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Application of Cognitive Training Therapy for Alzheimer's Disease and Evaluation of its Efficacy

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Abstract: *Objective:* The purpose of this study is to conduct in-depth research on the cognitive training treatment of Alzheimer's disease and evaluate its efficacy. *Methods:* 74 cases of Alzheimer's disease patients in the hospital were randomly selected for analysis and study from January 2023 to December 2023. The 74 patients were divided into two groups, 37 cases in the control group received conventional drug treatment, while 37 cases in the study group received conventional drug treatment combined with cognitive training. The cognitive functions of the two groups of patients before and after receiving the two different treatment methods were compared. *Results:* The cognitive impairment symptoms of patients in both groups were alleviated to a certain degree. The ADAS-Cog score of the study group was significantly lower than that of the control group, and the CDT, RVR, TMT-A, DS, FOME, and BD scores were higher than those of the control group, $P < 0.05$. *Conclusion:* After the combined intervention of medication and cognitive training therapy, the cognitive function of patients with Alzheimer's disease was significantly improved, which increased the patients' rehabilitation effect and quality of life, so this combined therapy is worth further research for widespread application.

Keywords: Cognitive function; Cognitive training; Alzheimer's disease

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1. Introduction

Alzheimer's disease is a common clinical neurodegenerative disease that has a main symptom of progressive cognitive decline and decreasing ability to perform daily living tasks. In addition, patients with Alzheimer's disease may also be accompanied by a variety of mental and behavioral abnormalities [1]. Currently, cholinesterase inhibitors are mainly used in the clinical treatment of early to middle-stage Alzheimer's disease. Although medication can improve cognitive function to a certain extent, it may also lead to the risk of functional impairment. Therefore, a comprehensive treatment plan should be formulated based on the patient's specific condition. Cognitive training is a standardized task training developed by professional therapists for patients suffering from symptoms of cognitive impairment involving memory, attention, and executive ability. This type of training can be performed in a variety of forms and has been confirmed through clinical studies to have a positive effect on improving cognitive function in patients with stroke, traumatic brain injury, and so

on [2–3]. Therefore, 74 patients with Alzheimer's disease were included in this study to research and explore the application value of the integrated intervention of medication and cognitive training.

2. Information and methods

2.1. General information

In this study, 74 cases of Alzheimer's disease patients in the hospital were randomly selected to be analyzed and studied from January 2023 to December 2023. Among the 74 patients, there were 34 males and 40 females, and the patients had a disease duration of 1–8 years, with an average of 4.12 ± 1.22 years. The 74 patients were divided into two groups. The control group consisted of 37 cases that underwent conventional drug treatment with an age range of 59–79 years old, and a mean of 69.12 ± 2.62 years. The study group consisted of 37 cases that underwent conventional medication combined with cognitive training treatment with an age range of 60–78 years, and a mean of 69.12 ± 2.32 years. The general data of patients is $P > 0.05$ at the start of the study.

2.2. Methods

The 37 cases of Alzheimer's disease in the control group received conventional drug treatment. The treatment involved the patients taking Donepezil tablets orally as prescribed by the doctor, with a dose of 5 mg each time, once a day for three months. At the same time, communication with patients was increased and necessary psychological support was provided. The patients in the study group received training treatment on this basis, with the following specific contents. First, the therapist explored with the patients the cognition of time, place, and people through the form of dialog. Secondly, the patients were asked to make associations with a specific word at the beginning of a word or make a list of nouns for a specific category of items, such as fruits and vegetables, at a specific time. This training method is not only effective in improving patients' cognitive flexibility but is also a key means of word fluency and categorization ability training. Thirdly, elements containing graphics such as numbers, letters, animals, and so on are made into recognition cards in the form of black and white superimpositions, which are then divided into different difficulty levels according to the difference in the number of superimpositions [4–5]. Subsequently, patients were asked to accurately recognize and name the specific graphics on each card, so that the patients' graphic recognition ability could be effectively improved [6–7]. Fourthly, patients are invited to observe a set of character pictures in detail and subsequently narrate the contents of the pictures in detail. During the process of observation and narration, the therapist will ask a series of relevant questions and require the patient to give accurate answers based on the content of the pictures. Questions of different levels of difficulty are designed according to the level of abstraction of the pictures. In low-difficulty questions, the patient mainly needs to recognize the subjects in the picture and their basic information, such as the gender of the person shown. These questions help train the patient's basic recognition skills. In contrast, high-level questions require patients to further analyze potential relationships between the people in the picture. These types of questions aim to develop patients' abstract generalization ability so that they can understand the relationships and connections between subjects while recognizing them [8]. After training with questions of different difficulties, patients can gradually improve their cognitive abilities. In addition, this training method has a significant effect on strengthening the patients' episodic and memory extraction ability. Based on strict adherence to the principle of error-free learning, individualized cognitive training tasks were developed for each patient with different baseline cognitive abilities. In addition, if the patient exudes frustration or a bad mood, the therapist will prioritize giving him or her the necessary psychological support and comfort rather than continuing cognitive training [9–10].

2.3. Observation indicators

The cognitive function of the two groups of patients before and after treatment was systematically evaluated using the cognitive subscale (ADAS-Cog), covering language, memory, attention, and manipulation. The severity of cognitive impairment was negatively correlated with the scores, meaning the lower the scores, the less severe the cognitive impairment. The clock drawing test (CDT) assessed the executive function; the verbal retrieve test (RVR) assessed the semantic memory storage function; the connection test-A (CT-A) assessed the cognitive function of the two groups of patients; the trail-making test-A (TMT-A) assesses attention and motor speed; the digit span test (DS) assesses immediate memory capacity; the fuld object memory evaluation (FOME) assesses delayed memory functioning; and the block design test (BD) assesses visuospatial functioning. Tables were utilized for the presentation.

2.4. Statistics and methods

All research data were analyzed by the SPSS 23.0 system. Count data were expressed by ($x \pm s$, %) and the differences between the two groups were compared by t and x^2 tests. If $P < 0.05$, it indicates that the experiment has significant value.

3. Results

The data shows that the cognitive impairment symptoms of the two groups of patients have improved. As shown in Table 1, the ADAS-Cog score of the study group is significantly lower than that of the control group, and the scores of CDT, RVR, TMT-A, DS, FOME, and BD are higher than those of the control group, with $P < 0.05$.

Table 1. Comparison of various cognitive function scores between the two groups of patients ($x \pm s$)

Cognitive function score	Before treatment			After treatment		
	Study group	Control group	*P*-value	Study group	Control group	*P*-value
Language	8.44 ± 1.32	8.32 ± 1.31	$P > 0.05$	4.11 ± 1.42	6.73 ± 1.68	$P < 0.05$
Memory	13.23 ± 3.16	13.29 ± 3.21	$P > 0.05$	8.12 ± 2.31	10.65 ± 2.44	$P < 0.05$
Attention	3.25 ± 1.25	3.21 ± 1.27	$P > 0.05$	2.17 ± 0.26	2.87 ± 0.76	$P < 0.05$
Manipulation	3.34 ± 1.28	3.43 ± 1.24	$P > 0.05$	2.11 ± 0.76	2.99 ± 0.21	$P < 0.05$
CDT	2.12 ± 0.32	2.11 ± 0.26	$P > 0.05$	2.98 ± 0.61	2.39 ± 0.56	$P < 0.05$
RVR	15.35 ± 2.32	15.22 ± 2.36	$P > 0.05$	18.62 ± 2.59	16.88 ± 2.37	$P < 0.05$
TMT-A	81.25 ± 6.36	81.63 ± 6.62	$P > 0.05$	89.47 ± 5.36	84.87 ± 5.52	$P < 0.05$
DS	3.34 ± 1.28	3.43 ± 1.24	$P > 0.05$	2.11 ± 0.76	2.99 ± 0.21	$P < 0.05$
FOME	6.46 ± 0.76	4.44 ± 0.77	$P > 0.05$	7.76 ± 0.89	7.32 ± 0.80	$P < 0.05$
BD	5.52 ± 1.32	5.49 ± 1.34	$P > 0.05$	6.88 ± 0.98	6.56 ± 0.91	$P < 0.05$

4. Discussion

The main cause of cognitive decline or impairment symptoms in patients with Alzheimer's disease is closely related to the neurobiological changes in their brain tissue. In the early stage of the disease, most patients show a decrease in localized cerebral blood flow, with the frontal-parietal and temporal regions being the most severely affected [11–12]. According to relevant studies, cognitive training therapy can activate the cortex of the frontal-

parietal region, temporal region, and other brain regions of the patients, thus enhancing cerebral blood flow and strengthening the local metabolism in the brain. After systematic categorical fluency training in clinical practice, the cerebral blood flow in the left frontal region of patients can be significantly improved, thus optimizing brain function. At the same time, the implementation of word fluency training can increase the local cerebral blood flow mainly in the temporal region, which can further improve the brain's ability to process verbal information. Both training methods help to improve the cognitive function of the brain [13]. In addition, cognitive processes such as episodic memory and memory extraction are correlated with neurobiological changes in the medial temporal and limbic lobes of the patient's brain. Functional training in executive aspects, such as stereotypical switching and inhibitory control ability, can effectively influence the functional performance of the frontal lobe-related cortex of patients [14–15].

The results of this study indicated that both groups of patients receiving treatment showed improvement in cognitive impairment symptoms, and there was a significant reduction in ADAS-Cog scores in the study group compared with the control group. The CDT, RVR, TMT-A, DS, FOME, and BD scores were higher in the study group than those in the control group ($P < 0.05$). This indicates that cognitive training can effectively promote the increase of cerebral blood flow in patients, and can improve the metabolic function of brain areas, thus improving the cognitive ability and quality of life of patients to a certain extent.

In summary, the combination of drug therapy and cognitive training for Alzheimer's disease patients has shown remarkable clinical effects. This comprehensive treatment method can not only effectively promote the improvement of cognitive function, but also help to control the progression of the disease, which is worthy of widespread clinical application.

Disclosure statement

The authors declare no conflict of interest.

References

[1] Li CX, Fang Y, Jiang N, et al., 2021, Cognitive Improvement of Mild to Moderate Alzheimer's Disease Patients by Adaptive Cognitive Training. Journal of Hunan Institute of Technology (Natural Science Edition), 34(04): 43–46.

[2] Wu LY, 2023, Early Diagnosis and Treatment of Alzheimer's Disease. Population and Health, 2023(09): 89–92.

[3] Wang L, He Y, Li YM, et al., 2023, Application of Cognitive Intervention based on VR Technology Combined with Individualized Chemical Recreational Therapy in Patients with Mild-to-moderate Alzheimer's Disease. Contemporary Nurses, 30(11): 37–41.

[4] Zhang RF, Zhu JZ, Hu JQ, et al., 2023, Effects of Regression Family Intervention on Cognitive Function and Quality of Life in Patients with Alzheimer's Disease. Journal of Nursing, 38(22): 106–110.

[5] Zheng YJ, Zhang YQ, Gong W, 2023, Effects of Recreational Cognitive Training Combined with Psychological Liaison Care on Patients with Mild to Moderate Alzheimer's Disease. Psychology Monthly, 18(22): 204–206.

[6] Li N, Wang CL, Fang XN, et al., 2023, Evidence-based Practice of Rehabilitation Training for Patients with Mild to Moderate Alzheimer's Disease. China Practical Medicine, 18(24): 152–157.

[7] Xu QC, Du MZ, 2023, Effects of Virtual Technology Combined with Conventional Cognitive Rehabilitation Training on Cognitive Function in Patients with Alzheimer's Disease. Medical Theory and Practice, 36(24): 4298–4300.

[8] Han GH, Pang XL, Sun HL, et al., 2021, Quality Evaluation of Meta-analytic Reports of Cognitive Interventions for Alzheimer's Disease Patients in China. Chinese Family Medicine, 19(11): 1946–1950.

[9] Ni Z, Sun GQ, Jiang ML, 2023, Effects of Multisensory Stimulation Combined with Early Cognitive Rehabilitation

Training on Cognitive Ability and Mental Status of Patients with Alzheimer's Disease. Zhejiang Medicine, 45(04): 404–407 + 415.

[10] Lin XY, Ye H, Chen H, 2023, Effects of Cognitive-perceptual Dysfunction Training Combined with Occupational Therapy on the Recent Rehabilitation Effect and Prognosis of Patients with Alzheimer's Disease. Chinese and Foreign Medical Research, 21(05): 149–153.

[11] Wang J, Yuan J, Wang L, 2022, Clinical Efficacy of Aripiprazole and Donepezil Combined with Functional Training in the Treatment of Alzheimer's Disease and its Effect on Patients' Cognitive Function and Behavioral Ability. Journal of Clinical Rational Drug Use, 15(27): 73–76.

[12] Cai LL, Huang ZH, Yu ZG, 2022, Effects of Cognitive Function Training Combined with Daily Living Ability Training on Patients with Alzheimer's Disease. Chinese Contemporary Medicine, 29(19): 90–93.

[13] Xiao GX, 2023, Clinical Efficacy of Transcranial Direct Current Stimulation Combined with Cognitive Training in Alzheimer's Disease and its Neural Mechanism, thesis, Anhui Medical University.

[14] Hu FX, 2022, Effects of Comprehensive Rehabilitation Training Combined with Donepezil Hydrochloride on Cognitive Function and Quality of Life in Patients with Mild-to-moderate Alzheimer's Disease. Reflexology and Rehabilitation Medicine, 3(07): 171–173.

[15] Zhao XY, Huang XX, Wan QQ, 2021, An Integrative Review of Exercise Combined with Cognitive Training in Patients with Mild Cognitive Impairment and Alzheimer's Disease. Chinese Nursing Education, 18(12): 1098–1105.