原　著

Factors associated with the survival of community-dwelling elderly people whose demented status is overlooked: six-year follow-up in an urban city in Japan

都市在宅高齢者における認知症見逃し群の生存関連要因 6 年間の追跡調査より

Chisako Yamamoto[1)] , Tanji Hoshi[2)]
山本 千紗子[1)]，星 旦二[2)]

1）Faculty of Nursing, Chukyogakuin University
2）Department of Urban Environment, Tokyo Metropolitan University

1）中京学院大学　看護学部
2）首都大学東京　都市環境学部

Abstract

The purpose of this study was to search for factors associated with the six-year survival of elderly people in an urban city in Japan whose demented status was overlooked. From the September 2001 baseline data of the complete survey of community-dwelling elderly people aged 65 years and older (the elderly), the number of analysis subjects was 13,058, and 12,147 survivors were followed up for 6 years. We used the Tokyo Metropolitan Institute of Gerontology (TMIG) Index of Competence to measure the functional capacity of elderly people based on five activities of daily living that included instrumental and intellectual activities: making bank deposits and/or withdrawals, filling out forms/documents such as pensions forms, reading books/newspapers, shopping, and food preparation.

Among these five activities, we defined the first three, which involve language and cognition, as intellectual activities and used them to derive cognitive scores. We divided the elderly into the family-recognized demented (FRD) and the non-demented (ND), and we further divided the latter into higher and lower scoring-cohorts (ND-HSC and ND-LSC). Our previous study[1)] showed that people in the ND-LSC were equivalent to those whose demented status is overlooked. We performed Cox proportional hazards regression analysis (Cox regression analysis) to calculate hazard ratios (HRs) for death (or risk of death) in the ND-LSC. The results showed gender differences in the factors associated with six-year survival: in men, these were inabilities in making bank deposits/withdrawals, reading books/newspapers, shopping and food preparation, and in women, these were shopping and food preparation only. The results suggested that the declining status of these activities could be useful guides for family caregivers in early detection of demented status and prognosis for survival, and that they could provide significant information for family-support programs.

抄録

2001 年 9 月実施の 65 歳以上都市在宅高齢者調査の分析対象者 13,058 人のうち、6 年間の生存状況を追跡できた 12,147 人について、老研式活動能力指標を活用し、日常生活の手段的自立と知的能動性を含む 5 活動「預貯金出入・

年金等書類記入・新聞書物を読む・買い物・食事の用意」を中心に、ベースラインの3年後および6年後の追跡調査結果から、生存関連要因を探索した。文字を用いる必要のある「預貯金出入・年金等書類記入・新聞書物を読む」を知的3活動として得点化し、家族が同居高齢者を認知症と認識している群（家族認識認知症群）以外の、いわゆる健常と見なされている群（非認知症群）を、知的活動高得点群と低得点群に分けた。非認知症群の知的活動低得点群は、認知症を見逃されている群に等しいことが、先行研究で明らかにされている[1)]。非認知症・低得点群について、Cox回帰分析にて死亡ハザード比(HR)を求めた。結果は、非認知症・低得点群に共通の生存関連要因には性差が見られた。男性特有の要因は「預貯金の出入ができない・新聞書物を読まない・買い物ができない・食事の用意ができない」であったが、女性では「買い物ができない・食事の用意ができない」のみであった。性差が見られるこれらの活動能力の低下状態は、認知症の早期発見と生存予後に関する家族用指標となり、地域家族支援プログラムの有用な情報となりうることが示された。

Key words：Japanese elderly in an urban city, lower scoring-cohort in the non-demented, factors associated with six-year survival, gender differences, guide for family caregivers in early detection of demented status and prognosis for survival.

キーワード：都市在宅高齢者、知的活動低得点群、6年生存関連要因、性差、家族用認知症・生存予後判断指標

Ⅰ．INTRODUCTION

According to the census of October 1, 2010, the total population of Japan was 128.06 million2), and the aging rate of 23.1% was estimated to rise to 40.5% by 2055. Thus, the size of the elderly population in Japan as a whole is expected to increase. The population aged 75 years and older (late elderly) is expected to exceed the population of the elderly people between 65 and 74 years (early elderly) in 2017 and will continue to increase thereafter[3)]. Since age is a risk factor for dementia, the prevalence of dementia will increase among the late elderly[4)]. Based on the 2002 data of the primary insured elderly who were approved for long-term care, the Ministry of Health, Labour and Welfare estimated the number of people with dementia to be 1.49 million in 2002, 2.5 million in 2015, 3.23 million in 2025, and 3.76 million in 2035, with a peak at 3.85 million in 2040 and then a decrease to 3.78 million in 2045[5)].

With a rapidly increasing aging rate, valuing “creation of a society where people continue living comfortably even after suffering from dementia”, the Japanese government implemented a program entitled Nationwide Caravan to Train One Million Dementia Supporters in 2005[6)] as part of the Ten-Year Strategy to Provide People Knowledge on Dementia and to Create a Healthy Community. A number of preventive measures against dementia were taken by local governments, synchronizing with national government policies. For example, Tama City, Tokyo, has been sending lecturers even to small groups of five participants or more[7)]. Wards in Yokohama City have been offering lectures such as How to Prevent Dementia, Understanding Dementia and Assisting the Elderly with Dementia, Key to Slowing Brain-aging[8)]. They attained the goal of one million dementia supporters in late May 2009[9)]. They projected to increase this number to 4 million by 2014[10)]. Under an Urgent Project to Improve Quality of Life and Medical Service for People with Dementia, they have been promoting dementia education in primary and secondary schools to increase understanding and supportive action for people with dementia and their family caregivers[10)].

Knowledge and findings on dementia based on vertical and longitudinal studies are significant in dementia education programs. It is essential for analytical studies to focus on gender differences to provide useful knowledge, since statistical figures differ by gender, the best example of which is average life expectancy. A previous study showed a great gender difference in the prognosis of elderly people with dementia[11)]. Since female gender is a risk factor of dementia[12)], the prevalence of dementia in elderly women aged 85 years and older is approximately twice as high as that in elderly men,

both in Japan (11.3% in men and 22.9% in women[4]) and in the United States (12.1% in men and 20.3% in women[13]).

In a three-year follow-up from the 2001 baseline, Yamamoto[14] clarified that the hazard ratio (HR) for death in the family-recognized demented (FRD), as a whole, among the community-dwelling elderly was 1.401 (p=0.016, 95% confidential interval [CI] =1.066-1.858). When analyzed by gender, it was significant only in men, whose HR for death was 2.051 (p=0.004, 95% CI=1.251-3.364) and in women was 1.092 (p=0.617, 95% CI=0.774-1.540). Yamamoto and Hoshi[15] showed that family caregivers observed the elderly to be demented when they perceived their inability to make bank deposits and/or withdrawals, to fill out forms/documents such as pensions forms and to read books/newspapers. The results were common both in men and women and also in the two sets of data taken in an urban city (data collection in 2001, 13,067 analysis subjects) and in ten rural towns and villages from Northern Hokkaido to Southern Kyushu (data collection from 1998 to 1999, 12,757 analysis subjects). Inability in food preparation was characteristic in women and common in the two sets of data. It was also clarified that among the non-demented (ND) elderly, which were defined as elderly people who were not FRD, there were people whose demented status was overlooked: 6.3% in men and 9.3% in women[1], and their cognitive scores were low. These findings showed that detailed studies on dementia should be done, focusing not only on the known demented status of the elderly but also on the levels of intellectual activities in the ND. Knowledge and information based on findings would be significant when the elderly themselves and their family caregivers could apply it to practical use for early detection of demented status in everyday life.

The purpose of this study was to search for factors associated with the six-year survival of urban community-dwelling elderly people whose demented status is overlooked, from among five activities of daily living including instrumental and intellectual activities.

Ⅱ. METHODS

1. Baseline and follow-up surveys

Baseline data were derived from the Complete Survey of the Community-dwelling Elderly of 65 Years and Older compiled in September 2001 in City A in the Metropolis. Self-administered questionnaires were mailed to all elderly subjects. Responses were returned by mail by the addressees themselves or by proxies when the addressees were unable to respond for reasons such as absence, hospitalization, cognitive impairment or demented status. Questionnaires consisted of 44 items, including fundamental attributes, respondents (addressee himself or herself, or proxy), family members, self-perceived health, activities of daily living, instrumental activities, socio-economic status, long-term care insurance, and others. This study was not based on definite diagnoses but on respondent data compiled in 2001.

The respondents in the 2001 survey were followed up for six years and their survival was investigated in September 2004 and October 2007. During the six-year follow-up period, 915 people moved to other cities and 1,899 died. In both 2004 and 2007, total of 12,147 individuals (5,665 men and 6,482 women) were followed up.

2. Study population

1) Subjects

Questionnaires were mailed to all elderly people aged 65 years and older living with a spouse and/or child's family (n=16,462), and 13,195 people responded by mail (response rate 80.2%). After inappropriate responses were excluded, the number of analysis subjects was 13,058 (6,010 men and 7,048 women), among which 11,529 addressees (5,450 men and 6,079 women) responded for themselves, and 1,529 responses were by proxies (560 men and 969 women, who were all family members) (see Table 1). We defined those whose family caregivers responded as proxies due to the addressee's demented status or cognitive impairment as the FRD, and the others as the ND. The number of FRD was 239 (67 men and 172 women), and their average age (and standard deviation [SD]) was 80.6 ± 9.2 years in men and 84.7 ± 7.7 years in women. The number of ND was 12,819

(5,943 men and 6,876 women) and their average age (and SD) was 72.0 ± 6.1 years and 73.1 ± 6.7 years in men and women, respectively (see Table 2).

2) Outlines of the study field

The study field, City A, is located in the suburbs of metropolitan Tokyo. According to the 2005 census, which reflects the background of this study from 2001 to 2007, it had a population of 146,587, and consisted of 62.9 thousand households, among which 59.5% was nuclear families which include households of a couple only, households of a couple with their child(ren) and households of one parent with his or her child(ren), 35.7% was one-person households and 4.8% other households. The largest proportion, 80.0%, worked in tertiary industry, the service industry, in which 58.4% worked in information technology, medicine, care and welfare service, education including supplementary private schools, government and local offices, and other professions that were difficult to classify.

The aging rate in 2005 was 15.8%, which was lower than the national average of 20.2%. This was probably because approximately 60% of the population lived in the so-called New Town, in which the population aged 45 to 54 years occupied the largest proportion[16]. The aging rate rose to 19.2% as of January 2, 2009; however, it was still lower than the national average of 22.8% in 2009. City A is possibly a younger city in Tokyo metropolitan areas.

3. Analytical methods

To search for factors associated with survival, we used the Tokyo Metropolitan Institute of Gerontology (TMIG) Index of Competence. Having partly modified it, we applied five activities of daily living, including instrumental and intellectual activities. We measured functional capacity by activities including making bank deposits and/or withdrawals, filling out forms/documents such as pensions forms, reading books/newspapers, shopping, and food preparation, and cognitive scores by the first three activities, which require language and cognition. We allocated one point to a positive answer. Scores ranged from 0 to 3 points. In association of the status of the FRD and cognitive scores, we calculated areas under the

Table 1. Respondents at Baseline

		Age-group					
		65-69	70-74	75-79	80-84	85+	Total
Men	Addressees	2,429	1,541	836	418	226	5,450
		44.6	28.3	15.3	7.7	4.1	100.0%
	Proxies	163	122	85	90	100	560
		29.1	21.8	15.2	16.1	17.9	100.0%
Women	Addressees	2,423	1,617	1,108	586	345	6,079
		39.9	26.6	18.2	9.6	5.7	100.0%
	Proxies	157	164	195	154	299	969
		16.2	16.9	20.1	15.9	30.9	100.0%

Table 2. Family-recognized Demented(FRD) and the others (the Non-demented (ND)) at Baseline

		Age-group					
		65-69	70-74	75-79	80-84	85+	Total
Men	Family-recognized Demented (FRD)	8	15	5	11	28	67
		11.9	22.4	7.5	16.4	41.8	100.0%
	Non-demented (ND)	2,584	1,648	916	497	298	5,943
		43.6	27.7	15.3	8.4	5.0	100.0%
Women	Family-recognized Demented (FRD)	8	11	23	35	95	172
		4.7	6.4	13.4	20.3	55.2	100.0%
	Non-demented (ND)	2,572	1,770	1,280	705	549	6,876
		37.4	25.7	18.6	10.3	8.0	100.0%

receiver operator characteristic curves (AUC) and determined the highest AUC, i.e., the cut-off point of 0-1/2-3. We defined the 0-1 scoring cohort as the lower-scoring cohort (LSC) and the 2-3 scoring cohort as the higher-scoring cohort (HSC). We further divided the ND into an LSC (ND-LSC) and an HSC (ND-HSC).

To explore the relationship between survival and the five capacities as independent variables, we used a Cox proportional hazards model (Cox regression) to calculate hazard ratios (HRs) for death (or risk of death) by gender three and six years after baseline. Adjustment factors were age, ND-LSC and FRD. The stepwise method was applied to the five capacities.

4. Ethical procedures

The University made an agreement with City A to protect personal data. The University Committee on Ethical Issues approved the surveys and the study. Individuals were all numbered without names, and an alternative "I don't want to answer." option was provided, so that we assumed all respondents to have consented to the surveys.

Ⅲ. RESULTS

Table 3 shows HRs for death in the ND-LSC, i.e., those whose demented status is overlooked. The ND-LSC itself was not significant in men or women for three- and six-year survival.

In men HRs from highest to lowest in three-year survival were inabilities in shopping (HR=2.368, p＜0.001, 95% CI=1.650-3.399), reading books/newspapers (HR=1.894, p＜0.001, 95% CI=1.334-2.688), making bank deposits/withdrawals (HR=1.636, p=0.014, 95% CI=1.106-2.419) and food preparation (HR=1.433, p=0.011, 95% CI=1.085-1.892); those in six-year survival were inabilities in shopping (HR=1.936, p＜0.001, 95% CI=1.481-2.531), reading books/newspapers (HR=1.510, p=0.003, 95% CI=1.151-1.982), food preparation (HR=1.460, p＜0.001, 95% CI=1.209-1.763) and making bank deposits/withdrawals (HR=1.358, p=0.044, 95% CI=1.008-1.829). In women, HRs from highest to lowest in three-year survival were inabilities in shopping (HR=2.426, p＜0.001, 95% CI=1.576-3.735) and food preparation (HR=1.889, p=0.003, 95% CI=1.240-2.879); those in six-year survival were inabilities in shopping (HR=1.910, p＜0.001, 95% CI=1.413-2.581), making bank deposits/withdrawals (HR=1.507, p=0.027, 95% CI=1.049-2.165) and food preparation (HR=1.383, p=0.058, 95% CI=0.989-1.943).

The characteristic factors in men were inabilities in making bank deposits/withdrawals and reading books/newspapers both in three- and six-year survival, and those in women were inabilities in making bank deposits/withdrawals and filling out forms/documents such as pensions forms in six-

Table 3. Result of Cox Regression (1):
Lower-scoring cohort in ND (ND-LSC) as an adjustment factor (FRD excluded)

		3-year survival			6-year survival		
		HR	*P*-value	95%CI	HR	*P*-value	95%CI
Men	Age*	1.083	0.000	1.070-1.096	1.096	0.000	1.086-1.105
	ND-LSC*	0.833	0.408	0.540-1.284	1.043	0.803	0.749-1.453
	Inability in shopping	2.368	0.000	1.650-3.399	1.936	0.000	1.481-2.531
	Inability in food preparation	1.433	0.011	1.085-1.892	1.460	0.000	1.209-1.763
	Inability in making deposits/withdrawals	1.636	0.014	1.106-2.419	1.358	0.044	1.008-1.829
	Inability in reading books/newspapers	1.894	0.000	1.334-2.688	1.510	0.003	1.151-1.982
Women	Age*	1.062	0.000	1.045-1.080	1.084	0.000	1.072-1.097
	ND-LSC*	1.358	0.104	0.939-1.965	0.903	0.650	0.580-1.404
	Inability in shopping	2.426	0.000	1.576-3.735	1.910	0.000	1.413-2.581
	Inability in food preparation	1.889	0.003	1.240-2.879	1.383	0.020	1.051-1.820
	Inability in making deposits/withdrawa	—	—	—	1.507	0.027	1.049-2.165
	Inability in filling out forms/documents	—	—	—	1.386	0.058	0.989-1.943

Note. * Ajustment factor, HR: hazard ratio (for death), CI: confidential interval,
—: excluded before the last step ($P \geqq 0.10$).

year survival. The common factors both in men and women and both in three- and six-year survival were inabilities in shopping and food preparation.

For further study, we also performed Cox regression analysis, in which the FRD were input as an adjustment factor and the ND-LSC were excluded. Table 4 shows HRs for death in the FRD. The HR in FRD men and the three-year survival was 0.566 (p=0.049, 95% CI=0.321-0.999). The HR in FRD women and the six-year survival was 1.390 (p=0.050, 95% CI=1.000-1.931). An opposite tendency of risk of death was shown. A common factor both in men and women and both in three- and six-year survival was inability in shopping. HRs for three-year survival were 2.680 (p<0.001, 95% CI=1.769-4.060) in men and 2.080 (p=0.004, 95% CI=1.256-3.446) in women; those for six-year survival were 2.035 (p<0.001, 95% CI=1.484-2.790) in men and 2.464 (p<0.001, 95% CI=1.862-3.261) in women. HRs for death for inability in shopping were more than twice as high both in men and women and also both in three- and six-year survival. In the case of inability in food preparation, the HR in women for three-year survival was 2.070 (p=0.008, 95% CI=1.214-3.528) and that in men for six-year survival was 1.399 (p=0.001, 95% CI=1.150-1.702).

Ⅳ. DISCUSSION

1. Factors associated with survival in the elderly whose demented status is overlooked (ND-LSC)

1) Characteristic factors in men

This study showed that inabilities in reading books/newspapers and making bank deposits/withdrawals were characteristic factors in men. Yamamoto and Hoshi clarified that family caregivers regarded the elderly as demented when they perceived inabilities in making bank deposits/withdrawals and reading books/newspapers, and that the results were the same in rural and urban areas and in men and women[15]. We analyzed the urban data only in this study, since there were no follow-up rural data. As described in Outlines of the study field, 80.0% worked in the tertiary industry, in which 58.4% worked in information technology, medicine, care and welfare service, education, government and local offices; most of community-dwelling elderly people over 65 years retired from such occupations. Lack of active cognitive activities after retirement might possibly accelerate the onset of dementia and advance the demented status, thus worsening survival. This needs further study; however, declining capacities of the two activities in men can possibly be a survival and prognosis guide for family caregivers to use, since family caregivers can easily observe them in daily life.

Table 4. Result of Cox Regression (2):
Family-recognized demented (FRD) as an adjustment factor (ND-LSC excluded)

		3-year survival			6-year survival		
		HR	*P*-value	95%CI	HR	*P*-value	95%CI
Men	Age*	1.101	0.000	1.085-1.117	1.108	0.000	1.098-1.119
	FRD*	0.566	0.049	0.321-0.999	0.939	0.761	0.627-1.407
	Inability in shopping	2.680	0.000	1.769-4.060	2.035	0.000	1.484-2.790
	Inability in food preparation	1.296	0.088	0.962-1.745	1.399	0.001	1.150-1.702
	Inability in making deposits/withdrawals	1.483	0.068	0.971-2.264	1.319	0.091	0.957-1.818
Women	Age*	1.074	0.000	1.053-1.095	1.100	0.000	1.086-1.114
	FRD*	1.144	0.593	0.697-1.878	1.390	0.050	1.000-1.931
	Inability in shopping	2.080	0.004	1.256-3.446	2.464	0.000	1.862-3.261
	Inability in food preparation	2.070	0.008	1.214-3.528	—	—	—

Note. * Ajustment factor, HR: hazard ratio (for death), CI: confidential interval,
—: excluded before the last step ($P \geqq 0.10$).

2) Common factors in men and women

The common factors in men and women were, first, inability in shopping, and, second, inability in food preparation in three- and six-year survival in ND-LSC men and women. Family caregivers can easily perceive such declines in capacity in everyday life, especially in elderly women aged 65 years and older whose major role in the households seemed to be housekeeping. Capacities of shopping and food preparation can also be a guide for family caregivers to use. Thus, there were four gender characteristic in men and two in women.

3) Progression of overlooked dementia suggested

Shopping and food preparation require executive functions. They describe a set of cognitive abilities that are largely carried out by prefrontal areas of the frontal lobe, whose impairment is related to demented status. The components of executive functions are setting a goal, planning, initiating a plan, and achieving a goal effectively. According to the DSM-IV (Diagnostic and Statistical Manual of Mental Disorders, the 4th Edition) which provides standards to diagnose Alzheimer's disease, a patient should be diagnosed as demented when he or she has a memory disorder and impairment of at least one executive function[17]. It is said that there is no definite standard of diagnosis and that the patient should be diagnosed as cognitively impaired while the patient's executive functions are obviously more declined than before[18].

The result that inabilities in shopping and food preparation in the ND-LSC increased the HR for death suggested that the ND-LSC was equivalent to the cohort whose demented status was overlooked, as previously reported by Yamamoto and Hoshi[1]. It is also estimated that the overlooked demented status was already advanced, since impairment in executive functions is hard to observe in the early stage of dementia[18]. Regarding declining capacities in shopping and food preparation in the elderly as symptoms of aging, family caregivers neither think of dementia nor consult a specialist. They overlook and neglect the demented status of the elderly. Thus, especially the ND-LSC elderly have a greater risk of progression of their demented status. Early detection, diagnosis and treatment of dementia are essential, not only to enhance and maintain the quality of life (QOL) of the elderly in late life, but also to decrease the burden of long-term care of family caregivers and increase their QOL. Knowledge that decline of executive functions is a sign of dementia and associated with survival should be prevalent among family caregivers.

2. A common factor both in those whose demented status is overlooked (ND-LSC) and the family-recognized demented (FRD)

In spite of gender differences, follow-up years and two-way Cox regressions analyses, it was inability in shopping that was common in all cases, with an increased HR for death ranging from 1.813 to 2.680. In other words, the elderly who had become unable to shop by themselves had higher risk of death. A previous study clarified that the ND-LSC elderly group was equivalent to those whose demented status was overlooked[1] and this study further showed that the ND-LSC had the same factor and a rather high HR in inability in shopping as the FRD. This also suggests that the ND-LSC elderly group was equivalent to those whose demented status was overlooked.

3. Advanced age of the FRD presumed

Mortality statistics in Japan do not include dementia and Alzheimer's disease, but in US mortality statistics, Alzheimer's disease was the 14th leading cause of death among fifteen major diseases in 1995, and it was the 8th leading cause of death in elderly people 65 years and older[19]. It rose to the 8th leading cause of death in 2002 and to the 6th leading cause of death in 2007[20]. While death by cerebral stroke and cardiovascular disease decreased by 20% and 13%, respectively, Alzheimer's disease increased by 66%[13]. Since elderly people affected by severe Alzheimer's disease have a greater risk of pneumonia due to malnutrition and dysphagia, their cause of death is often classified as pneumonia[13]. In this sense, Alzheimer's disease as a cause of death might be higher. Many previous studies reported that the average survival after onset of dementia was

approximately five years. Larson et al.[21] followed 23,000 elderly persons 60 years of age and older and reported that 521 persons were diagnosed with Alzheimer's disease and that the average survival was 4.2 years in men and 4.6 years in women (4.5 years in total). Xie et al.[22] followed 13,004 elderly persons 65 years of age and older for 14 years, from 1992 to 2005, and reported that of 438 demented persons, 356 died , and the average survival after developing disease was 4.1 years in men and 4.6 years in women (4.5 years in total). Sugai reported that the average survival of people with Alzheimer's dementia was 6.1 years and that in people with vascular dementia was 5.5 years, and that dementia was a factor that increased the HR for death[23].

As a reference, we also performed Cox regression analysis to clarify the common factor in every case. The HR for death in the FRD was increased only in the case of the ND-LSC excluded and in women for six-year survival. In men, for three-year survival it was reduced by 44%. The reason is presumed to be the advanced age of the analysis subjects. A previous study[1] reported that the average age at death in the ND-HSC was 80.0 years in men and 83.1 years in women in 2007, a follow-up year. Since the nationwide average age in 2007 was 79.19 years in men and 85.99 years in women, ND-LSC men lived 0.8 years longer and women's lives were 2.9 years shorter. The average age of the FRD was 85.6 years in men and 90.1 years in women, which was 5.6 years in men and 7.0 years in women, longer than that in the ND-HSC.

4. Findings as guides for early detection of demented status

As it is well known that there are gender differences in dementia statistics, we further analyzed our data and showed that there were also gender differences in capacities in daily activities associated with prognoses. We also showed that the HRs for death differed greatly, even in the ND, depending on the decline in intellectual activities. We must perform studies on dementia focusing not only on gender differences but also on levels of intellectual activities. This would provide significant suggestions for prevention and education programs on dementia.

We must offer family caregivers useful knowledge based on the findings of our studies. Although it is necessary that the elderly themselves are sensitive to their own decline in such executive functions and consult a specialist early, it is most essential that family caregivers can detect the elderly demented status at the earliest stage possible. Family caregivers can easily perceive inabilities in the daily capacities described above in everyday life. As a previous study reported, their perception and judgment of the demented status is appropriate[24]. In addition, they need neither special training nor expenses in detection of demented status. Findings of this study can be guides for early detection of demented status for family caregivers. Offering them findings as further information could be a part of a useful and significant family-support program.

Ⅴ. CONCLUDING REMARKS

Among five activities of daily living, including instrumental and intellectual activities, the common factor increasing the HR for death for three- and six-year survival in ND-LSC was, first, inability in shopping for both men and women and, second, inability in food preparation. Gender characteristic factors in men were inability in reading books/newspapers and making bank deposits/withdrawals. Since knowing the prognoses of dementia is essential for planning long-term care programs and implementation of treatment[25], these findings should be applied as guides for early detection of demented status for family caregivers to use. Once they observe declining capacities in some activities mentioned above, family members must seriously accept these declines and promptly and properly take action in treating them.

Our results showed that the status of FRD men did not increase the HR for death. One of the reasons would be, as described in the above discussion, that the average age at death for ND-HSC was younger than that for FRD; however, it is our future research topic to clarify the reason for this in association with causes of death, rank of long-term care insurance,

annual income, educational background, lifestyle, and other factors to support the findings of this study.

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