

## EFFECTS OF REMINISCENCE THERAPY USING NOSTALGIC SONGS ON THE COGNITIVE FUNCTION OF THE ELDERLY LIVING IN THE COMMUNITY

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*Abstract:* The study aimed to examine the effects of reminiscence therapy using nostalgic songs on the cognitive function of elderly people living in the community. The subjects were 34 people who had undergone assessment of their vital functions using a basic check list and stated that they had problems related to “withdrawal” or “cognitive functions”. Their cognitive functions were assessed using the Hasegawa Dementia Scale–Revised (HDS–R) and Mini–Mental State Examination (MMSE) prior to and following the implementation of reminiscence intervention using nostalgic songs. The cognitive functions of the elderly were classified into three levels and assessed according to the judgment criteria of those scales. There were significant differences in the total HDS–R score and scores for the subscale items “recital of numbers in reverse order” and “delayed recall” received by all subjects. There were also significant differences in the total MMSE score and scores for the subscale items “spatial orientation” and “delayed recall” received by all subjects. Regarding cognitive function levels, there were significant differences in the total score and subscale score for “delayed recall” received by elderly people who had been determined as having “cognitive dysfunction” using the HDS–R and “mild cognitive dysfunction”. That is, it is not possible to evaluate possible dementia, but there is a risk of transitioning to suspicion of dementia when it is left unattended, using the HDS–R and MMSE.

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**Key words:** reminiscence, nostalgic songs, community–dwelling homebound elderly person, cognitive function

### I. Introduction

In recent years, in Japan, where the population is rapidly aging, the estimated prevalence rate of dementia is 15% among those aged 65 years or older, with the number of people with dementia estimated at approximately 4.39 million (for 2010)<sup>1)</sup>. It is expected that the number of such individuals will increase as the Japanese population ages further. Therefore, in order to prevent dementia among homebound elderly people, it is important to intervene early while their cognitive impairment is still mild.

In addition, concerning elderly people with a tendency toward a homebound state, the Ministry of Health, Labour, and Welfare<sup>2)</sup> reported that they may encounter a high risk of dementia and become bedridden as a result of losing both mental and physical vitality, and

suggested the necessity of elderly care prevention and related ideas.

One of the interventions aimed at preventing cognitive dysfunction is the reminiscence proposed by Butler (U.S. psychiatrist), which is a form of psychotherapy<sup>3)</sup>. Elderly people implementing reminiscence reconfirm the meanings of their lives by recalling their past, and can achieve mental stability by recognizing that professionals sympathize with this process<sup>4)</sup>. As one of the care prevention measures, reminiscence may be increasingly needed in Japan's super-aging society.

In studies investigating the beneficial effects of reminiscence, elderly facility users with mild-to-moderate dementia showed increases in scores for Mini-Mental State Examination (MMSE) and Hasegawa Dementia Scale-Revised (HDS-R) which are generally cognitive psychological tests<sup>5) 6)</sup>. In other studies, performing reminiscence with nostalgic songs for community-dwelling homebound elderly people who were using small-sized facilities for the elderly had the effect of promoting their interpersonal relationships<sup>7)</sup>.

Thus, many studies investigated the beneficial effects of reminiscence for elderly facility users or that employing music. However, few studies have investigated whether reminiscence with nostalgic songs has an effect in preventing cognitive dysfunction in community-dwelling homebound elderly people not diagnosed with dementia, or the level of cognitive function for which reminiscence is effective when it is performed with elderly people. Against this background, the present study aimed to clarify the effects of reminiscence with nostalgic songs on the cognitive function of community-dwelling homebound elderly people not diagnosed with dementia, as well as the changes in the effects according to the cognitive function level determined using a cognitive function assessment scale.

## II. Methods

### 1. Subjects

In a village of Nara Prefecture, in order to select participants of care prevention programs from community-dwelling homebound elderly people not diagnosed with dementia or certified as requiring care, screening is performed annually with a basic checklist for life functions<sup>1)</sup>. The checklist is sent by the village's health and welfare center to the target elderly people. In principle, they fill out the checklist by themselves, but family members do it for some elderly people if they are familiar with the elderly person's daily life. The checklist was filled out by 1,426 out of 1,628, 1,426 out of 1,687, and 1,389 out of 1,687 in 2012, 2013, and 2014, respectively. Of the respondents, we selected those who checked  $\geq 1$  of the 2 items for "homebound state" or  $\geq 1$  of the 3 items for "cognitive function". As a result, 55 out of 1,426, 43 out of 1,426, and 50 out of 1,389 served as the study subjects in 2012, 2013, and 2014, respectively.

By making a telephone call or home visit, public health nurses from the village provided the candidate subjects for the care prevention programs with an explanation about reminiscence with nostalgic songs, and asked them to participate in these programs. A total of 45 elderly people deciding to participate were provided with an explanation of the study objectives by the researchers. Of the candidates consenting to cooperate in the study, 34 who implemented reminiscence with nostalgic songs throughout the study period were analyzed. During the 3-

year study period, no subjects participated in more than one program.

## 2. Intervention strategies

### 1) Intervention periods and duration

From September 2012 to February 2013, September 2013 to February 2014, as well as September 2014 to February 2015, monthly reminiscence was performed with nostalgic songs.

### 2) Implementation of reminiscence with nostalgic songs

The present study was conducted in the health and welfare center of the village, in which the subjects resided. Because some of the subjects checked the item “homebound state” in the checklist, reminiscence was performed at intervals of one month in order not to impose psychological, physical, and social burdens on them to an extent that would hinder continued study participation. The intervention was conducted a total of six times, with the same content every time. Each intervention lasted for approximately 90 minutes, and subjects were provided with a 10-minute break during the intervention. The number of staff members involved in this program, including the researchers, was 8-9: one psychiatric nurse as a leader, three psychiatric nurses as co-leaders, one public health nurse as a supporter, and 3-4 volunteers taking care of the subjects’ personal concerns.

During the waiting time before initiating reminiscence, in order to create an atmosphere that would help the subjects recall their past, toys/confectionery that they may have used/consumed in childhood were prepared on a desk, and subjects freely touched them and played with them with staff members. In addition, nostalgic songs were played before performing reminiscence.

Nostalgic songs were used for reminiscence because, by singing them, reading their lyrics, and listening to their melodies again, listeners may be able to recall events and scenes, even those that are usually out of their memory, from the era when these songs were commonly played<sup>7)</sup>. Furthermore, even when it seems that an individual has difficulty verbalizing what they have recalled, nostalgic songs have the effect of facilitating their recall because the lyrics of these songs often represent the experiences, ideas, and feelings that they had when they often listened to the songs<sup>7)</sup>. In addition to songs that are favored by the elderly based on previous studies<sup>7)</sup>, 150 popular or children’s songs with which the subjects were presumably familiar in their childhood were selected, and they were edited according to the “Meiji”, “Taisho”, and “Showa” eras.

For reminiscence, a list of these songs was distributed to the subjects. Each of them chose their favorite song from the list, and 4-5 songs were used for each program. In accordance with shouts from the subjects requesting these songs, all participants sang them together while playing musical instruments. Afterwards, the leader asked subjects requesting their favorite songs to talk freely about what they recalled when singing the songs. The leader listened to these subjects intently in a manner that facilitated the expression of their feelings, and made efforts to understand these feelings in a sympathetic way. In addition, to share the obtained topics with other participants, the leader also talked with them about the topics.

## 3. Methods for data collection

### 1) Assessment scales

#### (1) Revised version of Hasegawa’s Dementia Scale

The Revised version of Hasegawa’s Dementia Scale (HDS-R) is one of the screening tests for

dementia, and comprises the following nine subitems: “age”, “orientation to time”, “orientation to place”, “word memorization”, “calculation”, “backward digit recall”, “delayed recall”, “memorizing objects”, and “word fluency”. The highest possible score is 30 points, with higher scores indicating higher-level cognitive function<sup>8)</sup>. Scores of  $\leq 20$ , 21–27, and  $\geq 28$  points are judged as the presence of cognitive impairment, presence of mild cognitive impairment, and absence of cognitive impairment, respectively<sup>9)</sup>.

#### (2) Mini-Mental State Examination

The Mini-Mental State Examination (MMSE) was developed to measure the level of cognitive impairment<sup>10)</sup>, and comprises the following 11 subitems: “date orientation”, “place orientation”, “memorization”, “attention and calculation”, “delayed recall”, “naming objects”, “repeating phrases”, “3-step commands”, “reading letters”, “writing letters”, and “copying figures”. The highest possible score is 30 points<sup>11)</sup>. Scores of  $\leq 23$ , 24–27, and  $\geq 28$  points are judged as the presence of cognitive impairment, presence of mild cognitive impairment, and absence of cognitive impairment, respectively<sup>9)</sup>.

#### 2) Methods for data collection

Each scale was used before and after reminiscence with nostalgic songs. Approximately one month before the first course of reminiscence and within one month after the final (sixth) course, the researchers conducted one-to-one interviews with the subjects at a facing-type booth to talk about the HDS-R and MMSE. Before study initiation, the researchers practiced interviews repeatedly, and standardized the study procedures, including how to ask the scale-related questions and the time limit for the subjects to answer them.

#### 3) Analysis

The Wilcoxon signed-rank test was used to analyze the differences in the HDS-R and MMSE scores of all subjects before and after the intervention. Concerning the differences in cognitive function levels, the subjects were divided into those “having cognitive impairment”, those “having mild cognitive impairment”, and those “not having cognitive impairment” based on the pre-intervention HDS-R and MMSE scores, as well as according to each scale’s criteria for cognitive impairment. The between-group differences in the total HDS-R/MMSE scores and each subitem score were then analyzed using the Wilcoxon signed-rank test.

The level of significance was set at 0.05 (two-sided) . For all analyses, SPSS 22.0 Statistics Base was used.

#### 4. Ethical considerations

We informed subjects of the study objective and details, and explained that: 1) the obtained data would not be used for purposes other than the study objective, 2) their personal information would be protected, and 3) the study results would be reported in conferences and published in scientific journals. After achieving the understanding of the subjects, we asked them to cooperate with the study. In addition, using oral and written forms, we explained to the subjects that study participation was optional, and non-participation in the study would not result in any demerit for them. Their consent was obtained in written form. The study was conducted with the approval of the ethical review board of a university to which the researchers belonged.

## IV. Study results

### 1. Attributes and cognitive function levels of the subjects

The total number of subjects was 34 during the 3-year study period: 11, 12, and 11 subjects in the first, second, and third years. The mean age of the subjects was 81.4 (SD  $\pm$  5.9) years (Table 1) .

Table 2. shows the number of subjects according to each cognitive function level for each scale. Among subjects who were given the same judgment based on the two scales, the numbers of those “having cognitive impairment”, those “having mild cognitive impairment”, and those “not having cognitive impairment” were 1, 12, and 8, respectively.

Table 1. Subject attributes

Sex	(n)	Age (mean $\pm$ SD)
Males	6	81.3 $\pm$ 7.9
Females	28	81.3 $\pm$ 5.5
Total	34	81.4 $\pm$ 5.9

Table 2. Subjects' cognitive function levels

		(n)	Age (mean $\pm$ SD)
HDS-R	With cognitive impairment	5	84.6 $\pm$ 6.5
	With mild cognitive impairment	18	80.2 $\pm$ 5.5
	Without cognitive impairment	11	82.2 $\pm$ 5.8
MMSE	With cognitive impairment	4	81.2 $\pm$ 6.1
	With mild cognitive impairment	18	81.9 $\pm$ 6.3
	Without cognitive impairment	12	79.8 $\pm$ 3.8

[Note]

1. Scores of  $\leq$  20, 21–27, and  $\geq$  28 points are judged as the presence of cognitive impairment, presence of mild cognitive impairment, and absence of cognitive impairment, respectively.
2. Scores of  $\geq$  23, 24–27, and  $\geq$  28 points are judged as the presence of cognitive impairment, presence of mild cognitive impairment, and absence of cognitive impairment, respectively.

### 2. Comparison of cognitive function before and after the intervention

As shown in Table 3., before and after the intervention, significant differences were noted in the total HDS-R score ( $p < 0.01$ ), as well as in the subitems of “backward digit recall” and “delayed recall” ( $p < 0.01$  and  $p < 0.001$ , respectively) . In addition, significant differences were noted in the total MMSE score ( $p < 0.05$ ) , as well as in the subitems of “orientation to place” and “delayed recall” ( $p < 0.05$  and  $p < 0.01$ , respectively) .

### 3. Comparison of cognitive function according to the level of cognitive function before and after the intervention

As shown in Tables 4. and 5., before and after the intervention, significant differences were noted in the total HDS-R score among subjects “having mild cognitive impairment” and those “having cognitive impairment” ( $p < 0.05$ ) . A significant difference was noted in the subitem of “delayed recall” among subjects “having mild cognitive impairment” and those “having cognitive impairment” ( $p < 0.01$  and  $p < 0.05$ , respectively) . In addition, among subjects “having mild cognitive impairment”, significant differences were noted in the total MMSE score, as well as in the subitem of “delayed recall”, before and after the intervention ( $p < 0.01$  and  $p < 0.05$ , respectively) .

Table 3. Comparison of cognitive function before and after the intervention (n=34)

		Before the intervention	After the intervention	p
HDS-R (Subitems)	(Total)	26.0 (23.8-28.0)	28.0 (24.8-29.0)	.002**
	Age	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.000
	Orientation to time	4.0 (4.0-4.0)	4.0 (3.8-4.0)	.739
	Orientation to place	2.0 (2.0-2.0)	2.0 (2.0-2.0)	.317
	Word memorization	3.0 (3.0-3.0)	3.0 (3.0-3.0)	1.000
	Calculation	2.0 (1.0-2.0)	2.0 (1.0-2.0)	.830
	Backward digit recall	1.0 (1.0-2.0)	2.0 (1.0-2.0)	.007**
	Delayed recall	4.0 (2.8-6.0)	5.5 (5.0-6.0)	.000***
	Memorizing objects	4.5 (4.0-5.0)	5.0 (4.0-5.0)	.398
	Word fluency	5.0 (4.8-5.0)	5.0 (5.0-5.0)	.959
MMSE (Subitems)	(Total)	26.0 (25.0-28.3)	28.0 (26.0-29.0)	.011*
	Date orientation	5.0 (5.0-5.0)	5.0 (5.0-5.0)	.763
	Place orientation	5.0 (4.0-5.0)	5.0 (5.0-5.0)	.046*
	Memorization	3.0 (3.0-3.0)	3.0 (3.0-3.0)	1.000
	Attention and calculation	3.0 (2.0-5.0)	4.5 (2.8-5.0)	.088
	Delayed recall	2.0 (1.0-3.0)	3.0 (2.0-3.0)	.007**
	Naming objects	2.0 (2.0-2.0)	2.0 (2.0-2.0)	1.000
	Repeating phrases	1.0 (1.0-1.0)	1.0 (1.0-1.0)	.257
	3-step commands	3.0 (3.0-3.0)	3.0 (3.0-3.0)	.317
	Reading letters	1.0 (1.0-1.0)	1.0 (1.0-1.0)	.317
	Writing letters	1.0 (1.0-1.0)	1.0 (1.0-1.0)	.317
	Copying figures	1.0 (1.0-1.0)	1.0 (1.0-1.0)	.655

The Wilcoxon signed-rank test \* : p<.05 \*\*p<.01 \*\*\*p<.001  
Median (interquartile range)

Table 4. Comparison of cognitive function before and after the intervention according to the level of cognitive function as assessed by the HDS-R

	Group with cognitive impairment (n=5)		p	Group with mild cognitive impairment (n=18)		p	Group without cognitive impairment (n=11)		p	
	Before the intervention	After the intervention		Before the intervention	After the intervention		Before the intervention	After the intervention		
HDS-R (Total)	19.0 (18.0-19.5)	25.0 (20.5-27.5)	.043*	25.0 (24.0-26.3)	28.0 (24.0-29.0)	.011*	28.0 (28.0-29.0)	29.0 (28.0-30.0)	.660	
Age	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.000	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.000	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.000	
Orientation to time	4.0 (3.0-4.0)	3.0 (3.0-4.0)	.564	4.0 (4.0-4.0)	4.0 (3.0-4.0)	.317	4.0 (4.0-4.0)	4.0 (4.0-4.0)	.157	
(Subitems)	Orientation to place	2.0 (1.5-2.0)	2.0 (2.0-2.0)	.317	2.0 (2.0-2.0)	2.0 (2.0-2.0)	1.000	2.0 (2.0-2.0)	2.0 (2.0-2.0)	1.000
	Word memorization	3.0 (3.0-3.0)	3.0 (3.0-3.0)	1.000	3.0 (3.0-3.0)	3.0 (3.0-3.0)	1.000	3.0 (3.0-3.0)	3.0 (3.0-3.0)	1.000
	Calculation	2.0 (1.5-2.0)	2.0 (2.0-2.0)	.317	2.0 (1.0-2.0)	2.0 (1.0-2.0)	.803	2.0 (2.0-2.0)	2.0 (1.0-2.0)	.655
	Backward digit recall	1.0 (0.5-2.0)	2.0 (1.0-2.0)	.157	1.0 (1.0-1.3)	1.0 (1.0-2.0)	.059	2.0 (1.0-2.0)	2.0 (1.0-2.0)	.157
	Delayed recall	3.0 (1.0-3.5)	4.0 (3.0-5.5)	.034*	3.5 (2.5-5.0)	5.0 (5.0-6.0)	.001**	6.0 (5.0-6.0)	6.0 (5.0-6.0)	1.000
	Memorizing objects	4.0 (2.5-4.0)	4.0 (3.0-4.5)	.317	5.0 (4.0-5.0)	5.0 (4.0-5.0)	.755	5.0 (4.0-5.0)	5.0 (4.0-5.0)	.655
	Word fluency	0.0 (0.0-2.0)	4.0 (1.0-5.0)	.109	5.0 (5.0-5.0)	5.0 (5.0-5.0)	.339	5.0 (5.0-5.0)	5.0 (5.0-5.0)	.317

The Wilcoxon signed-rank test \* : p<.05 \*\*p<.01  
Median (interquartile range)

Table 5. Comparison of cognitive function before and after the intervention according to the level of cognitive function as assessed by the MMSE

	Group with cognitive impairment (n=4)			Group with mild cognitive impairment (n=18)			Group without cognitive impairment (n=12)			
	Before the intervention	After the intervention	p	Before the intervention	After the intervention	p	Before the intervention	After the intervention	p	
MMSE (Total)	23.0 (22.3-23.0)	26.5 (24.5-27.8)	.066	25.0 (25.0-26.3)	27.5 (26.0-29.0)	.004**	29.0 (28.0-30.0)	28.5 (28.0-29.0)	.250	
Date orientation	5.0 (4.3-5.0)	4.5 (4.0-5.0)	.317	5.0 (4.8-5.0)	5.0 (5.0-5.0)	.705	5.0 (5.0-5.0)	5.0 (5.0-5.0)	.564	
Place orientation	4.0 (3.3-4.8)	5.0 (4.3-5.0)	.083	5.0 (4.0-5.0)	5.0 (4.8-5.0)	.206	5.0 (5.0-5.0)	5.0 (5.0-5.0)	.564	
Memorization	3.0 (3.0-3.0)	3.0 (3.0-3.0)	1.000	3.0 (3.0-3.0)	3.0 (3.0-3.0)	1.000	3.0 (3.0-3.0)	3.0 (3.0-3.0)	1.000	
Subjects	Attention and calculation	2.0 (1.3-2.0)	4.0 (2.5-4.8)	.102	2.0 (1.0-4.3)	3.5 (2.0-5.0)	.080	5.0 (5.0-5.0)	5.0 (4.0-5.0)	.416
	Delayed recall	0.0 (0.0-0.8)	2.0 (1.3-2.0)	.083	2.0 (1.0-3.0)	3.0 (2.0-3.0)	.011*	3.0 (2.0-3.0)	3.0 (2.0-3.0)	1.000
	Naming objects	2.0 (2.0-2.0)	2.0 (2.0-2.0)	1.000	2.0 (2.0-2.0)	2.0 (2.0-2.0)	1.000	2.0 (2.0-2.0)	2.0 (2.0-2.0)	1.000
	Repeating phrases	1.0 (1.0-1.0)	0.5 (0.0-1.0)	.157	1.0 (1.0-1.0)	1.0 (1.0-1.0)	.564	1.0 (1.0-1.0)	1.0 (1.0-1.0)	.157
	3-step commands	3.0 (3.0-3.0)	3.0 (3.0-3.0)	1.000	3.0 (3.0-3.0)	3.0 (3.0-3.0)	.317	3.0 (3.0-3.0)	3.0 (3.0-3.0)	1.000
	Reading letters	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.000	1.0 (1.0-1.0)	1.0 (1.0-1.0)	.317	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.000
	Writing letters	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.000	1.0 (1.0-1.0)	1.0 (1.0-1.0)	.317	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.000
	Copying figures	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.000	1.0 (0.8-1.0)	1.0 (1.0-1.0)	.317	1.0 (1.0-1.0)	1.0 (1.0-1.0)	.317

The Wilcoxon signed-rank test \* : p<.05 \*\*p<.01  
 Median (interquartile range)

## V. Discussion

### 1. Effects of reminiscence on the subjects' cognitive function

We assessed the effects of reminiscence with nostalgic songs on the subjects' cognitive function. As a result, significant increases were noted in the HDS-R and MMSE scores after the intervention. Previous studies reported that reminiscence with nostalgic songs has the effect of helping an individual recall the experiences that they have forgotten by relating these experiences to the songs<sup>7)</sup>. The results of our study suggest that reminiscence with nostalgic songs facilitated the subjects' recall, and activated various brain functions involved in cognitive function, including the hippocampus that underlies the memory and recall functions<sup>12)</sup>. Memory recall refers to story consideration; the frontal lobes, Broca's area, amygdaloid complex, and Wernicke's area control consideration, speech, emotions, and the understanding of speech, respectively<sup>12)</sup>.

We suggest that, by performing reminiscence with nostalgic songs, subjects recalled their memories, re-experienced emotions associated with these memories, considered the memories as stories in order to tell them to other people, and understood speech, and their higher brain functions (e.g., the frontal lobes) were activated. On the other hand, singing nostalgic songs while playing musical instruments or reading their lyrics, as well as listening to other people's musical performances or singing, represents demonstrating sophisticated and high-level skills that involve keeping rhythms along with motions, as well as taking a harmony according to other people's singing voices or sounds. The motor area of the brain controls playing musical instruments, the parietal/occipital lobes control reading lyrics and keeping rhythms, and the somatosensory area controls hearing through the thalamic<sup>12)</sup>.

To prevent memory decline, tackling a dual task is more effective than tackling a single task<sup>13)</sup>.

Because reminiscence with nostalgic songs is an activity in which an individual tackles multiple tasks at the same time, such as reading lyrics, singing songs, and/or keeping rhythms while playing musical instruments, we suggest that it prevented cognitive dysfunction or improved subjects' cognitive function.

Backward recall is a sensitive index for measuring attention function <sup>14)</sup> and, in our study, the score for the HDS-R subitem of "backward digit recall" significantly increased after the intervention, which suggests that reminiscence with nostalgic songs is also effective to improve attention function.

The score for the subitem of "delayed recall", which is used to assess recent memory, significantly increased after the intervention for both the HDS-R and MMSE. Impaired recent memory, so-called "forgetfulness", refers to a state in which an individual is unable to maintain their memory for more than a few minutes while dealing with interference in the form of other information <sup>15)</sup>. We suggest that reminiscence with nostalgic songs has the effect of improving cognitive function, particularly recent memory.

The MMSE subitem of "orientation to place" and the HDS-R/MMSE subitem of "delayed recall", whose scores significantly increased after the intervention, are related to hippocampal function <sup>16)</sup>. Because the hippocampus is located very close to the auditory area of the temporal region, listening to music helps an individual recall their past <sup>17)</sup>. The results of our study indicate that, through reminiscence, in which subjects sang nostalgic songs while playing musical instruments, listened to them (sounds, melodies, and lyrics), and recalled their past, the hippocampus was activated and memory recall was facilitated, leading to improvement in memory function.

In the present study, the leader listened intently to the accounts of the subjects, particularly their feelings, in a sympathetic way, and made efforts to encourage them to express their feelings. Feeling is divided into "emotion" and "mood", and an emotion refers to a temporary feeling that occurs in response to an event or scene <sup>18)</sup>. The hypothalamus plays an important role in expressing emotions <sup>18)</sup>, and forms the Papez circuit as a neural circuit that involves the hippocampus <sup>15)</sup>. <sup>19)</sup> Yamane et al. reported that playing musical instruments influences one's emotions <sup>20)</sup>, and we suggest that the Papez circuit was activated through such influence, as well as through memory recall that facilitated the expression of feelings and emotions, leading to increases in the scores for the subitems of "orientation to place" and "delayed recall".

## **2. Difference in the effects of reminiscence according to the level of cognitive function**

Both subjects with and without cognitive impairment showed no significant differences in the HDS-R or MMSE score before and after the intervention, but subjects with mild cognitive impairment showed significant increases in these scores after the intervention. "Mild cognitive dysfunction" in this study is based on HDS-R and MMSE criteria <sup>9)</sup> and it is not possible to evaluate possible dementia, but there is a risk of transitioning to suspicion of dementia when it is left unattended. These results indicate that reminiscence with nostalgic songs has the effect of improving the cognitive function of elderly people with mild cognitive impairment. Therefore, such reminiscence may be applicable as psychotherapy aimed at preventing cognitive dysfunction or improving cognitive function. In addition, subjects with mild cognitive

impairment showed a significant increase only in the scores for the HDS-R/MMSE subitem of “delayed recall” after the intervention, which indicates that reminiscence with nostalgic songs prevents elderly people with mild cognitive impairment from experiencing a decline in recent memory.

### 3. Study limitations and insight into future studies

The total number of subjects was low (n=34) during the 3-year study period. In addition, because the study did not involve control subjects, the beneficial effects of reminiscence could not be fully investigated.

When multiple scales are used for elderly people, including latter-stage elderly people, like we did in the present study, the testing imposes heavy mental and physical burdens on them. Furthermore, if involving control subjects and simply asking them to cooperate in testing, ethical issues may arise due to the test-related burden imposed on them.

From the perspective of the objectivity of the study results, there is a need to conduct control studies with more subjects in order to clarify the probability of the intervention results. For this purpose, it is necessary to first reduce the burden of cognitive function tests on elderly subjects, and then advance ideas regarding study designs, such as assigning community-dwelling homebound people who meet the study criteria and are participants in other care prevention programs as control subjects.

## VI. Conclusion

Community-dwelling homebound elderly people implementing reminiscence with nostalgic songs showed significant increases in their HDS-R and MMSE scores. In addition, as a result of comparing these scores according to the level of cognitive function before and after the intervention, among subjects with mild cognitive impairment, the scores for the subitem of “delayed recall” significantly increased in both the HDS-R and MMSE.

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