

一方で、様々な特性やニーズをもつ地域在住の高齢者に主体的に認知機能低下予防に取り組んでもらうためには、運動以外にも効果が期待できる介入プログラムが用意されていることが望ましいであろう。これまでの研究でも、知的活動や認知リハビリなど認知機能への刺激をねらったプログラムの介入効果については報告されてきている¹⁾。さらに、近年では、認知症高齢者を対象にした口腔機能向上プログラムによる認知機能やADLの低下抑制効果を検証しようとする研究もみられるようになってきた⁵⁾。しかしながら、今のところ、客観的な口腔機能検査法を用いた評価や、その結果にもとづいたオーダーメイドの介入、介入後の評価による有効性の確認は、十分になされていない。

そこで、本研究では、地域在住高齢者に5か月の総合的な口腔機能向上プログラムを実施し、認知機能や精神的健康度、日常生活動作能力、主観的健康感にどのような影響を及ぼすかについて検討を行う。

B. 方法

1. 研究対象者

宮古島市の介護予防事業に参加している、あるいは今後参加意思のある要介護認定を受けていない65歳以上の高齢者を対象に研究協力者を募集したところ、108名から研究協力の同意が得られた。本研究では、市の要望を優先し、生きいき教室（通称「生きデイ事業」、月2回実施）に参加する3つの地区の高齢者37名を介入群とし、1地区の生きいき教室（月2回実施）に参加する26名と、二次予防事業（パソコン、健康体操など週1～2回実施）に参加する30名、検査のみを受ける15名の計71名を対照群とした。対象者の属性は、表1のとおりである。

平均年齢は78.8歳（SD=6.2）、男性の割合が16.7%、平均教育年数は9.0年（SD=2.9）、MMSEの平均得点は24.1点（SD=4.5）であった。T検定の結果、介入群よりも対照群の方が、平均年齢（ $t=2.629, df=106, p<.05$ ）、平均教育年数（ $t=-4.325, df=93.656, p<.001$ ）が有意に高かった。また、カイ二乗検定の結果、介入群よりも対照群で有意に男性の割合が多かった（ $\chi^2=7.902, df=1, p<.01$ ）。

表1 研究対象者の属性

項目		介入群 (n=37)	対照群 (n=71)	全体 (n=108)
年齢 ^{注1)}		80.9±5.4	77.7±6.4	78.8±6.2
性別 ^{注2)}	男性	1 (2.7)	17 (23.9)	18 (16.7)
	女性	36 (97.3)	54 (76.1)	90 (83.3)
教育年数 ^{注1)}		7.6±2.2	9.8±2.9	9.0±2.9
MMSE ^{注1)}		23.1±3.9	24.6±4.7	24.1±4.5

注1)数値はMean±SDを表す。注2)数値は人数(%)を表す。

2. 介入プログラムの内容

介入群には、2週間に1度、1時間の口腔機能向上プログラムを5か月間（計8回）実施した。プログラムの主な内容は表2のとおりである。参加者は、毎日、各々の口

腔状態に合わせた咀嚼法や清掃法、体操等を実施・記録した。介入期間中にプログラムを欠席した者には、歯科衛生士が参加者宅への電話や訪問を行い、課題の実施状況を確認した。

表2 口腔機能向上プログラムの内容

回	内容
第1回	口腔機能検査に基づいた口腔機能向上プログラムの紹介と意志決定
第2回	第1回の確認（個別支援）
第3回	お口の清掃で認知症を予防しよう！ —多数歯、少数歯、無歯顎に対応した清掃法の紹介—
第4回	第3回の確認（個別支援）
第5回	よく噛んで認知症を予防しよう！ —日常生活でよく噛む方法の体験談の報告と実践のすすめ—
第6回	第5回の確認（個別支援）
第7回	お口元気プログラムの効果を確認しよう！ —自分でできる口腔機能検査の体験と初回検査結果との比較—
第8回	第7回の確認（個別支援）

3. 評価項目

プログラムの効果を評価するために、以下にあげるような認知機能検査と精神的健康度、日常生活動作能力、主観的健康観について、プログラム介入前（事前評価）と介入後（事後評価）の2回測定した。このほかに、本研究で実施した口腔機能向上プログラムが、実際に対象者の口腔機能向上に効果をもたらしたかどうかを確認するた

めに、口腔機能検査も実施した。

1) 認知機能

本研究で測定した認知機能検査の課題は、表3のとおりである。ファイブ・コグ検査⁶⁾ (①～⑥)は集団で、TMTのA形式とB形式⁷⁾、WAISIIIの符号課題⁸⁾ (⑦～⑨)は個別で、それぞれ訓練された検査者が実施した。

表3 認知機能検査の課題と測っている機能

課題		測っている機能
ファイブ・コグ検査		
テスト バ ッ テ リ ー	①手先の運動スピード	運動機能
	②文字位置照合	注意機能
	③手がかり再生	記憶・学習機能
	④動物名想起	言語機能
	⑤時計描画	視空間認知機能
	⑥共通単語	思考機能
⑦TMT-A 形式、TMT-B 形式	処理速度、注意機能、遂行機能	
⑧WAISIIIの符号課題	遂行機能、注意機能、処理速度	
⑨MMSE	見当識、記憶、注意、計算、言語、思考、視空間認知、構成、遂行機能	

2) 精神的健康度

精神的健康度については、WHO-5 (5項目)日本語版⁹⁾を用いて、「1.まったくない」から「6.いつも」の6件法で回答を求めた。5項目の回答を合計して尺度得点を算出した。

3) 日常生活動作能力

日常生活動作能力については、老研式活動能力指標¹⁰⁾ (13項目、2件法)を用いた。「はい」と回答した場合に1点、「いいえ」と回答した場合に0点を与え、13項目の合計得点と3つの下位尺度(手段的自立、知

的能動性、社会的役割)得点を算出した。

4) 主観的健康感

主観的健康感については、現在の健康状態について、「1.非常に健康」から「4.健康でない」の4件法で回答を求めた。

5) 口腔機能

口腔機能検査¹¹⁾の項目と計測している機能は、表4のとおりである。①～⑨の各検査の得点を合計した得点(100点満点)を算出した。

表4 口腔機能検査の項目

項目	測っている機能・内容	満点 (点)
1. 口腔の周り	①口腔の開閉	10
	②頬の膨らまし	10
2. 咀嚼能力	③唾液湿潤度(Kiso-wet、KISOサイエンス社製)	10
	④咀嚼力判定ガム(ロッテ社製)	20
3. 嚥下機能	⑤反復唾液嚥下テスト(RSST)	10
	⑥5秒間でカカカと言える回数	10
	⑦オーラルディアドコキネシス(pa音、ta音、ka音)	10
4. 清潔度検査	⑧唾液吐出液の濁度(吸光度)	10
	⑨歯みがき回数	10

C. 結果

1. プログラムの出席率

介入群37名のプログラムの平均出席回数は5.9回、平均出席率は76.7%であった。会場ごとの出席率は、A地区が90.3%、B地区が78.4%、C地区が67.9%、D地区が70.0%であった。

2. 介入効果

口腔機能、認知機能、精神的健康度、日常生活動作能力、主観的健康感の介入効果について、分析結果を示す。

1) 分析対象

研究協力者108名のうち、プログラム介入前(事前評価)とプログラム介入後(事後評価)の両方のデータがそろっている者

を分析対象とした。対象人数は77名(介入群33名、対照群44名)であった。

2) 分析方法

事前、事後の各評価項目を従属変数とした、群×時間の2要因分散分析を行った。共変量には、年齢、性別、教育年数を投入した。

3) 分析結果

(1) 口腔機能への介入効果

口腔機能検査の合計得点に有意な介入効果がみられた($F(1,70)=7.39, p<0.01$) (図1参照)。この結果から、本研究で実施し口腔機能向上プログラムの内容が、対象者の口腔機能を向上させるプログラムとして有効であったことが示された。

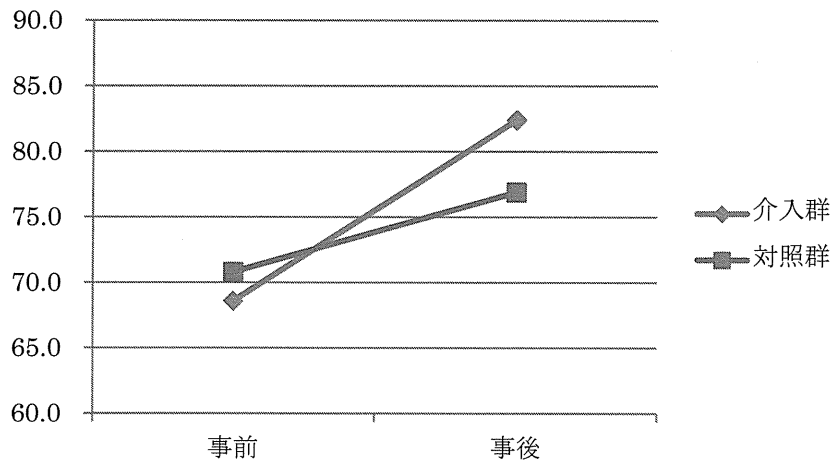


図1 口腔機能（合計得点）への介入効果

(2) 認知機能への介入効果

それぞれの検査ごとに分析を行ったが、いずれの認知機能検査においても統計学的に有意な介入効果は示されなかった。

(3) 精神的健康度への介入効果

WHO-5 の尺度得点については、有意な介入効果は認められなかった。

(4) 日常生活動作能力への介入効果

老研式活動能力指標 13 項目の合計得点と、3 つの下位尺度（手段的自立、知的能動性、社会的役割）得点それぞれについて介入効果を検証したが、いずれの尺度においても有意な介入効果はみられなかった。

(5) 主観的健康感への介入効果

主観的健康感については、有意な介入効果は示されなかった。

<下位分析>

1) 分析対象

事前評価時点の認知機能やプログラムへの参加率によって、介入効果に違いが生じる可能性が考えられるため、対象者を限定した下位分析を行った。事前と事後の両方のデータがそろっている 77 名のうち、事前評価時点での MMSE が 26 点以下の者を抽出した。また、介入群については、プログラムに 3 分の 2 以上 (66.6%以上) 出席した者を分析対象とした。その際、介入群で女性のみが抽出されたため、対照群も女性のみで分析をした。最終的な下位分析の対象者は 44 名 (介入群 22 名、対照群 22 名) であった。

2) 分析方法

事前、事後の各評価項目を従属変数とした、群×時間の 2 要因分散分析を行った。共変量には、年齢、性別、教育年数を投入した。

3) 分析結果

(1) 口腔機能への介入効果

口腔機能検査の合計得点に有意な介入効果がみられた ($F(1,38)=4.97, p<0.05$) (図2参照)。この結果から、本研究で実

施し口腔機能向上プログラムの内容が、下位分析の対象者においても、口腔機能を向上させるプログラムとして有効であったことが示された。

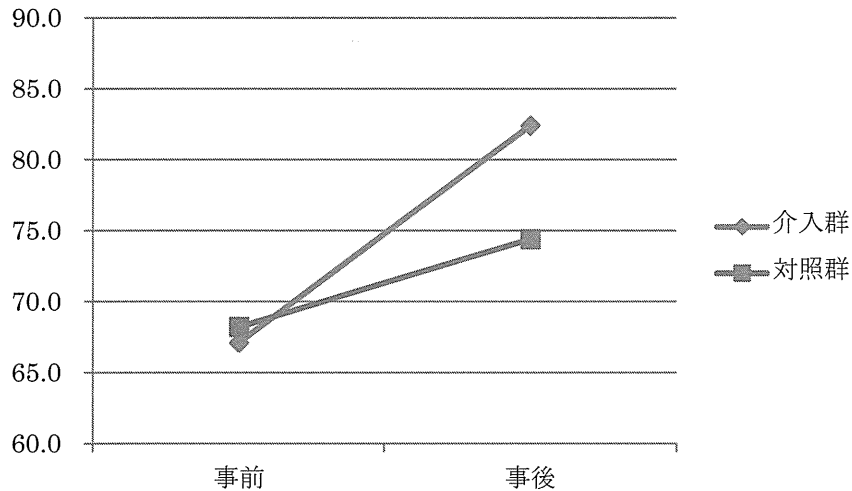


図2 下位分析における口腔機能（合計得点）への介入効果

(2) 認知機能への介入効果

それぞれの検査ごとに分析を行ったところ、ファイブ・コグの共通単語課題（思

考機能）で有意な介入効果が認められた ($F(1,36)=4.21, p<0.05$) (図3参照)。

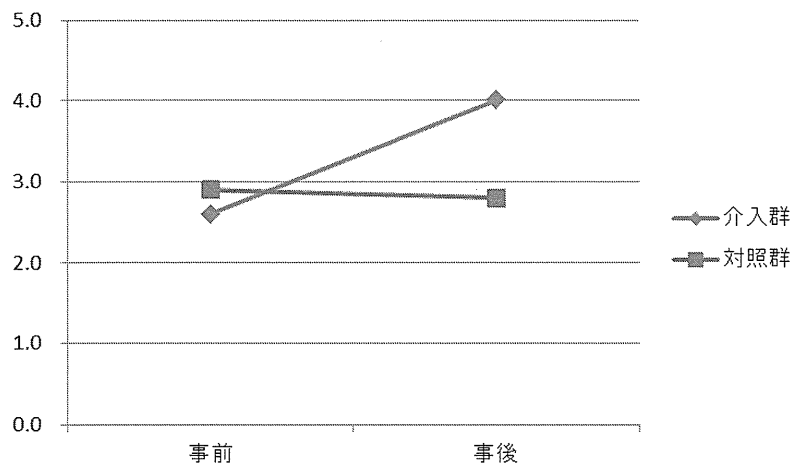


図3 下位分析における共通単語課題への介入効果

(3) 精神的健康度への介入効果

WHO-5 の尺度得点については、有意な介入効果は認められなかった。

(4) 日常生活動作能力への介入効果

老研式活動能力指標 13 項目の合計得点と、3 つの下位尺度（手段的自立、知的能動性、社会的役割）得点それぞれについて介入効果を検証したが、いずれの尺度においても有意な介入効果はみられなかった。

(5) 主観的健康感への介入効果

主観的健康感については、有意な介入効果は示されなかった。

D. 考察

本研究では、地域在住高齢者に約 5 か月の総合的な口腔機能向上プログラムを実施し、認知機能や精神的健康度、日常生活動作能力、主観的健康感にどのような影響を及ぼすかについて検討を行った。

介入効果を分析した結果、口腔機能検査の合計得点において、有意な介入効果がみとめられた。この結果は、本研究で実施し口腔機能向上プログラムの内容が、対象者の口腔機能を向上させるプログラムとして有効であったことを示すと考えられる。認知機能、精神的健康度、日常生活動作能力、主観的健康感については、いずれも有意な介入効果はみとめられなかった。

一方、性別や事前評価時点の認知機能、プログラムへの出席率によって、介入効果に違いが生じる可能性も考えられる（たとえば、女性により有効である可能性や、よ

り認知機能の低下した者に有効である可能性、よりプログラムへの参加意欲が高く出席率が高い者に有効である可能性など）。そこで、分析対象者を、女性で MMSE 得点が 26 点以下の者かつ、介入群においてはプログラムの出席率が 66.6%以上（3 分の 2 以上出席）の者という条件で抽出して下位分析を行った。分析の結果、口腔機能検査の合計得点に有意な介入効果がみられた。また、認知機能については、思考機能を反映しているファイブ・コグの共通単語課題で有意な介入効果がみられた。精神的健康度、日常生活動作能力、主観的健康感については、有意な介入効果はみられなかった。

全体的な分析では、いずれの認知機能においても有意な介入効果は示されなかったが、特定の条件で抽出された対象者については、思考機能への介入効果が示された。つまり、本研究で実施した口腔機能向上プログラムは、女性に限っての結果ではあるが、やや認知機能の低下した、しかし、プログラムへのモチベーションは高いというような特性をもった層に対して、思考機能の低下抑制効果が示された。

一方で、本研究にはいくつかの限界や課題がある。ひとつ目は、研究協力者のリクルート方法に制約があったために、介入群と同じ生きいき教室の参加者のみを対照群として設定することができなかった点である。非 RCT による介入研究では、独立変数と従属変数の間に様々な交絡因子があると考えられるので、今後、同じような活動に参加している者を介入群、対照群として設定できるように、研究対象者の抽出方法を検討する必要があるだろう。

ふたつ目は、本研究事業からの脱落者が

予想以上に多く、介入効果の分析対象者数が減ってしまったことである。実際に、事前評価の時点で108名であった研究協力者が事後評価の時点では77名に減少しており、28.7%が脱落していた。脱落率の高さは、特に対照群で顕著であった。原因のひとつとして、事前評価から事後評価までの期間が5か月と長期であったため、特に対照群の研究協力へのモチベーションが低下してしまったということが考えられる。今後、対照群の研究協力への動機づけを維持するような工夫が必要かもしれない。

最後に、本研究の結果は、宮古島という限られた地域での結果であるため、結果の一般化には慎重を要する。今後、他の地域でもプログラムの効果を検証する必要があるだろう。

E. 結論

対象者全体では、口腔機能向上プログラムによる顕著な認知機能への介入効果は示されなかったが、女性でやや認知機能の低下した、プログラム参加率が高いという特性をもった対象者については、思考機能への介入効果が示された。

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G. 研究発表

なし

H. 知的財産権の出願・登録状況

特になし

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Ⅲ 研究成果の刊行に関する一覧表

研究成果の刊行に関する一覧表

書籍

著者氏名	論文タイトル名	書籍全体の編集者名	書籍名	出版社名	出版地	出版年	ページ
栗田主一	認知機能低下の背景と予防戦略	高橋龍太郎	楽しくいきいき、認知症予防！	インターメディア	東京	2013	8-18
宇良千秋	対象者のスクリーニングとプログラムの選択	高橋龍太郎	楽しくいきいき、認知症予防！	インターメディア	東京	2013	18-25
藤原佳典、 鈴木宏幸	社会活動をめざす「絵本の読み聞かせ」プログラムの実際と評価	高橋龍太郎	楽しくいきいき、認知症予防！	インターメディア	東京	2013	26-59
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平山亮、 高橋龍太郎	プログラムの実施とその後の継続に向けて	高橋龍太郎	楽しくいきいき、認知症予防！	インターメディア	東京	2013	146-155
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雑誌

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Anosognosia: Patients' Distress and Self-awareness of Deficits in Alzheimer's Disease

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Abstract

We aimed to study how patients with mild cognitive impairment (MCI) and Alzheimer's disease (AD) suffer from awareness of their deficits. Self-awareness was assessed using the Anosognosia Questionnaire for Dementia in 12 pairs of MCI outpatients and caregivers, 23 with mild AD, and 18 with moderate AD. The discrepancy between patient's and caregiver's evaluation (anosognosia) became greater as AD progressed. The predictors of patients' distress, shown by multiple linear regression analyses, were awareness of decline in intellectual or social functioning; self-awareness of deficits in remembering appointments in MCI; in remembering appointments, writing, mental calculation, and understanding the newspaper in mild AD; and in mental calculation and doing clerical work in moderate AD. Caregivers assumed the predictors of patients' distress differently: awareness of deterioration of memory in MCI and mild AD, and basic activities of daily living in moderate AD. Understanding patients' disability from patients' perspective is required for successful care.

Keywords

Alzheimer's disease, anosognosia, self-monitoring, self-awareness, empathy

Introduction

Deficits in self-awareness of disease, anosognosia, has been recognized as one of the typical symptoms in Alzheimer's disease (AD).¹ The unawareness of impairment is manifested in several domains, including memory and other cognitive functions, and psychological and behavioral functions.²⁻⁴ As for neural substrates of self-awareness, previous research has identified involvement of posterior dorsomedial regions of the parietal lobe including the precuneus and the temporoparietal junction, as well as the prefrontal cortex, in experiments with healthy volunteers.⁵⁻⁷ The experiments in patients with AD showed that those areas are related to deficits in self-awareness⁸⁻¹⁰ and decline of regional cerebral blood flow is observed from the early stages of disease.¹¹⁻¹³ The finding is consistent with the symptomatic changes occurring as neurodegeneration progresses; self-awareness gradually deteriorates as the disease progresses.^{4,14}

These neuropsychological findings are beneficial if they are implemented to care for patients with AD. Previous studies reported that behavioral and psychological symptoms of dementia (BPSD) could be caused by deficits of self-awareness.¹⁵⁻¹⁷ From the caregivers' perspective, BPSD increases caregiver distress.¹⁸ However, it is essential to understand the perspective of patients for treatment and care

of BPSD.^{19,20} To our knowledge, few studies have tried to elucidate the awareness of the deficits from the patients' perspective. For a better understanding of patients' perspective, we assessed the self-awareness of patients and analyzed their distress caused by self-awareness of their deficits. To understand the discrepancy, we also assessed caregivers' perspectives of patients' abilities and how the caregivers assessed patients' distress. We hypothesized that patients retain self-awareness of deficits partially and/or insufficiently and feel distressed by self-awareness at least in the early stage of AD, which the caregivers' might assess differently. The BPSD could result from such misunderstanding of how patients feel, rather than objective assessment of function. It would contribute to beneficial care of

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Table 1. Demographic Data^a

CDR	n	Gender, n (M, F)	Mean ± SD		
			Age, years	Education, years	MMSE
0.5	12	(2, 10)	74.8 ± 5.0	10.5 ± 2.3	26.9 ± 1.5
1	23	(9, 14)	79.6 ± 7.8	9.4 ± 2.1	19.9 ± 4.1
2	18	(3, 15)	82.3 ± 17.8	9.4 ± 3.5	12.5 ± 5.7

Abbreviations: CDR, Clinical Dementia Rating scale; M, male; F, female; MMSE, Mini-Mental State Examination; SD, standard deviation.

^a There were no significant differences among groups in age ($P = .193$), gender ($P = .185$, chi-square test), or education ($P = .535$). Scores on MMSE were significantly different among groups ($P < .001$).

patients with AD to understand patients' distress related to self-awareness of deficits.

Methods

The participants were 53 pairs of outpatients and their caregivers: 12 amnesic patients with Clinical Dementia Rating scale (CDR) 0.5, 23 with mild AD (CDR 1), and 18 with moderate AD (CDR 2). Demographic data are shown in Table 1. The exclusion criteria were psychiatric diseases, delirium, and verbal incomprehension including aphasia. Participants were diagnosed based on the criteria for AD by National Institute of Neurological and Communicative Disorders and Stroke and the Alzheimer's Disease and Related Disorders Association (NINCDS-ADRDA),²¹ and mild cognitive impairment (MCI) by the report of the International Working Group on Mild Cognitive Impairment.²² The CDR 0.5 was regarded as MCI, although a different classification was proposed whereby CDR 0.5 encompasses both mild and earlier dementia²³ or it corresponds to very mild dementia.²⁴ Patients with CDR 0.5 were limited to those free from objective symptoms of other types of dementia such as dementia with Lewy bodies or frontotemporal dementia. Patients with scores over 7 on the Japanese version of the Short Form of the Geriatric Depression Scale,²⁵ which has a full score of 15, were also excluded because depressive tendency could affect self-evaluation.^{26,27} The ethics board of the Gunma University School of Health Sciences approved all procedures (No. 21-27), and written informed consent was obtained from participants.

Anosognosia was evaluated by the questionnaire discrepancy method, which compares patient's self-report with that of a caregiver.²⁸ The patients and caregivers were required to answer the same questions about the function of the patients independently. The caregivers' assessment was considered as the objective standard and discrepancy was analyzed between the patients' and the caregivers' assessment.

We chose the Japanese version of the Anosognosia Questionnaire for Dementia (AQ-D),^{3,29,30} which contains questions asking awareness of deficits on intellectual functioning (22 items), and mood and behavior domains (8 items). Each item of the AQ-D was evaluated on 0 to 3 scales: *never* (0 point), *sometimes* (1 point), *usually* (2 points), or *always* (3 points). Lower scores of the patients meant deficits of awareness in

comparison with those of the caregivers. Self-awareness for each item was analyzed by one-sample *t* test. Summed scores of the 2 domains were compared among CDR groups using 1×3 analysis of variance ([ANOVA]; 3 groups according to CDR). The caregivers' scores were analyzed in the same fashion. Discrepancy of each item was evaluated by paired *t* test. Scores of the 2 domains were summed up, and those summed scores were compared among CDR groups using 2×3 repeated measured ANOVA (the patients and their caregivers in pairs and 3 groups according to CDR).

To understand patients' perspective, how patients feel distressed by self-awareness of deficits was analyzed as below. The patients' scores of mood and behavior domain were regarded as their distress from the patients' perspective.³¹ The predictors of scores of mood and behavior domain were analyzed using multiple linear regression analyses. The dependent variables were summed scores of mood and behavior domains (8 items), and the candidates of predictors were chosen among items in intellectual functioning domain. All the 22 items in intellectual functioning domain were assessed by one sample *t* test, and those items with statistical significance ($P < .05$) were entered in a stepwise fashion into multiple linear regression analyses. The caregivers' assessment was analyzed in the same fashion to show how the caregivers assessed the patients' distress.

The patients were also tested using the Mini-Mental State Examination. All analyses were conducted using the Japanese version of SPSS for Windows version 19.0 (IBM Corporation, New York). Significance was set as $P < .05$.

Results

Self-awareness of the Patients

In intellectual functioning domain, patients' assessments were 8.5 ± 4.9 in CDR 0.5, 11.6 ± 6.7 in CDR 1, and 7.2 ± 4.1 in CDR 2 (Table 2). There was a significant difference among the groups ($P = .042$); however, self-evaluation of patients in CDR 2 was not significantly different from that of patients in CDR 0.5 (Figure 1).

The results of each item are shown in Table 2. In CDR 1, patients were aware of their problems in all the 16 items where discrepancy was observed. Concerning 2 items of problems with orientation in the neighborhood (#11) and mental calculation (#15), patients' awareness was not significantly different from that of caregivers.

In CDR2, patients were not aware of their problems in remembering telephone call (#3), understanding conversations (#4), signing one's name (#5), understanding the newspaper (#6), writing (#9), handling money (#10), orientation in the neighborhood (#11), practicing favorite hobbies (#13), communicating with people (#14), bladder control (#17), understanding the plot of a movie (#18), orientation in the house (#19), doing home activities (#20), and feeding oneself (#21), although caregivers noticed the patients' deficits.

In mood and behavior domains, patients' assessments were 3.3 ± 3.0 in CDR 0.5, 3.4 ± 2.9 in CDR 1 and 4.6 ± 4.0 in CDR 2 (Table 2). The results of each item are shown in Table 2.

Table 2. The Results of Each Item

		CDR	Caregivers ^a Mean ± SD	Patients ^b Mean ± SD	Disc ^c P value	Pred. C ^d	Pred. P ^e
Intellectual functioning domain							
1	Problems with remembering dates	0.5	1.17 ± 0.83 ^g	0.92 ± 0.67 ^g	.429		
		1	1.91 ± 0.79 ^h	1.30 ± 0.76 ^h	.016 ^f		
		2	2.61 ± 0.50 ^h	1.11 ± 0.76 ^h	<.001 ^h		
2	Problems with orientation in new places	0.5	0.42 ± 0.51 ^f	0.25 ± 0.45	.166		
		1	1.17 ± 1.03 ^h	0.74 ± 0.92 ^g	.047 ^f		
		2	1.78 ± 1.00 ^h	0.78 ± 0.73 ^h	.004 ^g		
3	Problems with remembering telephone call	0.5	0.50 ± 0.67 ^f	0.33 ± 0.49 ^f	.551		
		1	1.43 ± 0.79 ^h	0.65 ± 0.71 ^h	<.001 ^h		
		2	2.06 ± 1.11 ^h	0.17 ± 0.38	<.001 ^h		
4	Problems with understanding conversations	0.5	0.58 ± 0.67 ^f	0.33 ± 0.49 ^f	.389		
		1	1.13 ± .63 ^h	0.52 ± 0.59 ^h	.002 ^g		
		2	1.78 ± 0.88 ^h	0.11 ± 0.47	<.001 ^h		
5	Problems with signing your name	0.5	0.08 ± 0.29	0.00 ± 0.00	.339		
		1	0.22 ± 0.42 ^f	0.17 ± 0.49	.747		
		2	1.33 ± 1.14 ^h	0.00 ± 0.00	<.001 ^h		
6	Problems with understanding the newspaper	0.5	0.25 ± 0.45	0.58 ± 0.67 ^f	.166		
		1	1.00 ± 0.95 ^h	0.43 ± 0.51 ^h	.020 ^f		.221 ^f
		2	1.94 ± 0.94 ^h	0.11 ± 0.32	<.001 ^h		
7	Problems with keeping belongings in order	0.5	0.75 ± 0.97 ^f	0.58 ± 0.79 ^f	.551		
		1	1.61 ± 0.99 ^h	0.43 ± 0.66 ^g	<.001 ^h		
		2	2.44 ± 0.70 ^h	0.22 ± 0.43 ^f	<.001 ^h		
8	Problems with remembering where things were left	0.5	1.50 ± 0.80 ^h	0.83 ± 0.39 ^h	.005 ^g	.555 ^f	
		1	1.78 ± 0.80 ^h	1.04 ± 0.64 ^h	.001 ^g	.352 ^g	
		2	2.33 ± 0.77 ^h	0.83 ± 0.51 ^h	<.001 ^h		
9	Problems with writing	0.5	0.67 ± 0.89 ^f	0.33 ± 0.49 ^f	.166		
		1	0.96 ± 0.71 ^h	0.52 ± 0.79 ^g	.022 ^f	.934 ^h	.533 ^h
		2	2.17 ± 0.86 ^h	0.28 ± 0.75	<.001 ^h		
10	Problems with handling money	0.5	0.50 ± 1.00	0.25 ± 0.62	.082		
		1	1.04 ± 1.07 ^h	0.35 ± 0.71 ^f	.015 ^f		
		2	2.06 ± 1.00 ^h	0.11 ± 0.47	<.001 ^h		
11	Problems with orientation in your neighborhood	0.5	0.33 ± 0.89	0.08 ± 0.29	.389		
		1	0.65 ± 0.83 ^g	0.30 ± 0.56 ^f	.103		
		2	1.39 ± 1.14 ^h	0.11 ± 0.32	<.001 ^h		
12	Problems with remembering appointments	0.5	0.67 ± 0.89 ^f	0.50 ± 0.52 ^g	.504		.766 ^g
		1	1.78 ± 0.95 ^h	0.78 ± 0.67 ^h	<.001 ^h		.388 ^g
		2	1.94 ± 0.80 ^h	0.56 ± 0.62 ^g	<.001 ^h		
13	Problems with practicing favorite hobbies	0.5	0.17 ± 0.39	0.25 ± 0.45	.674		
		1	0.83 ± 0.94 ^h	0.39 ± 0.72 ^f	.038 ^f	-.309 ^f	
		2	1.67 ± 0.97 ^h	0.28 ± 0.75	<.001 ^h		
14	Problems with communicating with people	0.5	0.08 ± 0.29	0.25 ± 0.45	.339		
		1	0.74 ± 0.69 ^h	0.35 ± 0.49 ^g	.025 ^f		
		2	1.39 ± 0.92 ^h	0.00 ± 0.00	<.001 ^h	-.471 ^h	
15	Problems with mental calculations	0.5	0.42 ± 0.67	0.83 ± 0.39 ^h	.054		
		1	1.17 ± 0.89 ^h	1.22 ± 0.80 ^h	.852		.322 ^g
		2	1.83 ± 1.10 ^h	0.83 ± 1.15 ^g	.022 ^f		.523 ^g
16	Problems with remembering shopping lists	0.5	0.75 ± 0.87 ^f	0.58 ± 0.51 ^g	.638		
		1	1.65 ± 0.93 ^h	0.74 ± 0.81 ^h	<.001 ^h		
		2	2.22 ± 0.81 ^h	0.50 ± 0.71 ^g	<.001 ^h		
17	Problems with bladder control	0.5	0.17 ± 0.58	0.00 ± 0.00	.339		
		1	0.39 ± 0.84 ^f	0.13 ± 0.34	.186		
		2	1.00 ± 1.03 ^g	0.00 ± 0.00	.001 ^g	.382 ^g	
18	Problems with understanding the plot of a movie	0.5	0.25 ± 0.45	0.42 ± 0.51 ^f	.438		
		1	1.09 ± 0.67 ^h	0.52 ± 0.51 ^h	.006 ^g		
		2	1.67 ± 1.03 ^h	0.11 ± 0.32	<.001 ^h		
19	Problems with orientation in the house	0.5	0.00 ± 0.00	0.00 ± 0.00	–		
		1	0.13 ± 0.34	0.00 ± 0.00	.083		
		2	0.94 ± 1.11 ^g	0.00 ± 0.00	.002 ^g		

(continued)

Table 2. (continued)

	CDR	Caregivers ^a Mean ± SD	Patients ^b Mean ± SD	Disc ^c P value	Pred. C ^d	Pred. P ^e
20 Problems with doing home activities	0.5	0.92 ± 1.16 ^f	0.42 ± 0.67	.166		
	1	1.09 ± 1.04 ^h	0.22 ± 0.42 ^f	.001 ^g		
	2	2.06 ± 0.94 ^h	0.11 ± 0.32	<.001 ^h		
21 Problems with feeding oneself	0.5	0.42 ± 1.00	0.00 ± 0.00	.175		
	1	0.17 ± 0.49	0.04 ± 0.21	.266		
	2	1.00 ± 1.14 ^g	0.06 ± 0.24	.004 ^g	.490 ^h	
22 Problems with doing clerical work	0.5	0.92 ± 1.16 ^f	0.75 ± 0.97 ^f	.504	.439 ^f	
	1	1.52 ± 1.08 ^h	0.74 ± 1.10 ^g	.002 ^g		
	2	2.33 ± 0.84 ^h	0.94 ± 1.35 ^g	.002 ^g	.574 ^h	.439 ^f
Sum	0.5	11.50 ± 10.48 ^h	8.50 ± 4.87 ^h	0.389		
	1	23.48 ± 9.68 ^h	11.61 ± 6.66 ^h	<.001 ^h		
	2	39.94 ± 14.65 ^h	7.22 ± 4.14 ^h	<.001 ^h		
Mood and behavior domains						
23 More rigid and inflexible about decisions	0.5	0.75 ± 0.87 ^f	0.58 ± 0.90 ^f	.339		
	1	1.57 ± 0.90 ^h	0.61 ± 0.72 ^g	<.001 ^h		
	2	2.06 ± 0.80 ^h	0.94 ± 1.21 ^g	.003 ^g		
24 More egotistical and self-centered	0.5	0.92 ± 0.90 ^g	0.58 ± 0.67 ^f	.266		
	1	1.39 ± 0.94 ^h	0.26 ± 0.45 ^f	<.001 ^h		
	2	1.56 ± 0.86 ^h	0.67 ± 0.97 ^f	<.001 ^h		
25 More irritable	0.5	0.50 ± 0.67 ^f	0.58 ± 0.51 ^g	.723		
	1	0.96 ± 0.93 ^h	0.39 ± 0.58 ^g	.020 ^f		
	2	1.22 ± 0.88 ^h	0.83 ± 1.04 ^g	.149		
26 More frequent crying episodes	0.5	0.08 ± 0.29	0.42 ± 0.51 ^f	.104		
	1	0.48 ± 0.79 ^g	0.43 ± 0.66 ^g	.770		
	2	0.67 ± 0.84 ^g	0.83 ± 0.99 ^g	.636		
27 Laughing inappropriately	0.5	0.08 ± 0.29	0.17 ± 0.39	.586		
	1	0.17 ± 0.39 ^f	0.22 ± 0.52	.770		
	2	0.39 ± 0.61 ^f	0.06 ± 0.24	.029 ^f		
28 Increased sexual interest	0.5	0.00 ± 0.00	0.17 ± 0.39	.166		
	1	0.13 ± 0.34	0.09 ± 0.29	.665		
	2	0.11 ± 0.32	0.06 ± 0.24	.579		
29 Less interest in favorite activities	0.5	0.50 ± 0.67 ^f	.42 ± 0.51 ^f	.723		
	1	1.00 ± 0.85 ^h	.65 ± 0.93 ^g	.088		
	2	1.61 ± .92 ^h	.61 ± 1.04 ^f	.001 ^g		
30 More depressed	0.5	.83 ± 0.83 ^g	.42 ± 0.67	.096		
	1	1.13 ± 0.87 ^h	0.70 ± 0.76 ^h	.038 ^f		
	2	1.33 ± 0.69 ^h	.56 ± 0.92 ^f	.012 ^f		
Sum	0.5	3.67 ± 2.77 ^h	3.33 ± 2.99 ^h	0.768		
	1	6.83 ± 3.41 ^h	3.35 ± 2.92 ^h	<.001 ^h		
	2	8.94 ± 2.60 ^h	4.56 ± 4.00 ^h	<.001 ^h		

Abbreviation: SD, standard deviation; CDR, Clinical Dementia Rating scale.

^a Scores of caregivers were analyzed by one-sample *t* test, and statistically significance was denoted.

^b Scores of caregivers patients were analyzed by one-sample *t* test, and statistically significance was denoted.

^c Discrepancy between caregivers' and patients' assessment, showing severity of anosognosia; discrepancy was evaluated by paired *t* test.

^d Predictors of distress in caregivers were analyzed by multivariate regression model, and statistically significant standardized beta value was shown in the column.

^e Predictors of distress in patients were analyzed by multivariate regression model, and statistically significant standardized beta value was shown in the column.

^f *P* < .05.

^g *P* < .01.

^h *P* < .001.

Caregivers' Evaluation

Caregivers' assessments were 11.5 ± 10.5 (mean ± standard deviation) in CDR 0.5, 23.5 ± 9.7 in CDR 1 and 39.9 ± 14.7 in CDR 2 in intellectual functioning domain (Table 2 and Figure 1), and they were 3.7 ± 2.8 in CDR 0.5, 6.8 ± 3.4 in CDR 1, and 8.9 ± 2.6 in CDR 2 in mood and behavior domains (Table 2).

Anosognosia: Discrepancy Between Caregivers' and Patients' Assessment

In intellectual functioning domain, discrepancy between caregivers' and patients' assessment was significantly different among groups (*P* < .001), and post hoc analysis showed that caregiver's assessment was significantly higher than patients' assessment in the CDR 1 and CDR 2 groups (*P* < .001 in both

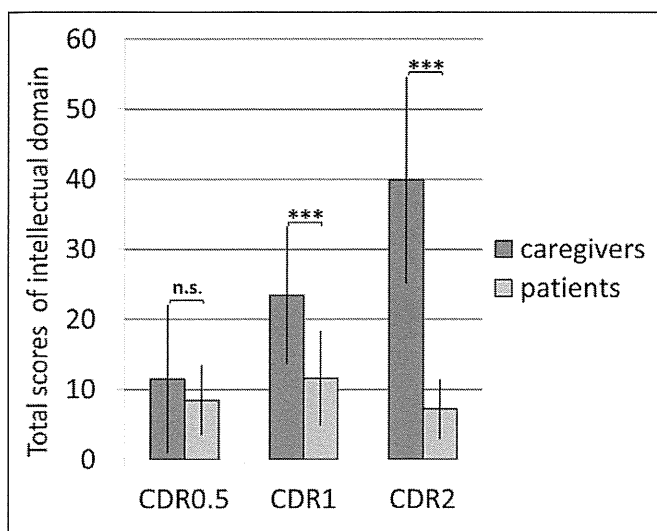


Figure 1. Discrepancy between patients' and caregivers assessment in intellectual functioning domain. Discrepancy was evident in CDR, Clinical Dementia Rating scale (CDR) 1 and 2 groups ($P < .001$ in both), but not in CDR 0.5 group ($P = .389$). Caregivers assessment was aggravated as the disease progressed ($P < .001$). Patients' self-assessment in CDR 1 was worse than that in CDR 2 group ($P = .045$), and there were no significant differences between patients' self-assessment in CDR 2 and that in CDR 0.5. Significant level: *** $P < .001$, ns: not significant.

groups) but not in the CDR 0.5 group ($P = .389$). The findings for each item are shown in Table 2. In CDR 0.5, discrepancy was significant only in mislaying (#8). In CDR 1, discrepancy was observed in 16 items except 6 items: problems with signing one's name (#5), orientation in the neighborhood (#11), mental calculation (#15), and bladder control (#17), orientation in the house (#19), and feeding oneself (#21). Concerning the last 2 items (#19 and #21), the caregivers answered that the patients were capable of these activities. In CDR 2, discrepancy was observed in all 22 items (Table 2 and Figure 1).

In mood and behavior domains, discrepancy between caregivers' and patients' assessment was significantly different among groups ($P = .022$), and post hoc analysis showed that caregivers' assessments were significantly higher than patients' assessment in the CDR 1 and CDR 2 groups ($P < .001$), but not in the CDR 0.5 group ($P = .768$). The findings for each item are shown in Table 2.

Patients' Perspective and Caregivers' Perspectives of Patients' Distress

In CDR 0.5, according to patients' perspectives, problems with remembering appointments (#12) were predictors of distress defined as patients' scores of mood and behavior domain, whereas according to caregivers' perspective, problems with remembering where things were left (#8) and doing clerical work (#22) were predictors.

In CDR 1, according to patients' perspectives, problems with remembering appointments (#12), writing (#9), mental calculation (#15), and understanding the newspaper (#6) were predictors. Problems with writing (#9) were common predictors in assessment of patients and caregivers. According to caregivers' perspectives, problems with remembering where things were left (#8) were a positive predictor, whereas problems with practicing favorite hobbies (#13) were a negative predictor.

In CDR 2, according to patients' perspectives, problems with mental calculation (#15) and doing clerical work (#22) were predictors. Problems with doing clerical work (#22) were common predictors in the assessment of patients and caregivers. According to caregivers' perspectives, problems with feeding oneself (#21) and bladder control (#17) were positive predictors, and problems with communicating with people (#14) was a negative predictor (Table 2).

Discussion

From patients' perspectives, awareness of deficits remained until CDR 2, although awareness diminished as disease progressed. In CDR 0.5, patients' assessments of function and those of caregivers were similar. In CDR 1, the patients were generally aware of their deficits even if their assessment was insufficient. In CDR 2, insufficient awareness of deficits remained and was related to the elemental cognition such as memory (#8, #12, and #16), and time and spatial orientation (#1 and #2). At the same time, it was also shown that the patients no longer retained self-awareness in many aspects. They lost awareness of deficits in activities requiring executive function such as handling money (#10), practicing favorite hobbies (#13), and doing home activities (#20). Metacognition is considered to be closely related to executive functions,^{32,33} and it should be noted that self-awareness concerning executive function could deteriorate before self-awareness related to memory or orientation.

In CDR 2, deficits in self-awareness were also apparent in the activities regarding communication and social interaction: understanding conversations (#4), communicating with people (#14), understanding the newspaper for accessing information on society (#6) and understanding the plot of a movie that involves communication of characters (#18). Unawareness of communication deficits could be partly explained by a defense mechanism³⁴ in the desire to cling to social interaction.

Discrepancy was observed between patients' and caregivers' perspective in what patients felt distressed, adding to the difference between patients' and caregivers' assessment of patients' deficits. From the patients' perspective, patients in CDR 0.5 and 1 might feel distressed due to attenuated social interaction; difficulty with remembering appointments (#12) was chosen as a predictor of distress in CDR 0.5 and in CDR 1. Social interaction and network tend to become limited due to the disease,³⁵ and the patients may be aware of the difficulties in maintaining social

interaction. Problems with writing (#9) and understanding the newspaper (#6) were also chosen in CDR 1. Those 2 are intellectual tasks related to communication. Writing is an important measure of communication, especially for patients who may have difficulty with face-to-face communication because of the deterioration of comprehension and language abilities. Newspapers are one of the useful tools to catch up with the world. Home delivery service of newspapers is common in Japan, and many elderly individuals habitually read newspapers.

Patients with AD might also be annoyed with awareness of deficits in intellectual tasks.³¹ Patients in CDR 1 and 2 felt distressed as a result of awareness of problems with mental calculation (#15). Patients in CDR 2 also felt distressed as a result of awareness of deficits in clerical work (#22); in the Japanese version, the clerical work was limited to household budget management. The caregivers understood the patients' distress concerning deficits in writing (#9, CDR 1) and deficits in doing clerical work (#22, CDR 2); however, they imagined that the patients in CDR 0.5 and 1 only felt distressed by awareness of deterioration of memory (#8 difficulties in remembering where things were left) and those in CDR 2 felt distressed by awareness of deterioration of basic activities of daily living in bladder control (#17) and feeding oneself (#21). Caregivers also thought that patients did not care about problems in practicing favorite hobbies (#13, CDR 1) or communicating with people (#14, CDR 2).

The results indicated that patients felt distressed by awareness of deficits, especially deficits in social interaction and intellectual work. The results also suggested that the patients would prefer to satisfy social needs rather than basic physiological need, which caregivers assumed to be patients' concerns in CDR 2. Misunderstanding of these needs could lead to BPSD. The BPSD is not triggered solely by physiological factors, but rather reflects social environments in which the behavior occurs.³⁶⁻³⁸ Thus, modifying environmental factors could be beneficial approach to managing BPSD. As the relationship with caregivers is one of the most influential social environmental factors for the patients, modifying caregivers' behaviors should be beneficial treatment of BPSD.³⁹ To the contrary, modifying patients' awareness, for example, awareness-raising approaches would be inappropriate. Decline of abilities is inevitable for patients with AD, and the approach forces the patients to confront their deficits and could lead to adverse effects such as anxiety and lowering of self-esteem and motivation.^{31,40} The essence of care as nonpharmacological intervention is interpersonal empathetic relationship. Empathy involves cognitive processes to understand others and situations analytically,⁴¹ and cognitive empathy focuses on understanding what the patient needs based on the patients' perspective. It could be an effective tool for cognitive empathy to analyze why patients feel distressed due to self-awareness of disease.

This study had some limitations. The questionnaire discrepancy method recognizes caregivers' assessment as an objective standard, which could be biased by patient-caregiver relationship and caregivers' factors such as depression and

health status. This research was conducted in a small number of participants. For the next step, we are planning an interventional study to enhance the coping resources of caregivers with a larger number of participants.

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INTERVENTION USING A COMMUNITY-BASED WALKING PROGRAM IS EFFECTIVE FOR ELDERLY ADULTS WITH DEPRESSIVE TENDENCIES

To the Editor: Dementia has become a socioeconomic burden in Japan because of the increasing elderly population, and delaying the onset of dementia would significantly

reduce its incidence. Under the Japanese public Long-Term Care Insurance Act, municipality-led interventions for the prevention of mental decline are encouraged in accordance with the concept of community-based rehabilitation.¹ A previously reported randomized controlled trial demonstrated the efficacy of a walking program in preventing mental decline in elderly individuals with subjective memory complaints, and significant benefits were shown in a categorical word fluency test related to frontal lobe function.²

This intervention aimed at producing synergetic effects of aerobic exercise and social interaction based on the five principles of brain-activating rehabilitation for dementia: maintaining a pleasant atmosphere, enhancing participants' motivation and self-directed thinking, maintaining interactive communication, providing social roles for participants, and providing positive feedback for learning.³ It has been reported that aerobic exercise such as walking is beneficial for prevention of mental decline, as well as for slowing the progression of dementia.⁴ A rich social network and interaction may protect against mental decline,⁵ whereas social isolation is associated with risk of mental decline.⁶ Social isolation and loneliness is fundamentally associated with depression in senile individuals.⁷ Thus, the previous study was continued with a larger population, and the relationship between participants' depressive tendency and improvement in word fluency tests was reviewed.

The intervention participants were 138 community residents aged 65–80. Based on a medical examination, 106 participants had no cognitive decline (normal controls, NC), and 32 were diagnosed with mild cognitive impairment (MCI). All participated in a 90-minute intervention program conducted once a week for 12 weeks. The intervention was conducted as described previously.² The program consisted of a 30-minute exercise period and 60 minutes of small-group work with five to eight participants. Evaluation was conducted twice: at a baseline assessment before the intervention and at a postintervention assessment. Function of word fluency was measured using a categorical test of “animals,” and depressive tendency was measured using a self-completed questionnaire

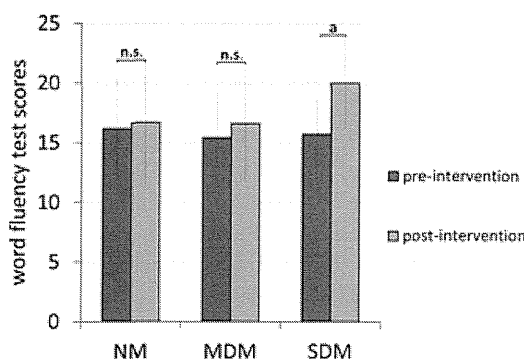


Figure 1. Results of word fluency test. Participants were classified into three groups according to Geriatric Depression Scale score; a score of 0–4 indicated normal mood (NM), 5–9 indicated a mild tendency toward depressed mood (MDM), and 10–15 indicated a severe tendency toward depressed mood (SDM). A higher score on the word fluency test indicates improvement. ^a $P < .001$.

from the Geriatric Depression Scale (GDS);⁸ a score of 0–4 indicated normal mood (NM), 5–9 indicated a mild tendency toward depressed mood (MDM), and 10–15 indicated a severe tendency toward depressed mood (SDM).

The effects of the intervention were analyzed in the participants whose attendance rate was greater than 80%. There were 117 participants (mean age \pm standard deviation 72.4 ± 4.3 , 11.9 ± 2.6 years of education; 36 male and 81 female; 91 NC and 26 MCI). Participants were divided into three groups according to baseline GDS score (79 NM, 31 MDM, 7 SDM). Scores on a word fluency test and GDS were analyzed using two by three analysis of covariance with covariates of age, sex, and years of education: two terms for pre- and postintervention and three groups for NM, MDM, and SDM. The Japanese version of SPSS for Windows version 19.0 (IBM Corp., New York, NY) was used, and statistical significance was set as $P < .05$. The ethics board of Gunma University School of Health Sciences approved all procedures, and written informed consent was obtained from all participants.

The results of the word fluency test were significantly different between the groups ($F(2,111) = 5.345$, $P = .006$), and within-subject post hoc analysis showed significant improvement only in the SDM group (NM, preintervention 16.2 ± 4.2 , postintervention 16.7 ± 4.9 , $P = .13$; MDM, preintervention 15.4 ± 3.8 , postintervention 16.6 ± 4.7 , $P = .06$; SDM, preintervention 15.7 ± 2.9 , postintervention 20.0 ± 3.7 , $P < .001$; increase indicated improvement; Figure 1). In addition, the attendance rate of each SDM participant was greater than 80%, and depressive mood was ameliorated. The GDS results were significantly different between the groups ($F(2, 111) = 8.304$, $P < .001$), and within-participant post hoc analysis showed amelioration in MDM and SDM (NM, preintervention 1.6 ± 1.4 , postintervention 2.0 ± 2.1 , $P = .16$; MDM, preintervention 6.4 ± 1.4 , postintervention 5.5 ± 2.0 , $P = .02$; SDM, preintervention 11.0 ± 1.0 , postintervention 8.9 ± 2.5 , $P = .003$; decrease indicated amelioration).

These results suggest that this intervention provided dual benefits in cognitive function and amelioration of depressive mood in community residents with depressive tendencies. Presenile depressive states are common in elderly individuals, and depressive state and withdrawal related to depressive mood have been found to be risk factors for dementia. Thus, this intervention may be worthwhile for community-based rehabilitation programs. The intervention reported here involved a small group of subjects, although the intervention is continuing, and the results will be confirmed in a larger population as well as longitudinal follow-up of participants.

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