ORIGINAL RESEARCH

The Association Between Medical Treatment of Physical Diseases and Psychological Distress After the Great East Japan Earthquake: The Shichigahama Health Promotion Project

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ABSTRACT

Objective: Physical disease patients are known to experience high levels of psychological distress. This study examined the association between the medical treatment of physical diseases and psychological distress in the coastal area affected by the Great East Japan Earthquake.

Methods: Using cross-sectional data, we studied 3032 individuals aged ≥40 years who lived in Shichigahama, Miyagi, Japan. We examined the associations between 8 medical treatments for physical diseases and psychological distress, defined as Kessler Psychological Distress scale score ≥13 of 24 points. To investigate the associations, we performed multiple logistic regression analyses.

Results: There were statistically significant associations between psychological distress and medical treatments for myocardial infarction/angina pectoris (odds ratio [OR] = 1.8, 95% confidence interval [CI] = 1.0-3.0) and liver disease (OR = 3.1, 95% CI = 1.0-7.7). The other 4 medical treatments for physical diseases had ORs of 1.3 or higher and were positively associated with psychological distress: cancer, hyperlipidemia, kidney disease, and diabetes mellitus. The degree of damage to homes did not affect the association between most of the medical treatments for physical diseases and psychological distress.

Conclusions: In the disaster area, most of the medical treatments for physical diseases had positive associations with psychological distress, irrespective of the degree of damage to homes. (*Disaster Med Public Health Preparedness*. 2015;9:374-381)

Key Words: psychological warfare, preventive health services, mental disorders, public health, earthquakes

The number of patients with mood (affective) disorders, including depressive disorders, has been consistently high among Japanese people since 2005 (0.924 million in 2005, 1.041 million in 2008, and 0.958 million in 2011) according to the Patient Survey by the Ministry of Health, Labour, and Welfare in Japan.[1] In Japan, individuals who suffer from depressive disorders have the second highest number of disability-adjusted life years.[2] Thus, determining the risk factors for depression (ie, major depression or elevated depressive symptoms) is important, as early detection may prevent severe cases of depression or psychological distress from developing.

For many years, depression has been common among patients with physical diseases, such as diabetes,[3] cardiovascular disease,[4] HIV infection,[5] rheumatoid arthritis,[6] and cancer.[7] In our previous large cross-sectional study,[8] a history of physical diseases such as cancer, diabetes mellitus, and hypertension was positively associated with psychological distress among 43 487 subjects living in a community located in Miyagi Prefecture before the disaster. In terms of the mechanisms involved in the associations between physical disease and psychological distress, subjects with a physical disease may experience physiological stress reactions,[9] an increased level of fatigue,[10] or a decreased level of activity of daily life (ADL)/quality of life (QOL).[11-13] Further, it has been shown that psychological distress acts as one of the major factors causing various physical diseases.[14,15]

On March 11, 2011, the northeastern coast of Japan was devastated by the Great East Japan Earthquake of

magnitude 9.0 and the tsunami that followed the earthquake. On March 11, 2015, 18 475 people were recorded as dead or missing because of the earthquake.[16] Three years have passed since the disaster, and its adverse psychological effects on the survivors are now apparent.[17] Although previous studies have indicated that disaster influences occurrence and characteristics of various kinds of physical diseases, and psychological distress has been considered to be an important factor underlying this influence,[18-20] the association between psychosocial distress and medical conditions in postdisaster settings has not been well characterized. If those who have physical disease experience a disaster simultaneously, the level of psychological distress may be high. In that case, special attention for mental health care will be needed in postdisaster medical settings.

In this study, we examined the psychological distress among patients who received treatment for physical diseases in the disaster area, and we also examined whether these associations were affected by the degree of damage to homes. We used data obtained from a population-based study of over 3000 subjects to investigate the associations between medical treatments for physical disease, psychological distress, and the degree of damage to homes, which were adjusted for the potentially confounding effects of various lifestyle-related and socioeconomic factors.

MATERIALS AND METHODS

Study Design, Setting, and Participants

This study was based on a health survey as a part of a project named Shichigahama Health Promotion Project, a cooperative project between Tohoku University and Shichigahama Town in regards to health promotion activities, a health survey, and health supports for the people affected by the Great East Japan Earthquake. The survey aimed to evaluate the current overall health and life status of community members in 5 specific seashore areas of Shichigahama Town during September 2012, where more than 10% of households were partially or totally destroyed by the Great East Japan Earthquake and tsunami.

The entrusted survey teams visited all households in the target area and asked for participation in the survey. A form for written informed consent and the questionnaire were handed directly to the residents who expressed willingness to participate in the survey and subsequently collected. First, in October 2012, there was a survey for residents whose homes were suffered by large-scale damage, which was followed in December 2012 by a survey of residents of the same affected seashore area whose homes underwent small-scale damage. Definition of large-scale damage was based on the criterion of "partially or totally destroyed" in the building damage assessment conducted by the local government of Shichigahama town following the criteria issued by the Cabinet Office, and small-scale damage represented less or no damage due to the disaster.

Of the study population of 7036 subjects (2910 with large-scale damage and 4126 with small-scale damage), 6840 participants (97%) were reached by the survey team, and 4949 (70%) participated in the survey upon written informed consent and returned the questionnaire. Among the total participants, 3886 (55%) completed the Kessler Psychological Distress scale (K6) survey section, and of them, 3032 (43% of the total) were aged ≥40 years. Thus, data from the 3032 participants (1206 with large-scale damage and 1826 with small-scale damage) were subjected to the following analyses (Figure 1). In this study, we excluded the subjects who were less than 40 years old (n = 854) because almost no subjects received treatment for physical diseases: stroke (n = 0), myocardial infarction or angina pectoris (n = 0), cancer (n = 0), kidney disease (n = 1), liver disease (n = 0), hypertension (n = 7), diabetes mellitus (n = 9), and hyperlipidemia (n = 4).

Measurements

Data regarding current treatments for selected physical diseases were collected using a self-administered questionnaire, which asked whether the subjects were undergoing treatment for any of the following 8 physical diseases: stroke, myocardial infarction or angina pectoris, cancer, kidney disease, liver disease, hypertension, diabetes mellitus, or hyperlipidemia. These diseases were selected based on the rationale that they are frequent among Japanese and may be related to psychological stress. Basic individual information (ie, age, gender, income, body weight and height, time spent walking per day, smoking status, and alcohol drinking status), as well as detailed information of personal experience of the Great East Japan Earthquake (eg, the subject's location during the great earthquake, evacuation, presence of posttraumatic stress response, and the death of family members) were collected through the questionnaire.

Psychological Distress

The K6 scale was used as an indicator of psychological distress.[21-23] The respondents were asked about their mental status over the previous month based on 6 questions, to which they responded by selecting: "all of the time" (4 points), "most of the time" (3 points), "some of the time" (2 points), "little of the time" (1 point), or "none of the time" (0 points). The total scores ranged from 0 to 24. The questions were as follows: "Over the last month, how often have you felt the following: [i] nervous, [ii] hopeless, [iii] restless or fidgety, [iv] so sad that nothing could cheer you up, [v] that everything was an effort, or [vi] worthless?" K6 is based on modern psychometric theory and it outperforms other scales.[21,22] The Japanese version of K6 was developed recently using the standard back-translation method and it has been validated.[24] As suggested by several researchers, we classified individuals with scores of ≥13 of 24 points as having psychological distress.[8,17,23-25] Furukawa et al[24] investigated whether K6 could predict the 30-day prevalence of *Diagnostic and Statistical Manual of Mental Disorders* (Fourth Edition) (DSM-IV)–defined mood and anxiety disorders based

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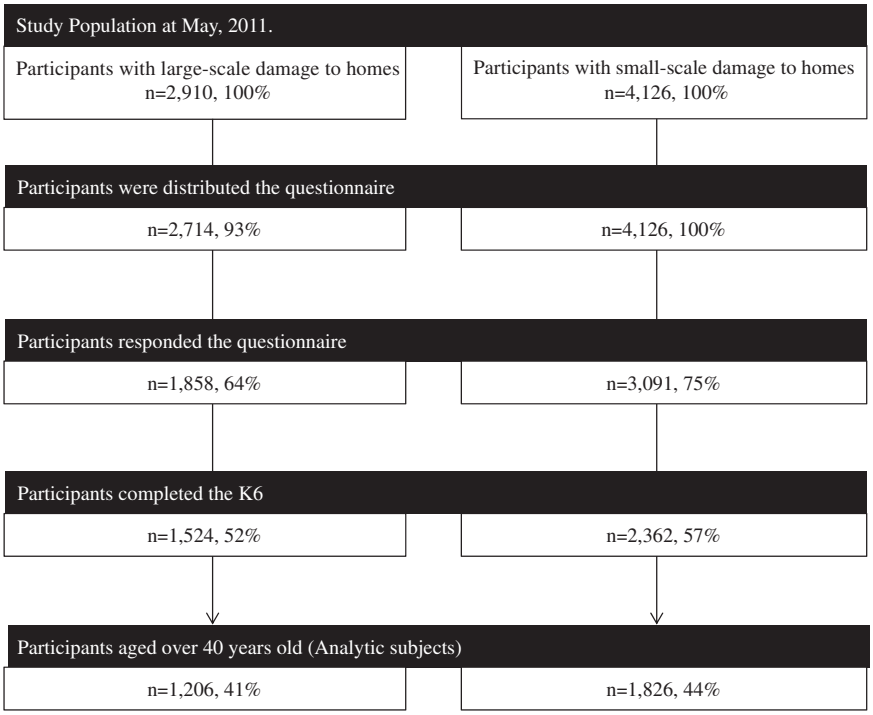
FIGURE 1

Study Participants in the Shichigahama Health Promotion Project, Shichigahama, Miyagi, Japan (n = 3032)



on the World Health Organization Composite International Diagnostic Interview in the Australian National Survey. They showed that K6 detected DSM-IV–defined mood and anxiety disorders (area under the receiver operating curve [AUC]: 0.89; 95% confidence interval [CI]: 0.88-0.90) better than the General Health Questionnaire 12 (AUC: 0.80; 95% CI: 0.78-0.82).

Ethical Issues

The study protocol was reviewed and approved by the Ethics Committee of Tohoku University Graduate School of Medicine.

Statistical Analyses

Multiple logistic regression analyses were implemented to evaluate association between medical conditions and psychological distress. The multivariate odds ratios (ORs) were adjusted for gender, age in years (40-49, 50-59, 60-69, ≥70), current cigarette smoking (no smoking, 1-19 cigarettes/day, ≥20 cigarettes/day, unknown), alcohol consumption (no drinking, ≤1 *go*/day, ≥2 *go*/day, unknown; 22.8 g of alcohol amounts to 1 *go* or traditional unit of sake (180 ml), which also approximates two glasses of wine (200 ml), or beer (500 ml) in terms of alcohol contents.), time spent walking (<0.5 hours/day, ≥0.5 hours/day, unknown), income (difficult to live, no problem or easy to live, unknown), and degree of damage to homes (large-scale, small-scale).

Stratified analyses according to differences in the degree of damage to homes were applied to evaluate whether this factor significantly interacted with the association between medical conditions and psychological distress.

Finally, we conducted multiple logistic regression analyses. The categories of the degree of damage to homes and each medical treatment for physical disease were combined, and we then grouped subjects into 4 categories: damage (small-scale) and physical disease (−), damage (small-scale) and physical disease (+), damage (large-scale) and physical disease (−), and damage (large-scale) and physical disease (+).

All statistical analyses were performed using SAS version 9.3 (SAS Inc, Cary, NC) and all statistical tests were 2-sided. $P < 0.05$ was considered to indicate statistical significance.

RESULTS

Tables 1 and 2 summarize medical conditions for the 8 physical diseases of the participants, along with the demographic data, lifestyle, socioeconomic characteristics of the subjects, and prevalence of psychological distress for each category. Prevalences of receiving treatment for stroke, myocardial infarction or angina pectoris, cancer, kidney disease, liver disease, hypertension, diabetes mellitus, and hyperlipidemia were 1%, 6%, 3%, 1%, 1%, 33%, 10%, and

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TABLE 1

Demographics, Lifestyle, and Socioeconomic Characteristics in the Shichigahama Health Promotion Project, Shichigahama, Miyagi, Japan (n = 3032)

Demographic Variables	No. of Subjects	No. of Subjects With K6 Score ≥13 of 24 (%)	*P* Value of χ^2 Test
Total	3032	160 (5)	—
Age at survey, y			.02
40–49	629	33 (5)	
50–59	689	35 (5)	
60–69	773	27 (3)	
≥70	941	65 (7)	
Gender			<.01
Men	1416	57 (4)	
Women	1616	103 (6)	
Current smoking status			.83
No smoking	2076	111 (5)	
1–19 cigarettes/d	287	17 (6)	
20 cigarettes or more/d	428	22 (5)	
Unknown	241	10 (4)	
Alcohol consumption			<.01
No drink	987	68 (7)	
≤1 *go*/d[a]	779	25 (3)	
≥2 *go*/d	321	14 (4)	
Unknown	945	53 (6)	
Time spent walking			<.01
Less than 0.5 h/d	989	75 (8)	
≥0.5 h/d	1979	78 (4)	
Unknown	64	7 (4)	
Income			<.01
Difficult for living	1304	105 (8)	
No problem or easy for living	1683	50 (3)	
Unknown	45	5 (3)	
Degree of damage to homes			<.01
Large-scale	1206	86 (7)	
Small-scale	1826	74 (4)	

[a]22.8 g of alcohol amounts to 1 *go* or traditional unit of sake (180 ml), which also approximates two glasses of wine (200 ml), or beer (500 ml) in terms of alcohol contents.

17%, respectively. Older subjects, women, and non–alcohol drinkers experienced higher levels of psychological distress (K6 score ≥13 of 24 points). Subjects who spent less time walking or who had lower incomes (difficulty living) also suffered from psychological distress. Furthermore, subjects with large-scale property damage due to the great earthquake experienced higher levels of psychological distress.

The multiple logistic regression models detected significant associations between psychological distress and current medical treatment for the following physical diseases: myocardial infarction/angina pectoris (OR = 1.8, 95% CI = 1.0-3.0) and liver disease (OR = 3.1, 95% CI = 1.0-7.7). Although the factors of receiving treatment for cancer, hyperlipidemia, kidney disease, and diabetes mellitus tended to be associated with a higher prevalence of psychological distress (OR ≥ 1.3), the associations did not reach statistical significance (Table 2).

We also conducted stratified analyses of the OR for psychological distress according to the differences in the degree of damage to homes. Most medical treatment of physical diseases was consistently and positively associated with psychological distress irrespective of the degree of damage to homes (Table 3).

We combined the categories of the degree of damage to homes and each medical treatment for physical disease, where the ORs were higher for psychological distress among the subjects with damage (large-scale) and each physical disease (+): stroke (OR = 2.9), myocardial infarction or angina pectoris (OR = 3.6), cancer (OR = 1.5), kidney disease (OR = 3.0), liver disease (OR = 7.0), hypertension (OR = 1.7), diabetes mellitus (OR = 2.3), and hyperlipidemia (OR = 2.4) (Table 4).

DISCUSSION

In this study, we examined the associations between medical treatments for physical diseases and psychological distress among the members of a community aged ≥40 years in a town affected by the Great East Japan Earthquake. Our results showed that most medical treatments for physical diseases had positive associations with psychological distress.

We considered medical treatments for 8 physical diseases, and most were associated with higher levels of psychological distress. In our previous large cross-sectional study of 43 487 people, which did not consider the effect of the Great Earthquake, the subjects with histories of various physical diseases (cancer, diabetes mellitus, hyperlipidemia, hypertension, myocardial infarction, stroke, gastric or duodenal ulcer, liver disease, arthritis, osteoporosis, kidney disease, and fall or fracture) also had high levels of psychological distress.[8] The results obtained in the current study are consistent with those reported in our previous study. The previous study focused on the past history of physical diseases,[8] and the current study focused on the current medical treatment of physical diseases. Thus, doctors and paramedics need to monitor patients with treatment continuously for psychological distress even after they leave the hospital following treatment for a physical disease.

In terms of the mechanisms responsible for the associations between physical diseases and psychological distress, the subjects with physical diseases suffered physiological stress reactions,[9] increased levels of fatigue,[10] or decreases in ADL/QOL.[11-13] Among the subjects with medical treatment for stroke (OR = 0.5, 95% CI = 0.03-2.5) and hypertension (OR = 1.1, 95% CI = 0.7-1.6), the ORs were not high

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TABLE 2

Multivariate OR and 95% CI for Psychological Distress (K6 Score ≥13) by Medical Treatment of Physical Disease in the Shichigahama Health Promotion Project, Shichigahama, Miyagi, Japan (n = 3032)[a]

Medical Treatment of Physical Diseases	No. of Subjects	No. of Subjects With K6 Score ≥13 of 24 (%)	Multivariate Adjusted ORs (95% CIs)	*P*
Stroke				
None	2998	159 (5)	1.0 (reference)	—
Under treatment	34	1 (3)	0.5 (0.03–2.5)	.51
Myocardial infarction/angina pectoris				
None	2850	143 (5)	1.0 (reference)	—
Under treatment	182	17 (9)	1.8 (1.0–3.0)	.04
Cancer				
None	2938	151 (5)	1.0 (reference)	—
Under treatment	94	9 (10)	1.8 (0.8–3.5)	.14
Kidney disease				
None	2990	157 (5)	1.0 (reference)	—
Under treatment	42	3 (7)	1.3 (0.3–3.8)	.67
Liver disease				
None	2993	155 (5)	1.0 (reference)	—
Under treatment	39	5 (13)	3.1 (1.0–7.7)	.02
Hypertension				
None	2025	101 (5)	1.0 (reference)	—
Under treatment	1007	59 (6)	1.1 (0.7–1.6)	.65
Diabetes mellitus				
None	2728	139 (5)	1.0 (reference)	—
Under treatment	304	21 (7)	1.3 (0.8–2.2)	.24
Hyperlipidemia				
None	2522	123 (5)	1.0 (reference)	—
Under treatment	510	37 (7)	1.5 (1.0–2.2)	.06

Abbreviations: OR, odds ratio; CI, confidence interval; K6, Kessler Psychological Distress scale.

[a]The multivariate ORs have been adjusted for gender; age in years (40–49, 50–59, 60–69, ≥70); current cigarette smoking (no smoking, 1–19 cigarettes/d, 20 cigarettes or more/d, unknown); alcohol consumption (no drink, ≤1 *go*/d, ≥2 *go*/d, unknown; 22.8 g of alcohol amounts to 1 *go* or traditional unit of sake (180 ml), which also approximates two glasses of wine (200 ml), or beer (500 ml) in terms of alcohol contents.); time spent walking (≤0.5 h/d, ≥0.5 h/d, unknown); income (difficult to live, no problem or easy to live, unknown); and degree of damage to homes (large-scale damage, small-scale damage).

(Table 2). For stroke, this could be explained partly by the lack of statistical power due to the small number of participants who received medical treatment for stroke in our study (n = 34). Most patients with hypertension are asymptomatic even if they are undergoing treatment. This might explain why treatment for hypertension did not influence their stress reaction, fatigue, or ADL/QOL.

In this study, we also examined the potentially confounding effect of the degree of damage to homes on the ass ociation between medical treatments for physical disease and psychological distress. Various studies have reported associations between stressful life events and physical diseases.[26] In our study, most of the medical treatments for physical diseases were consistently and positively associated with psychological distress after stratification by the degree of damage to homes (Table 3). This result suggests that there were strong association between medical treatment for physical diseases and psychological distress irrespective of the scale of damage, whereas psychological distress was greater in individuals with large-scale damage than in those with small-scale damage. The medical treatment of physical disease and degree of damage to homes was independent of psychological distress (Table 4). Therefore, people who live in a community with large-scale damage and who are being treated for physical disease could have a high prevalence of psychological distress; thus, medical care should be provided.

This study had several limitations. First, our sample size of 3032 was not sufficiently large to obtain adequate statistical power to measure the real effect of specific current medical treatments on psychological distress. Second, because of the nature of cross-sectional designs, we could not determine the causal links between medical treatments for physical disease and psychological distress in this study. Third, because we assessed the medical treatments for physical disease using a self-reported assessment, the exact physical disease status might have been classified incorrectly. However, this possibility of misclassification does not guarantee a negative bias. Fourth, the valid response rate (55%, n = 3886) was not high among the study population of 7036; thus, the study may have been biased toward healthier people in the community. However, this bias does not affect the internal validity of the association between medical treatment for physical diseases and psychological distress. Finally, we

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TABLE 3

Multivariate OR and 95% CI for Psychological Distress (K6 Score ≥13) by Medical Treatment of Physical Disease Stratified by the Degree of Damage to Homes (Large-Scale, Small-Scale) in the Shichigahama Health Promotion Project, Shichigahama, Miyagi, Japan (n = 3032)[a]

Medical Treatment of Physical Diseases	No. of Subjects	No. of Subjects With K6 score ≥13 of 24 (%)	Multivariate Adjusted ORs (95% CIs)	*P*
Stroke				
Large-scale damage				
None	1193	85 (7)	1.0 (reference)	—
Under treatment	13	1 (8)	2.4 (0.1–13.9)	.42
Small-scale damage				
None	1805	74 (4)	1.0 (reference)	—
Under treatment	21	0 (0)	Not applicable	—
Myocardial infarction/angina pectoris				
Large-scale damage				
None	1133	76 (7)	1.0 (reference)	—
Under treatment	73	10 (14)	2.3 (1.0–4.8)	.04
Small-scale damage				
None	1717	67 (4)	1.0 (reference)	—
Under treatment	109	7 (6)	1.4 (0.5–3.0)	.47
Cancer				
Large-scale damage				
None	1167	83 (7)	1.0 (reference)	—
Under treatment	39	3 (8)	0.8 (0.2–2.6)	.78
Small-scale damage				
None	1771	68 (4)	1.0 (reference)	—
Under treatment	55	6 (11)	3.1 (1.1–7.3)	.02
Kidney disease				
Large-scale damage				
None	1187	84 (7)	1.0 (reference)	—
Under treatment	19	2 (11)	1.6 (0.2–6.3)	.56
Small-scale damage				
None	1803	73 (4)	1.0 (reference)	.88
Under treatment	23	1 (4)	0.9 (0.05–4.4)	
Liver disease				
Large-scale damage				
None	1191	83 (7)	1.0 (reference)	—
Under treatment	15	3 (20)	5.0 (1.1–18.0)	.02
Small-scale damage				
None	1802	72 (4)	1.0 (reference)	—
Under treatment	24	2 (8)	2.5 (0.4–9.1)	.24
Hypertension				
Large-scale damage				
None	784	55 (7)	1.0 (reference)	—
Under treatment	422	31 (7)	1.0 (0.6–1.6)	.91
Small-scale damage				
None	1241	46 (4)	1.0 (reference)	—
Under treatment	585	28 (5)	1.3 (0.8–2.2)	.34
Diabetes mellitus				
Large-scale damage				
None	1078	74 (7)	1.0 (reference)	—
Under treatment	128	12 (9)	1.4 (0.7–2.7)	.33
Small-scale damage				
None	1650	65 (4)	1.0 (reference)	—
Under treatment	176	9 (5)	1.3 (0.6–2.7)	.44
Hyperlipidemia				
Large-scale damage				
None	985	66 (7)	1.0 (reference)	—
Under treatment	221	20 (9)	1.4 (0.8–2.4)	.23
Small-scale damage				
None	1537	57 (4)	1.0 (reference)	—
Under treatment	289	17 (6)	1.6 (0.8–2.7)	.14

Abbreviations: OR, odds ratio; CI, confidence interval; K6, Kessler Psychological Distress scale.

[a]The multivariate odds ratios (ORs) have been adjusted for gender; age in years (40–49, 50–59, 60–69, ≥70); current cigarette smoking (no smoke, 1–19 cigarettes/d, 20 cigarettes or more/d, unknown); alcohol consumption (no drink, ≤1 *go*/d, ≥2 *go*/d, unknown; 22.8 g of alcohol amounts to 1 *go* or traditional unit of sake (180 ml), which also approximates two glasses of wine (200 ml), or beer (500 ml) in terms of alcohol contents.); time spent walking (≤0.5 h/d, ≥0.5 h/d, unknown); and income (difficult to live, no problem or easy to live, unknown).

focused on subjects who received medical treatments for physical disease, but we did not have the disease severity or the symptoms of the subjects in detail. Thus, the disease severity or the symptoms could have affected and modified psychological distress.

Among most individuals receiving medical treatments for physical disease, there was a positive association with psychological distress, irrespective of the scale of damage to homes. Thus, doctors and paramedics need to monitor patients with treatment continuously for psychological

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TABLE 4

Multivariate OR and 95% CI for Psychological Distress (K6 Score ≥13) by Category of Combination With Medical Treatment of Physical Disease and Degree of Damage to Homes (Large-Scale, Small-Scale) in the Shichigahama Health Promotion Project, Shichigahama Town, Miyagi, Northern Japan (n = 3032)[a]

	Damage (Small) and Physical Disease (–)	Damage (Small) and Physical Disease (+)	Damage (Large) and Physical Disease (–)	Damage (Large) and Physical Disease (+)
Stroke	1.0 (reference)	Not applicable	1.6 (1.2–2.3)	2.9 (0.2–15.7)
OR (95% CI) and *P* value	—	—	<.01	.33
Myocardial infarction/ angina pectoris	1.0 (reference)	1.4 (0.6–3.0)	1.6 (1.1–2.3)	3.6 (1.6–7.4)
OR (95% CI) and *P* value	—	.45	<.01	<.01
Cancer	1.0 (reference)	3.4 (1.2–8.1)	1.8 (1.3–2.5)	1.5 (0.3–4.4)
OR (95% CI) and *P* value	—	<.01	<.01	.56
Kidney disease	1.0 (reference)	0.8 (0.05–4.2)	1.6 (1.2–2.3)	3.0 (0.5–11.3)
OR (95% CI) and *P* value	—	.87	<.01	.16
Liver disease	1.0 (reference)	2.4 (0.4–8.6)	1.6 (1.2–2.3)	7.0 (1.5–23.8)
OR (95% CI) and *P* value	—	.25	<.01	<.01
Hypertension	1.0 (reference)	1.3 (0.8–2.1)	1.9 (1.2–2.8)	1.7 (1.0–2.9)
OR (95% CI) and *P* value	—	.34	<.01	.03
Diabetes mellitus	1.0 (reference)	1.3 (0.6–2.6)	1.7 (1.2–2.4)	2.3 (1.1–4.3)
OR (95% CI) and *P* value	—	.47	<.01	.02
Hyperlipidemia	1.0 (reference)	1.6 (0.9–2.7)	1.7 (1.2–2.5)	2.4 (1.3–4.0)
OR (95% CI) and *P* value	—	.13	<.01	<.01

Abbreviations: OR, odds ratio; CI, confidence interval; K6, Kessler Psychological Distress scale.

[a]The multivariate odds ratios (ORs) have been adjusted for gender; age in years (40–49, 50–59, 60–69, ≥70); current cigarette smoking (no smoking, 1–19 cigarettes/d, 20 cigarettes or more/d, unknown); alcohol consumption (no drink, ≤1 *go*/d, ≥2 *go*/d, unknown; 22.8 g of alcohol amounts to 1 *go* or traditional unit of sake (180 ml), which also approximates two glasses of wine (200 ml), or beer (500 ml) in terms of alcohol contents.); time spent walking (≤0.5 h/d, ≥0.5 h/d, unknown); and income (difficult to live, no problem or easy to live, unknown). The categories of degree of damage to homes and each medical treatment of physical disease were combined, and we newly categorized the subjects with damage (small-scale) and physical disease (–), damage (small-scale) and physical disease (+), damage (large-scale) and physical disease (–), and damage (large-scale) and physical disease (+).

distress even after they leave the hospital following treatment for a physical disease. Undertaking screening for psychological distress among subjects with physical diseases will help to prevent severe consequences.

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