

Cognitive rehabilitation for elderly people with early-stage Alzheimer's disease

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Abstract. [Purpose] The purpose of this study was to investigate the effect of cognitive rehabilitation including tasks of cognitive training on performance of everyday activities in elderly people with early-stage Alzheimer's disease. [Subjects and Methods] Forty-three elderly people (15 men, 28 women) with a diagnosis of Alzheimer's disease who had a Mini-Mental State Examination (MMSE) score of 18 or above were randomly assigned to two groups: the cognitive rehabilitation group (experimental) and control group. This study used a randomized controlled trial design. Cognitive rehabilitation is consisted of 8 sessions, each lasting 60 minutes (individual 30 min, group 30 min). The eight weekly individual sessions of cognitive rehabilitation were performed consisting of an individualized intervention focusing on a personally meaningful goal. The eight weekly group sessions involved practicing time-and-place orientation, matching faces and names, and learning memory and sustaining attention. [Results] Significant improvements were observed in rating of occupation performance and satisfaction, Quality of Life in Alzheimer's Disease (QOL-AD), and the orientation subscale of the MMSE in the experimental group, whereas participants in the control group did not show any significant difference in any tests between before and after the intervention. [Conclusion] Cognitive rehabilitation including tasks of cognitive training is an effective intervention for improving performance and satisfaction with respect to activities of daily living and specific cognitive functions.

Key words: Alzheimer, Cognitive rehabilitation

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INTRODUCTION

Early dementia is a condition that allows engaging in independent living, maintaining proper personal care, and retaining relatively sound judgment, despite the loss of social life or capacity for work¹⁾. Symptoms of early dementia include memory loss and changes in personality and orientation regarding date and time. As the symptoms progress, behavioral, mental, and psychological symptoms manifest, resulting in a decline in quality of life, and these become the primary reason for institutionalization²⁾.

If given an adequate environment and support and sufficient time, elderly people with dementia can learn and maintain some information and skills in spite of difficulty with their memory³⁾. Cognitive rehabilitation (CR) is an individualized approach to help people with dementia and their families, and health professionals who identify their individual goals and practice strategies focused on them⁴⁾. CR may help people with dementia to maintain residual memory ability by identifying the best way to obtain important infor-

mation⁵⁻⁷⁾. Several learning techniques and strategies such as spaced retrieval, dual cognitive support, and procedural memory training have been demonstrated as methods to enhance learning ability of patients with mild Alzheimer's disease (AD)⁸⁻¹⁰⁾. The focus of cognitive rehabilitation is on decreasing functional disability and maximizing social participation and engagement in activities of daily living (ADL)⁴⁾.

Cognitive training (CT), on the other hand, generally involves practice of standardized tasks designed to improve specific cognitive function (i.e., memory, problem solving, attention). The tasks may be presented by a computerized¹¹⁾ or paper-and-pencil^{12, 13)} form and may involve analogs of activities of daily living^{14, 15)}. CT was demonstrated to have an effect on memory, mood, and analogs of ADL for people with early stage dementia^{12, 13, 16)}.

Within the context of non-pharmacological interventions for people with early-stage dementia, the number of studies measuring the effects of CR on activities of daily living in elderly people with dementia is limited^{10, 17)}. In order to demonstrate the efficacy of CR, an evidence-based study on the use of CR is necessary. In addition, there are no studies investigating the efficacy of CR programs conducted in conjunction with already proven cognitive training. Therefore, the objective of this study was to investigate whether a CR program including tasks of CT improve performance of everyday activities in real life in elderly people with dementia.

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SUBJECTS AND METHODS

Forty-three participants who had been diagnosed with possible AD or probable AD were recruited in the current study. They were diagnosed by an experienced neurologist after a thorough neurocognitive evaluation, MRI of the brain, and blood tests. They were recruited from a day care center. Participants were in the early stages as indicated by a Mini-Mental State Examination (MMSE) score of 18 or above and excluded if there was concurrent neurologic disorder or major psychiatric disorder. All participants signed a written informed consent form to participate in this study according to the ethical standards of the Declaration of Helsinki¹⁸. Demographic and clinical characteristics of the participants are summarized in Table 1. There were no significant differences between the experimental and control groups before the intervention.

This was a randomized controlled trial study, which compared CR with an active control condition. Participants were randomly assigned to either the CR group (n=22) or the control group (CG) (n=21). The participants in the CR group participated in 8 sessions, each lasting 60 minutes (individual 30 min, group 30 min), a day per week for 8 weeks. The participants in the control group received an active control intervention involving unstructured conversation and questioning with the examiner as well as watching health-related videos. The participants in the control group participated in 8 sessions, each lasting 1 hour, each week.

All assessments were administered before and after the intervention and by blinded assessors. The Canadian Occupational Performance Measure (COPM), Modified

Barthel Index (MBI), Quality of Life in Alzheimer's Disease (QOL-AD), MMSE orientation subscale, and Lowenstein Occupational Therapy Cognitive Assessment-Geriatric (LOTCA-G) memory subscale were completed before and after the intervention.

The individual sessions for the CR approach involved an individualized intervention focusing on a personally meaningful goal (e.g., maintaining attention when cooking, learning to use a cellular phone, remembering the names of people) indicated by COPM. The individual sessions consisted of practical strategies and aids, compensation strategies (e.g., using a memory notebook), and the techniques for stress management to improve performance and functioning in relation to goals. The group sessions of CR involved some tasks of cognitive training. The group sessions focused on practicing time-and-place orientation through paper-and-pencil tasks provided by a researcher and use of a calendar and personal memory notebook or cellular phone at the start of each session. The group sessions also involved matching faces and names and learning memory (e.g., writing words related to a specific topic) and sustaining attention (e.g., writing numbers matched to a figure) through paper-and-pencil tasks provided by a researcher.

Statistical comparison of all assessments in each group was performed with the paired t-test. The significant differences before and after the intervention between the groups were examined using the independent t-test. The SPSS version 21.0 software (SPSS, IBM Corp., Armonk, NY, USA) was used for statistical analyses. The selected significance level was 0.05.

RESULTS

There were no significant differences in the general characteristics between the CR group and CG. No significant difference was also observed before the intervention between the two groups. The mean and SD values for each group in the pre- and post-intervention assessment are shown in Table 2. The participants in the CR group showed a significant improvements in COPM performance and satisfaction ratings, QOL-AD, and the MMSE orientation subscale after the intervention ($p < 0.01$). However, the participants in the CG did not show any significant difference in any assessments after

Table 1. General characteristics of the subjects (n=43)

	CR (n=22)	CG (n=21)
Gender (Male/Female)	8/14	7/14
Age	70.4±7.9	71.4±8.2
Years of education	8.7±3.8	8.5±3.1
MMSE	23.1±2.1	22.8±1.8
MBI	98.2±1.3	98.2±1.7

All variables are frequency or mean±SD. MMSE: Mini Mental Status Examination, MBI: Modified Barthel Index

Table 2. Participant outcomes at pre-and post-intervention

Measures (Maximum score)	CR (n=22)		CG (n=21)	
	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention
COPM : performance score (10)	4.5±1.3	5.9±1.2 ^a	4.6±1.4	4.6±1.4
COPM : satisfaction score (10)	5.1±1.7	6.8±1.6 ^a	5.1±1.3	4.9±1.9
MBI (100)	98.2±1.3	98.2±1.4	98.2±1.7	98.2±1.1
QOL-AD (52)	33.1±5.5	36.5±4.3 ^a	32.9±7.2	32.9±5.2
MMSE: Orientation (10)	7.3±1.1	8.2±1.0 ^a	7.2±1.2	7.1±1.2
LOTCA-G: Memory (12)	9.0±1.4	9.3±1.4	8.7±1.4	8.6±1.2

All variables are mean ±SD. ^asignificant difference between pre-and post-intervention $p < 0.01$, significant difference at post-intervention between two groups, $p < 0.01$

COPM: Canadian Occupational Performance Measure, MBI: Modified Barthel Index, QOL-AD: Quality of Life in Alzheimer's Disease, MMSE: Mini Mental Status Examination, LOTCA-G: Lowenstein Occupational Therapy Cognitive Assessment-geriatric

the intervention. There was a significant difference between CR group and CG in COPM performance and satisfaction ratings, QOL-AD, and the MMSE orientation subscale after the intervention ($p < 0.01$).

DISCUSSION

The main purpose of this study was to demonstrate that CR including tasks of cognitive training is an effective intervention for elderly people with early-stage AD. The results of this study showed more positive effects on occupation performance and satisfaction, quality of life, and orientation in the CR group than in the CG. This results support the assumption that CR would be an effective intervention for elderly people with early-stage AD.

The scores of COPM performance and satisfaction ratings showed significant improvements in the CR group compared with the CG, revealing a therapeutic effect of CR in performing occupation. This result is valuable in that the performance ability in a real life setting of elderly people with dementia, which can be considered as the core of CR, was improved. The results also were consistent with the study by Clare et al.¹⁹, who reported a strong correlation between performance and satisfaction. Therefore, CR can have a positive impact on satisfaction as well as performance ability of activities as a result of training practical skills focusing on an individual goal. Therefore, CR not only improves performance by practicing practical skills focused on individualized goals of elderly people with dementia but also serves as a beneficial treatment that can improve performance satisfaction.

No significant difference was observed in MBI scores before and after the intervention in both groups. This is probably because it is difficult to sensitively reflect change of performance owing to the great distance between the ratings of MBI.

The quality of life in elderly people with dementia is reduced due to physical, cognitive, and emotional symptoms^{20–22}. However, the finding in the present study indicated that the CR approach may be an effective intervention to improve the quality of life in elderly people with early dementia. This supports the results of the previous studies on the effect of CR²³. In particular, improvement was seen in the interpersonal relationship category, which is thought to have come from regular interactions with the researcher and other elderly people during the intervention.

The participants in the CR group showed significant improvement in orientation after the intervention. This result is consistent with other studies demonstrating the efficacy of CT in which repetitive exercise was performed targeting specific cognitive domains^{6, 14}. The improvement in orientation was most likely related to the repetitive training with paper-and-pencil task, use of the calendar, and personal memory notebook or cellular phone during the intervention. Although there was no significant difference in the LOTCA-G memory subscale between before and after the intervention in the CR group, their performance was improved. But participants in the CG had worse performance on the LOTCA-G memory subscale after the invention compared with before the intervention. Memory difficulties

are an outstanding feature of AD and are typically one of the main problems experienced by people with early-stage AD²⁴. Thus, the above finding suggests that CR programs specifically have to involve the memory training to maintain the current level of function of memory in people with AD.

The limitation of this study is that the effect of the CR group was not compared with another group, such as one performing CT alone. Therefore, CR might not be the best therapy method for the improvement of cognitive function in elder people with early-stage AD. However, this study has worth as evidence-based literature supporting the efficacy of CR including tasks of cognitive training in early-stage AD.

Further research into the effects of the CR approach on elderly people with early-stage AD will be necessary to compare with other treatment methods²⁵. Also, various measurement methods will need to be used to assess not just a cognitive function test but also performance of activities in the real-life setting.

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