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Original Article

The effects of continuing care combined with music therapy on the linguistic skills, self-care, and cognitive function in Alzheimer's disease patients

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Abstract: Objective: This study aimed to investigate the effects of continuing care combined with music therapy on the linguistic skills, self-care abilities, and cognitive function in elderly Alzheimer's disease (AD) patients. Methods: A total of 73 patients with AD were recruited as the study cohort and randomly allocated into a control group (n=36) and an experimental group (n=37). The control group was given routine nursing care, and the experimental group was given continuing care combined with music therapy. The changes in the patients' linguistic skills, self-care abilities, cognitive functions, and quality of life before and after the nursing care in both groups were recorded. The Western Aphasia Battery (WAB) was used to assess the patients' linguistic skills. Results: The WAB scores in the experimental group were significantly higher than the WAB scores in the control group after the completion of the nursing (P<0.05). The Activities of Daily Living (ADL) and the Mini-Mental State Examination (MMSE) scores in the experimental group were significantly higher than the corresponding scores in the control group after the nursing care (P<0.05). After the intervention, the patients' SF-16 scores in the experimental group were significantly higher than the corresponding scores in the control group (P<0.05). Conclusion: Continuing care combined with music therapy can improve the linguistic skills of elderly AD patients and improve their self-care abilities and cognitive function, which is of positive clinical significance.

Keywords: Continuing care, music therapy, Alzheimer's disease, self-care ability, cognitive function

Introduction

Alzheimer's disease (AD) is a degenerative nervous system disease, and its incidence is on the rise as people age [1-3]. AD is the sixth leading cause of death in the United States, second only to malignant tumors and cardiovascular disease. According to the AD report, the number of AD patients is currently as high as 47 million worldwide and is expected to reach 130 million by 2050 [4]. The duration of AD, from mild cognitive impairment in its early stages to eventual death, is about three years or more, and in some cases can last more than a decade.

However, the pathogenic factors and pathology of AD have not been clearly clarified in modern medicine. Therefore, the development of AD cannot be prevented. There are very few effective drugs for AD. Most of the prescribed drugs are cholinesterase inhibitors and NMDA receptor antagonists, but the therapeutic effect is lower than expected. At one time, AD was considered the most expensive disease in the world. Medicaid payments are on average 23 times higher for those with AD compared to those without.

As the disease progresses, AD patients develop cognitive and language impairments and lose the ability to live independently and care for themselves, imposing a severe financial and emotional burden on themselves and their families [5-7]. AD cannot be cured, but scientific and effective care will improve the quality of life. In addition, a study has shown that musical interventions can effectively improve cognitive function, verbal expression, and self-care abilities in patients with AD [8].

The aim of this study was to implement continuing care combined with music therapy in the elderly with AD to analyze their effects on

patients' linguistic skills, self-care abilities, and cognitive function, and provide a theoretical basis for improving patients' symptoms and quality of life.

Methods and materials

General information

A total of 73 patients with AD admitted to the Department of Neurology of our hospital from January 2018 to January 2020 were included and randomly divided into the control group (CG, n=36) or the experimental group (EG, n=37). Among them, there were 20 males and 16 females in the CG, with an average age of (69.89±5.51) years, and 21 males and 16 females in the EG, with an average age of (70.06±6.67) years.

Inclusion criteria: This study included patients who were between 65 and 80 years old, patients who met the diagnostic criteria for AD [9], patients who had a survival period of ≥3 months, and patients who presented with various degrees of memory loss, cognitive impairment, and aphasia.

Exclusion criteria: Patients with cerebral hemorrhages and brain tumors, patients with severe lesions in their functional organs, and patients with immune deficiency.

Personal files were established for the 73 patients in the study cohort, and data such as name, gender, age, contact telephone number, and home address were registered. Informed consent forms were signed by all the patients or their families. This study was reviewed and approved by the ethics committee of our hospital.

Intervention methods

The CG was given routine care, including health education, monitoring of the condition, and medication reminders.

The EG was given continuing care combined with music therapy. A professional team, including 1 doctor, 5 nurses, 2 psychologists and 1 nutritionist, was established to conduct a comprehensive assessment of each patient's condition. Individualized interventions were developed. The specific measures of the continuing care combined with music therapy were as follows.

(1) Medication guidance: The nursing staff provided targeted medication instruction to the patients according to the doctor's instructions, keeping detailed records of the dosage and consumption, as well as any side effects that occurred. The patient's family members were instructed to supervise the patient's medication on a daily basis to prevent medication errors.

(2) Dietary guidance: The dietitian formulated personalized meal instructions and a meal preparation program to ensure healthy dietary habits and to meet each patient's nutrition requirements.

(3) Life guidance: The nursing staff made home visits to assess each patient's daily living environment, assist in identifying potential risk factors, and provide professional guidance for the prevention of potential hazards, such as installing non-slip devices in the bathroom and wearing identification tags printed with the patient's name, address, and contact phone number to prevent the patient from getting lost. The patient's relatives were encouraged to communicate more with the patient every day to enhance their language skills. Some precious photos and items of the past as well as the environment where they used to work and live were introduced to stimulate their memories. The whole nursing process was guided on a gradual level, to avoid increasing the patients' psychological burdens.

(4) Music intervention: According to the information and interests found in the patient's personal data, the nursing staff selected suitable songs and played 30 min music for the patient every morning before bathing, before the lunch break, and at night before bedtime. The nursing staff communicated briefly with the patients to find out whether they had other types of music they would like to listen to and to encourage them to sing while enjoying the music [10].

The patients were followed up using a WeChat communication group, in which timely answers to the concerns of the patients and their families could be provided.

Observation indicators

Linguistic skills: The linguistic skills of both groups were assessed before and after intervention using the Western Aphasia Battery

Table 1. Comparison of the baseline data in the two groups ($\bar{x} \pm s$)/[n (%)]

Baseline data		Control group (n=36)	Experimental group (n=37)	t/X^2	*P*
Gender	Male	20	21	-0.356	0.803
	Female	16	16		
Average age (years)		69.89±5.51	70.06±6.67	-0.098	0.904
Average weight (kg)		60.91±8.21	61.40±8.06	-0.323	0.748
Average duration (years)		6.79±2.46	6.58±2.97	-0.087	0.913

Table 2. Comparison of the WAB scores in the two groups ($\bar{x} \pm s$)/[n (%)]

Item	Control group (n=36)		Experimental group (n=37)		*t*	*P*
	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention		
Writing and reading	43.78±3.07	56.24±7.15	43.38±3.57	60.45±6.74	5.345	0.025
Repetition	43.19±5.02	57.26±4.87	43.64±4.77	63.54±8.47	7.463	0.008
Auditory comprehension	44.15±5.13	57.66±6.02	43.87±4.23	64.53±6.07	4.087	0.045
Spontaneous speech	46.54±2.88	51.74±3.41	45.97±2.46	61.15±3.67	5.195	0.023
Volume of information	41.95±2.83	57.89±5.05	42.01±2.75	62.55±4.38	5.766	0.018
Fluency	43.14±1.68	60.54±7.03	43.89±1.73	66.93±6.67	4.953	0.038

(WAB). The WAB test is designed to provide a means of evaluating the major clinical aspects of language function: content, fluency, auditory comprehension, repetition and naming, plus reading, writing and calculation, with higher scores indicating better linguistic skills [11].

Self-care ability: The patients' ability to care for themselves was evaluated using the Activities of Daily Living (ADL) scale before and after the intervention. A 100-point questionnaire was used to rate personal hygiene or grooming, dressing, toileting, transferring, or ambulating, and eating, with a higher score indicating better self-care abilities [12, 13].

Cognitive function: The patients' cognitive functions were assessed before and after the intervention using the Mini-Mental State Examination (MMSE). The maximum MMSE score is 30 points. A score of 20 to 24 indicates mild dementia, 13 to 20 indicates moderate dementia, and less than 12 indicates severe dementia [14, 15].

Quality of life: The patients' quality of life was evaluated before and after the intervention using the 100-point SF-36 scale. The higher the score, the better the quality of life [16, 17].

Statistical methods

The data analysis was performed using SPSS 17.0. The measurement data were expressed as the mean ± standard deviation ($\bar{x} \pm s$), and the differences between groups were compared using T-tests, and when $P<0.05$, a difference was considered statistically significant.

Results

Comparison of the differences in the baseline data

There were no significant differences in terms of the baseline data, such as gender, age, weight, or disease duration ($P>0.05$), so the two groups were comparable (**Table 1**).

Analysis of the linguistic skill changes

No significant differences were observed in the WAB scores in the two groups before the intervention ($P>0.05$), and the two groups' WAB scores showed significant improvement after the intervention and were higher in the EG than in the CG ($P<0.05$) (**Table 2**; **Figure 1**).

Analysis of the changes in the patients' self-care abilities

There was no significant difference in the ADL scores between the two groups before the intervention ($P>0.05$). The CG scored (37.84±4.05), which was lower than the (46.60±4.71) in the EG after the intervention ($P<0.05$) (**Figure 2**).

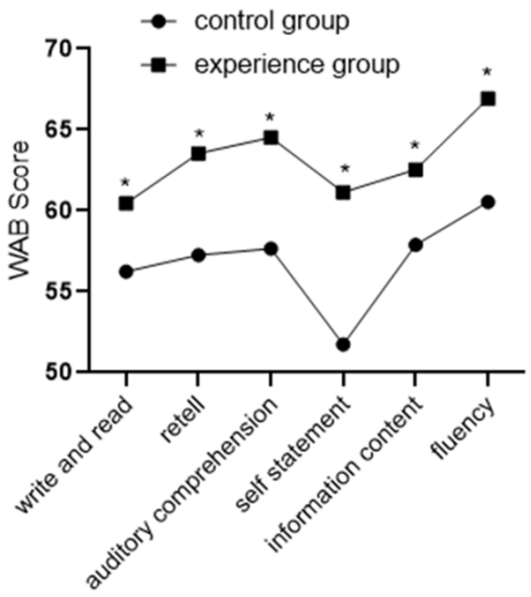

Figure 1. Change analysis of the WAB scores before and after the intervention in the two groups of patients. After the comparative analysis, it was found that the six WAB test fluency scores, namely, repetition, auditory comprehension, spontaneous speech, amount of information, and fluency in the experimental group were significantly higher than the WAB test scores in the control group ($P<0.05$), * indicates that the same index group comparison difference is statistically significant.

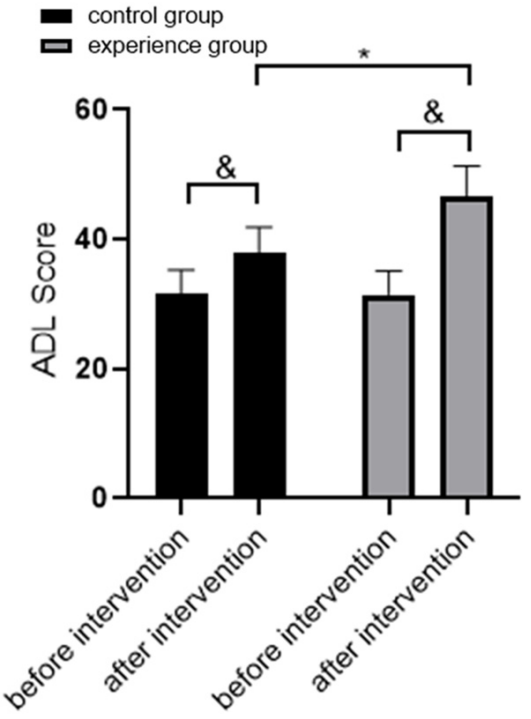

Figure 2. A change analysis of the ADL scale scores before and after intervention. &$P<0.05$ before vs. after intervention, *$P<0.05$ between the groups.

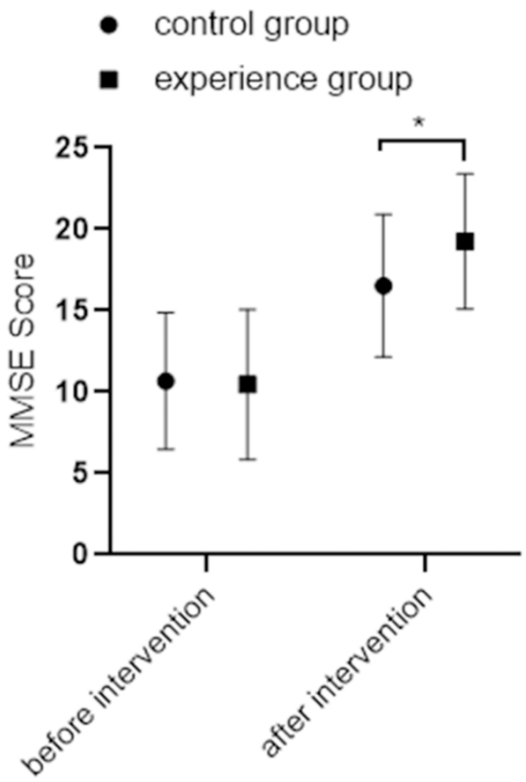

Figure 3. Analysis of the change in the MMSE scale scores before and after the intervention in the two groups of patients. *$P<0.05$ compared with the control group.

Analysis of the changes in cognitive function before and after the intervention

There was no significant difference ($P>0.05$) in the MMSE scores in the CG (10.68±4.20) and the EG (10.46±4.62) before the intervention. After the intervention, the two groups' MMSE scores showed a significant improvement, and the score in the CG (16.54±4.38) was lower than the score in the EG (19.26±4.15) ($P<0.05$) (**Figure 3**).

Analysis of changes in quality of life before and after intervention

There was no significant difference in the SF-36 scores between the two groups before the intervention ($P>0.05$). The two groups' SF-36 scores showed a significant improvement after the intervention and differed significantly ($P<0.05$) (**Table 3**; **Figure 4**).

Discussion

AD is a disease triggered by a degeneration of the central nervous system [18]. As China

Table 3. Comparison of the SF-36 scores in the two groups ($\bar{x} \pm s$)/[n (%)]

Item	Control group (n=36)		Experimental group (n=37)		*t*	*P*
	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention		
Physiological	64.07±8.54	72.53±11.20	63.84±7.93	78.94±11.05	7.386	0.012
Physical	58.45±6.77	63.22±9.45	59.02±7.05	71.30±10.15	5.573	0.020
Social	60.49±7.31	69.37±10.04	60.80±6.94	78.45±10.27	6.375	0.015
Emotional	63.51±8.31	73.54±9.77	62.97±7.94	79.88±10.38	4.387	0.040
Health	66.41±7.64	72.10±10.34	66.97±6.75	78.62±9.35	4.465	0.037

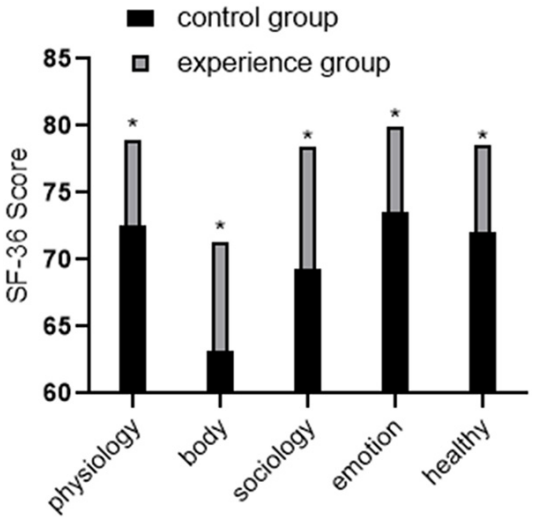

Figure 4. Analysis of the changes in the SF-36 scores before and after the intervention in the two groups of patients. *P<0.05 compared with the control group.

enters an aging stage, the number of AD patients increases at a rate of more than 300,000 per year, and according to published data, as of 2019, there are 9 million cases of dementia, of which more than two-thirds are AD. AD has become a major public health and social challenge affecting China's economic development. With the current medical technology, AD cannot be cured, and patients need to take drugs to control the development of AD for years, but these drugs are expensive and have poor efficacy, and the patients will be hospitalized repeatedly, thus increasing the medical costs and financial burdens [19-21]. The early symptoms of AD are subtle, and as the disease progresses, patients will develop memory impairment, personality and behavioral changes, aphasia, and disorientation, which seriously affects their quality of life. Patients with moderate to severe AD must be cared for by other family members. Therefore, an efficient care plan could be established to improve the adverse symptoms and slow down the progression of AD [22].

Making a timely diagnosis and providing scientific care plans, combined with pharmacological and non-pharmacological means, can effectively slow down the progression of AD [23]. As an emerging therapeutic approach, music therapy is now widely used in the treatment protocols of patients with AD. Gómez Gallego et al. have shown that music therapy can reduce anxiety and enhance the emotional experience, thus improving the cognitive, psychological and behavioral problems of patients with AD, and dance therapy can also be used as an adjunct therapy [24]. Using music as a pleasant stimulus can even produce neurosecretory effects and reduce sympathetic nerve activation related to stress [25]. Peck et al. have also shown that music affects the memory through the neurotransmitter levels, the autonomic nervous system, and a wider range of neurons, and these three mechanisms are not independent [26]. Lyu et al. also found that short-term or persistent auditory stimuli can significantly improve the vocabulary recall ability and verbal fluency of AD patients [27].

This study showed that the WAB cores, the ADL scores, the MMSE scores, and the SF-36 scores in the EG were higher than they were in the CG after the continuing care combined with music therapy (P<0.05). The reason may be that a comprehensive assessment of each patient's personal data and medical condition was performed by the professional team. According to the results of the individual assessment, individualized medication, dietary, and daily life guidance were offered, which significantly improved the AD patients' linguistic skills, self-care abilities, cognitive functions, and quality of life. The combination of continuing care and music therapy is designed to meet the diverse needs of the patients, and the team of profes-

sionals will follow up with the patients to provide professional guidance on the problems they encounter in their daily lives.

As the disease progresses, people with advanced AD needs comprehensive care from their caregivers. High quality nursing can improve their quality of life and slow down the progression of the disease. As the elderly are characterized by chronic conditions, poor immunity, and lack of self-care abilities, they are the most suitable population for continuing care. In the treatment of elderly patients with AD, pharmacologic intervention was combined with non-pharmacologic intervention to provide personalized and efficient continuing care combined with music therapy, allowing family members to communicate more with patients, using music and other external stimuli to stimulate the patients' neurosecretory functions and to promote their verbal expression, restore their cognitive function, build their confidence in overcoming the disease, reduce negative emotions, and improve their quality of life.

In summary, continuing care combined with music therapy can significantly enhance the linguistic skills, self-care abilities and cognitive function as well as the quality of life in patients with AD, so it is worthy of clinical promotion. The innovation of this study was to abandon the concept of providing drug therapy alone for AD treatment and to introduce continuing care combined with music therapy. The shortcoming of the present study include: (1) The small sample size; (2) Insufficient follow-up time. To address these shortcomings, the next step is to carry out studies with large sample sizes and long follow-up times, thereby providing more detailed theoretical evidence for the treatment of elderly patients with AD.

Disclosure of conflict of interest

None.

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