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Factors Associated With Cognitive Impairment From Investigation in Aged 60 and Older Community of a Town in Shimane Prefecture

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To investigate factors related to cognitive impairment among elderly residents of a town in Shimane Prefecture, we studied the cognitive status of 277 residents, aged 60 and older using Hasegawa's Dementia Scale-Revised（HDS-R）, and we assessed the residents' activities of daily living, instrumental ADL, current occupation, self-rated health, medical history, and health-related behaviors using a questionnaire completed by the residents. We examined the cross-sectional association of cognitive impairment with the subjects' answers to the questionnaire by logistic regression analysis. Among the 277 subjects, 20 were judged as cognitively impaired according to the HDS-R. In the self-rated health and disease categories, "falling risk," "absence of vigor"（apathy）, and "medical history of stroke" were significantly associated with cognitive impairment. We found that "absence of vigor" was significantly associated with cognitive impairment. It is important to screen for cognitive impairment in order to detect and prevent the development of dementia among the elderly.

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INTRODUCTION

The number of elderly citizens in Japan continues to increase, and the study and discussion of various aspects of this growing population（including physical and mental illnesses）are ongoing［1-3］. For example, dementia is of great concern as a complex disease whose incidence increases with age［4］. Another problem is apathy among the elderly. Apathy（sometimes called 'absence of vigor'）can be defined as a "simultaneous decrease in the behavioral, cognitive and emotional concomitants of goal-directed behavior due to loss of motivation" and, for clinical purposes, as a "lack of motivation that is not attributable to a diminished level of consciousness, cognitive impairment, or emotional distress"［5］.

In the present study, we estimated the incidence of cognitive impairment among the members of a senior citizens' club in Shimane Prefecture, and we cross-sectionally examined the association of cognitive impairment with activities of daily living（ADL）［6］, instrumental ADL（IADL）［7］, living arrangements, present occupation, social relationships, self-rated health, medical history, and health-related behaviors.

METHODS

Study population

We targeted the members of a senior citizens' club aged 60 and older living in H town in eastern Shimane Prefecture, Japan. The number of members was 595, and the study participants were recruited from among these members. Among the 287 participants, 277 consented to the survey after being informed of our objectives (Fig. 1). We gave these 277 individuals a questionnaire about their daily life for them to answer on their own. We measured their blood pressure and conducted a brief neurologic examination (September 2003 to October 2003). In 2003, the population of H town was about 14,000, and the proportion of those aged ≥ 65 years was 18.9%. Shimane University's Medical Ethics Committee approved our protocol.

Measures

The self-administered questionnaire consisted of 41 questions about age, gender, living arrangements, present occupation, ADL (eating, elimination, dressing, and bathing), IADL (ability to independently prepare meals, shop for groceries or clothes, perform housekeeping tasks, and manage finances and community mobility), social relationships (frequency of contact with children, friends, and neighbors), self-rated health (falling risk, memory complaint, absence of appetite, depressive symptoms, absence of vigor (apathy), and problems with insomnia), medical history (hypertension, diabetes mellitus, heart disease, stroke, liver disease, stomach ulcers, lumbago, arthralgia, neuralgia, fracture, benign prostatic hyperplasia, cataracts, anemia), medical treatments (antihypertensives, sleeping pills), exercise regimen, smoking history, frequency of laughing, and pleasure from activities. The epidemiologists involved in the present study determined that the ADL, IADL depressive symptoms, absence of vigor (apathy) and other factors should be included in the study questionnaire.

The functional status items included four ADL tasks (eating, elimination, dressing, and bathing) and five IADL tasks (preparing meals, shopping, cleaning one's room, managing money, and travelling outside the living district). We asked the subjects whether they were able to perform each task independently, with some help, or not at all. We categorized the responses into two groups: independently able versus partly or completely unable. Health parameters included self-rated health items, such as absence of vigor (apathy) and medical history. The questions were designed to be answered

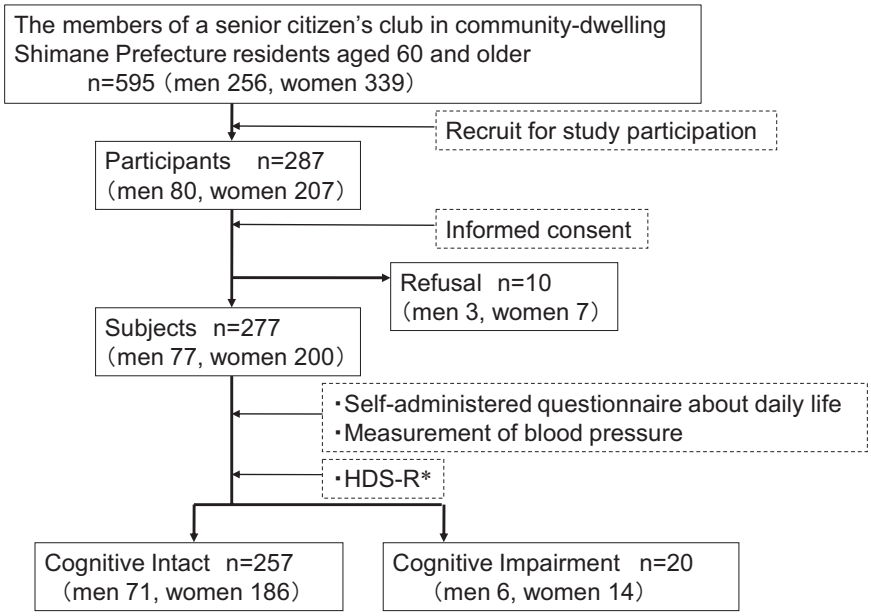

Fig. 1. Subject selection.
*HDS-R: Hasegawa's Dementia Scale-revised.

"Yes" or "No" so that elderly people could answer them quickly and easily. The questions were also designed so that they could be understood by even the cognitively impaired [8].

The subjects' cognitive status was measured by Hasegawa's Dementia Scale-Revised (HDS-R) [9] in which cognitive impairment is indicated by scores <20-21 and intact cognition >21 points out of 30 possible. The HDS-R is often used in Japan.

Statistical analyses

We used a logistic regression analysis to examine the cross-sectional association between cognitive impairment and each item on the self-administered questionnaire. We used a two-category indicator variable instead of the original variables for each questionnaire item. The adjusted odds ratios were assessed using logistic regression, by first controlling for age and gender and then including occupation. All factors were adjusted for age and gender as independent variables. Because farm work is considered more physically demanding than office work, the parameter "occupation" was divided into "farm work" and "non-farm work" and was used as an independent variable in the logistic regression.

Statistical analyses were conducted using SPSS software for Windows version 14.0 (SPSS Inc., Chicago, IL, USA). The number of subjects included in the individual analyses varied slightly due to some missing data because of loss of answers. Results were considered significant for p-value <0.05.

RESULTS

Fig. 1 illustrates the subject selection process. Of the 595 members of a senior citizens' club, 287 individuals volunteered for the study participation. Among the 287 participants, 277 (77 men and 200 women) consented to the survey after being informed of our objectives, making the response rate 46.6%. Ten club members did not consent to take part in the present study (the "Refusal group"), two members were hearing-impaired, one was visually impaired, and one member suffered from both hearing and visual impairments.

Table 1 summarizes the subjects' characteristics by age, gender, cognitive status, and health. The mean ages ± standard deviations were 73.6 ± 5.3 and 74.5 ± 6.1 years, respectively, for men and women. The subjects' ages ranged from 60 to 90 years. Among the 277 subjects, 20 (7.2%; 95% CI, 4.2-10.2) were rated by the HDS-R as cognitively impaired.

Table 2 lists the associations of cognitive function with ADL and IADL, and Table 3 summarizes the associations according to living arrangement, occupation, self-rated health, and diseases. ADL and IADL were not significantly associated with cognitive impairment by logistic regression analysis when adjusted for age and gender (Table 2). In the self-rated health and disease categories, "falling risk", "absence of vigor" (apathy), and "medical history of stroke" were significantly associated with cognitive impairment (Table 3). The remaining factors were not significantly associated with cognitive impairment.

Table 4 presents the association of cognitive impairment with age, gender, occupation, and other factors, adjusted for age and gender. The results indicated that "absence of vigor" (apathy) was significantly associated with cognitive impairment. The odds ratio was 3.3 (95% CI, 1.1-10.3).

DISCUSSION

As a first step toward assessing dementia, we estimated the proportion of cognitive impairment and estimated the factors related to cognitive impairment in an elderly population. Our results showed that apathy was significantly associated with cognitive impairment (odds ratio, 3.3; 95% confidence interval: 1.1-10.3) among the members of a senior citizens' club in Shimane Prefecture's residents aged 60 and greater (Table 4). Other studies have found that a healthy social network [10], physical activity [11], and non-physical activity [12] protect against cognitive impairment and dementia. Since a person's vigor influences these protective factors, the absence of vigor (apathy) may cause cognitive impairment and dementia through a loss of these protective factors.

We assessed the subjects' cognitive status using the HDS-R, which is widely used in Japanese epidemiological studies to screen for dementia [13-17]. Several distinguishing features of the HDS-R are: (i) it can be quickly and easily administered, (ii) it

Table 1. Characteristics of subjects by age, gender, cognitive status, and diseases

	Prevalence among total samples	
Variable	**n**	**%**
Total	277	100
Age		
60-69	64	23.1
70-79	165	59.6
80+	48	17.3
Gender		
Female	200	72.2
Male	77	27.8
Occupation		
Office work	1	0.4
Self-employed	8	2.9
Farm work	75	27.1
Homemaker	57	20.6
Others	7	2.5
Unemployed	128	46.1
Unknown	1	0.4
Cognitive status		
Intact cognition (HDS-R* $\geq$ 21)	257	92.8
Cognitive impairment (HDS-R* $\leq$ 20)	20	7.2
Medical history (including multiple answers. Number of each disease / Total number as follows.)		
Stroke	5	0.9
Heart disease	39	6.9
Hypertension	96	17.1
Diabetes mellitus	16	2.8
Liver disease	14	2.5
Gastric ulcer	37	6.5
Lumbago / Arthralgia	120	21.2
Neuralgia	33	5.8
Fracture	41	7.2
Prostatomegaly	9	1.6
Cataract	81	14.3
Anemia	16	2.8
Others	59	10.4

*HDS-R: Hasegawa's Dementia Scale-Revised

Table 2. Association of cognitive function and ADL and IADL ability

Outcome		Cognitive status		Odds ratio (95% CI*)
		Impaired	Intact	for cognitive impairment
ADL†				
Eating	Able	18	250	1.0
	Unable	2	6	4.7 (0.8–26.5)
Elimination	Able	20	251	1.0
	Unable	0	0	-
Dressing	Able	20	253	1.0
	Unable	0	1	-
Bathing	Able	20	257	1.0
	Unable	0	0	-
IADL‡				
Preparing meals	Able	14	186	1.0
	Unable	6	69	0.7 (0.2–2.2)
Shopping	Able	17	236	1.0
	Unable	3	21	1.4 (0.4–5.4)
Cleaning one's room	Able	15	236	1.0
	Unable	5	21	2.7 (0.8–9.3)
Managing money	Able	18	248	1.0
	Unable	2	9	2.9 (0.5–16.5)
Travelling outside of the living district	Able	18	229	1.0
	Unable	2	28	0.5 (0.1–2.4)

For the table, N = 277, except Eating (N = 276), Elimination (N=271), Dressing (N= 274), and Preparing meals (N = 275).

The table shows cross-sectional results.

* CI represents confidence intervals.

Odds ratios show 95% confidence intervals in parentheses, and adjusted for age and gender.

†ADL: activities of daily living

‡IADL: instrumental ADL

Table 3. Association of cognitive function and living arrangement, occupation, self-rated health, and diseases

Outcome		Cognitive status		Odds ratio (95% CI*)
		Impairment	Intact	for cognitive impairment
Living arrangement (Living alone)	Non-case	15	227	1.0
	Case	5	30	0.5 (0.1–1.4)
Occupation (Farm work)	Non-case	16	185	1.0
	Case	3	72	1.9 (0.5–7.0)
Self-rated health				
Falling risk	Non-case	12	221	1.0
	Case	8	35	3.3 (1.2–9.1)
Memory complaint	Non-case	5	69	1.0
	Case	15	184	0.9 (0.3–2.7)
Absence of appetite	Non-case	17	239	1.0
	Case	3	18	2.5 (0.6–9.9)
Depressibility	Non-case	16	236	1.0
	Case	4	21	3.0 (0.9–10.2)
Absence of vigor	Non-case	14	230	1.0
	Case	6	25	3.7 (1.3–10.9)
Sleeplessness	Non-case	16	209	1.0
	Case	4	46	1.1 (0.3–3.5)
Medical history				
Stroke	Non-case	18	254	1.0
	Case	2	3	8.0 (1.1–60.2)
Heart Disease	Non-case	16	222	1.0
	Case	4	35	1.3 (0.4–4.2)
Hypertension	Non-case	12	169	1.0
	Case	8	88	1.2 (0.5–3.1)
Diabetes mellitus	Non-case	19	242	1.0
	Case	1	15	1.2 (0.1–9.5)

For the table, N = 277, except Occupation (N=276), Falling risk (N = 276), Memory complaint (N = 273), Absence of vigor (N = 275), and Sleeplessness (N = 275).

* CI represents confidence intervals.

Odds ratios show 95% confidence intervals in parentheses, and adjusted for age and gender.

Case shows percentage of total inparentheses.

Table 4. Logistic regression results of the association between cognitive impairment and age, gender, occupation, and factors being associated with cognitive impairment by logistic regression adjusted for age and gender

Independent variables	Odds ratio (95% CI*)
Age	n.s.†
Gender(Men / Women)	n.s.†
Occupation (Farm work / Non-farm work)	n.s.†
Falling risk	n.s.†
Absence of vigor	3.3 (1.1–10.3)
Medical history of stroke	n.s.†

*CI: confidence intervals

†n.s.: not significant

has a high discrimination rate (the cut-off point for dementia is 21/20, and the sensitivity and specificity are 0.90 and 0.82, respectively), and (iii) it is not influenced by the subject's educational level [9, 18]. Thus, the HDS-R is a suitable and well-established screening tool for studies such as ours. However, it is not suitable for individuals with vision or hearing impairments because it is difficult for the interviewer to communicate with them. Despite its limitations, the HDS-R has been used to assess cognitive status in Japanese epidemiological studies that have screened populations for dementia [13-17].

In a cross-sectional study, Dodge and colleagues [19] found that the severity of cognitive impairment was associated with disability in each ADL-IADL task, with larger effects shown for ADL items. In the present study, in contrast, ADL and IADL abilities were not significantly associated with cognitive impairment. The prevalence of ADL disabilities was very low for "eating" in our study population and near zero for the other ADL, and the prevalence of IADL disabilities was low except for "preparing meals" (Table 2). We speculate that almost all of the subjects in the present study were relatively active.

Stroke, heart disease, hypertension, and diabetes mellitus are known to be risk factors for dementia [14, 20-23]. However, in our study, none of these diseases was significantly associated with cognitive impairment (Table 3). As diabetes was reported as a risk factor for dementia in two Japanese studies - the Hisayama study [14] and a study by Kimura and colleagues [22] - it will be necessary to reanalyze our findings through an examination of levels of blood glucose levels and HbA1c.

Absence of vigor (apathy) has considered diverse health conditions including stroke, Parkinson's disease, dementia, malnutrition and depression. In clinical studies of stroke and dementia, apathy has been associated with advancing age, deficits in ADL, lower global cognitive function, poor verbal fluency, reduced attention and speed of information processing, and premorbid neuroticism. In the present study, five subjects had a history of stroke and one was characterized as apathetic. However, because of the sample size, no definitive conclusions can be drawn.

In this paper, it has been reported by the survey data in 2003, almost ten years ago. Elderly patients with dementia will become more increasing with aging population. There is a real need for understanding the data of temporal changes, helping prevent dementia for community-dwelling elderly. Therefore, we think that it is very important to perform further discussion based on almost ten years ago and today on the members of a senior citizens' club in Shimane Prefecture.

We note some limitations of our present study. First, since this was a cross-sectional study, a causal relationship could not be determined. For this rea-

son, we could not determine whether "absence of vigor (apathy) contributes to cognitive impairment" or vice versa [24]. To examine this causal relationship, we plan to conduct a longitudinal cohort study in the future.

Second, the small number of subjects may have introduced some bias. Third, since only a limited sampling area and a particular population in Shimane Prefecture, Japan was used and the response rate was not high (46.6%), we cannot claim that our data represent the general population. We speculate that the low response rate occurred because some of the senior citizens' club members had been admitted to a geriatric healthcare facility and were thus not able to participate. We need to conduct our next study using a more statistically significant sample size.

In conclusion, our cross-sectional analysis of factors associated with cognitive impairment in elderly individuals indicated that "absence of vigor" (apathy) was significantly associated with this condition. Our findings highlight the importance of screening for cognitive impairment in order to detect and prevent the development of dementia among the elderly.

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