ORIGINAL CONTRIBUTION**Smoking Habits and Socioeconomic Factors in Japan**

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To observe whether there is a relationship between smoking habits and socioeconomic factors among Japanese people, we analyzed data from a large population survey with a random sampling method throughout the country. Information of smoking habits (never, current, and former smoking), occupation, length of education, and annual household income was obtained from 1,454 participants. Prevalence of smokers and socioeconomic status was inversely associated in Japan as well as in other developed countries. However, the association was not so strong as that in other countries. *J Epidemiol*, 1994; 4: 157-161.

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According to a book recently published¹⁾, in Japan the proportion of current smokers is higher for males but lower for females than in other developed countries, although the proportion for males is decreasing annually. Other data^{2,3)} being also available to know the proportion among Japanese show similar results.

The relationship between smoking habits and socioeconomic factors, such as social class, occupation, income, and education, have been revealed in developed countries⁴⁻¹⁶⁾. The higher the socioeconomic status is, the fewer persons smoke cigarettes. On the other hand, there is few information about the relationship among Japanese people.

We observed the relationship between smoking habits and socioeconomic factors among Japanese using random sample data from all over the country.

MATERIALS AND METHODS

On November 1992, we surveyed how Japanese obtained information about health. Two thousand subjects more than or equal to 18 years of age were selected randomly from whole Japanese people.

The selection methods were as follows. First, all of the municipalities (about 3,200) were stratified into 25 categories; 5 districts (Tohoku and Hokkaido; Kanto; Chubu and Hokuriku; Kinki; and Chugoku, Shikoku

and Kyushu), and 5 population sizes (the 12 large cities; cities with a population size of $\geq 150,000$; cities with a population size of 50,000-149,999; cities with a population size of $< 50,000$; and towns and villages). Subject municipalities were selected randomly from the categories. Second, using census tracts, we chose 200 areas from the municipalities selected at the first stage. The probability whether an area was selected was so dependent on the population size of the category that the numbers of target areas in the 25 categories were in proportion to the population sizes. Finally, 10 persons in each area were selected as the subjects to the survey with using rosters of resident registration at random. We thus selected the 2,000 subjects randomly.

Two hundred well-trained interviewers of Dentsu Research Inc., each of whom took charge of an area, met the subjects and asked to participate in the survey, and 1,460 consequently agreed. The interviewers were trained through simulated interviewing each other using the questionnaire of this survey as well as at least 1 day attendance at a basic training program with a standardized manual provided by the company. Approximately 20 or 30 minutes were spent for each interview.

Information used in the current study was demographic data, smoking habits, occupation, education, and annual household income.

Of the 1460 examined population, 6 participants were

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excluded from the analysis because their information about smoking habits was unknown.

The smoking habits were divided into following three groups; never smoked, former smokers, and current smokers. Occupations were divided into four groups; employers and professionals, managers, workers, and others including housewives and the retired. Although occupations were asked as 11 categories, the numbers of subjects with some occupations were so small that we observed them as the four categories. Education levels were assessed by length: less than or equal to 9 years was equivalent to graduation from elementary and middle schools, 10 through 12 years was graduation from high schools, and more than 12 years was graduation from colleges or higher.

Chi square values, and Mantel-Haenszel summary chi square ones adjusted for potential confounders were used for statistical tests. Mantel-Haenszel odds ratios with test-based 95% confidence intervals were calculated to exclude the effects of potential confounding factors, such as age.

RESULTS

Of the 2,000 study population, 1,460 (73.0%) participated in the study. The proportion of the participants was higher in old age group, but there was no difference between sexes. It was rather low in the 12 large cities (67.9%) and high in the towns and villages (78.2%).

Of 717 male participants, 141 (19.7%) were never

smoked, 172 (24.0%) were former smokers, and 404 (56.3%) were current smokers (Table 1). Of 737 female participants, 609 (82.6%) were never smoked, 40 (5.4%) were former smokers, and 88 (11.9%) were current smokers. The proportion of current smokers for both sexes decreased according to the age. On the other hand, the proportion of never smoked for male decreased according to the age, whereas that for female increased.

Relationships between smoking habits and observed 3 socioeconomic factors are shown in Tables 2, 3, and 4. In terms of occupation, females without a paid work ("others" in Table 2) were less likely to smoke. The 310 female "others" comprised 244 housewives, 28 students, and 38 persons who answered as "having no occupation." Those educated for ≥ 13 years were less likely to be current smokers in both sexes with statistical significance. In the least household income group, there were more current smokers and less never smoked than in other groups, although there was no statistical significance for males.

For female, whether one had a paid work or not seemed important for the smoking habits (Table 2). Therefore, we calculated odds ratios using 2 occupational groups according to the paid work for females. Moreover, potential confounding factors such as age and education level were adjusted. As shown in Table 5, statistically significant high odds ratios for current smokers and low ones for never smoked were observed in those having paid works.

Finally, we explored the relationship between smoking habits and education excluding the effects of age and occupation as confounding factors. As shown in Table 6, none of the odds ratios but one were statistically significant. However, odds ratios for never smoked elevated and those for current smokers lowered according to the length of education for both sexes. Odds ratios of both those

Table 1. The numbers of examined population and smoking status by gender and age, 1992, Japan.

age (year)	never smoked	former smoker	current smoker	total
male				
18-29	37 (31.1)	12 (10.1)	70 (58.8)	119 (100)
30-39	24 (18.9)	26 (20.5)	77 (60.6)	127 (100)
40-49	24 (15.6)	31 (20.1)	99 (64.3)	154 (100)
50-59	39 (24.1)	46 (28.4)	77 (47.5)	162 (100)
60+	17 (11.0)	57 (36.8)	81 (52.3)	155 (100)
total	141 (19.7)	172 (24.0)	404 (56.3)	717 (100)
test*	p<0.01	p<0.01	p<0.05	
female				
18-29	106 (71.6)	12 (8.1)	30 (20.3)	148 (100)
30-39	122 (77.2)	12 (7.6)	24 (15.2)	158 (100)
40-49	152 (85.4)	5 (2.8)	21 (11.8)	178 (100)
50-59	118 (90.8)	5 (3.8)	7 (5.4)	130 (100)
60+	111 (90.2)	6 (4.9)	6 (4.9)	123 (100)
total	609 (82.6)	40 (5.4)	88 (11.9)	737 (100)
test*	p<0.01	n.s.	p<0.01	

percentages in parentheses.

n.s.: not significant.

* chi square test (degree of freedom = 4).

Table 2. Smoking status by occupations, 1992, Japan.

occupations	never smoked	former smoker	current smoker	total
male				
employers and professionals	30 (17.5)	39 (22.8)	102 (59.6)	171 (100)
managers	15 (17.2)	20 (23.0)	52 (59.8)	87 (100)
workers	69 (20.2)	78 (22.9)	194 (56.9)	341 (100)
others	24 (22.0)	32 (29.4)	53 (48.6)	109 (100)
female				
employers and professionals	75 (87.2)	2 (2.3)	9 (10.5)	86 (100)
managers	3 (75.0)	0 (0.0)	1 (25.0)	4 (100)
workers	256 (79.0)	16 (4.9)	52 (16.0)	324 (100)
others †	265 (85.5)	22 (7.1)	23 (7.4)**	310 (100)

percentages in parentheses.

†: including housewife.

** : p<0.01 by Mantel-Haenszel summary chi square adjusted for age.

Table 3. Smoking status by length of education, 1992, Japan.

length of education (year)	never smoked	former smoker	current smoker	total
male				
≤9 ^a	22 (15.1)	43 (29.5)	81 (55.5)	146 (100)
10–12 ^b	54 (18.3)	67 (22.7)	174 (59.0)	295 (100)
13+ ^c	53 (25.4)	53 (25.4)	103 (49.3)**	209 (100)
female				
≤9 ^a	107 (83.6)*	9 (7.0)	12 (9.4)	128 (100)
10–12 ^b	312 (82.5)	19 (5.0)	47 (12.4)	378 (100)
13+ ^c	127 (85.8)**	7 (4.7)	14 (9.5)*	148 (100)

percentages in parentheses.

*: $p < 0.05$ **: 0.01 by Mantel-Haenszel summary chi square adjusted for age.

^a: equivalent to graduation from elementary and middle schools.

^b: equivalent to graduation from high schools.

^c: higher levels than high school graduation.

Table 4. Smoking status by annual household income, 1992, Japan.

annual household income (yen)	never smoked	former smoker	current smoker	total
male				
<5 million	25 (13.9)	51 (28.3)	104 (57.8)	180 (100)
5–6	39 (22.5)	34 (19.7)	100 (57.8)	173 (100)
7–8	30 (22.1)	35 (25.7)	71 (52.2)	136 (100)
9+	41 (22.2)	42 (22.7)	102 (55.1)	185 (100)
female				
<5 million	178 (76.4)**	18 (7.7)	37 (15.9)**	233 (100)
5–6	146 (84.4)	9 (5.2)	18 (10.4)	173 (100)
7–8	100 (85.9)	5 (3.9)	13 (10.2)	128 (100)
9+	177 (84.8)	7 (5.1)	14 (10.1)	138 (100)

percentages in parentheses.

** : $p < 0.01$ by Mantel-Haenszel summary chi square adjusted for age.

Table 5. Smoking status and occupation for females, crude, and age- and education-adjusted odds ratios and their 95% confidence intervals,* 1992, Japan.

occupation	never smoked	former smoker	current smoker
crude			
having**	0.71 (0.48–1.06)*	0.60 (0.32–1.12)	2.20 (1.34–3.60)
not having †	1.00 (reference)	1.00 (reference)	1.00 (reference)
age- and education-adjusted			
having	0.61 (0.38–0.98)	0.69 (0.34–1.39)	2.69 (1.47–4.90)
not having	1.00 (reference)	1.00 (reference)	1.00 (reference)

*: Mantel-Haenszel odds ratios with test-based 95% confidence intervals.

** : employers, professionals, managers, and workers.

† : others including housewives.

Table 6. Smoking status and length of education, age- and occupation-adjusted, odds ratios and their 95% confidence intervals,* 1992, Japan.

length of education (year)	never smoked	former smoker	current smoker
male			
≤9 ^a	1.00 (reference)	1.00 (reference)	1.00 (reference)
10–12 ^b	1.21 (0.62–2.36)*	1.21 (0.75–1.96)	0.77 (0.49–1.21)
13+ ^c	1.36 (0.54–3.42)	1.23 (0.68–2.26)	0.71 (0.40–1.27)
female			
≤9 ^a	1.00 (reference)	1.00 (reference)	1.00 (reference)
10–12 ^b	1.85 (0.97–3.54)	0.44 (0.14–1.35)	0.71 (0.32–1.54)
13+ ^c	4.14 (1.34–12.8)	0.31 (0.04–2.34)	0.27 (0.07–1.03)

*: Mantel-Haenszel odds ratios with test-based 95% confidence intervals.

^a: equivalent to graduation from elementary and middle schools.

^b: equivalent to graduation from high schools.

^c: higher levels than high school graduation.

with medium education levels and those with high education levels were similar for males, while odds ratios increased (never smoked) or decreased (former and current smokers) according to the length of education. Although Table 6 shows summary odds ratios, similar trends existed in each stratified group such as a specific age and occupation group.

DISCUSSION

This is a report showing the relationship between smoking habits and socioeconomic factors among Japanese people using random sample data. The only one report which indicated the relationship in Japan so far was a survey of pregnant women visiting a hospital and their

husbands¹⁷⁾. Like other studies outside Japan, this data indicated the reverse association between the education and the proportion of smokers. As the data is based on the pregnant women visiting a certain hospital, however, there would be biases and this is a disadvantage of the study. Accordingly, this report is the only one which shows the relationship among Japanese people.

The proportions of never smoked, former smokers, and current smokers for each sex in the current study are similar to some data in Japan so far^{1–3)}. In addition, the fact that the proportion of current smokers among males at their 50's of age was rather low resembles that observed formerly¹⁸⁾. Consequently, we consider the fact that only three quarters of the study population participated in the study did not involve a large bias about smoking status.

We observed the inverse relationship between the 3 socioeconomic factors and the proportion of current smokers, which is same as the data from other developed countries. However, the relationship was not so strong as those in other countries⁴⁻¹⁶, especially for males. For example, in the United States in 1985, the prevalence among whites with less education levels than high school graduate was twice as high as among those with education levels being equal to or higher than 4 years college (44.9% vs. 19.3%)⁹. On the other hand, our results show that the prevalence among those with ≤ 9 years of education was 53.4% while that among those with ≥ 13 years was 40.2% (Table 6). We consider that the higher proportion of current smokers for males is the reason of this phenomenon. The smoking habit is more prevalent in Japan than in other developed countries^{1,19}. In terms of this point, this country is not a developed one. When health education and administration against smoking permeate the country in near future, and then if those who have high socioeconomic status stop smoking earlier than those having low status^{12,20,21}, the difference among the status may become larger than now.

The years of schooling affected the smoking habits in the current study; the longer the years are, the lower the proportion of current smokers is and the higher that of never smoked is (Tables 3 and 6). In addition, trends that odds ratios increase or decrease according to the education levels are observed especially for females. We believe these trends are the effects of education systems in Japan, which is not official. Smoking habits are usually established in one's teenage era in Japan. We can guess so because the proportions of smokers among the teenage group and those age 20's are quite similar¹. In Japan, children who hope to enter colleges go to selected middle and high schools, where special training for the entrance examination for universities is provided. On the other hand, children with educational aspirations are less likely to smoke cigarettes than those without²². Therefore, smoking is expected to be less prevalent in middle and high schools where many students hope to enter universities. Peer pressure is one of the largest factors which affect whether to start smoking^{23,24}. Thus, college graduates may be less likely to be smokers because they had less classmates who smoked when their smoking habits were established in middle and high schools.

Females with paid works are more likely to smoke than those without (Table 5). This phenomenon differs from that observed in Western countries; prevalence of current smokers depends on occupational status, and that for housewives is smaller than for those with unskilled manual occupations but larger than for professionals^{13,16,25}. In Japan there may be two reasons; economic one and social one. Women with paid works may smoke more easily than women without them because they earn incomes by

themselves. On the other hand, many of the working women work among men and some of them smoke cigarettes because they hope to associate on equal terms with men in workplace.

In conclusion, we showed the relationships between smoking habits and socioeconomic factors such as occupation, education, and household income exist among Japanese people. The associations are less strong, however, than those in other developed countries.

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