Prevalence and factors related to smoking among secondary school students in Kota Tinggi District, Johor, Malaysia

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Abstract. Smoking among adolescent is a public health concern in Malaysia. Multiple studies on smoking prevalence and its related factors have been conducted in Malaysia, however, they were specific to either urban or rural areas alone. Studies in mixed settlement areas (urban, rural, land development area) had not been intensively investigated. This study reports the prevalence, demographic and factors related to smoking amongst form four students in the district of Kota Tinggi, Johor. A cross-sectional study of 16-year old secondary school students in Kota Tinggi district was conducted using two-stage stratified, proportionate sampling in July 2005. The study instrument used was a validated structured questionnaire on smoking and its related factors. Smoking prevalence was found to be 29.7%. More than 50% of male students were smokers. Prevalence was highest in FELDA (Federal Land Development Authority) settlement areas. Smoking was associated with having a brother or friend who smokes and poor academic performance. The study revealed that smoking prevalence was high, especially among male students in land development schemes. This situation will contribute to high smoking-related health problems in the future if proper preventive measures are not taken accordingly.

INTRODUCTION

Smoking is the single most important cause of death globally as reported by the World Health Organisation (WHO, 1995). In Malaysia smoking-related diseases are among the important current public health issues where they were the main cause of mortality with 10,000 deaths reported annually (Malaysian Medical Association, 2002). This is even more urgent because smoking prevention is also an important measure in curbing drug abuses in the population. The national drug agency of Malaysia (Persatuan Mencegah Dadah Malaysia, PEMADAM) reported that 100% of drug addicts are smokers (Pemadam, 2003). This finding is in line with the 'Gateway Drug Theory' which postulates that use of illicit drugs such as cannabis and other narcotics begin with the use of "soft" drugs such as tobacco (Fleming *et al.*, 1989).

Smoking habit is often considered a normal behaviour among male adults in Malaysia. It has been reported that 45% of Malaysian males smoke (Haniza & Suraya, 1996) compared to only 32% and 29% of their counterparts in Singapore and Britain/the United Kingdom respectively (Lopez, 1997). The second National Health and Morbidity Survey (NHMS II) which was conducted in 1996 reported that there were about 4.5 million smokers in Malaysia. Whilst the majority of smokers in Malaysia are adults, most of them start smoking as adolescents. Earlier studies suggested that the earlier a person starts

smoking, the higher the probability of being a smoker in later years (Chen & Millar, 1998).

It has been suggested that the most effective strategy in tobacco control is preventing youths from taking up smoking (Unger *et al.*, 2001). Similarly, in Malaysia with high prevalence of smoking among the adults, preventing youths from taking up the habit early is the most effective strategy for reducing smoking prevalence and therefore reduce smoking-related diseases in the population in the future. The trends in smoking among adolescents have not changed much. Studies conducted in various localities showed that the prevalence of smoking among male youths were between 17-36% (Thambypillai, 1985; Shamsuddin & Haris, 2000; Naing *et al.*, 2004) and 1-5% among females in the same group. (Thambypillai, 1985; Ahmad *et al.*, 1997).

Several factors were frequently associated with smoking among adolescents including socioeconomic factors, peer pressure and mass media exposure. Basic data as well as understanding of the risk factors pertaining to the risk for smoking in a particular locality is essential in order to formulate effective instruments for smoking prevention and education programs. Several studies on smoking prevalence and risk factors have been carried out in Malaysia, however, most are focused on a specific locality either in city or rural areas (Thambypillai, 1985; Shamsuddin & Haris, 2000; Naing *et al.*, 2004). In this study, the district of Kota Tinggi in Johor was selected. It is a district located in the southwestern part of Johor which consists of urban, rural and FELDA (Federal Land Development Authority) land development scheme areas with a total population of 200,000. This study was conducted to determine the prevalence of smoking in a mixed settlement area. The study also reports the demographic and other factors related to smoking among Form Four students in the district. Secondary school students were considered representative of adolescents primarily because schooling is the main activity for 7-18 year olds.

MATERIALS AND METHODS

Study design
A cross-sectional school based survey conducted in the secondary schools in the district of Kota Tinggi, Johor. In order to obtain a representative sample, a two stage proportionate stratified sampling technique was applied, with schools as primary sampling units and with all form four students in the selected school as secondary sampling units. The sample design features levels of stratification. First, each locality constitutes a stratum. The school sample was then selected in each strata independently. The sample of schools was selected systematically, 5 secondary schools from Felda settlement (out of 10 school available in FELDA), 3 from urban area (out of 7 school available in the Urban) and one school from rural area (out of 2 school available in the rural) were selected. The second stage involved simple random sampling of students from each school. A sample size of 360 form four students was calculated based on 7% prevalence rate (reported from the Healthy Lifestyle Campaign Baseline Study among adolescents in the state of Johor in 2002), setting the maximum tolerable error at 3%, design effect of 0.67, assuming intraclass correction coefficient to be 0.5 and the average proportion of students per strata at 0.33 as well as non-response rate of 30%. The total number of students from each school were proportionate to the total number of students in the respective schools. The figures are then pooled into strata by locality resulting in selection of 35 out of 436 students from rural areas, 155 out of 1957 students from the urban areas and 170 out of 2129 form four students from the FELDA settlement areas. Sampling was done from a complete list of all form four students from all selected schools arranged in random order (not according to order of classroom in school).

Students from each school were selected according to random numbers generated using EpiInfo 6 software. Weights were not applied to each strata as proportionate sampling had been performed earlier. The sampling strategy is shown in Fig 1.

Study instrument

The questionnaire used in the study was adapted from a standardized questionnaire developed and validated by Hanjeet *et al.* (2001). The questionnaire was tested in a pilot study; after which minor modifications were made to the original questionnaire. Specimens for biochemical testing were not collected due to logistic limitations, nevertheless the methodology has been widely accepted and other studies have reported high correlation between utilizing a questionnaire only and in combination with specimen analysis for determination of smoking status (Velicer *et al.*, 1992; Kentala *et al.*, 2004).

Field survey was conducted after obtaining approval of the protocol from the Ministry of Education and the Johor State Education Department for conducting the study. The method of questionnaire administration was "self-administered" and conducted at venues determined by the school officials. Before the session started, members of the research team briefed respondents on the importance of giving an honest response, assurance of confidentiality of the information given and obtained written informed consent. Assistance was provided for respondents who requested clarification on any of the questions. The research team which consisted of the principal investigator and staff from the district health office were trained and cautioned not to be too particular in their observation in order to avoid the "Hawthorne effect" i.e. (tendency of research subjects to act atypically as a result of their awareness of being studied). Filled forms were collected and sealed in full view of the students. Sociodemographic factors and risk factors measured in the questionnaire are gender, percentages of peers smoking, sibling and parents smoking. Academic achievement
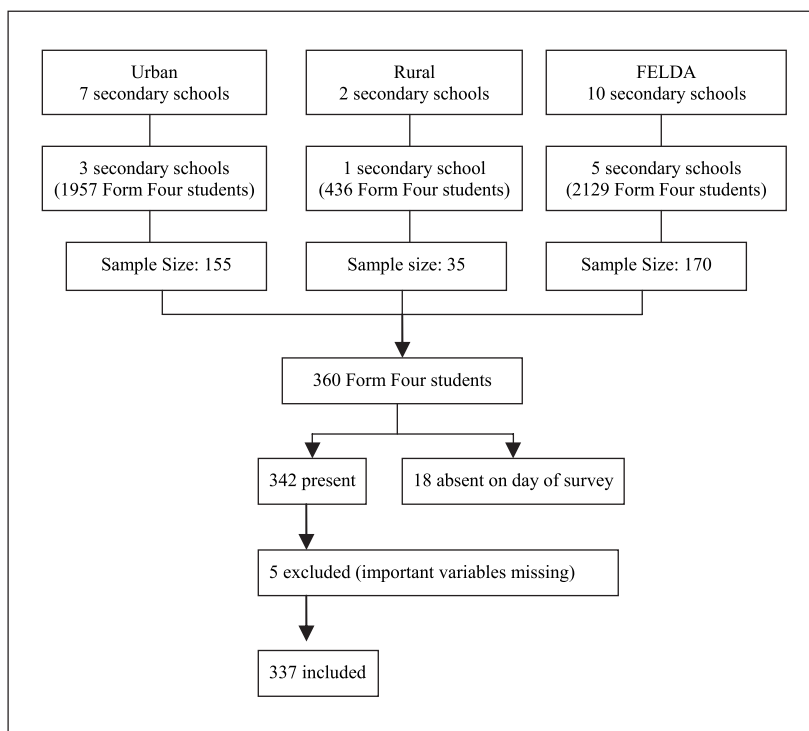

Figure 1. Sampling strategy.

was rated on a five point Likert scale. Involvement in sports and co-curricular activities was determined by hours spend by the respondent in the activities. The one-hour median was the basis for segregation into two groups. Data cleaning was done in 2 stages, first manually, then by running a random check on 30% of the data.

Definitions

A smoker is defined as someone who smokes at least one cigarette stick in the past 7 days. A non-smoker is defined as a person who has never smoked. Ex smokers are defined as those who have not smoked for the past 6 months or more. For the sake of analyses, ex-smoker and non-smoker were combined together.

Statistical analysis

All data were analyzed using SPSS version 11.5. Chi square or Fisher Exact test were performed to determine the associations between individual categorical variables and the outcome (smoking). Independent t-test was used to test the mean-score of academic achievement. Variables that turned out to be significant (p <0.05) were included in the logistics regression model. The stepwise backward likelihood multivariate logistic regression was used to test the association between smoking and the factors. The final model of factors was checked for fitness using Hosmer-Lemeshow goodness of fit test. The p value was not significant indicating the model had fit. The final model was also analysed for all possible two-way interaction, revealing no significant interaction in the final model. All statistical analysis was done at 95% confidence level.

RESULTS

A total of 342 out of 360 students responded with a response rate of 95%. Eighteen students who did not respond were absent from school on the day of the study. Five respondents were excluded because important variables were not filled adequately. Therefore, a total of 337 students with complete questionnaires were included in the analysis. From the 337 respondents, 173 (51.3%) were males and 164 (48.7%) females. Respondents from schools in FELDA settlement areas make up 181 (53.7%) of the total respondents followed by urban 126 (37.4%) and rural 30 (8.9%). Majority of the respondents were Malays 294 (87.2%), followed by Chinese 35 (10.4%), Indians 7 (2.1%) and other 1 (0.3%).

Overall smoking prevalence was 29.7%. Smoking was more prevalent among male students (54.1%) compared to females (4.3%) (p<0.001) (Table 1). Thirty four male respondents (19.8%) were past smokers. Smoking was more prevalent in male students from FELDA settlements 71 (39.2%) compared to their counterparts in rural and urban schools 29 (18.6%) (p<0.001). However, the smoking rates among female students between the three localities were not significantly different.

Age of initiation was as early as 5 years old in male, but majority of them start smoking at between 11-13 years of age. Pattern of smoking among females was different from their counterpart. Among male students, those from land settlement areas start smoking earlier (12.23 years old) compared to those from urban (12.87) and rural areas (12.93). 56.7% of male students in land settlement areas are smokers even before entering secondary school compare to 33.7% for male students from urban school and 36.7% for those from rural school.

Majority of smokers (88.8%) smoked less than five cigarettes per day, the same pattern can be observed across gender and locality. (Fig. 3)

Among those who do more than 1 hour per week of co-curricular activity there were less smokers compared to those who do less (p<0.001). Involvement in sports was not associated with smoking behaviour (Table 1).

Those whose excelled in their studies exhibited less tendency to smoke (Table 2). The majority of smoker picked up smoking with friends (95.7%) and bought
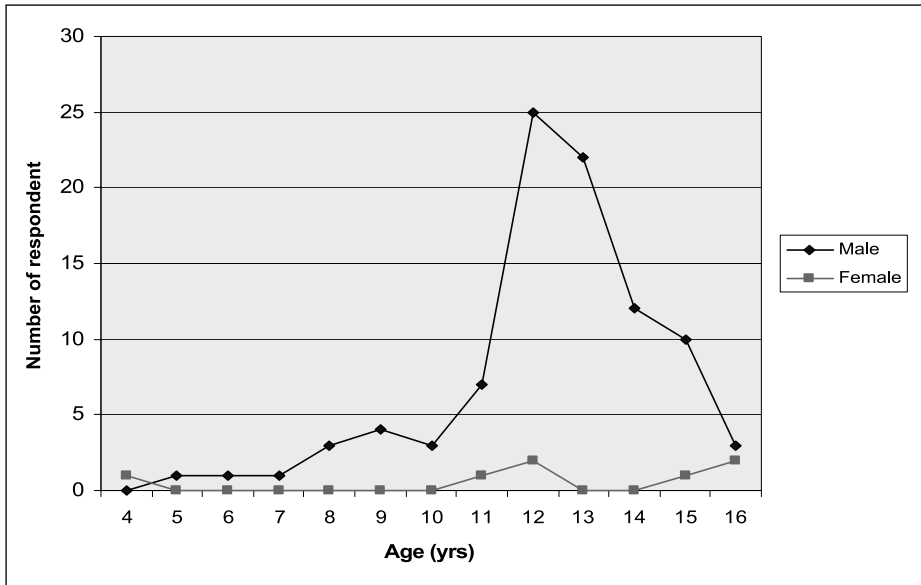
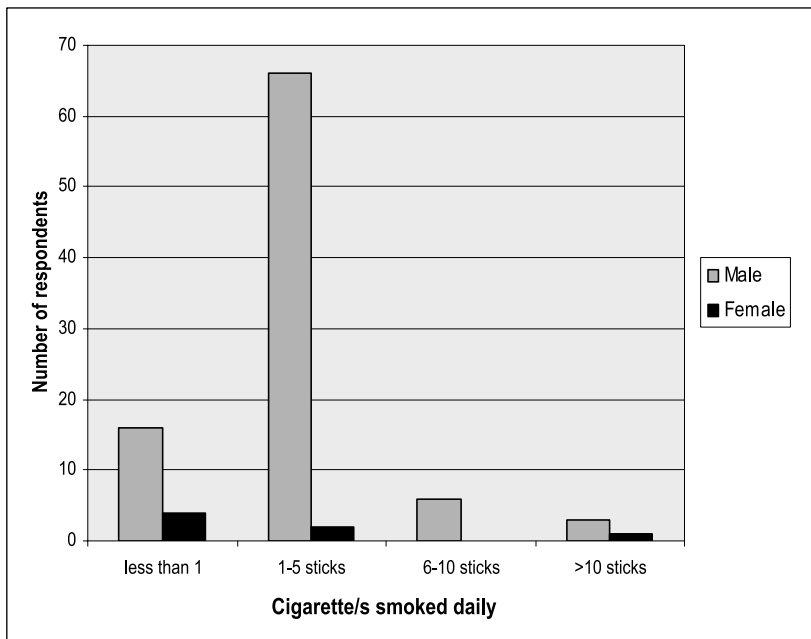Figure 2. Age of smoking initiation by gender among Form Four Students in Kota Tinggi District.

Figure 3. Amount of cigarettes smoked daily by gender among form four students in Kota Tinggi District.

Table 1. Smoking status among respondents

Variable	Smoking Status		p value
	Smoker n(%)	Non Smoker n (%)	
Gender (n-337)			
Male	93 (54.1)	79 (45.9)	p<0.001
Female	7 (4.2)	158 (95.8)	
Locality(n-337)			
Urban	15 (11.9)	111 (88.1)	p<0.001
Land Settlement Area	71 (39.2)	110 (60.8)	
Rural	14 (46.7)	16 (53.3)	
Father smoking (n-290)			
Yes	75 (33.5)	144 (65.5)	p<0.001
No	10 (14.1)	61 (85.9)	
Elder brothers smoking (n-239)			
Yes	65 (40.4)	96 (59.6)	p<0.001
No	10 (12.8)	68 (87.2)	
Mother smoking (n-337)			
Yes	2 (25)	6 (75)	p>0.05**
No	98 (29.8)	231 (70.2)	
Elder sister smoking (n-333)			
Yes	2 (50)	2 (50)	p>0.05**
No	96 (29.4)	233 (70.6)	
Younger brothers/sisters smoking (n-337)			
Yes	5 (36.7)	9 (64.3)	p>0.05**
No	95 (29.4)	228 (70.6)	
Percentage of best friends smoking (n-336)			
0-40%	12 (7.8)	141 (92.2)	
>40%	88 (48.1)	95 (51.9)	p<0.001
Curicular activities(n-332)			
< 1 hour per week	53 (38.7)	84 (61.3)	p<0.001
>1 hours per week	45 (23.1)	150 (76.9)	
Sports activies(n-331)			
<1 hour per week	59 (29.9)	138 (70.1)	p>0.05
>1 hours per week	38 (28.4)	96 (71.6)	

Non Smoker consists of non smoker and ex-smoker
Chi-square tests were used in statistical analysis
***Analysis by Fisher's exact test*

Table 2. Score for Academic Achievement

Variable	Smoking Status		t value	p value
	Smoker	Non Smoker		
Academic achievement	2.30	2.79	5.095	p<0.001

Table 3. Source of cigarettes and individual accompany during smoking initiation

Source of Cigarettes (n-96)	
Bought themselves	80 (83.3)
Friends	12 (12.5)
Family members	4 (4.2)
Person besides you when initiated smoking (n-94)	
Friends	90 (95.7)
Relatives	3 (3.2)
Father	1 (1.1)

the cigarettes themselves (83.3%), while 12 (12.5%) got them from friends (Table 3).

Variables such as gender, percentages of peers smoking, sibling and parents smoking, academic achievement, involvement in co-curricular and locality area were evaluated to determine the factor/s that may be associated with smoking (Table 4). Having many close friends who smoke, sibling who smokes and low academic achievement were positively associated with smoking.

DISCUSSION

Among adults in the United States who have ever smoked daily, 82 percent tried their first cigarette before age 18 years, and 53 percent became daily smokers before age 18 years (HHS, 1994). In this study more than half (54%) of male students are regular smokers at the age of

Table 4. Factors related to smoking among respondents

	Odd ratio (95% C.I)	Adjusted Odd Ratio[a] (95% C.I)
Gender		
Male	26.57 (11.77-59.98)	20.85 (6.32-68.75)[a]
Female	Reference	Reference
Locality		
Land Settlement	2.83 (1.71 – 4.66)	1.51 (0.50-4.57)[a]
Other localities	reference	
Father smoking		
Yes	3.18 (1.54-6.56)	1.49 (0.44-5.10)[a]
No	Reference	Reference
Elder brother smoking		
Yes	4.60 (2.21-9.60)	4.25 (1.54-11.72)[a]
No	Reference	Reference
Percentage of friends smoking		
0-40%	Reference	Reference
>41%	10.88 (5.64-20.99)	8.63 (2.84-26.21)[a]
Academic achievement[b]	0.54 (0.40-0.73)	0.35 (0.18-0.66)[b]
Curicular activities		
Less or 1 hours per week	2.12 (1.32-3.42)	1.49 (0.60-3.56)[a]
More than 1 hour per week	Reference	Reference

Hosmer-Lemeshow goodness of fit test $\chi^2 = 13.43$ p = 0.098
[a] Adjusted for other variables in the table
[b] For each unit increase in Likert scale

16 and even higher in land development schemes. This rate is far higher compared to the prevalence among the same group in 1996 (Abdullah, 1996) i.e. 30.7% and also higher than found in a few other local studies. Naing *et al.* (2004) in his study in Kota Bharu in 2001 reported prevalence of smoking among male students at 35.9%. Thambypillai (1985) in Kuala Lumpur reported only 17% prevalence of smoking among secondary school students. Studies in China (Li *et al.*, 1999) and Japan (Osaki & Minowa, 1996) also reported lower rates i.e. 15% and 23.3% respectively. Among female students however, the low prevalence (4.5%) is consistent with previous studies (Thambypillai, 1985; Ahmad *et al.*, 1997). This situation might be due to the persistence of local customs in which smoking is not an acceptable behaviour in women.

Having family members or friends who smoke increases the risk for smoking. The Social Learning Theory states that learning is through observation (Bandura, 1977). Constant exposure to family members who smoke will expedite the process of behaviour-copying and this learning will influence individuals of the same sex. This is illustrated in the finding that the majority of male smokers have a male sibling who smokes. However, the influence of a father who smokes which was found significant in univariate analysis was insignificant after taking into account other variables. This is in agreement with the findings of the cohort studies by Rajan *et al.* (2003) and Woodruff *et al.* (2004) but in contrast with another study by Shamsuddin & Haris (2000) in Kota Bharu. Differences in community composition, local customs and family bonds may be the explanation, which requires further study.

Having a friend who smokes may influence an adolescent to smoke due to peer pressure and also encouragements, in order to be accepted in a clique. Ninety percent of smokers initiated smoking with friends. This demonstrates the importance of this factor in smoking initiation. Unger *et al.* (2002) reported similar findings among Chinese and Californian adolescents. In spite of the cultural dissimilarities between the two groups, the same factor affects both. This study points out that the likelihood of being a smoker is higher among academically poor students. A similar finding of association between high smoking prevalence and poor academic performance had been report by Naing *et al.* (2004) and Thambypillai (1985). Although the locality factor is not related to smoking in this study, more than half of male respondents in land settlement areas who become smokers before entering secondary school is worrisome and needs further investigation.

Apart from concern for the health problems related to smoking that these youths might develop in later years, the risk of involvement in drug abuse is equally worrying in view of the Gateway Drug theory. Torabi *et al.* (1993) reported that individuals who consistently smoked a pack of cigarettes a day had higher risk for using illicit drugs (ten to thirty times more likely) compared to nonsmokers. Denson (1973) in a study on illicit drug use among adolescents found that drug users were smokers who progressed to taking drugs. Johnston *et al.* (1987) reported a dramatic relationship between tobacco and drugs in his study among students in which the number of drug users was higher among those who smoke. Fleming *et al.* (1989) reported substance abusers are younger among smokers. The trend of drug use was similar to the pattern of 20 years ago i.e. it starts with tobacco and progresses to drug use.

The Control of Tobacco Products Regulations 2004 prohibits the sale of tobacco products to those below 18 years of age. Offenders upon conviction are liable to a fine not exceeding ten thousand ringgit or a prison term of not more than two years (Malaysian Food Act, 1983), yet 80% of the smokers who are all minors bought their cigarettes from shops. Law enforcement need to be upheld and tightened to prevent smoking among youths and delay their initial age of

smoking and hopefully they would be more mature in any decisions on their chosen behaviour.

The findings of the study suggest that a holistic approach involving various stakeholders are imperative in order to tackle the problem of smoking among youths. The family unit, school, peers and law enforcers should play their roles more actively to prevent smoking amongst youths at the 'micro' level. While at the 'macro' level, legislation must be tightened and the provisions of the "Framework Convention on Tobacco Control" be implemented consistently.

This study is the first reported study conducted in an area of mixed settlement (Urban, Rural, land development area) to our knowledge. The findings are worrisome, as the prevalence of smoking among youths is still high in spite of the best efforts of the government including the "Tak Nak" campaign aimed at reducing smoking among youths.

While this study has its limitations (being cross-sectional in design) and focuses only on the social aspects of the respondent that contributes to smoking without accounting for other factors such as psychological aspects and its interactions (which warrants future investigation), the findings are nonetheless encouraging and the sample size is adequately large and representative.

This study shows that the smoking habit might in future become a major public health and social problem that the public will face, and which will worsen unless effective preventive measures are put in place. Holistic prevention programs which involve the participation of all stakeholders must be mobilized in order to realize the vision of the Ministry of Health of reducing the number of smokers to half of the present figure and ensure that smoking-related diseases are no longer a public health problem by the year 2020.

REFERENCES

Abdullah, S. (1996). National health morbidity survey: Health risk behavior among adolescent. Ministry of Health Malaysia. 133-135.

Ahmad, Z., Jaafar, R. & Musa, R. (1997). Cigarettes smoking among Malaysian youth: problem and prospects. *Proceedings of the Malaysian Society of Health 21st Symposium*, *Kuala Lumpur. 6-7th December 1997.*

Bandura , A. (1977). Social learning theory. New Jersey: Prentice-Hall, Inc.

Chen, J. & Millar, W.J. (1998). Age of smoking initiation: implications for quitting. *Health Rep* **9**: 39–46.

Denson, R. (1973). Cigarette smoking: a child's guide to addiction. *Canadian Journal of Public Health* **64**(2): pp. S1–S4 Supplement.

Fleming, R., Leventhal, H., Glynn, K. & Ershler, J. (1989). The role of cigarettes in the initiation and progression of early substance use. *Addictive Behaviors* **14(3)**: 261–272.

Haniza, M.A. & Suraya, A. (1996). Smoking among adults in Malaysia. NHMS2 Conference. p 118-125.

Hanjeet, K., Wan Rozita, W.M. & Amal, N.M. (2001). Risk factors of smoking among secondary school adolescents in Kuala Lumpur. *International Medical Research Journal* **5(2)**: 59-63.

HHS. (1994). *Preventing Tobacco Use Among Young People: A Report of the Surgeon General.* Atlanta, GA: HHS, PHS, CDC, NCCDPHP, OSH.

Johnston, L., O'Malley, P. & Bachman, J. (1987). In: *National trends in drug use and related factors among American high school students and young*

adults, *1975–1986*, National Institute on Drug Abuse, Washington, DC, pp. 248–255.

Kentala, J., Utriainen, P., Pahkala, K. & Mattila, K. (2004). Verification of adolescent self-reported smoking. *Addictive Behaviors* **29**: 405-411.

Li, X., X, Fang. & B, Stanton. (1999). Cigarette smoking among schoolboys in Beijing, China. *Journal of Adolescence* **22**: 621–625.

Lopez, A. (1997). Tobacco or Health - A global status report. Geneva: *World Health Organization.*

Malaysian Food Act. (1993). The Control of Tobacco Product (Amendment) Regulations, 2004 Government Gazette P.U.(A) 324.

Malaysia Medical Association. (2002). Tobacco and its harmful effect on health and towards a tobacco free generation in Malaysia. http://www. mma.org.my/current_topic/tobacco-mma.htm (Access 30.11.2005)

Naing, N.N., Ahmad, Z., Musa, R., Abdul Hamid, F.R., Ghazali, H. & Abu Bakar, M.H. (2004). Factors related to smoking habits of male adolescents . *Tobacco Induces Diseases* **2(3)**: 133-140.

Osaki, Y. & Moniwa, M. (1996). Cigarette smoking among junior and senior high school students in Japan. *Journal of Adolescent Health* **18(1)**: 59-65.

Pemadam. (2003). Memahami asas penagihan dadah http://202.71.97.105/artikal/index.php?nid=20020423140638 (access 4/3/05).

Rajan, B.K., Leroux, B.G. Jr., Peterson, J.R. A.V., Bricker, J.B., Andersen, M.R., Kealey, K.A. & Sarason, I.G. (2003). Nine-year prospective association between older siblings' smoking and children's daily smoking. *Journal of Adolescent Health* **1**: 25-30.

Shamsuddin, K. & Haris, M.A. (2000). Family influence on current smoking habits among secondary school children in Kota Bharu, Kelantan. *Singapore Medical Journal* **41(4)**: 167-171.

Thambypillai, V. (1985). Smoking among urban Malaysian school children. *Journal of the Malaysian Society of Health* **21(7)**: 818-823.

Torabi, M.R., Bailey, W.J. & Majd-Jabbari, M. (1993). Cigarette smoking as a predictor of alcohol and other drug use by children and adolescents: evidence of the "gateway drug effect". *Journal of School Health* **63(7)**: 302–306.

Unger, J.B., Li, Y., Chen, X. Jiang, X., Azen, S., Qian, G., Tan, T., Jie, G., Sun, P. Liu, C.H. *et al.* (2001*).* Adolescent smoking in Wuhan, China: Baseline data from the Wuhan smoking prevention trial. *American Journal of Preventive Medicine*, **21(3)**: 162-169.

Unger, J.B., Yan, L., Shakib, S., Rohrbach, L.A., Chen, X., Qian, G., C.P Chou, J, Shan., Azen, S., Zheng, H. & Anderson, C. (2002). Peer influences and access to cigarettes as correlates of adolescent smoking: A cross-cultural comparison of Wuhan, China, and California. *Preventive Medicine* **34(4)**: 476-484.

Velicer, W.F., Prochaska, J.O., Rossi, J.S. & Snow, M.G. (1992). Assessing outcome in smoking cessation studies. *Psychological Bulletin* **111**: 23-41.

WHO. (1995). Reported by the Director-General, WHO program on tobacco or health E 13 77/22 Add 1 Geneva.

Woodruff, S.I., Laniado-Laborín, R., Candelaria, J.I., Villaseñor, A. & Sallis, J.F. (2004). Parental prompts as risk factors for adolescent trial smoking: Results of a prospective cohort study**.** *Addictive Behaviors* **9**: 1869-1873.