

RESEARCH COMMUNICATION

Factors Related to Starting and Continuing Smoking among Senior High School Boys in Fukuoka, Japan

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Abstract

The purpose of this study was to identify factors that influence starting and quitting smoking among Japanese male adolescents aged 15-18. Two thousand and twelve senior high school boys in Fukuoka City, Japan, answered unsigned self-administrated anonymous questionnaires in July 2001. Odds ratios (ORs) and their 95 % confidence intervals (CIs) were computed to assess the strength of associations between students' smoking status and alcohol consumption habits. Additionally, the link between a students' smoking status and parental influence (parental smoking) was also assessed. Approximately 90% of the students, both current and ex-smokers, had ever smoked prior to senior high school while 77% of the students (smokers and non-smokers) had the experience of drinking alcohol prior to admission to senior high school. After adjustment for school year (i.e., freshman, sophomore, junior, senior), academic education level, after-school club activities, time of first drinking experience and the frequency of drinking, there was a significant increased risk to become a smoker when one parent is a smoker (OR = 1.67, 95% CI = 1.18-2.37) or when both parents are smokers (OR = 2.94, 95% CI = 1.66-5.18) compared to both parents being non-smokers. The consumption of alcohol prior to entering senior high school was significantly associated with more than 2.5-fold greater risk for the onset of smoking when compared to the risk of becoming a smoker when alcohol consumption started after entering senior high school. An increased frequency of drinking was also associated with starting smoking (OR = 14.00, 95% CI = 8.08-24.26; 2-3 times/week vs. never). Similarly, an increase in drinking frequency resulted in less likelihood of smoking cessation. For instance, the data showed that, the subjects were 1/3 less likely to quit smoking. Paternal smoking had a significant impact on whether or not a child would quit smoking (OR = 0.55, 95% CI = 0.38-0.81) as compared to a child that had paternal and maternal non-smokers. This study suggested that drinking habits started earlier than smoking habits among adolescents. Many students had already experienced drinking before admission to senior high school, while the experience of smoking mostly typically started after admission to high school. These data show the urgency of developing anti-smoking educational programs that could be developed and introduced prior to admission to high school.

Key Words: Smoking - continuing - quitting - senior high school boys - alcohol drinking

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Introduction

Tobacco smoke contains more than 4000 types of chemical compounds, and more than 600 of these include carcinogenic compounds. Thus, in addition to the risk of developing ischemic heart disease due to smoking, the risk of developing many types of cancer is also increased (Health and Welfare Statistic Association, 2006; World Health Organization, 2002). In particular, the association between cigarette smoking and lung cancer is well established. In industrialized countries, tobacco smoking is responsible for 80-90% of lung cancer deaths as well as contributing to deaths due to other types of cancers (World Health Organization, 2002).

Adolescent smoking represents a point of attack in efforts to reduce the toll taken by cigarette smoking on

public health. It has been estimated that about half of adolescents who continue to smoke regularly will die prematurely from diseases attributable to smoking (Peto et al., 1994), contributing to an overall estimate of 440,000 youths currently expected to die from tobacco-related causes each year in the United States (Marshall et al., 2006). As adolescent smoking has increased worldwide (Gilpin et al., 1999), health education programs have focused on prevention. Adolescents usually encounter the practice of smoking among their friends, and then take up the habit themselves (World Health Organization, 2002). In addition, when adolescents buy tobacco for themselves, they are more likely to be established smokers (Leatherdale, 2005). Smoking among adolescents is a serious problem for several reasons. Firstly, the longer the duration of smoking causes the greater the risk of

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developing cancer (World Health Organization, 2002). Also smoking has more harmful effects on the health of adolescents than on the health of adults (Japanese Ministry of Health and Welfare, 2002). It can become more difficult to quit smoking when an adolescent has consumed a higher amount of tobacco. Secondly, once adolescents begin to smoke, they have a greater tendency to become dependent on nicotine due to a higher sensitivity to substances compared to adults. The onset of smoking at an early age has been associated with higher nicotine dependence among adolescents (Breslau et al., 1993; Fernandez et al., 1999; Takakura and Wake, 2003). A Japanese study found that the initiation to smoking before the age of 13 may increase the likelihood of becoming addicted to nicotine and alcohol in the future (Oura et al., 2003). An American study also suggested that persons who smoked their first cigarette at 14 to 16 years of age were 1.6 times more likely to become dependent than those who initiated smoking at an older age (Breslau et al., 1993). Therefore it is more difficult for adolescents than adults to quit smoking due to the nicotine dependence. This may lead, which leads to significant social, occupational, or medical impairment (World Health Organization, 2002). Lastly, tobacco is identified as a “gateway” drug. It has been suggested that, all other things being equal, an adolescent who uses any one drug is more likely to use other illicit and hazardous drugs. As reducing the use of tobacco among adolescents is a public health priority, it is urgent that anti-smoking education programs be developed and introduced at an early age.

In Japan, propaganda regarding the dangers of tobacco smoking, warning signs on tobacco packaging, the introduction of anti-smoking devices, a ban on TV and radio commercials for tobacco-related products, and litigation against the tobacco industries have been introduced (Tokunaga, 2001). By those efforts, the rates of smoking for adult males have tended to decline in Japan. According to the National Health Nutrition Survey in Japan, the prevalence of smoking among adult males has gradually decreased after 1998. The prevalence of adult male smokers decreased from 52.7 % in 1997 (Ministry of Health and Welfare of Japan, 1998) to 43.3 % in 2004 (Ministry of Health, Labour and Welfare of Japan 2006). Similarly, according to the National Survey on Underage Smoking and Drinking, the prevalence of “smoking at least one day during a month” decreased from 32.5 % in 2000 (Ministry of Health, Labour and Welfare, Japan, 2002) to 21.7 % in 2004 (Ministry of Health, Labour and Welfare, Japan, 2005). Despite adolescent awareness of the risks related to tobacco use, the prevalence of smoking among adolescents remains high. In Japan, there are many vending machines which allow tobacco to be readily available to adolescents. Thus, the ability to prevent youths from smoking is of great concern to “Healthy Japan 21” (Japan’s national plan for health), which would refer to “Healthy People” in USA and “Our Healthier Nation” in UK. In 2000, the Ministry of Health and Welfare recently announced a new approach called the “Healthy Japan 21” campaign to promote better health of each citizen who will live in Japan in the 21st century (<http://www.kenkounippon21.gr.jp/>)

www.kenkounippon21/about/kakuron/index.html). “Healthy Japan 21” recognized antismoking measures as an important public health theme in their campaign. This organization aims to eradicate smoking among youth and to reduce the number of current young adult smokers by 50% by the year 2010. To achieve this goal it is important to know the characteristics that contribute to the smoking onset and continuation by individuals.

In view of the current situation in Japan, we attempted to identify the factors related to smoking onset and cessation among senior high school boys in Fukuoka City, southern Japan, with special emphasis on their alcohol consumption habits and their parental influences (i.e., parental smokers or non-smokers).

Subjects and Methods

Subjects

This study used cross-sectional senior high school data from anonymous senior high school boys in Fukuoka City, Japan. In July 2001, the study group was provided unsigned, self-administered, anonymous questionnaires that were presented as part of the health education curriculum. The students were informed that any information obtained by the questionnaire was kept confidential and would be collected by their teachers. Sixty-six students were absent on the day when the questionnaires were distributed, but the remaining 2014 students responded to the questionnaire. Within the stated data set of 2014 students, only two sets of data were not included in the data analysis because two of the students provided contradictory answers. This study was approved by the Ethics Committee of Sapporo Medical University, where one of the authors (M. W.) is an alumnus.

Questionnaire

All students were questioned about their smoking and drinking experiences, their current smoking and drinking status and habits, and their parental smoking status. The details of the questionnaire have been reported elsewhere (Kiyohara and Washio, 2001; Washio et al., 2003).

Statistical Analysis

Students were classified into three categories according to school year, namely freshman year (the first year), sophomore year (the second year), and the third year. They were further classified into four categories according to their academic education level (listed from least advanced to most advanced): main stream education (usual), honours education (special), advanced honours education (super) and unified junior high school and senior high school education (consecutive). They were also divided by their smoking habits: current-smoker, non-smoker (those who had never smoked) and ex-smoker (those who had smoked at some point but had stopped during the past year). The first experience of smoking or drinking included both habitual and non-habitual consuming. Data analyses were done using SAS software, version 9.1.3 (SAS Institute Inc, 2005), to calculate frequencies, differences in proportions with the chi-square test (χ^2), and the Cochran-Armitage test for trends in

Table 1. Selected Characteristics of Senior High School Boys (n=2012)

Characteristics	Number of subjects (%) [*]			Difference
	Current-	Ex-	Non-smoker	
School year				
First year	43 (6.3)	158 (23.1)	483 (70.6)	p<0.001
Second year	81 (11.4)	177 (25.0)	451 (63.6)	
Third year	94 (15.2)	159 (25.7)	366 (59.1)	
Academic education level				
Usual	172 (12.4)	347 (25.1)	865 (62.5)	p<0.001
Special	18 (6.3)	79 (27.5)	190 (66.2)	
Super	10 (7.4)	34 (25.2)	91 (67.4)	
Consecutive	18 (8.7)	34 (16.5)	154 (74.8)	
After-school club activities				
Cultural club	16 (8.5)	44 (23.3)	129 (68.2)	p<0.001
Athletic club	21 (4.6)	130 (28.6)	303 (66.8)	
Nothing	175 (13.1)	312 (23.4)	846 (63.5)	
Both	0 (0.0)	0 (0.0)	2 (100.0)	
Unknown	6 (17.7)	8 (23.5)	20 (58.8)	
Total	218 (10.8)	494 (24.6)	1,300 (64.6)	

^{*}Based on totals across a row

proportions. Logistic regression analysis was used to estimate odds ratios (ORs) for going from current-smokers to ex-smokers and from non-smokers to current-smokers. Potential confounding was assessed by adjusting the regression analyses for school year, academic education level, after-school club activities, frequency of drinking alcohol, the age at which the first alcoholic beverage was consumed, and parental smoking status. All the p values presented are for 2-tailed tests with levels <0.05 defined as significant.

Results

Among 2012 male students, 218 (10.8 %) were classified as current-smokers and 494 (24.6 %) were classified as ex-smokers. The rest of 1300 (64.6 %) were classified as non-smokers. Table 1 indicates the selected characteristics of the subjects. The prevalence of non-smokers increased with advancing academic education level with 74.8% of the students being non-smokers in their academic subgroup. Students who didn't belong to any club activities had the highest percentage of current-smokers (13.1%). The percentage of students who had never smoked decreased with increasing school year (i.e., 70.6% for the first year, 63.6% for the second year and 59.1% for the third year, p for trend<0.01)

Table 2 presents prevalence of students' smoking and drinking, and their parental smoking status. Among 712 students with smoking experience (current-smokers + ex-smokers), over 30% [(67+165)/712] of students with smoking experience had the first experience in the elementary school. Over 50% of students [(114+267)/712] had their first experience with smoking in junior high school. Therefore, 86.1% [(67+165+114+267)/712] of the students who had claimed they had once smoked or still smoked had done so before admission to senior high school. As for the time of their first alcohol drinking experiences, 93.8% [(147+50+356+108)/712] of the students who had claimed they had once smoked or still smoked answered that they had the experience of drinking

Table 2. Prevalence of Students' Smoking and Drinking, and Parental smoking (n=2012)

Characteristic	Number of subjects (%) [†]			Difference
	Current-	Ex-	Non-smoker	
The first experience of smoking				
Never	0 (0.00)	0 (0.00)	1300 (100)	NS
Elementary	67 (28.6)	165 (71.4)	0 (0.0)	
Junior high	114 (29.9)	267 (70.1)	0 (0.0)	
Senior high	32 (34.0)	62 (66.0)	0 (0.0)	
Unknown	5 (100.)	0 (0.0)	0(0.0)	
The first experience of drinking				
Never	6 (1.70)	7 (2.00)	336 (96.3)	p<0.001
Elementary	147 (12.9)	356 (31.2)	637 (55.9)	
Junior high	50 (12.1)	108 (26.1)	256 (61.8)	
Senior high	9 (9.40)	21 (21.9)	66 (68.7)	
Unknown	6 (46.1)	2 (15.4)	5 (38.5)	
Frequency of drinking				
Never	36 (3.40)	216 (20.4)	807 (76.2)	p<0.001
Sometimes [*]	126 (15.7)	240 (30.0)	434 (54.3)	
Often ^{**}	51 (35.7)	38 (26.6)	54 (37.7)	
Unknown	5 (50.0)	0 (0.0)	5 (50.0)	
Parental smoking				
None	76 (7.50)	242 (23.8)	697 (68.7)	p<0.001
Father only	100 (12.8)	180 (23.0)	502 (64.2)	
Mother only	6 (9.0)	25 (37.3)	36 (53.7)	
Both parents	28 (20.6)	44 (32.3)	64 (47.1)	
Unknown	8 (66.7)	3 (25.0)	1 (8.3)	
Total	218 (10.8)	494 (24.6)	1300 (64.6)	

^{*}, ^{**} One or less times, Two or 3 times a week. [†]Based on totals across a row. NS, Not significant (between current smokers and ex-smokers)

alcohol prior to entering high school, while about 68.7% [(637+256)/1300] of non-smokers had the first experiences of drinking in the elementary school. The data also shows that 77.2% of the students (smokers and non-smokers) had the experiences of drinking alcohol before admission to senior high school. As compared to non-smokers (46.3%), current-smokers (61.5%) and ex-smokers (50.4%) were found to have a higher frequency of parental smoking.

Table 3 shows predictors which may contribute to smoking. This table contains data of current smokers' drinking status, time of first drinking experience, and parental smoking status. The risk of becoming a current-smoker increased with increasing frequency of drinking. The adjusted ORs for the onset of smoking associated with occasional and frequent alcohol consumption were 4.29 (95 % CI = 2.80-6.57) and 14.00 (95 % CI = 8.08-24.26), respectively, as compared with never drinking. Similarly, the adjusted ORs for smoking onset associated with paternal smoking and parental smoking (mother and father) were 1.67 (95 % CI = 1.18-2.37) and 2.94 (95 CI = 1.66-5.18), respectively, as compared with both parental non-smoking. The effect that the drinking onset has on the students' smoking onset was shown to be significant. If a student started smoking earlier, the OR of becoming a smoker was statistically significant. The adjusted ORs for smoking onset in relation to drinking onset in junior high school and elementary school were 2.50 (95 % CI =1.30-4.82) and 2.90 (95 % CI = 1.59-5.29), respectively as compared with the drinking onset starting in a senior high school.

Table 4 shows predictors for smoking cessation based

Table 3. Predictors of Current Smoking by Drinking Status and Parental Smoking Status

Parameter	Status	Crude OR(95 % CI)	OR1(95 % CI)	OR2(95 % CI)	OR3(95 % CI)
Frequency of drinking					
	Never	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
	Sometimes*	6.51 (4.41-9.60)	6.22 (4.20-9.21)	6.21 (4.19-9.21)	4.29 (2.80-6.57)
	Often**	21.2 (12.7-35.2)	20.6 (12.3-34.7)	20.9 (12.4-35.1)	14.0(8.08-24.3)
The first time of drinking,					
	Senior high	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
	Junior high	5.23 (2.88-9.52)	5.27 (2.88-9.63)	5.38 (2.94-9.86)	2.50 (1.30-4.82)
	Elementary	6.18 (3.58-10.7)	6.74 (3.88-11.7)	6.81 (3.92-11.8)	2.90 (1.59-5.29)
Parental smoking					
	None	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
	Father only	1.83 (1.33-2.52)	1.83 (1.32-2.53)	1.81 (1.31-2.50)	1.67 (1.18-2.37)
	Mother only	1.53 (0.62-3.75)	1.40 (0.57-3.46)	1.42 (0.58-3.53)	1.12 (0.43-2.97)
	Both parents	4.01 (2.43-6.64)	3.94 (2.35-6.59)	3.83 (2.29-6.42)	2.94 (1.66-5.18)

OR = odds ratio; CI = confidence interval. OR1; OR2; and OR3: Adjusted for school year and academic education level; Adjusted for school year, academic education level, after-school club activities.: Adjusted for school year, academic education level, after-school club activities, frequency of drinking, the first time of drinking and parental smoking. *, ** One or less times, Two or 3 times a week

Table 4. Predictors of Smoking Cessation by Drinking Status and Parental Smoking Status

Parameter	Status	Crude OR(95 % CI)	OR1(95 % CI)	OR2(95 % CI)	OR3(95 % CI)
Frequency of drinking					
	Never	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
	Sometimes*	0.32 (0.21-0.48)	0.32 (0.21-0.48)	0.30 (0.20-0.47)	0.28 (0.18-0.43)
	Drinking often**	0.12 (0.07-0.22)	0.13 (0.07-0.23)	0.13 (0.07-0.22)	0.11 (0.06-0.20)
The first time of drinking,					
	Senior high	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
	Junior high	1.16 (0.57-2.36)	0.97 (0.47-2.00)	0.95 (0.46-1.97)	1.21 (0.55-2.66)
	Elementary	1.30 (0.67-2.50)	1.05 (0.54-2.04)	1.01 (0.52-1.98)	1.51 (0.72-3.15)
The first time of smoking,					
	Senior high	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
	Junior high	1.25 (0.78-2.01)	1.07 (0.65-1.76)	1.07 (0.65-1.77)	1.07 (0.62-1.85)
	Elementary	1.33 (0.80-2.22)	1.14 (0.67-1.93)	1.14 (0.67-1.94)	1.22 (0.68-2.17)
Parental smoking					
	None	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
	Father only	0.56 (0.40-0.80)	0.57 (0.40-0.82)	0.57 (0.40-0.82)	0.55 (0.38-0.81)
	Mother only	1.30 (0.52-3.30)	1.31 (0.51-3.34)	1.32 (0.52-3.38)	0.99 (0.36-2.69)
	Both parents	0.49 (0.28-0.84)	0.52 (0.30-0.89)	0.54 (0.31-0.93)	0.58 (0.32-1.03)

OR = odds ratio; CI = confidence interval. OR1; OR2; and OR3: Adjusted for school year and academic education level; Adjusted for school year, academic education level, after-school club activities.: Adjusted for school year, academic education level, after-school club activities, frequency of drinking, the first time of drinking and parental smoking. *, ** One or less times, Two or 3 times a week

on drinking habits and parental smoking status. Students who had one or both parents who smoked found it more difficult to quit smoking (OR = 0.55, 95 % CI = 0.38-0.81) and (OR = 0.58, 95 % CI = 0.32-1.03), respectively, as compared with both parental non-smoking. Likewise, the frequency of drinking negatively impacted the individual's ability to quit smoking. The adjusted ORs for smoking cessation associated with those that occasionally drank alcohol (1 or less times per week) and those that frequently drank alcohol (2-3 times per week) were 0.28 (95 % CI = 0.18-0.43) and 0.11 (95 % CI = 0.06-0.20), respectively, as compared with never drinking. Meanwhile the ORs for smoking cessation of the first time of smoking and drinking experience didn't reach the statistical significance.

Figure 1a shows the first experience with smoking in relation to smoking status. It was more prevalent in junior high school both for current-smokers and ex-smokers. The first experience of drinking by smoking status is shown in Figure 1b. The first time of alcohol drinking was most common in an elementary school for all subgroups (non-smokers, ex-smokers, and current smokers).

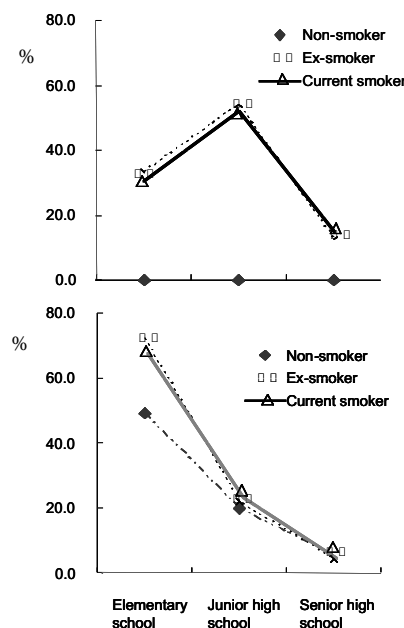


Figure 1. First Experiences by Smoking Status: a) Of Smoking; b) Of Alcohol Drinking

Discussion

In spite of the unsigned self-administered anonymous questionnaires, some of the smokers may have answered falsely due to concern that there was no anonymity since the questionnaires were collected by their teachers. As a result, the prevalence of current smokers among third year boys (15.2%) may have been underestimated in this study. This is because 15.2% is lower than the figure obtained by the National Survey on Underage Smoking and Drinking 2004 in Japan (21.7%) (Ministry of Health, Labour and Welfare, Japan, 2005). The Japanese government has increased the tax on cigarettes beginning in 2006, but the tax was only increased by one Japanese yen per cigarette. Although there is no legal restriction on smoking among people over the age of 20, the rate of smoking for adult males results in a small decline in Japan (Health and Welfare Statistic Association, 2006). Similarly, the prevalence of smoking among adolescents has gradually decreased. The decline in adolescent smoking prevalence in Japan may be caused partly by increased tobacco prices. Meanwhile, the prevalence of female smokers has remained steady at approximately 10%, but it has been increasing among younger women (Ministry of Health, Labour and Welfare of Japan, 2006).

In this study, the prevalence of non-smokers was increased with advancing the level of academic education. Academic education level may be directly proportional to proper education about the harm in smoking (Kiyohara and Washio, 2001). This result emphasises the importance of providing the most adolescents with adequate information on the hazardous effects of smoking. Students who did not belong to any after-school club activity were most frequently found in current-smokers (Table 1). To participate in club activities, which may be considered to have beneficial effects on mind and body, tend to reduce the risk of smoking. Furthermore, it was also suggested that when a student belongs to an athletic club, they are likely to choose a healthier lifestyle because of training for their respective discipline (Hedman et al., 2007).

A student was more likely to start smoking when both of his parents smoked or his father smoked (Table 3). The previous studies also suggested that a student surrounded by parental smoking was more likely to become a smoker (Leatherdale and Manske, 2005; Leatherdale et al., 2006; Milton et al., 2004). Children may feel that they are not completely prohibited from smoking if their fathers are current-smokers. Therefore paternal smoking may give greater influence than maternal smoking to senior high school boys' smoking behavior in this study. In Japan, a father is looked up to as a role model for a boy and so he may tend to imitate his father's behavior. In that case, a father is a teacher by negative example. The effect of maternal smoking on her son's smoking was not statistically significant in this study while other studies have shown that maternal smoking was more influential to smoking onset of her children than paternal smoking (Hedman et al., 2007; Leatherdale et al., 2005). This discrepancy may be due to the fact that our study was performed using only male students while the other studies included both sexes. It has been reported that smoking

behaviour and its predictors differed between different genders (Hedman et al., 2007; Hoving et al., 2007). Furthermore, Ogawa and Tominaga (1985) found that girls were more readily influenced by persons around them than boys. Further research is needed to explore the gender difference of influential factors on the onset of smoking.

Several papers have reported a strong association between smoking and drinking in boys and girls combined samples (Kato et al., 1987; Breslau et al., 1996; Takakura et al., 2000; McClure et al., 2002; Oura et al., 2003; Takakura and Wake, 2003). Two (Kato et al., 1987; Takakura and Wake, 2003) of these six studies with gender-segregated analyses found that there was no gender difference in the association. We found that the onset of drinking at an early age made boy students more susceptible to becoming smokers. This suggests that drinking habits started earlier than the smoking habits. The prevention of the onset of drinking at an early age should be a high priority since it could have a large impact on preventing adolescents from smoking. The risk of being a current-smoker increased in proportion to the frequency of alcohol drinking (Table 4). These suggest that drinking alcohol may play an important role in the temptation to smoke. Under the influence of alcohol drinking, the temptation to smoke may increase.

The predictors of smoking cessation among adolescents have been somewhat less-investigated as compare to correlates of smoking cessation among adults. Gender differences in determinants (smoking and drinking) associated with smoking cessation according to gender were not observed (Osler et al., 1999). We found that it was more difficult for boy students to stop smoking when both of their parents or their fathers smoked (Table 4). Parental smoking have been found to correlate with adolescents' quitting (Chassin et al., 1984; Hansen et al., 1985; Skinner et al., 1985; Stanton et al., 1996; Zhu et al., 1999). Therefore, there appears to be a paternal or parental (mother and father) influence on whether or not one terminates smoking. Higher cigarette consumption was associated with lower cessation rates (Sargent et al., 1998). Smoking cessation rates were lower among those who started smoking at younger ages (Breslau and Peterson, 1996; Burt and Peterson, 1998) because nicotine addiction may play in the maintenance of smoking in adolescents. Although starting to smoke at an earlier age may result in higher cigarette consumption, there was no association between the cessation of smoking and the timing of the onset smoking (Table 4). We found that students who consumed less alcohol were more likely to quit smoking. It has been reported that alcohol consumption was also related to less likelihood of a quit attempt (Stanton et al., 1996; Osler et al., 1999; Paavola et al., 2001). This is partly because smoking cessation is more common among those who have a healthier lifestyle (Rose et al., 1996).

Currently, vending machines are an easy way to obtain tobacco, not only for adults but also for children, even though smoking is banned in Japan for people less than 20 years of age. A new attempt by the Japanese government to control the use of tobacco among youths involves the use of an ID card "taspo" (the acronym for tobacco passport). The cards have been issued at no charge

to adults 20 years of age or over and will be valid for 10 years. The Japanese government expects that the implementation of the taspo card will greatly reduce the number of smoking adolescents because many students are able to buy tobacco readily from vending machines (Yoshimi and Sobue, 2004). Beginning in 2004, a trial run using the taspo card was carried out on Tanegashima Island in Kogashima prefecture by the Japanese government. Beginning in March 2008, cigarette vending machines throughout the country will gradually be replaced with "age verifying" cigarette machines. The taspo system is scheduled to be in operation nationwide by July 2008. On Tanegashima Island, the number of underage people who have caught by police because of smoking was 50, 39, 31, 10, 84 and 38 students in 2002, 2003, 2004, 2005, 2006 and 2007, respectively (Ohashi, 2007). Some underage people bought tobacco using the taspo card that was issued to their parents or other relatives. The goal of the new system is to make it more difficult for children to buy tobacco. Another stated goal is to raise awareness among adults to keep cigarettes away from children. It may take some time for the Japanese government to fully implement the plans to achieve these goals.

There were some limitations in this study. Our data are from a cross sectional survey, which limits attributions about the direction of causality between variables. Our findings were not inconsistent with the finding of other studies, however. We were concerned here only with very limited correlates of adolescents' smoking. There may be other variables, such as parents' opinions and attitudes (parental opposition), home smoking restrictions, and bans on public places, which influence senior high school boys smoking apart from examined variables and these could lead to an artificial relation between examined variables and adolescent smoking. Studies in Europe and the United States have shown that parental opposition to smoking is more important predictor of adolescents' smoking than is parental smoking behavior (Aaro et al. 1981, Eiser et al., 1989; Mermelstein R, the Tobacco Control Network Writing Group 1999). Home smoking restrictions had a much greater effect than bans in public places on smoking among US high school students, however (Wakefield et al., 2000). In Japan, adults' smoking in public places such as restaurants, pachinko parlors, universities, hospitals, department stores and hotels has not completely prohibited yet. As for adolescents, bans on home smoking may result in smoking outside of their house. In addition to parental opposition, home smoking restrictions and bans on public places, socio-environmental, home-environmental, biological, behavioral, and psychosocial factors may affect adolescents' smoking. Further research is required to identify these factors, which can help more effectively smoking prevention/cessation in adolescents. From a public health perspective, both predictors of quit attempts and predictors of successful quitting among attempters are useful targets for intervention.

In conclusion, paternal (fathers) and parental (both mothers and fathers) smoking status had a greater influence on the onset of smoking by adolescents among senior high school boys than maternal smoking alone. The

frequency of alcohol consumption and the age of the onset of alcohol consumption were also associated with the onset of smoking. Similarly, their alcohol consumption habits and the influence of parental smoking were important predictors for the smoking cessation. Since we have found that the major determinant for boy's smoking was having his drinking habits and having parents who smoke, we propose that prevention programs should be directed at students before they experience the consumption of alcohol and who have parents who smoke. At the same time, improvement of the smoke-free environment should be promoted. At least homes should be established as smoke-free places. Smoking is one of the greatest health problems because it will become the biggest single risk factor for cancer and cardiovascular disease. Prevention through health education should put a high priority among all school and community.

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