% reported by Fadhli et al. (22). This finding is very encouraging, given the drop in more than 50% of the smoking prevalence among 16-year-old males compared to those studies. However, efforts to reduce the prevalence rate of smoking among adolescents should be increased and intensified to reduce the prevalence of smoking among adults and adolescents in the state.

Three quarters of adolescents initiated smoking between the ages of 11 and 16 years old. This finding has been replicated locally and in developed countries (11, 13, 31). This might be because of the cognitive development at this age, which is the stage at which formal operations (Piaget's Cognitive Theory) and personal fables are usually exhibited. Personal fable is when a person/persons believe that they are unique and omnipotent. In addition, they might also feel that people around them are eagerly watching or listening to them. The feeling of the presence of an imaginary audience and sense of invincibility (32), might drive adolescents (i.e., those younger than 18) to engage in risky health behaviors such as smoking. They involve in risk seeking behaviours mainly to attract the attention of their peers. Further studies to elucidate the relationship between adolescents' emotions and psyche and smoking behaviour are strongly recommended.

In GSHS, having a number of friends and peers who are helpful was identified as a protective factor for smoking. However, it was not significantly associated with smoking in the current study. In which having higher number of helpful peers will enable the adolescents to share their problem in order to reduce their stress level and emotional problems thus there will be a decrease in risk to involve in smoking. However, our finding needs to be interpreted cautiously, as this study does not investigate adolescents' peer behaviors, such as smoking status. The outcome of this study was in agreement with the findings of Lim et al in Peninsular Malaysia (1). Adolescent who had parents/guardians who knew what they did during their leisure time showed less likelihood to be a current smoker. The finding in this study suggested that influence of parents/guardians on smoking practices amongst respondents was stronger than the influence from peers. Similar findings were also been reported by Lim et al in a longitudinal study among teenagers in the district of Kota Tinggi (10), and, in a review (33) on parental influence on adolescent smoking behaviour. These reports refute the notion that parental influence is less important than peer influence (34). A plausible reason for this finding is Asian adolescents are relatively submissive to the authoritarian parenting style of their parents/guardian compared to their counterparts in the West.

This study had several limitations. Firstly, it was cross-sectional in design, thus causal relationships cannot be established. Secondly, independent factors such as knowledge, family function, social network of peers, which have been found to be significant factors for smoking in previous studies were not investigated. Thirdly, smoking status was based on self-report without biochemical verification, which might give rise to under-reporting. However, Lim et al (35) showed a high "consistency" of self-reported smoking status with exhaled CO concentration if the confidentially of the information is assured. And the findings of this study can be generalised to the secondary school students in Kelantan, in view of its sample representativeness and high response rate.

CONCLUSION

This study showed that among Kelantanese adolescents, smoking is predominantly prevalent among male adolescents, upper secondary school students, those with at least one parent/guardian who smoked, those whose parents did not know what the adolescents did during their free time. Proactive intervention programs with participation of parents/guardian are urgently needed to reduce the prevalence of adolescents-current smokers in the state of Kelantan.

ACKNOWLEDGEMENTS

We would like to thank the Director-General of Health, Ministry of Health, Malaysia for his permission to publish this paper.

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