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Efficacy of Cognitive Stimulation Therapy in Community-Dwelling Elderly with Mild Cognitive Impairment

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Abstract

Objective: To explore the intervention effect of Cognitive Stimulation Therapy (CST) on the elderly with Mild Cognitive Impairment (MCI) in community.

Methods: From May to December 2021, 67 community-dwelling elderly people with MCI in Jinwan District of Zhuhai were selected and randomly divided into the control group (n=33) and the intervention group (n=34). The control group received routine health education, while the intervention group received 12 sessions of CST for 6 weeks in addition to routine health education. The overall cognitive function and specific cognitive domains (memory function, language function and executive function) were assessed before and after the intervention.

Results: After intervention, the CST group had significant improvements in overall cognitive function and specific cognitive domains (memory function, language function, and executive function) compared with the control group ($P<0.05$).

Conclusions: CST can effectively improve the cognitive function of the elderly with MCI in the community, which is worthy of further promotion and application in the community.

Keywords: Cognitive stimulation therapy; Community; Mild cognitive impairment; The elderly

Introduction

Mild Cognitive Impairment (MCI) refers to the presence of mild cognitive decline in one or more cognitive domains compared to the previous level, but do not affect the independence of daily activities [1]. China has the largest number of MCI patients in the world. Studies have shown that the prevalence of MCI in Chinese people aged 60 years and above is as high as 15.5%, and up to 97.2% of MCI patients live in the community, 99.2% of MCI patients do not know what "MCI" is, even less understand the association between "MCI" and "dementia" [2]. Therefore, it is urgent to explore a suitable intervention program for the elderly with MCI in the community. Cognitive Stimulation Therapy (CST) was first proposed by Woods et al. in 2003 [3], which refers to a series of interesting activities to stimulate thinking, attention and memory in a social environment in the form of a group, so as to improve cognitive and social functions [4]. CST has been widely used in institutions and community dementia patients. Cochrane systematic review collected evidence-based research evidence on the efficacy of cognitive stimulation in dementia patients from different countries and regions and confirmed that CST can indeed improve the cognitive function of dementia patients [5]. However, there are few studies on cognitive stimulation intervention for elderly with MCI in the community.

This study applied cognitive stimulation therapy to elderly patients with MCI in the community and observed the application effect of its community scenario, so as to provide a reference for exploring a more suitable intervention method for elderly patients with MCI in the community.

Methods

A total of 67 elderly people with MCI who were screened by physical examination in Jinwan District of Zhuhai from May to December 2021 were selected as the research objects.

Inclusion criteria: ①patients with mild cognitive impairment diagnosed by DSM-5 criteria [1]; ②age of 60-79 years old; ③have clear consciousness, basic communication skills, and can cooperate to complete the study; ④informed consent for this study and voluntary participation.

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Exclusion criteria: ①severe mental disorders; ②serious organic heart disease, malignant arrhythmia, malignant tumor, liver and kidney failure and other diseases; ③severe hearing and visual impairment, unable to communicate effectively; ④had participated in other similar intervention trials within 30 days before study initiation.

Drop-out criteria: ①patients withdrew from the study due to subjective and objective reasons; ②loss of follow-up due to inability to get in touch.

This study adopted a parallel randomized controlled trial design, and 67 elderly people with MCI screened by physical examination in the community were enrolled as the research objects. According to the simple random grouping method, they were divided into the intervention group (34 cases) and the control group (33 cases). The procedure of randomization was to set a random seed on SPSS 24.0 for Windows statistical software, calculate variables, generate random numbers, and then use the visual binning function of SPSS to perform randomization.

The allocation concealment step was to number the subjects from 1 to 67, generate random numbers and groups according to the above randomization procedure, hide the random numbers and groups in an opaque sealed envelope with corresponding numbers written on the outside, and then another person distributed the envelope, opened the envelope in public, and enrolled the subjects according to the random numbers and groups.

A total of 67 subjects completed the baseline data collection. Among the 34 participants in the experimental group, 32 participants participated in at least 10 of the 12 interventions and completed the post-test data collection at the end of the intervention. Two participants who did not participate in the post-test data collection due to less than 10 interventions were considered to be lost to follow-up. In the control group, 33 patients participated in the general health education intervention, 29 patients completed the collection of post-test data, and 4 patients did not participate in the collection of post-test data and were considered to be lost to follow-up. The total dropout rate of this study was 8.96%, with 5.89% in the experimental group and 12.12% in the control group.

The control group received routine health education intervention, and the content of health education included diet, exercise, sleep, mood and another lifestyle guidance. The frequency of intervention was once every three weeks, and a total of two interventions were carried out in the form of health education lectures. Except for routine health education intervention group also accept cognitive stimulation therapy intervention. Except for the cognitive stimulation therapy intervention, the daily community activities of the intervention group were similar to those of the control group.

The procedure for each CST intervention was the same, and it was divided into three parts: the opening activity, the main activity, and the closing activity. Each intervention was 1 hour long. The duration of the opening activity was 5 to 10 minutes. The content is to recall the theme of the last event and lead the participants to discuss current events The duration of the main activity was 45 to 50 minutes, and the main activity of each activity had 2 to 3 different themes, and the duration of each theme was 15 to 20 minutes. The duration of the closing activity was 5 minutes, the researcher made a summary of the activity, assigned homework. The theme of each main activity and the homework are as follows. The theme of the first activity were to introduce the convention of group activities, self-introduction of each group member, glass ball game, and the first two pieces of advanced plane puzzle. The assignment was for the subjects to go home and continue practicing the remaining six flat step puzzles. The theme of the second activity was the color radish squat game, pottery making and the first four levels of the moving car out of the warehouse game. Homework was to continue to practice the first 24 levels of moving the car out of the warehouse after returning home. The theme of the third activity was finger games, four color chess, and geometric figure peg board. Homework was to continue to practice geometric figure peg board after returning home. The theme of the fourth activity were number games (to see who can count fast), pottery coloring, and maze books. Homework was to continue to practice the maze books after returning home. The theme of the fifth activity was word games, sorting games, and jigsaw puzzles. Homework was to continue to practice jigsaw puzzles after returning home. The theme of the sixth activity were traffic sign card, current affairs news, logic dog game and summary of the first six activities. Homework was to continue to practice logic dog after returning home. The theme of the seventh activity to the twelfth activity was repeated from the first to the sixth. The activities were conducted in the form of group activities. Two sessions per week for 60 minutes. The intervention consisted of 12 sessions lasting 6 weeks.

Outcomes

The primary outcome measure was overall cognitive function, and the secondary outcome measure was specific cognitive domains, including memory function, language function and executive function. ①The overall Cognitive function was assessed by Montreal Cognitive Assessment-Basic (MoCA-B), which had 9 dimensions and the total score ranged from 0 to 30. The cut-off values of MCI were as follows: primary school education level ≤19 points, secondary school education level ≤22 points, university education level ≤24 points. ②Memory function was assessed by Auditory Verbal Learning Test-Huashan version (AVLT-H). In AVLT-H, N5 (long delay recall) and N7 (recognition) were the most sensitive assessment measures. The N5 score ranges from 0 to 12 and the N7 score ranges from 0 to 24. The cut-off values of MCI were N5 (long delayed recall) score ≤4 (60-69 years old), ≤3 (70-79 years old); N7 (recognition) score ≤19 (60-69 years old), ≤18 (70-79 years old). ③Language function was assessed by Animal Fluency Test (AFT). The cut-off values of MCI were as follows: animal fluency scored 12 points or less (middle and below), 13 points or less (high school), 14 points or less (university and above). ④The Shape trails test A-B (STT A-B) was used to evaluate the executive function. The STT was divided into A and B parts, and each part included practice questions and test questions. Evaluation of the part was tested by A and B to complete the attachment to the total number of time-consuming, the longer the time, the heavy damage. MCI cut-off values: STT-A test, 60-69 years old ≥80 seconds, 70-79 years old ≥100 seconds; STT-B test questions, ≥200 seconds for 60 to 69 years old and ≥240 seconds for 70 to 79 years old.

Statistical Approach

SPSS26.0 software was used to analyze the data. The measurement data obedient to normal distribution, and the mean ± standard deviation was used for statistical description. Two independent sample t-test or corrected t-test was used for comparison between the two groups. The comparison between the two groups the Mann - Whitney U test. Count data were de-

scribed by frequency and constituent ratio. Chi-square test or continuity correction chi-square or Fisher exact test were used for statistical analysis of count data. All statistical analysis results were considered statistically significant at $P<0.05$.

Results

Before the intervention, there were no significant differences in gender, age, marital status, education level, smoking status, cerebrovascular diseases, hypertension, hyperlipidemia, diabetes, and family history of cognitive impairment between the two groups ($P>0.05$), as shown in Table 1.

There was no significant difference in MoCA-B, AVLT-H (N5), AVLT-H (N7), AFT, STT-A test and STT-B test scores between the two groups before intervention (P>0. 05), as shown in Table 2.

After intervention, the cognitive function scores of MoCA-B, AVLT-H (N5), AVLT-H (N7), AFT, STT-A and STT-B tests were compared between the two groups, and the differences were statistically significant (P<0.05), as shown in Table 3.

Table 1: The baseline data of the intervention group and the control group were compared.

variables of interest	control group (*n*=33)	Intervention group (n=34)	χ^2	*P*
gender				
male	15(45.5%)	16(47.1%)	0.017[a]	0.895
female	18(54.5%)	18(52.9%)		
Age				
60~	20(60.6%)	16(47.1%)	1.236[a]	0.266
70~	13(39.4%)	18(52.9%)		
marital status				
have a spouse	30(90.9%)	29(85.3%)	0.110[b]	0.740
no spouse	3(9.1%)	5(14.7%)		
education level				
secondary school and above	26(78.8%)	26(76.5%)	0.052[a]	0.820
primary school and following	7(21.2%)	8(23.5%)		
smoking status				
never smoked	21(63.6%)	23(67.6%)	0.119[a]	0.730
smoke	12(36.4%)	11(32.4%)		
cerebrovascular diseases				
not have	15(45.5%)	15(44.1%)	0.012[a]	0.912
have	18(54.5%)	19(55.9%)		
Hypertension				
not have	19(57.6%)	15(44.1%)	1.214[b]	0.271
have	14 (42.4%)	19(55.9%)		
Hyperlipidemia				
not have	26(78.8%)	23(67.6%)	1.058[a]	0.304
have	7(21.2%)	11(32.4%)		
Diabetes				
not have	30(90.9%)	28(82.4%)	0.447[b]	0.504
have	3(9.1%)	6(17.6%)		
family history of cognitive impairment				
not have	30(90.9%)	32(94.1%)	0.001[b]	0.972
have	3(9.1%)	2(5.9%)		

Note: a: Pearson's chi-square test; B: chi-square continuity correction; c: Fisher's exact test.

Table 2: The cognitive function scores of the two groups were compared before intervention.

outcome	control group (n=33) $\bar{x} \pm s$	intervention group n=34) $\bar{x} \pm s$	*t/t'*	*P*
MoCA-B	21.18±2.92	20.79±2.82	0.553[a]	0.582
AVLT-H (N5)	2.91±1.99	2.82±2.43	0.157[a]	0.875
AVLT-H (N7)	18.70±3.66	17.68±3.53	1.161[a]	0.250
AFT	9.88±2.75	9.35±1.77	0.928[b]	0.358
STT-A test	114.09±39.66	109.24±42.34	0.484[a]	0.630
STT-B test	245.06±65.85	253.59±71.65	-0.507[a]	0.614

Note: a: two independent sample t test; b: Two independent samples corrected t-test

Table 3: The cognitive function scores of the two groups were compared after intervention.

outcome	control group n=33) $\bar{x} \pm s$	intervention group n=34) $\bar{\chi} \pm s$	*t/t'*	*P*
MoCA-B	21.12±2.67	23.97±2.55	-4.469[a]	<0.001
AVLT-H (N5)	3.18±2.18	4.68±2.07	-2.874[a]	0.005
AVLT-H (N7)	18.70±3.85	20.62±2.70	-2.373[a]	0.021
AFT	10.15±2.50	11.59±2.40	-2.399[a]	0.019
STT-A test	95.18±44.89	70.82±33.94	2.500[b]	0.015
STT-B test	235.58±80.50	186.79±60.22	2.802[b]	0.007

Note: a: two independent sample t test; b: Two independent samples corrected t-test

Discussion

China's aging population is severe, and the number of MCI patients in the community is increasing year by year. The non-pharmacological intervention has become a research hotspot. Previous non-pharmacological interventions, such as cognitive training and lifestyle intervention, have poor compliance when implemented in the community. Non-pharmacological interventions with high participation enthusiasm and strong viscosity need to be explored urgently.

The results of this study showed that the baseline data of the intervention group and the control group were balanced and comparable. The intervention results showed that cognitive stimulation therapy could improve the overall cognitive function and specific cognitive domains such as memory, language, and execution of MCI patients in the community.

Cognitive stimulation therapy has a positive effect on improving cognitive function. Continuous mental stimulation can keep the mind active and improve cognitive function. Cognitive stimulation therapy is based on the principle of "use it or lose it", which states that lack of cognitive activity accelerates cognitive decline. The study of Gibbor et al. showed that "continuous mental stimulation" is important for people with dementia [6], and the Lancet Commission report also recommended that "cognitive, physical, and social activity should be maintained in midlife and later life" [7]. The primary purpose of "cognitive stimulation" therapy is to stimulate the participants' thoughts and keep them active. Based on the design of "cognitive stimulation" therapy, this study implemented a series of intervention activities; the frequency of intervention was twice a week, 60 minutes each time, which appropriately stimulated the thinking and attention of the elderly with MCI. In addition, when the elderly completed the task, the implementer only gave appropriate prompt information rather than too much help, so as to give full play to the potential of the participants and let them complete the activity by themselves. The old man in the process of actively participate in group activities to keep the active thinking, thus improve the cognitive function.

The cognitive stimulation intervention facilitated social interaction and support, which improved cognition. Cognitive function includes executive function, learning and memory, sensorimotor function, language, complex attention and social cognition [1]. Social cognition is one of the important cognitive functions. Several studies have shown that cognitive stimulation facilitates social interaction and support [6,8]. The interaction between cognitive stimuli and social factors improved the cognitive function of the study subjects.

The concept of "people-centered" care provided a supportive environment for cognitive function improvement. Cognitive stimulation therapy emphasizes the concept of "people-centered" care. Many studies have suggested that the basic value of the people-centered concept is to create a supportive environment for cognitive function improvement. The study by Gibbor et al. mentions "confident" and "relaxed environment" [6], the study by Leung et al. mentions "providing supportive/non-threatening group environment" [9], and the study by Orfanos et al. mentions "group support" [8]. Cognitive stimulation can enhance participants' social confidence, allow them to contact others, and promote relaxation and enjoyment [8]. These studies suggested that a supportive environment is a condition for cognitive function improvement, and cognitive stimulation intervention activities provide a supportive environment for cognitive function improvement.

In this study to intervene in the process of fully the application of the principle of "people-oriented", as the researchers before activities have a thorough understanding of each participant's general situation, such as different culture, education background, preferences, etc., and give full consideration to these factors, the design and selection activities project according to specific circumstances, specific content and form; The intervention environment was a spacious, bright and undisturbed activity space. Items such as magnifying glasses and reading glasses are provided at each event; the implementers fully respect each participant, respect different opinions, views, and beliefs, and encourage each participant to actively participate in the activity. Each event inclusive atmosphere, and fully take care to each participant, build value each participant environment, such as hearing impaired people to participate in, will be extra repeat instructions to ensure he loudly in his ears hear, and as part of the slow, the perpetrators will be extra "special attention" to help them; Each activity as far as possible to create a happy atmosphere, to provide participants with a more enjoyable learning environment, so that they feel fun. The supportive environment created by the "people-oriented" care concept provides a good supportive environment for the implementation of cognitive stimulation activities and maintains the dignity and sense of achievement of the participants [10].

Conclusion

In conclusion, cognitive stimulation therapy is simple, easy to implement, inexpensive, and can improve the cognitive function of patients with MCI. It can be carried out as a routine activity in community health service centers and community home care service stations for the long-term.

Author Statements

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