Original Research Article

A Multi-Component Cognitive Stimulation Program among Older People with Dementia in Day Care Centers of Taiwan: A Pilot Study

ABSTEACT

Aims: To examine the effectiveness of this multi-component, cognitive stimulation program in day care centers for older people with dementia to prevent cognitive function decline, self-care abilities decline, and behavior problems or the development of depressive moods.

Study design: This was pre- and post-test experiments with two groups.

Place and Duration of study: Subjects were recruited from day care centers located in southern of Taiwan, between May 2018 to December 2018.

Methodology: Subjects in the experimental group were treated with the multi-component, cognitive stimulation program (MCCSP). Activities of MCCSP contained: structured brain exercise activities and music-leading exercise activities. There were twenty-three subjects (n = 14, in the experimental group; n = 9 in the comparison group) participated the study.

Results: Results showed that the mini-mental status score (MMSE), the score in Cornell Scale for Depression in Dementia (CSDD), the score in Clifton Assessment Procedures for the Elderly Behavior Rating Scale (CAPE-BRS) and score of activity of daily living (ADLs) have improved between the pre- and posttest scores in the experimental group. Hence, to examine post-intervention changes between experimental and comparison groups, scores showed statistical significant differences in CAPE-BRS and CSDD, but no statistical significant differences in MMSE and ADLs.

Conclusion: Staff caregivers of day care center can provide the effectiveness of a multi-component cognitive stimulation program for delaying the occurrence of behavioral problems, depressive mood, and cognitive function declined.

Key words: day care, dementia care, elders, cognitive stimulation

1. INTRODUCTION

People with dementia rates are increasing in all regions of the world and are related to the aging population. According to the World Health Organization [1], 50 million people have dementia, and more than half (60%) of all people with dementia live in low- and middle-income countries. Owing to the increase in new cases each year, the number of people with dementia is expected to rise to 82 million in 2030 and 152 million in 2050. Hence, the estimated proportion of the general population aged 60 and over with dementia at any given time is between 5 and 8 per 100 people. The costs of caring for people with dementia was US$818 billion [2], and the majority of care is provided by family caregivers. However, the increase in dementia in older adults not only leads to an increase in healthcare costs and burden but also increases the disability population.

The term dementia refers to progressive degenerative brain syndromes, with alternation of memory, thinking, orientation, comprehensive, language, and decision making [3]. Additional behavioral problems that often affect people with dementia include depression, apathy, anxiety, agitation, delusions, pacing, paranoia, hallucinations, wandering, or restlessness. Zhao et al. [4] conducted a systematic review and meta-analysis to understand the prevalence of neuropsychiatric symptoms (NPS) among people with Alzheimer's disease. Forty-eight eligible articles provided data for 12 NPS reported in the Neuropsychiatric Inventory (NPI). Results indicated that the most common NPS were apathy (49%), depression (42%), aggression (40%), anxiety (39%), and sleep disorder (39%). The less prevalent NPS were irritability (36%), appetite disorder (34%), aberrant motor behavior (32%), delusion (31%), disinhibition (17%), and hallucination (16%). The least common was euphoria (7%). Others reported that apathy, aberrant motor behavior, sleep problems, eating problems, and agitation/aggression were the most common symptoms in people with Alzheimer’s disease, and that their prevalence was 71.0%, 61.3%, 56.5%, 51.6%, and 45.2%, respectively [5]. While there are side effects of medications, such as weakness, loss of appetite, troubling sleep, shakiness (tremor), or muscle cramps, pharmacological intervention has been regarded as the mainstay of behavioral problems and/or NPS. Consequently, people with dementia may be unable to participate in activities of daily living (ADLs). Therefore, the development of non-pharmacological interventions has been of crucial importance in caring for people with dementia.

In the past few decades, older people with dementia, functional impairments, and behavioral and psychological problems have been managed with non-pharmacological interventions, such as person-centered care approaches [6], sensory stimulation [7], music therapy [8], and aromatherapy [9]; and cognitive-emotional approaches such as animal therapy [10], reminiscence therapy [11] or the scientific exercises approach [12]. Doi et al. [13] conduced a three-arm, single-blind randomized control trail to examine the effectiveness of a structured cognitive leisure activity program for a mild cognitive impairment (MCI) community residence for older people. The structured, cognitive, leisure activity program provided activities for 60 minutes weekly over 40 weeks, including dancing, playing musical instruments, and health education. The results indicated that the people with dementia who were dancing or playing musical

instruments showed improved memory and cognitive function compared with a health education program in older adults with MCI. Cheng et al. [12] also examined the effects of cognitive stimulation (mahjong) and physical exercise (tri chi [TC]) on older people with mild dementia. Activities were provided three times weekly for 12 weeks. Results found that subjects receiving the mahjong intervention showed improvement in cognitive function, delayed recall, and forward digit span test. The results also showed similar effects for subjects receiving TC, but not for delayed recall. However, while these approaches have been successful in minimizing behavioral and psychological problems among older people with dementia, these studies do not consider how to optimize and maintain physical function.

To provide care without exacerbating behavioral and psychological problems and preventing functional decline, a multi-component, cognitive stimulation program was designed. Therefore, the purpose of this study is to examine the effectiveness of this multi-component, cognitive stimulation program in day care centers for elderly people with dementia to prevent cognitive function decline, self-care abilities decline, and behavior problems or the development of depressive moods.

2.MATERIAL AND METHODS

This study conducted pre- and post-test experiments with two groups. Subjects who met sample selection criteria were recruited and randomly assigned to either the experimental group or the comparison group, depending on the day-care center they attended. Subjects in the experimental group were treated with the multi-component, cognitive stimulation program (MCCSP). Subjects in the comparison group received same care as usual.

2.1 Sample

Twenty-three subjects were recruited from two day-care centers located in southern Taiwan. The eligible subjects included: (1) aged 60 years and over, (2) lived in his/her own home, (3) with or without a hearing device and able to speak Mandarin or Taiwanese, (4) cognitively intact as determined by a score of less than 24 on the Mini-Mental State Examination (MMSE); and, (5) agreed to participate in the study. The subjects who were excluded were those who were bedridden and unable to sit in a wheelchair, or who had one or more acute diseases during the data collection period and were unable to return to the day-care center.

2.2 Interventions

In the experimental group, MCCSP was implemented by two registered nurses (RN) and students who majored in senior citizen services. MCCSP was a structured, cognitive, leisure activity program for cognitively impaired older people. Activities of MCCSP contained (1) structured brain exercise activities and (2) music-leading exercise activities. The structured brain exercise activities included playing musical instruments/singing; playing board games; and classes in Chinese, sciences, sociology, physical education, cooking, and math. The music-leading exercise activities comprised: (1) clearly designed background music, melody, and rhythm, (2) activities designed within rehabilitation and music, and (3) musical activities and/or physical activities carried out explicitly. Based on subjects' cultural background,

songs in the music-leading exercise activity were familiar, simple, and had clear rhythm and melody. The MCCSP, however, began with a music-leading exercise activity. Subjects received 30-minutes of physical exercise with 5 minutes of warm-up at the beginning and 5 minutes of cool down. Due to unpredictable behavior problems or depressive moods of dementia in older people, subjects next received one or two structured brain exercise activities depending on subjects' participation throughout the day. However, the MCCSP was provided for at least one hour, three times a week for 12 weeks. In contrast, subjects in the comparison group were provided with their usual activities. The daily usual activities included un-structured brain exercise activities and music-leading exercise activities. The un-structured brain exercise activities also included singing, playing board games, classes in cooking, or art. Songs in the music-leading exercise activity were selected without considering subjects' cultural background. Activities were carried out by two nursing assistants or a social worker in the day care center and students majoring in senior citizen services.

2.3 Instruments

Demographic instrument was collected via chart records; and used to assess the elders' age, length of attending a day-care center, gender, marital status, and educational level.

The Mini-Mental State Examination (MMSE) was used to measure the cognitive function status of the participants. It has been applied in clinical settings for assessing clients' cognitive functions in Taiwan. The MMSE is a criterion-referenced instrument, and contains 11 items. It can be used to examine subjects' orientation, registration, recall, attention and calculation, recall, language and copying abilities. The score ranges from 0 to 30. The sum of the score is used to identify subjects' cognitive function. A score below 23 suggests cognitive impairment [14].

The Clifton Assessment Procedures for the Elderly Behaviour Rating Scale (CAPE-BRS) was used to measure behavioral problems of older people with dementia, including activities of daily living, apathy, communication difficulties, and social disturbance in older people with dementia. It was collected by observations. The CAPE-BRS includes 18 items. Each item is scored from 0 to 2. The total score ranges from 0 to 36. Higher scores indicate greater disability [15].

The Cornell Scale for Depression in Dementia (CSDD) was used to examine symptoms of depression in people with dementia. It was collected by observations. It includes 19 items, and measures mood-related signs, behavioral disturbances, physical signs, cyclic functioning, and ideational disturbance. The total score ranges from 0 to 38. A score from 0 to 6 indicates no depression, 7 to 9 indicates mild depression, 10 to 19 indicates possible severe depression, and 18 and over indicates severe depression. The CSDD was translated into Chinese, and the validity and reliability have been examined [16].

The Refined ADL Assessment Scale (RADL) was used in this study to measure performance in the activities of daily living (ADLs) of the participants [17]. It was collected by observations. The RADL was designed to measure five tasks of basic ADLs for older people with Alzheimer and related disorders. It

includes tasks of feeding, washing, grooming, dressing, and toileting. The toileting task was not assessed in this study because it was likely to disturb the privacy of older adults. However, each task in RADL is broken down into 2 to 5 subtasks. Each subtask is further broken down into the sequence of steps needed for completion of the activity. The RADL is collected via observations, and each step is rated across a continuum from (6) unassisted, (5) to verbal prompt, (4) nonverbal prompt, (3) physical guiding, (2) full assistance, (1) full assist no attempt, and (0) non-associated. The scores for the feeding activity range from 0 to 126, for washing activity range from 0 to 204, for grooming activity range from 0 to 174, for dressing activity range from 0 to 150, and for toileting activity range from 0 to 126. A higher score indicates greater independence in ADLs performance. The content validity and reliability of the RADL were examined, and it has been translated and the Chinese translation has been used in nursing homes, long-term care facilities, and day-care centers of Taiwan [18].

2.4 Data analysis

The SPSS 20.0 statistical software package for Windows was used to analyze the data. The alpha level of significance was set at .05. The data were analyzed using the *t*-test, Chi-square test, Pearson's correlation, and logistic regression.

3. RESULTS

3.1 Demographic information

In this study, 28 older adults were recruited from two day-care centers located in southern Taiwan. They were randomly assigned to either the experimental group (n = 16) or the comparison group (n = 12), depending on which day-care center they attended; however, during the intervention period, five subjects withdrew to receive services of other day-care centers. At the end of the study, only 23 subjects remained (14 subjects in the experimental group, 9 subjects in the comparison group). Testing of the differences between the two groups of subjects, found that there were statistically significant differences regarding age, CAPE-BRS, MMSE, and ADL at p = .000, but no significant difference was found for CSDD. Table 1 presents the demographic information and differences between the two groups of subjects.

Table 1. Demographic information

Variables	Experimental group Mean (SD)/%	Comparison group Mean (SD)/%	*t-test/X²*
Age	75.02 (10.41)	82.82 (5.59)	2.053
Period of attending a day-care center (month)	8.79 (1.25)	22.44 (11.20)	4.577**
CSDD (Baseline)	0.86 (0.93)	6.89 (5.33)	3.516**
CAPE-BRS (Baseline)	4.21 (7.59)	9.33 (6.91)	1.688
MMSE (Baseline)	15.34 (5.59)	11.56 (3.58)	1.961
ADLs (Baseline)	569.29 (134.80)	552.08 (66.39)	0.407

Feeding	118.50 (28.06)	124.44 (2.65)	0.787
Dressing	95.93 (22.72)	89.53 (17.86)	0.753
Grooming	163.29 (38.67)	154.22 (24.97)	0.692
Washing	191.57 (45.36)	183.89 (24.29)	0.527
Gender			0.735
Female	10	7	
Male	4	2	
Marital status			0.435
Single/ Widow	10	5	
Married	4	4	
Educational			0.608
No formal education	6	5	
≤ 9years	4	3	
> 9years	4	1	

Note. MMSE = mini-mental status exam; CSDD = The Cornell Scale for Depression in Dementia; CAPE-BRS = The Clifton Assessment Procedures for the Elderly-Behaviour Rating Scale, ADLs = activity of daily living.

** $p < .01$

3.2 Testing association among variables

To test the normality of each variable, the Kolmogorov-Smirnov test was performed. Results showed that the baseline variables: CSDD ($p = .000$), CAPE-BRS ($p = .012$) and ADLs ($p = .000$), were normally distributed, while the MMSE ($p = .020$) was not normally distributed. Furthermore, results showed significant negative correlations between MMSE and CAPE-BRS ($r = -.718$, $p = .000$), MMSE and CSDD ($r = -.575$, $p = .004$), CSDD and ADLs ($r = -.672$, $p = .000$), CAPE-BRS and ADLs ($r = -.865$, $p = .000$), while positive correlations existed between MMSE and ADL ($r = .653$, $p = .001$), and between CSDD and CAPE-BRS ($r = .847$, $p = .000$). These results are summarized in Table 2.

Table 2. Testing association among variables

Variables	MMSE	CSDD	CAPE-BRS	ADLs
MMSE	-	-.575**	-.718**	.653**
CSDD	-.575**	-	.847**	-.672**
CAPE-BRS	-.718**	.847**	-	-.865**
AD:s	.653**	-.672**	-.865**	-

3.3 Outcomes of Interventions

The pre- and posttest scores of MMSE, CSDD, CAPE-BRS and ADLs for the experimental and comparison groups are presented in Table 3. In the experimental group, although MMSE, CSDD, CAPE-BRS and ADLs showed improvement based on the pre- and posttest scores, results showed no statistically significant improvement ($p > .05$). For subjects in the comparison group, the pre- and posttest scores of MMSE, CSDD, CAPE-BRS slightly improved, but the score of ADLs showed a decline. These changes were not statistically significant ($p > .05$). Thus, the post-intervention changes between experimental and comparison group scores showed statistical significant differences in CAPE-BRS (t = 2.697*, p = .017) and CSDD (t = 5.12**, p = .000), but no statistical significant differences in MMSE (t = 1.042, p = .309) and ADLs (t = 0.807, p = .430).

In addition, a linear stepwise regression was performed to understand the predictors of post-intervention among variables. Results showed the baseline ADLs, pre- and post-intervention CAPE-BRS were significant predictors of post-intervention ADLs. The model accounted for 91.5% of the variation (R^2 = .956; Adjusted R^2 = .915) in the post-intervention ADLs. Results also showed that baseline CSDD and post-intervention ADLs were significant predictors of post-intervention CSDD. The model accounted for 86.5% of the variation (R^2 = .930; Adjusted R^2 = .865) in the post-intervention ADLs.

Table 3. Outcomes of interventions

Variables	Pre-test	Post-test
	Mean (SD)	Mean (SD)
MMSE		
Experimental group	15.43 (3.589)	19.07 (7.66)
Comparison group	11.56 (3.58)	15.89 (6.23)
CSDD		
Experimental group	0.85 (2.93)	0.000 (0.000)
Comparison group	6.89 (5.33)	6.33 (4.69)
CAPE-BRS		
Experimental group	4.21 (9.59)	1.57 (4.54)
Comparison group	9.33 (6.91)	7.78 (5.89)
ADLs		
Experimental group	569.29 (134.80)	577.43 (106.62)
Comparison group	552.09 (66.39)	542.17 (99.30)
Feeding		
Experimental group	118.50 (28.06)	120.36 (21.14)
Comparison group	124.44 (2.65)	123.67 (5392)
Dressing		
Experimental group	95.93 (22.72)	97.14 (18.17)

Comparison group	89.53 (17.86)	87.61 (19.17)
Grooming		
Experimental group	163.29 (38.67)	165.71 (31.00)
Comparison group	154.22 (24.09)	152.11 (34.73)
Washing		
Experimental group	191.57 (45.36)	194.21 (36.33)
Comparison group	183.89 (24.29)	178.78 (44.87)

**, $p < .01$; *, $p < .05$

4. Discussion

This study showed a correlation between cognitive function, behavioral problems, depressive mood, and ADL performance among older people with dementia living at home. These results were consistent with previous studies [8, 12, 18]. For example, Wang and colleagues [6] have examined 116 elderly people with dementia in long-term care facilities to understand the correlation between cognitive function, depression, and behavioral problems. The behavioral problems were measured by CAPE-BRS, depressive mood status was measured by CSDD, and cognitive function was measured by MMSE. Results show that the MMSE and CAPE-BRS have had a negative correlation, and positive correlation between the CSDD and CAPE-BRS, but no statistically significant correlations between the MMSE and CSDD. Hence, Aliberti and colleagues [19] conduced a prospective cohort study among 7338 community-dwelling elderly people, without dementia and ADLs dependence at baseline. Results found that cognitive function of elderly people was highly associated with ADL dependence and death. Although the study of Wang et al. has slightly different with the results of present study, this result may relate to number of subjects recruited, and study setting difference. In the Wang et al study, 149 subjects were recruited, and lived in a long-term care facility. The subjects in this study lived at home, which may have less cognitive impaired [20].

This study also has had similar results as previous studies [12,20,21] which as depression and behavioral problems among older people with dementia in day-care center can be prevented via structured brain exercise activities, and music-leading exercise activities. For example, Hsu and colleagues [21] organized an intervention program of physical exercise, music therapy, reality orientation, art therapy, reminiscence therapy and horticultural therapy once every week for 6 months for 141 older people with dementia in two veterans' home in northern Taiwan. Results found that subjects with a lower MMSE score, more severe behavioral and psychological symptoms of dementia (BPSD), and depressive symptoms at baseline were more likely to benefit from the intervention. Satoh and colleagues [22] also examined the effect of physical exercise with musical accompaniment on cognitive function of 119 elderly people. Results found that elderly people who received physical exercise combined with music showed improved cognitive function. Hence, Luttenberger and colleagues [23] implemented multicomponent group therapy consisting

of motor stimulation, practice ADL, and cognitive stimulation for elderly people with in five nursing homes. Results indicate that subjects who received the interventions of multicomponent group therapy maintained their cognitive function and ability to carry out ADLs during the intervention phase, but deteriorated after the end of therapy. However, to prevent cognitive function and decline in ADLs performance, and prevent behavioral problems and depressive mood, structured brain exercise activities, and music-leading exercise activities should be provided regularly for elderly people with dementia.

4.1 Limitations

The strength of the multi-component cognitive stimulation program (MCCSP) was developed based on subjects' cultural background. The intervention was easy accepted by dementia older people. Since the intervention were carried by nursing assistants, socials or registered nurse, and students, they may be busy or lack of ability to leadership activities. In the future study, nursing assistants who are major caregivers of day care centers need to be educated to carry out the MCCSP. Hence, due to small sample size, this study should be considered as a pilot study for further study. The generalizability of these findings to elderly people with dementia in day care centers of Taiwan cannot be ensured. Further study with a larger sample size, an intervention with a longer duration, and a stronger research design such as a longitudinal, repeated-measures, experimental design is needed to determine the efficacy of MCCSP in preventing cognitive function decline, self-care abilities decline, and behavior problems or the development of depressive moods among elderly people with dementia in day care centers.

5.CONCLUSION

Several behavioral problems, depressive mood, and cognitive function and ADLs performance decline are associated with dementia in elderly people. This study demonstrated the effectiveness of a multi-component cognitive stimulation program for delaying the occurrence of these problems. However, further research with an experimental design and a longer intervention could be necessary to examine the effectiveness of the multi-component cognitive stimulation program developed in the study.

CONSENT AND ETHICAL APPROVAL

This research was approved by the Ethical Board (. Before any intervention took place, the researchers informed the participants about the purpose, benefits of the study, and the written, informed consent of the participants was obtained.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of

knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

Reference

1. World Health Organization. Dementia. https://www.who.int/news-room/fact-sheets/detail/dementia; 2017 Accessed December 12 2017.
2. World Health Organization.Towards a dementia plan: A WHO guide. https://www.who.int/mental_health/neurology/dementia/en/; 2018 Accessed June 3 2019.
3. Abbate C, Trimarchi PD, Inglese S, Tomasini E, Bagarolo, R, Giunco F, Cesari M. **Signs** and symptoms method in neuropsychology: A preliminary investigation of a standardized clinical interview for assessment of cognitive decline in dementia**.** Appl Neuropsychol Adult. *2021; 28*(3): 282-296.
4. Zhao QF, Tan L, Wang HF, Jiang T, Tan MS, Tan L, Xu W, Li JQ, Wang J, Lai TJ, Yu JT. The prevalence of neuropsychiatric symptoms in Alzheimer's disease: Systematic review and meta-analysis. *J Affect Disord*. 2016; 190: 264-271.
5. Charernboon T, Phanasathit M. Prevalence of neuropsychiatric symptoms in Alzheimer's disease: a cross-sectional descriptive study in Thailand. *J Med Asso Thai*. 2014; 97: 560-565.
6. Fazio S, Pace D, Flinner J, Kallmyer B. The fundamentals of person-centered care or individuals with dementia. *The Gerontologist*. 2018; 58: S1, S10-S19.
7. Prins AJ, Scherder EJA, van Straten A, Zwaagstra Y, Milders MV. Sensory stimulation for nursing-home residents: Systematic review and meta-analysis of its effects on sleep quality and rest-activity rhythm in dementia. Dement Geriatr Cognit Disord*, 2020;* 49(3): 219-234.
8. Wang HH, Hsieh CY. Effect of multicomponent exercise program intervention on functional fitness and cognitive function in elderly with mild cognitive impairment. *NCYU J Phy Edu, Heal & Rec*. 2017; 16: 13-32.
9. Kaymaz TT, Ozdemir L. Effects of aromatherapy on agitation and related caregiver burden in patients with moderate to severe dementia: A pilot study. Geriatr Nurs, 2017; 38(3), 231-237.
10. Baek SM, Kee,Y, Sohng KY. The psychological and behavioural effects of an animal-assisted therapy programme in Korean older adults with dementia**.** Psychogeriatr. *2020;* 20(5): 645-653.
11. Li M, Lyu JH, Zhang Y, Gao ML, Li R, Mao PX, Li WJ, Ma X. Efficacy of group reminiscence therapy on cognition, depression, neuropsychiatric symptoms, and activities of daily living for patients with Alzheimer disease. J Geriatr Psychiatry Neurol. *2020; 33*(5): 272-281.
12. Cheng ST, Chow P, Song YQ, Yu ECS, Chan ACM, Lee TMC, Lam JHM. Mental and physical activities delay cognitive decline in older persons with dementia. *Am J Geriatr Psy.* 2014; 22: 63-74.

13. Doi T, Verghese J, Makizako H, Tsutsumimoto K, Hotta R, Nakakubo S., Suzuki T, Shimada H. Effects of cognitive leisure activity on cognition in mild cognitive impairment: Results of a randomized controlled trial. *J Am Med Dir Assoc.* 2017; 18: 686-691.
14. Crun RM, Anthony JC, Bassett SS, Folsteein M. Population-based norms for the Mine-Mental State Exam by age and educational level. *JAMA*. 1993; 269: 2836-2839.
15. Pattie AH, Gilleard CJ. *Manual of the Clifton Assessment Procedures for the Elderly (CAPE).* Sevenoaks, Kent, UK: Hodder and Stoughton; 1979.
16. Sharp LK, Lipsky MS. Screening for Depression across the lifespan: A review of measures for use in primary care settings. *Am Fam Physician*. 2002; 66: 1001-1008.
17. Tappen RM. The effect of skill training on functional abilities of nursing home residents with dementia. *Res Nurs Health*. 1994; 17: 159-165.
18. Chang SH, Wung SF, Crogan NL. Improving activities of daily living for nursing home elder persons in Taiwan. *Nur Res.* 2008; 57: 191-198. https://doi.org/10.1097/01.NNR.0000319492.14005.7f
19. Aliberti MJR, Cenzer I, Smith AK, Lee SJ, Yaffe K, Covinsky KE. Assessing risk for adverse outcomes in older adults: The need to include both physical frailty and cognition. *J Am Geriatr Soc.* 2019; 67: 477-483.
20. Toot S, Swinson T, Devine M, Challis D, Orrell M. Causes of nursing home placement for older people with dementia: A systematic review and metaanalysis. Int Psychogeriatr. 2017; 29: 195–208.
21. Hsu TJ, Tsai HT, Hwang AC, Cehn LY, Chen LK. Predictors of non-pharmacological intervention effect on cognitive function and behavioral and psychological symptoms of older people with dementia. *Geriatr Gerontol Int*. 2017; 17: 28-35.
22. Satoh M, Ogawa JI, Tokita T, Nakaguchi N, Nakao K, Kida H, Tomimoto H. The effects of physical exercise with music on cognitive function of elderly people: Mihama-Kiho project. *PLoS One*. 2017; 9: e95230.
23. Luttenverger K, Hofner B, Graessl E. Are the effects of a non-drug multimodal activation therapy of dementia sustainable? Follow-up study 10 months after completion of a randomized controlled trail. *BMC Neur*. 2012; 12: 151-159.