The association between self-reported history of physical diseases and psychological distress in a community-dwelling Japanese population: the Ohsaki Cohort 2006 Study

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Introduction

The number of patients with mood (affective) disorders including depressive disorders is gradually increasing among Japanese people (0.711 million in 2002, 0.924 million in 2005 and 1.041 million in 2008). In Japan, individual suffering from depressive disorders show the second largest number of disability-adjusted life years. To determine risk factors for depression (i.e. major depression or elevated depressive symptoms) is an important task, and early detection of depression may prevent a serious case of depression or psychological distress.

For many years, depression has been common among patients with physical disease such as diabetes,1 cardiovascular disease,2 human immunodeficiency virus infection,3 rheumatoid arthritis4 and cancer.5 In a recent study, risk for depression ≥10 years after cancer diagnosis was shown to be increased by 21% in men and 5% in women.6 The influence of depression may persist for a considerable period of time after the treatment of physical disease, and therefore those with a history of chronic disease may suffer continuous depression.

With regard to the mechanism underlying the association between a history of physical disease and psychological distress, the following three mechanisms have been proposed. First, physiological conditions affect the activity of the hypothalamic-pituitary-adrenocortical (HPA) axis, one of the major stress responses of the body. Activation of the HPA axis increases psychological distress.6 Second, fatigue is a clinically important symptom among patients with physical diseases, and also a core symptom of depression.7 That is, fatigue might relate to the results of medical treatment or pain causes psychological distress.8 Third, in physical diseases, physical functions and/or quality-of-life (QOL) decline, increasing the psychological distress level.9–11

The social relationships between community-dwelling people represent one of the most important aspects of the social condition. Social support is defined as the existence or availability of people who let individuals know that they care about, value and love them.12,13 The link between social support and psychological well-being is well established. It is widely known that social support can decrease depression.14,15 Also, social support decreases the risk of several physical diseases.16 Therefore, persons with a history of physical disease who have social support show decreased levels of psychological distress.

However, large-scale studies have not investigated the association between physical disease and psychological distress in community-dwelling people. One reason for this might be the difficulties in...
assessing psychological distress in the general population. However, Kessler et al. have developed a shortened type of screening scale to monitor the prevalence of psychological distress in populations [the Kessler 6-item psychological distress scale (K6)], which we applied in the present study to investigate whether physical disease is associated with a higher degree of psychological distress. We used the data from a large population-based study of >40,000 subjects to investigate the association between history of physical disease, psychological distress and social support, with adjustment for potential confounding effects of varying lifestyles and socioeconomic factors.

Materials and methods

Study design, setting and participants

The design of the Ohsaki Cohort 2006 Study has been described in detail. In brief, the source population for the baseline survey comprised all men and women aged ≥40 years living in Ohsaki City, northeastern Japan, on 1 December 2006. The baseline survey was conducted between 1 December and 15 December 2006. A questionnaire was distributed by the heads of individual administrative districts to individual households and collected by mail. Of the 77,235 respondents eligible to participate, 49,855 (26,512 men and 23,343 women; 64.5%) who provided valid responses formed the study cohort. Of these respondents, 43,487 (87.2%) completed K6; thus, responses from these 43,487 participants were analyzed in this study.

Measurements

History of physical disease was collected by the self-administrated questionnaire used in the baseline survey, which asked whether participants had been diagnosed with any of 13 physical diseases during their lifetime up to the baseline: tuberculosis or pleurisy, cancer, diabetes mellitus, hyperlipidemia, hypertension, myocardial infarction, stroke, gastric or duodenal ulcer, liver disease, arthritis, osteoporosis, kidney disease, fall or fracture. Only subjects ≥65 years were questioned about falls or fractures.

Basic individual information (i.e. age, gender, education, body weight and height, time spent walking per day, smoking status) and general dietary intake during the previous year (based on a 40-item food frequency questionnaire) were also collected at the same time. This food frequency questionnaire was subsequently assessed, and the results showed a reasonably high level of validity and reproducibility in regard to assessment of the usual levels of intake of nutrients, foods and food groups among the study population. This study measured alcohol, fish and green tea consumption using the food frequency questionnaire.

The status of social support available to each person was assessed by asking the following questions: Do you have someone that you can consult when you are in trouble? This called for a response of ‘sufficient’, ‘insufficient’, or ‘unknown’. This questionnaire was available in Japanese only, and its validity was evaluated. Lack of social support was significantly associated with an increased risk of depression status among elderly population.

Psychological distress

K6 was used as an indicator of psychological distress. Respondents were asked about their mental status over the previous month by six questions to which they responded by choosing either ‘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). 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 has already outperformed other existing scales.

Ethical issues

The return of questionnaires completed by the participants was regarded as consent to participate in the study, which involved cross-sectional analysis of the baseline survey data and the longitudinal study of subsequent mortality and immigration. The study protocol was reviewed and approved by the Ethics Committee of Tohoku University Graduate School of Medicine.

Statistical analysis

We used multiple logistic regression analyses. The multivariate odds ratios (ORs) were adjusted for gender; age in years (40–49, 50–59, 60–69, ≥70); body mass index in kg/m² (≤18.4, 18.5–24.9, ≥25.0, unknown); cigarette smoking (never, former, currently smoking, unknown); alcohol consumption (never, former, currently drinking ≤2 go/day, ≥3 go/day, unknown); fish consumption (almost never, 1–2 times/month to almost every day, unknown); green tea consumption (never and sometimes, 1–4 cups/day, ≥5 cups/day, unknown); hours spent walking each day (≤0.5, 0.5–1.0, ≥1, unknown); years of education (≤15, 16–18, ≥19, unknown); and social support to consult with when requiring help (sufficient, lack, unknown).

We also conducted stratified analyses according to differences in social support status regarding whether social support significantly interfered in the association between physical disease and psychological distress. Social support, as the interaction between physical disease and psychological depression, was tested through the addition of cross-product terms to the multivariate-adjusted model.

All statistical analyses were performed with SAS version 9.1 (SAS Inc., Cary, NC, USA), and all statistical tests were two-sided. A P < 0.05 was considered to indicate statistical significance.

Results

Table 1 shows subjects’ demographics, lifestyle and socioeconomic characteristics and percentages evidencing psychological distress for each category. Younger and older subjects suffered more psychological distress (K6 score ≥13/24). Women, current smokers and former drinkers also suffered psychological distress. Subjects with low fish or green tea consumption, low body weight, less time spent walking, lower educational level, lack of social support and those in the unknown categories apart from alcohol consumption also suffered psychological distress.

By multiple logistic regression models, we found a statistically significant association between the history of physical disease and psychological distress, except tuberculosis and pleurisy. In subjects with a history of stroke, the multivariate OR of psychological distress (2.3, 95% CI: 1.9–2.8) was more than twice that of subjects with no history of disease, whereas for subjects with a history of cancer, myocardial infarction, liver disease, arthritis, osteoporosis and fall or fracture, OR was 1.5 times or greater (table 2).

We also conducted stratified analyses regarding OR of psychological distress according to differences in social support status. Almost all subjects with a history of physical disease were at increased risk of psychological distress, regardless of social...
support. Therefore, significant interactions were not shown, except for hyperlipidemia. In subjects with a history of hyperlipidemia, multivariate OR was 1.0 for adequate social support and 1.8 for absence of social support. Therefore, a significant interaction was shown (table 3).

## Discussion

The present study examined the association between history of physical disease and psychological distress among a community-dwelling population aged ≥40 years. Our results suggest that a history of physical disease showed a significant positive association with psychological distress.

Our study had a number of strengths. First, it was a large, population-based study of >40,000 community-dwelling people.

Second, we considered many (n = 13) physical diseases. No previous research has considered the association between a variety of physical diseases and psychological distress. Especially in subjects with a history of stroke, fall or fracture, myocardial infarction, liver disease, arthritis, osteoporosis and cancer, OR of psychological distress was higher (≥1.5).

With regard to the mechanism of association between physical disease and psychological distress, subjects with physical disease suffered physiological stress reactions, increased level of fatigue or decrease in Activities of Daily Living (ADL)/QOL. 9–11 Subjects with a history of tuberculosis or pleurisy (infectious diseases) had...
short-term recoveries following diagnosis. This may not have been associated with psychological distress because these diseases did not become chronic in nature.

In this study, we examined in detail the potential confounding effect and effect modification of social support on the association between history of physical disease and psychological distress. Various studies have reported the association between social support and physical disease.25-27 Most histories of physical disease were consistently and positively associated with psychological distress,14-16 although this finding could be attributed to chance.

Table 3 Multivariate ORa and 95% CI for psychological distress (K6 score ≥13/24) by history of disease stratified to status of social support (sufficient, lack or unknown)

<table>
<thead>
<tr>
<th>History of diseases</th>
<th>Social support: to consult in trouble</th>
<th>P for interactionb</th>
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<tbody>
<tr>
<td></td>
<td>Sufficient</td>
<td>OR (95% CI)/P value</td>
</tr>
<tr>
<td>Tuberculosis or pleurisy (ever vs. never)</td>
<td>1.0 (0.6–1.4) 0.78</td>
<td>0.8 (0.4–1.3) 0.34</td>
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<tr>
<td>Cancer (ever vs. never)</td>
<td>1.6 (1.3–1.9) &lt;0.01</td>
<td>1.3 (0.9–1.8) 0.14</td>
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<tr>
<td>Diabetes mellitus (ever vs. never)</td>
<td>1.2 (1.0–1.4) 0.06</td>
<td>1.8 (1.4–2.3) &lt;0.01</td>
</tr>
<tr>
<td>Hyperlipidemia (ever vs. never)</td>
<td>1.0 (0.8–1.2) 0.94</td>
<td>1.8 (1.4–2.3) &lt;0.01</td>
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<tr>
<td>Hypertension (ever vs. never)</td>
<td>1.2 (1.0–1.3) &lt;0.01</td>
<td>1.3 (1.0–1.5) 0.02</td>
</tr>
<tr>
<td>Myocardial infarction/Ever vs. Never)</td>
<td>1.8 (1.4–2.2) &lt;0.01</td>
<td>1.3 (0.7–2.0) 0.38</td>
</tr>
<tr>
<td>Stroke (ever vs. never)</td>
<td>2.3 (1.9–2.9) &lt;0.01</td>
<td>1.7 (1.1–2.7) 0.03</td>
</tr>
<tr>
<td>Gastric or duodenal ulcer (ever vs. never)</td>
<td>1.3 (1.1–1.4) &lt;0.01</td>
<td>1.4 (1.2–1.8) &lt;0.01</td>
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<tr>
<td>Liver disease (ever vs. never)</td>
<td>1.5 (1.2–1.8) &lt;0.01</td>
<td>2.0 (1.5–2.7) &lt;0.01</td>
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<tr>
<td>Arthritis (ever vs. never)</td>
<td>1.6 (1.4–1.9) &lt;0.01</td>
<td>1.8 (1.4–2.4) &lt;0.01</td>
</tr>
<tr>
<td>Osteoporosis (ever vs. never)</td>
<td>1.5 (1.2–1.8) &lt;0.01</td>
<td>2.0 (1.4–2.9) &lt;0.01</td>
</tr>
<tr>
<td>Kidney disease (ever vs. never)</td>
<td>1.3 (1.0–1.6) 0.04</td>
<td>1.3 (0.9–1.9) 0.12</td>
</tr>
<tr>
<td>Fall or fracture (ever vs. never)</td>
<td>1.6 (1.3–1.9) &lt;0.01</td>
<td>2.0 (1.4–2.8) &lt;0.01</td>
</tr>
</tbody>
</table>

The multivariate OR has been adjusted for age in years (40–49, 50–59, 60–69, ≥70); gender (man, woman); body mass index in kg/m2 (<18.4, 18.5–24.9 ≥25.0, unknown); cigarette smoking (never, former, currently smoking, unknown); alcohol consumption (never, former, currently drinking ≥0–2 go/day, ≥3 go/day, unknown); fish consumption (almost never, 1–2 times/month to almost every day, unknown); green tea consumption (never and sometimes, 1–4 cup/day, ≥5 cup/day, unknown); time spent walking (<0.5 h/day, 0.5–1 h/day, ≥1 h/day, unknown); and education (<15 years, 16–18 years, ≥19 years, unknown).

2Social support as the interaction between diseases and psychological depression were tested through the addition of cross-product terms to the multivariate-adjusted model.

3Analytic subjects were included only ≥65 years.

In most individuals with a history of physical disease, this was significantly and positively associated with psychological distress, and associations were found irrespective of the existence of social support. Even after leaving hospital following treatment for a physical disease, doctors and paramedics need to continuously monitor a patient for psychological distress. We suggest the establishment of some type of screening for psychological distress in subjects with physical disease, which could be important in preventing this consequence.

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Conflicts of interest: None declared.

Key points

- Subjects with a history of physical disease were significantly and positively associated with psychological distress.
- Social support did not modify this association between history of physical disease and psychological distress.
- Even after patients have left hospital following treatment for physical disease, they require continuous monitoring for psychological distress by doctors and paramedics.
References