

A Comparison of Depressive Mood of Older Adults in a Community, Nursing Homes, and a Geriatric Hospital: Factor Analysis of Geriatric Depression Scale

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ABSTRACT

The Geriatric Depression Scale (GDS)-15 was used in 607 adults aged 65+ years living in a community, nursing homes, and a general hospital to explore characteristics of depressive mood in different care settings. Factor analysis of GDS-15 extracted 4 factors labeled unhappiness, apathy and anxiety, loss of hope and morale, and energy loss. The scale scores labeled unhappiness, apathy and anxiety, and loss of hope and morale were negatively correlated with the Barthel Index and the Mini-Mental State Examination scores. The results classified the depressive patterns into 2 types, one fitting the nursing home residents and the other fitting the hospital patients. The dominant factors of the nursing-home type were unhappiness and loss of hope and morale, and the hospital type was highly related with apathy and anxiety. The results indicate an extended utility of the GDS-15 for a deeper understanding of depressive mood in various care settings. (*J Geriatr Psychiatry Neurol* 2006;19:26-31).

Keywords: depressive mood; Geriatric Depression Scale; factor analysis

Depression is one of the most common and insidious problems for older adults, including those in long-term care settings. Although nursing home residents and geriatric hospital patients often receive comprehensive assessments involving instruments programmed to evaluate depression, it has been suggested that clinicians tend to underestimate the presence of depression, possibly because depressive symptoms may be assumed to be a

part of normal aging, not related to the disease of depression, and therefore are sometimes overlooked.¹ We previously reported on the relationship between functional disabilities and depressive mood in older patients admitted to the geriatric ward of a general hospital using factorial analysis.² The results clarified factorial components of the Geriatric Depression Scale (GDS)-15,³ which consists of 4 major factors. Two of those factors, "loss of morale and hope" and "memory loss and reduction of social activity," were significantly correlated with the presence of functional disabilities; thus, we concluded that depression associated with physical and/or cognitive handicaps could be reflected in patterns of GDS scores. However, as suggested in our report, the features of depression affected by acute medical conditions in hospitalized elderly patients may not always be generalized to older adults living in a community or other long-term care settings.

In this study, we extended this line of research to include a community and several nursing homes, both to apply this new and easy method using factorial analysis and to clarify the differences in patterns of depressive mood among these 3 settings.

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Table 1. Profiles of the Participants in Three Settings

	<i>N</i>	<i>Age</i>	<i>Basic ADL</i>	<i>MMSE</i>	<i>GDS-15</i>
Community	184	71.5 ± 7.5	19.7 ± 0.8	27.9 ± 0.4 ^a	5.1 ± 3.5
Nursing homes	178	82.4 ± 6.1	13.8 ± 4.6	21.0 ± 4.5	8.6 ± 2.1
General hospital	245	77.4 ± 6.6	17.7 ± 4.0	25.7 ± 4.2	5.7 ± 3.8
Total	607	79.4 ± 9.6	17.2 ± 4.2	24.7 ± 4.4	6.4 ± 3.6

Note: ADL = activities of daily living; MMSE = Mini-Mental State Examination; GDS = Geriatric Depression Scale.

a. MMSE was measured in 22 randomly sampled older adults in the community. The comparative analysis including residents in the community was not performed.

** $P < .01$

METHODS

Participants and Measurements

We sampled 928 adults aged 65 years or over. Among these, we consecutively enrolled 184 community-dwelling residents in Tsukude village, a rural village in central Japan, 389 residents in 4 nursing homes (mean length of stay, 409 ± 313 days at the survey), and 355 patients admitted to the geriatric ward of a teaching general hospital. In the community, data were collected from physically and cognitively independent volunteers visiting a health care center for an annual health check. All participants were asked to complete the Japanese version of short form GDS-15⁴ and the Barthel Index⁵ to assess their basic activities of daily living (ADL), with the assistance of attending staff if necessary. The GDS-15 is a well-established assessment scale for depressive mood, consisting of 15 self-administered alternative (yes/no) questions. A higher score indicates a greater degree of depressive mood with a cutoff score set at 6/6+.⁶ All nursing home residents and all hospital patients underwent the Mini-Mental State Examination (MMSE),⁷ administered by the attending doctors for hospital patients and by nurses for nursing home residents. In the community, because of availability of staff, MMSE was measured in 22 randomly sampled older adults to represent their cognitive status. Participants who were unable to answer the questionnaires because of acute illness and those who declined to cooperate with the study were excluded. Also in accordance with previous reports^{8,9} regarding the validity of the GDS, participants who scored below 15 on the MMSE were excluded. As a result, 211 nursing home residents and 110 hospital patients were not included, and the data of remaining 607 participants (female 56.7%; mean age 77.1 ± 8.0 SD) were used for analysis.

Statistical Analysis

Correlation coefficients were calculated by Pearson's method for parametric data and by Spearman's method for nonparametric data. Differences in continuous variables among more than 2 groups were determined by a one-way analysis of variance, and Tukey's test was used for subsequent multiple comparisons. Kruskal-Wallis test was used for categorical comparisons of the nonparametric

data. The internal consistency of the GDS-15 was calculated with Cronbach's α . The principal factor analysis for the GDS-15 was performed with an eigenvalue of 1.0 or more as the extraction criterion, and factors were identified after varimax rotation. Scale scores were calculated by counting the number of scored items belonging to the factors extracted from the GDS-15. Values of $P < .05$ were considered to indicate statistical significance, and all tests were 2-tailed. All statistical analyses were performed on a personal computer with the statistical software package SPSS for Windows version 11.0 (SPSS Inc, Chicago, IL).

RESULTS

Table 1 shows the mean age, basic ADL, MMSE, and GDS-15 scores for each group of participants. Basic ADL and MMSE scores were highest in the community and lowest in the nursing homes. The mean GDS-15 score of all the participants was 6.4 ± 3.6 SD, and 49.7% of them scored above 6. The GDS-15 score was significantly higher in the nursing homes than in the other settings, and no fewer than 87.6% of the nursing home residents had a GDS-15 score above 6.

Table 2 shows depressive response rate (the rate of respondents who had an alternative choice representing depressive mood) for each GDS-15 item in the 3 groups. Nursing home residents scored significantly higher than the other 2 participant groups on the following 10 of the 15 items: satisfied, dropped activities, emptiness, often bored, in good spirits, feels happy, prefers to stay in, wonderful to be alive, feels worthless, and feels situation is hopeless. "Full of energy" was the only item in which the hospital patients scored highest. The internal consistency of the GDS-15 was high, with Cronbach's α being .778. The factor analysis of GDS-15 extracted 4 factors, whose loading values are shown in Table 3. Factor I represented "unhappiness," which included the items 1, satisfied; 5, in good spirits; 7, feels happy; and 11, wonderful to be alive. Factor II, labeled "apathy and anxiety," was made up of 6 items: 2, dropped activities and interest; 3, emptiness; 4, often bored; 6, afraid something bad will happen; 8, often feels helpless; and 15, most people better off than self. Factor III, labeled "loss of hope and morale," included 4 items: 9, prefers to stay in; 10, more problems with memory than most; 12, feels worthless; and 14, feels situation is

Table 2. Depressive Response per Group to Each Geriatric Depression Scale-15 Item

	Community	Nursing Homes	General Hospital	Kruskal-Wallis Test (P)
1. Satisfied	26.0	75.1	19.8	<.001
2. Dropped activities and interest	40.0	55.9	51.3	<.001
3. Emptiness	18.9	41.7	33.9	<.001
4. Often bored	15.4	46.0	28.9	<.001
5. In good spirits	33.4	88.1	21.8	<.001
6. Afraid something bad will happen	40.2	50.3	50.6	.076
7. Feels happy	28.7	81.8	21.9	<.001
8. Often feels helpless	52.6	68.6	63.0	.007
9. Prefers to stay in	43.4	60.8	43.0	<.001
10. More problems with memory than most	66.3	64.4	54.0	.021
11. Wonderful to be alive	27.0	65.9	22.2	<.001
12. Feels worthless	17.2	41.8	28.9	<.001
13. Full of energy	46.0	33.5	63.1	<.001
14. Feels situation is hopeless	30.9	52.5	43.2	<.001
15. Most people better off than self	29.7	33.0	30.8	.795

Note: Bold indicates highest; italic indicates lowest.

Table 3. Principal Factor Analysis (Varimax) of the Geriatric Depression Scale-15

Item	Factor I Unhappiness	Factor II Apathy and Anxiety	Factor III Loss of Hope and Morale	Factor IV Energy Loss
1. Satisfied	0.776			
2. Dropped activities and interest		0.413		
3. Emptiness		0.756		
4. Often bored		0.532		
5. In good spirits	0.746			
6. Afraid something bad will happen		0.421		
7. Feels happy	0.771			
8. Often feels helpless		0.385		
9. Prefers to stay in			0.280	
10. More problems with memory than most			0.247	
11. Wonderful to be alive	0.684			
12. Feels worthless			0.567	
13. Full of energy				0.475
14. Feels situation is hopeless			0.690	
15. Most people better off than self		0.418		
Explained variance	2.3	1.8	1.4	0.5
Cumulative percentage of variance explained	15.3	27.5	36.8	40.3

Note: The factor score was calculated by a regression method, which cumulated factor loadings of all items of Geriatric Depression Scale-15.

hopeless. Factor IV, labeled “energy loss,” included the item 13, full of energy. The cumulative percentage of variance explained was 40.3%.

The GDS-15 score had a significant negative correlation with basic ADLs (Pearson’s $r = -.304, P < .001$) and with MMSE score ($r = -.220, P < .001$), but not with age. Table 4 shows the correlations between the scale score of each factor extracted from GDS-15 and age, basic ADL, and MMSE score. The scale scores of factors I, II, and III were negatively correlated with basic ADL and MMSE scores, whereas that of factor IV showed significant positive correlations with basic ADL and MMSE scores.

Based on the results of the scale-score calculations, a radar chart was created to analyze patterns in the GDS-15 scores. Figure 1 illustrates the patterns of 3 care settings. The pattern in nursing homes was wide above and below, indicating large contributions of Factors I (unhappiness) and III (loss of hope and morale) to the participants’

depressive mood. On the other hand, the pattern in the general hospital had a sharply pointed shape, which suggested the large contribution of factor II (apathy and anxiety).

DISCUSSION

In the present study, most of the nursing home residents were in a depressive mood. Their average GDS-15 score was 8.6 ± 2.1 SD, higher than in the studies of nursing home residents by Sutcliffe et al,¹⁰ Casarett et al,¹¹ and Rinaldi et al,¹² which showed averages of 5.4 ± 3.2 SD, 5.6 ± 4.4 SD, and 6.7 ± 3.8 SD, respectively. With an intent to secure the validity of the GDS-15, we excluded participants with moderate and severe cognitive impairment. Rinaldi et al included participants with MMSE scores of 5 or higher (mean MMSE score 20.0 ± 6.1 SD), and Sutcliffe et al had no exclusion criteria based on MMSE score.

Table 4. Correlation Coefficients Between the Scale Scores of the Factors Extracted From GDS-15 and Age, Basic ADL, and MMSE Score

Item	Factor I Unhappiness	Factor II Apathy and Anxiety	Factor III Loss of Hope and Morale	Factor IV Energy Loss
Age	.065 <i>P</i> = .131	.273* <i>P</i> < .001*	.043 <i>P</i> = .322	-.095* <i>P</i> = .027*
Basic ADL	-.374* <i>P</i> < .001*	-.167* <i>P</i> < .001*	-.169* <i>P</i> < .001*	.108* <i>P</i> = .010*
MMSE	-.263* <i>P</i> < 0.001*	-.098* <i>P</i> = .017*	-.164* <i>P</i> < .001*	.083* <i>P</i> = .043*

Note: GDS = Geriatric Depression Scale; ADL = activities of daily living; MMSE = Mini-Mental State Examination. Correlation coefficients between age and the factors were calculated by Spearman's method, and those between basic ADL, MMSE and the factors were calculated by Pearson's method.

**P* < .05.

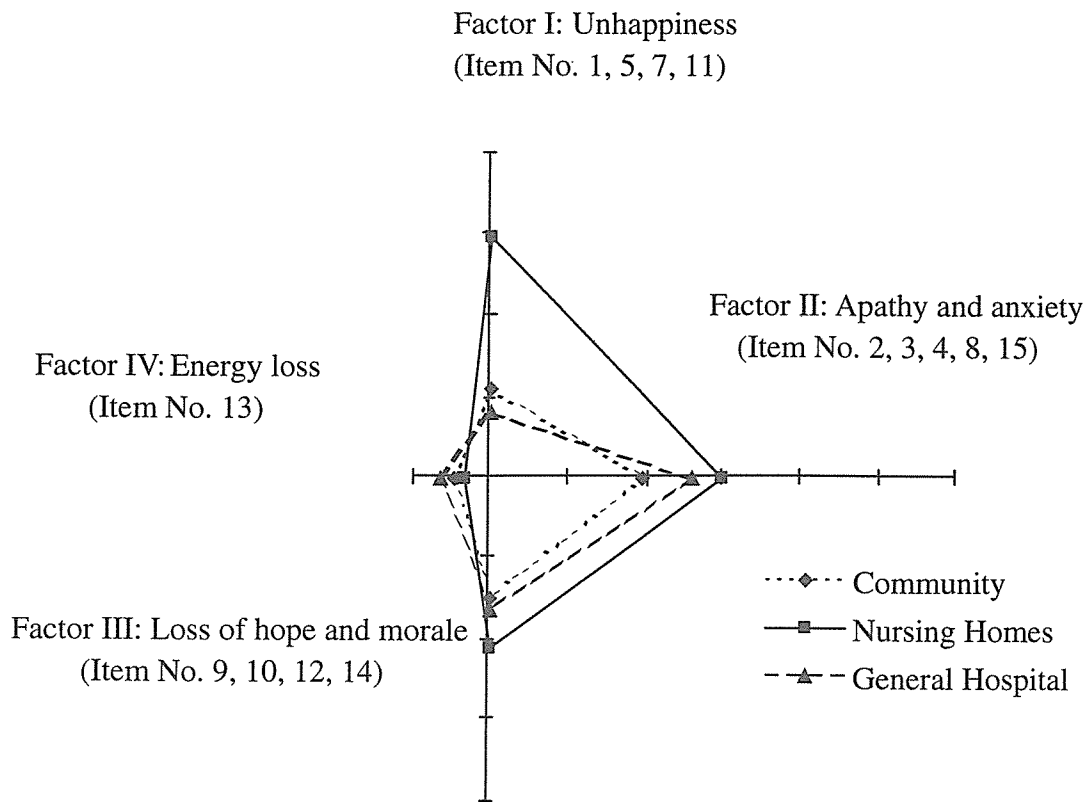


Figure 1. The factorial pattern on a Geriatric Depression Scale (GDS)-15 radar chart for the participants in a community, nursing homes, and a general hospital.

On the other hand, Casarett's samples had higher cognitive abilities (mean MMSE score 27.4 ± 1.7 SD) than our participants. Thus, higher average GDS-15 score in the present study relative to the above reports may be attributable to variability of participants' cognitive status. Another explanation for the discrepant results may be that because there was a wide range in the residents' length of stay, our study may have included participants who were still in their transitional period trying to adjust to the nursing home environment. Therefore, our results may not necessarily reflect persistent psychological status of nursing home residents. On the other hand, hospital patients showed significantly higher GDS-15 scores than the community residents, which is consistent with the

previous findings suggesting that acute medical conditions or exacerbations of chronic illnesses may be associated with depressive mood.¹³⁻¹⁵

The present study revealed that depressive symptoms in older adults are common in long-term care settings. The factorial analysis demonstrated clear associations of physical/cognitive status with depressive mood. The results of this study showed a similar factorial structure of GDS-15, which is comparable to the results of a previous Japanese study^{6,16} as well as those reported from countries with different ethnicities.¹⁷⁻¹⁹ All of the factors extracted from GDS-15 had rather weak but significant correlations with basic ADL and MMSE scores. In particular, Factors I (unhappiness) and III (loss of hope and morale) showed

stronger negative correlations with basic ADL and MMSE scores than the other factors. These findings indicate that Factors I and III can be especially enhanced by physical and/or mental disabilities; thus, these factors may be associated with secondary depression.

As shown in the radar chart, it is interesting that the pattern of GDS-15 scores in the nursing homes was vertically wide, indicating strong contributions by Factors I (unhappiness) and III (loss of hope and morale) to depressive moods, whereas the pattern in the hospital was extended far out to the right relative to other factors, indicating a relatively strong contribution by Factor II (apathy and anxiety). Thus, when older adults show the nursing-home type depressive pattern with dominant factors influenced highly by functional handicaps, clinicians should endeavor to alleviate the handicaps—for example, by improving the care environment through more adequate care services or extending the patient's remaining functional abilities. On the other hand, when older adults show the hospital-type depressive pattern, clinicians should pay attention to the temporary nature of depressive moods derived from acute physical or mental deterioration. An understanding of the differences in depressive patterns can be useful in formulating clinical interventions. However, a limitation of this study is that it did not take the time course of functional disabilities of the study sample into consideration. Ormel et al²⁰ clarified that basic ADL/instrumental ADL disability and depression are mutually reinforcing over time in a community-based cohort study. Therefore, a speculation arises, regarding the structural difference of depressive mood in different care settings, that it may be the length of time participants have been suffering from functional disabilities, not their environment of care, that explains the difference we observed in this study. Longitudinal studies tracking hospital inpatients who move into nursing homes for the assessment of changes in their depressive mood would be necessary to address this issue. The other limitation is that the findings do not address the influence of quality of care or treatment on depressive mood of the study participants. An interventional approach may clarify whether the environment of care can affect depressive mood of older adults with functional disabilities.

In summary, we carried out a factorial analysis of GDS-15 in older adults in a community, nursing homes, and a geriatric ward of a general hospital and extracted 4 factors, labeled unhappiness, apathy and anxiety, loss of hope and morale, and energy loss. Among the 3 settings, depressive mood was observed most frequently in the nursing homes. The depressive patterns of GDS-15 scores were classified into 2 types, 1 fitting the nursing home residents and the other fitting the hospital patients. The dominant factors of the nursing-home type depressive pattern were unhappiness and loss of hope and morale, which were influenced highly by the participants' func-

tional handicaps, and the hospital-type depressive pattern was highly related to apathy and anxiety. The results indicate an extended utility of the GDS-15 for a deeper understanding of depressive mood in different care settings; this instrument may help staff and clinicians to more accurately identify those who are depressed and initiate an appropriate treatment intervention.

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Influence of behavioral and psychological symptoms of dementia (BPSD) and environment of care on caregivers' burden

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Abstract

With increasing population of older adults in need of care, caregiver's burden is becoming a major concern. We investigated the relative contributions of BPSD of care recipients, caregiver's background and the care environment to caregiver's burden assessed by using Zarit burden interview (ZBI). Among BPSD, inability of finding the way home, inability of managing money and fecal incontinence were the most difficult symptoms to cope with. A path analysis, by which we constructed a network model to clarify the contributions of the factors examined to the caregiver's burden, indicated that the severity of dementia, the feeling of "would rather die than be in the same condition" and the physical pain of the caregivers showed great direct influences on the score of the ZBI. In conclusion, we clarified kinetic and dynamic interactions of factors affecting caregiver's burden by using a path analysis. The model indicates that the caregiver's burden can be affected not merely by the illness of the care recipients but by the caregiver's background and the care environment.

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Keywords: Care burden; Path analysis; Behavioral and psychological symptoms of dementia (BPSD)

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1. Introduction

The proportion of the population made up of individuals aged 65 and older in Japan exceeded 19.0% in 2003 (MHLW, 2003). Among the elderly population, 13% were estimated to be in need of care due to their physical or mental disabilities (MHLW, 2000). According to the MHLW (2001), 71.1% of elderly care recipients who live at home are receiving care primarily from their family members. The Japanese government launched public long-term care insurance in the year 2000, with an aim of providing care recipients with the relevant care services according to their level of disability. Because the present system for evaluating the level of disability is still in its developmental stage, further revisions are required with particular reference to the adequate assessment of dementia and related behavioral disturbances, which must be reflected in the evaluation of relevant care needs. Previous reports have demonstrated an association between the caregiver's burden and both the BPSD and the care environment, but how these factors contribute to the increase of the caregiver's burden remains to be clarified. Because the caregiver's burden is a multi-layered phenomenon involving various factors on both sides (care recipients and caregivers), clarification of the complicated relationship between these factors and the caregiver's burden should lead to a better understanding of how the burden increases, and thus of what interventions might help to reduce it.

In this study, in an attempt to clarify the structure of the caregiver's burden and how it develops, we here applied a network model using path analysis.

2. Subjects and methods

2.1. Subjects

A total of 116 caregivers of elderly patients were enrolled in this study. All patients were care recipients who either attended the geriatric outpatient of the Nagoya University Hospital or used in-home care services from community service providers. Written informed consent was obtained from all participants.

2.2. Measurements

A structured questionnaire was handed or sent to the caregivers of the care recipients. The questionnaire asked about the care recipient's and caregiver's background, clinical conditions, care environment, familial and economic status, and the caregiver's burden was sent to each of the caregivers. The severities of physical disability and dementia were evaluated according to the criteria shown in Tables 1 and 2. These criteria are normally used for evaluating the level of disability when care recipients apply for services provided for by the public long-term care insurance policy. Respondents were also queried in regard to the types of services provided and the presence or absence of an intimate counselor and an alternative caregiver. In addition, the caregivers were asked whether or not they had to relocate in order to provide care, whether the demands of providing care had forced them to

Table 1
Criteria of the severity of physical disability

1	Almost independent in daily living despite some disabilities and able to go out of home by self, going out of home by self using public transportation
2	Almost independent in daily living despite some disabilities and able to go out of home by self, going out of home by self within neighborhood
3	Almost independent in domestic daily living but unable to go out of home without assistance, spending most of day time out of bed and able to go out of home with assistance
4	Almost independent in domestic daily living but unable to go out of home without assistance, spending a considerable day time in bed and seldom go out of home
5	Spending most of day time in bed and require any assistance in daily activities but able to keep sitting position, able to move to a wheel chair from bed and do eating and toileting out of bed
6	Spending most of day time in bed and require any assistance in daily activities but able to keep sitting position, require assistance to move to a wheel chair
7	Bed ridden all the time and require assistance for toileting, eating and dressing, unable to roll over without assistance
8	Bed ridden all the time and require assistance for toileting, eating and dressing, unable to roll over without assistance

quit their job, whether they found their role rewarding, and whether they ever took time off from providing care.

The BPSD of the patients were assessed using an original list (Table 3). The lists consisted of 18 symptoms (nos. 1–18) included in the primary assessment dataset of the public long-term care insurance and 17 symptoms (nos. 19–35) selected from the lists applied in previous studies (Sanford, 1975; Greene et al., 1982; Baumgarten et al., 1990). For each applicable symptom, the caregivers were asked to rate the degree of difficulty in coping with the symptom by providing a score ranging from 0 (none) to 10 (very severe).

The caregiver's burden was assessed by the Zarit burden interview (ZBI) (Zarit et al., 1980). The ZBI has 21 questions with four choices for each item, and the total score (full score: 84) was used for the analyses. We also asked the caregivers to self-rate their overall sense of burden and life satisfaction on a scale of 0 (extremely low) to 100 (extremely high).

Table 2
Criteria of the severity of dementia

0	Not demented
1	Almost independent both domestically and socially despite some dementia symptoms
2	Hampered in daily living with mental symptoms, abnormal behaviors and communication disorders, but barely maintain independence with close supervision by others
3	In constant need for assistance because of incapacity due to mental symptoms, abnormal behaviors and communication disorders. Problematic symptoms or behaviors are observed
4	Incapacitated in daily living with frequent mental symptoms, abnormal behaviors and communication disorders, and unable to maintain independence without assistance by others
5	In need of specialized medical care because of extreme mental disorders, problematic behaviors or severe physical ailments persistent manifestation of psychiatric symptoms such as delirium, delusion, agitation, or self-inflicting injury

Table 3
The list of BPSD

1	Delusion of being robbed
2	Confabulation or spread around
3	Hallucination
4	Changeable mood
5	Sleep disturbance
6	Verbal and non-verbal abuse
7	Repeated story
8	Loud voice
9	Resistant to care
10	Wandering
11	Restlessness
12	Inability in finding the way home
13	Request to go home
14	Hording useless things
15	Inability of managing the hot things
16	Destroying property
17	Filthy behavior
18	Allotriophagy
19	Confusion between present and past
20	Misrecognition for family
21	Misrecognition of acquaintance
22	Inability of managing money
23	Inappropriate sexual behavior
24	Hiding things
25	Compulsive behavior
26	Misinterpretation for caregivers' contact
27	Hanging around persistently, repetitive question
28	Disturbing conversation
29	Waking caregiver up
30	In need to be watched out
31	Reduction of interest
32	Appears unhappy or depressed
33	Abnormal appetite
34	Urinary incontinence
35	Fecal incontinence

In addition to the above assessment of caregiver's burden, with an aim to clarify relative contributions of caregiver's feeling to the burden, two questions asking a sense of loss as the care recipient's cognition declines and whether or not he/she would rather die than be in the same condition were included in the questionnaire. Also, a covert wish if the care recipient would disappear and a latent desire for dying to escape from the burden were asked.

2.3. Statistics

Pearson's correlation coefficients (r) were calculated for parametric data and Spearman's rank of order correlation coefficients (ρ) were calculated for non-parametric data. We used the chi-square test with Yates correction, and Fisher's exact test for

categorical comparisons of the data. Differences in the means of continuous measurements among the groups were tested using the Student's *t*-test and one-way analysis of variance (ANOVA). Tukey's test was performed for multiple comparisons when ANOVA showed a significant difference. The internal consistency of the ZBI was calculated by Cronbach's alpha. Multiple regression analysis, using the step-wise method with the variables of significant measures detected in the univariate analyses, was conducted to identify the factors contributing to the ZBI. Patients whose relevant data was missing were excluded from the multivariate analysis. To clarify the process by which the caregiver's burden develops, a path analysis was performed for the variables which had a significant relationship with the ZBI, using multiple regression method as described by Munro (2001) and Polit (1996). Path analysis is an extension of the regression model, used to test the fitness of the correlation matrix. A *p*-value of <0.05 was considered to indicate statistical significance; all tests were two-tailed. All statistical analyses were performed on a personal computer with the statistical package SPSS 11.0 and Amos 4.02 for Windows (SPSS Inc., Chicago, IL).

3. Results

3.1. Attributes of the care recipients

Seventy-four percent of the care recipients were female. The mean age of the recipients was 79.8 ± 9.1 years (here and in all other cases \pm S.D.), and the mean duration of receiving care was 46.6 ± 42.1 months. The numbers of cohabitants were: none (6.4%), one (14.7%) and more than two (78.9%). The mean severity of physical disability was 3.2 ± 2.0 , and the mean severity of dementia was 2.0 ± 1.3 . A majority (94.4%) of all the care recipients surveyed used some care services as follows: day service (73.8%), respite care (25.2%), home visit care (25.2%), use of supporting instruments of care (21.5%), home visit nursing (10.3%), home visit by physician (8.4%), bathing service (3.7%), home visit dentistry (2.6%) and in-home rehabilitation (0.9%).

3.2. Attributes of the caregivers and the care environments

A majority (84%) of the caregivers were female. The caregivers' relationships to the care recipients were: spouse (30.4%), daughter (30.4%), daughter-in-law (27.8%), son (8.7%) and others (2.6%). The mean age of the caregivers was 60.8 ± 11.5 months and the duration of providing care was 45.3 ± 42.2 months. A majority (79.3%) of the caregivers experienced some physical pain of their own, and many of them had to either retire from their work (19.5%) or change their residence for care (13.2%). Meanwhile, 27.2% of the caregivers answered "poor" or "mildly poor" to the question about a premorbid interpersonal relationship with the care recipients. Seventy-eight percent of caregivers had an intimate counselor, and 56% of them had an alternative caregiver. The caregivers found their roles rewarding at the following rates: always, 4.5%; often, 4.5%; sometimes, 28.2%; rarely, 24.5%; none, 38.2%. The frequencies of physical pain felt by the caregivers were: always, 22.1%; often, 8.0%; sometimes, 30.1%; rarely, 18.6%; never, 21.2%. The

frequency of respite from the care was: more than once a week, 41.1%; a few times per month, 23.4%; never, 35.5%.

Twenty-five percent of the caregivers had a strong sense of loss due to the deterioration of cognitive function of the care recipient, and 46.0% of them thought they would rather die if they were in the same status as the care recipient.

3.3. The BPSD

Fig. 1 shows the frequencies of observed BPSD and the difficulties in coping with the BPSD. The mean number of BPSD reported by the caregivers was 11.7 ± 7.9 . The mean of the cumulative score of difficulties was 63.5 ± 52.1 .

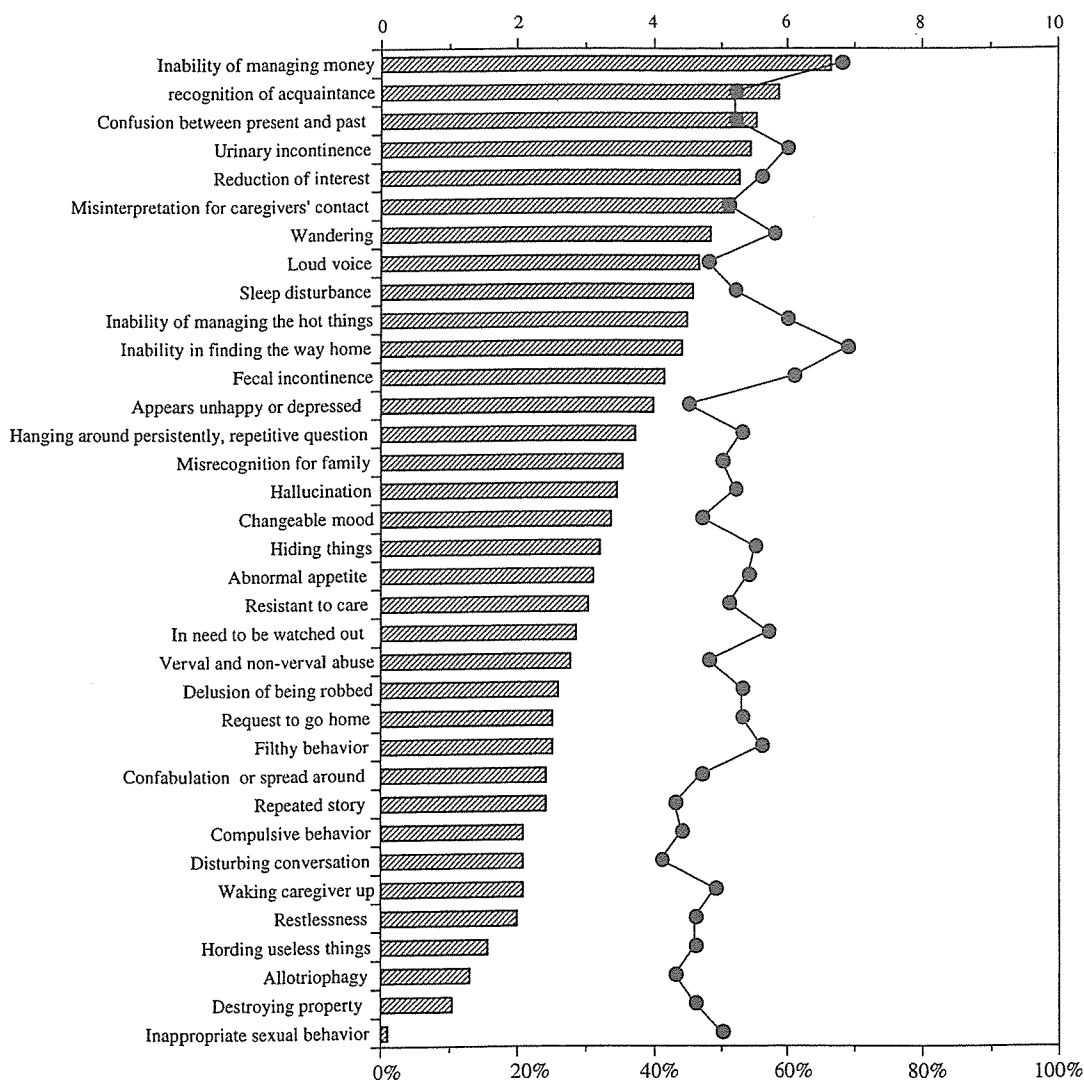


Fig. 1. The frequency of BPSD to be observed, and the difficulties of coping with each symptom. The horizontal bar chart shows the frequencies of BPSD to be observed, and the kinked line shows the difficulties to cope with the symptoms.

3.4. Caregivers' burden

The mean ZBI score was 35.3 ± 15.6 . The reliability was high, with a Cronbach's α of 0.915, and the alpha was also high ($\alpha = 0.918$) when it was calculated only for the care recipients with dementia. The overall burden score was 56.6 ± 25.8 , and the score was strongly correlated with the ZBI score ($r = 0.623$, $p < 0.001$). When the subjects were limited to the care recipients with dementia, Cronbach's α of the ZBI score remained high, with $\alpha = 0.918$, and the ZBI score was also strongly correlated with the burden score with an r of 0.528 ($p < 0.001$).

The severity of dementia was related with the ZBI ($r = 0.334$, $p = 0.003$), but it did not have a significant association with the burden score ($r = 0.154$, $p = 0.163$). Meanwhile, the severity of physical disability showed no significant correlation with the ZBI or the burden score.

The ZBI and the burden score were significantly associated with the duration of care (ZBI: $r = 0.223$, $p = 0.021$; burden score: $r = 0.219$, $p = 0.018$, respectively), the presence of an intimate counselor ($t = -3.685$, $p < 0.001$; $t = -2.179$, $p = 0.024$), and the frequency of physical pain in the caregivers ($\rho = -0.311$, $p = 0.001$; $\rho = 0.293$, $p = 0.002$). The presence of an alternative caregiver made the burden score slightly higher ($t = -1.988$, $p = 0.049$), but did not affect the ZBI ($t = -1.581$, $p = 0.117$). No significant difference of the ZBI or the burden score was seen depending on the caregiver's gender, age or economic status. There was no significant difference of the ZBI or the burden score depending on a familial relationship. The ZBI and the burden score were the highest if the caregiver was daughter-in-law (mean ZBI score: 38.1 ± 13.8 , mean burden score: 65.0 ± 23.6 , respectively). The premorbid interpersonal relationship between the caregiver and the care recipient was not significantly related with the ZBI score ($\rho = 0.034$; $p = 0.730$) or the burden score ($\rho = -0.170$; $p = 0.071$).

Multiple regression analysis for the ZBI showed that the significant variables were the severity of dementia (standardized $\beta = 0.740$), the presence of an intimate counselor (standardized $\beta = 0.289$), and the BPSD of disturbing conversation (standardized $\beta = 0.294$), appears unhappy or depressed (standardized $\beta = 0.304$) and urinary incontinence (standardized $\beta = 0.205$) with an adjusted R^2 of 0.401.

3.5. The influence of burden on the caregivers' mental status

The covert wish if the care recipient should disappear was observed consistently in 5.2% of the caregivers, often in 1.7% of them, sometimes in 17.2%, occasionally in 31.0%, and 44.8% of the caregivers never had the wish. The wish was highly related with the ZBI and the burden score (ZBI: $\rho = 0.431$, $p < 0.001$; burden score: $\rho = 0.391$, $p < 0.001$). The caregivers' latent desire to die in order to escape from the burden was observed consistently in 0.9% of caregivers, often in 2.6% of them, sometimes in 5.3%, occasionally in 17.5%, and 73.7% of them never had the desire. The desire was also related with both the ZBI and the burden score (ZBI: $\rho = 0.442$, $p < 0.001$; burden score: $\rho = 0.396$, $p < 0.001$).

Furthermore, the caregivers' satisfaction score was highly associated with the ZBI and the burden score (ZBI: $r = -0.490$, $p < 0.001$; burden score: $r = -0.343$, $p < 0.001$). The overall satisfaction was related with the presence of an intimate counselor ($p = 0.006$), but

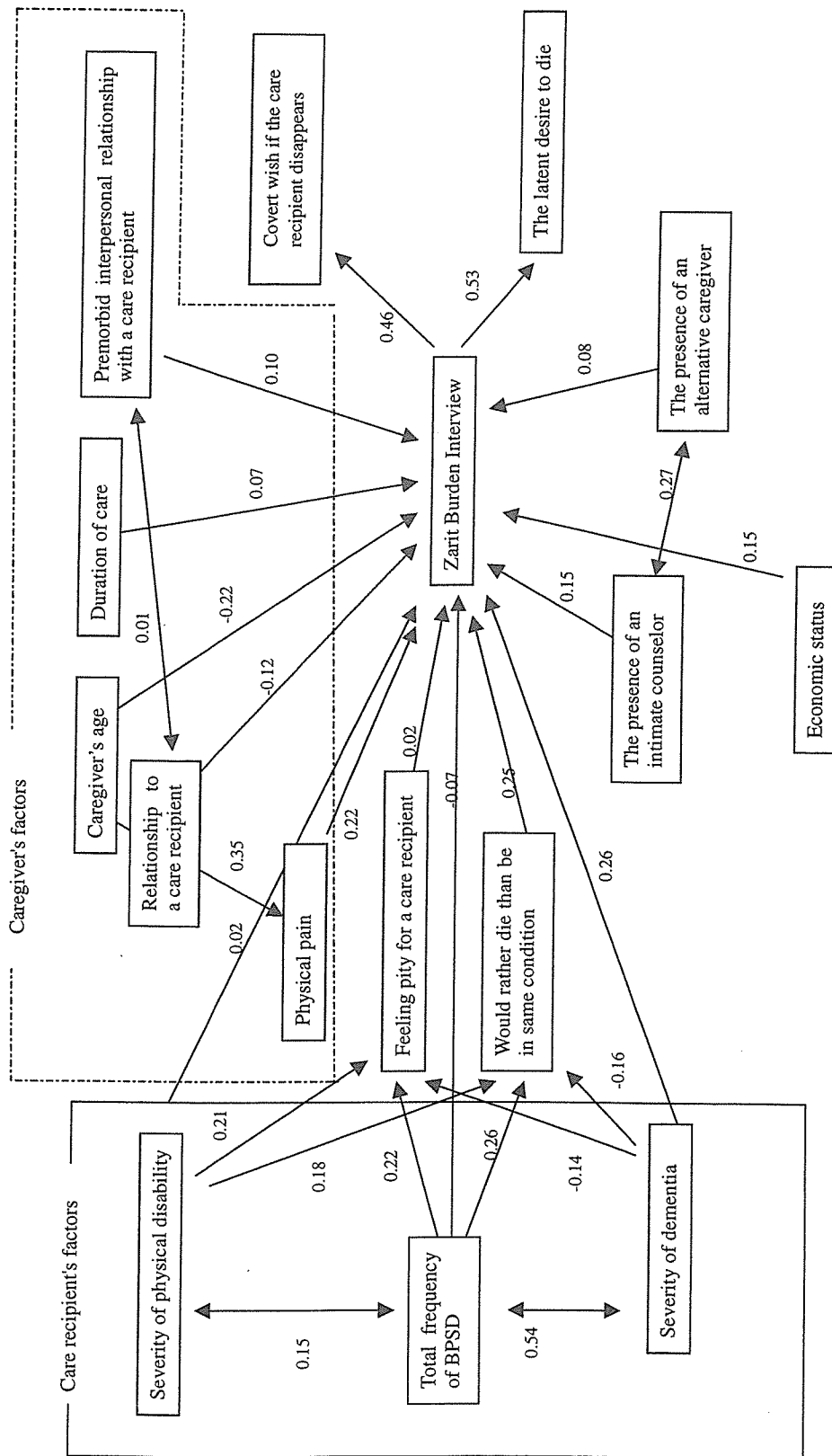


Fig. 2. The path model of the ZBI and the variables. The numbers show the standardized direct effects.

no significant association was found with the age of the caregivers, the relationship, the duration of care, annual income, the presence of an alternative caregiver, the presence of physical pain or the premorbid interpersonal relationship between the caregiver and the care recipient.

3.6. Path analysis (Fig. 2)

A path analysis indicated a significant network model of the relationship around the caregiver's burden, showing an adjusted R^2 of 0.370. The severity of dementia, the sense of "would rather die than be in the same condition" and physical pain of the caregivers showed large direct influences on the score of ZBI. The total frequency of BPSD significantly affected both pity for the care recipients and the sense of "would rather die than be in the same condition", but the burden was significantly influenced only by the sense of "would rather die than be in the same condition".

4. Discussion

In the present study, the ZBI was used to assess the caregivers' burden. The reliability and the validity of ZBI for the Japanese population have already been examined by Arai et al. (1997). However, despite the fact that the ZBI was originally developed for the caregivers of care recipients with dementia, none of the reports had adequately addressed the utility of the interview in assessing caregiver's burden in dementia care.

Caring for a patient suffering from dementia tends to keep caregivers bound at home, thereby increasing the caregiver's burden. The difficulty of coping with such unpredictable patient behavior as sudden tantrums or wandering often distresses the caregiver (Haley, 1997). The strong association of urinary and fecal incontinence with caregivers' burden observed in this study is consistent with previous reports demonstrating that incontinence is a strong predictor for collapse in caregiving at home (Ouslander et al., 1990; etc.). Moreover, the results demonstrated that patients' urinary and fecal incontinence make it difficult for caregivers to continue their regular job or to take time away from caregiving due to the time required for this special care. Hence, it may be essential to pay particular attention to the management of a patient's continence in terms of reducing caregivers' burden. In addition to incontinence, we confirmed strong associations of various BPSD, such as nocturnal delirium, hallucination, interfering with family conversation, and appears unhappy or depressed, with the caregiver's sense of burden.

Pearlin et al. (1990) constructed a model in which the primary stressor can be added to and modified by the care environment and the caregivers' background as secondary stressors. The present study showed that the duration of care, the presence of an intimate counselor, and the presence of physical pain in caregivers were strongly associated with the burden.

In the present study, regression analyses could not construct models with a high, adjusted R^2 for the ZBI and the burden score. But the path analysis indicated a network model with a higher adjusted R^2 , which yielded abundant information of the variables involved with care burden. The path analysis showed strong direct effects of severity of

dementia, the sense of “would rather die than be in the same condition”, and physical pain on the caregiver. The fact that pity for the care recipient has only little direct effect for the ZBI might suggest that the caregiver’s sense of burden stems from concerns of the caregiver’s own rather than from his/her compassion for the care recipient. We believe that the network model clarifies the relative involvement and kinetics of various factors influencing the caregiver’s burden. In particular, the presence of an intimate counselor to the caregivers and physical pain had substantial impact on caregiver’s burden. The overall frequency of BPSD had a significant effect on the caregivers’ sense of pity or the desire that they would rather die than be in the same condition. Meanwhile only the feeling that they would rather die than be in the same condition had the largest effect on the caregiver’s burden. These results may imply that it is the depreciation of demented care recipients as human, not the sympathy for them that loads the caregivers’ mind with the burden.

The caregiver’s burden is a complicated concept because it has a multi-layered structure. The structure consists of various factors such as the care recipients’ illness, and physical, psychological, and social stress for the caregiver.

In conclusion, the path analysis in the present study revealed the kinetic and dynamic interactions of factors affecting caregiver’s burden. The results indicate that caregiver’s burden can be affected by physical and psychological status of caregivers, as well as by medical conditions of care recipients. The application of this analytical method may help to establish strategies to reduce caregivers’ burden by a better understanding of how the burden develops.

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第1回プロジェクト研究論文

軽症認知症高齢者に対する音楽療法の効果と意義 —生活自立度、認知機能、介護負担度、脳画像への影響について—

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キーワード：認知症、高齢者、音楽療法、認知機能、脳画像

Dementia, Elderly, Music therapy, Cognitive function, Brain image

抄録：本研究では軽症認知症患者に対する能動的音楽療法が、認知機能や日常生活活動能力(ADL)、介護負担感尺度にどのように影響するかについて、同時期のコントロール群との比較において評価した。国立長寿医療センター(旧国立療養所中部病院)の高齢者総合診療外来および物忘れ外来に通院中の65歳以上の軽症認知症患者31名(17名対象群、14名コントロール群)に対し、文書による同意を得た後、日常生活自立度(BI)、うつ状態評価(GDS)、及び心理検査(MMSE, SKT)、介護負担感尺度評価(ZBI)、脳画像検査(SPECT)を行った。音楽療法対象者は8~10回を1クールとして、初回検査日の1週間後より、毎週1回の能動的音楽療法を行った。音楽療法に際し、毎回、痴呆用愛媛式音楽療法評価表(D-EMS)を用いてアクティビティ評価を行った。1クール終了日の1週間後に再評価を行い、音楽療法の効果を判定した。コントロール群は通常の外来通院している軽症認知症高齢者とし、初回検査の12週間後にBI、GDS、心理検査、ZBIを行い統計学的に対象群との比較検討をした。対象群では音楽療法中のアクティビティ評価では下位項目の歌唱、リズム、身体運動、表情、参加意欲に改善傾向を認めた。しかしながら、参加者の8名では開始時にすでに最良値を示していたため効果評価ができなかった。BI、GDS、MMSE値は療法前後での有意な変化は認めなかったが、より感度の高いSKTでは記憶力、注意力ともに療法後有意($P<0.05$)に改善を認めた。コントロール群では、MMSE、SKTとも検査前後での有意な変化は認めなかった。また、ZBIの変化は両群との間に明らかな違いは認めなかった。SPECTを用いた脳画像検査ではiNeurostatを用いた画像解析により対象群とコントロール群の比較検討を行った。対象群で特異的に脳血流が増加したと考えられた部位は、視床、大脳基底核(いずれも右側に強い増加)および両側視床下部、脳幹部であった。軽症認知症高齢者における能動的音楽療法は、視床、大脳基底核を中心とした脳内の血流増加により、認知機能の改善効果をもたらす可能性が示された。

(日本音楽療法学会誌、5:48~57, 2005)

はじめに

現在、認知症に伴う周辺症状の改善など、種々の効果を期待し、認知症患者に対する音楽療法が国内外で行われている。しかしながら、認知障害の軽い認知症患者に対する能動的音楽療法が、認知機能や日常生活活動能力(ADL)、介護負担度に

どのように影響するかについて、同時期のコントロール群との比較において評価した報告¹⁻⁵⁾はこれまで少ない。理由として、認知症の初期症例の診断そのものが難しいことや同程度の認知症の症例を集めることが難しい事等が背景にあると考えられる。

一方、本研究を行う国立長寿医療センターは認知症を専門の診療領域の一つとしているため、初期認知症患者の受診が多く、認知症の進行遅延についての有効な対応を迫られている。しかしながら、現在行われている認知症の非薬物療法のほと

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(受付日：2004年11月1日)

んどは般化するに足るエビデンスが未だ乏しい状況にある⁶⁾。このため、本研究は認知症の初期患者に焦点を当てて、能動的音楽療法が認知症の進行遅延に有用であるかどうかを、より科学的に評価する目的で計画した。

本研究では国立長寿医療センターに通院中の軽症認知症高齢者に対し、音楽療法前後のADL、心理検査、うつ状態、介護負担感尺度の評価を行い、同時期の音楽療法を行わない軽症認知症患者のコントロール群との比較検討を行った。これに加え、音楽療法群に対しては音楽療法中の対象者の行動観察評価を行った。さらに、その効果のより客観的な裏づけを得るため、音楽療法前後での脳血流画像の変化を解析した。これらにより、音楽療法の軽症認知症患者の進行遅延への可能性を検討した。

対象・方法

国立長寿医療センター（旧国立療養所中部病院）の高齢者総合診療科外来および物忘れ外来に通院

中の65歳以上の軽症認知症患者（Clinical dementia rating scale⁷⁾が0.5～1点）の31名（うち17名が対象群、14名がコントロール群）に対し、文書による同意を得た後、ADL（Barthel Index; BI）⁸⁾、うつ状態（Geriatric Depression Scale; GDS）⁹⁾、心理検査（Mini-Mental State Examination; MMSE¹⁰⁾、Syndrom Kurz Test; SKT¹¹⁾、介護負担感尺度（Zarit Caregiver Burden Interview; ZBI）¹²⁾、脳画像検査（脳血流シンチグラフィ；Single Photon Emission Computed Tomography; SPECT）を行った。コントロール群は通常の外来通院している軽症認知症患者とした。SPECTの核種及び画像化にはIMP-ARG法を用いた。

音楽療法対象者に対してはクローズドシステムによる7名～14名のグループセッションを、8～10回を1クールとして、毎週1回1時間弱の能動的音楽療法を行った。能動的音楽療法のセッションは日本音楽療法学会認定音楽療法士1名、臨床心理士1～2名、ボランティア1～5名からなる

・導入

はじめの歌♪靴がなる
（歌詞提示せず1番のみ）

・リズム歌唱またはアクティビティ

例 ボール等を使った活動

♪幸せなら手をたたこう の歌詞にそった活動

・季節の話題

・今日のテーマの説明

例「今日は昭和10年代の歌を」

歌唱後 参加者間の会話を中心に回想等

・鑑賞等

・歌唱

・次回のお知らせ等

上記に加え参加者の状態をみて適宜、歌唱のテンポや曲目を変更している。

図1 音楽療法のセッション内容－典型例－

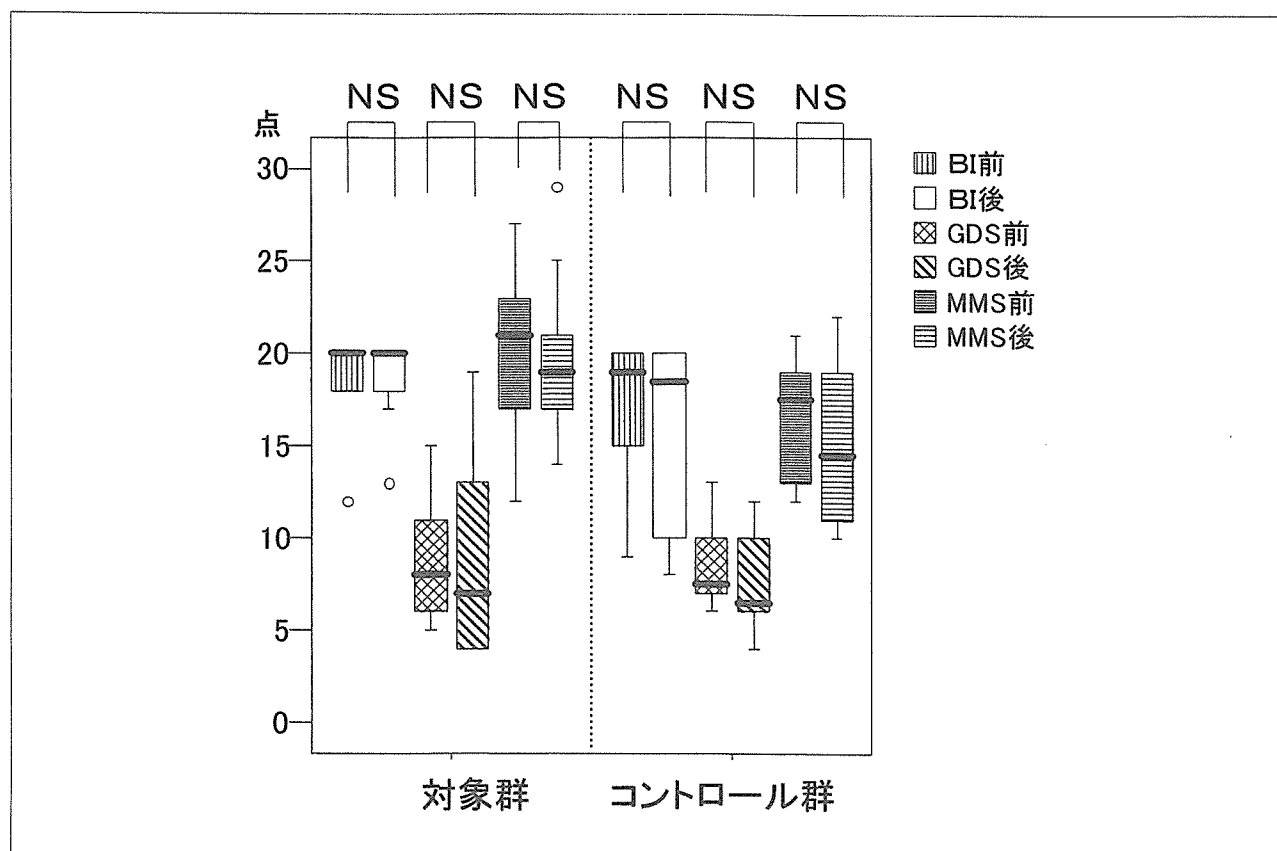


図2 対象群・コントロール群前後の比較（箱ひげ図で示した）

音楽療法チームにより行った。各回のセッションは典型的なセッション構成を決め図1のように行ったが、参加者のメンバー構成、参加者の嗜好、季節、気候等を考慮して、音楽療法士の裁量により、セッション毎の歌唱のテンポや曲目など内容を変更した。音楽療法に際し、毎回、痴呆用愛媛式音楽療法評価表（D-EMS）¹³⁾を用いて臨床心理士によるアクティビティ評価を行った。

対象群では療法開始1週間前及び1クール終了1週間後にADL、うつ状態、心理検査、介護負担感尺度の再検査を行った。コントロール群では研究参加の同意取得日と12週後にADL、うつ状態、認知機能、介護負担感評価を対象群と同様に行い、統計学的有意差を検討した。統計学的解析にはSPSS（12.0J）を用い、Wilcoxonの符号付き順位検定を行った。P<0.05の危険率をもって統計学的有意差ありとした。

音楽療法後のSPECT画像は、2クール以上の音楽療法継続参加者のうち画像検査同意が得られた5名に対してのみ、6ヶ月後に行った。6ヶ月

後のコントロール群（同意が得られた4名）のSPECT画像との比較検討を行った。画像解析には日本メジフィジックス社のiNeurostatを用いた。iNeurostatは研究実験用に開発されたIMP/HMPAO/IMZ-SPECTデータ専用のインターフェースソフトウェアであり、本研究における療法前後の脳血流変化の解析にはStat_1 tZのソフトを用いた。Stat_1 tZは対応のある2群のSPECT画像を対象とし、コンディションの違いによる脳血流の変化が有意かどうかにつきpaired t検定（片側検定）を行うソフトである。

認知症診断および病型診断は心理検査、神経学的検査、脳画像診断を総合し、国内外の標準的診断基準⁸⁾に基づき、行った。なお音楽療法研究期間中はアルツハイマー病治療薬塩酸ドネペジルの新規内服は同意のもと行われなかった。

なお、本研究は国立長寿医療センター（旧国立療養所中部病院）の倫理小委員会により承認された（承認番号76）。

結果

対象群（17名）とコントロール群（14名）の軽症認知症患者の平均年齢±標準偏差はそれぞれ、75.4±7.9歳、82.1±4.8歳であった。男女比は音楽療法群 2:15、コントロール群 3:11といずれも男性の参加が少なかった。病型別分類は音楽療法群ではアルツハイマー型痴呆12名、血管性痴呆3名、前頭側頭型痴呆1名、その他1名であった。コントロール群ではアルツハイマー型痴呆12名、血管性痴呆1名、レビー小体型痴呆1名であり、いずれもアルツハイマー型痴呆症症例により主として構成されていた。

ADL、うつ状態指標の変化（図2）

対象群、コントロール群とも BI、GDS とも前後での有意な変化は認めなかった。

心理検査における変化（図2、3）

心理検査では対象群では MMSE 値は療法前後での有意な変化は認めなかった（図2）が、より感

度の高い SKT では記銘力、注意力ともに療法後有意（ $P < 0.05$ ）に改善しており（図3）、総合点でも療法後の有意な（ $P = 0.005$ ）改善を認めた（図3）。一方、コントロール群では、MMSE、SKT とも検査前後での有意な変化は認めなかった（図2、3）。

アクティビティ評価（図4）

対象群では音楽療法中の D-EMS を用いたアクティビティ評価では下位項目の歌唱、リズム、身体運動、表情、参加意欲に改善傾向を認めた。しかしながら、参加者のほぼ半数の8名では開始時にすでに最良値を示していたため効果評価はできなかった。認知面では音楽療法開始後一旦、増悪傾向にあり回復しているように見えたが、この評価項目もほとんどの参加者は前記と同様の理由で、音楽療法の間ほとんど変化せず、数人のみの変動により平均値に影響を受けたのみで、あり、統計学的有意差検定は行えなかった。

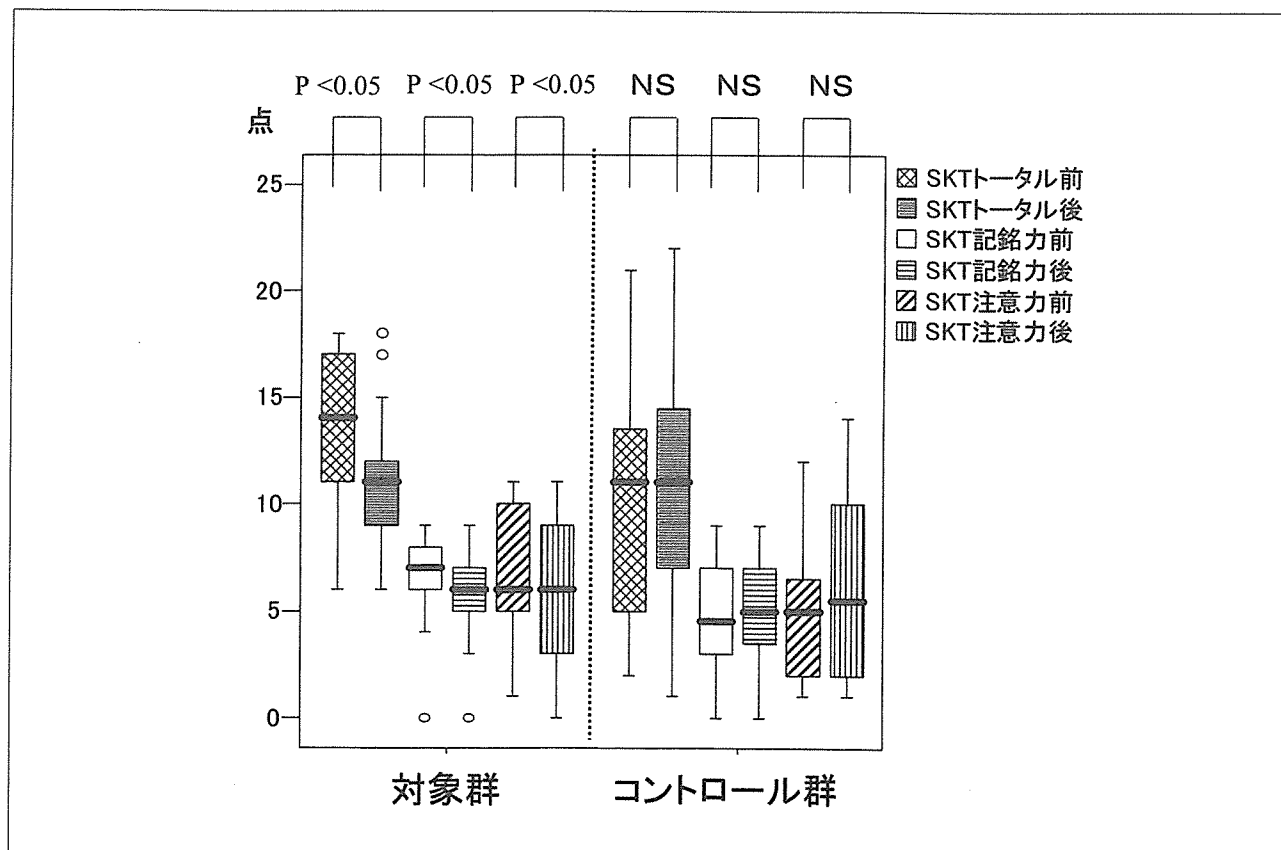


図3 心理検査 (SKT) の記銘力、注意力への影響 (箱ひげ図で示した)