Table 2
Comparison of the risk of dementia and mild cognitive impairment between quick-responders and delayed-responders

	Quick-responders ($n = 1619$)	Delayed-responders ($n = 225$)	Unadjusted models			Adjusted models		
	No. (%)	No. (%)	OR	95% CI	p value	OR	95% CI	p value
Dementia	60 (3.7)	19 (8.4)	2.40	1.40–4.10	0.001**	2.27	0.96–5.36	0.062
Age 65–74 years	13 (1.4)	2 (1.8)	1.31	0.29–5.90	0.723	1.72	0.23–13.12	0.599
Age 75 years or over	47 (6.8)	17 (14.7)	2.36	1.30–4.27	0.005**	2.42	0.92–6.39	0.075
MCI–1SD below	567 (38.9)	67 (47.2)	1.40	0.99–1.98	0.055	1.44	0.99–2.10	0.055
Age 65–74 years	301 (34.4)	37 (50.7)	1.96	1.21–3.17	0.006**	2.27	1.37–3.77	0.002**
Age 75 years or over	266 (45.7)	30 (43.5)	0.91	0.55–1.51	0.726	0.83	0.47–1.46	0.513
MCI–1.5SD below	276 (18.9)	28 (19.7)	1.05	0.68–1.62	0.822	1.19	0.75–1.87	0.458
Age 65–74 years	161 (18.4)	14 (19.2)	1.05	0.57–1.93	0.869	1.33	0.71–2.51	0.374
Age 75 years or over	115 (19.8)	14 (20.3)	1.03	0.56–1.92	0.917	0.97	0.50–1.88	0.924

For mild cognitive impairment (MCI) analyses, 1,457 quick-responders and 142 delayed-responders were included.
**$p < 0.01$.
Adjusted odds ratios (ORs) were calculated after controlling for age, sex, years of education, Geriatric Depression Scale (GDS) and Nishimura's Activities of Daily Living (ADL). CI = confidence interval, SD = standard deviation.

3.3. Dementia

As a result of the consensus diagnosis meeting, 60 quick-responders were identified as having dementia. We estimated the prevalence of dementia among quick-responders to be 3.7% (60/1,619). On the other hand, the second phase showed that 19 of the 225 subjects (8.4%) had dementia. Thus, the prevalence of dementia was significantly higher for delayed-responders than quick-responders ($p = 0.001$). In total, we estimated the overall prevalence of dementia in our community samples to be 6.5% $((60 + 19 + 44)/(1,619 + 225 + 44))$, which is similar to the estimated dementia prevalence of 7.3% for the whole of Japan as of 2001 (Table 2).

3.4. Mild cognitive impairment

Among the samples with complete data for cognitive assessment, 1,457 quick-responders and 142 delayed-responders without loss of information on subjective memory complaint were included for this analysis. Using 1 SD and 1.5 SD cut-off values, 567 and 276 of 1,457 (38.9%, 18.9%) quick-responders and 67 and 28 of 142 delayed-responders (47.2%, 19.7%) were indicated to have some type of MCI, respectively. In order to examine the results more thoroughly, we used logistic regression analysis. As shown in Table 2, the rate of MCI (1 SD cut-off) was significantly higher for delayed-responders aged 74 or younger, even after controlling for age, sex, years of education, GDS score and ADL (adjusted odds ratio [OR] = 2.27, 95% confidence interval [CI]: 1.37–3.77, $p = 0.002$). The unadjusted OR for dementia was significantly higher in the old-old group; however, the significance disappeared after adjusting these variables.

3.5. Cognitive performance on five domains

We also compared cognitive function between quick-responders and delayed-responders after excluding individuals with dementia. The scores on memory function were significantly lower for delayed-responders than quick-responders, both in those aged 65–74 and over 75 years ($p < 0.001$ and $p = 0.039$, respectively).

Table 3
Distributions of dementia among the users of long-term care insurance

Long-term care insurance	Dementia No. (%)	Non-dementia No. (%)	p value
User	43 (30.5)	98 (69.5)	< 0.001
Non-user	36 (2.1)	1,667 (97.9)	

3.6. Long-Term Care Insurance

To provide further details on the non-responders, we also examined the data on LTCI. While 141 responders (131 of quick-responders and 10 of delayed-responders) proved to be the LTCI users, only 39 of these 141 provided complete data, which indicated that 102 of the 141 users were cognitively and/or physically so frail that they could not complete some of the examinations. We compared 141 LTCI users and 1,703 non-users among responders in terms of prevalence of dementia. The comparison revealed a significantly higher prevalence of dementia for the LTCI users (30.5%) than the non-users (2.1%, $p < 0.001$) (Table 3).

4. Discussion

Participation rate is one of the most important issues for an epidemiological study. We recruited 1,888 (1,619 quick-responders, 225 delayed-responders and 44 nursing home residents) of the 2,698 potential candidates. Participation rates of recent large studies, for example, the Amsterdam study of the Elderly[3] and the Canadian Study of Health and Aging[23] were 71.5% and 72.1%, respectively. Therefore, participation rate of our study (70.0%) appears to be acceptable.

We found that the prevalence of MCI (1 SD cut-off) was higher for delayed-responders aged 74 or younger. In contrast to previous studies,[1] the present study indicated that delayed-responders had a higher prevalence rate of dementia in the old-old group. The discordance is presumably attributable to methodological differences, namely recruitment of non-responders or assessment of cognitive functions. We, however, believe that non-responders in general are in lower cognitive states for the following reasons. First, the prevalence of LTCI use was significantly higher among final-nonresponders than the responders ($p < 0.001$). In addition, the LTCI data revealed that the prevalence of dementia was significantly increased in the LTCI users than the non-users among the responders (Table 3). These results suggest that the prevalence rate of dementia is higher in final-nonresponders.

It has been said that if a person is identified as having amnestic MCI, this subtype will have a high likelihood of developing Alzheimer's disease.[7] When compared with quick-responders in our study, delayed-responders had a 2.3-fold higher prevalence of MCI (OR = 2.27, 95% CI: 1.37–3.77) and significantly impaired memory function ($p < 0.001$). These results suggest that the delayed-responders have increased likelihood of MCI and developing dementia in later in life.

With regard to methodological issues, we used different settings of examining cognitive functions between quick-responders and delayed-responders. These differences might have affected the results. It has been said that face-to-face interaction is more effective than other methods in a health education area.[2,4] One of the reasons for the effectiveness of face-to-face interaction is that participants can receive timely feedback. Despite this advantage, delayed-responders exhibited significantly lower cognitive scores. Furthermore, we used only the data from 1,449 of 1,619 (89.5%) quick-responders and 153 of 225 (68.0%) delayed-responders for the normative data. However, the difference in the rate of use of data does not appear to have contributed to the poorer cognitive function observed among delayed-responders. The primary reason for the lower rate of delayed-responders (68.0%) was that many had such severe cognitive impairment that they could not complete the series of examinations. Thus, we may have overestimated cognitive functions of delayed-responders. Even with the possibility of overestimation, our results indicated lower cognitive function among delayed-responders.

The present study has some strength. While many of the previous similar studies[3,5] evaluated the cognitive function by using simple screening tests such as the Mini-Mental State Examination, we used an extensive cognitive test battery. Furthermore, we employed 1 and 1.5 SD cut-off using normative corrections for age, sex and years of education. These methods allowed us a more precise estimate of cognitive functions.

The present study also has limitations. One of the limitations is that the local welfare commissioners recommended individual residents for participation in the research, although the uncontactable individuals were excluded from the study. Excluding subjects and final-nonresponders may have produced distortions in the results. Nevertheless, we also confirmed the data regarding final-nonresponders including age, sex and LTCI use. Using the LTCI data made it possible to understand some basic characteristics of final-nonresponders. However, there is a possibility we may not be able to fully clarify the details of final-nonresponders. Second, we followed 8.3% (225/2,698) of delayed-responders. According to the previous research, approximately 6% to 14% non-responders were studied.[3,4,6] Moreover, Launer et al. attempted to collect 10% of all non-responders to clarify the characteristics and 8.5% of non-responders were studied.[3] In our study, 21.7% (225/1,035) of whole non-responders were followed. Thus, these delayed-responders could be compared with quick-responders. Third, we conducted a cross-sectional study. Further longitudinal study would be required to reveal a lifelong cognitive trajectory of non-responders.

In conclusion, we found that the prevalence of MCI was increased 2.3-fold in delayed-responders aged 74 or younger compared to the quick-responders. Our findings also suggest that non-responders are, in general, in lower cognitive states and have a higher prevalence of dementia. In order to develop services for persons with dementia, including early interventions, we must pay more attention to non-responders.

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References

1. Forbes WF, Barham JF. Concerning the prevalence of dementia. *Can J Public Health* 1991;**82**:185–8.
2. Herzog AR, Rodgers WL. Age and response rates to interview sample surveys. *J Gerontol* 1988;**43**:S200–5.
3. Launer LJ, Wind AW, Deeg DJ. Nonresponse pattern and bias in a community-based cross-sectional study of cognitive functioning among the elderly. *Am J Epidemiol* 1994;**139**:803–12.
4. Jacomb PA, Jorm AF, Korten AE, et al. Predictors of refusal to participate: a longitudinal health survey of the elderly in Australia. *BMC Public Health* 2002;**2**:4.
5. Norton MC, Breitner JC, Welsh KA, et al. Characteristics of nonresponders in a community survey of the elderly. *J Am Geriatr Soc* 1994;**42**:1252–6.
6. Boersma F, Eefsting JA, van den Brink W, et al. Characteristics of non-responders and the impact of non-response on prevalence estimates of dementia. *Int J Epidemiol* 1997;**26**:1055–62.
7. Petersen RC, Doody R, Kurz A, et al. Current concepts in mild cognitive impairment. *Arch Neurol* 2001;**58**:1985–92.

8. Levy R. Aging-associated cognitive decline. Working Party of the International Psychogeriatric Association in collaboration with the World Health Organization. *Int Psychogeriatr* 1994;**6**:63–8.
9. Luis CA, Loewenstein DA, Acevedo A, et al. Mild cognitive impairment: Directions for future research. *Neurology* 2003;**61**:438–44.
10. Ritchie K, Artero S, Touchon J. Classification criteria for mild cognitive impairment: A population-based validation study. *Neurology* 2001;**56**:37–42.
11. Yesavage JA, Brink TL, Rose TL, et al. Development and validation of a geriatric depression screening scale: A preliminary report. *J Psychiatr Res* 1982;**17**:37–49.
12. Ritchie K, Fuhrer R. A comparative study of the performance of screening tests for senile dementia using receiver operating characteristics analysis. *J Clin Epidemiol* 1992;**45**:627–37.
13. Nishimura T, Kobayashi T, Hariguchi S, et al. Scales for mental state and daily living activities for the elderly: Clinical behavioral scales for assessing demented patients. *Int Psychogeriatr* 1993;**5**: 117–34.
14. Sohlberg M, Mateer CA. *Attention Process Training Manual*. Washington: Association for neuropsychological research and development; 1986.
15. Grober E, Buschke H, Crystal H, et al. Screening for dementia by memory testing. *Neurology* 1988;**38**:900–3.
16. Freedman M, Leach L, Kaplan E. *Clock drawing. A neuropsychological analysis*. New York: Oxford University Press; 1994.
17. Solomon PR, Pendlebury WW. Recognition of Alzheimer's disease: The 7 Minute Screen. *Fam Med* 1998;**30**:265–71.
18. Wechsler D. *WAIS-R: Manual: Wechsler Adult Intelligence Scale-Revised*. New York: Harcourt Brace Jovanovich for Psychological Corp; 1981.
19. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. Fourth ed. Washington DC: APA; 1994.
20. Petersen RC. *Mild Cognitive Impairment: Aging to Alzheimer's Disease*. New York: Oxford; 2003.
21. Petersen RC, Morris JC. Mild cognitive impairment as a clinical entity and treatment target. *Arch Neurol* 2005;**62**:1160–3, discussion 1167.
22. Tsutsui T, Muramatsu N. Care-needs certification in the long-term care insurance system of Japan. *J Am Geriatr Soc* 2005;**53**:522–7.
23. The Canadian Study of Health and Aging Working Group. The incidence of dementia in Canada. *Neurology* 2000;**55**:66–73.
24. Araki I, Hashimoto H, Kono K, et al. Controlled trial of health education through face-to-face counseling vs. e-mail on drinking behavior modification. *J Occup Health* 2006;**48**:239–45.

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ORIGINAL ARTICLE

Effects of short-term reminiscence therapy on elderly with dementia: A comparison with everyday conversation approaches

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Abstract

Background: Recent research has demonstrated the usefulness of reminiscence therapy as a psychosociological approach to the care of the demented elderly. However, to date neither the variables (e.g. evaluation methods and the optimal number of therapy sessions related to this technique) have been established, nor have the differences between reminiscence and other verbal interventions been clarified. In the field of clinical and nursing care in which reminiscence therapy is undertaken, in order to facilitate the participation of as large a number of elderly people as possible, both short- and long-term courses of sessions are needed. The present study conducted five therapy sessions using closed groups. Mainly, a verbal fluency task was used to assess the efficacy of therapy.

Method: The results of the five sessions that were conducted with a reminiscence therapy group (reminiscence group; $n = 8$ ambulant elderly women with Alzheimer's-type dementia) were compared with those of an everyday conversation group (conversation group; $n = 8$ ambulant elderly women with Alzheimer's-type dementia).

Results: In the reminiscence group, there was a significant increase in the number of words recalled at the end of the fifth session compared with that recalled at the end of the first session. In addition, the number of words recalled increased significantly compared with that recalled by the conversation group. Furthermore, the interchanges through non-verbal communication between others in the group improved and a positive change in participants' everyday life circumstances was observed. Moreover, the participants in the reminiscence group reported that they enjoyed the sessions.

Conclusions: Reminiscence therapy performed over a short period of time in closed groups was shown to be more effective than everyday conversations in the treatment of elderly people with dementia. It is suggested that the effectiveness of group reminiscence therapy should be ascertained not only by the verbal fluency tasks, but also by changes in patients' interactions with others through non-verbal communication.

Key words: *elderly with dementia, non-verbal communication, reminiscence therapy, verbal fluency.*

INTRODUCTION

As the importance of individual care for elderly people with dementia is increasingly recognized, improving the quality of care is becoming the expected norm. In particular, psychological and sociological therapeutic approaches are being introduced in the hope that they will help maintain an optimal mental condition of the demented elderly. Reminiscence therapy is one of these approaches, in which the elderly recall various experiences from their past life and share them with others. Through this process, it is expected that emotional stability will be promoted and that the elderly will be able to share their knowledge and areas of expertise.[1–8] Psychological and sociological

approaches to caring for the demented elderly are necessary to draw a distinction between non-pharmacological therapies and recreation therapies.[9] However, studies have suggested that it is difficult to place reminiscence therapy within these classifications.[10,11] In addition, methods for evaluating the adequacy of reminiscence therapy, as well as the optimal means of implementing it, are still under investigation.[12,13] In particular, it is necessary to undertake investigations regarding the exact therapeutic pathways that are realized through reminiscence therapy in the context of care that supports the everyday lives of elderly people with dementia.

Prior research on reminiscence therapy has evaluated its effectiveness by analyzing the content of the memories recalled[14] and the interactions that took place during the sessions.[2] Other research has examined general cognitive functions, the ability to perform everyday living activities, personality, attentiveness, reaction times, and verbal/visuospatial functions.[15] However, in many studies, the assessment has been designed to fit the intentions and needs of the therapist.[16] It is important to undertake easy and simple evaluation methods that assess the efficacy of treatment approaches based on improvements in the patients' conditions. In addition, evaluation methods should take into account the context in which the therapy will ultimately be implemented.

In most cases, reminiscence therapy is conducted as a course consisting of approximately eight to 10 sessions with fixed members. However, when there are a large number of sessions and participation is fixed, it is likely that many elderly people suffering from dementia will not have the chance to participate in therapy. In the field of clinical and nursing care, a fewer number of sessions is preferable and considered more practical.

In a previous study, because reminiscence therapy is a verbal approach, the effectiveness of reminiscence therapy in elderly patients with Alzheimer's disease was investigated with a verbal fluency task reflecting the operation of verbal functions.[17] The results were compared with a group that did not receive reminiscence therapy intervention. The design of the study included a small number of sessions with a semiclosed group. Results indicated that, in the treatment group, the number of words recalled in the verbal fluency tasks increased significantly after five sessions and, moreover, increased significantly compared with the number of words recalled by elderly people in the non-treatment group. The positive effects of reminiscence therapy, observed using a short-term, semiclosed treatment format, suggested that it was an appropriate means of fitting the treatment to the individual needs of patients. In addition to the benefits of long-term therapy with a closed group that have been reported in the literature, the results of that study of short-term therapy with a semiclosed group indicated the benefits of introducing reminiscence therapy to more elderly people with dementia. Furthermore, the study indicated the usefulness of verbal fluency tasks. However, the differences between the effects of reminiscence therapy and other verbal approaches to treatment have not been clarified, because prior studies have only used no-treatment control groups. In view of this limitation, the present study compared a reminiscence therapy group with an everyday conversation (control) group to determine the efficacy of reminiscence therapy.

METHODS

The research was approved by the ethics committees of all the care facilities that participated in the study and was conducted according to their guidelines.

Reminiscence and conversation groups

The two interventions (reminiscence and conversation) occurred over a course consisting of five therapy sessions that were designed similar to those in prior studies that used verbal fluency tasks for evaluation purposes,[17] with the exception that in the present study a closed group (all participants were fixed) was used in order to clarify the effects of the two different approaches. The sessions took place once a week for approximately 1 h.

At each session, the reminiscence group began with greetings (informing participants of the start of the meeting, the agenda, and the date, among other things) and then moved on to reminiscence. The session concluded with closing greetings (informing participants of the end of the meeting and other information). The group leader was one of the authors (YO), with one or two staff members participating as coleaders. There were four reminiscence themes: (i) childhood play; (ii) helping with housework; (iii) school memories; and (iv) memories centered on the current

Table 1 Characteristics of the elderly subjects with dementia participating in reminiscence therapy or the everyday conversation group

	Reminiscence group (n 8)	Conversation group (n 8)
Sex	Women only	Women only
Age (years)		
Mean (± SD)	84.0 ± 4.7	84.0 ± 8.5
Range	(74–89)	(68–93)
MMSE (points)		
Mean (ISD)	15.5 ± 3.6	14.9 ± 2.2
Range	(10–22)	(12–19)

season. The sessions were designed so that the first and final (fifth) sessions were based on the same theme.

A group engaging in everyday conversations was set up as a verbal control group to compare with the reminiscence group. There were no set themes for this group and they discussed everyday topics. With this exception, all other aspects of the sessions conducted with the conversation group were identical to those of the reminiscence therapy sessions.

Participants

The participants consisted of elderly with dementia who were either in hospital, in a group home, or using day service centers. In accordance with the guidelines of the ethics committee of each facility, oral or written informed consent to participate in the study was obtained either from the participants or their families. The group receiving reminiscence therapy (reminiscence group) consisted of eight ambulant elderly women with Alzheimer's-type dementia (mean age 84.0 ± 4.7 years; range 74–89 years) with mean scores on the Mini-Mental State Examination (MMSE)[18] of 15.5 ± 3.6 points (range 10–22 points). The group participating in everyday conversations (conversation group) also consisted of eight ambulant elderly women with Alzheimer's-type dementia (mean age 84.0 ± 8.5 years; range 68–93 years) with mean scores on the MMSE of 14.9 ± 2.2 points (range 12–19 points; see Table 1). There were no significant differences in age ($t_{(14)} = 0.00$, NS) or MMSE score ($t_{(14)} = 0.42$, NS) between the two groups.

Evaluation of outcomes

Treatment outcomes were evaluated in the same way in both groups. The MMSE was administered before the initial session. In order to assess the effect of participating in the treatment, a four-item verbal fluency task was administered to the two groups. This included: (i) animal names; (ii) words beginning with the letter 'A'; (iii) words beginning with other letters ('KA', 'SA', 'TA', and 'NA'); and (iv) words related to the theme of the day in the reminiscence group. Similar to the method used in a prior study,[17] item (iii) was changed weekly with new letters according to the order of the Japanese syllables, 'KA', 'SA', 'TA', and 'NA'. The verbal fluency tasks were designed so that the first and final evaluations were based on the same items. After each session, participants returned to their living area, such as private rooms or common rooms, and individually recorded the words they could remember over a period of 1 min.

Furthermore, we used additional evaluation scales to ascertain whether there were changes beyond the number of words recalled.

The appearance of the reminiscence group at each session was evaluated using the Todai-shiki Observational Rating Scale (TORS).[19,20] This scale consists of 20 items designed to evaluate verbal communication, non-verbal communication, attention/interest, and emotion. One point was awarded to a participant each time an item on the scale was observed, such that higher scores indicated a better condition. The inter-rater reliability of the TORS in elderly dementia patients was confirmed.[20]

The participants' subjective feelings were also evaluated by asking them about their level of happiness after each group session, as they returned to their living areas. Mood was evaluated on a scale ranging from 1 (very unpleasant) to 5 (very good). Happiness was evaluated similarly on a scale ranging from 1 (didn't feel happy at all) to 5 (felt very happy).

Furthermore, the everyday condition of the participants was evaluated before the first session and after the last session using the Saint Marianna Hospital's Elderly Dementia Patients' Daycare Evaluation Table for care-giving staff[21] (hereafter, the Daycare Evaluation Table). The Daycare Evaluation Table was originally developed to evaluate the condition of the elderly while participating in daycare. The reliability and validity of the evaluation table was not confirmed. This evaluation table was adopted in the present study because its evaluation items and standards were considered an easy means by which to assess the condition of elderly patients with dementia.

Because the 31 items in total also include items concerning the condition of patients undertaking activities at the daycare site, one psychiatrist and one clinical psychologist independently extracted appropriate items to evaluate the condition of the elderly with dementia in everyday life. Finally, 10 items ('facial expression', 'cooperativeness', 'emotional tendency', 'reliance tendency', 'anxiety tendency', 'damage tendency', 'depression state', 'talking', 'spontaneously talking to others', and 'showing interest in others') were adopted as items for evaluation chosen by both the psychiatrist and clinical psychologist. In this scale, a lower the score indicates a better condition. The evaluations were performed by a psychologist or the care-giving staff. The conversation group was also evaluated in a similar manner.

Analysis of results

Two-way analysis of variance (ANOVA) was conducted on the number of words recalled in the verbal fluency task. In addition, *t*-tests were performed on the results of TORS, the subjective feelings of the participants, and the Daycare Evaluation Table. Next, two-way ANOVA was conducted on the first and final evaluations on the verbal fluency task, TORS score, the subjective feelings of the participants, and the Daycare Evaluation Table for the two groups. A multiple comparison test (Dunnett's *t*-test) was used to determine any significant changes in the number of words for each session. Furthermore, correlation analysis was performed to ascertain whether there were any relationships among the scales indicating significant changes for the reminiscence group.

Because the reliability and validity of the Daycare Evaluation Table was not confirmed, in the present study a value of internal consistency of 10 items was calculated using Cronbach's alpha coefficient (Cronbach's $\alpha = 0.88$).

The significance level was set at below 5%.

RESULTS

Comparison of first scores on each scale

The results of two-way ANOVA on the number of words remembered on the four verbal fluency tasks at the first evaluation were not significantly different within ($F_{(3,42)} = 2.14$, NS) or between ($F_{(1,14)} = 0.23$, NS) the two groups. Furthermore, no significant differences were found between the two groups on evaluation of the participants' condition during the first evaluation of TORS verbal communication ($t_{(14)} = 0.60$, NS), non-verbal communication ($t_{(14)} = -0.72$, NS), attentiveness/interest ($t_{(14)} = 0.86$, NS), emotion ($t_{(14)} = 0.51$, NS), subjective feelings 'Mood' ($t_{(14)} = 0.00$, NS), and 'happiness' ($t_{(14)} = -1.00$, NS), or for the 10 items investigated using the Daycare Evaluation Table ($t_{(14)} = 1.48$, NS).

Changes in verbal fluency scores between the two groups

Comparison of first and final evaluations

The mean verbal fluency score of the reminiscence group on the first and final evaluations changed from 3.4 to 5.1 for animal names (Fig. 1a), from 2.3 to 3.9 for words beginning with 'A' (Fig. 1b), from 2.9 to 4.0 for words beginning with another letter (Fig. 1c), and from 2.5 to 4.8 for words relating to the reminiscence theme of the day (Fig. 1d). These results clearly show that the number of words increased between the first and the final evaluations.

Conversely, the mean verbal fluency score of the conversation (control) group on the first and final evaluations changed from 4.0 to 3.5 for animal names (Fig. 1a), from 2.6 to 2.1 for words beginning with 'A' (Fig. 1b), from 3.6 to 2.8 for words beginning with another letter (Fig. 1c), and from 2.6 to 2.0 for words relating to the reminiscence theme of the day (Fig. 1d). It is clear that, in this group, the number of words between the first and final evaluations did not increase in any of the categories.

Next, the change in the total number of words on the first and final evaluations was compared for the two groups. In the conversation group, the mean number of words decreased from 12.9 to 10.4, whereas in the reminiscence group the mean number of words increased from 11.0 to 17.8 (Fig. 2). Two-way ANOVA revealed an interaction between the total number of words recalled on the first and final evaluations for each group ($F_{(1,14)} = 13.79$, $P = 0.002$). There was a significant difference in the number of words recalled on the first and final evaluations between the two groups (Table 2).

Changes in the number of words recalled following the sessions

Changes in the total number of words recalled by the reminiscence group after each treatment session are shown in Fig. 3. Figure 3 shows that the number of

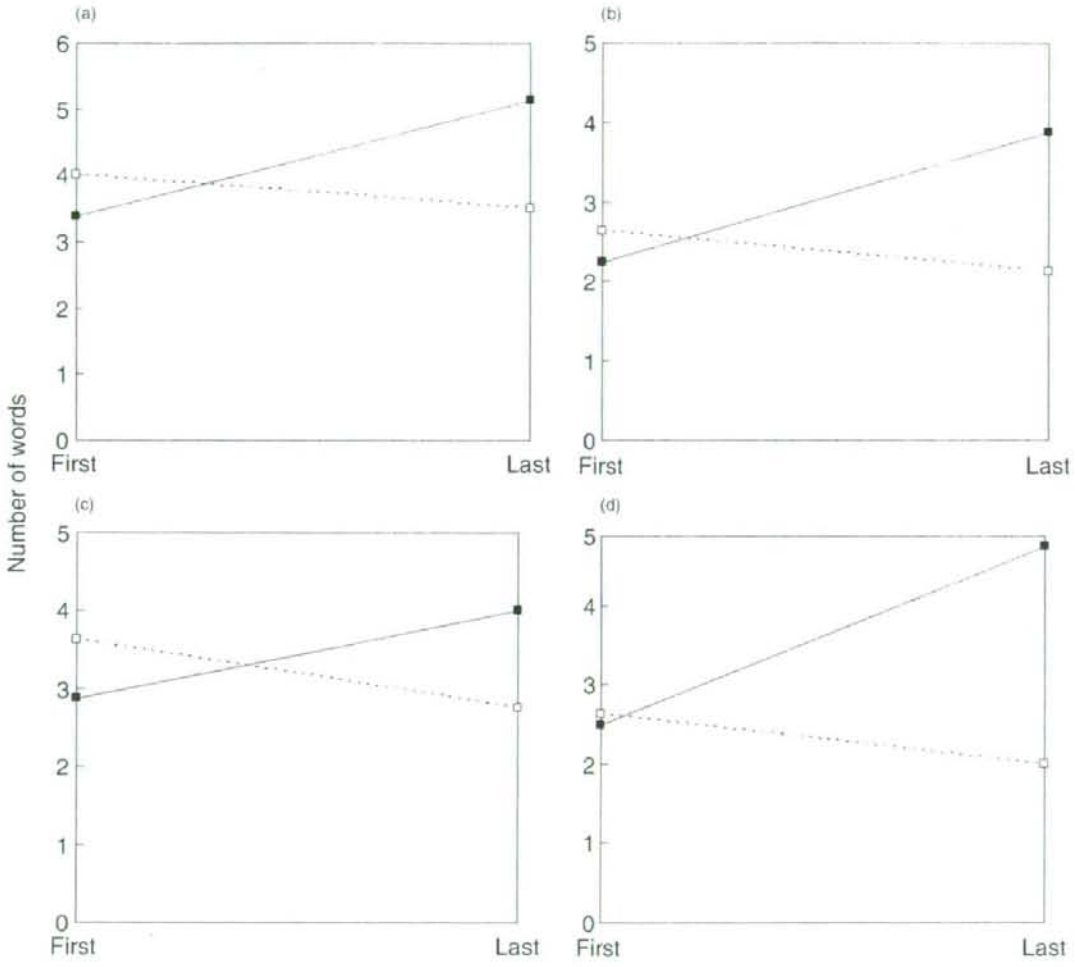

Figure 1 Changes in the number of (a) animal names, (b) words beginning with the letter 'A', (c) words beginning with the letter 'KA', and (d) words relating to the theme recalled by patients in the reminiscence (■) and conversation (□) groups at the first and fifth evaluations of therapy.

words increased with the number of times reminiscence therapy was repeated. A multiple comparison test was used to investigate changes in the number of words over the five sessions. Compared with the first session, the number of words increased significantly in the reminiscence group from the third session onwards (after the third session, $P = 0.003$; after the fourth session, $P = 0.012$; after the fifth session, $P = 0.000$). Conversely, there was no significant change in the number of words recalled by the conversation group between the first and the following sessions (Fig. 3).

Changes in other evaluations

Evaluation of patients on the first and final sessions using TORS indicated that there were significant differences only for non-verbal communication items between the two groups ($F_{(1,14)} = 13.60$, $P = 0.002$).

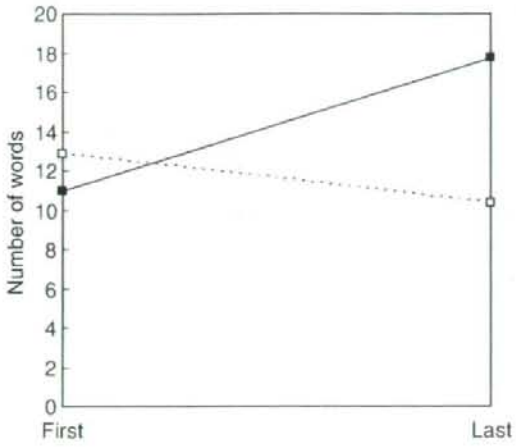

Figure 2 Total number of words recalled by patients in the reminiscence (■) and conversation (□) groups at the first and fifth evaluations of therapy.

Thus, changes in non-verbal communication differed based on differences in the type of session (Table 2; Fig. 4).

Evaluation of subjective feelings after each session indicated an interaction only in the happiness scores for the two groups between the first and final sessions ($F_{(1,14)} = 14.40$, $P = 0.002$). These results confirm that the degree of happiness differed based on the type of session (Table 2; Fig. 5).

Evaluation of daily appearance based on the Daycare Evaluation Table (total score of 10 items) revealed an interaction between the two groups before and after the sessions ($F_{(1,14)} = 8.44$, $P = 0.012$). Accordingly, it was confirmed that changes in the items on the Daycare Evaluation Table were related to the content of the session (Table 2; Fig. 6).

Participants' appearance during the sessions

Participants in the reminiscence group were observed to be uneasy during the beginning of the first session, but gradually they became closer to each other as they recalled nostalgic memories with the group. The participants did not always actively converse, but they still enjoyed conversing with others. The staff observing the session was encouraged by the appearance of the participants in the reminiscence group. Conversely, in the conversation group, although resistance did not increase from the first session onwards, the conversations were difficult to start, there was no progression in group development, and the staff felt that the therapeutic intervention was difficult and that it should be conducted in line with the abilities of the participants.

Correlations among the scales for the reminiscence group

We used correlation analysis to ascertain whether there were any relationships among the scales indicating significant changes for the reminiscence group. After the reminiscence therapy had been performed five times, compared with the first therapy session, significant changes were found in the following scales: the total words recalled on the verbal fluency task, 'non-verbal communication' of TORS, the feeling of 'happiness' at each session, and the Daycare Evaluation Table. We investigated correlations among the scales using the results of the final evaluations (Table 3). The results revealed a significant negative correlation ($r = -0.94$, $P < 0.01$) between the Daycare Evaluation Table and the feeling of 'happiness' at each session. Furthermore, the correlation coefficient for the number of words recalled and the feeling of 'happiness' each time was $r = 0.68$, revealing no significant difference. Thus, no clear correlation was observed.

DISCUSSION

Changes based on session content and evaluation method

It was expected that participants in the reminiscence group would not only come to feel more secure, but that communication with their families and care-giving staff would also improve. The present study revealed an interaction between the number of words recalled on the first and final evaluations using the verbal fluency task and the type of intervention, either reminiscence therapy or conversation only.

In the reminiscence group, interest in the other group members increased with each session. Non-verbal communication was undertaken with no trouble with participants nodding their heads as they appeared to enjoy listening to each other. After the sessions, they reported feeling happier than did participants in the conversation (control) group. For elderly people with dementia who have impaired recall of recent memories, it is easier to recall and talk about nostalgic memories from the distant past. Therefore, it

Table 2 Comparison of changes between the reminiscence and conversation groups

Evaluation	Mobilizing factor (intrasubject)	Type III sum of squares	Degrees of freedom	Mean square	*F* value	*P* value
Verbal fluency						
Total	Pre–post	36.13	1	36.13	2.91	0.110
	Pre–post × therapy	171.13	1	171.13	13.79	0.002
	Error (pre–post)	173.75	14	12.41		
Todai-shiki Observational Rating Scale						
Verbal communication	Pre–post	5.28	1	5.28	16.66	0.001
	Pre–post × therapy	0.78	1	0.78	2.47	0.139
	Error (pre–post)	4.44	14	0.32		
Non-verbal communication	Pre–post	3.78	1	3.78	9.74	0.008
	Pre–post × therapy	5.28	1	5.28	13.60	0.002
	Error (pre–post)	5.44	14	0.39		
Attentiveness/interest	Pre–post	0.28	1	0.28	0.44	0.518
	Pre–post × therapy	0.28	1	0.28	0.44	0.518
	Error (pre–post)	8.94	14	0.64		
Emotions	Pre–post	3.13	1	3.13	2.85	0.114
	Pre–post × therapy	0.50	1	0.50	0.46	0.511
	Error (pre–post)	15.38	14	1.10		
Subjective feelings						
Mood	Pre–post	0.28	1	0.28	0.84	0.375
	Pre–post × therapy	1.53	1	1.53	4.57	0.051
	Error (pre–post)	4.69	14	0.34		
Happiness	Pre–post	1.13	1	1.13	3.60	0.079
	Pre–post × therapy	4.50	1	4.50	14.40	0.002
	Error (pre–post)	4.38	14	0.31		
Daycare Evaluation Table						
Total of 10 items	Pre–post	51.26	1	51.26	19.70	0.001
	Pre–post × therapy	21.95	1	21.95	8.44	0.012
	Error (pre–post)	36.42	14	2.60		

$P < 0.05$ was considered significant (two-way ANOVA).
Pre–post, evaluation at first session and final sessions; Therapy, reminiscence group or conversation group.

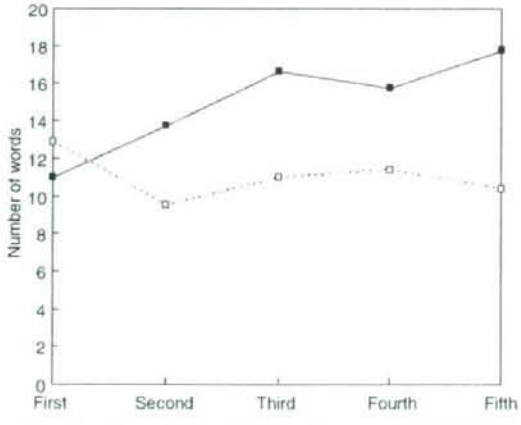

Figure 3 Changes in the total number of words recalled by patients in the reminiscence (■) and conversation (□) groups after each therapy session.

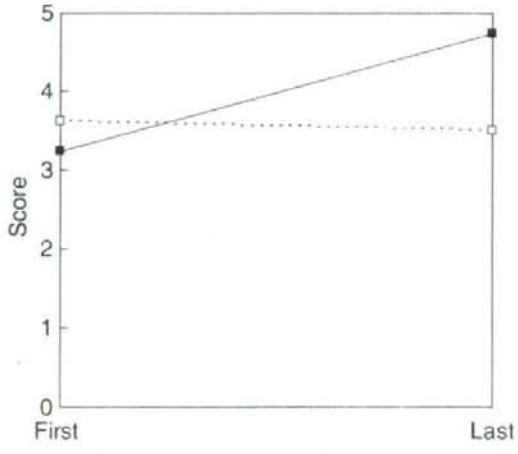

Figure 4 Changes in non-verbal communication, as assessed by the Todai-shiki Observational Rating Scale, in patients in the reminiscence (■) and conversation (□) groups at the first and fifth evaluations of therapy.

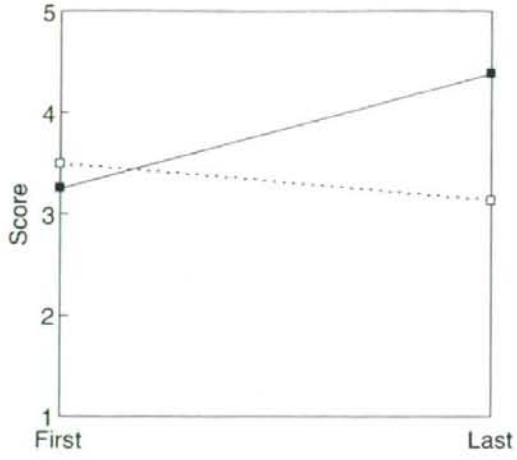

Figure 5 Changes in the impression of 'happiness' in patients in the reminiscence (■) and conversation (□) groups at the first and fifth sessions of therapy.

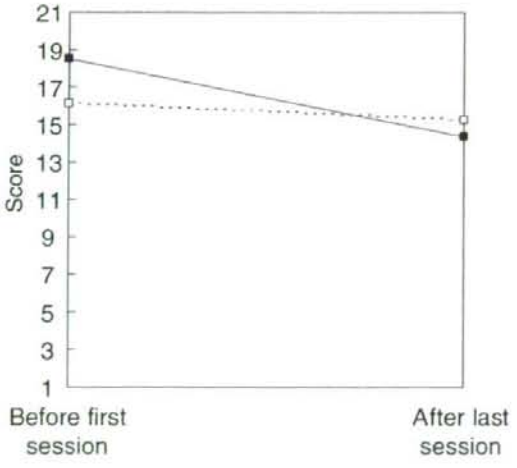

Figure 6 Scores (total 10 items) for the Daycare Evaluation Table in the reminiscence (■) and conversation (□) groups before the first and after the last session of therapy.

is likely that the number of words recalled, as well as the happiness of this group, was promoted through reminiscence therapy. The present study did not find a significant difference in the verbal communication scores during the sessions based on TORS. However, there was an increase in non-verbal communication, including sensitivity, turning one's ear, and smooth exchanges with others. Therefore, improvements resulting from therapy were not limited to fluency in recalling memories. It is possible that the introduction of appropriate topics to release memories that the elderly with dementia could relate to easily facilitated the sharing of experiences.

The reminiscence group also showed positive changes in daily life, as indicated by the Daycare Evaluation Table for estimating changes in communication with others and other psychological variables. This suggested that reminiscence therapy may have an effect on the daily life of elderly people with dementia, even after the reminiscence session.

Previous studies have used a variety of scales to evaluate the efficacy of reminiscence therapy in the elderly with dementia. It should be noted that a certain degree of communicative ability is necessary for subjects to participate in reminiscence therapy. Moreover, because there are a number of ways to participate in the sessions, such as recalling experiences of the self, representing experiences, listening closely to others' recollections, there could also be individual differences in the manifest efficacy of therapy, depending on the type and degree of participation. In the present study, we measured the number of words produced on a verbal fluency task as an index of the efficacy of reminiscence therapy. We suggest that future research should also consider the effects of changes in interest and exchanges with others when evaluating the efficacy of such therapy.

Methods of implementing treatment

Usually reminiscence therapy is conducted in closed groups over eight to 10 sessions, and participants are reported to actively participate and change positively as they develop smoother interpersonal relationships with others.[3–6] The present study took into consideration the circumstances of those in a hospital, group home, or visiting a daycare center, and conducted the treatment over a short five-session regimen. Moreover, the group members were fixed (closed group) in order to compare the reminiscence group with the conversation group. In the reminiscence group, significant positive changes, such as an increase in the number of words recalled and an improvement in daily living condition, were revealed. Improvements in the participants observed in the present study suggest

Table 3 Correlations among the scales in the reminiscence group

	Verbal fluency (total)	TORS	Impression of 'happiness'	The Daycare Evaluation Table
Verbal fluency (total)	-	0.28	0.68	-0.49
TORS		-	0.31	-0.34
Impression of 'happiness'			-	-0.94**
The Daycare Evaluation Table (total)				-

Pearson correlation coefficient, $^{**}P < 0.01$.
TORS, non-verbal communication (Todai-shiki Observational Rating Scale).

that reminiscence therapy could be introduced to the elderly with dementia, even over a short time span.

Moreover, investigation of the correlations among the scales in which significant changes were observed after the reminiscence therapy had been performed revealed a significant negative correlation between the feeling of 'happiness' at each session and the Daycare Evaluation Table. These results show that happiness while participating in reminiscence therapy is related to a change in everyday life. In addition, the results reveal that it is possible that elderly patients with dementia are not emotionally impaired. However, no significant correlations were revealed on either of the scales for the number of words recalled on the verbal fluency task. Therefore, it is possible that reminiscence therapy is helpful in activating the frontal and temporal lobes, even in patients who did not enjoy the therapy. The difficulties in evaluating the effectiveness of reminiscence therapy are possibly related to the distinctive characteristics of the therapy. Although it is very important that the elderly participants in reminiscence therapy enjoy reminiscing, the findings of the present study indicate the importance of investigating multiple meanings of reminiscence therapy beyond simply happiness. Even though there was a tendency for a correlation between the number of words and enjoyment, this was not significant. However, because the number of participants in the present investigation was limited, we hope to increase the number of subjects in further studies to examine any possible connection.

From the perspective of continuing the therapy, it may be easier to offer this to participants using group-work techniques (planning, formation, development, closure) to devlop the group over time[2] for long-term treatment. Moreover, the present study found a significant increase in the number of words from the third session onwards. It is thought that patients suffering from dementia are able to adapt easily, even with a short period of practice, such as in the present study, which took place over a course of five sessions only. However, the results also indicate that positive changes are limited and that the patients did not have sufficient pleasant feelings at an adequate level. This may possibly have been caused by the shortness of the treatment period, which prevented the group from maturing. In addition, because the participants' degree of dementia was not mild, it is possible that the degree of reminiscence achieved was not sufficient.

Based on the results of the present study, it is concluded that reminiscence therapy is an effective method of providing care to a wide range of elderly people, including those with dementia. It could be introduced as a part of the daily exchange at care facilities. For example, it may be implemented quickly in group homes with the goal of improving care in accordance with the wishes of elderly with dementia.[22] The present study revealed the usefulness of introducing such therapy over a short period of time.

It is suggested that introducing reminiscence therapy could serve a number of purposes, such as a recreational activity providing an enjoyable time for everyone over a longer period of time. As the number of therapy sessions changes, the purpose of the group, the condition of the patients, and the intervention point to keep in mind may also change. In addition, based on the results obtained over short and long periods of therapy, a variety of concrete plans for developing this method could be developed.

Further research is necessary to examine the effectiveness of reminiscence therapy based on differences in the number of sessions and the progression of the disease. Studies should also be designed to investigate the relationship between reminiscence therapy and other non-pharmacological therapies.

REFERENCES

1 Kiernat JM. The use of life review activity with confused nursing home residents. *Am J Occup Ther* 1979; **33**: 306–310.

2 Nomura T. Application of reminiscence to group work with institutionalized elderly. *Soc Gerontol* 1992; **35**: 32–46 (in Japanese with an English abstract).
3 Nomura T. Reminiscence. *Jpn J Geriatric Psychiatry* 1995; **6**: 1476–1484 (in Japanese).
4 Nomura T. *Reminiscence and Life Review*. Tokyo: Chuohouki Syuppan, 1998 (in Japanese).
5 Kurokawa Y. Reminiscence group approach for the cognitively impaired elderly. *Jpn J Geriatr Psychiatry* 1994; **5**: 73–81 (in Japanese).
6 Kurokawa Y. Reminiscence group with Japanese dementia patients. *J Jpn Clin Psychiatry* 1995; **13**: 169–179 (in Japanese with an English abstract).
7 Okumura Y, Fujimoto N, Narita M. Rehabilitation program for mild dementia patients of Alzheimer type. *Jpn J Geriatric Psychiatry* 1997; **8**: 951–963 (in Japanese).
8 Mihara S, Okumura Y, Sugimura Y *et al.* Reminiscence at dementia wards. *Resume Second Conf Jpn Soc Dement Care* 2000; 25 (in Japanese; Abstract).
9 Imai Y. The concept of non-pharmacological therapy for dementia. *Jpn J Gerontol* 2004; **26**: 5–14 (in Japanese).
10 Merriam SB. The concept and function of reminiscence: A review of the research. *Gerontologist* 1980; **20**: 604–609.
11 Molinari V, Reichlin RE. Life review reminiscence in the elderly: a review of the literature. *Int J Aging Hum Dev* 1984–1985; **20**: 81–92.
12 Kurokawa Y, Saito M, Matsuda O. The evaluation of the efficacy of psychotherapy for the elderly: A literature review of reminiscence and life review. *Jpn J Geriatr Psychiatry* 1995; **6**: 315–329 (in Japanese).
13 Nomura T. Application of evaluative framework on reminiscence practice. *Jpn J Gerontol* 2004; **26**: 24–31 (in Japanese).
14 Merriam SB. The structure of simple reminiscence. *Gerontologist* 1989; **29**: 761–767.
15 Hashimoto R, Suzuki A, Konno K *et al.* Effect of group work (reminiscence) for institutionalized patients with Alzheimer's disease. *Jpn J Geriatr Psychiatry* 2005; **16**: 337–346 (in Japanese with an English abstract).
16 Ota Y. What kind of assessment tool is appropriate for reminiscence? In: Reminiscence Life Review Research Group (ed.). *Handbook for Reminiscence*. Tokyo: Chuohouki Shuppan, 2001; 108–109 (in Japanese).
17 Okumura Y, Tanimukai S, Kuze J. The study of evaluation method and frequency of the reminiscence group for the elderly with dementia. *J Jpn Soc Dement Care* 2005; **4**: 24–31 (in Japanese with an English abstract).
18 Folstein MF, Folstein SE, McHugh PR. 'Mini-mental state': A practical method for grading the cognitive state of patients for the clinician. *J Psychiatr Res* 1975; **12**: 189–198.
19 Kurokawa Y, Matsuda O, Maruyama K, Saito M. *Manual for Reminiscence Groups*. Tokyo: World Planning, 1999 (in Japanese).
20 Matsuda O, Kurokawa Y, Saito M *et al.* Interrater reliability of the Todai-shiki Observational Rating Scale (TORS) for group psychotherapy of elderly patients with dementia. *Psychogeriatrics* 2001; **1**: 133–138.
21 Hasegawa K. *Nursing and Day Care for Elderly People with Dementia*. Tokyo: Igaku Shoin, 1986 (in Japanese).
22 Nomura T, Takahashi Y, Miyazawa K. The fact and effect of reminiscence at group homes. *Resume Second Conf Jpn Soc Dement Care* 2001; 109 (in Japanese; Abstract).

Prevalence of Mild Cognitive Impairment in a Japanese community: Toward more workable MCI criteria

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Running title: Prevalence of MCI

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Key words; MCI, dementia, depression, APOE4

Background: More than 20 population-based studies of prevalence of Mild Cognitive Impairment (MCI) have been reported. However, the results have widely varied according to the criteria of MCI. Although a more general approach to the diagnosis of MC was proposed recently, few epidemiological studies based on the approach have been published

Methods: As the first wave of the longitudinal study of a community sample, we assessed the cognitive function of Japanese elderly aged 65 years and older. We attempted to estimate the prevalence of 4 subtypes of MCI based on the recent diagnostic approach. For each of the 4 MCIs, we estimated the prevalence using two cutoffs (1 and 1.5 SD below norms). It has been reported that presence of apolipoprotein E4 allele (APOE4) known as a strong risk factor for Alzheimer disease (AD) is associated with high convert risk from MCI to AD. Thus, we calculated the frequency of APOE4 carriers for each MCI subtype.

Results: 1916 (70%) of 2730 baseline samples were enrolled in this project. After excluding the subjects who had been diagnosed as having dementia, the prevalence of subtypes of MCI ranged from 1.7% to 13.5% depending on the criterion applied. The prevalence of MCI using 1 SD cutoff is higher than that of 1.5 SD, and the prevalence of amnestic MCI single 1.5 SD is lowest among subtypes of MCI. The frequency of APOE4 is higher for amnestic MCIs than that for non-amnestic MCIs and cognitively normal group.

Conclusion: Prevalence of MCI is highly dependent on the diagnostic criteria applied. Amnestic MCI is more likely to convert to AD, while non-amnestic MCI might take different clinical course. For future intervention to delay the onset of dementia, it might be desirable to

target individuals with amnestic MCI multiple 1 SD.

KEY WORDS - MCI; pre-dementia; community; prevalence; depressive symptoms; APOE

INTRODUCTION

Mild Cognitive Impairment (MCI) has been used to describe a distinct state of abnormal cognition that does not amount to dementia, but is distinguishable from normal cognitive decline associated with aging (Petersen, 1996). Although Petersen's MCI (amnestic MCI single) is assumed to be a core subtype of MCI and pre-stage of dementia, some counterevidence has been produced. For example, its prevalence in a community-based cohort was very low compared to the established incidence rate of AD. (Jungwirth S, et al. 2005) More than 20 of community-based epidemiological studies of MCI and similar conditions have been reported and their results have varied widely according to different diagnostic criteria (Panza, et al., 2005). Recently, a more general approach to the diagnosis of MCI was proposed, which includes the consideration of multiple types of cognitive impairment in addition to the memory impairment that characterizes amnestic MCI. The approach distinguishes four clinical subtypes: amnestic MCI single, amnestic MCI multiple, nonamnestic MCI single, and nonamnestic MCI multiple (Petersen et al., 2004). To our knowledge, only two epidemiological studies employing the newly proposed general approach to the diagnosis of 4 subtypes of MCI have as yet been published (Busse A, et al. 2003, Jungwirth et al., 2005).

The significance of the entity of MCI depends on its high specificity and sensitivity for the conversion to dementia including Alzheimer disease (AD), in other words, its predictive validity. Regarding this issue, there appears to be a lack of consensus concerning the diagnosis of MCI. Namely, two cutoffs -- 1.0 SD and 1.5 SD -- for cognitive domains including memory have been used in the previous studies (Busse A, et al. 2003, Jungwirth et al., 2005).

It is said that there are several clinical and etiological heterogeneities among subtypes of MCI, and amnestic MCI has been assumed to share the clinical features of AD including overrepresentation of apolipoprotein E 4 allele (APOE4) known as a strong risk factor (Morris JC. 2006). In fact, some clinic-based researches have shown a relationship between the possession of APOE4 and the risk of conversion to AD (Petersen et al., 1995). Furthermore, a recent community studies showed diagnosis of amnestic MCI is associated with higher probability of later conversion to AD (Busse, et al., 2006, Fisher, et al., 2007,). Therefore, the data of APOE4 frequency for each MCI could provide some information about its clinical characteristics to a certain extent.

As the first wave of a prospective longitudinal study of an elderly community sample, we have set out to estimate the prevalence of subtypes of MCI using two cutoffs (1 and 1.5 SD below age-, sex-, and education-controlled mean) among Japanese population of elderly persons. Combining APOE4 frequency with the demographic data, the clinical utility of the subtypes of MCI will be discussed.

METHODS

The present research was conducted in Tone town, Ibaraki, Japan. This town is located approximately 40 kilometers northeast of central Tokyo, and consists of 22 districts. On May 1st, 2001, 3103 inhabitants aged 65 years and older lived in the town. These 3103 inhabitants are hereafter referred to as the potential candidates. This population composition compares to the composition of Japan's total population in 2001.

Seven psychiatrists and eight psychologists, who were trained for this study by the authors, along with public health nurses, conducted this research. The protocol of this study was approved by the ethics committee of the University of Tsukuba (Miyamoto, et al 2008)

THE FIRST STUDY

The general design of the project is shown in Figure 1. The first study was conducted between December 2001 and April 2002. Before the baseline examination, we sent the letter to each potential candidate and explained the objectives of the project. One week before the group screening, we telephoned each candidate and asked him or her to participate. We also asked the local welfare commissioners (*Minsei-iin*: persons who are vested with promoting social welfare in each local area) to recommend individual residents to participation in the research. We excluded individuals with whom a local welfare commissioner could not meet or contact despite three telephone (uncontactable individuals).

We visited each of the 22 districts once per week and conducted two group screenings in the

morning and afternoon. In addition to the group screenings at the 22 districts, we visited 44 individuals who were institutionalized in a long-term care facility and examined them using the same methods described below.

ASSESSMENT PROCEDURES

Prior to the series of examinations, one of the authors explained the aims of the present study. Subsequently, the eligible subjects provided informed written consent to participate in the study. After providing their informed consent, all participants underwent a screening interview.

Demographics and Medical and Psychiatric issues

The interview consisted of a structured questionnaire assessing age, sex, education, previous medical and psychiatric diseases, current medication use, and dementia risk factors including alcohol and tobacco consumption. The subjects were also asked to provide blood samples for routine tests and genotyping of apolipoprotein E (APOE). (Corder, et al., 1993) We also measured height and weight of each participant.

Mood Status

This interview was followed by the 15-item short version of the Geriatric Depression Scale (Brink, et al., 1982) for mood assessment. Those who scored 6 or more were considered to be

depressive symptoms cases.

Perceived Memory Difficulty

Participants were asked whether they had memory difficulties in general, as well as difficulties in specific areas according to the 19 items of the Deterioration de Cognitive Observe (DECO) which had been originally developed for an objective assessment of memory difficulty (Ritchie, et al., 1992). Participants were considered to have memory complaints if they indicated that they had problems on 1 or more of the items.

Assessment of Activities of Daily Living

Basic activities of daily living was measured using Nishimura's Activities of Daily Living (NADL) [12], which determines the level of independence in five activities: walking/transferring, going outside, dressing/bathing, feeding, and toileting. Responders were considered to be functionally intact if they reported no difficulty on any of the 5 items of the NADL.

Neuropsychological Battery

After completing the interview, all participants underwent a group assessment which used a set of 5 tests which measures the following cognitive domains: attention; memory; visuospatial function; language; and reasoning. We named this set of tests thereafter the 5-Cog.

We evaluated attention using a Japanese version of the set dependency activity (Sohlberg and