Exposure of Japanese School Children to Smoking-Related Environmental Factors

Tomofumi Sone

Japan has no legal restrictions on cigarette advertising and vending machines. This lack of smoking control measures is a possible contributor to smoking initiation by adolescents. This study was conducted to provide primary data on environmental factors related to smoking, such as cigarette advertising and candy cigarettes, that influence elementary school children in Japan. A cross-sectional survey was conducted with a self-administered questionnaire at two elementary schools in Kitakyushu City, Japan in 1995. Questionnaire sheets were anonymously filled out by 282 elementary school children at school. The effective response rate was 91.5% (128 boys and 130 girls). Over 90% of respondents had seen cigarette advertising on TV, candy cigarettes and cigarette vending machines. Over 75% had at least one smoker in their family. Fewer female children expressed an intent to smoke in the future despite the fact that there were no significant sex differences in smoking-related experiences. Children were highly exposed to cigarette advertising on TV, candy cigarettes, vending machines and family members' smoking. Control of such smoking-related factors in the environment would be crucial to keeping children from initiating smoking behavior. J Epidemiol, 2000; 10: 183-187

smoking, advertising; candy cigarettes; school children

INTRODUCTION

The initiation of cigarette smoking by adolescents is a great concern in Japan as well as in many other countries throughout the world. A survey in 1990 found that the proportion of regular, or almost daily, smokers in 18 year-old high school students was 20.3% (males) and 2.6% (females) 1. Yamaguchi et al. 2 predicted that a 1% annual reduction in the smoking initiation rate would result in a 20% decrease in the number of lung cancer deaths in 2041. Although smoking by minors under 20 years of age and sales of cigarettes to those minors have been legally prohibited since 1900, inadequate implementation of the law allows them to purchase cigarettes easily 3. In addition, Japan has no legal restrictions on cigarette advertising, sponsorship of sports and arts activities, and vending machines although cigarette brand advertising on TV and radio has been voluntarily terminated by the tobacco industry since April 1998. This lack of smoking control measures is a possible contributor to the taking up of cigarette smoking by adolescents.

The United States Surgeon General's report in 1994 4 summarized environmental risk factors in the initiation of tobacco use among young people. These environmental factors include advertising, accessibility, and sibling and peer use, all of which are my primary interests in this survey. Despite the high prevalence of vending machines and tobacco advertising in Japan, the number of domestic studies addressing this problem has been few.

A preliminary survey on components of the environment of school children that are related to smoking was conducted in Kitakyushu City, Japan in 1995. In this paper, primary data on children's exposure to cigarette advertising on TV, cigarette vending machines, candy cigarettes, and family smoking were provided. Relationships between smoking-related experiences, brand awareness and intent to smoke in the future, and smoking-related environmental factors were also examined.
SUBJECTS AND METHODS

A self-administered questionnaire survey of school children in the fourth to sixth grade was conducted at two municipal elementary schools in Kitakyushu City, Japan, in 1995. These two schools were selected without any specific preference.

The questionnaire consisted of questions on demographic information, smokers among family members, cigarette advertising on TV, candy cigarettes, cigarette vending machines, smoking-related experiences, brand awareness and predicted likelihood of smoking in the future. Smokers among family members were checked from classified options of the family member, such as father and mother, which is mutually exclusive. Questions about cigarette advertising on TV, candy cigarettes and cigarette vending machines had dichotomous responses as to whether children had seen each of these three smoking-related items. In terms of brand awareness, children were asked to distinguish a certain cigarette brand name from five brand names of computer software. All alternatives were shown in Japanese. Names of computer software, that is, Excel, Perfect, Pagemaker, Lotus and Statview, were used as incorrect response alternatives in the question because of the children's possible unfamiliarity with the brand names. No TV advertising of computer software has been broadcast, and the proportion of children who use PCs at home, except for the purpose of games, was still very small in Japan at the time of the survey in 1995. In addition, the two schools to which the author directed this survey had neither PC-rooms nor computer classes. When children did not know the cigarette brand name, Mild Seven, it was impossible for them to choose the correct answer from the options except by chance. Also, the names of computer software are suitable as alternative options because both they and the cigarette brand name, Mild Seven, are formed from English words. Predicted likelihood of smoking in the future was measured by asking "Will you smoke in the future?" with three options, that is, "I will smoke," "I will not smoke," and "I don't know."

Questionnaire sheets were distributed to the school children of 10 classrooms by their teachers and were filled out anonymously under their teachers' supervision. The respondents were in grades four to six, which corresponded to 10 to 12 years of age. The total number of subjects was 282 at 10 classrooms, and that of respondents 272. The number of absentees on the day of the survey was 10, and 14 incomplete responses were excluded from the analysis. Thus, the total number of respondents used for the analysis was 258, reflecting an effective response rate of 91.5%. The number of males and females was 128 and 130, respectively.

RESULTS

Table 1 shows the percentage of children who had smoking-related environmental factors by sex and grade. Grades were classified into two categories, that is, students of fourth and fifth grade, and those of sixth grade. Over 90% of all the children had seen cigarette advertising on TV, had seen candy cigarettes, and had seen cigarette vending machines in their neighborhood. In addition, over 75% of the children had at least one smoker among their family members. Although not shown in the table, among children in smoking families, 77.7% had a father who smoked followed by grandfather (28.7%), mother (24.8%) and siblings (8.4%). There were no sex and grade differences in smoking-related environmental factors.

Table 2 shows the percentage of children who had smoking-related experiences, brand awareness and the intention to smoke in the future, by sex and grade. Regarding smoking-related experiences, over 70% of the children had handled cigarettes. The proportion of ever-smokers, that is, those who had smoked at least once, were about 15% for males and less than 10% for females. The proportion of current smokers, who had smoked at least once during the past month, was very small in this survey. Although not asked in the definite manner, the relatively large number of children who had seen other children smoking may imply that the numbers of ever-smokers and/or current smokers among the respondents were underreported.

With regard to brand awareness, approximately 90% of the

<table>
<thead>
<tr>
<th>Smoking-related environmental factors</th>
<th>Sex (%)</th>
<th>Grade (%) 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td></td>
<td>(n=128)</td>
<td>(n=130)</td>
</tr>
<tr>
<td>1. Have seen cigarette advertising on TV</td>
<td>92.2</td>
<td>90.0</td>
</tr>
<tr>
<td>2. Have seen candy cigarettes</td>
<td>95.3</td>
<td>92.3</td>
</tr>
<tr>
<td>3. Have seen cigarette vending machines in my neighborhood</td>
<td>96.1</td>
<td>95.4</td>
</tr>
<tr>
<td>4. At least one smoker in the family</td>
<td>81.3</td>
<td>75.4</td>
</tr>
</tbody>
</table>

1) Sex ratio in each grade group is approximately 1.

n.s. not significant
respondents were able to distinguish the most popular domestic brand name, *Mild Seven*, from five brand names of computer software. Sixth graders were significantly more knowledgeable about the cigarette brand name than fourth and fifth graders.

There was a significant difference between males and females in terms of expressed likelihood of smoking in the future; female children expressed less of an intent to smoke in the future despite the fact that there was no significant sex difference either in cigarette-handling experience or ever-smoking experience.

Table 3 shows the relationships between smoking-related experiences, brand awareness and predicted smoking status in the future, and some smoking-related environmental factors, such as smokers in the family, cigarette advertising on TV and candy cigarettes. Observed differences in having handled cig-

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**Table 2.** Percentage of children in two elementary schools who have smoking-related experiences, brand awareness and intention to smoke in the future, by sex and grade, n=258, Kitakyushu, Japan.

<table>
<thead>
<tr>
<th>Smoking-related experiences</th>
<th>Sex (%)</th>
<th>Grade (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male (n=128)</td>
<td>Female (n=130)</td>
</tr>
<tr>
<td>1. Have handled cigarettes</td>
<td>78.1</td>
<td>72.3</td>
</tr>
<tr>
<td>2. Have smoked at least once</td>
<td>14.8</td>
<td>7.7</td>
</tr>
<tr>
<td>3. Have smoked at least once during the past month</td>
<td>3.1</td>
<td>0.0</td>
</tr>
<tr>
<td>4. Have seen other school children smoking</td>
<td>26.6</td>
<td>13.8</td>
</tr>
<tr>
<td>Awareness of cigarette brand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Picking out one domestic cigarette name, <em>Mild Seven</em>, from 5 brand names of computer software</td>
<td>Correct</td>
<td>90.6</td>
</tr>
<tr>
<td>Expressed likelihood of smoking in the future</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoking status in the future</td>
<td>Will smoke</td>
<td>14.1</td>
</tr>
<tr>
<td>Don't know</td>
<td>50.0</td>
<td>23.1</td>
</tr>
<tr>
<td>Will not smoke</td>
<td>35.9</td>
<td>73.1</td>
</tr>
</tbody>
</table>

¹ Chi-square test
² Fisher exact test
n.s. not significant, * p<0.05, ** p<0.01

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**Table 3.** Relationships between smoking-related experiences, brand awareness and self-predicted future smoking status, to smoking-related environmental factors. Elementary school children of fourth to sixth grade, n=258, Kitakyushu, Japan.

<table>
<thead>
<tr>
<th>Smokers in the family (%)</th>
<th>Have seen TV ads (%)</th>
<th>Have seen candy cigarettes (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>At least one (n=202)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None (n=56)</td>
<td>Yes (n=235)</td>
<td>No (n=23)</td>
</tr>
<tr>
<td>Have handled cigarettes</td>
<td>80.7</td>
<td>55.4</td>
</tr>
<tr>
<td>Have smoked at least once</td>
<td>12.9</td>
<td>5.4</td>
</tr>
<tr>
<td>Awareness of cigarette brand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Picking out one domestic cigarette name, <em>Mild Seven</em>, from 5 brand names of computer software</td>
<td>Correct</td>
<td>91.6</td>
</tr>
<tr>
<td>Expressed likelihood of smoking in the future</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoking status in the future</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Will smoke</td>
<td>10.9</td>
<td>1.8</td>
</tr>
<tr>
<td>Don't know</td>
<td>39.1</td>
<td>26.8</td>
</tr>
<tr>
<td>Will not smoke</td>
<td>50.0</td>
<td>71.4</td>
</tr>
</tbody>
</table>

¹ Chi-square test
² Fisher exact test
³ One of the expected cell values is less than 5.
n.s. not significant, * p<0.05, ** p<0.01
cigarettes, brand awareness and self-predicted smoking status in
the future between the children who had no smokers in their
family and those who had at least one smoker were statistically
significant. On the other hand, having seen cigarette advertise-
ing on TV and candy cigarettes did not appear to related to sig-
nificant differences in handling of cigarettes, smoking at least
once, brand awareness and expressed likelihood of smoking in
the future, except handling cigarettes was related to having
seen candy cigarettes.

DISCUSSION

The United States Surgeon General’s report in 1989 suggested several direct and indirect mechanisms by which advertise-
ing increases tobacco consumption. In Japan, cigarette brand advertising on TV has been voluntarily eliminated by the
tobacco industry since April 1998. At the point of this survey,
the voluntary code permitted cigarette brand advertising on TV
from 10:54 p.m. to 5:00 a.m. While this time frame was pri-
marily defined to protect children from exposure to cigarette
advertising on TV, the results indicated that most children had
actually seen TV advertising despite this voluntary regulation.
As shown in Table 3, however, the experience of seeing TV
ads was not significantly related to handling cigarettes, smok-
ing experience, brand awareness and the predicted likelihood
of smoking in the future. This survey did not measure the fre-
cuency of children’s contact with tobacco advertising on TV.
The author measured perceived frequency of contact with
tobacco advertising on TV in sample groups of nursing stu-
dents, and found a three-point scale of perceived frequency as
useful to evaluate level of contact with tobacco advertising. Such a frequency scale could be applied to further surveys of
school children on tobacco advertising.

This survey also revealed that most children had seen candy
cigarettes. In Norway, where very strict tobacco control poli-
cies are implemented, selling or supplying imitations of tobac-
co products, like candy cigarettes, to a person under 16 years
of age is forbidden. In Japan, candy cigarettes are still avail-
able. Klein et al. reported that school children who had pur-
chased candy cigarettes once, several times, often, and very
often were 1.07, 1.20, 1.61, and 3.52 times more likely to
have seen candy cigarettes provide an inappropriate pro-smoking mes-
gage for children. This survey did not ask children about the
purchase and use of candy cigarettes. Table 3 showed no rela-
tionship between having seen candy cigarettes and having
smoked at least once. This insignificance of the relationship
may be due partly to a less specific question on children’s con-
tact with candy cigarettes.

About 500,000 vending machines are used for selling ciga-
ettes to smokers, probably including minors, in Japan. The
amount of cigarettes sold by vending machines was about half
of the total amount sold in Japan in 1994. The result implies
that the number of cigarette vending machines in residential
areas is possibly enough to attract children to cigarettes.

The percentages of respondents who had seen cigarette advertise-
ing on TV, vending machines and candy cigarettes were much higher than what the author had expected to find. The
dichotomous questioning employed in these variables could not provide adequate information because of the, so
called, ceiling effect. By asking about the frequency of these
events, for instance, one could draw a more precise picture of
smoking-related environmental factors among the children.
The smoking prevalence in Japan was 52.7% among male
adults and 10.6% among female adults in 1995. This survey
revealed that quite a few children were exposed to cigarette
smoke at home. As suggested in Table 3, children who had at
least one smoker in their family were more likely to handle
cigarettes, be aware of the top-selling cigarette brand name and
have an intention to smoke in the future than those in whose
family no one smoked. Although interrelationships among
these variables are subjects that need further studies, it is cer-
tain that children who have smokers in their family would have
more contact with cigarettes, because cigarettes are often with-
in their reach at home. The determination of which member of
the family, that is, father, mother, grandparents or siblings, has
the most influence on children’s smoking is another interest.
Swan et al. reported that a mother smoking is associated
with an increased risk of her daughter smoking. In this survey,
however, such analyses were inappropriate due to the small
number of respondents in each category and the simple ques-
tions. Further research of larger samples using behavioral the-
tory, such as the Theory of Reasoned Action, will contribute
greatly to the investigation of this research question.

In terms of self-predicted likelihood of smoking in the
future, the interpretation of ”don’t know” answers needs special
attention. As shown in Table 2, the sum of ”will smoke” and
”don’t know” answers of males and females was 64.1% and
26.9%, respectively. These figures coincidentally parallel the
smoking prevalence in 20-29 years of age persons in Japan in
1990. The ”don’t know” respondents in this survey may be
much more inclined to smoking rather than to non-smoking in
the future although a cohort study of these subjects is required
to prove this hypothesis. As a next step, more specific ques-
tions regarding the intention to smoke in the future should be
developed.

The percentages of ever-smokers and current smokers in ele-
mentary school children in this survey were parallel to those in
other surveys in Japan. However, the distribution and col-
collection of questionnaire sheets under the teachers’ control in
class possibly lowered the validity of answers on some smok-
ing-related behaviors. The discrepancy between the percent-
age of ever-smokers and/or current smokers and that of chil-
dren who have seen other children smoking may demonstrate
the underreporting of the children’s smoking behavior caused
by the lack of confidentiality in this survey.

The sex difference in the predicted likelihood of smoking in the future among the school children probably reflects the traditional social norm on female smoking in Japan, that is, women should not smoke cigarettes. This social norm against women smoking has kept the smoking rate of females lower than that of males for years. Recently, however, smoking prevalence among young women between 20 and 29 years of age has increased remarkably; from about 10% in 1986 to about 17% in 1995\(^\text{10}\). The results suggest that since girls have a lower preference towards smoking in their early school years, anti-smoking education aimed at elementary school girls would be more effective for preventing female smoking than that towards girls in their late teens. On the other hand, preferable attitude towards smoking among male respondents in this survey suggests that the intervention for males should include approaches to weaken the influence of the social norm in Japan that male smoking is permissible.

There are several limitations in the present study, such as its cross-sectional study design, convenience sampling, small sample size and lack of confidentiality. In terms of sampling, the author used a convenience sampling, that is, a sampling without a specific randomizing technique. The two schools in this survey are, however, located in neither a vulnerable area nor an affluent area of the city. While specific biases are not introduced into this sampling, a better-designed sampling should be applied to further research. Also, although the data cannot bear any hypothesis testing, the author feels that these descriptive findings do contribute to planning further research by throwing light upon the environmental factors of smoking that surround school children in Japan. Although there have been a few policy research undertakings on the control of smoking-related environment in Japan, further studies on tobacco control policies, such as restrictions on advertising and vending machines, are required to prevent the initiation of smoking among Japanese children.

**ACKNOWLEDGEMENT**

I would like to express my appreciation to school officials of two elementary schools in Kitakyushu City for their cooperation to this study. I also thank Dr. Hiroaki Kahyo for his kind supervision.

**REFERENCES**