

ソーシャル・サポートが欠如していると回答した者の割合について、非都市部の先行研究と都市部の本研究との間で比較してみると以下のとおりである。すなわち、同一の評価尺度を用いている村岡らの報告¹⁰⁾から山形県長井市での調査対象者におけるソーシャル・サポート欠如者の割合を換算して本研究結果と比較すると、(i) 困ったときの相談相手がいないと回答した者の割合は、村岡らで3.2%、本研究で24.7%と、約8倍の格差。(ii) 体の具合の悪いときの相談相手がいないと回答した者の割合は、村岡らで2.5%、本研究で22.1%と、約9倍の格差。(iii) 家事などの日常生活を援助してくれる人がいないと回答した者の割合は、村岡らで13.8%、本研究で39.1%と、約3倍の格差。(iv) 具合の悪いとき病院に連れて行ってくれる人がいないと回答した者の割合は、村岡らで4.1%、本研究で25.3%と、約6倍の格差。(v) 寝込んだとき身の回りの世話をしてくれる人がいないと回答した者の割合は、村岡らで5.8%、本研究で28.1%と、約5倍の格差であった。村岡らの報告と比べ、本研究では全項目のソーシャル・サポート欠如者の割合が高い。これは、岸ら²⁵⁾も述べているように、隣人関係の希薄化、核家族化、独居者の増加などの、非都市部と異なる都市部特有の環境要因がソーシャル・サポートの欠如に反映されたためと考えられる。ソーシャル・サポートに関する質問項目を、(i)、(ii)は主として「相談による支援」を、質問項目(iii)、(iv)、(v)は主として「身辺介助による支援」と分類すると、村岡らは、「身辺介助による支援」に関する項目でのみ、抑うつ症状との間に有意な関連が認められたと報告している。そして、「相談による支援」と抑うつ症状との間に有意な関連が認められなかったのは、対象となった地域在住高齢者のほとんどに「相談による支援」が確立され、孤立高齢者が少ない非都市部地域での調査であることに拠るものであろうと考察している。非都市部と比較して、都市部在住高齢者に相対的に高い頻度で抑うつ症状が出現するという本研究の結果は、都市部在住高齢者のソーシャル・サポートの相対的な低さと密接に関連するものと思われる。

今回の結果では、男性では「相談による支援」と「身辺介助による支援」の両支援が抑うつ症状の出現に有意に関連していたが、女性では「身辺介助による支援」のみが抑うつ症状の出現に関連していた。ソーシャル・サポートと抑うつ症状の関連を分析している青木らの報告でも、ソーシャル・サポートの影響は女性よりも男性の方が顕著であることが示されている¹¹⁾。これらの結果は、特に退職後の高齢男性において、地域社会での人間関係の希薄化、孤立化がソーシャル・サポート欠如の要

因となり、抑うつ症状の出現に強く影響することを示唆している。一方、本研究の対象者の特性 (Table 1) から示唆されるように、身体機能の低下 (低い運動能力) は女性における抑うつ症状の有症率の高さに関連している可能性がある。「身辺介助による支援」の欠如は、男性のみならず女性においても、身体機能の低下を伴う高齢者の抑うつ症状の出現に密接に関連するものと思われる。

本研究の短所は、対象住民のうち受診率が43.5%にとどまったことである。高齢者では身体機能と抑うつ症状との関連が強いことが指摘されている¹⁰⁾¹¹⁾¹³⁾¹⁴⁾¹⁶⁾。本研究の対象者は、調査に自発的に参加した者であり、比較的身体機能が良好な集団であった。したがって、今回の結果は、対象地域での高齢者全体の抑うつ症状の有症率を過小評価していると考えられるべきである。このことを考慮すると、都市部在住高齢者の抑うつ症状の出現頻度は、本研究で見積もられる以上に極めて高いことが予想される。

日本の都市部一般住民の高齢者を対象に抑うつ症状とソーシャル・サポートの関連を調査したのは、本研究がはじめてである。本研究の結果、都市部の高齢者においては、うつ状態の地域介入においてソーシャル・サポートの確保が重要であることが示唆された。特に、男性高齢者に対するソーシャル・サポートの意義は高く、地域社会の中での人間関係の希薄化、孤立化を認める男性高齢者に対しては「相談による支援」が重要であり、身体機能の低下を認める男性および女性高齢者には「身辺介助による支援」が重要である。都市部において、こうしたサポートを高齢者に提供していくためには、訪問指導やケースマネジメントなどの技能をもつ保健福祉専門職の育成などが必要である²⁶⁾。また、サポートの内容を具体化させていくためには、事例研究を通して抑うつ症状の背景要因をさらに個別的に明確化していく必要がある²⁷⁾。同地区においては、2002年より社会資源の開発を含む統合的な地域介入プログラム²⁸⁾を立ち上げ、これによる地域介入研究を実施している。

謝辞：本研究の遂行と本論文作成にあたり、多大なるご指導とご協力をいただいた東北大学大学院医学系研究科神経科学講座精神神経学分野の松岡洋夫先生をはじめとする関係者の皆様方に心より感謝申し上げます。

文 献

- 1) 栗田圭一：老年期のうつ病と幻覚妄想病の治療とケア。日老医誌 2000;37:882-884.
- 2) 増地あゆみ, 岸 玲子：高齢者の抑うつとその関連要因

- についての文献的考察—ソーシャルサポート・ネットワークとの関連を中心に—, 日本公衛誌 2001; 48: 435—448.
- 3) 野口祐二: 高齢者のソーシャルサポート: その概念と測定. 社会老年学 1991; 34: 37—48.
 - 4) Barkman LF, Syme SL: Social networks, host resistance, and mortality: A nine-year follow-up study of Alameda County residents. *Am J Epidemiol* 1979; 109: 186—204.
 - 5) House JS, Robbins C, Metzner HM: The association of social relationships and activities with mortality: Prospective evidence from the Tecumseh Community Health Study. *Am J Epidemiol* 1982; 116: 123—140.
 - 6) Hanson BS, Isacson SO, Janzon L, Lindell SE: Social network and social support influence mortality in elderly men. *Am J Epidemiol* 1989; 130: 100—111.
 - 7) Oman D, Reed D, Ferrara A: Do elderly women have more physical disability than men do? *Am J Epidemiol* 1999; 150: 834—842.
 - 8) Harlow SD, Goldberg EL, Comstock GW: A longitudinal study of risk factors for depressive symptomatology in elderly widowed and married women. *Am J Epidemiol* 1001; 134: 526—538.
 - 9) Oxman TE, Berkman LF, Kasl S, Freeman Jr DH, Barrett J: Social support and depressive symptoms in the elderly. *Am J Epidemiol* 1992; 135: 356—368.
 - 10) 村岡義明, 生地 新, 井原一成: 地域在宅高齢者のうつ状態の身体・心理・社会的背景要因について. 老年精神医学雑誌 1996; 7: 397—407.
 - 11) 青木邦男: 高齢者の抑うつ状態と関連要因. 老年精神医学雑誌 1997; 8: 401—410.
 - 12) Hashimoto K, Kurita H, Haratani T, Fujii K, Ishibashi T: Direct and buffering effects of social support on depressive symptoms of the elderly with home help. *Psychiatry Clin Neurosci* 1999; 53: 95—100.
 - 13) 井原一成: 地域高齢者の抑うつ状態とその関連要因に関する疫学的研究. 日本公衛誌 1993; 40: 85—93.
 - 14) 長田久雄, 柴田 博, 芳賀 博, 安村誠司: 後期高齢者の抑うつ状態と関連する身体機能および生活活動能力. 日本公衛誌 1995; 42: 897—909.
 - 15) 森田昌宏, 須賀良一, 内藤明彦, 後藤雅博, 小泉 毅: 老人自殺多発地域における老年期うつ病の疫学調査. 社会精神医学 1987; 10: 130—137.
 - 16) 更井啓介: 老年期のうつ病・うつ状態: 老年期デプレッションの疫学. 老年精神医学雑誌 1990; 1: 1066—1073.
 - 17) 総務省統計局: 平成 12 年国勢調査報告. 東京, 2001.
 - 18) Folstein MF, Folstein SE, McHugh PR: "Mini-Mental State" A practical method for grading the cognitive state of patients for the clinician. *J Psychiat Res* 1975; 12: 189—198.
 - 19) Stewart AL, Greenfield S, Hays RD, Wells K, Rogers WH, Berry SD, et al.: Functional status and well-being of patients with chronic conditions; Results from the Medical Outcomes Study. *JAMA* 1989; 262: 907—913.
 - 20) Haga H, Shibata H, Suyama Y, Suzuki K, Iwasaki K, Suzuki T, et al.: Self-rated health as a predictor of active life in the community elderly. *J Epidemiol* 1995; 5: 11—15.
 - 21) Blink TL, Yesavage JA, Lum O, Heersema PH, Adey M, Rose TL: Screening tests for geriatric depression. *Clin Gerontol* 1982; 1: 37—44.
 - 22) 笠原洋勇, 加田博秀, 柳川有希子: 老年精神医学関連領域で用いられる測度: うつ状態を評価するための測度 (1). 老年精神医学雑誌 1995; 6: 757—766.
 - 23) Cwikel J, Ritchie K: Screening for depression among the elderly in Israel: an assessment of the short Geriatric Depression Scale (S-GDS). *Israel J Med Sci* 1989; 25: 131—137.
 - 24) Woo J, Ho SC, Lau J, Yuen YK, Chiu H, Lee HC, et al.: The prevalence of depressive symptoms and predisposing factors in an elderly Chinese population. *Acta Psychiatr Scand* 1994; 89: 8—13.
 - 25) 岸 玲子, 江口照子, 笹谷春美, 矢口孝行: 高齢者のソーシャル・サポートおよびネットワークの現状と健康状態—旧産炭地・夕張と大都市・札幌の実態—. 日本公衛誌 1994; 41: 474—488.
 - 26) 栗田主一: 都市部住宅地域に在住する高齢者の自殺予防プログラムの開発. 高齢者の自殺念慮の出現頻度と関連要因の調査から. 精神科 2004 (印刷中)
 - 27) 栗田主一, 小泉弥生, 関 徹, 佐藤宗一郎, 鈴木千寿: 自殺予防を目標とする高齢期抑うつ状態に特化した統合的地域介入プログラムの開発: 症例分析による方法論的検討. 平成 13 年度厚生科学研究費補助金障害保健福祉総合研究事業「うつ病による自殺の予防を目的としたスクリーニングと介入の研究」(主任研究者神庭重信) 総括研究報告書. 2002; 16—22.
 - 28) 栗田主一: 自殺予防を目標とする高齢期抑うつ状態に特化した統合的地域介入プログラムの開発: 都市在住高齢者の自殺念慮, 抑うつ症状, うつ病性障害の出現頻度と関連要因. 平成 14 年度厚生科学研究費補助金障害保健福祉総合研究事業「うつ病による自殺の予防を目的としたスクリーニングと介入の研究」(主任研究者神庭重信) 総括研究報告書. 2003; 17—25.

Abstract

Association between social support and depression in the elderly Japanese population

Yayoi Koizumi¹⁾²⁾, Shuichi Awata¹⁾, Toru Seki¹⁾, Naoki Nakaya²⁾, Shinichi Kuriyama²⁾, Yoshinori Suzuki²⁾,
Kaori Ohmori²⁾, Atsushi Hozawa²⁾, Satoru Ebihara³⁾, Hiroyuki Arai³⁾ and Ichiro Tsuji²⁾

To determine the association between social support and depression in elderly Japanese, we conducted a Comprehensive Geriatric Assessment among residents aged 70 years or over.

Out of 2,730 eligible subjects, 1,179 participated in the survey and 1,146 (480 men and 666 women) were analyzed. The Geriatric Depression Scale (GDS) was used to estimate depression status. The subjects were divided into two groups: depressive (GDS > 11 or taking antidepressant drugs) and non-depressive (GDS < 11). Various levels of social support were assessed by the following questions: Do you have someone (1) whom you can consult when you are in trouble? (2) whom you can consult when your physical condition is not good? (3) who can help you in daily housework? (4) who can take you to a hospital when you don't feel well? (5) who can take care of you when you are ill in bed? In multivariate logistic regression analysis, the calculated odds ratios (95% CIs) for the lack of each type of social support for depression status were: (1) 2.5 (1.5-4.1), (2) 1.9 (1.1-3.2), (3) 2.7 (1.7-4.4), (4) 1.9 (1.1-3.2), (5) 2.8 (1.6-4.9) in men, and (1) 1.2 (0.8-1.8), (2) 1.2 (0.8-1.8), (3) 1.4 (1.0-2.0), (4) 1.6 (1.1-2.3), (5) 2.0 (1.4-2.9) in women.

A significant association was found between social support and depression in this elderly population. We also found that this association was stronger in men.

Key words: *Elderly population, Geriatric depression scale, Depression, Social support*
(Jpn J Geriat 2004; 41: 426-433)

1) Department of Psychiatry, Tohoku University Graduate School of Medicine

2) Division of Epidemiology, Department of Public Health and Forensic Medicine, Tohoku University Graduate School of Medicine

3) Department of Geriatric and Respiratory Medicine, Tohoku University Graduate School of Medicine

Regular Article

Factors associated with suicidal ideation in an elderly urban Japanese population: A community-based, cross-sectional study

SHUICHI AWATA, MD,¹ TORU SEKI, MD,¹ YAYOI KOIZUMI, MD,¹ SOICHIRO SATO, MD,⁵ ATSUSHI HOZAWA, MD,² KAORI OMORI, MD,² SHINICHI KURIYAMA, MD,² HIROYUKI ARAI, MD,³ RYOICHI NAGATOMI, MD,⁴ HIROO MATSUOKA, MD¹ AND ICHIRO TSUJI, MD²

¹Department of Psychiatry, ²Division of Epidemiology, Department of Public Health and Forensic Medicine, ³Department of Geriatric and Respiratory Medicine, ⁴Division of Medicine and Science in Sports and Exercise, Tohoku University Graduate School of Medicine, Sendai, and ⁵Kodama Hospital, Ishinomaki, Japan

Abstract

The objective of the present study was to evaluate the association between suicidal ideation and potentially related factors in an elderly urban Japanese population. This was a community-based, cross-sectional study. Urban community residents aged 70 years or more were interviewed regarding suicidal ideation and sociodemographic and health-related variables. Subjects with depressive symptoms underwent further evaluation by psychiatrists using criteria of the Diagnostic and Statistical Manual of Mental Disorders, 4th edition. Associations were evaluated using univariate and multivariate logistic regression analyses. Of the 1145 eligible participants, 52 (4.5%) reported thoughts of suicide. Of 143 subjects with depressive symptoms (Geriatric Depression Scale, 14+), 22 (15.4%) reported suicidal ideation over a 2-week period. After controlling for depressive symptoms, lack of social support and impaired instrumental activities of daily living were significantly associated with thoughts of suicide. After controlling for the potentially associated factors detected in the univariate analysis, depressive symptoms were strongly associated with thoughts of suicide. In the elderly with depressive symptoms, mental disorders, including depressive and alcohol-related disorders, were significantly associated with suicidal ideation over a 2-week period. In the urban community setting, screening for lack of social support, impaired instrumental activities of daily living, and depressive symptoms, followed by diagnostic evaluation for mental disorders, particularly for depressive syndromes and alcohol-related disorders, may provide a practical and effective means of identifying elders at high risk of suicide.

Key words

alcohol-related disorder, depressive disorder, social support, suicidal ideation, urban population.

INTRODUCTION

Suicide in the elderly is a major public health problem in most industrialized countries.^{1,2} In Japan, the proportion of the population aged 65 years or over is the highest in the world, reaching 19% in 2003,³ and the annual

number of suicide victims aged 60 years or over has increased to 11 529, comprising more than one-third of all suicides.⁴ To determine policy and develop strategies to prevent suicide in the elderly, investigation of factors associated with suicide is urgently needed in the Japanese elderly population. However, substantial difficulties arise in obtaining background information and examining various factors associated with suicide in a large sample of completed suicides in a selected population.

Suicidal ideation is a powerful predictor of completed suicide.^{5,6} Accordingly, detailed investigation of

Correspondence address: Shuichi Awata, Department of Psychiatry, Tohoku University Graduate School of Medicine, 1-1 Seiryō-machi, Aoba-ku, Sendai 980-8574, Japan.

Email: awata@psy.med.tohoku.ac.jp

Received 7 October 2004; revised 20 December 2004; accepted 10 January 2005.

factors associated with suicidal ideation provides useful information closely related to completed suicide. In the last decade, several investigators in western countries and in Hong Kong have detected several sociodemographic and health-related factors associated with suicidal ideation in the elderly in the general population: female sex;⁷⁻⁹ increasing age;^{8,10} widowed status;^{9,10} financial insufficiency;⁹ lack of social support;⁹ stressful life events;⁹ fewer active coping skills;⁹ frequent medical consultations;⁹ physical illness;^{7,9,11} pain;^{11,12} impaired vision^{9,10,12} or hearing;^{9,12} incontinence;⁹ subjective perception of poor health;^{9,11,12} impaired daily living or physical functioning;^{9,10,12} impaired cognition;^{10,12} presence of any psychiatric symptom or disorder,⁷⁻¹⁵ particularly depression;^{7,10-12,14,15} use of psychotropic drugs,^{7,10,11} especially anxiolytics;^{7,11} and institutionalization.^{10,12}

Although many authors emphasize that among the various factors, depressive psychopathology makes the strongest contribution to suicidal ideation,^{7,8,10,11,15} several investigators have shown certain factors to be associated to suicidal ideation independently of depression: being unmarried,¹² presence of pain,¹² subjective perception of poor health,^{11,12} physical illness,⁹ history of myocardial infarction or peptic ulcer,⁷ physical disability,^{10,12} visual or hearing impairment,^{9,10,12} use of psychotropic drugs,^{7,10} use of hypnotics,¹¹ anxiety,¹¹ hostility,¹¹ and psychotic disorders.⁷

Several Japanese studies have focused on the risk of suicidal behavior in later life¹⁶⁻¹⁸ and have emphasized the importance of community-based management for depression in preventing suicide in the elderly.¹⁹⁻²¹ To our knowledge, however, no studies have systematically investigated factors associated with suicidal ideation in Japanese community-dwelling elders. In the present study, we examined a wide range of factors associated with suicidal ideation in elderly Japanese living in an urban residential district. Our ultimate aim is to develop a practical and effective strategy for identification of elders at high risk of suicide and, therefore, expedite intervention in the urban community setting.

METHODS

We conducted a two-phase cross-sectional survey in an urban residential district in Sendai, the capital of Miyagi prefecture in north-eastern Japan. In 2002, the population of Sendai was 995 314, and the proportion aged 65 years or over was 14.4%. The selected residential district is in the central region of the city and was developed in the mid-1960s. By 2002, the population of this district was 16 994, and the proportion aged 65 years or over was 24.4%, hence, a relatively large proportion of

residents were elderly. Approval for this research was obtained from the Ethics Committee of Tohoku University Graduate School of Medicine and Tohoku University Hospital.

In the first phase of the survey, we mailed a comprehensive geriatric assessment (CGA) and information regarding the present study to all district residents aged 70 years or over (total, 2730: 1132 men, 1598 women). Of these, 1198 participated in the CGA and 1178 gave informed consent for the study and were interviewed by trained interviewers between July and August 2002 at one of three nearby public facilities (Fig. 1).

Suicidal ideation at the time of the survey was evaluated by establishing the presence of 'thoughts of suicide' on the basis of the subject's response ('yes' or 'no') to the interview question, 'Do you feel so low that you think about committing suicide?' This is one of the two questions concerning suicidal ideation on the short revised version of the Composite International Interview.²² A previous Japanese study conducted in a rural community used the same question to assess suicidal ideation and reported that eight of 351 (2.3%) subjects aged 65 years or over experienced thoughts of suicide.²⁰

Sociodemographic variables including gender, age, educational level, marital status, cohabitants and perceived social supports were also assessed. Age was divided into four categories: 70-74, 75-79, 80-84 and ≥85 years. Educational level attained was assessed by determining age at completion of schooling and was divided into four categories: 0-12, 13-15, 16-18 and ≥19 years. These categories were roughly equivalent to the following educational levels: some elementary school, graduation from elementary school and some junior high school, graduation from junior high school and some high school, and graduation from high school, respectively. Marital status was categorized as follows: married, divorced or widowed, or single. Subjects were also classified as living alone or living with others. Perceived social support was evaluated on the basis of responses ('yes' or 'no') to the following five questions: 'Do you have someone to whom you can talk when you are in trouble?' (PSS1); 'Do you have someone to whom you can talk when your physical condition is not good?' (PSS2); 'Do you have someone who can help you with daily housework' (PSS3); 'Do you have someone who can take you to hospital when you do not feel well?' (PSS4); and 'Do you have someone who can take care of you when you are ill in bed?' (PSS5). These questions were extracted from a previous study regarding social support and elderly depression in a rural community,²³ and a strong association between negative answers to these items and depres-

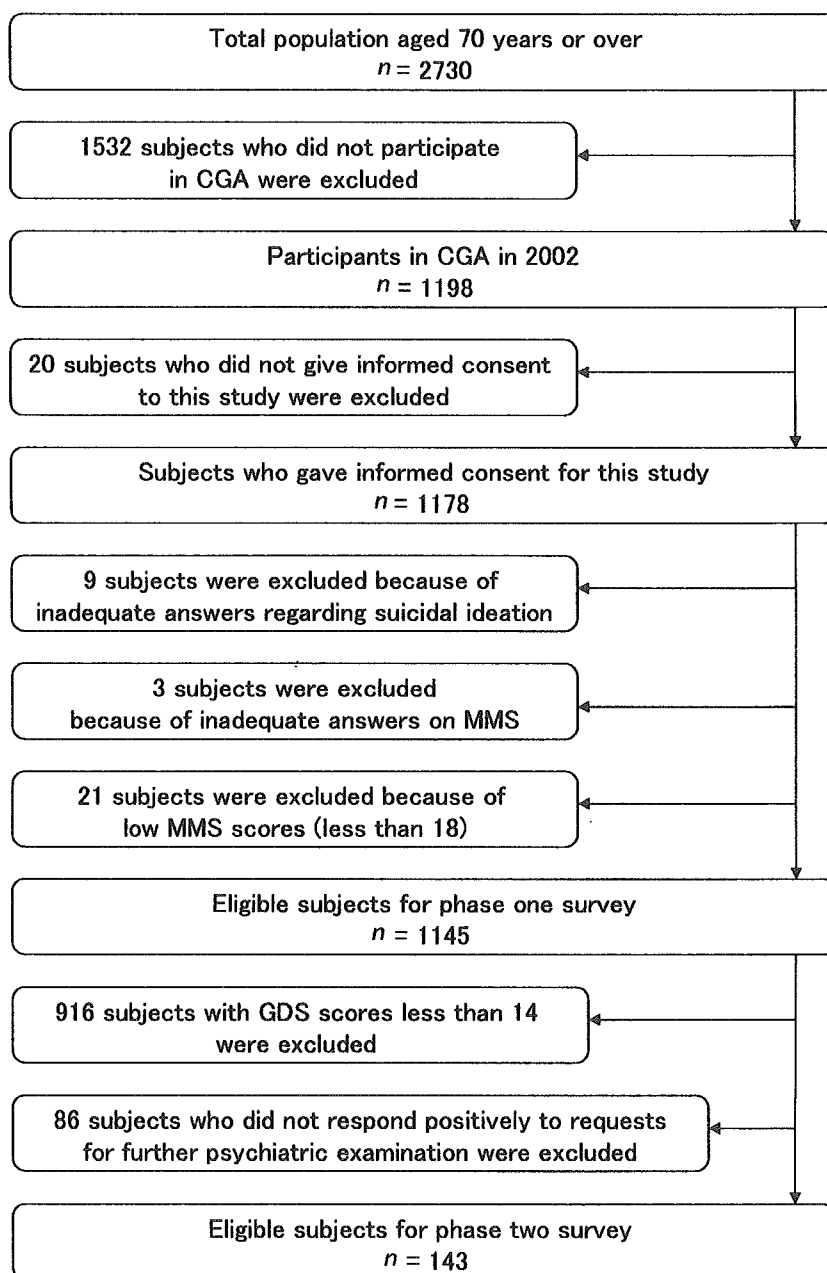


Figure 1. Flowchart showing a sample selection for phase one and two surveys.

sion has been confirmed in two Japanese community studies of elderly populations.^{23,24}

Health-related variables assessed included history of physical illness, pain, subjective perception of health, physical functioning, instrumental activities of daily living (IADL), alcohol-related problems, sleep disturbance, cognitive function, and current use of medication. History of physical illness was evaluated on the basis of responses ('yes' or 'no') to questions concerning a history of stroke, hypertension, ischemic heart

disease, diabetes mellitus, hyperuricemia, hyperlipidemia, renal disease, liver disease, cholelithiasis or cholecystitis, gastric or duodenal ulcer, tuberculosis, pneumonia, asthma, hearing disturbance, cataract, glaucoma, arthritis and osteoporosis. Subjects were classified into three categories according to the total number of above-mentioned physical conditions: 0–1, 2–3 and 4+. Pain within the previous 4 weeks was assessed by the question, 'Have you had any pain recently? If so, how intensely do you feel such pain?'

Possible answers were 'no pain', 'very mild pain', 'mild pain', 'moderate pain' and 'severe pain'. A subject who reported 'mild' to 'severe' pain was considered to have pain. Subjective perception of health was assessed by the question, 'How would you describe your overall health recently?' Possible answers were 'very good', 'good', 'neither good nor bad', 'bad' and 'very bad'. A subject who answered 'bad' or 'very bad' was considered to have a subjective perception of poor health. Physical function was assessed according to a subscale of the Medical Outcome Survey 36-item Short-Form Health Survey,²⁵ and was classified as 'impaired' if moderate activities such as moving a table were considered difficult. IADL were assessed using the Rouken-Shiki scale^{26,27} and a cut-off point of 10/11 was used to determine impairment in IADL. This scale is composed of 13 questions designed to measure higher-level competence in the elderly. According to the Lawton's hierarchy of competence, this covers instrumental self-maintenance, effectance (intellectual activity), and social role.^{27,28} The reliability and validity of the Rouken-Shiki scale have been studied in elderly Japanese with satisfactory results, and the average score in community residents aged in their 70s has been reported at around 11.^{26,27} Alcohol-related problems were identified on the basis of the 'cut down', 'annoyed', 'guilty', and 'eye-opener' (CAGE) questionnaire,²⁹ which includes four dichotomous questions. The total numbers of positive answers were classified into three categories: 0 (no alcohol-related problems), 1–2 (some alcohol-related problems), and 3–4 (severe alcohol-related problems). Sleep disturbance was assessed on the basis of the subjects' response ('yes' or 'no') to the question, 'Have you had any trouble sleeping within the last month?' Cognitive function was assessed on the basis of the Mini-Mental State Examination (MMSE).³⁰ Total scores ranging from 0 to 30 were classified into four categories: 0–17, 18–23, 24–27 and 28–30; indicating dementia, suspected mild dementia, suspected mild cognitive impairment, and no cognitive impairment, respectively. Depressive symptoms were assessed according to the Japanese version³¹ of the 30-item Geriatric Depression Scale (GDS)³² using two cut-off points: a score of ≥ 11 (GDS 11+) indicating relatively mild depressive symptoms, and a score of ≥ 14 (GDS 14+) indicating relatively severe depressive symptoms.

In the second phase of the survey, all subjects with a GDS score of ≥ 14 in the first phase of the survey were asked to undergo further psychiatric examination. One of four experienced psychiatrists visited the subject's home with a nurse and, after obtaining written informed consent, conducted a diagnostic evaluation using the Diagnostic and Statistical Manual of Mental

Disorders, 4th edition (DSM-IV) criteria.³³ Recent lasting suicidal ideation was evaluated as 'suicidal ideation over a 2-week period', one of the symptoms of a major depressive episode defined by DSM-IV as a relatively wide spectrum of recent suicidality, ranging from thoughts of death to a specific plan for attempting suicide.

Associations between suicidal ideation and each sociodemographic and health-related variable were assessed on the basis of odds ratios (OR) and 95% confidence intervals (CI). The OR was calculated for each variable alone and after controlling for the effect of depressive symptoms or other potential predictive variables using logistic regression analysis. All statistical analyses were performed with SPSS for Windows (version 11.5, SPSS Inc., Chicago, IL, USA). A *P*-value of less than 0.05 was considered statistically significant.

RESULTS

In the first phase of the survey, sufficient data regarding suicidal ideation were available from 1169 subjects (response rate = 42.8%). No gender difference in response rate was detected within each age group, however, response rate tended to decrease with age. Three subjects were excluded from the data analysis because of inadequate answers on MMSE, and 21 subjects with an MMSE score of less than 18 were excluded because moderate to severe cognitive impairment might have rendered their responses unreliable. The eligible sample for analysis, therefore, comprised 1145 subjects (mean age \pm standard deviation [SD], 76.29 \pm 4.78; range, 70–96 years); 480 men (mean age \pm SD, 76.04 \pm 4.70; range, 70–91 years) and 665 women (mean age \pm SD, 76.46 \pm 4.82; range, 70–96 years; Fig. 1).

Suicidal ideation was reported by 52 (4.5%) subjects; 18 (3.8%) men and 34 (5.1%) women. Frequencies in each sex and age group are shown in Table 1. Univariate analysis identified a lack of perceived social support (PSS4, PSS5), multiple physical illnesses, pain, subjective perception of poor health, impaired physical functioning, impaired IADL, sleep disturbance, and depressive symptoms as significantly associated with thoughts of suicide (Tables 2 and 3). However, when multivariate logistic regression analysis was performed by treating depressive symptoms as a covariate, only a lack of social support (PSS5) and impaired IADL were significantly associated with suicidal ideation (Tables 2 and 3). When controlling for factors other than depressive symptoms that were significantly associated with thoughts of suicide on univariate analysis, a strong association between depressive symptoms and suicidal ideation remained (Table 3).

Table 1. Frequencies of suicidal ideation in phase one study subjects

Age	Subjects			Thoughts of suicide		
	Male	Female	Total	Male	Female	Total
70–74	235	284	519	9 (3.8)	19 (6.7)	28 (5.4)
75–79	138	209	347	5 (3.6)	8 (3.8)	13 (3.7)
80–84	71	121	192	2 (2.8)	5 (4.1)	7 (3.6)
≥ 85	36	51	87	2 (5.6)	2 (3.9)	4 (4.6)
Total	480	665	1145	18 (3.8)	34 (5.1)	52 (4.5)

Percentages are indicated by parentheses.

In the second phase of the survey, of the 229 subjects with GDS 14+ and MMSE 18+, 143 agreed to further psychiatric examination (response rate = 62%; Fig. 1). Suicidal ideation over a 2-week period was reported by 22 (15.4%) subjects; four (9.1%) men and 18 (18.2%) women. No statistically significant gender difference was found in the frequency of suicidal ideation over this period ($\chi^2 = 1.934$, $P = 0.213$). Frequencies of each DSM-IV mental disorder are shown in Table 4. To examine the association between mental disorders and suicidal ideation, when defining depressive disorders according to DSM-IV criteria, suicidal symptoms were excluded from the nine symptoms of a major depressive episode. DSM-IV mental disorders, specifically a major depressive episode, depressive disorders not otherwise specified, adjustment disorder with depressed mood, mood disorder due to a general medical condition, and alcohol-related disorder were significantly associated with suicidal ideation over a 2-week period (Table 4).

DISCUSSION

Among the subjects of our study, that is, Japanese aged 70 years or over without apparent dementia living in an urban community, frequency of thoughts of suicide was estimated to be 4.5%. Although differences in age distribution of the study sample hinders simple comparisons, this is higher than that reported by a recent study conducted in a Japanese rural community using the same questionnaire, which documented a 2.3% prevalence of thoughts of suicide among the elderly aged 65 years or over.²⁰ The present finding is also inconsistent with urban–rural differences in the late-life suicide rate in Japan.¹⁶ However, the elderly living in some urban communities might be more likely to experience suicidal ideation in relation to the recent rapid increase of the proportion of elderly in residential districts. To confirm this, further investigation is needed using the

samples representing the general population in these communities.

In the present study, lack of social support and various negative health factors (multiple physical illnesses, pain, subjective perception of poor health, impaired physical functioning, impaired IADL, sleep disturbance, and depressive symptoms) were associated with thoughts of suicide. This finding is consistent with most previous studies in western countries^{7,8,10–15} and in Hong Kong,⁹ which demonstrate the importance of lack of social support or health-related problems as contributors to elderly suicidal ideation.

A noteworthy finding of the present study was that lack of social support and impaired IADL were significantly associated with suicidal ideation even after controlling for depressive symptoms. An elderly person's perception that no one can take care of them during times of confinement to bed due to illness (PSS5) reflects lack of perceived 'instrumental' social support, which is equivalent to feelings of isolation and helplessness related to inability to live independently. In addition, impaired IADL reflects the inability of older people to independently live in the community. Hence, feelings of isolation, helplessness, and loss of independence might be critical psychological problems in elderly community residents, irrespective of depression. Studies in a variety of different populations^{12,34–37} have also emphasized the relationship between lack of social support and suicide in the elderly. In a community-based study, Jorm *et al.*¹² pointed out the importance of lack of social support in elderly suicidal ideation: not being married was significantly associated with the wish to die, irrespective of depression. In older primary care patients, Bartels *et al.*³⁷ found that fewer social supports were associated with both passive and active suicidal ideation. Moreover, our previous study demonstrated that lack of social support was more frequently perceived by elders living in an urban community than those in a rural region, and a strong association has been found between lack of social support and depression after controlling for various demographic and health-related variables.²⁴ Hence, lack of social support may be a serious public health problem for elderly Japanese in urban residential districts, where the proportion of the elderly is increasing rapidly and resources for social support are relatively scarce compared to rural regions.

The present study showed depressive symptoms to be the strongest predictor of suicidal thoughts: depressive symptoms (GDS 14+) versus absence of depressive symptoms (GDS < 11) were associated with a 34-fold increase in the risk of suicidal ideation after controlling for other sociodemographic and health-related variables. This finding is consistent with the majority of

Table 2. Associations between suicidal ideation and sociodemographic variables

Variables	<i>n</i>	SI	Univariate analysis			Multivariate analysis		
			OR	95% CI	<i>P</i>	OR	95% CI	<i>P</i>
Age								
70–74 years	519	28	1			1		
75–79 years	347	13	0.7	0.4–1.3	0.266	0.6	0.3–1.2	0.134
80–84 years	192	7	0.7	0.3–1.6	0.342	0.6	0.2–1.4	0.201
≥85 years	87	4	0.9	0.3–2.5	0.759	0.7	0.2–2.1	0.496
Gender								
Male	480	18	1			1		
Female	665	34	1.4	0.8–2.5	0.276	0.9	0.5–1.7	0.797
Educational level								
≥19 years	342	11	1			1		
16–18 years	506	27	1.7	0.8–3.5	0.147	1.2	0.6–2.5	0.678
13–15 years	257	11	1.4	0.6–3.2	0.495	0.8	0.3–1.9	0.548
0–12 years	34	2	1.9	0.4–8.9	0.424	0.8	0.2–3.8	0.729
Marital status								
Married	693	27	1			1		
Widowed or divorced	403	22	1.4	0.8–2.5	0.229	0.9	0.5–1.7	0.827
Single	45	3	1.8	0.5–6.1	0.368	1.1	0.3–4.2	0.856
Living alone								
No	857	37	1			1		
Yes	284	15	1.2	0.7–2.3	0.500	0.8	0.4–1.6	0.563
PSS 1								
Yes	863	34	1			1		
No	282	18	1.7	0.9–3.0	0.090	1.2	0.6–2.2	0.651
PSS 2								
Yes	893	38	1			1		
No	252	14	1.3	0.7–2.5	0.383	0.9	0.5–1.7	0.725
PSS 3								
Yes	697	25	1			1		
No	448	27	1.7	1.0–3.0	0.056	1.1	0.6–2.0	0.768
PSS 4								
Yes	859	31	1			1		
No	286	21	2.1	1.2–3.8	0.010	1.3	0.7–2.4	0.402
PSS 5								
Yes	824	22	1			1		
No	321	30	3.8	2.1–6.6	<0.001	2.0	1.1–3.6	0.026

Univariate OR and 95% CI were calculated by crude logistic regression analysis. Multivariate OR and 95% CI were calculated after controlling for depressive symptoms. Because of minor differences in response rates for individual items, slight variation occurred in sample sizes between analyses.

95% CI, 95% confidence interval; *n*, number of subjects; OR, odds ratio; PSS, perceived social support, evaluated by the following questions: (PSS1), 'Do you have someone to whom you can talk when you are in trouble?' (PSS2), 'Do you have someone with to you can talk when your physical condition is not good?' (PSS3), 'Do you have someone who can help you with daily housework?' (PSS4), 'Do you have someone who can take you to hospital when you do not feel well?' (PSS5) 'Do you have someone who can take care of you when you are ill in bed?'; SI, number of subjects with suicidal ideation.

Table 3. Associations between suicidal ideation and health-related variables

Variables	<i>n</i>	SI	Univariate analysis			Multivariate analysis		
			OR	95% CI	<i>P</i>	OR	95% CI	<i>P</i>
Number of physical illnesses								
0–1	294	8	1			1		
2–3	467	19	1.5	0.7–3.5	0.331	1.6	0.7–3.8	0.309
≥4	384	25	2.5	1.1–5.6	0.028	1.5	0.6–3.4	0.382
Pain								
No	263	25	1			1		
Yes	820	22	2.9	1.6–5.2	<0.001	1.9	1.0–3.5	0.054
Subjective health perception								
Healthy	905	28	1			1		
Unhealthy	218	21	3.3	1.9–6.0	<0.001	1.3	0.7–2.5	0.415
Impaired physical functioning								
No	729	24	1			1		
Yes	411	28	2.2	1.2–3.8	0.007	1.0	0.5–1.8	0.881
Impaired IADL								
No	904	30	1			1		
Yes	141	18	4.3	2.3–7.9	<0.001	2.0	1.0–3.9	0.042
Smoking status								
Non-smoker	643	33	1			1		
Ex-smoker	335	15	0.9	0.5–1.6	0.230	1.2	0.6–2.4	0.537
Current smoker	145	4	0.5	0.2–1.5	0.653	0.5	1.8–1.6	0.252
Drinking status								
Non-drinker	506	20	1			1		
Ex-drinker	139	10	1.9	0.9–4.1	0.113	1.7	0.8–4.0	0.202
Current drinker	447	20	1.1	0.6–2.1	0.689	2.0	1.0–3.9	0.050
Alcohol-related problem (CAGE)								
0	336	11	1			1		
1–2	193	13	2.1	0.9–4.9	0.071	1.9	0.8–4.6	0.154
3–4	48	1	0.6	0.1–5.0	0.660	0.5	0.1–4.1	0.504
Sleep disturbance								
No	774	26	1			1		
Yes	350	26	2.3	1.3–4.0	0.003	1.4	0.8–2.5	0.293
Cognitive status (MMSE)								
28–30	653	23	1			1		
24–27	403	22	1.6	0.9–2.9	0.133	1.1	0.6–2.1	0.704
18–23	89	7	2.3	1.0–5.6	0.058	1.3	0.5–3.3	0.577
Depressive symptoms (GDS)								
0–10	761	4	1			1		
11–13	156	8	10.2	3.0–34.4	<0.001	11.8	3.0–47.0	<0.001
14–30	228	40	40.3	14.2–113.9	<0.001	33.8	9.7–117.5	<0.001

Univariate OR and 95% CI were calculated by crude logistic regression analysis. With the exception of depressive symptoms, multivariate OR and 95% CI were calculated after controlling for depressive symptoms. For depressive symptoms, multivariate OR and 95% CI were calculated after controlling for perceived social support (PSS5), number of physical illnesses, pain, subjective health feeling, impaired physical functioning, impaired IADL, and sleep disturbance. Because of minor differences in response rates for individual items, slight variation occurred in sample sizes between analyses.

95% CI, 95% confidence interval; CAGE, 'cut down', 'annoyed', 'guilty', and 'eye-opener'; GDS, Geriatric Depression Scale; IADL, instrumental activities of daily living; MMSE, Mini-Mental State Examination; *n*, number of subjects, OR, odds ratio; SI, number of subjects with suicidal ideation.

Table 4. Association between the 4th edition of the Diagnostic and Statistical Manual of mental disorders and recent suicidal ideation in subjects with depressive symptoms

	Male	Female	Total	RSI	OR	95% CI	<i>P</i>
No DSM disorders	26	41	67	2	1 [†]		
Any DSM disorder	18	58	76	20	11.3	2.5–51.4	0.002
Major depressive disorder, episode	2	4	6	3	37.5	3.9–358.3	0.002
Major depressive disorder, remission	1	11	12	2	5.0	0.6–40.1	0.133
Dysthymic disorder	1	2	3	1	17.3	1.0–305.8	0.052
Depressive disorder, not otherwise specified	4	6	10	2	9.0	1.1–77.2	0.045
Adjustment disorder with depressed mood	4	18	22	8	16.2	3.0–86.4	0.001
Mood disorder due to a general medical condition	2	0	2	1	78.4	2.1–2953.2	0.018
Anxiety disorder	0	11	11	2	5.1	0.6–41.4	0.129
Somatoform disorder	0	2	2	0	–	–	–
Sleep disorder	0	4	4	0	–	–	–
Alcohol-related disorder	2	0	2	1	96.0	3.0–3047.8	0.010
Delirium, dementia, and amnesic and other cognitive disorder	2	0	2	0	–	–	–
Total	44	99	143	22			

Adjusted logistic regression analysis controlled for age and gender.

[†]Baseline measurements.

95% CI, 95% confidence interval; OR, odds ratio; RSI, number of subjects with recent suicidal ideation.

studies, which indicate depressive symptomatology to be the strongest contributor to elderly suicidal ideation.^{7,8,10,11,14,15} Furthermore, the present study confirmed that a major depressive episode made an extremely strong contribution to recent suicidal ideation: major depressive episode versus depressive symptoms without any psychiatric diagnosis conferred a 37.5-fold increase in the risk of suicidal ideation over a 2-week period. This finding is also consistent with those of several previous reports^{7,8,10} that emphasize the extreme importance of major depression as a contributing factor in elderly suicidal ideation. Using multiple regression analysis, Forsell *et al.*¹⁰ demonstrated that a diagnosis of major depression accounted for 53.8% of the variance in recent suicidal thoughts in subjects aged 75 years or over. Barnow and Linden⁸ reported that major depression conferred a more than 40-fold increase in the risk of suicidal ideation in subjects aged 70 years over. In addition, in a psychological autopsy study, Conwell *et al.*³⁸ found major depression to be the most common psychiatric diagnosis, being detected in 57.1% of individuals aged 75 years or over who committed suicide.

Mental disorders other than major depressive disorder, that is, depressive disorder not otherwise specified, adjustment disorder with depressed mood, mood disorder due to a general medical condition, and alcohol-related disorder, were also significantly associated with recent suicidal ideation in the present study. Furthermore, in the first phase of the survey, it was noted that

current alcohol intake was marginally associated with suicidal ideation even after controlling for depressive symptoms, although only two subjects were diagnosed as having alcohol-related disorder in the second phase of the survey. Barnow and Linden⁸ showed that a specific psychiatric diagnosis not involving major depression versus no psychiatric diagnosis tripled the risk of being suicidal. In a psychological autopsy study, Conwell *et al.*³⁸ found depressive syndromes other than a major depressive disorder in 21.4% and alcohol-related disorder in 28.6% of individuals aged 75 years or more who committed suicide. The present study emphasizes that diagnostic assessment of mental disorders, particularly for depressive syndromes and alcohol-related disorder, is important to identify those at risk of late-life suicide in the urban community setting.

This study had several limitations. First, our sample population may not have adequately represented the elderly within the general population because the response rate for the first phase of the survey was only 43%. Elderly people who did not participate in the CGA might have been more likely than those who did participate to exhibit physical and mental health problems. Thus, in the present study, the frequency of suicidal ideation could have in fact been underestimated and the issue of suicidal ideation might be more serious among the elderly living in Japanese urban communities than was indicated by our results. Second, comprehensive structured diagnostic interviews were not

strictly performed because the ultimate aim of this study was to develop a realistic strategy for identification of elders at risk of suicide and to provide effective interventions in the community setting. To estimate more accurately the association between elderly suicidal ideation and various mental disorders, a survey of a larger sample population using a standardized comprehensive structured diagnostic interview is needed. Third, a cross-sectional design has inherent limitations in determining causal relations. However, the present study provides valuable information for developing screening methods for case identification. To clarify causal relationships, we are currently preparing to conduct a prospective cohort study on elderly suicidal ideation within the present sample.

CONCLUSIONS

In an urban community setting, screening for depressive symptoms, impaired IADL, and lack of social support followed by diagnostic evaluation, particularly for depressive syndromes and alcohol-related disorders, may provide a practical and effective strategy for case identification in the prevention of suicide in the elderly.

ACKNOWLEDGMENTS

The authors are grateful to all the participants of the Projects, to Dr S. Ebihara (Department of Geriatric and Respiratory Medicine, Tohoku University), Dr H. Haga (Tohoku Bunkagakuen University) and Dr N. Nakaya (Department of Public Health and Forensic Medicine, Tohoku University) for their valuable comments, and to Y. Nakata (Department of Public Health and Forensic Medicine, Tohoku University), M. Kubota and M. Fujikawa (both from Department of Psychiatry, Tohoku University Hospital) for their helpful secretarial assistance. This study was supported, in part, by a Grant-in-Aid for Scientific Research from the Japanese Ministry of Health, Welfare, and Labor.

REFERENCES

1. Pearson JL, Conwell Y. Suicide in late life: challenges and opportunities for research. Introduction. *Int. Psychogeriatr.* 1995; **7**: 131–136.
2. Szanto K, Gildengers A, Mulsant BH, Brown G, Alexopoulos GS, Reynolds CF III. Identification of suicidal ideation and prevention of suicidal behaviour in the elderly. *Drugs Aging* 2002; **19**: 11–24.
3. *Health and Welfare Statistics Association*. Main indications for public health. *J. Health Welfare Statistics* 2002; **49**: 34–78 (in Japanese).
4. *Community Safety Bureau of the Community Police Affairs Division of the National Police Agency. A Brief Report of Suicide in 2003*. Available from: <http://www.npa.go.jp/toukei/chiiki4/jisatu.pdf> 2004 (in Japanese).
5. Beck AT, Steer RA, Kovacs M, Garrison B. Hopelessness and eventual suicide: a 10-year prospective study of patients hospitalized with suicidal ideation. *Am. J. Psychiatry* 1985; **142**: 559–563.
6. Hawley CJ, James DV, Birkett PL, Baldwin DS, de Ruiter MJ, Priest RG. Suicidal ideation as a presenting complaint. Associated diagnosis and characteristics in a casualty population. *Br. J. Psychiatry* 1991; **159**: 232–238.
7. Skoog I, Aevansson O, Beskow J *et al.* Suicidal feelings in a population sample of nondemented 85-year-olds. *Am. J. Psychiatry* 1996; **153**: 1015–1020.
8. Barnow S, Linden M. Epidemiology and psychiatric morbidity of suicidal ideation among the elderly. *Crisis* 2000; **21**: 171–180.
9. Yip PSF, Chi I, Chiu H, Wai KC, Conwell Y, Caine E. A prevalence study of suicide ideation among older adults in Hong Kong SAR. *Int. J. Geriatr. Psychiatry* 2003; **18**: 1056–1062.
10. Forsell Y, Jorm AF, Winblad B. Suicidal thoughts and associated factors in an elderly population. *Acta. Psychiatr. Scand.* 1997; **95**: 108–111.
11. Scocco P, Meneghel G, Caon F, Buono MD, Leo DD. Death ideation and its correlates: survey of an over-65-year-old population. *J. Nerv. Ment. Dis.* 2001; **189**: 210–218.
12. Jorm AF, Henderson AS, Scott R, Korten AE, Christensen H, Mackinnon AJ. Factors associated with the wish to die in elderly people. *Age Aging* 1995; **24**: 389–392.
13. Linden M, Barnow S. The wish to die in very old persons near the end of life: a psychiatric problem? Results from the Berlin Aging Study (BASE). *Int. Psychogeriatr.* 1997; **9**: 291–307.
14. Scocco P, Leo DD. One-year prevalence of death thoughts, suicide ideation and behaviours in an elderly population. *Int. J. Geriatr. Psychiatry* 2002; **17**: 842–846.
15. Rao R, Dening T, Brayne C, Huppert FA. Suicidal thinking in community residents over eighty. *Int. J. Geriatr. Psychiatry* 1997; **12**: 337–343.
16. Watanabe N, Hasegawa K, Yoshinaga Y. Suicide in later life in Japan: urban and rural differences. *Int. Psychogeriatr.* 1995; **7**: 253–261.
17. Takahashi Y, Hirasawa H, Koyama K *et al.* Suicide and aging in Japan: an examination of treated elderly suicide attempters. *Int. Psychogeriatr.* 1995; **7**: 239–251.
18. Oyama H, Koizumi T. Depression and suicide in the elderly. *Psychosom. Med.* 2000; **4**: 256–264 (in Japanese).
19. Takahashi K, Naito H, Morita M *et al.* Suicide prevention for the elderly in Matsunoshima Town, Higashikubiki County, Niigata Prefecture: psychiatric care for elderly depression in the community. *Psychiatry Neurologia Japonica* 1998; **100**: 469–485 (in Japanese).
20. Ono Y, Tanaka E, Oyama H *et al.* Epidemiology of suicidal ideation and help-seeking behaviors among the

- elderly in Japan. *Psychiatr. Clin. Neuros.* 2001; **55**: 605–610.
21. Oyama H, Koida J, Sakashita T, Kudo K. Community-based prevention for suicide in elderly by depression screening and follow-up. *Community Ment. Health J.* 2004; **40**: 249–263.
 22. Robins LN, Wing J, Wittchen HU *et al.* The Composite International Diagnostic Interview: an epidemiologic instrument suitable for use in conjunction with different diagnostic systems and in different cultures. *Arch. Gen. Psychiatry* 1988; **45**: 1069–1077.
 23. Muraoka Y, Oiji A, Ihara K. The physical and psychological and social background factor of elderly depression in the community. *Jpn. J. Geriatr. Psychiatry* 1996; **7**: 397–407 (in Japanese).
 24. Koizumi Y, Awata S, Seki T *et al.* Association between social support and depression in the elderly Japanese population. *Jpn. J. Geriatr* 2004; **41**: 426–433 (in Japanese).
 25. McHorney CA, Ware JE Jr, Rachel Lu JF, Sherbourne CD. The MOS, 35-item Short-Form Survey (SF-35): III. Tests of data quality, scaling assumptions, and reliability across diverse patient groups. *Med. Care* 1994; **32**: 40–66.
 26. Koyano W, Shibata H, Nakazato K, Haga H, Suyama Y, Matsuzaki T. Mortality in relation to instrumental activities of daily living: one-year follow-up in a Japanese urban community. *J. Gerontol.* 1989; **44**: S107–109.
 27. Koyano W, Shibata H, Haga H, Suyama Y, Nakazato K. Measurement of competence in the elderly living at home: development of an index of competence. *Nippon Koshueiseigaku Zasshi* 1987; **34**: 109–114 (in Japanese).
 28. Lawton MP. Assessing the competence of older people. In: Kent DP, Kastenbaum RJ, Sherwood S (eds). *Research Planning Action for the Elderly: the Power and Potential of Social Science*. Behavioral Publications, New York, 1972, 122–143.
 29. Ewing JA. Detecting alcoholism. The CAGE Questionnaire. *JAMA* 1984; **252**: 1905–1907.
 30. Folstein MF, Folstein SE, McHugh PR. 'Mini-Mental State'. A practical method for grading the cognitive state of patients for the clinician. *J. Psychiatr. Res.* 1975; **12**: 189–198.
 31. Niino N, Imaizumi T, Kawakami N. A Japanese translation of the Geriatric Depression Scale. *Clin. Gerontol.* 1991; **10**: 85–87.
 32. Yesavage JA, Brink TL. Development and validation of a geriatric depression screening scale: a preliminary report. *J. Psychiatr. Res.* 1983; **17**: 37–49.
 33. *American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders*, 4th edn. American Psychiatric Press, Washington, DC, 1994.
 34. Kishi Y, Robinson RG, Kosier JT. Suicidal plans in patients with stroke: comparison between acute-onset and delayed-onset suicidal plans. *Int. Psychogeriatr.* 1996; **8**: 623–634.
 35. Alexopoulos GS, Bruce ML, Hull J, Sirey JA, Kakuma T. Clinical determinants of suicidal ideation and behaviour in geriatric depression. *Arch. Gen. Psychiatry* 1999; **56**: 1048–1053.
 36. Breitbart W, Rosenfeld B, Pessin H *et al.* Depression, hopelessness, and desire for hastened death in terminally ill patients with cancer. *JAMA* 2000; **284**: 2907–2911.
 37. Bartels SJ, Coakley E, Oxeman TE *et al.* Suicidal and death ideation in older primary care patients with depression, anxiety, and at-risk alcohol use. *Am. J. Geriatr. Psychiatry* 2002; **10**: 417–427.
 38. Conwell Y, Duberstein PR, Cox C, Herrmann JH, Forbes NT, Caine ED. Relationships of age and axis I diagnoses in victims of completed suicide: a psychological autopsy study. *Am. J. Psychiatry* 1996; **153**: 1001–1008.

Regular Article

Association between social support and depression status in the elderly: Results of a 1-year community-based prospective cohort study in Japan

YAYOI KOIZUMI, MD, PhD,^{1,2} SHUICHI AWATA, MD, PhD,¹ SHINICHI KURIYAMA, MD, PhD,² KAORI OHMORI, MD, PhD,² ATSUSHI HOZAWA, MD, PhD,² TORU SEKI, MD,¹ HIROO MATSUOKA, MD, PhD¹ AND ICHIRO TSUJI, MD, PhD²

¹Department of Psychiatry, Tohoku University Graduate School of Medicine, ²Division of Epidemiology, Department of Public Health and Forensic Medicine, Tohoku University Graduate School of Medicine, Miyagi, Japan

Abstract

We conducted a prospective cohort study on subjects aged ≥ 70 years in an urban community to determine whether there is any association between lack of social support and depression status. Of the 2730 eligible subjects, 1178 participated and were interviewed in a Comprehensive Geriatric Assessment (CGA) in 2002. We investigated the five social supports items using the following questions: (i) do you have someone with whom you can consult when you are in trouble?, (ii) do you have someone with whom you can consult when your physical condition is not good?, (iii) do you have someone who can help you with your daily housework?, (iv) do you have someone who can take you to a hospital when you do not feel well?, and (v) do you have someone who can take care of you when you are ill in bed? The Geriatric Depression Scale was used to estimate depression status. The subjects were divided into two groups: depressive and non-depressive. Of 753 subjects classified as non-depressive, 475 also took part in a CGA in 2003 and 278 dropped out. We calculated the risk of depression status in the elderly without social support. Lack of social support items (i) and (v) were significantly associated with an increased risk of depression status. The multivariate odds ratios (95% confidence intervals) regarding the risk of depression status among the elderly without (i) and (v) social support items were 2.6 (1.2–5.3) and 3.0 (1.4–6.1), respectively. We also found the increase risk of depression status with lack of social support item (v) was significantly different for different sexes and for different pain conditions. We conclude that there is a significant increase in the risk of depression status associated with the lack of social support in Japanese elderly people in an urban community.

Key words

depression status, elderly, Geriatric Depression Scale, prospective cohort study, social support.

INTRODUCTION

Past studies have indicated that depression among the elderly is related to a variety of physical and social conditions.^{1–7} The social relationships between community-dwelling people represent one of the most important

aspects of the social condition. Social relationships are divided mainly into social support and social network. Although few studies have used comparative concepts and featured measurements of social support and networks, the recent paper reported that social support represents the functional aspect of personal relationships, and social networks represents the structural aspect of personal relationships.² In this study, we followed this concept and focused on the relationship between social support and depression.

Among the past studies concerning the relationship between social support and depression status in the elderly, two cross-sectional studies and one cohort

Correspondence address: Dr Yayoi Koizumi, Department of Psychiatry, Tohoku University Graduate School of Medicine, Seiryouchou, Aoba-ku, Sendai city, Miyagi 980-7574, Japan. Email: aglaia-thk@umin.ac.jp

Received 10 December 2004; revised 20 April 2005; accepted 24 April 2005.

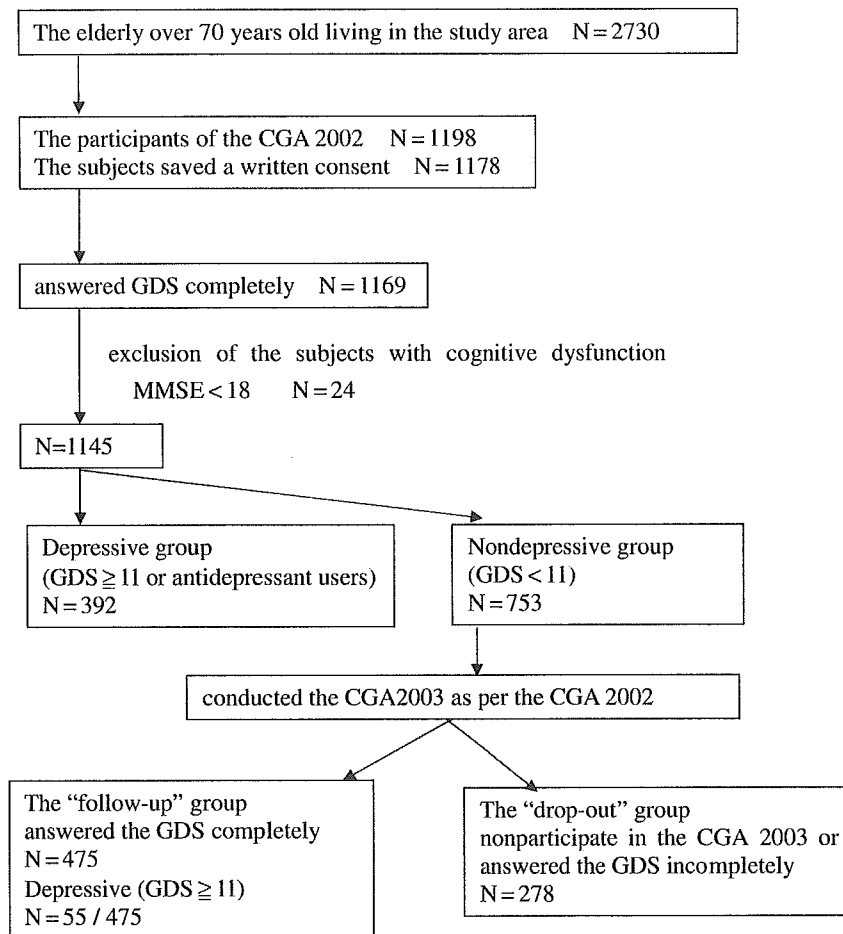


Figure 1. The study flow.

study reported a significant association between lack of social support and depression status in Japan.⁵⁻⁷ However, there are no community-based cohort studies of urban areas in Japan involving multivariate analysis of confounding factors. Neither have any studies taken particular note of the characteristics of the high-risk group for depression; those without social support.

To determine the association between lack of social support and depression status in elderly Japanese subjects who live in an urban area, we conducted a community-based prospective cohort study on residents who were ≥ 70 years of age, and calculated the risk of depression status where there was no social support, using multivariate analysis.

MATERIALS AND METHODS

Study subjects

We conducted a Comprehensive Geriatric Assessment (CGA) of all residents who were ≥ 70 years of age in

both 2002 and 2003 (the CGA 2002 and the CGA 2003, respectively) in the 'Tsurugaya' district, which is located almost in the center of Sendai city, one of the largest cities in the northern part of Japan.

The study design has been described in detail elsewhere.⁸⁻¹⁰ A flow diagram of the study design is shown in Figure 1. We invited all residents who were ≥ 70 years old ($n = 2730$) to participate in the CGA 2002, of which 1198 responded (43.8% response rate). Of these, 1178 provided their written consent to participate as subjects in this study (43.1% participation rate). We conducted an interview survey of the subjects' past medical history, information on medication, level of education, physical function,¹¹ cognitive function,¹² levels of pain, self-rated health, depression status, and social support. We assessed depression status with the aid of the Geriatric Depression Scale (GDS).¹³ Out of the 1178 subjects, 1169 completed the GDS. After excluding 24 subjects with cognitive dysfunction (Mini Mental State Examination, MMSE, Score¹² < 18), we analyzed 1145 subjects further. The subjects were

divided into two groups: depressive (GDS ≥ 11 or antidepressant users) and non-depressive (GDS < 11). In the CGA 2002, there were 392 subjects in the depressive group (384 with GDS ≥ 11 and eight with antidepressant users) and 753 in the non-depressive group. One year later, we conducted the CGA 2003 in the same way as the CGA 2002. To investigate the risk of depression status where there was no social support on the prospective cohort design, we chose subjects who were non-depressive and calculated the odds ratio of the depressive status (GDS ≥ 11) revealed in the CGA 2003 between the subjects without social support and the subjects with social support in CGA 2002. Of the 753 subjects who were non-depressive in the CGA 2002, 475 answered the GDS completely in the CGA 2003. We defined these 475 subjects as the 'follow-up' group. The remaining 278 subjects who did not participate in the CGA 2003 or who answered the GDS incompletely in the CGA 2003 were defined as the 'drop-out' group. Within 475 follow-up subjects, 55 subjects were depressive (GDS ≥ 11) in the CGA 2003.

This study was approved by the ethics committee of Tohoku University Graduate School of Medicine, at which the work was undertaken and conformed to the provisions of the Declaration of Helsinki, 1995 (as revised in Edinburgh in 2000). We also obtained written informed consent to participate from all of the subjects. The anonymity of the participants was preserved. After finishing the survey, we returned the individual results of the CGA 2002 and CGA 2003 to each participant in the form of a personal report.

Questionnaire

The Geriatric Depression Scale

The GDS consists of 30 questions that each require a 'yes' or 'no' answer, and was used in this study as a screening method for depression status.¹³ Compared with Hamilton Rating Scale for Depression, it was recommended that a state of depression should be indicated by a score of more than 11 points; the specificity of this scale was found to be 95%.¹³

Social support questionnaire

The degree of social support available to each subject was assessed by asking the following questions: (i) do you have someone with whom you can consult when you are in trouble?, (ii) do you have someone with whom you can consult when your physical condition is not good?, (iii) do you have someone who can help you with your daily housework?, (iv) do you have someone who can take you to a hospital when you do not feel

well?, and (v) do you have someone who can take care of you when you are ill in bed?

The questionnaire which we used in this study was referred to a previous report which was mentioned about the social background factor of elderly depression in the community.⁵ This social support questionnaire consists of five questions that each require a 'yes' or 'no' answer. In the previous report, it was suggested that questions (i) and (ii) represent the emotional aspect of social support, and questions (iii), (iv) and (v) represent the instrumental aspect.⁵ This questionnaire was only available in Japanese. The validity and reliability of this questionnaire were not evaluated.

Data analysis

To evaluate any selection bias that occurred among the follow-up group, we compared the baseline characteristics in the CGA 2002 between the follow-up group and the drop-out group. The mean GDS scores in the CGA 2002 for both groups were compared by *t*-test, and the remaining factors were compared by χ^2 test. We also calculated for the follow-up group, the risk of depression status in relation to lack of social support by using multivariate logistic regression analysis. The odds ratios (95% confidence intervals) were calculated for each of the five social support items. We considered the following variables as potential confounders: sex, age, presence or absence of a spouse, numbers of people living in their household (one, two, three, or over), history of physical diseases (the maximum number was 19, from the following: brain infarction, hypertension, ischemic heart disease, diabetes, gout, hypercholesterolemia, renal disease, hepatic disease, cholangitis or gallbladder stone, ulcer, tuberculosis, pneumonia, asthma, cancer, difficulty in hearing, cataract, glaucoma, arthritis, and osteoporosis), age at finishing school education (less than 16 years, 16–18 years, or more than 19 years), cognitive function (MMSE score: 18–24, 25–27, or more than 28), physical function (ability to perform moderate exercise, or disability), level of pain (none, slight, weak, moderate, or more severe), self-rated health (always healthy, health variable, always unhealthy), and the GDS score in the CGA 2002. These items were chosen as covariates because past studies have shown that they are factors related to depression status,^{2,5,6,10,14} because in the present study, multivariate regression analysis revealed a significant association between them and depression status, or because we considered them as important related factors in usual clinical findings.

We determined the characteristics of the high-risk group of developing depression status among lack of social support subjects. We conducted stratified analy-

ses of social support item (i), which represents an emotional aspect, and item (v), which represents the instrumental aspect. Items were stratified according to the following covariates: age, sex, presence or absence of a spouse, number of people living in their household, history of physical diseases, education level, physical function, pain, and self-rated health status. Thus we also investigated into the effect modification of these covariate factors have on the association between social support and depression status. We tested the statistical significance of effect modification by χ^2 test for the difference in natural logarithms of likelihood ratios obtained from two multivariate models, with the first model including indicator variables for exposure and a potential effect modifier, and the second model including indicator variables for exposure and a potential effect modifier and product terms of the two.¹⁵

SAS software was used for all analyses,¹⁶ and the level of statistical significance was defined as $P < 0.05$.

RESULTS

Table 1 gives a comparison of the baseline characteristics of the follow-up group (475 subjects) and the drop-

out group (278 subjects). We found no significant differences in the mean GDS scores obtained in the CGA 2002 or in the distribution of the lack of social support for each of the five items between the two groups. In contrast, it appeared that women, over 75 years of age, with a low education level, having cognitive dysfunction (MMSE <25), and with physical dysfunction, were more likely to drop out.

The odds ratios and 95% confidence intervals of the risk of depression status among those elderly who were without social support are given in Table 2. The multivariate odds ratios (95% confidence intervals) for each social support item were: (i) 2.6 (1.2–5.3), (ii) 1.7 (0.8–3.7), (iii) 1.1 (0.6–2.2), (iv) 1.8 (0.9–3.8), and (v) 3.0 (1.4–6.1). We found that lack of social support item (i) (having someone to consult when in trouble), one of the emotional aspects, was associated with a significant increase in the risk of depression status, as was item (v) (having someone who can take care of you when you are ill in bed), one of the instrumental aspects.

Furthermore, we determined the characteristics of the groups in which the risk of depression status was significantly increased due to lack of social support. As shown in Table 2, social support items (i) and (v) were

Table 1. Comparison of characteristics between the follow-up and the drop-out subjects

	Follow-up (<i>n</i> = 475)	Drop-out (<i>n</i> = 278)	<i>P</i> -value
GDS score in CGA 2002 (mean \pm SD)	5.8 \pm 2.8	6.2 \pm 2.8	0.954
Women	49.9	61.2	0.003
Age \geq 75 years	48.8	57.9	0.016
Spouse (-)	31.4	37.8	0.073
Living alone	19.8	24.5	0.132
No. past physical diseases \geq 3	51.0	46.0	0.193
Low education level	62.3	71.9	0.007
Cognitive dysfunction	4.0	16.2	<0.0001
Physical dysfunction	24.0	30.9	0.038
Pain (+)	72.4	73.0	0.858
Low health status	23.6	27.3	0.250
Social support (-)			
(i) To consult in trouble	19.0	23.0	0.181
(ii) To consult in bad physical condition	17.1	21.2	0.156
(iii) To help with your daily housework	32.6	35.6	0.404
(iv) To take to a hospital	20.8	19.4	0.641
(v) To take care of you	0.2	21.6	0.654
GDS score in CGA 2003 (mean \pm SD)	5.9 \pm 3.6		
GDS score in CGA 2003 \geq 11	11.6		

GDS scores between the follow-up and the drop-out groups were compared by *t*-test. Other factors shown as the proportion of each (%) were compared by χ^2 test. Low education level means that the age at finishing school education was under 19 years. Cognitive dysfunction means that MMSE score was less than 25. Physical dysfunction means disability to perform moderate exercise. Low health status means that in their self-rated health assessment the subjects answered that they were not always healthy.

Table 2. Association between social support and depression status by the logistic regression model: odds ratios (95% confidence intervals)

	(i)	(ii)	Social support item (iii)	(iv)	(v)
Age and sex adjusted	2.8 (1.5–5.2)*	2.2 (1.1–4.1)*	1.2 (0.7–2.2)	1.8 (0.9–3.3)	2.9 (1.6–5.3)*
Multivariate adjusted	2.6 (1.2–5.3)*	1.7 (0.8–3.7)	1.1 (0.6–2.3)	1.8 (0.9–3.8)	3.0 (1.4–6.1)*

Odds of the presence of social support = 1.0.

Adjusted for: sex, age, GDS score in 2002, presence or absence of spouse, number of household members (one, two, three or more), number of past physical diseases, age at finishing school education (<16, 16–18, ≥19 years), MMSE score (<25, 25–27, ≥28), physical function (ability to perform moderate exercise, or disability), pain (none, slight or weak, moderate or more severe), self-rated health (always healthy, health variable, always unhealthy).

*The significance level was $P < 0.05$.

significantly associated with the risk of depression status. In order to investigate into the effect modification of these covariate factors to the association between social support and depression status, we therefore selected these two items for further stratified analyses according to the following covariates: age, sex, presence or absence of a spouse, number of people living in their household, number of physical diseases experienced, education level, physical function, pain, and self-rated health status. As shown in Table 3, sex and experience of pain were significantly associated with the risk of depression status in lack of social support item (v). We found that the multivariate odds ratios (95% confidence intervals) for lack of social support item (v) were significantly higher among women 5.7 (2.6–14.4) than among men 0.5 (0.1–3.4), and among those subjects who suffered pain 4.8 (2.1–10.6) compared with those who did not 0.1 (0.003–2.5). A significant effect modification was observed between strata of sex and experience of pain. No significant difference in other covariates was found in the stratified analyses.

Overall, we found that the risk of depression status in individuals without instrumental social support was significantly increased in elderly women or in those suffering pain among the elderly in this study area.

DISCUSSION

In this cohort study, multivariate logistic regression models revealed that lack of social support items (i) 'do you have someone with whom you can consult when you are in trouble?' and (v) 'do you have someone who can take care of you when you are ill in bed?' were significantly associated with an increase in the risk of depression status. Our prior cross-sectional study showed significant associations between five items of social support and depression status in the elderly living in an urban community.¹⁰ After being categorized into two types of social support in our prior study, the

strongest associated items with depression status were the item (i) about the emotional aspect of social support and the item (v) about the instrumental aspect of social support. These findings are consistent with the results of this cohort study.

Generally, the 'causal' relationship between two investigated factors could not be identified in cross sectional studies. In contrast, in cohort studies, the 'causal' relationship between two investigated factors could be identified considered with confounding factors. So we found not only the significant relationship between social support and depression status, which we already reported before in the cross sectional study, but also the lack of social support is one of the causal factors of depression status considered with several confounding factors in this cohort study. Furthermore, if instrumental support was lacking, both elderly women and those elderly who suffered pain, were identified as a high-risk group for depression status.

The previous community-based cross-sectional study conducted in a rural area of Japan indicated that the instrumental aspect of social support was only significantly associated with depression status.⁵ In contrast, our present study showed that both the instrumental and emotional aspects of social support had significant effects on depression status. The present study was carried out in an urban community where lack of social support occurs more frequently than in rural communities (i.e. in urban areas there are weaker relationships among the people living in the community, a small number of people living in each household, and an increasing number of elderly who live alone). These problems might be related not only to the instrumental aspect, but also the emotional aspect of social support.

We found that the risk of developing depression status without social support item (v) was significantly increased in elderly women or if the elderly subjects suffered pain (Table 3). This indicates that these two factors make the association stronger between lack of

Table 3. Stratified analyses of the association between social support and depression status: the odds ratios (95% confidential intervals)

	D/Non-D	Social support item	
		(i)	(v)
Sex			
Men	22/216	1.8 (0.4–8.0)	0.5 (0.1–3.4)*
Women	33/204	3.0 (1.2–8.0)	5.7 (2.6–14.4)*
Age			
<75	25/218	7.1 (1.8–27.6)	4.2 (1.2–14.2)
≥75	30/202	1.8 (0.7–4.7)	3.3 (1.2–9.2)
Spouse			
Yes	36/290	2.2 (0.8–6.2)	1.9 (0.7–5.4)
No	19/130	6.2 (1.5–26.1)	7.3 (1.9–27.7)
Number in household			
≥2	44/337	2.9 (1.2–6.9)	2.6 (1.1–6.1)
1	11/83	2.3 (0.4–14.8)	10.1 (1.2–79.3)
No. past physical diseases			
<3	17/216	3.4 (0.9–13.2)	2.3 (0.6–8.4)
≥3	38/204	3.0 (1.1–7.9)	4.5 (1.6–12.5)
Education level			
High	14/165	6.0 (1.0–36.1)	3.7 (0.5–28.1)
Low	41/255	2.4 (1.0–5.7)	3.3 (1.4–7.7)
Physical function			
Good	36/325	2.4 (0.9–6.2)	2.4 (1.0–6.2)
Poor	19/95	3.0 (0.7–11.7)	3.9 (0.9–16.5)
Pain			
No	13/118	0.1 (0.002–2.6)	0.1 (0.003–2.5)*
Yes	42/302	3.0 (1.3–6.6)	4.8 (2.1–10.6)*
Self-rated health			
Healthy	34/329	2.1 (0.8–5.3)	3.2 (1.3–8.1)
Unhealthy	21/91	3.1 (0.8–12.9)	2.2 (0.5–9.1)

Odds of the presence of social support = 1.0

D, the number of depressive subjects whose GDS score in 2003 was over 11; non-D, the remainder of the subjects.

Adjusted for: sex, age, GDS score in the 2002 CGA, presence or absence of spouse, number of household members (one, two, three or more), number of past physical diseases, age at finishing school education (<16, 16–18, ≥19 year), MMSE score (<25, 25–27, ≥28), physical function (ability to perform moderate exercise, or disability), pain (none, slight or weak, moderate or more severe), self-rated health (always healthy, health variable, always unhealthy).

Low education level means that the age at finishing school education was under 19 years, high education level means 19 years or over. Poor physical function means an inability to perform moderate exercise, good means an ability to perform moderate exercise.

*A significant effect modification was observed between strata.

social support and depression status. We suggest therefore that it is particularly important for elderly women and those elderly who suffer pain to secure instrumental support as a means of preventing depression.

There were several limitations to this study. Although we found no difference with respect to depression status or social support between the follow-up group and the drop-out group, we found that the subjects in the drop-out group were physically frailer (Table 1). This indicated that the study subjects were more healthy than the rest of the elderly living in their community. The effect of lack of social support on depression might therefore have been underestimated. However, we still found a significant increase in the risk of depression status in the elderly who were without social support items (i) and (v). Another limitation was that we could not identify whether the type of social support was formal or informal. Furthermore, we could not investigate the effect of the changing status of social support to the depression status. Finally, we used this questionnaire as explorative, because there were no scales adequately validated for the social support in Japanese aged population. These points need to be clarified in the future in order to provide the community-dwelling elderly with the appropriate social support required to prevent the development of depression.

Concerning the social network, we add to the analyses of the risk of depression status in relation to the number in the household and marriage status, individually and respectively. We found significant associations between neither the number in the household nor marriage status and depression status in this study. However, past studies have shown that they are factors related to depression status,^{2,5,6,10,14} multivariate regression analysis revealed a significant association between them and depression status, and we considered them as important related factors in usual clinical findings. So we considered the number in the household and the marriage status as the covariates in the multivariate analyses in this study. We could not investigate the size of network and the frequency of contact with social resources. In the future, we should conduct the unified investigations as to the effect of social support and network of the community-dwelling elderly people in order to prevent the development of depression.

To determine the association between social support and depression status in the elderly Japanese, we conducted in a community-based cohort, a CGA of residents ≥70 years of age in both 2002 and 2003, and used multivariate analysis to calculate the effect of lack of social support on the risk of depression status. We concluded that there is a significant increase in the risk of depression status associated with lack of social support.

We have found that in the elderly population we studied, a lack of instrumental social support in elderly women and in those elderly people who suffered pain was associated with a high risk of developing depression. The findings of this study indicate the importance of social support for prevention of depression in the elderly who live in urban communities.

ACKNOWLEDGMENT

This study was based on data collected as part of the *Tsurugaya Project*, which was funded largely by the Ministry of Welfare and Health of Japan.

REFERENCES

1. Awata S. Treatment and care for depression and delusion in late life. *Nippon Ronen Igakkai Zasshi* 2000; **37**: 882–884 (in Japanese).
2. Masuchi A, Kishi R. A review of epidemiological studies on the relationship of social networks and support to depressive symptoms in the elderly. *Nippon Koshu Eisei Zasshi* 2001; **48**: 435–448 (in Japanese).
3. Harlow SD, Goldberg EL, Comstock GW. A longitudinal study of risk factors for depressive symptomatology in elderly widowed and married women. *Am. J. Epidemiol.* 1991; **134**: 526–538.
4. Oxman TE, Berkman LF, Kasl S, Freeman DH Jr, Barrett J. Social support and depressive symptoms in the elderly. *Am. J. Epidemiol.* 1992; **135**: 356–368.
5. Muraoka Y, Ikichi A, Ihara K. The physical and psychological and social background factor of elderly depression in the community. *Nippon Ronen Seishin Igaku Zasshi* 1996; **7**: 397–407 (in Japanese).
6. Aoki K. Depressive state of the elderly and its correlates. *Nippon Ronen Seishin Igaku Zasshi* 1997; **8**: 401–410 (in Japanese).
7. Hashimoto K, Kurita H, Haratani T, Fujii K, Ishibashi T. Direct and buffering effects of social support on depressive symptoms of the elderly with home help. *Psychiatry Clin. Neurosci.* 1999; **53**: 95–100.
8. Ohmori K, Ebihara S, Kuriyama S *et al.* The relationship between body mass index and a plasma lipid peroxidation biomarker in an older, healthy Asian community. *Ann. Epidemiol.* 2005; **15**: 80–84.
9. Hozawa A, Ebihara S, Ohmori K *et al.* Increased plasma 8-isoprostane levels in hypertensive subjects: the Tsurugaya project. *Hypertens. Res.* 2004; **27**: 557–561.
10. Koizumi Y, Awata S, Seki T *et al.* Association between social support and depression in the elderly Japanese. *Nippon Ronen Igakkai Zasshi* 2004; **41**: 426–433 (in Japanese).
11. Stewart AL, Greenfield S, Hays RD *et al.* Functional status and well-being of patients with chronic conditions. Results from the Medical Outcomes Study. *JAMA* 1989; **262**: 907–913.
12. Folstein MF, Folstein SE, McHugh PR. 'Mini-Mental State'. A practical method for guarding the cognitive state of patients for the clinician. *J. Psychiatr. Res.* 1975; **12**: 189–198.
13. Brink TL, Yesavage JA, Lum O, Heersema PH, Adey M, Rose TL. Screening tests for geriatric depression. *Clin. Gerontol.* 1982; **1**: 37–44.
14. Kishi R, Eguchi S, Sasaya H, Yaguchi T. Health status, social networks and support systems of elderly men and women in a large city and in former coal-mining areas – a population-based comparative study of 70-year-old residents of Supporo and Yubari. *Nippon Koshu Eisei Zasshi* 1994; **41**: 474–488 (in Japanese).
15. Ohashi Y, Hamada C. Cox regression, phreg procedure. *In Analysis of Survival Data (Biostatistics Using SAS Software)*. University of Tokyo Press, Japan, 1995; 167–193.
16. SAS Institute. SAS/STAT software: changes and enhancements, release 6.11. SAS Institute, Cary, N.C., 1996.