Association Between Health-Related Knowledge and the Awareness of Blood Pressure Readings

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This study aims to evaluate the relationships between awareness of blood pressure testing and health-related knowledge. Among 9 blocks in Japan, one or two areas were selected and a questionnaire survey including physical activity, nutrient intake, drinking habits, smoking habits, medical history, annual frequency of blood pressure testing, subjective sense of wellness, and health related knowledge was conducted. Respondents' sex and age were adjusted as potential confounding factors and the association between possession of health-related knowledge and awareness of blood pressure testing were examined by using a multiple logistic regression model. Among the 1,834 effective responses, 263 (14.3%) answered that they could state their blood pressure levels. These individuals tended to have a greater health-related knowledge. Even after adjusting for other potential confounders (smoking habits, medical history, annual frequency of blood pressure testing, and subjective sense of wellness) health-related knowledge were significantly related to blood pressure awareness. J Epidemiol, 1999; 9: 245-253.

METHODS

For this study, the country was divided into 9 blocks (Hokkaido, Tohoku, Kita-Kanto, National Capital Region, Tokai, Kinki, Chugoku, Shikoku, and Kyushu), from which one or two areas were selected. Cross-sectional surveys have

Chronic diseases such as cancer, stroke, and ischemic heart disease occupy prominent positions in the health-related problems in Japan. For specific disease entities, conditions that are closely related to an individual's life style, e.g., lung and colon cancers, angina pectoris, and myocardial infarction, are increasing. In examining health-related behavior (including life style), many models based on behavioral science¹⁻⁷ have been used to explain the relationship among practice, knowledge and attitude. Epidemiologic studies have been conducted in local communities from the aspect of behavioral science to establish the relationship between knowledge of health and health-related behavior⁸⁻¹⁰. The intent of this study is to examine the actual status of an individual's knowledge about the relation between life style (such as dietary habits, exercise, and smoking) and health; and to evaluate the relationship between health-related knowledge and the awareness of one's own blood pressure level.
been conducted every 3 years to follow-up on sequential changes in life style, risk factors for diseases, and morbidity. This is a report on the results of the first survey that covers the period between 1992 and 1994. The areas where the survey was conducted are shown in Figure 1. Among the 13 areas, 4 were classified as "urban sections" and 9 as "rural sections".

For the subjects of the survey in each area, candidates were recruited from the males and females between the ages of 30 to 69 years. They were selected from the register or the user of local health promotion centers. Before the survey, a candidate's willingness to participate in the research project was confirmed; and only those who agreed with the tenets of the survey were chosen. A questionnaire including physical activity, nutrient intake, drinking habits, smoking habits, medical history, annual frequency of blood pressure testing, subjective sense of wellness, and health-related knowledge was prepared. The subjects were requested to fill out the form and the entries were confirmed later at an interview. The responses to the questions on knowledge related to health were rated as either "right" or "wrong". If the respondents answered "don't know", it was assumed that their knowledge on that subject was incomplete; therefore the response was treated as "wrong". Annual frequency of blood testing and smoking status were classified into three or more categories and used as interval scales.

The awareness of one's blood pressure testing was used as an index. We asked their blood pressure measurement within the preceding year. The persons who answered that wrote down the results regularly or could state their blood pressure level were classified into "aware" group. And the persons who answered that they were not able to state the level or had not had their blood pressure taken within the preceding year were classified into "do not aware" group.

Health-related knowledge was compared in relation to one's awareness of their blood pressure testing. Then, each parameter of health knowledge was included individually as explanatory variables into multiple logistic models to adjust the sex and age for evaluation of the relation between the knowledge and the awareness of blood pressure testing. Second, the other attributes (smoking habits, medical history, annual frequency of blood pressure testing, and subjective sense of wellness) were included in the model as potential confounding factors. For the statistical analyses, an all-purpose statistical package,
SAS software (Version 6.12), was employed.

RESULTS

Totally, 2126 men and women participated in this project with response rate being 60.1%. Among them effective responses for the analyses were obtained from 1834. Table 1 shows the following parameters by sex: annual frequency of blood pressure testing, history of hypertension, treatment with anti-hypertension drug, history of hypercholesterolemia, treatment with anti-hypercholesterolemia, smoking status, educational status, dietary salt restriction and their own health, subjective sense of wellness and health-related knowledge. The residents of rural regions outnumbered (69.7%) the urban residents but there was no differences in the sex or age between the two groups. The sex was significantly related to smoking status, educational status and dietary salt restriction and their own health.

Among the respondents, 9.1% stated that they had not had their blood pressure measured over the past year. A history of hypertension was reported by 30.1% and 18.5% had received treatment with anti-hypertension drug. A history of hypercholesterolemia was listed by 23.3% and 6.2% had it treated with anti-hypercholesterolemia drug. Of the 1,282 who stated that they had no history of hypertension, 37 (2.0%) reported that they had undergone antihypertensive treatment in the past. Although it may appear inconsistent at first glance, this is a small percentage of the overall population and the possibility of antihypertensive therapy being conducted to prevent exacerbation of diseases (such as kidney dysfunctions) could not be denied. Therefore, these data were used in the analysis as they were.

Among the present and past smokers, 49.8% of the men still smoked, while 24.3% reported a history of smoking. Only 5.3% of women were still smoking and 2.6% reported past smoking. As for the educational level, 56.6% of the men had

| Variables                        | Category | Sex                  |
|----------------------------------|----------|----------------------|
|                                  |          | Male ( % )           | Female ( % )         | Total ( % )       |
| Awareness of blood pressure      | Present  | 736 ( 84.5 )         | 835 ( 86.7 )         | 1571 ( 85.7 )     |
|                                  | Absent   | 135 ( 15.5 )         | 128 ( 13.3 )         | 263 ( 14.3 )      |
| Annual frequency of blood        | none     | 85 ( 9.8 )           | 81 ( 8.4 )           | 166 ( 9.1 )       |
| pressure testing                 | once     | 191 ( 21.9 )         | 215 ( 22.3 )         | 406 ( 22.1 )      |
|                                  | 2-3      | 253 ( 29.0 )         | 270 ( 28.0 )         | 523 ( 28.5 )      |
|                                  | 4-6      | 136 ( 15.6 )         | 157 ( 16.3 )         | 293 ( 16.0 )      |
|                                  | 7-       | 206 ( 23.7 )         | 240 ( 24.9 )         | 446 ( 24.3 )      |
| Age                              | ≤49      | 319 ( 36.6 )         | 341 ( 35.4 )         | 660 ( 36.0 )      |
|                                  | 50-59    | 266 ( 30.5 )         | 330 ( 34.3 )         | 596 ( 32.5 )      |
|                                  | ≥60      | 286 ( 32.8 )         | 292 ( 30.3 )         | 578 ( 31.5 )      |
| Region                           | Urban    | 273 ( 31.3 )         | 282 ( 29.3 )         | 555 ( 30.3 )      |
|                                  | Rural    | 598 ( 68.7 )         | 681 ( 70.7 )         | 1279 ( 69.7 )     |
| History of hypertension          | Yes      | 262 ( 30.1 )         | 290 ( 30.1 )         | 552 ( 30.1 )      |
|                                  | Never    | 609 ( 69.9 )         | 673 ( 69.9 )         | 1282 ( 69.9 )     |
| Treatment with anti-hypertension | Yes      | 144 ( 16.5 )         | 196 ( 20.4 )         | 340 ( 18.5 )      |
| drug                             | Never    | 727 ( 83.5 )         | 767 ( 79.6 )         | 1494 ( 81.5 )     |
| History of hypercholesterolemia  | Yes      | 188 ( 21.6 )         | 240 ( 24.9 )         | 428 ( 23.3 )      |
|                                  | Never    | 683 ( 78.4 )         | 723 ( 75.1 )         | 1406 ( 76.7 )     |
| Treatment with anti-hyperchole- | Yes      | 49 ( 5.6 )           | 64 ( 6.6 )           | 113 ( 6.2 )       |
| steraemia drug                   | Never    | 822 ( 94.4 )         | 899 ( 93.4 )         | 1721 ( 93.8 )     |
| Smoking status                   | Current Smoker | 434 ( 49.8 )       | 51 ( 5.3 )           | 485 ( 26.4 )      |
|                                  | Ever Smoker | 212 ( 24.3 )        | 25 ( 2.6 )           | 237 ( 12.9 )      |
|                                  | Never Smoker | 225 ( 25.8 )       | 887 ( 92.1 )         | 1112 ( 60.6 )     |
| Educational status               | <18 years old | 378 ( 43.4 )        | 513 ( 53.3 )         | 891 ( 48.6 )      |
|                                  | ≥18 years old | 493 ( 56.6 )        | 450 ( 46.7 )         | 943 ( 51.4 )      |
| Subjective sense of wellness     | Well     | 670 ( 76.9 )         | 723 ( 75.1 )         | 1393 ( 76.0 )     |
|                                  | Not well | 201 ( 23.1 )         | 240 ( 24.9 )         | 441 ( 24.0 )      |
| Dietary salt restriction and their | Related | 757 ( 86.9 )         | 941 ( 97.7 )         | 1698 ( 92.6 )     |
| own health                       | Not related | 114 ( 13.1 )        | 22 ( 2.3 )           | 136 ( 7.4 )       |
| Total                            |          | 871 ( 100.0 )        | 963 ( 100.0 )        | 1834 ( 100.0 )    |
received education beyond the age of 18 years, while 46.7% of the women had attained the same educational status. For a subjective sense of wellness, 24.0% of all respondents stated that they were not well. The relationship between dietary salt restriction and their own health was negated by 13.1% of the men and by only 2.3% of women.

Table 2 shows the awareness of blood pressure testing grouped by sex and age: 14.3% respondents stated that they did not recognize their blood pressure testing. For both males and females, the percentage was greater in age groups below 49 years old.

The life style and health-related knowledge are listed according to awareness of their blood pressure level in Table 3. The question to which the highest percentage of correct answers

Table 2. Awareness of blood pressure according to sex and age.

| Sex    | Awareness of blood pressure | Total   |
|--------|------------------------------|---------|
|        | Present (%) | Absent (%) |         |
| ≤49 years old |          |           |         |
| Male   | 249 (78.1) | 70 (21.9) | 319 (100.0) |
| Female | 276 (80.9) | 65 (19.1) | 341 (100.0) |
| Total  | 525 (79.5) | 135 (20.5) | 660 (100.0) |
| 50–59 years old |          |           |         |
| Male   | 235 (88.3) | 31 (11.7) | 266 (100.0) |
| Female | 290 (87.9) | 40 (12.1) | 330 (100.0) |
| Total  | 525 (88.1) | 71 (11.9) | 596 (100.0) |
| ≥60 years old |          |           |         |
| Male   | 252 (88.1) | 34 (11.9) | 286 (100.0) |
| Female | 269 (92.1) | 23 (7.9)  | 292 (100.0) |
| Total  | 521 (90.1) | 57 (9.9)  | 578 (100.0) |

Table 3. Proportion of correct answers about the relation between lifestyle and health according to awareness of blood pressure level.

| Variables                                | Total | Present | Absent |
|------------------------------------------|-------|---------|--------|
| Methods of antihypertensive drugs administration | 67.2  | 68.8    | 57.8 **|
| Obesity and blood pressure               | 74.7  | 76.2    | 65.8 **|
| Dietary salt restriction and blood pressure | 89.7  | 90.9    | 82.5 **|
| Alcohol drinking and blood pressure      | 78.5  | 78.8    | 76.4   |
| Daily salt intake and health status      | 70.4  | 73.5    | 52.1 **|
| Fresh food and salt restriction          | 78.7  | 80.1    | 70.7 **|
| Processed food and salt restriction      | 76.6  | 76.8    | 75.3   |
| Physical labor and daily salt intake     | 42.8  | 43.9    | 36.1 * |
| Days of alcohol abstinence and health    | 80.8  | 82.0    | 73.4 **|
| Cholesterol and ischemic heart diseases  | 79.8  | 81.1    | 71.9 **|
| Walking and health                       | 76.1  | 77.7    | 66.2 **|
| Anaerobic exercise and weight control    | 60.0  | 60.4    | 57.8   |
| Aerobic exercise and weight control      | 85.0  | 85.4    | 82.5   |
| Smoking and ischemic heart diseases      | 62.2  | 63.7    | 52.9 **|
| Smoking and cancers of organs other than lung | 58.3  | 57.7    | 61.6   |
| Passive smoking and lung cancer          | 80.2  | 80.6    | 77.6   |

(**; p<0.01, *; p<0.05)
were given was on the relationship between dietary salt restriction and blood pressure (89.7%), while the question on the relationship between physical labor and dietary salt intake was answered correctly least frequently (42.8%). Over 70% of the respondents gave correct answers to most of the questions.

When the percentages for correct answers were examined in relation to the awareness of blood pressure testing, those who were aware produced correct answers at a consistently higher proportion (except for the relationship between smoking and cancer of organs other than the lung). The difference between those with and without an awareness of their blood pressure testing was more than 10% in response to the following questions: the methods of antihypertensive drugs administration, relationship between obesity and blood pressure, daily salt intake and health status, walking and health, and smoking and ischemic heart diseases. In addition, the percentages of correct answers to the following questions were significantly higher among those who were aware of their blood pressure testing: dietary salt restriction and blood pressure; fresh food and salt restriction; physical labor and salt intake; days of alcohol abstinence and health; and cholesterol level and ischemic heart diseases.

The findings given above suggested that knowledge related to health has an effect on the awareness of the blood pressure level. To evaluate this effect further, each question was included individually as explanatory variables, using sex- and age-adjusted logistic regression analyses. The results are shown in Table 4. Significant correlations were shown in the following: annual frequency of blood pressure testing; history of hypertension; treatment with anti-hypertension drug; history of hypercholesterolemia; treatment with anti-hypercholesterolemia drug; dietary salt restriction and their own health; methods of antihypertensive drugs administration; obesity and blood pressure; dietary salt restriction and blood pressure; daily salt intake and health status; fresh food and salt restriction; physical labor and daily salt intake; days of alcohol abstinence and health; cholesterol and ischemic heart diseases; walking and health; and smoking and ischemic heart diseases.

Variables other than health-related knowledge were adjusted by multiple logistic regression analysis. The results of these

| Variables                                      | Category (Exposure/Referent) | Odds ratio | 95% Confidence interval |
|------------------------------------------------|------------------------------|------------|------------------------|
| Annual frequency of blood pressure testing    | 7-1/4-6/2-3/1/0              | 2.41 **    | (2.11 - 2.77)          |
| Region                                         | Rural/Urban                  | 1.03       | (0.77 - 1.37)          |
| History of hypertension                       | Yes/No/No                   | 1.87 **    | (1.35 - 2.64)          |
| Treatment with anti-hypertension drug          | Yes/No/No                   | 2.39 **    | (1.52 - 3.94)          |
| History of hypercholesterolemia                | Yes/No/No                   | 1.48 *     | (1.06 - 2.12)          |
| Treatment with anti-hypercholesterolemia drug | Yes/No                      | 2.55 *     | (1.20 - 6.61)          |
| Smoking status                                 | Current/Current/Never       | 0.85       | (0.70 - 1.03)          |
| Educational status                             | Current/Current/Never       | 0.84       | (0.64 - 1.11)          |
| Subjective sense of wellness                  | Not well/Well               | 1.08       | (0.79 - 1.48)          |
| Dietary salt restriction and their own health  | Related/Not related         | 3.27 **    | (2.17 - 4.88)          |
| Methods of antihypertensive drugs administration| Correct/Wrong              | 1.63 **    | (1.24 - 2.13)          |
| Obesity and blood pressure                    | Correct/Wrong               | 1.68 **    | (1.26 - 2.22)          |
| Dietary salt restriction and blood pressure    | Correct/Wrong               | 2.14 **    | (1.47 - 3.06)          |
| Alcohol drinking and blood pressure            | Correct/Wrong               | 1.06       | (0.77 - 1.44)          |
| Daily salt intake and health status            | Correct/Wrong               | 2.33 **    | (1.77 - 3.06)          |
| Fresh food and salt restriction                | Correct/Wrong               | 1.60 **    | (1.18 - 2.16)          |
| Processed food and salt restriction            | Correct/Wrong               | 1.20       | (0.87 - 1.63)          |
| Physical labor and daily salt intake           | Correct/Wrong               | 1.45 **    | (1.11 - 1.92)          |
| Days of alcohol abstinence and health          | Correct/Wrong               | 1.57 **    | (1.15 - 2.12)          |
| Cholesterol and ischemic heart diseases        | Correct/Wrong               | 1.69 **    | (1.25 - 2.27)          |
| Walking and health                             | Correct/Wrong               | 1.73 **    | (1.30 - 2.29)          |
| Anaerobic exercise and weight control          | Correct/Wrong               | 1.24       | (0.94 - 1.62)          |
| Aerobic exercise and weight control            | Correct/Wrong               | 1.28       | (0.89 - 1.80)          |
| Smoking and ischemic heart diseases            | Correct/Wrong               | 1.57 **    | (1.20 - 2.06)          |
| Smoking and cancers of organs other than lung  | Correct/Wrong               | 0.88       | (0.67 - 1.15)          |
| Passive smoking and lung cancer                | Correct/Wrong               | 1.31       | (0.95 - 1.80)          |

(Each variable was evaluated individually, and adjusted for age and sex. **: p<0.01, *: p<0.05)
analyses are shown in Table 5. Significant correlations with awareness of blood pressure were noted in annual frequency of blood pressure testing; subjective sense of well-being; and dietary salt restriction and their own health. The results differed from those obtained when only sex and age were adjusted.

The findings given above suggested that the potential confounding factors other than sex and age should be adjusted to evaluate the effect between health-related knowledge and awareness of blood pressure. Table 6 shows the results of the effect of each health-related knowledge on awareness of blood pressure testing by multiple logistic regression analysis. The following were found to have statistically significant associa-

| Variables                                      | Category (Exposure/Referent) | Odds ratio | 95% Confidence interval |
|------------------------------------------------|------------------------------|------------|-------------------------|
| Sex                                            | Female/Male                  | 0.97       | (0.66 - 1.41)           |
| Annual frequency of blood pressure testing     | 0/1/2-3/4-6/7-               | 2.43 **    | (2.11 - 2.82)           |
| Age                                            | 60-69/70-79/80-              | 1.20       | (0.99 - 1.46)           |
| Region                                         | Rural/Urban                  | 1.14       | (0.79 - 1.64)           |
| History of hypertension                        | Yes/Never                    | 1.20       | (0.80 - 1.65)           |
| Treatment with anti-hypertension drug           | Yes/Never                    | 0.75       | (0.41 - 1.41)           |
| History of hypercholesterolemia                | Yes/Never                    | 1.10       | (0.74 - 1.64)           |
| Treatment with anti-hypercholesterolemia drug  | Yes/Never                    | 1.09       | (0.45 - 3.08)           |
| Smoking status                                 | Current/Ever/Never           | 0.94       | (0.77 - 1.16)           |
| Educational status                             | <18/≥18                      | 0.84       | (0.59 - 1.19)           |
| Subjective sense of wellness                   | Not well/Well                | 1.49 *     | (1.05 - 2.11)           |
| Dietary salt restriction and their own health   | Related/Not related          | 2.51 **    | (1.62 - 3.88)           |

Adjusted for all variables shown in this table. (*:p<0.05, **:p<0.01)

| Variables                                      | Odds ratio | 95% Confidence interval |
|------------------------------------------------|------------|-------------------------|
| Methods of antihypertensive drugs administration| 1.38 *     | (1.03 - 1.84)           |
| Obesity and blood pressure                     | 1.46 *     | (1.07 - 1.99)           |
| Dietary salt restriction and blood pressure    | 1.81 **    | (1.19 - 2.73)           |
| Alcohol drinking and blood pressure            | 0.95       | (0.67 - 1.34)           |
| Daily salt intake and health status            | 1.86 **    | (1.38 - 2.50)           |
| Fresh food and salt restriction                | 1.25       | (0.90 - 1.73)           |
| Processed food and salt restriction            | 0.93       | (0.65 - 1.31)           |
| Physical labor and daily salt intake           | 1.21       | (0.89 - 1.63)           |
| Days of alcohol abstinence and health          | 1.51 *     | (1.08 - 2.10)           |
| Cholesterol and ischemic heart diseases        | 1.37       | (0.98 - 1.91)           |
| Walking and health                             | 1.32       | (0.96 - 1.80)           |
| Anaerobic exercise and weight control          | 1.20       | (0.89 - 1.62)           |
| Aerobic exercise and weight control            | 1.16       | (0.78 - 1.69)           |
| Smoking and ischemic heart diseases            | 1.36 *     | (1.01 - 1.84)           |
| Smoking and cancers of organs other than lung  | 0.84       | (0.63 - 1.13)           |
| Passive smoking and lung cancer                | 1.31       | (0.91 - 1.86)           |

Referent group: Wrongly answered (**: p<0.01, *: p<0.05)

Each variable was evaluated individually, and adjusted for sex, annual frequency of blood pressure testing, age, region, history of hypertension, treatment with anti-hypertension drug, history of hypercholesterolemia, treatment with anti-hypercholesterolemia drug, smoking status, educational status, subjective sense of wellness, dietary salt restriction and their own health.
Appendix. Questions about health related knowledge.

1) Antihypertensive drugs should be taken only when the blood pressure elevated.
   1. True  2. False  3. Do not know

2) Are these manners good way to keep your blood pressure level normal or to decrease it?
   a) Reduce weight when you are obese  1. True  2. False  3. Do not know
   b) Decrease dietary salt intake  1. True  2. False  3. Do not know
   c) Avoid drinking too much  1. True  2. False  3. Do not know

3) To take less than 10g salt per day is good to keep good health.
   1. True  2. False  3. Do not know

4) Are these manners good way to restrict salt intake?
   a) Eating food fresh and in season  1. True  2. False  3. Do not know
   b) Eating frozen or processed food  1. True  2. False  3. Do not know

5) Manual laborers should take salt as much as they can.
   1. True  2. False  3. Do not know

6) Drinking less than five days per week and less than 360 ml of Japanese saki per day is good to keep yourself healthy.
   1. True  2. False  3. Do not know

7) Elevated cholesterol in blood makes you suffer from angina pectoris and myocardial infarction easily.
   1. True  2. False  3. Do not know

8) Walking ten thousand steps every day is good for health.
   1. True  2. False  3. Do not know

9) Are the following exercise is good way to improve obesity?
   a) Improve muscle power by weight training  1. Good  2. Not so good  3. Do not know
   b) Walking with quick steps or jogging  1. Good  2. Not so good  3. Do not know

10) Smoking makes you suffer from angina pectoris and myocardial infarction easily.
    1. True  2. False  3. Do not know

11) Smoking makes you suffer from cancers except lung easily.
    1. True  2. False  3. Do not know

12) Even if you do not smoke, inhalation fumes from others makes you suffer from cancers easily.
    1. True  2. False  3. Do not know

DISCUSSION

The present study focused on the current status of health-related knowledge and its relationship with awareness of blood pressure levels. The percentage of correct answers varied among the questions posed on health-related knowledge. The percentage of correct answers on the relationship between blood pressure and dietary salt reduction was 89.7%, which generally corresponded with the percentage of awareness of daily salt intake by individuals over 40 years of age (over 90%) according to a nationwide survey. However, the percentage of awareness of the relationship between smoking and ischemic heart diseases and also smoking and cancers of organs other than lung was 62.2% and 58.3%, respectively, which were lower than that of the effect of smoking on health (97.3%) that was found in a national survey. Almost all were aware of the relationship between smoking and lung cancer while the level of awareness of relation between smoking and other diseases was not so high. These findings generally agree with the results of a survey on health awareness of the employees of Gifu Prefecture, indicating that 62.5% of the respondents knew the relationship between smoking and angina pectoris.

In the analysis where only sex and age had been adjusted, a history of hypertension and hypercholesterolemia and their treatment were significantly related to an awareness of blood pressure testing. When the respondent has been treated for hypertension, the blood pressure itself is the target of the treatment so it is natural to be more concerned with their blood pressure. Furthermore, when a person is being treated for hypercholesterolemia or is under any form of medical treatment, it is readily conceivable that they will be aware of their blood pressure, one of the indices of their health status. When adjusted with parameters such as annual frequency of blood pressure testing by multiple logistic regression analysis, however, a history of hypertension and hypercholesterolemia and their treatment were not significantly related to awareness of blood pressure. Thus it was suggested that when individuals...
have a history of these conditions and their treatment, their blood pressure will be determined frequently, consequently raising their awareness of blood pressure.

The subjective sense of wellness did not have significant associations with blood pressure unless sex and age were adjusted. However, when other confounding factors were adjusted, persons with lower knowledge and awareness of blood pressure testing were found to be related to awareness of blood pressure testing, which is one of the indices of health status.

Knowledge on the relation between dietary salt restriction and their own health was significantly related to awareness of blood pressure reading, both in the analysis where only sex and age were adjusted and in the analysis where other factors together with the aforementioned two were adjusted. Even when there are incidences of ischemic heart diseases among siblings, persons with lower knowledge on the relation between diet and health didn't change their smoking and food habits.

When the subjects were grouped by awareness of blood pressure testing, it was found that the persons with awareness of blood pressure possessed better health-related knowledge, even in the analysis where only sex and age factors had been adjusted. Exposure to medical treatment improves one's knowledge related to health. When a person suffers from some illness not mentioned in the present survey, the possibility of heightened health-related knowledge and awareness of blood pressure prior to the start of the present survey cannot be denied. However, even after the anticipated potential confounding factors had been adjusted, health-related knowledge was found to be related to awareness of blood pressure testing with statistical significance.

The association between health-related knowledge and awareness of blood pressure testing was statistically significant. But the subjects of the present survey were limited to those who consented to participate in the project. Like those who participate in cancer screening projects, the subjects were associated with relatively low risk factors for diseases. Thus, there is a possibility that they possess better health-related knowledge than the general public.

In the present study, each specific item of health-related knowledge was independently evaluated for its effect on the awareness of blood pressure testing. In a future project, comprehensive evaluation indices using multiple questions will be prepared to determine the accuracy of health-related knowl-

edge. If an index includes elements other than knowledge such as risk perception, it can be useful for a health-promoting campaign when the possession of health-related knowledge is not necessarily related to healthy behavior. Improving one's knowledge related to dietary salt intake is a major subject in health education, but it is also essential to include other factors, such as the effect of smoking on the development of cancer of organs other than the lung (for which a general lack of knowledge was shown in the present survey).

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