Headache, Mental Health, and Use of Medical Resources: Health Diary Study in Japan

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To examine the association between poor mental health state and having headache in the Japanese general population, and the association between demographic characteristics and use of medical resources among subjects with headache. The subjects aged 18 through 75 years were chosen from the Japanese general population. We administered a questionnaire to obtain baseline data, and asked the participants to keep a personal health-diary during October 1–31, 2003. The state of mental health (MH) was examined using the SF-8 Health Survey in the baseline questionnaire. Of the 2371 subjects, 716 had a headache on at least one day during the study period. Of the 716, 52 consulted a physician, 475 used other medical resources, and 189 did nothing about the headache. There was an association between MH score and headache [adjusted odds ratio (OR) = 1.166 (95% confidence interval (CI): 1.010–1.346) for 10-point increment of MH score]. There was also an association between use of medical resources and having a family physician. Poor mental health was associated with headache in the Japanese general population, and one of the predictors of consulting a physician among the headache sufferers was having a family physician whom the subject greatly trusts.

Key words —— headache, health diary, medical resource, mental health, SF-8 Health Survey

INTRODUCTION

Headache is a very common complaint.[1–4] Previous studies showed that headache is associated with depression, stress and anxiety.[4–6] Drugs with antidepressant actions are also effective in the prophylactic treatment of both tension-type headache and migraine.[1] Recent studies also examined the impact of migraine on functional health that included mental health (MH) and well-being.[7–10] However, the association between MH and headache in Japan is not clear. Moreover, little is known about the use of medical resources among individuals with headache. To find which groups are at high risk for headache in the Japanese general population, we examined the association between MH and headache. We also examined the associations between demographic characteristics and the use of a medical resource for treatment of headache among the subjects with headache.

MATERIALS AND METHODS

Subjects and Questionnaire —— This study was part of the prospective health diary study conducted in Japan.[11] Ethical approval was obtained from the Research Ethics Committee of Kyoto University Graduate School of Medicine, Japan. The method used for data collection was described by Fukui *et al.*[11] In brief, a nationally representative panel comprised of 210000 households, and belonging to the Japan Statistics & Research Co. Ltd. (Tokyo, Japan), was used. Taking into consideration the size of the cities, towns and villages, a population-

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weighted, random sample of 5387 households was chosen. A letter describing this study and requesting the participation of families in the study was mailed to the 5387 households with a return envelope. Among them, 1867 households agreed to participate in the study. The sample size was adjusted to 1464 households to make the sample nationally representative in terms of co-habitation with a family member.

Data were collected from a baseline questionnaire and health diary. The written baseline questionnaire was administered to 3852 individuals in the 1464 households. The baseline questionnaire included the SF-8 Health Survey (SF-8), age, sex, cohabitants, co-habitation with a family member, morbid conditions, annual household income, employment, and number of working hours. This questionnaire also asked whether the individual had a family physician and if so, whether the individual highly trusted the physician or not. A subject was considered to have a family physician whom the subject greatly trusts if the subject assigned a score of 9 or 10 for the family physician on the 0–10 visual analogue scale (in which 10 corresponded to having a physician whom the subject greatly trusts). Information about the location of residence (urban or rural) was obtained from the random sampling process.

We mailed blank health-diary notebooks to the households. Participants in the households were asked to fill out baseline questionnaire from September 18, 2003 until October 3, 2003, and their own health diary daily from October 1, 2003 until October 31, 2003. The health diary included the following questions: Did you have any pain or health symptoms that made you feel uncomfortable today? If so, write down your specific symptoms. If you did have a symptom, did you (i) do nothing about it? (ii) consult a person(s) who was not a physician? (iii) take an over-the-counter (OTC) drug? (iv) take a vitamin or other supplement? (v) use a resource of oriental medicine? (vi) consult a physician? (vii) use another medical resource(s)?

We divided the subjects into the following two groups: the headache group consisted of those who reported that they had headache symptoms on 1 or more days during the study period, and the no-headache group consisted of the remaining subjects who did not have a headache during the study period.

We also divided the subjects who had a headache on one or more days during the 31-day study period into five groups according to the use of medical resources as follows: (a) consulting physician group: subjects who had a headache for one or more days during the study period and consulted a physician on one or more days; (b) oriental medicine resources group: subjects who had a headache on one or more days during the study period, who did not consult a physician, and who used a resource of oriental medicine on one or more days; (c) OTC drug group: subjects who had a headache on one or more days during the study period, who did not consult a physician nor use any resource of oriental medicine, and who used an OTC drug on one or more days; (d) other medical resource group: subjects who had a headache on one or more days during the study period, and who did not consult a physician, did not use an oriental medicine resource, did not use an OTC drug, but used another medical resource; (e) doing nothing group: subjects who had a headache on one or more days during the study period and who did nothing about it. We also defined the 'using medical resource but not consulting a physician' (MNP) group as subjects who used a medical resource but did not consult a physician; this group included the (b), (c) and (d).

The SF-8 Health Survey —— Several instruments that score the mental health state, which were validated scientifically, can detect depressive state. One such questionnaire is the five-item version of the Mental Health Inventory (MHI-5).[12] The MHI-5 serves as the MH domain of the SF-36 Health Survey (SF-36), which is one of the widely used, generic, health-related quality of life (HRQOL) instruments and has been translated into Japanese. [13, 14] The SF-8, which is a new, generic, eight-item assessment, is an alternative form of the SF-36 and generates a health profile consisting of eight scales and two summary measures describing the HRQOL. The SF-8 relies on a single item to measure each of the eight domains of health in the SF-36, which are physical functioning, role limitation due to physical health problems, bodily pain, general health, energy/fatigue, social functioning, role limitation due to emotional problems, and MH. The SF-8 had been constructed to provide an even shorter alternative to the SF-36 for use in large, population-based surveys of general and specific populations, in which precision is achieved more from sample size than by increasing measurement reliability. By administering a questionnaire of only eight items, the SF-8 reproduces the eight scales and two summary measures from the SF-36. The SF-8 is the first short-form sur-

Table 1. Subjects with or without Headache and Their Use of Medical Resources in October 2003

	N	(%)
	2371	(100)
No headache	1655	(70)
(a) Headache / Consulting Physician group	52	(2)
(b) Headache / OTC Drug group[a]	409	(17)
(c) Headache / Oriental Medicine Resources group[a]	13	(1)
(d) Headache / Other Medical Resource group[a]	53	(2)
(e) Headache / Doing Nothing group[b]	189	(8)

a) The MNP group consisted of subjects in (b), (c), and (d) as the group who used a medical resource but did not consult a physician (*n* = 475). *b*) No use of medical resource.

vey to be constructed on the basis of empirical studies linking each item to a comprehensive 'pool' of widely-used questionnaire items proven to measure the same concept. Because the item pool included the SF-36 survey, each SF-8 single-item scale and SF-8 summary measures are scored on the same metrics as the SF-36 scales and summary measures. The SF-8 was scored using a published algorithm, *i.e.*, by assigning the mean SF-36 scale score from the general Japanese population in 2002 to each response category of the SF-8 measuring the same concept.[15] The score have a mean of 50 and a standard deviation of 10 in the general 2002 Japanese population. A lower score indicates poorer health status, that is, a lower MH score indicates poorer MH, and higher tendency for psychological distress and poor well-being.

Statistical Methods —— The subjects were limited to adults aged 18 through 75 years who filled out the baseline questionnaire and the diary completely. In each subject, we determined the number of days that the subject had a headache or migraine during the month of October 2003 based on the personal health diary. We studied the associations between demographic characteristics and having a headache using the chi-square test. Next, we used a logistic regression model to calculate the odds ratio (OR) for poor MH for the headache group compared to the no-headache group. Adjustments were made for age, sex, co-habitants, co-morbid conditions, household income, number of working hours, and location of residence.

In the second analysis, we investigated factors associated with using a medical resource for their headache among those subjects who had a headache on one or more days. That is, using multivariate logistic regression analysis, we estimated the ORs of having a co-habitant(s), having a co-morbid condition(s), level of household income, number of working hours, location of residence, MH score, and the number of days of having a headache in the

Table 2. Number of Days with Headache Symptoms during the 31-day Period

	N	(%)
	2371	(100)
None	1655	(70)
1 day	325	(14)
2 days	157	(7)
3 days	82	(3)
4–6 days	108	(5)
7 days or over	44	(2)

consulting-physicians group, and in the MNP group compared with the doing-nothing group.

RESULTS

The baseline questionnaire was administered to 3852 individuals in 1464 households. Among them, 3477 individuals in 1286 households filled out the questionnaire completely. After excluding individuals aged less than 18 years ($N = 1026$) or for other reasons ($N = 80$), there were 2371 eligible subjects. Among the 2371 individuals, 716 (30%) had a headache on one or more days during the study period. With respect to utilization of health services, among the 716 subjects, 52 consulted a physician for their headache on one or more days, 475 used a medical resource but did not consult a physician, and 189 did nothing (Table 1). Table 2 shows the distribution of the number of days that the subjects had a headache. Of the 716 subjects who had a headache, 234 had a headache on 3 or more days during the study period. The demographic characteristics of the 2371 subjects are summarized in Table 3. The headache group was significantly younger than the no-headache group [41 [standard deviation (S.D.)= 14] years *vs*. 47 (S.D. = 16) years; $p < 0.0001$]. The MH score of the headache group was significantly lower than that of the no-headache group [47 (S.D. = 7) *vs*. 49 (S.D. = 7); $p < 0.0001$].

Table 3. Demographic Characteristics of the Subjects

	Total		No-headache group[a]		Headache group[a]		p
	N	(%)	N	(%)	N	(%)	
	2371	(100)	1655	(100)	716	(100)	
Sex							< 0.001
Male	1065	(45)	870	(53)	195	(27)	
Female	1306	(55)	785	(47)	521	(73)	
Age (years old)							< 0.001
18–29	480	(20)	296	(18)	184	(26)	
30–39	483	(20)	312	(19)	171	(24)	
40–49	506	(21)	338	(20)	168	(23)	
50–59	362	(15)	261	(16)	101	(14)	
60–75	540	(23)	448	(27)	92	(13)	
Co-habitation with family member							0.006
Living alone	385	(16)	246	(15)	139	(19)	
Other	1986	(84)	1409	(85)	577	(81)	
Diagnosed medical conditions							0.003
No	1635	(69)	1110	(67)	525	(73)	
Yes	736	(31)	545	(33)	191	(27)	
Number of working hours							0.004
Does not work	857	(36)	600	(36)	257	(36)	
1–24 hr/week	393	(17)	245	(15)	148	(21)	
25–48 hr/week	571	(24)	409	(25)	162	(23)	
49 hr or more/week	467	(20)	345	(21)	122	(17)	
Missing data	83	(4)	56	(3)	27	(4)	
Annual household income (million yen)							0.060
< 300	367	(15)	241	(15)	126	(18)	
300–999	1669	(70)	1178	(71)	491	(69)	
≧ 1000	261	(11)	177	(11)	84	(12)	
Missing data	74	(3)	59	(4)	15	(2)	
Location of residence							0.517
Urban	1915	(81)	1331	(80)	584	(82)	
Rural	456	(19)	324	(20)	132	(18)	

a) The headache group included subjects who had a headache on one or more days, and the no-headache group included the remaining subjects.

The associations between demographic characteristics and having headaches on crude analysis are also shown in Table 3.

Table 4 shows the results of adjusted analysis. The significant associations between headache and sex, age, and co-habitation status remained after the adjustments. We also observed a significant association between the MH score on the SF-8 and headaches [OR = 1.166 (95% confidence interval (CI): 1.010, 1.346) for 10-point increment of MH score].

In the second analysis, we examined the associations between demographic characteristics and the use of a medical resource among the subjects who had a headache on one or more days during the study period. We observed significant associations between the number of days of headache and using an OTC drug or other medical resource [adjusted ORs of one-day increment of headache were 1.305 (95% CI: 1.146, 1.486), and 1.640 (95% CI: 1.320, 2.037) for consulting a physician] (Table 5). Moreover, we observed an association between consulting a physician and having a family physician. The OR for having a family physician whom the subject does not greatly trust (score > 9) was 2.648 (95% CI: 1.059, 6.618), and the OR for having a family physician whom the subject greatly trusts (score > 9) was 3.901 (95% CI: 1.213, 12.54) compared with the group who did not have a family physician (Table 5).

DISCUSSION

In this study, we observed significant associations between having headaches and sex, age, co-

Table 4. Results of Adjusted Analysis of the Associations between Risk Factors and Having Headaches

	ORs[a]	(95% CI)
Sex		
Male	1.000	(Ref.)
Female	3.400*	(2.646, 4.369)
Age (years old)		
18–29	2.851*	(2.012, 4.040)
30–39	3.084*	(2.146, 4.434)
40–49	2.754*	(1.916, 3.958)
50–59	1.885*	(1.296, 2.740)
60–75	1.000	(Ref.)
Co-habitation with a family member		
Living alone	1.393*	(1.045, 1.858)
Other	1.000	(Ref.)
Diagnosed medical conditions		
No	1.000	(Ref.)
Yes	0.890	(0.704, 1.125)
Number of working hours		
No work with wages	0.872	(0.661, 1.150)
1–24 hr/week	1.000	(Ref.)
25–48 hr/week	0.876	(0.641, 1.197)
49 hr/week or over	1.090	(0.762, 1.561)
Annual household income (million yen)		
< 300	0.955	(0.644, 1.417)
300–999	0.782	(0.575, 1.063)
≧ 1000	1.000	(Ref.)
Location of residence		
Urban	1.000	(Ref.)
Rural	0.919	(0.719, 1.176)
MH (10-point decrease)	1.166*	(1.010, 1.346)

a) Odds ratios of each risk factor for having headaches on one or more days during the 31-day period (headache group *vs.* no-headache group) using multivariate logistic regression analysis. Independent variables in the logistic regression model were sex, age, co-habitation with a family member, diagnosed medical conditions, number of working hours, annual household income, location of residence, and MH score on the SF-8. *$p < 0.05$.

habitation status, and MH in both crude analysis and adjusted analysis. With respect to factors related to using medical resources among the headache sufferers, we showed that one of the predictors of consulting a physician among the headache patients was having a family physician whom the subject greatly trusts.

Thirty percent of the subjects in our study had a headache on one or more days during a 31-day period (Table 2). With respect to utilization of health services by the headache sufferers in this study ($N = 716$), 57% used an OTC medicine and 7% visited a primary care physician's office or the hospital (Table 1). Sakai and Igarashi[2] reported that 56% of their subjects had a recurrent headache in the past one year in a population-based, nationwide survey in Japan. The prevalence of migraine was 8%. They

also studied health service utilization by the migraine sufferers. Among the respondents, 57% used an OTC medicine, 3% visited a primary care physician's office or hospital regularly, and 12% visited a primary care physician's office or hospital once or twice in the past year. The previous survey asked individuals about their symptoms of headache in the past one year. Therefore, we cannot directly compare the prevalence of headache among our study subjects with the prevalence of headache among the subjects in the study of Sakai and Igarashi[2] because they studied the prevalence over one year, while we studied the prevalence over a month. The method used in our study, *i.e.*, a prospective health diary study, has been shown to increase the likelihood that respondents will report most of their symptoms.[16, 17] Another advantage of health diary sur-

Table 5. Results of Multivariate Logistic Regression Analysis to Examine the Associations between the Use of Resources for Headache and Factors among the Subjects with Headache (N = 716)[a]

	MNP group[b] (N = 475) compared with doing nothing[c] (N = 189)		Consulting a physician (N = 52) compared with doing nothing[c] (N = 189)	
	OR	(95% CI)	OR	(95% CI)
Sex				
Male	1.000	(Ref.)	1.000	(Ref.)
Female	1.349	(0.819, 2.220)	0.656	(0.218, 1.976)
Age (years old)				
18–29	1.075	(0.546, 2.116)	1.069	(0.300, 3.808)
30–39	1.157	(0.567, 2.361)	1.011	(0.259, 3.951)
40–49	1.703	(0.829, 3.495)	0.714	(0.165, 3.088)
50–59	0.931	(0.448, 1.933)	0.419	(0.085, 2.059)
60–75	1.000	(Ref.)	1.000	(Ref.)
Co-habitation with a family member				
Living alone	0.847	(0.500, 1.435)	1.639	(0.562, 4.782)
Other	1.000	(Ref.)	1.000	(Ref.)
Diagnosed medical conditions				
No	1.000	(Ref.)	1.000	(Ref.)
Yes	1.092	(0.679, 1.757)	1.483	(0.600, 3.662)
Number of working hours				
No work with wages	1.011	(0.613, 1.669)	0.857	(0.306, 2.402)
1–24 hr/week	1.000	(Ref.)	1.000	(Ref.)
25–48 hr/week	1.217	(0.685, 2.160)	0.614	(0.178, 2.121)
49 hr or more/week	1.242	(0.631, 2.442)	0.942	(0.212, 4.183)
Annual household income (million yen)				
< 300	1.514	(0.748, 3.065)	0.689	(0.158, 3.001)
300–999	1.490	(0.858, 2.585)	0.969	(0.317, 2.965)
≧ 1000	1.000	(Ref.)	1.000	(Ref.)
Location of residence				
Urban	1.000	(Ref.)	1.000	(Ref.)
Rural	0.926	(0.581, 1.477)	1.174	(0.455, 3.030)
MH (10-point decrease)	0.808	(0.605, 1.077)	0.934	(0.543, 1.607)
No. of days with headache (1-day increase)	1.305*	(1.146, 1.486)	1.640*	(1.320, 2.037)
Having a family physician				
No	1.000	(Ref.)	1.000	(Ref.)
Yes, a family physician whom the subject does not greatly trust[d]	1.080	(0.680, 1.716)	2.648*	(1.059, 6.618)
Yes, a family physician whom the subject greatly trusts[d]	1.349	(0.714, 2.546)	3.901*	(1.213, 12.542)

a) The independent variables in the logistic regression model were sex, age, co-habitation with a family member, diagnosed medical conditions, number of working hours, annual household income, location of residence, MH score on the SF-8, number of days of having headache in October 2003, and having a family physician. b) MNP group: using a medical resource but not consulting a physician. c) Doing nothing: no medical resource use. d) A subject was considered to have a family physician whom the subject greatly trusts if the subject assigned a score of 9 or 10 for the family physician on the 0–10 visual analogue scale (10 for having a physician whom the subject greatly trusts). *$p < 0.05$.

veys is that it minimizes recall bias compared with a questionnaire that requires subjects to remember his/her symptoms over the past 1 year or past 1 month. These evidences suggest that there are many headache sufferers in Japan and that many headache sufferers use OTC medicines and are not given adequate medical information from physicians.

We clarified the major risk factors for headache (female, aged 18 years through 59 years, living alone, and lower mental health). Providing appropriate health instructions at the time of health checkup or when an occupational health survey is performed, might be effective in improving the health of individuals.

There were some limitations in this study. We used a health diary, headache was self-reported, and we could not classify the type of headache. That is, the health diary we used in this study was not a spe-

cific headache diary and did not include information about headache intensity and associated symptoms. Therefore, it was not possible to establish a more specific headache diagnosis. Furthermore, the information in the diary about headache was not validated. Second, although the demographic characteristics of the subjects were similar to those obtained in the national census in Japan, the participation rate in this study was very low. We could not rule out that selection bias did not affect our results. Third, we are unable to discuss cause-effect relationships between MH and headache because we analyzed the data of this prospective health diary study as a cross-sectional survey. Despite these limitations, the results of this study are still valuable because there have been only a few studies that examined the association between MH and headache in the Japanese general population and the association between demographic characteristics and the use of medical resources by headache sufferers.

In conclusion, poor mental health was associated with headache in the Japanese general population, and one of the predictors of consulting a physician among the headache sufferers was having a family physician whom the subject greatly trusts.

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