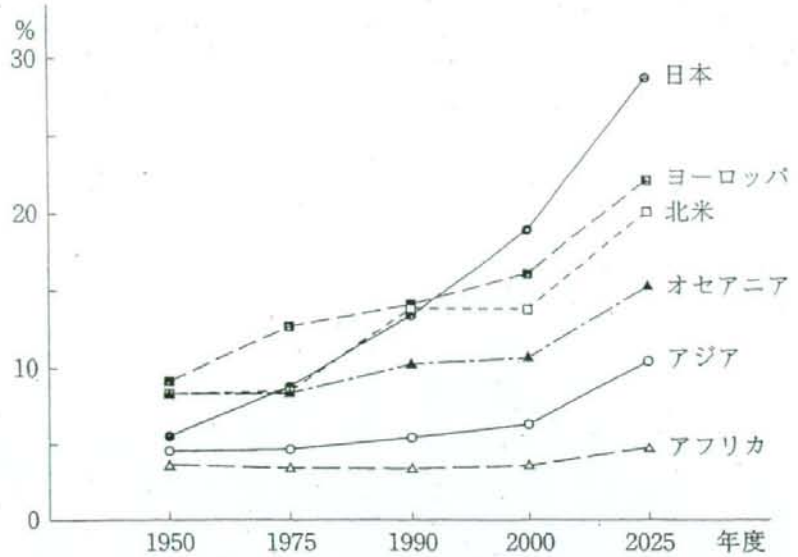

（エイジング総合研究センター：高齢社会基礎資料 02-03 版．78-102，中央法規出版，東京，2003 より作図）

図 3　世界主要地域別にみた 65 歳以上の高齢者の人口に占める割合の経年推移と将来予測

相関を呈していた（相関係数：男性＝0.882，女性＝0.856，図 4）．少子高齢化は世界の動向である事実をすでに述べたが，0～14 歳の子どもの人口比やひとりの婦人が生涯に何人の子どもを産むかという合計特殊出生率もまた，国民 1 人あたりの GNP と高度の相関を示している．以上に述べた健康関連指標と，国民 1 人あたりの GNP で表される経済指標は強い相関を示すが，この相関はあくまで強い関連性を示すものであって，因果関係を断定するものではない．両者の背後には，各国によって異なる生態系や歴史・文化，宗教，さまざまの価値体系や政治形態が複雑に絡んでいるものと思われる．しかしながら，この強い相関をもたらした主要な要因が，20 世紀になって全世界的に急速に発展した近代工業主義にあることはまちがいないであろう．

おわりに

社会の高齢化は，全地球的なグローバルな問題である．近代日本は，欧米

are multiple levels of evidence and to implement programs based on the highest level possible. Communities and organizations with limited resources may need to design programs based on lower levels of evidence, but the most effective programs will be those that incorporate Level A interventions, and we should endeavor to develop programs that use such interventions whenever possible.

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PREVALENCE OF HYPERTENSION AND ITS AWARENESS, TREATMENT, AND SATISFACTORY CONTROL THROUGH TREATMENT IN ELDERLY JAPANESE

To the Editor: Hypertension (HT) is one of the major cardiovascular risk factors in elderly people and is associated with lifestyle and socioeconomic status. The prevalence of HT in people aged 70 and older has been reported to be 71.2% for men and 80.3% for women in countries with established market economies.[1] The increase of HT over the last decade and its unsatisfactory control in people aged 70 and older in the United States were shown.[2] In this study, we showed the prevalence of HT, awareness, treatment, and satisfactory control in community-dwelling people aged 70 and older living in rural towns in Japan.

The study population consisted of 1,256 people aged 70 and older (449 men, 807 women, mean age 79.8), living in Miyagawa City in Mie Prefecture (59 men, 124 women, mean age 79.7), Tosa City (97 men, 227 women, mean 80.7) and Kahoku City (143 men, 223 women, mean age 79.2) in Kochi Prefecture, Urausu City in Hokkaido Prefecture (55 men, 85 women, mean age 79.8) and Yogo City in Shiga Prefecture (95 men, 148 women, mean age 79.4). There was no difference in the mean age between subjects with and without HT. In total, 1,256 subjects were examined from 1999 to 2004. Blood pressure was measured twice in a seated position after a 5-minute rest using an auto-sphygmomanometer (HEM 757, Omron, Japan). HT was defined as an average systolic blood pressure (SBP) of 140 mmHg or greater and an average diastolic blood pressure (DBP) of 90 mmHg or greater or current use of antihypertensive medication. The awareness group was defined as subjects who knew that they had HT, and the treatment group was defined as subjects currently taking antihypertensive medication daily. Satisfactory control in the treatment group was defined as subjects having controlled SBP and DBP of less than 140 and less than 90 mmHg, respectively. Statistical analysis was performed using a chi-square test and an unpaired Student *t*-test, with *P*-values less than .05 considered statistically significant.

Table 1 shows the prevalence of HT, awareness, treatment, and satisfactory control through treatment in Japanese community-dwelling elderly people. The prevalence of HT was 74.2% (n = 932) overall; it was significantly higher in women (76.6%) than in men (69.9%) ($P = .01$), similar to the prevalence in the United States.[2] The prevalence of HT was 72.5% in subjects aged 70 to 79 and 76.3% in those aged $\geq$ 80 and older, although there was no significant difference between the two groups. The rate of awareness was 67.9%, with no significant difference between the sexes or age groups. The rate of treatment was 60.9% overall, with that of men (56.4%) being significantly lower than that of women (63.3%) ($P = .04$). The rate of satisfactory control through treatment was 31.7% overall, with that in subjects aged 80 and older (27.2%) being significantly lower than that in those aged 70 to 79 (35.7%) ($P = .03$).

The prevalence of HT in elderly Japanese was almost the same as that in the United States[2] (i.e., 72% in U.S. subjects aged 70–79; 77% in those aged $\geq$ 80). Thus, the rates of awareness, treatment, and satisfactory control through treatment in elderly Japanese seem to be lower than those in the United States. In particular, the rates of awareness (Japan, 69%; United States, 74%), of treatment in those aged 70 to 79 (Japan, 61%; United States, 67%), and of satisfactory control through treatment in those aged 80 and older (Japan, 27%; United States,: 31%) appear to be lower in Japan than in the United States.

This study found that, in Japan, the prevalence of HT in people aged 70 and older is approximately 70%, which is similar to that of other developed countries.[1,2] The rate of

Table 1. Prevalence of Hypertension and Rate of Awareness, Treatment, and Satisfactory Control with Treatment in Japanese Aged 70 and Older from 1999 to 2004

			Those with Hypertension		
	All Subjects	Prevalence of Hypertension	Awareness	Treatment	Satisfactory Control with Treatment
Characteristic	n			n (%)	
Total	1,256	932 (74.2)	633 (67.9)	568 (60.9)	180 (31.7)
Male	449	314 (69.9)	208 (66.2)	177 (56.4)	57 (32.2)
Female	807	618 (76.6)*	425 (68.8)	391 (63.3)†	123 (31.5)
Age					
70–79	683	495 (72.5)	340 (68.7)	300 (60.6)	107 (35.7)
≥ 80	573	437 (76.3)	293 (67.0)	268 (61.3)	73 (27.2)‡

*$P<.05$, prevalence of hypertension between men and women (χ^2 test).
†$P<.05$, prevalence of treatment between males and females (χ^2 test).
‡$P<.05$, prevalence of satisfactory control with treatment between those aged 70–79 and those aged 80 and older (χ^2 test).

treatment for HT in men was found to be lower than that in women in Japan, with rates of awareness and treatment being lower than those in the United States. Furthermore, the rate of satisfactory control in Japanese people aged 70 and older currently being treated for HT was also surprisingly lower than that of the United States. Although the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure[3] reported that HT was an apparent independent risk factor for cardiovascular events, it was emphasized that an SBP of 140 mmHg or higher was a much more important cardiovascular disease risk factor than DBP in people aged 50 and older. Nevertheless, controversy still remains as to whether blood pressure should be kept under 140/90 for older elderly populations.[4]

In conclusion, geriatricians in developed countries should be knowledgeable about the actual states of awareness, treatment, and satisfactory control of HT in elderly people. Lower rates of satisfactory control of HT in elderly people in Japan might indicate that community doctors do not adequately appreciate the need to control HT strictly in older subjects and in particular in patients aged years and older, as studies in the United States have suggested. Further study and discussion is required as to the appropriate control and prevention of HT in older populations.

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ranged from 6 to 40 MU, and the dose of Dysport (Speywood/Biopharm, Wrexham, UK) ranged from 10 to 20 MU (1 MU of Botox is equivalent to ~2.5–4 MU of Dysport). Therefore, the dosage of 80 MU of BTX-A in the current study was in accordance with these studies and with a dose-finding study in which the primary endpoint was achieved with 75 MU of BTX-A (Dysport) per parotid gland without treatment-related adverse events.[3] The effect of the toxin was usually evident within 7 to 10 days,[2] and the second evaluation with the drooling scale score was repeated 30 days after. Finally, two other evaluations were performed 4 and 5 months after BTX-A injections to quantify the duration in time of botulinum toxin's action, which in the present study, was 4.2 months, a finding similar to other studies,[5] in which it has been suggested that botulinum toxin-induced anhidrosis may last up to 7 to 8 months.

The potential adverse effects could be dysphagia and chewing difficulties for botulinum toxin diffusion in pharyngeal, masseters, and temporalis muscles. It is not so rare to find other side effects, such as xerostomia, inflammation, and infection of the salivary glands; hematomas; and salivary duct calculi or physical injury from the needle in the facial nerve and carotid artery. In our experience, 1 mL compared with 2 mL of saline dilution may reduce adverse effects risks. Furthermore, the use of ultrasound guidance during the injection provides the correct needle position inside the gland to avoid lesions or effusion of formulation in the vascular structures or the surrounding tissues. The results of the present study demonstrate that further randomized, controlled trials are required to more fully evaluate this new modality of treatment of sialorrhea in PD.

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LIFESTYLE CHANGES AFTER ORAL GLUCOSE TOLERANCE TEST IMPROVE GLUCOSE INTOLERANCE IN COMMUNITY-DWELLING ELDERLY PEOPLE AFTER 1 YEAR

To the Editor: The global burden of diabetes mellitus (DM) is rapidly increasing, and prevention has become an urgent worldwide issue.[1] The early detection of DM and impaired glucose tolerance (IGT) using a 75-g oral glucose tolerance test (OGTT) in elderly Japanese people in a community setting has been reported.[2] The current study examined the effect of lifestyle changes on glucose intolerance detected using OGTT in community-dwelling elderly people.

In 2006, OGTTs were conducted in 418 community-dwelling elderly Japanese (174 men and 244 women, mean age 73.0 ± 7.1, all aged ≥ 60) to detect early DM or IGT. All subjects lived in Tosa town, Kochi prefecture, Japan. None had ever been diagnosed with or treated for DM or IGT. Using the criteria of the World Health Organization, DM, IGT, and normal glucose tolerance (NGT) were determined using OGTT.[2] Fifty elderly people were found to have DM, 135 IGT, and 233 NGT. All 418 participants were individually informed of the significance of the OGTT for DM or IGT and its prevention. Other information was

made available through newspapers. The 185 people with DM or IGT were individually contacted, lifestyle changes of dieting and exercise were recommended, and their family doctors were informed of the results of their OGTT. One year later, in 2007, 206 people (37 with DM, 90 with IGT, and 79 with NGT) participated in a follow-up survey. Because 10 people with DM or IGT had started taking medication for DM, 196 subjects were analyzed for the effects of the intervention-caused lifestyle changes without medication. Factors related to glucose intolerance, such as body weight, hemoglobin A1c (HbA1c), fasting blood sugar (FBS), fasting insulin, and homeostasis model assessment ratio (HOMA-R), were compared between the subjects' OGTTs in 2006 and in 2007. The rate of people with improvement for each factor was compared in those with DM, IGT, and NGT. Body weight was analyzed using the same machine (Ueda Avancer Corporation U-we'll2, Tokyo, Japan), and the same company (BML Inc., Saitama, Japan) analyzed blood chemistry in 2006 and 2007.

It was revealed that, by 2007, 72.0% of subjects with DM and 71.8% with IGT were dieting and 76.9% and 66.0%, respectively, of them had been exercising after the recommendations in the 2006 intervention. Body weight had significantly decreased from that in 2006 in all subjects with DM (from 56.7 to 54.4 kg), IGT (from 55.9 to 54.4 kg), and NGT (from 53.8 to 53.1 kg) (Table 1). The rate of people with decreases in body weight of more than 3 kg was 33.3% in DM, 20.9% in IGT, and 15.2% in NGT, but there were no significant differences between them. HbA1c significantly decreased one year later in DM (from 5.8% to 5.5%), IGT (from 5.4% to 5.3%), and NGT (from 5.3% to 5.2%). The rate of people with decreases in HbA1c of more than 0.4% was significantly higher in those with DM (43.3%) than IGT (18.8%) or NGT (8.1%). FBS also significantly decreased 1 year later in subjects with DM (from 118.7 to 110.1 mg/dL) and IGT (from 103.1 to 100.0 mg/dL) but not with NGT (from 96.0 to 95.4 mg/dL). The rate of people with decreases of FBS of more than 10 mg/dL was significantly higher in those with DM (40.0%) than IGT (20.7%) or NGT (3.8%). Fasting insulin and HOMA-R were significantly lower 1 year later but only in subjects with DM (from 7.0 to 5.5 μU/mL for insulin, from 2.1 to 1.5 for HOMA-R). The percentage of people with decreases of HOMA-R of more than 0.5 was significantly higher in those with DM (43.3%) than IGT (15.0%) or NGT (19.2%) (Table 1).

The study revealed improvements after 1 year in glucose intolerance as a result of health education for lifestyle changes combined with OGTT in community-dwelling elderly Japanese people not taking antidiabetic medication. In subjects with DM, all factors related to glucose intolerance (body weight, HbA1c, FBS, fasting insulin, and HOMA-R) improved. In IGT, body weight, HbA1c, and FBS improved. Even in NGT, body weight and HbA1c improved. Lifestyle changes were a simple and effective way to improve non-severe cases of DM or IGT, and prevention of their complications may be expected. OGTT was effective for the detection of preventable early DM or IGT.[2] A community network system for long-term follow-up and education of people with glucose intolerance is needed in Japan and other

Table 1. Effect of Nonpharmaceutical Intervention Through Lifestyle Changes on Glucose Intolerance in Community-Dwelling Elderly People in Japan

Factors Related to Glucose Intolerance	DM (n = 30)	IGT (n = 87)	NGT (n = 79)
Body weight, kg			
2006, mean ± SD	56.7 ± 9.4	55.9 ± 10.0	53.8 ± 8.6
2007, mean ± SD	54.4 ± 9.5***	54.4 ± 10.0***	53.1 ± 8.7**
Decrease of >3 kg, %	33.3	20.9	15.2
Hemoglobin A1c level, %			
2006, mean ± SD	5.8 ± 0.5	5.4 ± 0.3	5.3 ± 0.2
2007, mean ± SD	5.5 ± 0.3***	5.3 ± 0.3***	5.2 ± 0.2***
Decrease of >0.4%, %†	43.3	18.8	8.1
Fasting blood sugar, mg/dL			
2006, mean ± SD	118.7 ± 20.8	103.1 ± 10.0	96.0 ± 6.5
2007, mean ± SD	110.1 ± 17.2**	100.0 ± 8.4**	95.4 ± 6.9
Decrease of >10 mg/dL, %†	40.0	20.7	3.8
Insulin, μ/mL			
2006, mean ± SD	7.0 ± 4.0	5.2 ± 2.6	4.5 ± 3.1
2007, mean ± SD	5.5 ± 3.4*	5.0 ± 3.2	4.6 ± 2.6
Decrease of >0.5 μ/mL, %	63.3	45.0	39.7
Homeostasis model assessment ratio (HOMA-R)			
2006, mean ± SD	2.1 ± 1.2	1.4 ± 0.7	1.1 ± 0.7
2007, mean ± SD	1.5 ± 0.9**	1.2 ± 0.8	1.1 ± 0.8
Decrease of >0.5, %‡	43.3	15.0	19.2

$P<$ *.05, **.01, ***.001. Factors were compared between 2006 and 2007 (paired Student *t*-test).
$P<$ ‡.01, †.001. Rates of people with improvement were compared between diabetes mellitus (DM), impaired glucose tolerance (IGT), and normal glucose tolerance (NGT) (chi-square test).
SD = standard deviation.

countries, because the numbers of poor people with DM are increasing, especially in developing countries, and treatment by medication is not always readily available.[3–5]

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INTELLIGENCE AND CAROTID ATHEROSCLEROSIS IN OLDER PEOPLE: CROSS-SECTIONAL STUDY

To the Editor: Children who score higher on tests of intelligence have a lower subsequent risk of coronary heart disease.[1,2] One explanation may lie in observations linking higher intelligence in childhood with healthier behaviors and lower levels of some cardiovascular risk factors in adulthood.[3–5] Such individuals may be less susceptible to atherosclerosis.

Intelligence differences measured in childhood tend to remain stable into old age.[6] Crystallized intelligence is often assessed using vocabulary-based tests and shows little deterioration with aging. Fluid intelligence, often assessed using time-limited reasoning tests, ages like many physical abilities. At older ages, cognitive performance reflects not just peak ability earlier in life, but also the cumulative effects of disease processes. However, crystallized intelligence, being relatively resistant to the influences of age-related pathologies, provides an indicator of peak prior intelligence that is strongly correlated with intelligence in childhood.[7] The relationship between crystallized and fluid intelligence and carotid atherosclerosis in older people was investigated.

The participants were 466 men and women aged 66 to 75 from Sheffield, United Kingdom. The North Sheffield Research Ethics Committee approved the study. Fluid intelligence was assessed using the Alice Heim 4 test, Part 1 (AH4), which consists of 65 reasoning items of increasing difficulty.[8] Crystallized intelligence was assessed using the Mill Hill vocabulary scale's synonyms subtest, which assesses knowledge of word meaning.[9] It consists of 33 words of increasing difficulty. Participants underwent a color duplex ultrasonographic examination of the carotid arteries with an HDI3000 high-resolution, real-time scanner (Advanced Technology Laboratories, Bothell, WA). The ultrasonographer examined the carotid arteries and the bifurcation and estimated the maximum degree of stenosis. Intima-media thickness (IMT) of the far wall was measured three times in the common carotid artery and twice in the internal carotid artery on both sides and a mean value calculated. Linear regression was used to examine the relationship between cognitive test scores and IMT, and logistic regression was used to examine the relationship between cognitive test scores and having carotid stenosis greater than 30%.

Men who scored higher on the Mill Hill test of crystallized intelligence had less carotid atherosclerosis as measured according to IMT and degree of stenosis (Table 1). For a standard deviation increase in Mill Hill score, IMT decreased 2.26 μm (95% confidence interval (CI) = 0.36–4.17) and the odds ratio for having carotid stenosis greater than 30% was 0.72 (95% CI = 0.56–0.93). Separate adjustment for education, vitamin C concentration, and cardiovascular risk factors attenuated the relationship between Mill Hill score and IMT. Adjustment only slightly affected the relationship between Mill Hill score and carotid stenosis. Relationships between scores on the AH4 test of fluid intelligence and markers of carotid atherosclerosis in men were in a similar direction but considerably weaker and nonsignificant (data not shown). In women, there were no significant associations with either test.

No previous study has examined the relationship between crystallized intelligence and carotid atherosclerosis. Because the effects of aging and disease affect this area of cognitive function little, if at all,[7] scores on tests such as the Mill Hill provide an estimate of peak prior intelligence in older people. The findings of the current study suggest that higher premorbid intelligence may protect men against atherogenesis. Associations were not found between fluid

COMMUNITY-DWELLING ELDERLY FALLERS IN JAPAN ARE OLDER, MORE DISABLED, AND MORE DEPRESSED THAN NONFALLERS

To the Editor: We read with interest the article published by Somadder et al.[1] The authors document a correlation between depressive symptoms and self-reported numbers of falls in older subjects attending a day hospital in the United Kingdom. They reported that there were no significant differences in age, comorbidities, or performance on activities of daily living (ADLs) between fallers and infrequent fallers in their small population. We reexamined this important issue in community-dwelling elderly people in Japan and found findings different from those of Somadder et al.

The study population consisted of 1,261 people aged 65 and older (men 529, women 732, mean age 75.4 ± 7.2) living in T town, Kochi Prefecture, Japan. Fallers were screened using self-reported questionnaires, along with additional tests of ADLs and subjective quality of life (QOL) for community-dwelling older people in 2006. The question "Do you have any history of a fall within the past year?" was used for detecting fallers. Subjects who answered yes to the question were considered to be fallers. For the assessment of basic ADLs, the 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). For advanced ADLs, the Tokyo Metropolitan Institute of Gerontology index of competence rating scale of 0 to 13 was used.[2] This scale includes instrumental self-maintenance (0–5), intellectual activity (0–4), and social role (0–4). Five indicators of QOL (sense of subjective health, relationship with family, relationship with friends, financial satisfaction, and subjective happiness) were rated on a 100-mm visual analogue scale (worst QOL on the left end of the scale, best to the right).[3,4] The 15-item Geriatric Depression Scale (GDS-15)[5] was used for the assessment of depression; a score of 10 or more was considered to indicate depression. A fall risk index[6,7] with a score ranging from 0 (low risk of fall) to 21 (high risk of fall) was added to those and used for the assessment of risk of falls. Statview version 5.0 (SAS Institute, Inc., Cary, NC) was used for calculating chi-square tests for categorical variables, unpaired *t*-test for continuous variables, and Spearman correlation (r_s) between number of falls and GDS-15 and between fall risk index and GDS-15.

The proportion of fallers was 31.6% in this population. Fallers were significantly older (76.9 vs 74.7) and had significantly lower scores for each item of the ADLs and QOLs than nonfallers, even after the adjustment for age (Table 1). The proportion of subjects with depression was significantly

Table 1. Comparison of Activities of Daily Living (ADLs), 15-Item Geriatric Depression Scale (GDS-15) and Quality of Life (QOL) Scores of Fallers and Nonfallers

Characteristic	Fallers n = 399 (31.6%)	Nonfallers n = 862 (68.4%)	*P*-Value
Age, mean ± SD	76.9 ± 7.5	74.7 ± 6.9	<.001
Male, %	40.2	42.6	.40
Basic ADLs score, mean ± SD	19.1 ± 3.5	20.2 ± 2.5	<.001
Tokyo Metropolitan Institute of Gerontology index of competence (range 0–13), mean ± SD	9.3 ± 3.8	10.7 ± 3.2	<.001
Self-maintenance (range 0–5), mean ± SD	4.0 ± 1.6	4.4 ± 1.3	<.001
Intellectual activity (range 0–4), mean ± SD	2.7 ± 1.3	3.2 ± 1.1	<.001
Social role (range 0–4), mean ± SD	2.8 ± 1.4	3.2 ± 1.2	<.001
GDS-15 score			
Mean ± SD	6.5 ± 4.1	4.3 ± 3.7	<.001
>10, %	26.8	11.6	<.001
Fall risk index (range 0–21), mean ± SD	11.8 ± 3.8	7.0 ± 3.9	<.001
QOL score, mean ± SD			
Sense of subjective health	47.7 ± 21.8	56.7 ± 20.9	<.001
Relationship with family	72.3 ± 21.7	76.9 ± 20.3	<.001
Relationship with friends	69.5 ± 23.1	74.3 ± 20.7	<.001
Financial satisfaction	43.8 ± 24.9	51.2 ± 23.8	<.001
Subjective happiness	54.8 ± 22.0	62.0 ± 21.5	<.001

Unpaired *t*-test for continuous variables, chi square test for categorical variables.
Variables were adjusted for age when they were significantly correlated with age.
SD = standard deviation.

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higher in fallers (26.8% vs 11.6%, $P<.001$). Although only 59.6% of the fallers answered the numbers of falls, there was weak but significant correlation between number of falls and GDS-15 scores in those who had fallen ($r_s = 0.17$, $P = .002$). The mean fall risk index score was significantly higher in fallers than nonfallers, and there was significant correlation between fall risk index and GDS-15 ($r_s = 0.53$, $P<.001$) in fallers.

We confirmed the higher prevalence of depression in fallers than nonfallers, and there was a significant correlation between the number of falls and GDS-15, as Somadder et al. reported. However, unlike with the findings of Somadder et al., community-dwelling elderly fallers in Japan were significantly older and had lower quantitative ADL and QOL scores, as well as higher GDS-15 scores than nonfallers, even after adjustment for age.

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SUBJECTIVE SLEEP DISTURBANCES WERE CLOSELY ASSOCIATED WITH COMPREHENSIVE GERIATRIC FUNCTIONS IN DOSE-RESPONSIVE MANNER IN THE COMMUNITY-DWELLING ELDERLY PEOPLE IN JAPAN

To the Editor: Sleep disturbance and insomnia increase greatly with age. Because of its multifactorial origins, sleep disturbance should be regarded as a geriatric syndrome and a comprehensive geriatric assessment should be performed for its improvement.[1,2] The association between sleep satisfaction and activities of daily living (ADLs), depression, and qualities of life (QOL) was assessed in community-dwelling elderly people in Japan. Elderly people with poor and moderate sleep satisfaction had lower comprehensive geriatric function (CGF) scores than those with good sleep satisfaction.

The study population consisted of 1,432 subjects aged 65 and older (male:female 594:838, mean age 75.6 ± 7.2) living in a rural Japanese town, Tosa, in Kochi prefecture. Sleep satisfaction was assessed using a self-reported questionnaire, and subjects were classified into three classes using a sleep satisfaction scale; each subject was asked, "Do you sleep well?" Possible answers were good, moderate, and poor. Seven basic ADL items (walking, ascending and descending stairs, feeding, dressing, using the toilet, bathing, grooming) were assessed, each on a 4-level scale, with 3 = completely independent, 2 = needs some help, 1 = needs much help, and 0 = completely dependent. Scores for each item were summed to generate a total basic ADL score ranging from 0 to 21.[3] Higher-level daily activities were assessed using the Tokyo Metropolitan Institute of

from the final analysis. Participants were categorized as having received house calls based on their response to the following question: "In the last month how many times did you see a doctor in your home?" Participants who responded that they had at least one house call were labeled "House Call Group" and those with none were labeled "No House Call Group." The groups were compared on preselected demographic, functional, medical, and social measures. Descriptive statistics and Wilcoxon rank sum and chi-square tests were used. Statistical analysis was performed using SAS 9.1.3 (SAS Institute, Inc., Cary, NC).

RESULTS

The Table describes the two groups.

DISCUSSION

In a cross-section of community-dwelling older adults with disabilities, house call recipients were older and more likely not to be white, to live in large cities, to be Medicaid recipients, and to have more activity limitations than those who had not received house calls. This analysis has several limitations including its cross-sectional design, unadjusted comparisons, unweighted comparisons, and a probable underreporting of the prevalence of house calls because of the 1-month recall window. In spite of these limitations, the most significant general finding is unaffected; house calls are targeted to the most vulnerable elderly people. As healthcare organizations and policymakers consider how to address the healthcare needs of an aging population, they should recognize that house calls may be an important safety net service that helps highly vulnerable older adults remain in the community.

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IMPROVEMENT IN OBESITY AND GLUCOSE TOLERANCE IN ELDERLY PEOPLE AFTER LIFESTYLE CHANGES 1 YEAR AFTER AN ORAL GLUCOSE TOLERANCE TEST IN A RURAL AREA IN LAO PEOPLE'S DEMOCRATIC REPUBLIC

To the Editor: A high prevalence of diabetes mellitus (DM) and impaired glucose tolerance (IGT) was reported in a previous study in community-dwelling elderly people in a rural area of Lao People's Democratic Republic (PDR), a developing Southeast Asian country.[1] Prevention of DM has become an urgent issue, especially in developing countries, because the rate of increase of DM is much faster in developing countries than in developed ones.[2,3] This study examined the effect of a lifestyle change intervention on glucose tolerance detected using a 75-g oral glucose tolerance test (OGTT) in community-dwelling elderly Laotians.

In 2005, OGTTs were conducted in 209 Laotians aged 60 and older to detect DM or IGT. The subjects lived in rural villages in the Lahanam and Paxon zones in Songkhon District in Savannakhet Province in Lao PDR.[1] None had ever been diagnosed with or treated for DM or IGT. Using the criteria of the World Health Organization, DM, IGT, and normal glucose tolerance (NGT) were determined based on OGTT. Seventy-two subjects were found to have DM, 45 IGT, and 92 NGT.[1] All 209 participants were individually informed of the significance of the OGTT in detecting early DM or IGT and of its prevention. The 117 subjects with DM or IGT were individually contacted, and changes in diet and exercise were recommended. One year later, in 2006, 73 subjects (25 with DM, 16 with IGT, and 32 with NGT) participated in a follow-up survey. Because seven subjects with DM or IGT had started taking medication for DM, 66 subjects were analyzed for the effects of the lifestyle-change intervention without medication. Body weight, height, fasting blood sugar (FBS), and fasting insulin were examined in the subjects in 2005 and in 2006. Body mass index (BMI) was calculated, and the prevalence of obese subjects (BMI $\geq$ 25) was compared between 2005 and 2006. A homeostasis model assessment ratio (HOMA-R) was calculated, and the prevalence of subjects with glucose intolerance (HOMA-R $\geq$ 2.5) was also compared. Body weight was analyzed using the same scale (Tanita Inc., Tokyo, Japan), and the same company analyzed blood chemistry (BML Inc., Saitama, Japan) in 2005 and 2006.

It was revealed in interviews that most of the subjects with DM and IGT were dieting or exercising in 2006 after the lifestyle change recommendations in 2005. As a result,

Table 1. Improvement of Obesity and Glucose Tolerance After Lifestyle Changes After Oral Glucose Tolerance Test

		Body Mass Index ≥ 25		Homeostasis Model Assessment Ratio ≥ 2.5	
		2005	2006	2005	2006
Glucose Tolerance	N	%			
Diabetes mellitus	19	21.1	5.3*	47.4	21.1*
Impaired glucose tolerance	15	26.7	13.3*	33.3	13.3
Normal glucose tolerance	32	18.8	12.5**	6.3	21.9

$P<$ *.05; **.001.

The rates of obesity and glucose intolerance were compared between in 2005 and 2006 in each glucose tolerance group (chi-square test).

body weight in 2006 had significantly decreased from 2005 in all subjects with DM (from 53.1 to 49.8 kg), IGT (from 51.5 to 49.0 kg), and NGT (from 50.3 to 48.5 kg) ($P<.01$, $<.05$, $<.001$, respectively; paired Student t-test). The percentage of subjects with obesity (BMI ≥ 25) had significantly decreased in all subjects with DM (from 21.1% to 5.3%), IGT (from 26.7% to 13.3%), and even with NGT (from 18.8% to 12.5%) ($P<.05$, $<.05$, $<.001$, respectively; chi-square (χ^2) test) (Table 1).

The average FBS decreased in the subjects with DM (from 133.4 to 127.8 mg/dL) and IGT (from 99.0 to 94.1 mg/dL) and increased in those with NGT (from 88.9 to 96.5 mg/dL), but the differences were not statistically significant. The rate of subjects with decreases in FBS of more than 15 mg/dL after 1 year was significantly higher in those with DM (42.1%) than IGT (20.0%) or NGT (9.3%) (χ^2 test, $P<.05$).

The percentage of subjects with glucose intolerance (HOMA-R ≥ 2.5) had significantly decreased in subjects with DM (from 47.4% to 21.1%) (χ^2 test, $P<.05$). The percentage with glucose intolerance decreased in subjects with IGT (from 33.3% to 13.3%) and increased in those with NGT (from 6.3% to 21.9%), but the differences were not statistically significant (Table 1).

The study revealed improvements after 1 year in glucose tolerance as a result of health education for lifestyle changes combined with OGTT in community-dwelling elderly Laotians not taking antidiabetic medication, as in previous reports in Japan.[4,5] In subjects with DM, obesity and glucose tolerance significantly improved. In subjects with IGT, obesity significantly improved and the rate of glucose intolerance decreased, but the difference failed to reach a statistical significance because of the small sample size. Even in subjects with NGT, obesity significantly decreased.

Prevention of DM using lifestyle changes combined with OGTT screening may be effective, especially for people in developing countries, where the number of poor people with DM is increasing and medication is not always readily available.[6]

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ORIGINAL ARTICLE: EPIDEMIOLOGY, CLINICAL PRACTICE AND HEALTH

Factors associated with carotid atherosclerosis in community-dwelling oldest elderly aged over 80 years

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Background: Hypertension, hyperlipidemia, impaired glucose tolerance and smoking have been known to be risk factors for atherosclerosis. Recently, it was shown that hyperhomocysteinemia is also a risk factor for cerebral vascular disease and atherosclerosis. However, it is unknown if these are also risk factors in the oldest elderly population aged 80 years or older. We carried out a cross-sectional analysis to determine the associated factors with carotid atherosclerosis in the oldest elderly living in the community.

Methods: Subjects consisted of 136 oldest elderly aged 80 years or older living in the community. Blood pressure, orthostatic change of blood pressure, blood chemical parameters, height and bodyweight, lifestyle and medical history were examined. The thickness was measured of the total carotid artery intima-media complex (IMT) by carotid artery ultrasonography and used the maximum thickness (max IMT) for analysis.

Results: The factors that correlated with max IMT were age and low γ-glutamyl transpeptidase in males, and serum homocysteine levels in females. The subjects were divided into two groups: those with a max IMT of less than 1.0 mm and those with that of 1.0 mm or more. Factors associated with max IMT were age and abstinence from alcohol in males, and orthostatic blood pressure change in females. Factors significantly associated with higher carotid artery IMT were aging in males and orthostatic blood pressure change in females.

Conclusion: The factors associated with carotid artery IMT as an indicator of carotid atherosclerosis in community-dwelling oldest elderly aged 80 years or older were sex, aging, orthostatic blood pressure change and no alcohol intake. There were differences in risk factors for carotid atherosclerosis between the male and female population.

Keywords: carotid artery, Kahoku town in Kochi, oldest elderly, orthostatic blood pressure change, ultrasonic tomography.

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Introduction

Aging, hypertension, hyperlipidemia, impaired glucose tolerance, hyperhomocysteinemia, obesity and smoking have been pointed out as risk factors for atherosclerosis.[1-5] However, as most of the subjects in these studies were middle-aged or younger elderly, it remains unclear whether they are also the risk factors for atherosclerosis in oldest elderly aged 80 years or older. For example, although hypertension is generally known to be one of the risk factors for atherosclerosis in the middle-aged population, there is a study that points out the possibility that mortality rate rather rises in the elderly with hypotension.[6] In addition, though hyperlipidemia is one of the risk factors for ischemic heart disease and known to promote atherosclerosis, a longitudinal study in Japan showed that cognitive functions decline more rapidly in the elderly aged 75 years or older with lower serum cholesterol levels than those with higher serum cholesterol levels.[7]

In this study, we examined atherosclerosis of the carotid artery by ultrasonic tomography in the oldest elderly aged 80 years or older living in Kahoku, Kochi in Japan. The factors related to atherosclerosis of the elderly were analyzed using multiple regression analysis.

Carotid artery ultrasonic tomographic examination is a simple and noninvasive method. It is known that an increase of the intima-media complex in the carotid artery is one of the indicators of atherosclerosis in the early stages of the disease.[1] Investigations in middle-aged subjects showed that an increase of the intima-media complex, evaluated by carotid artery ultrasonic tomography, was related to the onset of cerebral vascular diseases and atherosclerotic heart diseases.[8,9]

On the other hand, it is still unclear if the factors associated with subjects aged 80 years or older may be applied to those of middle-aged ones. Thus, in this cross-sectional study, we investigated carotid atherosclerosis in the oldest elderly living in the community by ultrasonic tomography. We assessed carotid atherosclerosis using the thickness of the carotid artery intima-media complex and associated factors such as lifestyle, blood pressure, and blood chemical analysis including serum homocysteine levels.

Methods

The study population consisted of 136 community-dwelling oldest elderly people (male : female, 53:83; mean age, 84 years old) aged 80 years or older living in Kahoku in Kochi Prefecture in 1998. Kahoku town had a population of 5810 with 603 people of 80 years or more. There were 489 eligible people that were informed and 136 people agreed to join the study and underwent a comprehensive check-up of geriatric function in the community health center (27.8% of eligible subjects) as part of the Kahoku Longitudinal Aging Study.[10,11] Informed consent was obtained from these people. Physical examination, blood pressure measurement, blood chemistry analysis, an electrocardiogram, evaluation of cognitive and neurobehavioral functions and ultrasonography (SSA-340 A; Toshiba, Nasu, Japan) for carotid atherosclerosis were carried out. Two blood pressure measurements were carried out using an automatic sphygmomanometer (HEM 755C; Omron, Tokyo, Japan) while the subject was in a sitting, supine and then standing position, in this particular order, to examine the presence of orthostatic blood pressure change. The second measurement of blood pressure in the sitting position was used to define the high blood pressure group. The subjects were defined as having high blood pressure if their levels were 160 mmHg or more in the systolic phase, or 95 mmHg or more in the diastolic phase, or if they took antihypertensive drugs. Orthostatic change of blood pressure was defined as a systolic blood pressure (SBP) decline or increase of 20 mmHg or more after standing up from the supine position.

Blood chemical examination comprised assessment of total cholesterol, high-density lipoprotein (HDL) cholesterol, blood glucose, hemoglobin concentration, aspartate aminotransferase (AST), alanine aminotransferase (ALT), γ-glutamyl transpeptidase (γ-GTP), urea nitrogen, creatinine, total protein, albumin and homocysteine levels in non-fasting conditions. HbA1c was assessed when the blood glucose level was more than 110 mg/dL. The impaired glucose tolerance group was defined as having a blood glucose value of 200 mg/dL or more or HbA1c over 6.5%, or with a medical history of diabetes mellitus. Age, blood pressure values and blood chemical results were analyzed for an association with atherosclerosis evaluated by carotid artery ultrasonic tomography. In addition, body mass index (BMI), current smoking habits or alcohol consumption, medical history of cerebral infarction and ischemic heart disease were also analyzed.

Thickness of the intima-media complex was used as an indicator of carotid atherosclerosis. The thickness of the carotid artery intima-media complex, 1-cm proximal to the common carotid artery bulb in the long axial direction, was measured. The detection limit was 0.1 mm. Three different longitudinal views (anterior oblique, lateral, and posterior oblique) and transverse views of both carotid arteries were obtained. From the views, the thickness was measured from three directions bilaterally and a maximum of six measurements were used[12].

Continuous variables are shown as mean (standard error). The SAS program was used to analyze the data, subdivided into male and female (SAS Institute, Cary, NC, USA). For comparison of categorical variables,

χ^2 calibration was used. For comparison of means, the general linear model was used. For multivariate analysis, the logistic regression analysis was used. A *P*-value of <0.05 was considered to be statistically significant.

Results

Table 1 shows the average of each variable according to the male and female categories. The mean age of the males was significantly higher than that of the females. The mean SBP in females was significantly higher than that in males, and there was no significant difference between the mean diastolic blood pressure (DBP) between both sexes. There was also no significant difference in the orthostatically changed blood pressure between both sexes. Both serum total cholesterol and HDL cholesterol levels were significantly higher in females than in males. AST, ALT, γ-GTP, creatinine and hemoglobin concentrations were significantly higher in males than in females. Of particular note is that γ-GTP was remarkably higher in males than in females, perhaps due to alcohol consumption. Serum homocysteine levels were significantly higher in males than in females. There were no significant differences in serum blood urea nitrogen (BUN), total protein, albumin, and BMI between both sexes. The average maximum thickness of the carotid artery intima-media complex (max IMT) was significantly higher in males than in females.

With a mean thickness plus standard deviation of 1.0 mm, subjects were classified into two groups according to their max IMT value: (i) increased IMT group with an IMT of 1.0 mm or more; and (ii) non-increased IMT group with an IMT of less than 1.0 mm. Table 2 shows the comparison of max IMT between the two IMT groups by sex difference. The mean age of the non-increased IMT group was significantly younger than that of the other group in males. There was no significant difference in mean age between the females in both the groups. There were no significant differences in SBP, DBP, orthostatic change of blood pressure, BMI and blood parameters between both the IMT groups for both sexes. However, in females, homocysteine levels were significantly higher in the increased IMT group than in the non-increased IMT group after the adjustment for the effect of age.

Table 3 shows the comparison of medical history and background factors between the increased IMT group and the non-increased IMT group according to gender difference. The rate of male subjects who were drinking alcohol every day was significantly higher in the non-increased IMT group than in the other group. The rate of female subjects with an orthostatic blood pressure change of 20 mmHg or more was significantly higher in the increased IMT group than in the other group. There was no significant difference in the other factors between the two groups.

Table 1 Baseline characteristics of the subjects used in this study

	Male ($n = 53$)		Female ($n = 84$)		*P*
	Mean	(SE)	Mean	(SE)	
Age	84.6	(0.5)	82.9	(0.4)	0.01
Body mass index	22.0	(0.5)	22.7	(0.4)	ns
Systolic blood pressure	137.6	(2.8)	146.4	(2.2)	<0.05
Diastolic blood pressure	74.6	(1.7)	78.7	(1.3)	ns
Orthostatic change of blood pressure	10.8	(1.5)	12.8	(0.2)	ns
Blood chemical findings					
Total cholesterol (mg/dL)	174.0	(4.3)	198.6	(3.4)	<0.01
HDL cholesterol (mg/dL)	49.4	(2.0)	54.6	(1.6)	<0.05
AST (IU/L)	24.7	(0.8)	22.3	(0.7)	<0.05
ALT (IU/L)	17.8	(0.9)	14.2	(0.8)	<0.01
γ-GTP (IU/L)	32.5	(3.7)	12.2	(2.9)	<0.01
BUN (mg/dL)	20.4	(0.7)	19.8	(0.6)	ns
Creatinine (mg/dL)	0.89	(0.04)	0.76	(0.03)	<0.01
Hemoglobin (g/dL)	13.0	(0.2)	11.8	(0.1)	<0.01
Total protein (g/dL)	7.4	(0.1)	7.5	(0.1)	ns
Albumin (g/dL)	4.2	(0.0)	4.2	(0.0)	ns
Homocysteine (nmol/mL)	12.8	(0.6)	10.8	(0.5)	<0.05
max IMT (mm)	0.97	(0.02)	0.90	(0.01)	<0.01

ALT, alanine aminotransferase; AST, aspartate aminotransferase; BUN, blood urea nitrogen; γ-GTP, γ-glutamyl transpeptidase; HDL, high-density lipoprotein; max IMT, max intima-media thickness; ns, not significant; SE, standard error.

Table 2 Comparison of each variable between the group divided by intima-media thickness (max)

	Male					Female				
	max IMT < 1.0		max IMT ≥ 1.0		*P*	max IMT < 1.0		max IMT ≥ 1.0		*P*
	Mean	(SE)	Mean	(SE)		Mean	(SE)	Mean	(SE)	
Age	82.6	(0.75)	85.8	(0.63)	<0.01	82.9	(0.45)	82.7	(0.69)	ns
Body mass index	22.3	(0.64)	21.4	(0.54)	ns	22.8	(0.49)	22.7	(0.74)	ns
Systolic blood pressure	136.2	(4.79)	139.8	(4.00)	ns	145.1	(2.51)	148.7	(3.79)	ns
Diastolic blood pressure	74.1	(2.72)	76.4	(2.27)	ns	77.9	(1.61)	78.7	(2.43)	ns
Orthostatic change of blood pressure	10.0	(2.07)	11.4	(1.73)	ns	11.8	(1.60)	14.6	(2.41)	ns
Blood chemical findings										
Total cholesterol	170.2	(6.66)	176.8	(5.58)	ns	199.7	(4.27)	202.3	(6.40)	ns
HDL cholesterol	47.1	(2.84)	50.5	(2.38)	ns	55.2	(2.05)	53.6	(3.07)	ns
Hemoglobin	13.1	(0.34)	12.9	(0.28)	ns	12	(0.16)	11.7	(0.24)	ns
Total protein	7.5	(0.09)	7.4	(0.08)	ns	7.5	(0.06)	7.3	(0.10)	ns
Albumin	4.2	(0.058)	4.13	(0.048)	ns	4.22	(0.039)	4.22	(0.059)	ns
AST	25.3	(1.73)	24.2	(1.45)	ns	22.4	(0.63)	22.3	(0.94)	ns
ALT	20	(2.046)	15.7	(1.71)	ns	14.4	(0.67)	14.8	(0.998)	ns
γ-GTP	36.3	(9.52)	28.4	(7.97)	ns	13.9	(0.72)	11.4	(1.08)	ns
Creatinine	0.92	(0.059)	0.9	(0.049)	ns	0.71	(0.034)	0.8	(0.051)	ns
BUN	19.3	(1.18)	21.7	(0.99)	ns	19.79	(0.66)	19.46	(0.99)	ns
Homocysteine	14.9	(1.28)	11.8	(1.07)	ns	10.1	(0.47)	11.8	(0.71)	<0.05*

*After adjustment for age.

Table 3 Comparison of the frequency of each factor with the level of max IMT

	Male					Female				
	max IMT < 1.0		max IMT ≥ 1.0		*P*	max IMT < 1.0		max IMT ≥ 1.0		*P*
	n	(%)	*n*	(%)		*n*	(%)	*n*	(%)	
Blood pressure of ≥160/95 mmHg or medication	10	(47.6%)	15	(46.9%)	ns	40	(70.2%)	17	(65.4%)	ns
Orthostatic change of blood pressure ≥20 mmHg	3	(14.3%)	4	(12.5%)	ns	8	(13.8%)	10	(38.5%)	<0.05
Impaired glucose tolerance	1	(4.8%)	1	(3.1%)	ns	7	(12.1%)	0	(0.0%)	ns
Body mass index ≥25	5	(23.8%)	4	(12.5%)	ns	14	(24.1%)	6	(23.1%)	ns
Smoking habit	5	(23.8%)	5	(16.1%)	ns	0	(0.0%)	0	(0.0%)	ns
Alcohol intake	10	(47.6%)	6	(18.8%)	<0.05	1	(2.0%)	0	(0.0%)	ns
History of cerebral infarction	1	(4.8%)	2	(6.3%)	ns	5	(8.6%)	1	(3.8%)	ns
History of ischemic heart disease	1	(4.8%)	0	(0.0%)	ns	4	(6.9%)	1	(3.8%)	ns

Spearman's correlation analysis between each variable and the max IMT of the carotid artery were analyzed. There was a positive correlation between age and max IMT in males ($r = 0.44$), but there was no correlation in females. The analysis of all other variables was adjusted by age. There was a negative correlation between γ-GTP levels and max IMT ($r = 0.30$) in males, but not in females. Max IMT was also significantly correlated with serum homocysteine levels ($r = 0.29$) in the female group, but there was no significant correlation in the male group.

Table 4 shows the association of each variable with increased IMT by monovariate logistic analysis. In males, factors that were associated with increased IMT were aging, and not daily alcohol consumption. In contrast, in females, orthostatic change of blood pressure was significantly associated with increased IMT.

Table 5 shows odds ratios with significance for increased IMT in multiple logistic regression models. In males, only aging was independently associated with increased IMT. On the other hand, presence of

Table 4 Association with max IMT according to sex

	Monovariate logistic analysis		
	Odds ratio	95% CI	*P*
Male			
Age	1.32	1.09–1.61	<0.01
Hypertension	1.18	0.38–3.63	ns
Smoking habit	0.51	0.12–2.20	ns
Total cholesterol	1.01	0.99–1.03	ns
HDL cholesterol	1.02	0.98–1.07	ns
γ-GTP	1.00	0.98–1.01	ns
Orthostatic change of blood pressure ≥20 mmHg	0.92	0.18–4.63	ns
Body mass index	0.51	0.12–2.20	ns
Alcohol intake	0.22	0.06–0.80	<0.05
Homocysteine	0.90	0.79–1.03	ns
Hx of cerebral infarction	1.43	0.12–16.9	ns
Female			
Age	0.98	0.85–1.13	ns
Hypertension	0.71	0.26–1.94	ns
Total cholesterol	1.00	0.99–1.02	ns
HDL cholesterol	0.99	0.96–1.03	ns
Orthostatic change of blood pressure ≥20 mmHg	3.45	1.14–10.4	<0.05
Body mass index	1.07	0.35–3.23	ns
Homocysteine	1.14	0.99–1.31	ns
Hx of cerebral infarction	0.43	0.05–3.91	ns
Hx of ischemic heart disease	0.55	0.06–5.21	ns

95% CI, 95% confidence interval; Hx, history of.

orthostatic change of blood pressure was independently associated with increased IMT in females.

When age and sex were added as an explanation variable in multiple logistic analysis in both sexes, the presence of orthostatic change of blood pressure and no daily alcohol consumption were independently associated with increase of IMT in males.

Discussion

In this study, the association between carotid atherosclerosis and risk factors, verified in the middle-aged or younger elderly population, was examined in community-dwelling oldest subjects aged 80 years or older. These subjects covered 27.8% of the eligible community-dwelling old people over 80 years who were relatively healthy without severe disability. The prevalence of a history of cerebral infarction was 6.6% and that of ischemic heart disease was 4.4%. The frequency of carotid atherosclerosis is known to be different between males and females,[13] and there is a difference in the contribution of each risk factor level to carotid atherosclerosis between males and females, especially in the oldest group.[2] Taking this into account, we divided our subjects into two gender groups for the analyses.

Generally, in middle-aged people, it is known that aging, hypertension and orthostatic change of blood pressure, hyperlipidemia, glucose intolerance, obesity, smoking habit, alcohol consumption and hyperhomocysteinemia are risk factors for arteriosclerosis. However, in this study, which investigated community-dwelling oldest elderly people aged 80 years or older, the only independent associated factor that showed an increase of carotid artery IMT as an indicator of carotid atherosclerosis in males was aging.

It is suggested in this study that the risk factors other than aging do not have a large influence on progression of arteriosclerosis in the oldest old population, because many old males with those risk factors might have already died before they were 80 years old.

In females, on the other hand, the presence of orthostatic change of blood pressure was independently associated with an increased IMT of the carotid artery. There are some cross-sectional and longitudinal studies showing that orthostatic hypotension and hypertension are the important risk factors for cerebral infarction and ischemic heart disease.[14–17] Orthostatic change of blood pressure was independently associated with an increase of IMT of the carotid artery, especially in females. As orthostatic change of blood pressure was shown to be

Table 5 Association with max IMT according to sex

	Multivariate logistic analysis		
	Odds ratio	95% CI	*P*
Male			
Age	1.48	1.09–2.00	<0.05
Hypertension	1.88	0.34–10.37	ns
Smoking habit	0.89	0.10–8.19	ns
Total cholesterol	1.01	0.98–1.04	ns
HDL cholesterol	1.04	0.97–1.11	ns
γ-GTP	1.01	0.99–1.03	ns
Orthostatic change of blood pressure ≥20 mmHg	0.32	0.03–3.26	ns
Body mass index	0.61	0.08–4.87	ns
Alcohol intake	0.17	0.02–1.32	ns
Homocysteine	0.89	0.71–1.11	ns
Hx of cerebral infarction	0.63	0.02–18.20	ns
Female			
Age	0.92	0.77–1.10	ns
Hypertension	0.55	0.17–1.78	ns
Total cholesterol	1.01	0.99–1.02	ns
HDL cholesterol	1.01	0.98–1.05	ns
Orthostatic change of blood pressure ≥20 mmHg	8.34	2.12–32.85	<0.005
Body mass index	0.69	0.18–2.58	ns
Homocysteine	1.17	0.99–1.39	<0.1
Hx of cerebral infarction	0.23	0.02–2.97	ns
Hx of ischemic heart disease	1.46	0.12–17.39	ns

one of the risk factors of atherosclerotic diseases in previous longitudinal studies,[8,9] orthostatic change in blood pressure might be a better indicator of atherosclerosis than blood pressure levels themselves, which is easily modified by antihypertensive medication in the oldest elderly.

In general, it is known that high serum homocysteine levels are associated with carotid artery stenosis and with the severity of carotid artery lesions by ultrasonic tomographic examination.[3] An effect of homocysteine on platelet aggregation ability, fibrinolysis system, arterial endothelial cell disorder has been reported in vascular disorders, but its mechanism has not yet been clarified.[18–20] It is also known that hyperhomocysteinemia is one of the risk factors of atherosclerosis in addition to thromboembolism. This cross-sectional study supported the significant association between serum homocysteine levels and carotid arteriosclerosis in the oldest female population.

There are some reports that a small amount of alcohol consumption prevents atherosclerosis.[5,21] This study also revealed a negative association between alcohol consumption and IMT in the oldest male population.

In male elderly subjects aged 80 years or older, only aging was associated with arteriosclerosis, while orthostatic change of blood pressure was associated with an increase of IMT in the oldest female subjects. In general, progression of atherosclerosis is known to be slower in females than in males, and female subjects live longer than male subjects. Max IMT was also significantly lower in females than in males in this study. These results suggested that various risk factors are associated with atherosclerosis even in very old females. While in males, because of a more rapid progression of atherosclerosis, those who survived to more than 80 years old might have already been selected as extremely healthy ones and they might have been influenced to a lesser extent by various risk factors compared with females. This difference might be due to the influence of female hormones.[22,23] Estrogen has the effect of delaying atherosclerosis and it may be related to lipids.

Homma *et al.* examined the IMT and plaques in the carotid artery in subjects aged from young to over 100 years old. They reported that IMT size became greater with aging, but the numbers of plaques only increased with aging until 100 years, and after that, plaques decreased with aging.[24] In this study, IMT was associated with aging in males, while that was not demonstrated in females (Table 4).

A different association between risk factors and atherosclerosis may exist in oldest elderly subjects compared with younger people.

Although there were some study limitations, such as it being a cross-sectional study and having a small number of subjects, this study revealed gender differences in association with risk factors and carotid atherosclerosis by ultrasonic tomography.

In conclusion, the factors associated with carotid atherosclerosis in community-dwelling oldest elderly aged 80 years or older were sex, orthostatic change of blood pressure and alcohol intake. To determine definite risk factors for carotid atherosclerosis, further longitudinal studies including oldest elderly subjects will be needed.

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LETTER TO THE EDITOR

Community-dwelling elderly with chewing difficulties are more disabled, depressed and have lower quality of life scores

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Dear Editor,

Since 2006, the Japanese Ministry of Health, Welfare and Labor has recommended to screen swallowing and chewing abilities with the community-based comprehensive health-check examination to prevent disability of the elderly population. However, nationwide data of the actual condition of chewing disability in the community-dwelling elderly in Japan remains to be collected and be put in order. To address this important issue in a cross-sectional study in a community in Japan, we analyzed prevalence of elderly subjects with chewing difficulty associated with comprehensive geriatric assessment.

The study population consisted of 877 people aged 65 years and older (309 men, 568 women; mean age, 75.6 years; standard deviation, 6.7) living in Tosa, Kochi Prefecture, Japan (the response rate of questionnaire was 59.3% and the complete answering rate was 50.0% of the eligible population in the town). Using self-reported questionnaires, chewing difficulty was screened along with additional assessment of activities of daily living (ADL), depression and subjective quality of life (QOL) in community-dwelling elderly subjects in 2007. Each elderly subject was asked, "In the past 6 months, do you feel chewing difficulty when you eat hard foods?" to identify the deterioration in chewing ability on a yes/no basis.

For the assessment of basic ADL, the scores for seven items (walking, ascending and descending stairs, feeding, dressing, using the toilet, bathing, and grooming) were summed using a rating scale from 3 to 0 (3, completely independent; 2, need some help; 1, need help much; 0, completely dependent) into a basic ADL score (0–21).[1] For assessing higher-level ADL, each subject rated his/her independence in the Tokyo Metropolitan Institute of Gerontology Index of Competence (TMIG-IC).[2] This assessment 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).[3] Quantitative QOL were assessed using a 100 mm visual analog scale (worst QOL on the left end of the scale, best on the right) in the following five items: subjective sense of health, relationship with family, relationship with friends, financial satisfaction and subjective happiness.[4,5] SPSS statistical software package ver. 16.0 (SPSS, Chicago, IL, USA) was used for statistical analysis with a significance of $P < 005$.

Table 1 shows the comparison of scores in ADL, GDS-15 and subjective QOL between elderly subjects with and without chewing difficulty. The proportion of elderly who had chewing difficulty was 35.2% in this population. The elderly subjects with chewing difficulty were significantly older than those without chewing difficulty (77.5 vs 75.5 years). Mean scores in each ADL were significantly lower in the elderly with chewing difficulty than those without chewing difficulty after the adjustment for the effect of age. Mean score in GDS-15 was significantly higher and subjective QOL were lower in the elderly with chewing difficulty than those without. A significantly close association between chewing difficulty and ADL were consistent even after the adjustment for the effect of depression in multiple logistic regression analysis.

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Table 1 Comparison of activities of daily living, 15-Item Geriatric Depression Scale and quality of life between elderly with and without chewing difficulties

Chewing difficulties	With $n = 309$ (35.2%)	Without $n = 568$ (64.8%)	*P*-value
Age, mean ± SD	77.5 ± 6.9	75.5 ± 6.7	<0.001
Sex (male/female)	106/138	197/274	NS
ADL, mean ± SD			
Basic ADL score (range, 0–21)	18.9 ± 4.4	20.4 ± 1.6	<0.001*
TMIG-IC (range, 0–13)	9.4 ± 4.0	10.9 ± 2.7	<0.001*
Self-maintenance (range, 0–5)	3.9 ± 1.8	4.5 ± 1.1	<0.001*
Intellectual activity (range, 0–4)	2.7 ± 1.3	3.1 ± 1.1	<0.001*
Social role (range, 0–4)	2.8 ± 1.4	3.3 ± 1.1	<0.001*
Depression, mean ± SD			
GDS-15 score (range, 0–15)	6.2 ± 4.1	4.3 ± 3.6	<0.001
QOL, mean ± SD			
Sense of subjective health (range, 0–100)	46.3 ± 22.8	57.1 ± 20.8	<0.001
Relationship with family (range, 0–100)	70.2 ± 24.8	70.7 ± 20.3	<0.001
Relationship with friends (range, 0–100)	67.9 ± 25.9	77.5 ± 19.8	<0.001
Financial satisfaction (range, 0–100)	47.3 ± 24.6	49.9 ± 23.0	NS
Subjective happiness (range, 0–100)	55.4 ± 24.1	61.6 ± 21.3	<0.001

P-values were analyzed by Student's *t*-test. *After adjustment for the effect of age. ADL, activities of daily living; GDS-15, 15-Item Geriatric Depression Scale; NS, not significant; QOL, quality of life; SD, standard deviation; TMIG-IC, Tokyo Metropolitan Institute of Gerontology Index of Competence.

Our study revealed high prevalence of community-dwelling elderly who had chewing difficulty and also revealed the close association between chewing difficulty and ADL, depression and subjective QOL. Chewing ability is supposed to affect people's food selection.[6] Thus, these findings are considered to be particularly important for older people relevant to an influence on their nutritional states. Some previous studies show the relation between chewing ability and general health[7] and even mortality.[8,9] Although this study was based on a self-rated questionnaire, subjective chewing difficulty might be a very important indicator as Gordon *et al.* suggested that this might be a more reliable indicator than the quality of dentition itself.[10] The definition of "hard food" can be different among various foods and among several kinds of cooked conditions such as raw or boiled.[11] However, a subjective indicator could be useful, because it is supposed that how the hardness of foods is felt may differ from person to person in community-living elderly people.

In conclusion, community-dwelling elderly with chewing difficulties are more disabled, depressed and have lower QOL than those without. These findings suggest that, in considering the strategy for treatable subjects with chewing difficulties in the community, family physicians, dentists and care workers should be more aware that approximately 35% of community-dwelling elderly people have chewing difficulties deeply associated with lower ADL and QOL in the elderly population.

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