Research on the Application of Montessori Education Method in Cognitive Training of Patients with Alzheimer's Disease

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Abstract: *Objective:* To study the application of the Montessori education method in cognitive training in patients with Alzheimer's disease (AD). *Methods:* 40 cases of senile dementia patients who were admitted to our hospital from January 2022 to January 2023 were selected and randomly divided into an intervention group and a control group according to the single and double number table method, with 20 cases in each group. The intervention group used the Montessori education method, the principle of which was to implement individualized health interventions based on the individual conditions of the patients, for a period of 6 months; the control group was given conventional treatment and nursing of the disease. The Mini-Mental State Examination (MMSE) was used to compare the effects of the two groups of patients before and after health intervention and conduct statistical analysis. *Results:* The score of the intervention group was higher than that of the control group, and there was a statistical difference between the two ($P < 0.05$). *Conclusion:* Implementing the Montessori education method for diagnosed Alzheimer's patients can effectively improve their cognitive function and delay the progress of further dementia.

Keywords: Montessori education method; Alzheimer's disease; Cognitive training

1. Background

Alzheimer's disease (AD), commonly known as senile dementia, is a neurodegenerative disease with slow onset and progressive deterioration over time [1]. The most common early symptom of Alzheimer's disease is loss of short-term memory (difficulty remembering recent events). As the disease progresses, a variety of other symptoms may gradually appear, including language impairment, disorientation (including getting lost easily), emotional unsteadiness, loss of motivation, inability to care for oneself, and many behavioral problems. At present, there are about 50 million AD patients in the world, and there are about 4.6 million new AD patients every year. According to relevant research estimates, AD will affect 90 million people worldwide in 2050 [2].

Due to the aging of the world population, the global disease burden of AD is expected to increase further.

At present, there is no effective drug treatment for senile dementia, so it is of great significance to improve the quality of life and delay the progress of the disease in the non-drug treatment of senile dementia patients. The guidelines for the prevention and treatment of AD [3] clearly point out that the focus of the treatment of the disease is to control the risk factors, ensure the personal safety of patients, and do a good job in cognitive and psychological behavioral interventions [4].

In recent years, dementia-related care institutions in Canada and the United States have begun to apply a new nursing method—the Montessori education method. This education method has attracted the attention of researchers and practitioners. Although it cannot cure dementia, it can improve the quality of life of elderly patients with dementia in many ways [5]. This kind of training method is to choose Montessori education suitable for dementia patients, guide patients to engage in some fine movements, and improve patients' attention and positive responses through life education, sensory education, language education, mathematics education, etc., so that their sensibility can be explored become more refined, thereby improving patient quality of life and reducing stress for caregivers. This paper focuses on exploring the effect of the Montessori education method in the cognitive training of AD patients.

2. Research subjects and methods

2.1. Subjects

40 cases of AD patients hospitalized in our hospital from January 2022 to January 2023 were selected and the selection criteria are as follows: (1) According to the diagnostic criteria of the World Health Organization International Classification of Diseases (DSM-IV) diagnosed as senile dementia [6]; (2) Be able to participate in listening and speaking activities, have language communication skills and the ability to participate in activities; (3) Education level above primary school, gender is not limited; (4) Patients have basic cognitive ability, and the consent of the accompanying person is obtained at the same time; (5) The Mini-Mental State Examination (MMSE) screen out patients with 12–23 points (mild and moderate dementia). Using the design method of nonequivalent groups in similar experimental studies, the patients were given natural numbers according to the date of admission and were randomly divided into an intervention group of 20 cases and a control group of 20 cases according to the single and double number table method. Among them, there were 22 males and 18 females, aged 66–86 years, with an average of 70.24 ± 1.34 years old, and the course of disease was 1 year or more.

2.2. Methods

The control group received routine nursing. Nurses actively communicated with patients, carried out health education, maintained patient safety, paid close attention to vital signs, formulated scientific activity plans, etc., and instructed patients to develop regular work and rest time and ensure adequate sleep. The intervention group adopted the Montessori education method. Nurses set up a special nursing team in the hospital, made adequate educational preparations, provided corresponding activity materials for AD patients, chose appropriate activities, and helped improve cognitive function through life education, sensory education, language education, mathematics education, etc. 20 patients were divided into four groups, five patients in each group. Nurses trained in Montessori education provided guidance every day, and group activities were carried out once a week, 45 minutes each time, for 6 consecutive months. The specific intervention plan is as follows:

(1) Intelligence and memory training: Jigsaw puzzles, pinching beans, finger exercises, wooden boards, building blocks, etc. helped the brain to make logical associations and exercise flexibility of thinking.

(2) Language function training: Nurses or family members recited short nursery rhymes and poems with patients together, and various animals and fruits in daily life were made into colored cards for patients to recognize and read, so as to train patients' language memory ability.

(3) Classification ability training: Nurses classified animals, fruits, food, and other supplies in daily life one by one, and let patients name the related items.

(4) Orientation ability training: Nurses used simple, eye-catching, and fixed markers in the ward or home furnishings to train the patients' orientation.

(5) Attention training: Nurses guided patients to read various interesting pictorials, books, and newspapers, and provided patients with simple board games, such as flying chess and checkers.

(6) Coordination training: Nurses instructed patients to complete an action with their left and right hands at the same time, such as interactive throwing of a fitness ball, slapping a ball on the spot, etc.

(7) Mathematics education: Nurses used sensory teaching aids to carry out mathematics education, paid attention to the relationship between quantity, number, and number, cultivated patients' abstract thinking, and helped them become familiar with calculations in daily life. It can be realized by carrying out counting stick games, simulating grocery shopping scenarios, etc.

2.3. Data collection

The cognitive function of patients was assessed using the Mini-Mental State Examination (MMSE), the Chinese version of which was translated and revised by Zhou et al. [7]. Before the intervention and 6 months after the intervention, the MMSE scale was used for assessment. The MMSE scale is divided into time orientation, place orientation, language naming, attention calculation, short-term memory, object naming, language repetition, language comprehension, language expression, graphic description, etc., a total of 30 items, with 1 point for correctness and 0 points for errors. ≥ 24 is classified as normal; 13–23 is classified as mild intellectual disability; 5–12 is classified as moderate intellectual disability.

2.4. Statistical methods

Statistical analysis was performed using SPSS19.0 statistical software. The results of measurement data were represented by mean ± standard deviation (SD), the comparison between groups was performed by the t-test, and the count data was used by the χ^2 test, and $P < 0.05$ was considered statistically significant.

3. Results

After 6 months of using the Montessori education method in the intervention group, the MMSE score increased compared with that before treatment, and the various scores of the intervention group were higher than those of the control group, as shown in **Table 1**.

Table 1. Comparison of MMSE scores before and after the implementation of the Montessori education method (mean ± SD)

Group	Number of cases	Before implementation	After implementation
Intervention group	20	14.26 ± 2.64	22.05 ± 4.6
Control group	20	14.14 ± 2.74	16.75 ± 3.84
t	-	0.17	4.83
P	-	> 0.05	< 0.05

4. Discussion

At present, the aging trend of the domestic population is becoming increasingly significant, and the incidence of AD is increasing year by year. This disease can hinder the daily life of patients and cause a decline in memory and cognitive function. With the extension of the disease, the patient's thinking ability and self-care ability will decline. The gradual decline requires long-term care, which brings a heavy burden to patients and families. In the context of the rapid development of medicine, clinical nursing work is gradually innovating, advocating patient-centered, human-oriented nursing services, and introducing the Montessori education theory through sensory education, language education, life education, etc. allows patients to learn activities in a specific environment, use various teaching aids to carry out free operations, and promote the improvement of patients' cognitive abilities.

AD is a neurological degeneration disease with hidden progressive development. The clinical manifestations are aphasia, memory impairment, cognitive fuzzy executive dysfunction, etc., and it is more common in the elderly. The disease belongs to a group of heterogeneous diseases, and its onset is affected by various factors such as biological and social psychology, such as family history, viral infection, head trauma, thyroid disease, etc. The onset of the disease is slow and insidious. It affects more women than men. According to the level of cognition and deterioration of physical function, the disease can be divided into three stages. The first stage is mild dementia, mainly manifested as memory loss, reduced judgment, difficulty in dealing with complex problems, inattentiveness to family or work, social difficulties, resistance to new things, often suspicious and extreme, and difficulty in orienting time and place; the second stage is moderate dementia, mainly manifested as severely impaired memory, decreased visual space ability, severely impaired ability to distinguish between similarities and differences, inability to independently carry out outdoor activities, apathy, various mental symptoms, and inability to calculate and dress. The third stage is severe dementia, which is mainly manifested by the patient's complete need for care from others, severe memory loss, only fragmentary memories, inability to take care of himself, incontinence, limb stiffness, and eventually coma, patients usually die from complications such as infection.

In recent years, the Montessori education method has been introduced into the country from Western countries, and it has been widely used as a new nursing method for senile dementia. It stimulates the enthusiasm of patients to participate, promotes the thinking activities of patients, and plays a prominent role in improving the cognitive ability of patients.

Cognitive function is extremely important to the daily life of older adults. In the study by Ma et al. [8], it was pointed out that the Montessori intervention method can improve the attention, delayed memory and language function of Alzheimer's patients, and can improve the overall cognitive ability of the elderly. The clinical response due to dementia symptoms is mainly memory loss and inattention at first, and gradually develops into loss of basic life skills and social skills as the disease worsens. In Montessori theory, according to the degree of dementia of the patient, the corresponding intervention plan is formulated, and the corresponding skills of the patient are trained by means of task decomposition and continuous repetition. For patients with mild dementia, language education, life education, etc. can improve their life skills and social skills, and gradually fill in the lack of life skills and social interaction; for moderate patients, basic sensory education can be carried out, and according to their interests and hobbies, corresponding education programs with content that patients like to hear and see can be chosen. In the research by Qu et al. [9], it is pointed out that the cultivation of hobbies can shorten the distance between patients and the outside world, guide them to get in touch with more new things, promote the thinking activities of patients, and thus improve their cognitive functions. In the pre-prepared environment, dementia patients can freely choose suitable teaching aids to carry out activities,

slow down the degradation of social functions, and promote the development of cognitive functions. Under the guidance of this educational theory, it focuses on the coordinated development of multiple aspects, which is more scientific and efficient than traditional single training, and has great application value in improving the cognitive ability of dementia patients.

According to the theory of life-span development [10], the progressive impairment of cognitive function is the core symptom of senile dementia, and the influencing factors include plasticity (lifestyle, psychosocial conditions, diseases, etc.) and non-plasticity factors (age, gender), we delay the decline of cognitive function by interfering with factors affecting plasticity. **Table 1** shows that after 6 months of the Montessori education method intensive stimulation, the MMSE score of the intervention group was significantly improved. Through health interventions, Alzheimer's patients have enhanced their willingness to actively participate in activities and coping skills, increased interaction and communication with people around them, increased interest in things around them, reduced dependence on others, and spent less time sitting alone, which shows that the Montessori education can effectively improve the cognitive function of patients and delay the decline of brain cognitive function.

5. Conclusion

Montessori education has become a popular nursing method for senile dementia patients in foreign countries. It has developed well in intervention content, intervention tools, and intervention environment, and can improve the cognitive function of patients to a certain extent. At present, the traditional family intervention is still the main form of nursing care for senile dementia in my country, so there is great room for exploration in the development of Montessori education in China. In view of the particularity of AD patients such as cognitive dysfunction, mental and behavioral symptoms, and decreased social life ability, although it has fundamentally increased the difficulty of applying Montessori education to senile dementia patients, it is a relatively new and effective method to improve the cognitive function of elderly patients with dementia and reduce the burden on caregivers. Thus, it should be worthy of further research and promotion.

Disclosure statement

The authors declare no conflict of interest.

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