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FIFTEEN-ITEM GERIATRIC DEPRESSION SCALE PREDICTS 8-YEAR MORTALITY IN OLDER JAPANESE

To the Editor: The diagnosis of depression and the administration of antidepressant therapy have increased in nursing home residents; more research is needed to assess prognosis.¹ Depressive symptoms in older community-dwelling adults, as defined by a score of 6 or higher on the 15-item Geriatric Depression Scale (GDS),² are associated with lower activity of daily living (ADL) and quality of life (QOL) scores in Asian communities,^{3,4} yet the prognostic importance of the GDS remains to be clarified. A meta-analysis of 25 studies concluded that depression increases the risk of mortality,⁵ but these studies used various definitions of depression, and the results were not consistent in older adults. Results from the Berlin Aging Study showed that depression predicts mortality in people aged 70 to 84 but not in those aged 85 and older.⁶

To evaluate the predictive value of depressive symptoms determined according to the GDS for mortality in elderly Japanese, an 8.4-year mortality analysis was conducted. The study cohort consisted of 254 elderly residents (male:female = 64:190; mean age 79.5 ± 6.5 , range: 65–96) of a residential care home in Kyoto, Japan. The interview-based GDS was administered to the residents, with a 91.7% response rate of eligible residents during the baseline examination in 2001; those with scores of at least 6 were classified as having depressive symptoms. Walking, ascending and descending stairs, feeding, dressing, using the toilet, bathing, and grooming were evaluated to assess basic ADLs. Residents who were not completely independent in any of these seven ADL items were considered to be dependent in basic ADLs. The Tokyo Metropolitan Institute of Gerontology Index of Competence (TMIG-IC)⁷ scale (range: 0–13) was used to assess advanced ADLs. Residents with scores of 12 or less were considered to be dependent in advanced ADLs.

For QOL assessment, residents rated their subjective sense of health using a 100-mm visual analogue scale (VAS).^{8,9} Lower subjective sense of health was defined as a score of 50% or less on the VAS. Survival curves for residents with GDS scores of 6 or greater were compared with those with scores less than 6 using Kaplan-Meier curves and the Wilcoxon log-rank test. Adjusted Cox regression models were used to examine confounding variables. All data were analyzed using SPSS version 16 (SPSS, Inc., Chicago, IL).

Of 254 residents participating in the study, 39.8% ($n = 101$, male:female = 22:79, mean age 80.6 ± 6.5) had depressive symptoms based on GDS screening at the start of follow-up in 2001, and 40.6% ($n = 103$, male:female = 28:75, mean age at baseline 82.3 ± 6.3) had died by the end of the 8.4-year follow-up. Figure 1 shows unad-

justed Kaplan-Meier survival estimates for the overall study population (Figure 1A) and for each sex (Figure 1B and C) classified according to GDS score. A significant

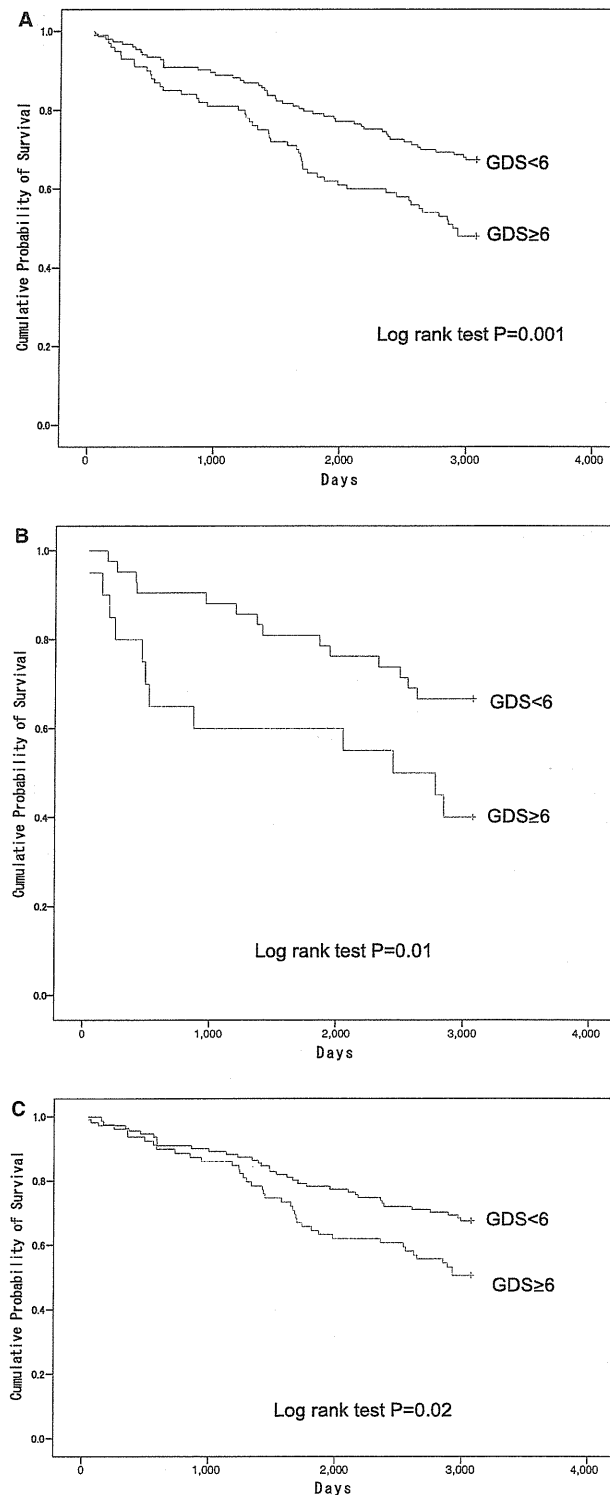


Figure 1. Unadjusted Kaplan-Meier survival estimates for residents with and without depressive symptoms, defined as a score of ≥ 6 on the 15-item Geriatric Depression Scale (GDS): (A) overall ($N = 254$), (B) male ($n = 64$), and (C) female ($n = 190$).

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MOOD DISORDERS IN COMMUNITY-DWELLING OLDER ADULTS IN ASIA

To the Editor: The article entitled, "Achieving effective antidepressant pharmacotherapy in primary care: the role of depression care management in treating late-life depression," by Bao and colleagues¹ deeply impressed us and led us to think back to an article entitled, "Reducing suicidal ideation in depressed older primary care patients," by Unützer and colleagues.² In Japan, 1998 marks the beginning of the third wave of increased suicides (> 30,000 per year), which was preceded by a second (1980-1983) and first (1947-1951) wave.³ Each wave in Japan was closely associated with periods of economic depression.⁴ The third wave of suicides in Japan began soon after the Asian economic crisis of 1997, which was reported to be closely associated with depression and suicide in some

Asian countries.⁵ The Japanese government has reported that suicides in Japan in 2007 were associated with old age (37%), health concerns (44%), and depression (18%).³ A screening-based investigation revealed that depression in community-dwelling older adults was closely associated with more difficulty in performing activities of daily living (ADLs) and lower quality of life (QOL) both in Japan⁶ and in other Asian communities.⁷ Although old age, health problems, and depression may be commingled, the reported prevalence of depression in older adults in Asian countries varied.⁸⁻¹⁰

The findings of a study using screenings and interviews to investigate the prevalence of depression in community-dwelling older adults (aged ≥ 60) in six Asian communities: Urausu, Japan (n = 729); Hong Chong, Korea (n = 329); Phuto district, Vietnam (n = 387); Savannakhet, Laos (n = 294); Maubin, Myanmar (n = 336); and Khon Kaen, Thailand (n = 407) are reported here (Table 1). The surveys were conducted from 2004 to 2007. All participants were first screened using a 15-item Geriatric Depression Scale (GDS) translated into the local language. Japanese psychiatrists interviewed participants with GDS scores of 6 or higher and diagnosed them based on Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) criteria. Statistical analysis was performed using StatView version 5 for Macintosh (SAS institute, Inc., Cary, NC). Analysis of variance was used for continuous variables in six groups, and the chi-square test was used for categorical variables. $P < .05$ was used to indicate statistical significance (analysis of variance comparing multiple variance).

Table 1 shows mean GDS scores, prevalence of participants with GDS scores of 6 and higher and of 10 and higher and prevalence of mood disorders diagnosed based on DSM-IV criteria. Although mean GDS score, the prevalence of participants with GDS scores of 6 and higher, and prevalence with GDS scores of 10 and higher varied between communities, the prevalence of elderly participants diagnosed with mood disorders was similar (6.2-9.6%). Many elderly people with depression had subjective experiences of illness, but few elderly participants in the surveyed population, including Japan, consulted psychiatrists or took antidepressant medications.

Table 1. Comparison of Geriatric Depression Scale Scores and Prevalence of Mood Disorders of Community-Dwelling Older Adults in Six Asian Communities

Variable	Urausu Japan (N = 728)	Hong Chong Korea (N = 329)	Phuto Vietnam (N = 387)	Savannakhet Laos (N = 294)	Maubin Myanmar (N = 336)	Khon Kaen Thailand (N = 407)	P [#] value
Age, mean \pm SD	74.4 \pm 7.1	72.3 \pm 6.1	70.8 \pm 8.1	69.6 \pm 7.6	70.3 \pm 7.0	68.4 \pm 6.7	< .001
Male/female, n/n	325/403	180/149	175/212	121/173	175/161	265/141	< .001
Geriatric Depression Scale (GDS) score (range 0-15)							
Mean \pm SD	4.4 \pm 3.2	5.4 \pm 4.2	3.4 \pm 2.7	5.5 \pm 2.8	3.7 \pm 3.1	4.1 \pm 3.1	< .001
≥ 6 , %	42	40	17	36	23	27	< .001
≥ 10 , %	8	20.5	7.6	6.5	7.6	9	< .001
Prevalence of mood disorders diagnosed by psychiatrists, %*	9.0	9.6	7.2	7.8	6.7	6.2	< .001

*Based on Diagnostic and Statistical Manual of Mental Disorders Fourth Edition.

SD = standard deviation.

[#]P-values were calculated by using analysis of variance (ANOVA) for continuous variables and chi-square tests for categorical variables. ANOVA gave a statistical test of whether the means (mean age or score in GDS) of several groups were all equal, and therefore generalized Student's two-sample t-test to more than two groups.

Although a study population that is not necessarily representative enough to compare the prevalence of depression cross-culturally between communities limits these data, 6.2% to 9.6% of elderly participants in this study were diagnosed with mood disorders based on DSM-IV criteria. More attention should be given to the practical application of standard criteria for screening and diagnosis of depression, which will be beneficial for early detection and consideration of follow-up and intervention in elderly patients with mood disorders in primary care and community settings in Asia.

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LETTER TO THE EDITOR

Farsightedness (presbyopia) in a wild elderly chimpanzee: The first report

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Dear Editor,

The chimpanzee (*Pan troglodytes*) is one of four genera in the family Hominidae, which also includes humans, gorillas and orangutans. Approximately 340 chimpanzees live in captivity in Japan and of these, only two chimpanzees are estimated to be older than 50 years old while the chimpanzees in the wild live for approximately 50 years.¹ The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) was ratified in 1980 in Japan, so the captive study of chimpanzee elders is limited. Important differences exist between chimpanzees raised in the wild and those raised in captivity. For example, chimpanzees born in the wild acquire social skills and knowledge from their mothers and the elder members of the community, while chimpanzees born in captivity and raised by humans do not have the ability to communicate well with other chimpanzees. As a result, chimpanzees raised by humans frequently abandon their babies when they become mothers. In that sense, it is very important for the chimpanzees to be grown up in a community with elder members. From the standpoint of research on the biology of human aging, it is important to observe aging in chimpanzees, who are the closest evolutionary relatives of humans, especially in a wild setting. Observing research on behavior of elderly chimpanzees in wild settings may be useful not only in the preservation of this endangered species but also in detecting geriatric syndrome in the chimpanzee related to that in human beings.

In the Bossou district in Guinea, West Africa, a group of 13 wild chimpanzees has been studied since 1976. Each individual in the group has been identified and

named, and its age has been confirmed or estimated. These chimpanzees coexist with humans in the primary and the secondary forests near the small hills surrounding the village of Bossou.² Bossou chimpanzees sometimes raid the farms and orchards to eat cultivated fruits. However, the chimpanzees have no predators in this area and they are not hunted by the villagers. Thanks to the long-term research, Bossou chimpanzees are fully habituated to humans and we have the record of each individual in the past four decades.² Six of these chimpanzees are estimated to be more than 40 years old, and three are believed to be at least 50 years old.

From 23–30 December 2008, we carried out the intensive observation focusing on the old female chimpanzee named Jire. She was estimated to be 50 years old. We did the focal animal sampling following the particular individuals at close range, from early morning till the time of sleeping in the beds in the tree, approximately 12 h a day. During the observation, we focused on the grooming behavior, a form of communication in chimpanzees.³ In terms of the grooming skill, the eye-hand coordination is very important. We carried out a quantitative observational study of behaviors of the chimpanzee every 5 min. Nineteen grooming scenes of Jire were recorded among a total 862 records of her behavior, of which 104 were missed records.

Following the focal observation, we noticed that the female chimpanzee named Jire groomed her daughter Joya with her eyes focusing at a distance of 40–50 cm. This makes a clear contrast to the younger chimpanzee Foaf (aged 27 years) that groomed with his eyes focusing directly on and close to (10–20 cm) the grooming spot (Fig. 1). Distance estimation of grooming eye spot was measured by video-photo analysis. Other old chimpanzees aged approximately 50 years or over also groomed with their eyes focusing at a longer distance than younger ones. Because chimpanzees remove very small

Author contributions: all authors participated in the research in Bossou, Guinea in 2008–2009, and discussed the findings.

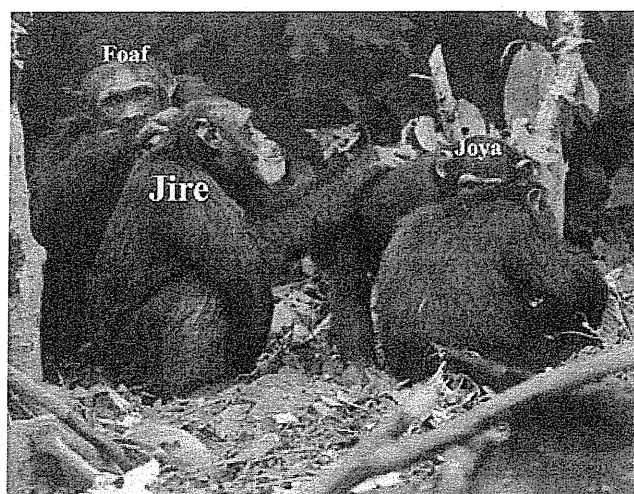


Figure 1 Jire (~50 years old) kept her eyes focused at a longer distance (40–50 cm) with her arm extended while grooming her daughter Joya, on the other hand Foaf (28 years old) kept his eyes focused closely (10–20 cm) while grooming Jire.

insects like lice from fur during grooming, they typically focus their eyes closely.⁴ The previous study reported that the visual acuity of the chimpanzee is approximately 1.5, comparable to humans.⁵ Thus, we strongly suspected that the grooming behavior of the old chimpanzee must be a symptom of farsightedness (i.e. experienced presbyopia) like an elderly human.

Hearing disturbance⁶ and chewing ability⁷ are closely associated with lower activities of daily living and with lower quality of life in community-dwelling human elderly. Presbyopia is caused by a decline in the accommodation of the lens. Visual impairment in humans is associated with social isolation and increased risk of depression,⁸ and presbyopia correction with an assistive device has been reported to improve human disability and depression.⁹ The similarity of accommodative mechanisms between human and monkeys have been reported by some researchers in ophthalmokinetic examinations, but not in clinical or field-setting study.¹⁰ Bito *et al.* has reported the use of the rhesus monkey as an animal model for presbyopia.¹¹ However, the underlying mechanisms of presbyopia development in monkeys are thought to differ from those of humans.¹² In monkeys, presbyopia is recognized only by examining lens thickness, intraocular pressure, accommodative amplitude and other ocular dimensions, but clinical or

field-setting symptoms remain unknown. Based on our observations, we believe that old chimpanzees must have developed presbyopia. This may be the first report of the observation of clinical presbyopia in chimpanzees in the wild. Although presbyopia in chimpanzees has only been observed to disrupt grooming behavior until now, the future study on the age-related physiological decline and dealing with a disabled state in chimpanzees may provide a clue for understanding human geriatrics and gerontology.

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cases.⁴ The mainstay of management is medical treatment and discontinuing the anticoagulant drugs, bowel rest, correction of PT with intravenous vitamin K with fresh-frozen plasma, and correction of anemia if present.^{5,6} Surgical intervention is indicated only if there is significant intramural hemorrhage, bowel perforation, ischemia, or peritonitis.^{4–6} Efforts to measure the quality of medication use in elderly patients have traditionally focused on inappropriate medications and doses, although a more-comprehensive approach to measuring the quality of medication use in elderly patients has been recommended.⁷ The most important determinant of risk for adverse drug reaction–related hospital admission in older patients is the number of drugs being taken. When considering only severe adverse drug reactions, risk is also related to age and frailty.⁸

In a previous study, poor adherence of elderly patients was responsible for 31% of overanticoagulation cases.⁹ These admissions could potentially be avoided with better anticoagulation control. Long-term warfarin use requires close monitoring of the coagulation profile to prevent this complication. Physician and patient awareness of the risk of bleeding when using warfarin is especially important for elderly patients. Clearer advice to older patients on the risk of nonadherence is important in such case.

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STRONG ASSOCIATION BETWEEN POLYCYTHEMIA AND GLUCOSE INTOLERANCE IN ELDERLY HIGH-ALTITUDE DWELLERS IN ASIA

To the Editor: Human longevity and aging of high-altitude dwellers remains to be fully clarified.¹ A high prevalence of diabetes mellitus (DM) and hypertension in elderly highlanders, particularly those living in rapidly modernized highland areas in Asia, because of the influence of socio-economic globalization, was previously reported.² Highlanders have biologically adapted to hypoxic environments by various genetic mechanisms such as an increase in hemoglobin concentration or increased blood flow.³ Elderly people living at high altitudes are less likely to adapt, and some of them suffer from chronic mountain sickness, characterized by excessive polycythemia, which is regarded as an exaggeration of the normal adaptation to altitude.⁴ In addition, highlanders have culturally adapted to the low availability of natural food resources, although it remains unknown whether elderly highlanders are more vulnerable to lifestyle-related diseases associated with rapidly changing and modernizing environments. To address this important issue in a cross-sectional study, the association between glucose intolerance and polycythemia in elderly people living in two highland areas in Asia was investigated.

The study population comprised consecutive elderly volunteers aged 60 and older who took part in medical camps held in two highland communities. The population included 209 Tibetans (mean age 66.1; 87 men, 122 women) living in Jiegu Town in Yushu County, Qinghai, China (3,700 m) and 117 Ladakhi (mean age 69.3 years, 48 men, 69 women) living in Domkhar Village, Ladakh, India (2,900–3,800 m). Yushu has modernized more rapidly than Ladakh.² Participants underwent a 75-g oral glucose tolerance test OGTT to screen for DM or impaired glucose tolerance (IGT) based on World Health Organization criteria.⁵ Polycythemia was defined as a hemoglobin level of 18 g/dL or higher for men and 16 g/dL or higher for women. Table 1 shows the baseline characteristics of and markers for lifestyle-related diseases, such as DM and IGT, for elderly subjects with or without polycythemia in both regions. The prevalence of polycythemia was higher in elderly people in Yushu (45%) than in Domkhar (31%) ($P = .009$). Mean hemoglobin concentrations in elderly people without and with polycythemia were 14.1 and 17.6 g/dL, respectively, in Domkhar and 15.3 and 17.6 g/dL, respectively, in Yushu.

The mean age of elderly subjects was higher in Domkhar than in Yushu, but there was no difference in mean age between elderly subjects with and without polycythemia in each area.

There was no difference in saturation of peripheral oxygen (SpO_2) between elderly subjects in Domkhar (88.8%) and those in Yushu (89.2%), because all were examined at the same altitude of 3,700 m. Mean SpO_2 was

Table 1. Association Between Polycythemia and Glucose Intolerance in Elderly High-Altitude Dwellers in Asia

Characteristic	Yushu in Qinghai, China		Domkhar in Ladakh, India	
	Without Polycythemia, n = 114 (55%)	With Polycythemia, n = 95 (45%)	Without Polycythemia, n = 81 (69%)	With Polycythemia, n = 36 (31%)
Male, %	48	34*	44	33
Age, mean \pm SD	65.7 \pm 5.8	66.6 \pm 6.1	69.0 \pm 6.5	70.1 \pm 7.3
Hemoglobin, g/dL, mean \pm SD	15.3 \pm 1.6	17.6 \pm 1.7***	14.1 \pm 1.9	17.6 \pm 1.7***
saturation of peripheral oxygen, %				
Mean \pm SD	89.5 \pm 3.1	88.8 \pm 3.6	89.6 \pm 4.8	87.1 \pm 6.5*
<90, %	42.5	51.1	45.7	66.7*
BMI, kg/m ² , mean \pm SD	26.2 \pm 4.3	28.8 \pm 4.4***	22.0 \pm 3.2	22.4 \pm 2.7
Obese (BMI > 25.0) %	54	82***	15	14
Hypertension, %	49	73***	51	58
Diabetes mellitus, %	10	18	3	19**
Diabetes mellitus or impaired glucose tolerance, %	41	56*	36	58*
Odds ratio (95% confidence interval) for diabetes mellitus or impaired glucose tolerance [†]	1.0	2.3 (1.2–4.3)*	1.0	3.0 (1.2–7.1)*

* $P < .05$, ** $.01$, *** $.001$; normocythemia versus polycythemia; chi-square test, Student *t*-test, logistic regression.

[†]After adjusting for age, sex, obesity, and saturation of peripheral oxygen (SpO₂) <90% using multiple logistic regression.

SD = standard deviation; BMI = body mass index.

lower in elderly subjects with polycythemia than those without in Domkhar ($P = .02$) but not in Yushu. Mean body mass index (BMI), prevalence of obesity (BMI > 25 kg/m²), and prevalence of hypertension (blood pressure \geq 140/90 mmHg or taking hypertensive medicine) in elderly subjects were much higher in Yushu than in Domkhar.

The prevalence of DM or IGT in elderly people with polycythemia was higher than in those without polycythemia in Yushu (56% vs 41%) and in Domkhar (58% vs 36%). The odds ratio for DM or IGT in elderly people with polycythemia compared with those without polycythemia was 3.0 (95% confidential interval (CI) = 1.2–7.1; $P = .01$) in Domkhar and 2.3 (95% CI = 1.2–4.3; $P = .01$) in Yushu, after adjustment for age, sex, obesity, and hypoxia (SpO₂ <90%) according to multiple logistic regression (Table 1).

A strong association was found between excessive polycythemia and glucose intolerance in elderly highlanders living in two distinct regions of Asia, despite differences in the prevalence of obesity and hypertension with the different influence of socioeconomic globalization.

There appear to be two reasons for the association between polycythemia and glucose intolerance. First, glucose intolerance may cause deterioration of blood vessels, metabolic dysfunction, and subsequent insufficient supply of oxygen to the human body; polycythemia might develop as a compensatory response. Second, people with polycythemia seem to be particularly vulnerable to glucose intolerance, suggesting poorer adaptation to hypoxia than in those without.

It is important to further examine this association between excessive polycythemia and DM in longitudinal follow-up of highlanders to prevent not only DM but also chronic mountain sickness.

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Author Contributions: Kiyohito Okumiya, Ryota Sakamoto, and Kozo Matsubayashi conceived and designed the project. All authors participated in the medical surveys in China or India. Kiyohito Okumiya, Ryota Sakamoto, and Kozo Matsubayashi analyzed and interpreted the data and prepared the manuscript.

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THE AGE- AND SEX-SPECIFIC INCIDENCE AND MEDICAL EXPENSES OF HEART FAILURE HOSPITALIZATION IN 2005 IN TAIWAN: A STUDY USING DATA FROM THE NATIONAL HEALTH INSURANCE

To the Editor: Heart failure increases sharply with aging.¹⁻⁶ Vital statistics in Taiwan show that life expectancy has been

increasing—from 70.8 in 1985 to 71.9 in 1995 and 74.5 in 2005 for men and from 75.8 in 1985 to 77.8 in 1995 and 80.8 in 2005 for women.⁷ Although the clinical burden of heart failure is expected to increase in Taiwan, its epidemiology remains unclear. This study analyzed the incidence of and medical expenses for hospitalization for heart failure in Taiwan during 2005 using the reimbursement data of the National Health Insurance (NHI), which is a compulsory and universal health insurance implemented since March 1, 1995.⁸

METHODS

The NHI covered 98.0% of the total population, and more than 90% of the medical institutes were contracted to the Bureau of NHI for providing healthcare services (those not contracted provided fewer services) in 2005.⁹ For each admission, computerized data of medical expenses, dates of admission and discharge, identification number, sex, birth date, and diagnostic codes based on the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) were available. The National Health Research Institute of Taiwan extracted the data of a random sample of 1,000,000 subjects covered by the NHI during 2005 for the purpose of academic research. The sample was representative of the general population of Taiwan.¹⁰ A total of 79,299 of the 1,000,000 subjects had records of one or more hospitalizations during 2005. Of them, 2,712 (3.4%) had a diagnosis of heart failure (ICD-9-CM codes 398.91, 402.11, 402.91, 404.11, 404.13, 404.91, 404.93, and 428) as a primary or secondary diagnosis. Patients with a first hospitalization with a diagnosis of heart failure were recruited.

The incidence of and total medical expenses for hospitalization for heart failure for 2005 were calculated according to age (each 5-year increment) and sex. The numerators of the incidences were the total number of patients with a diagnosis of heart failure in the specific subgroups of age and sex, and the denominators were the number of insured in the subgroups in the randomly selected 1,000,000 subjects from the NHI data set.

RESULTS AND DISCUSSION

The incidence of hospitalization for heart failure and percentage of total medical expenses according to age and sex are shown in Table 1. The total medical expenses for men, women, and all patients were 151,752,015, 123,736,224, and 275,488,239 New Taiwan dollars, respectively (33 New Taiwan dollars equals approximately 1 U.S. dollar). Incidence was highly dependent on age in either sex and was especially high in subjects aged 65 and older. Men had a higher incidence than women in all age groups except those aged 75 and older. The population aged 65 and older represented less than 10% of the total population in either sex but used 81.1% (77.5% in men and 85.6% in women) of the total medical expenses for first hospitalization for heart failure.

Consistent with other studies,¹⁻⁶ these data showed that heart failure was age dependent and that men had a higher incidence than women (Table 1). In the Framingham follow-up study, the incidence of heart failure was 2, 5, and 10 per 1,000 person-years for subjects aged 45 to 54, 55 to 64, and 65 to 74, respectively, in men and 1, 3, and 8 per 1,000 person-years, respectively, in women.² These were comparable to the data in Table 1.

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COMMUNITY-BASED GERIATRIC ASSESSMENT AND PREVENTIVE INTERVENTION LOWERED MEDICAL EXPENSES FOR THE ELDERLY

To the Editor: Before the introduction of the national long-term care insurance system, it was reported that commu-

nity-based geriatric assessment might lower the increasing rate of medical expenses in a rural town in Kochi Prefecture, Japan.¹ Even after the introduction of the national long-term care insurance system in 2000, total medical expenses for older adults has increased with the growth of the older population in Japan. Since 2004, community-based comprehensive geriatric assessments and interventions have been performed for older adults living in Tosa Town, Kochi Prefecture, Japan. Geriatric assessments included a comprehensive annual health-related questionnaire of all eligible people aged 65 and older (75-95% response rate) and annual geriatric examinations for people aged 75 and older (30-40% participant rate).² This longitudinal community-based project in cooperation with local government and resident organizing committees has attained several medical achievements: early detection of latent diabetes mellitus or impaired glucose tolerance in older adults because of community-based oral glucose tolerance tests,³ improvement of impaired glucose tolerance by lifestyle change interventions,⁴ increasing public awareness of hypertension in older adults,⁵ public education of dietary diversity,⁶ and early detection of fallers⁷ by introducing a fall risk index that can be completed in a brief amount of time.⁸

In parallel with medical and geriatric achievements of the community-based project, an additional achievement regarding changes in medical expenses for the elderly in this town was found. Changes in medical expenses from 2004 to 2007 in Tosa Town, where we have intervened, compared with medical expenses for older adults in two other communities (Motoyama Town and Kochi City) in Kochi prefecture and the average medical expenses of 35 communities in Kochi Prefecture⁹ are reported here. Kochi prefecture is located in Shikoku province in southwestern Japan and has 11 cities and 24 towns with a total population of 796,292 people, of whom 25.9% were aged 65 and older in 2006. Tosa Town is one of the 24 small towns in Kochi Prefecture and had a population of 4,632 people, of whom 40.6% were aged 65 and older in 2006. This comparative study on changes in medical expenses for older adults included two control communities: Motoyama Town, which neighbors Tosa Town and has a sociodemographic profile similar to that of Tosa Town, and Kochi City, which is the seat of Kochi prefecture. Total populations (and % of the population aged ≥ 65) in Motoyama Town and Kochi City in 2006 were 4,374 (37.9%) and 333,484 (20.5%), respectively.

Figure 1 compares annual changes in medical expenses in the national medical insurance system for one person aged 65 and older in Tosa Town from 2004 to 2007 with expenses in Motoyama Town, in Kochi City, and the average from 35 communities in Kochi Prefecture. Although medical expenses for older adults increased over the 4 years in Motoyama Town and Kochi City and in Kochi prefecture in general, expenses in Tosa Town decreased yearly from 2004 to 2007. The decrease in medical expenses for older adults in Tosa Town is probably due to community-based geriatric assessments and preventive interventions introduced since 2004. In 2007, differences in medical expenses between Tosa Town and neighboring Motoyama Town reached 140,000 Japanese yen (approximately \$1,075) for each elderly person each year, which totals approxi-

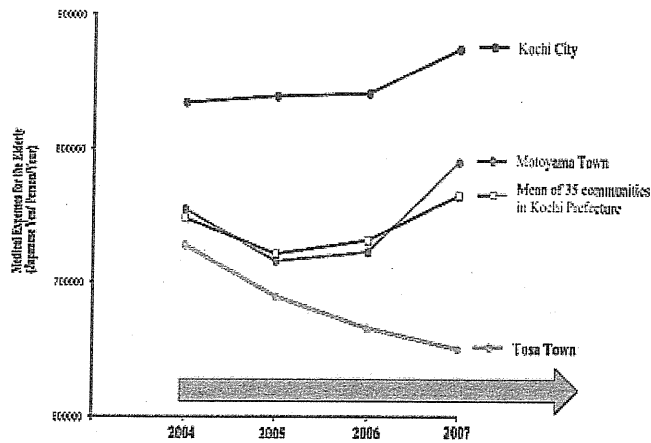


Figure 1. Annual changes in medical expenses for one person aged 65 and older in Tosa Town from 2004 to 2007, compared with expenses in Motoyama Town, in Kochi City, and the average expenses of 35 communities in Kochi Prefecture.

mately 200,000,000 Japanese yen (~ \$2 million) for 1,500 elderly persons in each town. The total annual budget of community-based geriatric assessments and preventive interventions in our project is 10 million Japanese yen (~ \$100,000). The decrease in medical expenses in Tosa Town suggests that it might be worthwhile to consider the community-based project not only from the perspective of geriatric achievements, but also from the financial dimension.

The elderly population is rapidly growing in Japan, especially in Kochi Prefecture. The percentage of the population aged 65 and older was greater than 30% in three of 11 cities and in 21 of 24 towns in Kochi prefecture.⁹ Considering public health results and financial conditions, community-based strategies to prevent disease and promote health of older adults are urgently needed in each community. In conclusion, community-based and field-setting geriatric assessment and preventive intervention may be extremely beneficial for health promotion of older adults and financial efficiency.

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GERO-ECONOMICS

To the Editor: Dear Congressional Representative and Program Administrator:

Not being an economist I hesitated to venture into the fray, but a geriatrician who could provide a different perspective might clarify, at least a bit, the debate about how to fund our healthcare system and the retirement years. The purpose of a national healthcare plan and a national retirement package is to maximize each individual's function and quality of life throughout the full span of life. We must recognize that healthcare and retirement needs are intertwined.

As most readers of this *Journal* know, the age of 65 as a starting point for the beginning of "old age" has no basis in physiology. Politicians, rather than scientists or physicians, were responsible for making that decision in the 19th and early 20th centuries. In those times, life expectancy was far shorter than it is today, assuring planners that relatively few would achieve the distinction of being elderly. Therefore, the costs of a national healthcare system and a national retirement system would have been modest. It was only after life expectancy at birth in the developed nations increased from approximately 47 years to almost 80 years that funding these programs became a significant issue.

To be successful and cost efficient, it is necessary for the designers of healthcare and retirement programs to have an appreciation of the aging process and the advent of chronic illness. Aging may be viewed as a process characterized by a diminution in reserve capacity in most organ systems, albeit to a different degree in each and with considerable variation from person to person. In addition, over the course of a lifetime, most of us accumulate a number of chronic diseases. Diabetes mellitus, arthritis, hypertension, coronary heart disease, cerebrovascular disease, and even many cancers are appropriately viewed as chronic conditions, rather than acute illnesses, under most circumstances. Such illnesses diminish the reserve capacity further.

The changes associated with aging and chronic illness cause the elderly population to be far from homogeneous. Therefore, perhaps the retirement system could be designed to mesh more closely with the health status of those it is supporting. For example, perhaps there might be an option for a perfectly well 65-year-old to receive a considerably smaller retirement benefit between the ages of 65 and 75 and a considerably larger benefit during the years that follow. This would allow that person to have some money early on but far more money when that individual might need the funds to remain independent or to reside at home. This might also decrease the costs to Medicaid, the funding source for the majority of nursing home beds.

Furthermore, as a long-time practicing geriatrician, I can assure you that there are innumerable opportunities to save money in the healthcare system and improve the outcomes for older adults at the same time. Many incentives in the healthcare system foster unnecessary costs, not to mention poor clinical outcomes. Payment for many procedures is outrageously excessive compared with payment for the comprehensive evaluation of an older adult with multiple chronic illnesses.¹ Payment for preventive health measures is often inadequate. Unnecessary testing and hospitalization are associated with huge costs. How often does a physician order multiple studies and admit an older adult to a hospital for fear of charges of malpractice? Are not huge numbers of admissions for congestive heart failure, pneumonia, and many of the other most common conditions unnecessary?^{2,3} If we were able to eliminate some of the waste in the healthcare system, we could add those savings to more-effective healthcare programs and the associated retirement programs.

Geriatric medicine is coming to have an influence on other medical specialties from general surgery to emergency medicine. Perhaps it should influence some of our associates in economics as well as those concerned with healthcare and retirement planning.

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SOUND-ALIKE SYNDROMES REVISITED

To the Editor: A year ago I wrote of a newly described concern, "Sound-Alike Syndromes" when one of our facility's new admissions suffered from Morvan's syndrome when Marfans was expected.¹ Much to my surprise, another example appeared, this time to my amusement.

A 95-year-old resident of our facility was admitted to a local medical center after a syncopal episode of unclear

DISCUSSION

This study provides evidence that AchE inhibitors may reduce falls risk in people with mild AD. Donepezil treatment significantly increased gait velocity and reduced gait variability, resulting in a more-stable walking pattern in the intervention group. These improvements were found early, after 1 month of intervention, and they were sustained for 4 months, suggesting a dose-response pattern (Figure 1). This effect was slightly more important during single tasking, showing that dual tasking affects cortical control of gait. By contrast, the control group experienced a decline in gait velocity over time and an increase in gait variability.

Because most of the studies targeting falls in people with dementia have been unable to prevent falls,¹⁰ it may be possible that this lack of effectiveness reflects different underlying mechanisms in falls risk factors. Although much is known about the multifactorial nature of falls, the number of falls and related injuries in people with dementia continues to increase. By characterizing and understanding the effects of cognitive enhancers on gait, an additional approach for reducing falls in this fast-growing population can be reached. These findings offer support and rationale to assess the effect of AchE inhibitors on gait performance and risk of falling in a larger, controlled clinical trial.

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HEALTH-RELATED DIFFERENCES BETWEEN PARTICIPANTS AND NONPARTICIPANTS IN COMMUNITY-BASED GERIATRIC EXAMINATIONS

To the Editor: With a growing aging population, how to provide effective and efficient strategies for the prevention of disabilities in community-dwelling elderly people is an intensely debated issue. We have confirmed the effect of yearly comprehensive geriatric examinations on sustaining activities of daily living (ADLs) in Japanese community-dwellers aged 65 and older.^{1–6} The response rate for our health-related questionnaire was 75% to 95%, whereas participation rates for geriatric examinations remain less than 30%. Based on the questionnaire results, we compared health-related background characteristics of those who did and did not participate in geriatric examinations in the rural town of Tosa, in Kochi, Japan.

The study population consisted of 794 community-dwelling subjects (82.7% of eligible population) aged 75 and older. We suggested that all of the eligible elderly subjects receive geriatric examinations in 2006; 259 did so (25.6%), and 535 did not.

Items on the health-related questionnaire included assessments for activities of daily living (ADLs), symptoms of depression, and quantitative quality of life (QOL). For ADL assessment, subjects rated their independence in seven areas (walking, ascending and descending stairs, eating, dressing, using the toilet, bathing, grooming) as to the help needed and rated them from 3 to 0 (3 = completely independent, 2 = some help necessary, 1 = a lot of help required, 0 = completely dependent). The scores were added to give ADL scores ranging from 0 to 21. To attain higher-level ADL assessments, subjects rated their independence using the Tokyo Metropolitan Institute of Gerontology Index of competence (TMIG-IC),⁷ which consists of a 13-item index including three sublevels of competence: instrumental self-maintenance (0–5), intellectual activity (0–4), and social role (0–4). We screened for depressive symptoms using the Japanese version of the 15-item Geriatric Depression Scale (GDS-15).⁸ Quantitative QOL was assessed using a 100-mm

Table 1. Comparison of Characteristics of Community-Dwelling Elderly Subjects in Tosa, Japan Who Did and Did Not Receive Health Examinations

Characteristic	Received an Examination (n = 259)	Did Not Receive an Examination (n = 535)	P-Value*
Age, mean \pm SD	80.7 \pm 4.4	82.2 \pm 5.8	.01
Male/female	93/166	213/322	.29
Lifestyle, %			
Living alone	27.0	19.7	.03
Work once or more a week	79.4	58.6	<.001
Exercise once or more a week	79.2	54.3	<.001
Activity of daily living score (range 0–21), mean \pm SD	20.1 \pm 1.8	17.4 \pm 5.8	<.001
Instrumental self-maintenance score (range 0–5), mean \pm SD	4.5 \pm 1.2	3.4 \pm 1.9	<.001
Intellectual activity score (range 0–4), Mean \pm SD	3.2 \pm 1.1	2.5 \pm 1.4	<.001
Social role score (range 0–4), mean \pm SD	3.2 \pm 1.1	2.5 \pm 1.5	<.001
Tokyo Metropolitan Institute of Gerontology Index of Competence score (range 0–13), mean \pm SD	10.7 \pm 2.9	8.1 \pm 4.4	<.001
Geriatric Depression Scale score (range 0–15), mean \pm SD	4.7 \pm 3.6	6.3 \pm 4.0	<.001
Quality of life score (range 0–100), mean \pm SD			
Subjective health	56.7 \pm 19.7	45.6 \pm 23.1	<.001
Family relationships	77.4 \pm 20.0	71.8 \pm 22.3	.01
Friend relationships	77.3 \pm 18.5	69.8 \pm 22.6	<.001
Financial satisfaction	53.5 \pm 23.2	47.7 \pm 25.2	.004
Subjective happiness	62.9 \pm 19.9	56.0 \pm 23.0	<.001

*P-values were calculated using the Student *t*-test for continuous variables after the adjustment for the effect of age was made. Chi-square tests were used for categorical variables.

SD = standard deviation.

visual analogue scale (lowest QOL on the left end of the scale, highest on the right). The following five items were measured: subjective sense of health, relationship with family, relationship with friends, financial satisfaction, and subjective happiness.^{3,9} Living conditions, current exercise, and work were also assessed.

Statistical analysis was performed using SPSS (SPSS, Inc., Chicago, IL). $P < .05$ indicated statistical significance.

Table 1 shows the comparison of lifestyles, ADL score, GDS-15 score, and subjective QOL. Subjects who did not receive an examination were significantly older than those who did (82.2 vs 80.7). Subjects who received an examination were significantly more likely to live alone, work or exercise once or more a week, and have significantly higher mean ADL scores and QOL and significantly lower GDS-15 scores than those who did not. Elderly subjects living alone may pay more attention to their health than those living with family.

Although subjects who received an examination were significantly more likely to be independent in ADLs (68.7%) than those who did not (44.9%), the latter tended to be very dependent in ADLs or completely independent in ADLs. A previous study found that, although IADL scores and mobility produced significant effects, elderly populations with excellent subjective health were less likely to receive geriatric examinations, suggesting the polarization of ADLs in those who did not receive examinations.¹⁰ Although our findings did not completely coincide with those of the previous study, elderly subjects with lower independence in ADLs who do not receive geriatric examinations should be considered to be at high risk for further decline in ADLs. Future strategies for intervention in elderly people

with lower independence in ADLs who do not receive geriatric examinations is necessary from a preventive standpoint.

In addition to physical disabilities, mental problems such as depression and lower subjective QOL were revealed as factors influencing participation in examinations. Because attending geriatric examinations involves social interaction for elderly people, programs that encourage depressed elderly people to join must be developed. Participation in comprehensive geriatric examinations might contribute not only to the detection of early-stage or latent diseases, but also to health promotion and social interaction associated with QOL improvement. Future strategies to encourage receiving examinations, such as more-appealing announcements; transportation services; and home visit examinations for frail, depressed, and home bound elderly people might be worth considering.

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Author Contributions: Y.I. and T.W. were the principal investigators of the study. All of the authors conducted community-based geriatric examinations in Tosa in 2006. All of the authors contributed to the interpretation of the data, helped with revisions of the manuscript, and read and approved the manuscript. K.M. supervised the progress of the study and approved the final manuscript.

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MIRIZZI SYNDROME CAUSING DELIRIUM IN AN ELDERLY PATIENT

To the Editor: Delirium is a cognitive disorder characterized by acute onset; fluctuating course; an altered level of consciousness; and disturbances in orientation, memory, attention, thinking, perception, and behavior.^{1,2} Delirium occurs in 11% to 26% of older patients admitted to general medical units and appears to be associated with significantly longer hospital stays, higher rates of admission to long-term care facilities, greater functional disability, and greater rates of death. It has been reported that the attending physicians do not detect up to 84% to 95% of the cases because of the clinical condition itself (which may be misinterpreted as depression, dementia, or even the physiological aging process) or the variability of symptoms, as well as the concomitant presence of etiological factors, which may induce confusion and complicate diagnosis.²⁻⁴

Reported here is a 77-year-old man who was admitted to the geriatric department with abdominal pain, jaundice, and a sudden change in cognition and attention. During further investigations regarding delirium of the patient, multiple gallbladder stones compressing the common bile duct were uncovered, and the patient was diagnosed with Mirizzi syndrome. To the best of the authors' knowledge, this is the first report of Mirizzi syndrome presenting with delirium in the geriatric literature. Mirizzi syndrome is jaundice due to a gallstone obstructing the cystic duct or Hartmann's pouch compressing the common hepatic duct.⁵ It occurs in approximately 1% of all patients suffering from cholelithiasis, and the clinical diagnosis may be difficult.

CASE

The patient was seen in our outpatient geriatric clinic with symptoms of sudden change in mental status, nervousness, abdominal pain especially in the upper right quadrant, decreased appetite, nausea, and vomiting.

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FOOD DIVERSITY IS CLOSELY ASSOCIATED WITH ACTIVITIES OF DAILY LIVING, DEPRESSION, AND QUALITY OF LIFE IN COMMUNITY-DWELLING ELDERLY PEOPLE

To the Editor: Dietary quality and diversity are closely associated with longevity,¹ and several dietary guidelines have long emphasized the value of eating a variety of foods,² but changes in health status with aging, such as deterioration of chewing ability,³ can lead to reduced food diversity.⁴ To examine the association between food diversity and health status in community-dwelling elderly people, questionnaires were developed that allow an assessment of food diversity. Through these questionnaires, the health status of elderly people who scored high and low in terms of food diversity were compared.

The study population consisted of 689 community-dwelling people aged 65 and older (288 men, 401 women; mean age 75.7 ± 7.3) living in Tosa, Kochi Prefecture, Japan (39.1% of the eligible population in the town). Subjects suspected of having cognitive impairment based on

criteria of Japanese Ministry of Health, Welfare and Labor and those with scored less than 23 on the Mini-Mental State Examination were excluded. Information on food diversity and geriatric functions was obtained using self-reported questionnaires in 2008. Food diversity was determined using an abridged 11-item Food Diversity Score Kyoto (FDSK-11) revised from the Japanese dietary variety score⁵ and National Nutritional Survey, Japan. The FDSK-11 consists of 11 main food groups (grain, meat, fish and shellfish, eggs, milk, beans and soybean products, potatoes, vegetables, seaweed, nuts and fruits); each participant rated the frequency of eating these foods over 1 week. Participants were asked whether they had eaten each of the 11 food groups for 1 day or more (a score of 1) a week or less (a score of 0). Scores were summed to provide a FDSK-11 ranging from 0 to 11, with a higher score indicating greater food diversity. Geriatric functions were assessed by measuring activities of daily living (ADLs), depression, and quantitative subjective quality of life (QOL), as well as through medical examinations. To assess basic ADLs, scores for seven items (walking, ascending and descending stairs, feeding, dressing, using the toilet, bathing, and grooming) were summed using a rating scale from 0 (completely dependent) to 3 (completely independent) to obtain a basic ADL score (0-21).⁶ For advanced ADLs, the Tokyo Metropolitan Institute of Gerontology Index of Competence rating scale (0-13) was used.⁷ This scale measures instrumental self-maintenance (0-5), intellectual activity (0-4), and social roles (0-4). Depressive symptoms were screened for using the Japanese version of the 15-item Geriatric Depression Scale.⁸ Quantitative QOL was assessed using a 100-mm visual analogue scale (lowest QOL on the left end of the scale, highest on the right), which includes five items: subjective sense of health, relationship with family, relationship with friends, financial satisfaction, and subjective happiness.⁹ Chewing ability was reported using a self-rated questionnaire on a yes or no basis.⁴ Body mass index was calculated using height and body weight measured during the medical examination. Statistical analysis was performed using SPSS (SPSS, Inc., Chicago, IL). $P < .05$ indicated statistical significance.

The mean FDSK-11 score was 9.9 ± 3.0 . Scores were classified into two groups using 9/10 as the cutpoint. Table 1 shows the comparison of health status between subjects with high and low food diversity scores. Elderly participants with lower food diversity scores were significantly older (77.9 vs 75.4) than those with higher scores. Mean scores for each ADL were significantly lower in participants with lower food diversity scores than those with higher scores even after adjusting for the effect of age. Geriatric Depression Scale scores were significantly higher and subjective QOL was lower in participants with lower food diversity scores than those with higher scores. A close association was found between lower food diversity and chewing difficulty.

Earlier studies reported that nutritional adequacy of a diet can be predicted by counting the number of foods groups taken.¹⁰ In this study, all food groups from National Nutritional Survey, Japan were used except for seasonings and condiments, and significant health-related differences were found between participants with high and low FDSK-11 scores.

Table 1. Comparison of Activity of Daily Living (ADL), Geriatric Depression Scale (GDS), and Quality of Life (QOL) Scores of Elderly Subjects with High and Low Food Diversity Scores

Variable	Food Diversity		P-Value
	High (n = 593)	Low (n = 96)	
11-item Food Diversity Score Kyoto, mean \pm SD	10.6 \pm 0.4	8.1 \pm 1.2	<.001
Age, mean \pm SD	75.4 \pm 7.2	77.9 \pm 7.4	.002
Sex (male/female)	243/350	45/51	NS
Body mass index, mean \pm SD	22.9 \pm 3.0	23.0 \pm 2.9	NS
Chewing difficulty, %	20.4	26.0	<.001
ADL score, mean \pm SD (range 0–21)	20.1 \pm 1.9	19.4 \pm 2.3	.006*
Tokyo Metropolitan Institute of Gerontology Index of Competence, mean \pm SD (range 0–13)	11.2 \pm 1.0	9.5 \pm 2.5	<.001*
Self-maintenance (range 0–5)	4.5 \pm 1.1	4.1 \pm 1.4	<.001*
Intellectual activity (range 0–4)	3.3 \pm 1.1	2.6 \pm 1.0	<.001*
Social role (range 0–4)	3.3 \pm 1.4	2.8 \pm 1.0	<.001*
GDS score, mean \pm SD (range 0–15)	4.1 \pm 3.8	6.2 \pm 4.3	<.001
QOL score, mean \pm SD (range 0–100)			
Subjective sense of health	56.5 \pm 19.9	51.7 \pm 18.3	.03
Relationship with family	78.7 \pm 19.2	71.9 \pm 23.5	.003
Relationship with friends	77.1 \pm 18.7	71.9 \pm 22.8	.02
Financial satisfaction	51.7 \pm 23.1	46.9 \pm 25.8	NS
Subjective happiness	63.2 \pm 20.6	55.4 \pm 22.8	<.001

P values were calculated using the Student *t*-test for continuous variables and the chi-square test for categorical variables.

*After adjusting for the effect of age.

SD = standard deviation; NS = not significant.

In conclusion, food diversity was closely associated with ADLs, depression, and subjective QOL in community-dwelling elderly people. This suggests that the FDSK-11 could serve as a useful indicator in screening for food diversity in elderly people living in communities. In addition to preventing malnutrition, assessing food diversity will provide an estimate of comprehensive geriatric functions.

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Author Contributions: Yumi Kimura, Taizo Wada, and Kozo Matsubayashi contributed to the study concept and design, analysis and interpretation of data, and preparation of the manuscript. All contributing authors aided in the survey and interpretation of data, helped with manuscript revisions, and read and approved the manuscript.

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BILATERAL CORONARY ARTERY TO PULMONARY ARTERY FISTULA PRESENTED AS ATYPICAL CHEST PAIN IN A 70-YEAR-OLD MAN

To the Editor: Congenital coronary fistula is a rare heart defect, with fistulous communication to the pulmonary artery or cardiac chamber and pulmonary artery fistula constituting 17% of them. Dual origin of the fistula from both coronary systems is an extremely rare occurrence. One such case is reported that presented with atypical chest pain.

A 70-year-old man was admitted to hospital with sudden, sharp, short-lived chest pain. Physical examination was normal except for a 2/6 continuous murmur at the left sternal border. Electrocardiography was normal. Laboratory results demonstrated normal values of cardiac enzymes. Although it seemed that it was atypical chest pain, he had a history of hypertension and cigarette smoking for 30 years, so exercise stress testing was performed, but then was stopped because of the patient's request because of fatigue. Coronary angiography was performed to clarify the atypical chest pain. Coronary angiography showed that there were no atherosclerotic lesions, but there were two fistulas originating from the proximal parts of the left anterior descending artery and right coronary artery (Figure 1). Angiographic images did not demonstrate a big shunt, so it was decided to provide medical therapy.

DISCUSSION

Coronary artery fistula is a rare heart defect that consists of communication between a coronary artery and a cardiac chamber or pulmonary vessel. Coronary artery fistula may be congenital or acquired (traumatic, infectious, or iatrogenic). The incidence of this anomaly ranges from 0.2% to 0.4% in selected series of congenital heart disease patients, and its incidence in the overall population is estimated to be approximately 0.002%.¹ Fistulas originating from the right coronary artery account for 50% to 58% of cases, with 25% of cases from the left anterior descending artery and 18.3% from the circumflex artery.² The frequency of bilateral coronary fistula is rare. The majority of coronary artery fistulas drain into the right heart chamber or pulmonary artery. Bilateral coronary fistulas are unique in their tendency to terminate in the pulmonary artery.

Clinically, many fistulas are small and asymptomatic. Patients may present suddenly with cardiac arrest or more gradually with angina pectoris or heart failure. Documented symptoms and complications include continuous murmurs, coronary steal causing angina pectoris or acute myocardial infarction with or without concomitant atherosclerotic disease, clinical heart failure, stroke, arrhythmias, coronary aneurysm formation and rupture, and superior vena cava syndrome.³⁻⁶ Neither clinical nor hemodynamic characteristics distinguish patients with bilateral coronary artery-pulmonary artery fistulas from those with coronary artery fistulas in general.

Spontaneous fistula closure is an infrequent situation, and consequently, all symptomatic fistulas should undergo closure as soon as diagnosis is made. Asymptomatic patients can be treated medically, but nitrate therapy, which might possibly increase myocardial ischemia in case of coronary fistulas, must be avoided, and endocarditis prophylaxis must be given to all patients. The physician must decide whether to manage symptomatic patients with percutaneous closure or surgical closure. Ordinarily percutaneous closure is preferable with a high-risk patient for surgery; feasible anatomic presentation for closure not including tortoise fistulae, which takes off more proximal to the coronary artery, multiple drainage sites, high risk of side branch occlusion during procedure, and unfavorable back

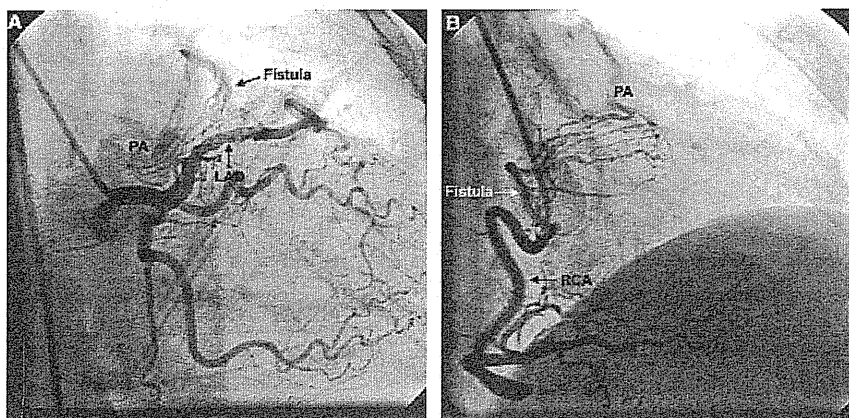


Figure 1. (A) Coronary artery fistula between left anterior descending (LAD) artery and the pulmonary artery (PA). (B) Coronary artery fistula between the right coronary artery (RCA) and the PA.

patients with DLB have the highest Braak and Braak stages and would be classified as LBV from a clinico-pathological point of view. Although the main limit of this study was the lack of a pathological diagnosis, it reflects the common clinical situation. These results underscore the difficulty of a DLB diagnosis in the elderly population in which the prevalence of AD lesions is high and might alter the occurrence of clinical signs of DLB,⁶ as well as the pattern of episodic memory impairment. Further research with pathological diagnosis is needed in this age group.

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AGE AND SEX SIGNIFICANTLY INFLUENCE FALL RISK IN COMMUNITY-DWELLING ELDERLY PEOPLE IN JAPAN

To the Editor: The methodology for assessment, intervention, and prevention of falls in community-dwelling elderly people has been intensely debated in the field of geriatric medicine.^{1,2} Falling is the third leading cause of elderly people becoming bedridden and is among the principal causes of morbidity in elderly people in Japan.³ To detect early risk for falls in elderly people, the Working Group for Fall Prevention in the Japanese Ministry of Health, Welfare and Labor developed a validated Fall Risk Index (FRI). The FRI consists of 21 questionnaire-based items identified through a search of international and Japanese research articles that surveyed the history of falls within 1 year on a yes or no basis.^{4–6} The 21 items included in the FRI encompassed physical, cognitive, emotional, and social aspects of functioning and environmental factors and included history of stumbling, ability to climb stairs, walking speed, ability to cross the road within green signal time interval, ability to walk 1 km without rest, ability to stand on one leg for 5 seconds, use of cane, ability to squeeze a towel, dizziness, hunched back, knee joint pain, visual disturbance, hearing disturbance, forgetfulness, fear of falling, use of five or more prescription medications, sensation of darkness inside home, presence of obstacles inside house, presence of barriers on the floor, daily stair use at home, and steep slopes around the house (Appendix). Each of the 21 items received a score of 1 (risk present) or 0 (risk absent), and the sum of all items constituted the FRI, which ranged from 0 (low fall risk) to 21 (high fall risk).

FRI was assessed in community-dwelling elderly people, and significant age- and sex-dependent differences were found. The study population consisted of 4,773 community-dwelling subjects aged 65 and older (2,014 male, 2,759 female, mean age 75.5 ± 7.0) living in three towns in Japan (Tosa, Odai, and Urausu). Response rates of the eligible population in each town were 79%, 83%, and 90%, respectively. Statistical analysis was performed using SPSS (SPSS, Inc., Chicago, IL). $P < .05$ indicated statistical significance.

A comparison of FRI according to age groups for male and female subjects is displayed in Figure 1. Significant differences in mean FRI were found across age groups for men and women and were found to increase with age. Mean FRI for women was significantly higher than in men in each age group of age 70 and older. Women scored 7.2 (vs 6.1 in men), 8.3 (vs 7.2), 9.6 (vs 8.0), and 11.5 (vs 9.8) in age groups 70 to 74, 75 to 79, 80 to 84, and 85 and older, respectively. Sex differences in mean FRI also increased with age (0.34, 1.08, 1.14, 1.61, 1.96 in each age group).

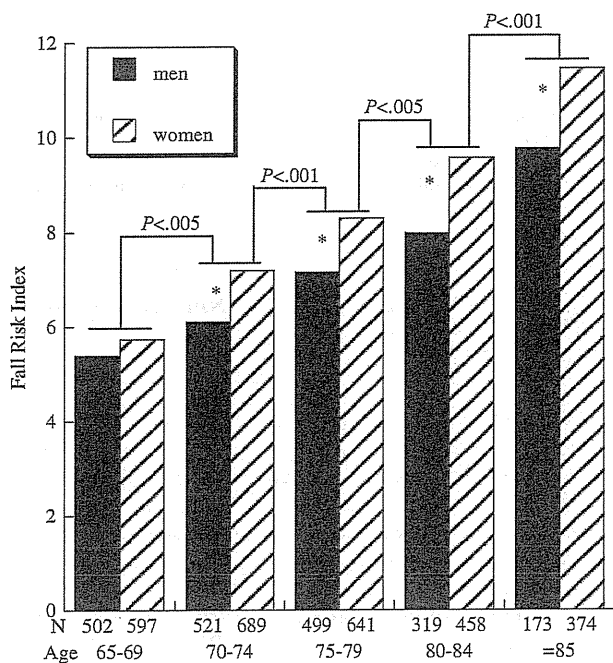


Figure 1. Comparison of Fall Risk Index (FRI) according to age group in community-dwelling elderly men and women in Japan. Significant differences in FRI were found at $P < .001$ between age groups in men and women using one-way analysis if variance and post hoc test using Fisher protected least significant difference. * $P < .001$ between men and women in Student t -test.

Activities of daily living (ADLs) in elderly people are known to decrease with age and are sex-dependent.⁷ Age and ADLs are closely correlated to incidences of falling in community-dwelling elderly people.⁶ Although the FRI was primarily developed for early detection of fall risk in elderly people, the data suggest that this index could be a useful indicator to estimate total geriatric functional status. Aside from an estimation of fall risk, effects of age and sex on living environment-related ADLs may also be determined.

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APPENDIX

- Q1. History of stumbling within 1 year
 Q2. Can you climb stairs without help?
 Q3. Do you feel your walking speed declined recently?
 Q4. Can you cross the road within the green signal interval?
 Q5. Can you walk 1 kilometer continuously?
 Q6. Can you stand on one foot for about 5 seconds?
 Q7. Do you use a cane when you walk?
 Q8. Can you squeeze a towel tightly?
 Q9. Do you feel dizzy?
 Q10. Is your back bent?
 Q11. Do you have knee pain?
 Q12. Do you have vision problems?
 Q13. Do you have hearing problems?
 Q14. Do you think you are forgetful?
 Q15. Do you feel anxious to fall when you walk?
 Q16. Do you take more than five kinds of prescribed medicines?
 Q17. Does your home feel dark when you are walking in it?
 Q18. Are there any obstacles within the house?
 Q19. Are there any uneven surfaces within your house (e.g., stairs, thresholds)?
 Q20. Do you have to use stairs in daily living?
 Q21. Do you have a steep slope around your house?

VISUOSPATIAL IMPAIRMENT AND MORTALITY

To the Editor: Rosano et al.¹ recently demonstrated significant associations between gait and the Digit Symbol Substitution Test (DSST)² on the one hand and functional outcomes and mortality risk on the other. Both predictors have previously been associated with Executive Control Function (ECF). They conclude that frontal function may be associated with both functional outcomes and survival in older persons.

We agree that ECF is an important determinant of functional outcomes, but its specific association with survival is less certain. We have recently examined this in great detail as part of the Freedom House Study (FHS). Although the DSST was associated with survival in our cohort too, this effect did not withstand adjustment for visuospatial impairment, particularly as measured using a simple clock-copying task (CLOX2).^{3,4} In contrast, ECF, as measured using CLOX1, does not predict survival independently of CLOX2; neither do any of several other ECF measures. Thus, it seems to us that it may have been the DSST's visuospatial aspects that were responsible for this effect.

Visuospatial tasks have been specifically associated with survival in several previous studies. We have replicated CLOX2's ECF independent effect in three different cohorts.⁵ Similarly, Lavery et al.⁶ found an association between CLOX scores and survival in another retirement community. In our study and Lavery et al.'s, the association between CLOX scores and survival was independent of age and multiple comorbidities. Antonelli-Incalzi et al.⁷ have associated a similar figural copying task with survival in

elderly patients with chronic lung disease. The effect of visuospatial task performance on survival was comparable with hypoxemia, but independent of hypoxemia and additive to it.

We have hypothesized that neurodegenerative changes in the right insular cortex mediate this effect.⁸ Clock-drawing performance has been associated with structural right insular changes in elderly people without dementia⁹ and functional changes in Alzheimer's disease (AD).¹⁰ The insula mediates autonomic function and is vulnerable to AD and Lewy body dementia but also stroke, depression, and psychotropic medications. Thus, this pathology may increase the risk of falls, syncope, and sudden arrhythmic deaths in a wide variety of geriatric conditions. We have recently shown how insular AD lesions may moderate the associations between survival, corrected QT intervals, and even age itself in older persons.¹¹ The high prevalence of insular neuropathology in elderly persons without dementia⁸ and the selective loss of visuospatial function in normal aging¹² highlights the significance of this finding.

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