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PERSONAL HEALTH PRACTICES AND ATTITUDES TOWARD NONSMOKERS' LEGAL RIGHTS IN JAPAN

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Abstract—To evaluate a role of education to acquire a healthy lifestyle (health education) in achieving a smokeless society, the relationship between attitudes toward the legal right to be free from involuntary smoking in public places, based on human rights, and personal health practices was determined using answers to a questionnaire from 887 randomly-selected citizens of Osaka.

The answers were analyzed within four subgroups of respondents divided by smoking status and sex. Among the respondents, three significant relationships of attitude scores to health practices were identified. Within subgroups of female subjects, questionnaire attitude scores decreased as health practice scores increased. Among male non-smokers, those who had high health practice scores also had high attitude scores. Among male smokers, there was no statistical association between health practice scores and attitude scores. Our results demonstrated that attitudes toward the legal right to be free from involuntary smoking among male-nonsmokers were closely related to personal health practices, and implied the effectiveness of health education among this subgroup for the advancement of their legal right to be free from involuntary smoking.

Key words—legal right to be free from involuntary smoking, personal health practices, lifestyle

INTRODUCTION

The legal right to be free from involuntary smoking in public places is a fundamental human right. Within the past several years, this legal right has been reinforced, yet the prevalence of cigarette smoking in Japan remains one of the highest of the industrialized countries' (in 1986, 62.5% of men and 12.6% of women [1]). This advancement of the legal right has caused social changes related to smoking. There has been no decrease in smoking prevalence, but a rapid increase in the number of public places where smoking is prohibited by law, ordinance or other measure has occurred. These prohibitions are thought to have gained public support because of wide-spread recognition of the harmful effects of involuntary smoking [2, 3].

To evaluate the effectiveness of education to acquire a healthy lifestyle (health education) in fostering the legal right to be free from involuntary smoking, we have determined several relationships between attitudes toward this legal right and personal health practices for citizens of a Japanese city in this study. Personal health practices were studied because these constitute a reflection of health consciousness, and because these also have been shown to be closely related to health status [4–9].

MATERIALS AND METHOD

Subjects

The subjects were 1500 randomly-selected citizens of D city. They were randomly selected in about a 1 per 80 ratio from among males and females in 10-year age groups (20s, 30s, 40s, 50s and 60s or more). D city is a typical satellite town of Osaka, and ranks midway among cities in the Osaka area in terms of per capita income, industrial scale, population, longevity, age distribution and so forth. Therefore, D city is regarded as a representative Japanese municipality. The study was conducted by questionnaire in July, 1988. At that time, 921 responses (61.4%) to the questionnaire inquiry were received.

Content of questionnaire

We designed a self-administered format questionnaire consisting of questions concerning subjects' personal health practices as well as attitudes toward the legal right to be free from involuntary smoking.

Attitudes toward the legal right to be free from involuntary smoking

As this legal right was changing and had been but vaguely outlined in Japan at the time of the study, we measured attitudes toward the legal right to be free from involuntary smoking by surveying awareness of legal measures regulating smoking in public places [1, 10]. Acts and ordinances concerning smoking in public places in Japan are shown in Table 1. Act nos 1, 4, 5 and 6 in Table 1 are intended to prevent involuntary smoking, and act nos 2 and 3 are intended to prevent fire. This legal right is closely related to the harmful health effects of involuntary smoking. Moreover, smoking in trains is controversial for both smokers and nonsmokers in Japan. Therefore, especially from among four legal measures (No. 1, No. 4, No. 5 and No. 6), attitudes toward the Railway Business Act were evaluated by the questionnaire. Questions concerning attitudes are shown in Table 2. Each item was a multiple choice question with 4 possible answers, and each respondent received an 'attitude score' of between 4 and 12 based upon his or her answers.

Table 1. Acts and ordinances regulating smoking in public places in Japan

1. Railway Business Act (Law No. 65, 1900)
2. Fire Fighting Act (Law No. 186, 1948)
3. Municipal ordinances based on the Fire Fighting Act (Law No. 186)
4. 'Notification on the health effect of smoking' (Notification from the Ministry of Public Welfare to the Governors and Mayors of major cities, 6 Feb. 1963)
5. 'Notification on the restriction of smoking places' (Notification from the Ministry of Public Welfare to President of National Hospital, National Sanatorium, National Cancer Research Center and National Cardiovascular Center, 28 April 1983)
6. 'Notification on the restriction of smoking places in waiting rooms of public hospitals' (Notification from the Ministry of Public Welfare to Governors, 5 April 1984)

Personal health practices

Belloc and Breslow [5], Palmore [6], Fuchs [7], and others have demonstrated that personal health practices involving, for example, use of tobacco, alcohol, participation in exercise and attention to nutrition is important in determining his or her years of healthy life. Two early studies demonstrated a strong relationship between personal health practices and health status [6, 11]. And, seven health practices were shown to be related to physical health status and subsequent mortality rate in the Alameda County study [5, 12]. Based upon these previous works, in particular that of Belloc and Breslow [5, 12], Morimoto modified the list of seven personal health practices mentioned above to construct a group of eight for use in a study in Japan [13, 14] (Table 3). These eight were chosen as question items concerning personal health practices for the present study, and comprised items in a Health Practice Index (HPI). Each item had multiple possible answers (2–6 per item), and answers were dichotomized into the categories of 'good' or 'not good' health practice according to Morimoto's criteria, as shown in Table 3. In order to evaluate personal health practices in total, each respondent was assigned a HPI score of between 0 to 8 based upon his or her number of 'good' health practices reported, and stratified into three strata by HPI scores, using the method by Morimoto [14] and Belloc *et al.* [5, 12]. These strata were 'POOR' (HPI scores = 0–3), 'MODERATE' (HPI scores = 4,5) and 'GOOD' (HPI scores of 6 or more).

Statistical techniques

In our study, sex and smoking status were treated as separate variables. Therefore, each respondent was categorized into one of four subgroups by smoking status and sex ('MALE SMOKER', 'MALE NONSMOKER', 'FEMALE SMOKER' and 'FEMALE NONSMOKER'). The four possible answers to questions concerning attitudes ('asking him/her to stop smoking', 'deciding what to do some time later', 'hesitating to ask him/her to stop smoking', or 'don't want to ask him/her to stop smoking'; see Table 2) were quantified, and assigned the values upper ('asking him/her to stop smoking'), middle ('deciding what to do some time later') or lower ('hesitating to ask him/her to stop smoking' or 'don't want to ask him/her to stop smoking') within each of the four subgroups using the method recommended by Guttman [15, 16]. Briefly, respondents were categorized into a matrix consisting of questions (row) and responses (column). Then, values of row and column in the matrix were determined so that correlation coefficients between values of row and those of columns can be maximum. The last two answers were combined for quantification because of their overlapping character.

The mean attitude score for each HPI stratum within the four subgroups was calculated, and comparisons were made among the strata using the Wilcoxon test. In order to pick up each health practice item related to attitude score, correlation coefficients between individual health practice questionnaire items and attitude score were calculated.

RESULTS

We received 921 responses from 1500 citizens solicited (Fig. 1). Thirty-four of the respondents, however, did not complete the questionnaire completely, and their answers were eliminated from further analyses. The remaining analyzed sample consisted of responses from 556 non-smokers and 331 smokers, the mean age of whom was 42.03 years (nonsmokers, 42.56 years; smokers, 41.71 years). The prevalence of cigarette smoking among male respondents was 61.7%, while that among females was 15.9%.

The relationships between HPI score and attitude score within each of the four subgroups are shown in Table 4. Within the 'M. NONSMOKER' group, the mean attitude score of 'GOOD' respondents was significantly higher than that of 'POOR' respondents ($P < 0.05$). Generally, within the 'M. NONSMOKER' group, attitude scores increased as HPI scores did. Within the 'F. NONSMOKER' group, the mean attitude score of 'GOOD' and 'MODERATE' respondents was significantly lower than that of 'POOR' respondents ($P < 0.05$). Within this group, attitude scores generally decreased as HPI scores

Table 2. Questions for measurement of attitudes toward the Railway Business Act

If you were in the following situation, what would you do? Please explain your attitude by using 'asking him/her to stop smoking', 'deciding what to do some time later', 'hesitating to ask him/her to stop smoking' or 'don't want to ask him/her to stop smoking'.

Case 1. Your family member, who does not know that smoking is prohibited there, begins smoking in a crowded no-smoking car.

Case 2. A foreigner in the seat next to you, who does not know that smoking is prohibited there, begins smoking in a crowded no-smoking car.

Case 3. Your family member, who does not know that smoking is prohibited there, begins smoking in a vacant no-smoking car with other smoking passengers.

Case 4. A foreigner in the seat next to you, who does not know that smoking is prohibited there, begins smoking in a vacant no-smoking car with other smoking passengers.

Table 3. Eight personal health practice items and GOOD criteria

1. Cigarette smoking (not smoking)
2. Consuming alcohol (not consuming alcohol almost every day)
3. Eating breakfast (eating breakfast every morning regularly)
4. Sleeping hours (sleeping for 7–8 hr per 24 hr)
5. Working hours (working for less than 9 hr)
6. Physical exercise (exercising twice a week or more often)
7. Nutritional balance (eating foods with balanced nutrition)
8. Mental stress (keeping mental stress adequate)

GOOD health practice criteria recommended by Morimoto are in parenthesis.

increased. Within the 'M. SMOKER' group, there was no statistical association between HPI stratum and attitude scores. Within the 'F. SMOKER' group, attitude scores of 'POOR' respondents were significantly higher than those of the 'MODERATE' respondents ($P < 0.05$).

Within each stratum, there was a tendency for the attitude scores of 'M. NONSMOKER' respondents to be higher than those of the other subgroups' subjects. Within the 'POOR' stratum, the attitude scores of 'M. NONSMOKER' respondents were significantly higher than those of the 'F. NONSMOKER' respondents ($P < 0.05$), while within the 'MODERATE' stratum, the attitude scores of 'M. NONSMOKER' respondents were significantly higher than those of the 'M. SMOKER' ($P < 0.01$), 'F. SMOKER' ($P < 0.01$) and 'F. NONSMOKER' ($P < 0.01$) respondents. Within the 'MODERATE' stratum, the attitude scores of 'M. SMOKER' respondents were also significantly higher than those of the 'F. SMOKER' ($P < 0.01$) and 'F. NONSMOKER' ($P < 0.01$) respondents. Within the 'GOOD' stratum, the attitude scores of 'M. NONSMOKER' respondents were higher than those of 'M. SMOKER' ($P < 0.05$), 'F. SMOKER' ($P < 0.01$) and 'F. NONSMOKER' ($P < 0.01$) respondents.

Correlation coefficients between individual health practice questionnaire items and attitude score are shown in Table 5. The largest number of life style items could be related to attitude score for subjects within the 'M. NONSMOKER' subgroup, but no life style item was statistically related to attitude score within the 'M. SMOKER' and 'F. SMOKER' groups.

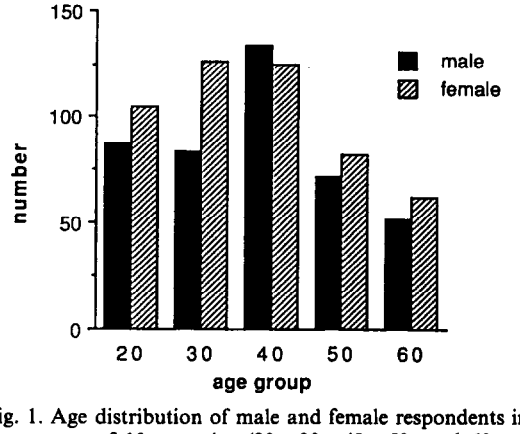

Fig. 1. Age distribution of male and female respondents in age groups of 10 year size (20s, 30s, 40s, 50s and 60s or older).

DISCUSSION

In this study, we determined the relationship between personal health practices and attitudes towards the legal right to be free from involuntary smoking in Japan. Every kind of consciousness has a three-layered structure and is composed of 'knowledge', 'opinion' and 'attitude' [17] (Fig. 2). 'Knowledge' is knowledge; 'opinion' is opinion; and 'attitude' is attitude. This three-layered model, although not explicitly allowing for the importance of subconscious factors, is both simple and widely accepted. Therefore, we adopted this model, and studied the relationship between personal health practices and the uppermost layer of the relevant consciousness, i.e. attitudes toward the legal right to be free from involuntary smoking. The results were interpreted in consideration of the limitations of this model.

In this study, we measured attitudes toward the legal right to be free from involuntary smoking by measuring attitudes toward the Railway Business Act (Law No. 65, 1900) and the introduction into Japan of no-smoking train carriages. Besides smoking in public facilities covered by the Involuntary Smoking Prevention Act (e.g. train cars, hospital waiting rooms etc.), other relevant situations such as smoking in public facilities covered by the Fire Fighting Act (e.g. cinemas, department stores, exhibition sites etc.) also exist. Hence, in a supplementary study conducted with respects to another population in D city, we studied the relationship between personal health practices and attitudes toward the restriction of smoking in a type of public facility covered by the Fire Fighting Act, i.e. cinemas. We approached 160 randomly-selected citizens, and 136 of these responded to our questionnaire inquiry (85.0%). We got the same trends concerning the relationship between HPI and attitude score as illustrated in Table 4, indicating that the results obtained are probably valid in other situations to a large extent.

Recently, no smoking train carriages have become very popular in Japan. In no-smoking carriages, the rights of passengers to clean air are guaranteed, and insured by the orders given to smoking passengers by conductors when necessary in situations described in the Act (Railway Business Act, Article 25; Law No. 65, 1900). Questions in Table 3 concerned attitudes possible in various situations in no-smoking carriages. Owing to differences in character and prevalence of smoking between men and women (in 1986, male: 62.5%, female: 12.6%), the attitude scores of female respondents were expected to be much lower than those of male respondents. Specifically, a Scandinavian study showed that in concrete situations, women on the whole were far more lenient than men,

Table 4. Relationship between attitude scores and personal health practices

	MALE	FEMALE	M. SMOKER	M. NONSMOKER	F. SMOKER	F. NONSMOKER
POOR	8.64 ± 2.44 8.54 (n = 188)	8.42 ± 1.84 8.24 (n = 121)	8.51 ± 2.62 8.41 (n = 136)	9.01 ± 1.87 9.01 (n = 52)	8.51 ± 1.93 8.30 (n = 37)	8.38 ± 1.81 8.12 (n = 84)
MODERATE	9.14 ± 2.10 9.05 (n = 190)	7.90 ± 1.49 7.89 (n = 275)	8.72 ± 2.22 8.67 (n = 102)	9.62 ± 1.85 9.50 (n = 88)	7.41 ± 1.73 7.44 (n = 29)	7.96 ± 1.45 7.94 (n = 246)
GOOD	9.50 ± 2.29 9.45 (n = 37)	7.72 ± 2.15 7.80 (n = 76)	8.73 ± 2.74 8.32 (n = 18)	10.25 ± 1.48 10.19 (n = 19)	7.89 ± 0.73 7.86 (n = 9)	7.70 ± 2.27 7.82 (n = 67)

Upper values are scores representing attitudes toward laws (Mean ± SD). Middle values are age-adjusted scores of attitudes towards laws. Lower values are number of respondents. Significantly different at level of $*P < 0.05$ or $**P < 0.01$ by Wilcoxon test.

apart from those of the highest educational level [18]. Moreover, female respondents might possibly consider their capacity for asserting their rights to men in answering to the questionnaire items. These expectations were confirmed by our findings.

The results obtained showed that the trends of relationships between personal health practices and attitudes toward the legal right to be free from involuntary smoking were quite opposite for females ('F. SMOKER' and 'F. NONSMOKER') and male non-smokers. Within the 'M. NONSMOKER' group, those who had high HPI scores also displayed high attitude scores (Table 4). Also, within the 'M. NONSMOKER' group, the health practice items, 'sleeping time', 'physical exercise' and 'nutritional balance' were significantly correlated with attitude scores (Table 5). These results indicate that attitudes toward the legal right to be free from involuntary smoking among 'M. NONSMOKER' respondents were reflected in life styles or health consciousness (Tables 4 and 5). Tables 4 and 5, taken together, also indicate that health education among non-smokers is effective in ensuring legal rights in this connection, although the basic model of consciousness in the present study does not allow for the importance of sub-conscious factors. Within the 'F. NONSMOKER' group, on the other hand, those who had low HPI scores also displayed high attitude scores (Table 4). A very similar trend was observed within the 'F. SMOKER' group (Table 4). Within the 'F. SMOKER' group, however, no health practice item was significantly correlated with attitude scores (Table 5). Within the 'F. NONSMOKER' group, only one health practice item, i.e. 'sleeping time', was significantly correlated with attitude scores (Table 5). In view of these results, therefore, we cannot conclude that health education is ineffective for the advancement of the relevant legal rights among females; further analysis is necessary to determine this.

Within each stratum, the attitude scores of 'M. NONSMOKER' respondents were higher than those of the other subgroups' members (Table 4). Considering their characteristic behaviors, it might have been supposed that the scores of nonsmoking males ('M. NONSMOKER') should have been higher than those of the other subgroups' members. The age distribution of the respondents was almost the same as that of the initial 1500 citizens who received the questionnaire, and the prevalences of smoking among male and female respondents were close to the figures published for the general public by the Ministry of Health and Welfare [1]. Therefore, the demographic differences between respondents and non-respondents were thought to be negligible; the results of our study can therefore be extrapolated to the whole population even though the questionnaire response rate was low. In summary, our study demonstrated the following points: (1) Among male-nonsmokers, those who had high health practice scores had also high attitude scores. Attitude toward the legal right to be free from involuntary smoking among male non-smokers were closely related to personal health practices. This finding implies the effectiveness of education to foster the acquisition of a healthy lifestyle for the progress of their legal right to be free from involuntary smoking among male-nonsmokers. (2) Among females, attitude scores decreased as scores of personal health practices increased.

Table 5. Correlation coefficients between individual health practices and attitude scores

	M. SMOKER (n = 256)	M. NONSMOKER (n = 159)	F. SMOKER (n = 75)	F. NONSMOKER (n = 397)
1. Physical exercise	0.00	0.16*	−0.07	−0.02
2. Sleeping time	−0.04	0.17*	0.15	−0.10*
3. Eating breakfast	0.10	0.02	−0.04	−0.06
4. Working hours	0.03	0.05	−0.17	0.02
5. Nutritional balance	−0.04	0.24**	−0.08	−0.04
6. Consuming alcohol	−0.02	0.02	−0.12	−0.01
7. Mental stress	0.06	−0.07	−0.15	−0.07
8. Smoking	—	—	—	—

$*P < 0.05$, $**P < 0.01$.

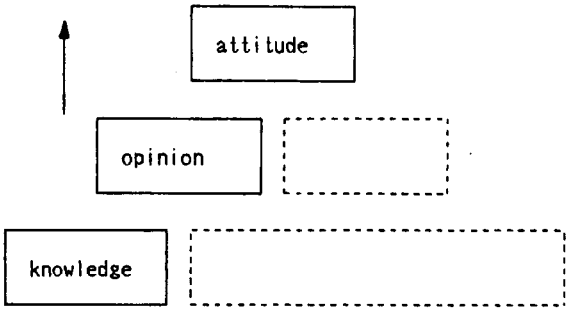

Fig. 2. A schematic model of the three-layered structure of consciousness. 'Knowledge' is the base, the next level up is 'opinion', and the uppermost level is 'attitude'.

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REFERENCES

1. Ministry of Health and Welfare, Eds *Smoking and Health*, p. 7. Hoken Dohjin Sya, Tokyo, 1987. (In Japanese.)
2. Hirayama T. Non-smoking wives of heavy smokers have a higher risk of lung cancer: a study from Japan. *Br. Med. J.* **282,** 183, 1981.
3. Dahms T. E., Bolin J. F. and Slavin R. G. Passive smoking. Effects on bronchial asthma. *Chest* **80,** 530, 1981.
4. Berkman L. F. and Breslow L. *Health and Ways of Living*, pp. 61–112. Oxford University Press, New York, 1983.
5. Belloc N. B. and Breslow L. Relationship of physical health status and health practices. *Prev. Med.* **1,** 409, 1972.
6. Palmore E. Health practices and illness among aged. *Gerontologist* **10,** 313, 1970.
7. Fuchs V. R. *Who Shall live?* Basic, New York, 1974.
8. Slater C. H., Lorimer R. J. and Lairson D. R. The independent contributions of socioeconomic status and health practices to health status. *Prev. Med.* **14,** 372, 1985.
9. Leigh J. P. Direct and indirect effects of education on health. *Soc. Sci. Med.* **17,** 229, 1983.
10. Hoshi T. and Mori T. Smoking regulations in Japan and abroad. In *Study Report on Smoking and Health* (Edited by Smoking and Health Study Team), p. 149. Health Fund Study Report (Report), Tokyo, 1986. (In Japanese.)
11. Pratt L. The relationship of socioeconomic status to health. *Am. J. Publ. Hlth* **61,** 281, 1971.
12. Belloc N. B. Relationship of health practices and mortality. *Prev. Med.* **2,** 67, 1973.
13. Morimoto K. Lifestyle and health. *J. Publ. Hlth* **52,** 135, 274, 415, 1986. (In Japanese.)
14. Morimoto K. Induction of chromosome alterations by poor lifestyle. *Oncologia* **21,** 49, 1988. (In Japanese.)
15. Guttman L. The quantification of a class of attributes: A theory and method of scale construction. In *The Prediction of Personal Adjustment* (Edited by Horst P.), p. 329. Socio. Res. Council, New York, 1941.
16. Yanai H. and Takane Y. *Multivariate Analysis*, p. 182. Asakura Syoten, Tokyo, 1977. (In Japanese.)
17. Rokumoto K. *Legal Sociology*, p. 189. Yuuhi-kaku, Tokyo, 1986. (In Japanese.)
18. Berl K. Law and education: some aspects of Scandinavian studies into 'the general sense of justice'. *Acta sociol.* **10,** 21, 1966.