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ORIGINAL ARTICLE

Effect of cognitive stimulation therapy in combination with other intervention modalities on cognitive ability in elderly with cognitive impairment: a quasi-experimental study

Yuda Turana[1], Tara Puspitarini Sani[1], Virginia Geraldine Hanny Prasetya[2], Ika Suswanti[1], Lisye Konny[1], Magdalena Surjaningsih Halim[2], and Yvonne Suzy Handajani[1]

[1]School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia
[2]Faculty of Psychology, Atma Jaya Catholic University of Indonesia

yuda.turana@atmajaya.ac.id

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ABSTRACT

BACKGROUND
Cognitive stimulation therapy (CST) has been proven to be beneficial in improving cognition and quality of life in people with mild cognitive impairment (MCI) and mild dementia (MD). This study investigates the benefit of more frequent exclusively CST intervention compared to less-frequent CST-exercise combination on cognitive ability among elderly people with cognitive impairment.

METHODS
A quasi-experimental controlled study involving 22 subjects aged ≥ 60 years with cognitive impairment. They were divided into three groups: group A (6 months, weekly CST + exercise sessions, n=13), Group B (3 months, twice-weekly CST-only sessions, n=5), group C (3 months, no intervention, n=4) as control. The Modified Mini Mental State Examination Indonesian Version was used for evaluating the cognitive ability of the elderly subjects. Data were analyzed using one-way Anova and Kruskal-Wallis tests

RESULTS
All participants completed the study, the majority being female with mean age of 70.43 ± 6.97 years and differences in education level distribution across the three groups. The scores before and after the intervention showed a significant difference in the registration and construction domains ($p<0.005$). However, there was a greater improvement of the mean difference in cognitive scores in groups A and B compared to the control group, although the difference was not statistically significant ($p >0.05$).

CONCLUSION
A twice-weekly CST-only intervention and a once-a-week CST-exercise combination provide better cognitive improvement than no intervention (control). Therefore, elderly people with cognitive impairment should be encouraged to engage in physical activities, brain training, and group activities for promoting the brain's ability.

Keywords: Cognitive stimulation therapy, combination, cognitive impairment, elderly

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INTRODUCTION

The increase in the proportion of elderly in the population requires special attention because it will impact their health and social and economic aspects. Along with the global increase in life expectancy, it is estimated that degenerative disorders will become the most common diseases encountered in society. Several symptoms of decreased physiological and neurological functions can predict early degenerative processes and dementia in the elderly.[1]

Cognitive decline is closely related to the risk of dementia.[2,3] The longitudinal study of Hu et al.[3] showed that 17.5% of subjects with amnestic mild cognitive impairment (aMCI) had converted to dementia within six years, while a JACC scientific expert panel report states that patients with vascular cognitive impairment are at risk for dementia.[4] Another study found that MCI associated with high, but variable, conversion to dementia may be influenced by demographic and health factors.[5]

Patients with MCI and early dementia can receive interventions to slow the rate of decline early on. Because pharmacological therapy has its limitations in slowing cognitive decline, it is essential to use various non-pharmacological interventions, either singly or in combination. One example of a non-pharmacological intervention for dementia is cognitive stimulation therapy (CST). This program involves participants discussing their daily activities or tasks that they think can stimulate mental activity,[6] while other studies have shown that the benefits of CST were found to be independent of treatment.[7]

Dementia cannot be cured; efforts can be done only to slow down progression and avoid worsening of the clinical condition. The abovementioned cognitive stimulation therapy (CST) has been shown to be beneficial for cognitive function in elderly with dementia. Several previous studies have reported an association between CST and improved cognitive function in elderly with mild cognitive impairment or dementia living in the community.[7,8]

Various other non-pharmacologic modalities have been shown to be beneficial for cognitive function. A study conducted by Sanchia et al.[9] showed that brain exercise activities two times a week can improve cognitive function. Similarly, a 20-year cohort study also demonstrated the role of social activity in slowing cognitive decline.[10] These studies demonstrated that the treatment for dementia can be done through a combination of physical, social, and mental stimulation simultaneously to have a more significant impact.

Most CST intervention studies are given 14 times in 2 meetings per week (initial CST). However, in elderly living in the Indonesian community, it is a challenge to hold regular meetings twice a week. Therefore, in this study, we wanted to examine the effect of CST intervention if it was carried out once a week but in combination with another modality, namely brain vitality exercise (BVE). A meta-analysis of 36 studies found moderate-quality evidence for a small benefit in cognition associated with cognitive stimulation (CS) and for a clinically important difference of 1.99 points between CS and controls (95% CI: 1.24- 2.74). This meta-analysis has identified that the frequency of group sessions and level of dementia severity may influence the outcomes of CS, and these aspects should be studied further.[11]

The aim of this study was to investigate the benefit of more frequent exclusively CST intervention compared to less-frequent CST exercise in combination with BVE (brain vitality exercise) among elderly aged 60 years and older who had cognitive impairment.

METHODS

Research design

This study was of quasi-experimental design and was conducted at the *Panti Werdha Berea* nursing home between February and April 2019 and in the Santa Maria Immaculate Church between September 2019 and March 2020.

Research subjects

The sample size was calculated by applying G*Power with the power value (1-β) at 0.80, the alpha value (α) at 0.05, and the effect size at 0.80. Thus, the resulting sample size was 13 people per group. Subjects were divided non-randomly into three groups, namely group A, which was given intervention in the form of a CST program and BVE for six months (13 elderly); group B, which was given CST intervention for 3 months (5 elderly), and the control group which received no intervention (4 elderly). Initially, the planned duration of intervention was 6 months of CST+BVE in group A and 6 months of CST only in group B. However, due to the pandemic and

Large-Scale Social Restrictions, the intervention was carried out for 6 months for CST+BVE in group A (Community) and 3 months of CST in group B and controls (Nursing Home).

Inclusion criteria were elderly aged 60 years and older who had cognitive impairment. Subjects had normal or mild impairment in activities of daily living (ADL score 12-19 from 20). The Barthel Index score is a cumulative score of 10 items, with a maximum score of 20 corresponding to complete independence, and a minimum score of 0 signifying total dependence.[12] Subjects did not have any psychiatric/neurological disorders, chronic medical conditions, major visual/hearing disorders, or movement disorders of the upper limbs, and were able to read, write, and converse in Indonesian. The flow diagram of the participants can be viewed in Figure 1.

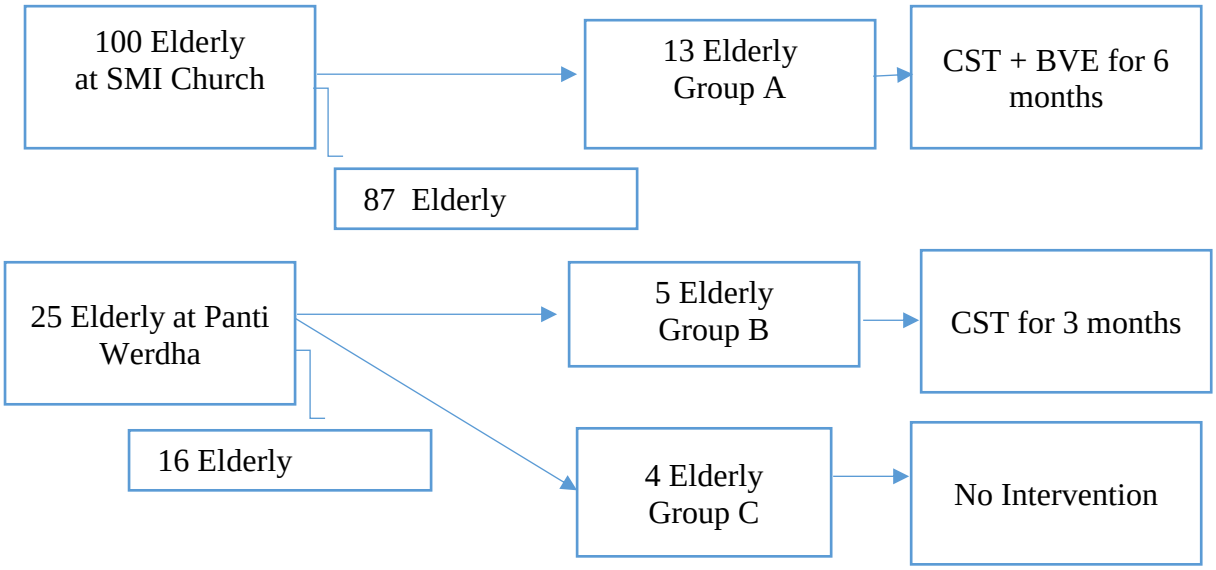

Figure 1. Flowchart of the participants

Intervention programs

CST and brain vitality exercise

In its implementation, the CST program adapted the guidebook Making a Difference by Spector A, Thorgrimsen L, Woods B, and Orrell M.[13] After obtaining permission from the publisher, the process of translation and adaptation of the book into Indonesian was carried out by 5 of the authors of the present study (YT, TPS, YSH, EL, H).

In accordance with the recommendations of the CST program, the intervention in this study consisted of 14 structured sessions. Each session is 45 to 60 minutes long in a small group of 5-8 subjects. Each session is carried out with the subjects being continuously assisted by a facilitator, who provides the same activity in each meeting, consisting of a warm-up activity, a reality orientation board (RO) on which is displayed factual information for the group, and time orientation (date, time, and weather).

Brain vitality exercise (BVE) is based on a combination of traditional Indonesian dances and Tai Chi. This exercise is done for 12 minutes, and consists of several slow movements with the aim of aligning muscle movement patterns. All movements involve eye sight, breathing and perception.[14] Group A was given CST and BVE guided by an instructor for six months, with the treatment being carried out once a week, while in group B the CST intervention was given two times a week for three months. Group C represents the control group and did not receive any intervention. The assessors and therapists delivering the intervention were different individuals.

Instruments

Modified Mini Mental State Examination

The cognitive function examination uses the Indonesian version of the modified mini mental state examination (MMSE) with a maximum score of 30 points to measure the mental abilities of registration, orientation, attention/calculation,

memory, language, and visual construction functions. [15,16] Visual construction is the ability to construct a copy of an object or image after studying the parts constituting the original and is tested in item 11 of the MMSE.

Statistical analysis

Our study looked at the characteristics of age, gender, and education in each of the intervention groups and in the control group. To determine the program's effectiveness, we compared changes in scores before and after the intervention. For comparisons between pre- and post-cognitive scores, normally distributed continuous data were analyzed using Anova, and non-normally distributed continuous data were analyzed using Kruskal-Wallis tests. Categorical data (gender and education) were analyzed using Chi-Square test. Data processing in this study used IBM SPSS Version 22.0 with a statistical significance level set at $p < 0.05$.

Ethical Clearence

This research was approved by the ethics committee of Atma Jaya Catholic University of Indonesia School of Medicine and Health Sciences and received written consent from each subject (No.17/05/KEP-FKUAJ/2019).

RESULTS

Most of the subjects in this study were women, with the groups varying in mean age (years) [(Group A: 66.61 ± 4.32; Group B: 75.81 ± 5.23; and Group C: 76.52 ± 7.31)]. The difference in in education level is seen in each group. In group A most of the subjects, namely 8 persons (61.53%) have Senior High School education, while in groups B and C 2 subjects (60.03%) and 2 subjects (50.03%), respectively have Elementary School education. Group A is the elderly group in the church community, while groups B and C are the elderly living in a nursing home (Table 1).

At baseline the mean MMSE total score in group A (25.92±2.63) was significantly higher than in group B (23.00±2.91) and group C (22.25±3.30) (p=0.038). Similarly, in the orientation area, the mean score in group A (9.30±0.86) was significantly higher than in group B (7.80±1.48) and group C (5.75±2.87) (p=0.011) (Table 1).

The Kruskal-Wallis test showed that after the intervention the total delta MMSE score in group A (1.69±2.83) was significantly increased compared to group B (1.60±3.36) and group C which inversely showed a decrease (-4.50±2.89) (p=0.018) (Table 2).

Table 1. Demographic and clinical characteristics of the intervention and control groups at baseline

Variables	Group A (n=13)	Group B (n=5)	Group C (n=4)	p value
Age (years)	66.61 ± 4.32	75.81 ± 5.23	76.52 ± 7.31	0.002
Sex				
Male	3 (23.07)	0 (0.00)	0 (0.00)	0.176
Female	10 (76.93)	5 (100.00)	4 (100.00)	
Education				
Elementary School	0 (0.00)	2 (60.00)	2 (50.0)	0.026
Junior High School	2 (15.38)	1 (20.00)	1 (25.0)	
Senior High School	8 (61.53)	1 (20.00)	1 (25.0)	
College or University graduate	3 (23.09)	0 (0.00)	0 (0.0)	
MMSE				
Total score	25.92±2.63	23.00±2.91	22.25±3.30	0.038
Orientation	9.30±0.86	7.80±1.48	5.75±2.87	0.011
Registration	2.46±1.05	2.80±0.44	3.00±0.00	0.568
Attention/calculation	4.23±1.17	4.40±0.55	4.25±1.50	0.859
Memory	1.54±0.97	1.00±1.41	0.75±0.95	0.345
Language	7.38±0.96	6.80±0.84	7.50±0.58	0.336
Construction	1.00±0.00	0.20±0.45	1.00±0.00	<0.001

Data presented as mean ± SD, except for sex and education n (%); MMSE: mini mental state examination; Group A: cognitive stimulation therapy program and brain vitality exercise for six months; Group B: cognitive stimulation therapy for 3 months; Group C: control, no intervention

Table 2. The MMSE delta scores after the intervention by treatment groups

MMSE	Group A (n=13)	Group B (n=5)	Group C (n=4)	p-value*
Orientation	0.54±0.98	0.00±1.58	-0.75±4.03	0.500**
Registration	0.54±1.05	-0.60±0.55	-1.00±0.00	**0.001**
Attention/calculation	0.00±0.82	0.40±0.89	-0.75±0.96	0.148
Memory	0.23±1.24	0.20±0.45	-0.25±1.26	0.750
Language	0.46±1.19	0.80±1.30	-1.25±1.50	0.105
Construction	-0.77±0.28	0.80±0.45	-0.50±0.58	**0.002****
Total delta MMSE score	1.69±2.84	1.60±3.36	-4.50±2.89	**0.018**

*Kruskal Wallis test, data presented as mean±SD; Group A: cognitive stimulation therapy program and brain vitality exercise for six months; Group B: cognitive stimulation therapy for 3 months; Group C: control, no intervention

The results showed that there was a significant difference in mean scores between registration and construction items in groups A, B and C ($p<0.005$). The mean registration score in group A increased by 0.54 compared to groups B and C which inversely showed a decrease, while on construction items the mean score increased by 0.80 in group B compared to the mean score in groups A and C which decreased. Meanwhile, for memory and language items, the average difference in scores tended to occur in groups A and B, compared to the control group, although the difference was not significant ($p\geq0.05$). Our results also showed that after intervention there was an improvement of total delta MMSE score of 1.7 points in group A and 1.6 points in group B, while group C showed a decrease of 4.5 points ($p<0.05$). This shows that the combined intervention of CST and brain vitality exercise effectively improves registration, while a single CST intervention is effective for improving construction domain scores (Table 2).

DISCUSSION

Our study compared the effectiveness of single and combination interventions to improve cognitive function in the elderly with MCI, improving cognitive scores in the single intervention (CST program) and combination (CST + BVE), while showing different areas of improvement in each intervention. Several studies in Indonesia showed the effectiveness of a single CST intervention program with differences in the duration of the intervention.[17,18] Our results found an improvement in scores on the attention, memory, language, and construction items in the single CST intervention after three months. The study by Juniarni and Haerunnisa [17] showed an increase in scores before and after the intervention in cognitive function and quality of life. The study of Sanchia and Halim [9] in the elderly community in nursing homes showed a significant difference in cognitive function in the memory domain after one month of intervention, whereas the study of Spector's et al.[19] found significant differences between the treatment and control groups in the language subscale, but not in memory and orientation or praxis.

The combination intervention (CST+BVE) showed improvement in the scores of orientation, registration, memory, and language. Meanwhile, another study with a combination of CST and Tai chi showed improvements in all items of attention, verbal, construction, conceptualization, and memory, including MMSE globally.[20] A meta-analysis showed that CST improved the cognitive ability language and activities of daily living of people with dementia. [21]

Our study found that both types of intervention showed improvements in two cognitive items, namely the verbal and memory domains. CST material is designed implicitly as the activity of asking people's opinions rather than asking for answers. Some tasks, such as word and object categorization, may have prompted new semantics. The constant encouragement of views and opinions, for example, around controversial topics in current affairs, may have prompted people to find new ways to express themselves verbally. Some sessions specifically focus on verbal skills, such as word association, object categorization, and word games. However, verbal communication is a crucial theme of CST, and many of the activities involve thinking about words and using language more creatively than anyone else, therefore one might say that both interventions affected verbal improvement.[19]

Post-intervention, the difference in cognitive function scores in all domains of the intervention

groups showed a tendency to remain the same or to improve, compared to the control group, which tended to decrease. This suggests that the CST modality, either administered with other modalities or exclusively, may prevent the deterioration of cognitive function in the elderly with MCI.

A study by Young et al. [22] demonstrates the effectiveness of the multicomponent intervention on improving cognitive ability among community-dwelling older adults with probable dementia, suggesting that the multicomponent intervention can facilitate early identification, assessment, and treatment for community-dwelling older adults with probable dementia.

The limitations of this study are the small sample size, unequal distribution of samples, and different age variations between groups such that the benefits of the intervention cannot be generalized to certain age groups. However, multi-component CS interventions that demonstrated significant benefits for cognitive impairment reported more intensive interventions, which may act as a barrier to future implementation of these programs outside of residential settings.

CONCLUSIONS

A twice-weekly CST-only intervention and a once-weekly CST-exercise combination provide better cognitive improvement than no intervention in the control group. The less frequent use of modified CST modalities (only once a week) but given for a longer time and combined with exercise modalities can be an intervention option for the elderly who live in the community and find it challenging to access CST. Further studies should follow up or monitor the effectiveness of integrating interventions in the long term on the cognitive functions of elderly people with cognitive impairment.

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AUTHOR CONTRIBUTIONS

Contributors YT, YSH, TP contributed to the conception, study design, interpretation, and write- up; VGHP, IS, LK contributed to data collection, data analysis and write- up of the draft and final manuscript. YT, TP, VGHP, IS, LK, MSH, YSH oversaw the data collection process and overall research work including interpretation of results, reviewing and revising critically the manuscript. All authors read and approved the final version to be submitted for publication.

Data availability statement

The data used to support the findings of this study is available from the corresponding author upon request.

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Conflict Interest

Competing interests: No relevant disclosures.

Declaration of use of AI

We confirmed that the responsibilities and tasks of our manuscript that can only be attributed to and performed by humans.

REFERENCES

1. Emmady PD, Schoo C, Tadi P. Major neurocognitive disorder (Dementia). Treasure Island (FL): StatPearls Publishing;2023.
2. Rosenberg A, Solomon A, Jelic V, Hagman G, Bogdanovic N, Kivipelto M. Progression to dementia in memory clinic patients with mild cognitive impairment and normal β-amyloid. Alzheimer's Res Ther 2019;11:99. doi: 10.1186/s13195-019-0557-1.
3. Hu C, Wang L, Guo Y, Cao Z, Lu Y, Qin H. Study of the risk and preventive factors for progress of mild cognitive impairment to dementia. Am J Alzheimers Dis Other Demen 2020;35: 1533317520925324. doi: 10.1177/ 1533317520925324.
4. Iadecola C, Duering M, Hachinski V, et al. Vascular cognitive impairment and dementia: JACC Scientific Expert Panel. J Am Coll Cardiol 2019;73:3326–44. doi: 10.1016/j.jacc.2019.04.034.
5. McGrattan AM, Pakpahan E, Siervo M, et al. Risk of conversion from mild cognitive impairment to dementia in low- and middle-income countries: A systematic review and meta-analysis. Alzheimer's Dement Transl Res Clin Interv 2022;8:e12267. doi: 10.1002/trc2.12267.
6. Fink HA, Jutkowitz E, McCarten JR, et al. Pharmacologic interventions to prevent cognitive

decline, mild cognitive impairment, and clinical Alzheimer-type dementia. Ann Intern Med 2018; 168:39–51. doi: 10.7326/M17-1529.
7. Elmiyanti NK, Salamung N. Effects cognitive stimulation therapy for dementia: systematic review. Indones Nurs J Educ Clin. 2023;7:270–81. DOI: 10.24990/injec.v7i2.539.
8. Cao Y, Wang N, Zhang Q, et al. Effects of cognitive stimulation therapy on patients with dementia: An umbrella review of systematic reviews and meta-analyses. Exp Gerontol 2023; 177:112197. doi: 10.1016/j.exger.2023.112197.
9. Sanchia N, Halim MS. Terapi stimulasi kognitif untuk lansia dengan mild cognitive impairment: studi eksperimental di Panti Wreda. Neurona 2020;36:3–4. DOI: https://doi.org/10.52386/neurona.v36i4.83.
10. Marioni RE, Proust-Lima C, Amieva H, et al. Social activity, cognitive decline and dementia risk: a 20-year prospective cohort study. BMC Public Health 2015;15:1089. doi: 10.1186/ s12889-015-2426-6.
11. Woods B, Aguirre E, Spector AE, Orrell M. Cognitive stimulation to improve cognitive functioning in people with dementia. Cochrane Database Syst Rev 2012;2:CD005562. doi: 10.1002/14651858.CD005562.pub2.
12. Hopman-Rock M, van Hirtum H, de Vreede P, Freiberger E. Activities of daily living in older community-dwelling persons: a systematic review of psychometric properties of instruments. Aging Clin Exp Res 2018 31:917–25. doi: 10.1007/s40520-018-1034-6.
13. Spector A, Thorgrimsen L, Woods B, Orrell M. Making a difference: an evidence-based group programme to offer cognitive stimulation therapy (CST) to people with dementia. UK: Hawker Publications; 2006.
14. Markam S. Latihan vitalisasi otak. Jakarta: Grasindo; 2005. Indonesian.
15. Perhimpunan Dokter Spesialis Saraf Indonesia (Perdossi). Panduan praktik klinik diagnosis dan penatalaksanaan demensia. Jakarta; 2015. Indonesian.
16. Halim MS. Tes modified Mini mental state (3MS) versi Indonesia: alternatif alat ukur untuk penapisan fungsi kognitif. In: Buku Pendekatan Khusus dalam Menangani Permasalahan Lansia. Jakarta: Unika Atma Jaya;2015.p.168–80. Indonesian.
17. Juniarni L, Haerunnisa LL. Efficacy of application of cognitive stimulation therapy (CST) in increasing cognitive function, activities of daily living, psychology, and quality of life in elderly. Risenologi 2021;6:6–13. DOI: https: //doi.org/10.47028/ j.risenologi.2021.61a.208.
18. Triestuning E, Sipollo BV. Cognitive stimulation therapy on elderly with dementia in Panti Werdha Pandaan, Pasuruan. Int Conf Kerta Cendekia Nurs Acad 2019;1:139–44. doi: 10.5281/zenodo. 3371836.
19. Spector A, Orrell M, Woods B. Cognitive Stimulation Therapy (CST): Effects on different areas of cognitive function for people with dementia. Int J Geriatr Psychiatr 2010;25:1253–8.
20. Lobbia A, Carbone E, Faggian S, et al. The efficacy of cognitive stimulation therapy (CST) for people with mild-to-moderate dementia: a review. Eur Psychol 2019;24:257–77. https://doi.org/10.1027/1016-9040/a000342.
21. Chen X, Effectiveness of cognitive stimulation therapy (CST) on cognition, quality of life and neuropsychiatric symptoms for patients living with dementia: a meta-analysis. Geriatr Nurs 2022;47:201-10. https://doi.org/10.1016/ j.gerinurse.2022.07.012.
22. Young DKW. Multicomponent intervention combining a cognitive stimulation group and tai chi to reduce cognitive decline among community-dwelling older adults with probable dementia: a multi-center, randomized controlled trial. Dementia (London) 2020 19:2073-89. doi: 10.1177/1471301218814637.

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