

Effects of a cognitive-enhancement group training program on daily living activities, cognition, and depression in the demented elderly

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Abstract. [Purpose] The effects of a cognitive enhancement group training program on daily living activities, cognition, and depression in the demented elderly population of a local Korean community were investigated. [Subjects and Methods] The study included 22 elderly subjects who were 65 years of age or older, had been diagnosed with dementia, and were attending a daily care center in K City, Republic of Korea. Eleven subjects participated in the program, which was conducted twice a week for 8 weeks for a total of 16 sessions. Eleven subjects in a non-training group did not receive any interventions. [Results] The MMSE-K, MBI and KDS scores of all of the eleven subjects who participated in the program improved, and the improvements were statistically significant. [Conclusion] Cognitive enhancement group training programs may have positive effects on daily living activities, cognition, and depression.

Key words: Daily living activities, Cognition, Depression

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INTRODUCTION

Concomitant with increases in advanced aging and life expectancy, there has been a sharp worldwide increase in the number of patients experiencing dementia. In fact, 4.6 million people around the world are newly diagnosed with dementia every year¹⁾. Of the diseases associated with senility, dementia is particularly difficult to treat and is the type of degenerative disease that requires long-term treatment. Therefore, not only are there declines in the quality of life of patients with dementia but also the family members who support these patients experience an increased burden and enhanced emotional and psychological pain²⁾. The symptoms associated with dementia can be divided into cognitive changes, including a deteriorating memory for new facts, conversational difficulties, problems understanding words and writing, and a loss of orientation, and neuropsychiatric changes, including depression, apathy, atrophy, insomnia,

fear, paranoia, hallucinations, and abnormal thoughts that accompany problematic behavior³⁾. Of the neuropsychiatric symptoms, depression is a very general characteristic of elderly individuals that can increase the risk of dementia and other cognitive disorders⁴⁾. Accordingly, dementia is considered a typical organic psychosis characterized by deteriorating cognitive and higher mental functions, and represents a complicated clinical syndrome that is often comorbid with memory disorders and changes in behavior and character⁵⁾. In addition, dementia may manifest in the form of multiple cognitive disorders, which often include general intellectual impairments that influence daily living and other independent activities⁶⁾.

Therefore, the therapy for individuals with dementia must treat declines in cognitive function, a diminished ability to perform daily activities, and an increase in behavioral and mental symptoms including depression. The general clinical paradigms for the treatment of the demented elderly include psychological approaches such as music therapy and reminiscence therapy, cognitive assistive tools to compensate for declines in cognition, and computer-based cognitive rehabilitation training⁷⁾. According to Teppen et al.⁸⁾, when treating the demented elderly, it is necessary to include complex cognitive training along with physical activities to induce their active participation and help improve their daily lives. Therefore, the development and application of a complex

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Table 1. Cognitive enhancement group training program

Session	Category	Cognitive activity program	Written cognitive training program	
1	Creativity activity	Decorate a name tag	Simple step	Orientation
2	Music activity	Play Smart Harmony		Linguistic ability
3	Physical activity	Ring a quoit		Attention
4	Creativity activity	Make a picture frame	Complex step	Memory
5	Music activity	Play Smart Harmony		Calculation
6	Physical activity	Stack wood blocks		Visual perception
7	Creativity activity	Make a mosaic		Spatial perception
8	Music activity	Play Smart Harmony		Problem solving
9	Physical activity	Throw a ball in a box		Orientation
10	Creativity activity	Make paper fans		Linguistic ability
11	Music activity	Play Smart Harmony		Attention
12	Physical activity	Hit a balloon		Memory
13	Creativity activity	Make a mandala pattern mobile		Calculation
14	Music activity	Play Smart Harmony		Visual perception
15	Physical activity	Throw darts		Spatial perception
16	Creativity activity	Make a traditional Korean mask		Problem solving

program that helps maintain patients' existing functions and improve their quality of life is essential.

Thus, in the present study, we developed a cognitive enhancement group training program and applied it to a local demented elderly population in an attempt to improve their cognition, symptoms of depression, and daily lives. Our program consists of fundamental material that can be easily administered to demented elderly in public health centers, daily care centers, and dementia-related facilities to maintain and improve their behavioral and cognitive capabilities.

SUBJECTS AND METHODS

We initially recruited 25 demented elderly subjects 65 years of age or older who were diagnosed with dementia by a psychiatrist and attended a daily care center in K City, Republic of Korea, between June 15, 2013, and September 20, 2013. Of the 25 subjects who agreed to participate, 13 were placed into a training group, and 12 were placed into a non-training group. None of the subjects had hearing or eyesight problems or had joined any similar programs, and all were able to use both hands. Of the original 25 subjects, 2 from the training group and 1 from the non-training group were excluded from the analyses due to disease or falling during the research period; thus, 22 subjects were included. All participants provided informed consent prior to taking part in the study, and all experimental procedures were approved by the institutional review board of Inje University.

Subjects in the training group participated in a cognitive enhancement group training program twice a week for 8 weeks (a total of 16 sessions) at the daily care center. During each session, the patients completed a 50 min cognitive activity program and a 50 min cognitive training program (written format). Two occupational therapists with more than 5 years of experience conducted the cognitive activity program. In addition, the relevant employees of the daily care center received education regarding a weekly task amount

Table 2. Demographic characteristics (n=22)

Variables	TG (N=11)	NTG (N=11)
	Frequencies	Frequencies
Age (years)		
65–69	2 (18.2%)	1 (9.1%)
70–74	1 (9.1%)	-
75–79	2 (18.2%)	3 (27.3%)
80–84	6 (54.5%)	1 (9.1%)
Over 85	-	6 (54.5%)
Gender		
Male	1 (9.1%)	2 (18.2%)
Female	10 (90.9%)	9 (81.8%)
Education		
None	5 (45.5%)	7 (63.6%)
Elementary school graduate	4 (36.4%)	3 (27.3%)
Middle school graduate	1 (9.1%)	-
High school graduate	1 (9.1%)	1 (9.1%)
Housemate		
Single	1 (9.1%)	1 (9.1%)
With spouse	3 (27.3%)	1 (9.1%)
With family of son and daughters	6 (54.5%)	9 (81.8%)
Other	1 (9.1%)	-
Duration of dementia (months)		
Below 12	-	1 (9.1%)
13–24	3 (27.3%)	1 (9.1%)
25–36	2 (18.2%)	3 (27.3%)
37–48	1 (9.1%)	5 (45.5%)
Over 49	5 (45.5%)	1 (9.1%)

TG: training group; NTG: non-training group

and goals to ensure that the training program ran efficiently. The activity program consisted of a creative activity (six

Table 3. Comparison of functional recovery measures within and between groups

Parameters	Values				Change value	
	TG (n=11)		NTG (n=11)		TG (n=11)	NTG (n=11)
	Pre	Post	Pre	Post	Post-Pre	Post-Pre
MBI	79.55 (10.45)	83.27 (10.01)***	66.91 (26.03)	72.73 (29.42)	3.73 (1.35)	5.82 (18.24)
MMSE-K	11.09 (2.43)	15.64 (3.41)***	13.55 (2.12)	12.82 (2.48)	4.55 (2.84)	-0.73 (1.62)***
KDS	47.82 (17.33)	39.27 (12.29)*	52.73 (19.37)	52.73 (19.14)	-8.55 (12.27)	0.00 (18.24)

Values are means \pm SD

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

TG: training group; NTG: non-training group; MBI: Modified Barthel Index; MMSE-K: Mini-Mental Status Examination-Korean version; KDS: Korean Depression Scale

sessions), a musical activity (five sessions), and a physical activity (five sessions). The musical activity involved playing the music game Smart Harmony, which was developed during a 3-year research collaboration between the Ergonomic Design Technology Lab in the Department of Industrial and Management Engineering at Pohang University of Science and Technology, the Department of Neurology at Samsung Medical Center, and Seed Technology. During the Smart Harmony game, participants played music in an ensemble by focusing on a timing bar that moved in conjunction with the musical flow of a digital score and shaking digital sticks equipped with wireless communication capabilities. The training program was developed by the present research team for the purpose of improving critical cognitive factors including orientation, linguistic ability, attention, memory, visual perception, spatial perception, calculation, and problem solving. This task included both simple and complex steps. The appropriateness of the activity and training programs was reviewed by two professors who specialize in occupational therapy. The contents of the cognitive enhancement group training program are presented in Table 1.

The pre- and post-test assessments were individually conducted by the two occupational therapists in an environment conducive to focusing on the task. During the testing period, the subjects completed the Modified Barthel Index (MBI) to assess daily life activities, the Mini-Mental Status Examination-Korean version (MMSE-K) to evaluate cognitive function, and the Korean Depression Scale (KDS) to determine levels of depression. The collected data were analyzed using SPSS WIN version 21.0, and the descriptive statistics of the subjects were obtained to evaluate their general characteristics. Independent t-tests were used to analyze differences between the two groups after the program, and paired t-tests were used to investigate the effects of the program within the training group.

RESULTS

The general characteristics of the subjects are presented in Table 2, and a comparison of the functional recovery measures after the training program (within and between groups) is shown in Table 3. The training group exhibited significant improvements in daily living activities, cognition, and depression after participating in the program ($p < 0.05$), whereas the non-training group did not.

There were no significant differences between the groups

in terms of daily living activities but the training group showed a significant improvement in cognitive function compared with the non-training group ($p < 0.05$). Moreover, although the difference was not statistically significant ($p = 0.064$), the training group had a lower level of depression than the non-training group.

DISCUSSION

Dementia has a considerable impact on national health and welfare⁹). Although there is currently a lack of evidence regarding the effectiveness of cognitive therapies for the treatment of dementia¹⁰), nonpharmacological programs such as these tend to possess lower risks than drug treatments. Nonetheless, in an aging society, nonpharmacological rehabilitation therapy can be very effective for patients with senile diseases, including dementia, who require long-term treatment¹¹).

We evaluated the effectiveness of a cognitive enhancement group training program in a local population of demented elderly individuals and found that cognitive function, depression, and daily living activities of subjects in the training group were maintained and even improved compared with the non-training group. These findings are consistent with the results of previous studies that have shown that rehabilitation positively improves cognitive function¹²) and that cognitive activity in conjunction with active extremity exercise positively affects cognition, quality of life, balancing ability, and walking ability in demented elderly¹³). Similarly, in previous studies, a rehabilitation service offered to local communities helped improve the daily lives of demented elderly¹⁴), and an integrated program designed to prevent dementia positively influenced not only the cognition of elderly participants but also their psychosocial functions (including depression), self-esteem, and quality of life¹⁵). The findings of the present study support these data.

Because the present study was intended to be a pilot investigation for a cognitive enhancement group training program that could be provided to local communities, only a small number of subjects were evaluated over a short period of time. Therefore, it is difficult to generalize our findings. In future studies, it will be necessary to conduct this same program on a larger number of subjects from various institutions to obtain a generalizable assessment of its effects on cognitive function, emotional state, and daily living activi-

ties of elderly individuals with dementia. In addition, having such a program in which the demented elderly population in local communities can easily participate and receive treatment will allow for constant evolution and improvement of the program and the provision of fundamental material that can be used for domestic research on dementia and its treatment.

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