

Effect of Music Therapy on Cognitive and psychological in Patients with Alzheimer's Disease

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Abstract. Alzheimer's disease (AD) has become a worldwide health issue due to its increasing prevalence but limited pharmacologic effects. Besides traditional pharmacologic interventions, non-pharmacologic interventions are also very important. Music therapy (MT) is a long-established therapy with good applicability to people with dementia. This article mainly studies the cognitive and psychological influences of music on AD patients, mainly in listening to music, singing and doing rhythmic exercise. The advancement of music therapy has brought new treatment options to people who suffer from Alzheimer's disease, which is a positive development for patients and their families, making it more likely that AD can be cured. This paper will reflect on the role and comparisons from previous research. In the research results, listening to music, singing, and doing rhythmic exercise all have varying degrees of relief and improvement in depression, cognitive impairment, anxiety, and fugue. This research is helpful for scholars to understand the effects the music therapy has on patients.

Keywords: Alzheimer's disease, music therapy, cognition.

1. Introduction

Alzheimer's disease is the most common form of dementia, affecting more than 26 million people worldwide [1]. The disease causes memory loss, difficulty communicating, and temporal confusion. As the disease progresses, patients gradually lose functional autonomy and change their natural behaviors. They may not be able to absorb new knowledge or replace old knowledge, and it may affect the individual's ability to take care of themselves and daily activities such as personal hygiene, dressing, feeding and exercise. Alzheimer's disease is not only an important medical problem, but also a social and economic problem, which needs to be paid enough attention [1].

Professional therapists use the sensory stimulation of music as a therapeutic tool. This treatment includes many aspects and elements of music, such as melody and rhythm are two of them. Not only that, but music therapy can be used for a variety of people, both mentally ill and healthy, including those with dementia. As a proven non-medication-assisted therapy, music therapy is widely used in rehabilitation programs and programs in hospitals and nursing homes. By providing sensory stimulation, music therapy can prevent, delay, and improve the quality of life and physical and mental functioning of people with dementia [2]. This treatment had a positive impact on patients' cognitive abilities, emotional management, and social interaction. Therefore, music therapy plays an important role in the treatment of dementia, providing patients with a very effective auxiliary treatment means. Music is a recreational activity that most people enjoy and pursue, so music therapy occupies a unique and important position in the field of treating Alzheimer's disease. By participating in music therapy, people with dementia can improve their cognitive abilities, enhance their memory, and improve their emotional state. The rhythm and melody of music can help people with dementia regain their sense of time and space, while also reducing anxiety and depression. Since music is a recreational activity enjoyed and pursued by most people, including the elderly, music therapy holds a unique and important position in the field of treating Alzheimer's disease. Except for its applications of dementia, music therapy is widely used in other areas of cognitive impairment. Studies and experiments have shown that music therapy can improve cognitive performance, promote the restoration of brain function, and have a good effect on the emotion and behavior among human

beings with cognitive impairment. The range of applications of music therapy is expanding to provide more rehabilitation options for people with cognitive impairment.

Music plays an important role in enhancing, stimulating and improving people's memory [3]. Especially in the course of treatment and therapy for dementia, musical interventions can often have a significant positive impact on such patients. Even when patients' other cognitive functions had deteriorated, their response to the musical intervention was still very pronounced. This suggests that music is more than just a form of entertainment, it can also be used as a medium to enhance motivational functions, self-expression and communication. The efficacy of music has been fully confirmed in patients with dementia, providing new ideas and methods for related treatment.

Although there are now medications that can stabilize the worsening of Alzheimer's symptoms and inhibit their progression, there has never been the possibility of being able to cure or reverse the degree of deterioration. On top of that, there is no non-pharmacological treatment that clearly improves the quality of life of patients and their relatives.

In fact, one study showed that a reduction in negative emotions can also promote good or even better performance in memory, cogitation or non-memory-related activities and tasks in people with AD. Interventions at the emotional extent can be observed to have a good impact on abilities that are about cognitive (including memory tasks) in such patients, based on emotional intervention therapy as music therapy, as this approach has been shown to improve the emotional well-being of patients with attention deficit disorder.

2. Effect of Listening to Music in Music Therapy on the Treatment of Alzheimer's Disease

According to a 1998 report, Johnson JK mentioned that a pair of twins with attention deficit disorder showed a great improvement on spatial-time tasks after listening to a Mozart piano sonata. Last year, Li CH et al. conducted a study in which they treated patients with mild attention deficit disorder by listening to Mozart sonatas (KV 448) and Pachelbelli Canon through headphones [4]. The results showed that after six months of the music intervention, patients' Mini-Mental State Assessment (MMSE) and Cognitive Ability Screening Tool (CASI) scores decreased slightly, but this decrease was not statistically significant. It is worth mentioning that the patients who received music therapy performed better in terms of cognitive abilities in the abstract domain. Music has certain particularity in regulating effect. Research has found that certain types of music can have an effect on people's mood and can modulate the effect of music. However, there is relatively little clinical literature on background music for dementia patients. In a recent study, researchers chose the "spring" movement from Vivaldi's Four Seasons as background music for recall tests in patients with mild attention deficit disorder and healthy controls [4]. Their results showed that a musical background enhanced the recall of autobiographical memories and also reduced feelings of anxiety. This study gives us a new idea that by choosing appropriate music as background music, people can improve their recall ability and help relieve anxiety. However, further research is needed to explore the effects of different types of music on different populations, as well as to determine the best music selection strategies. It is hoped that more research will focus on this area in the future to provide better music treatment options for dementia patients. The mechanism by which background music works has been debated. It has been suggested that background music can have an effect by causing changes in mood, such as a reduction in anxiety. Other scientists believe that music can improve memory by increasing arousal. One study found that in people with mild or moderate attention deficit disorder, listening to familiar Spanish songs stabilized and improved self-awareness. Compared to Alzheimer's patients who were familiar with the songs, those who were unfamiliar with the songs performed worse on the MMSE (Mini-Mental State Examination) and FAS (Finger Tapping Test) tests. Music therapy can help patients relieve symptoms and improve quality of life by providing emotional support and cognitive stimulation [5]. To sum up, although the mechanism of background music's effect on people is controversial, there have been studies demonstrating its positive effects. By causing mood changes

and enhancing arousal states, background music can stabilize and improve self-awareness and play an important role in people with early Alzheimer's disease. Therefore, adopting "music therapy" to treat such patients may be a more effective method. Ozdemir L stated that the influence of MT in treating AD can last 3 weeks post-intervention. After 6 weeks of intervention, Gómez Gallego M et al. It has been found that listening to patients' favorite music significantly improves memory and orientation in patients with attention deficit disorder [6]. Meanwhile, symptoms of depression and anxiety improved in patients suffering from Alzheimer's Disease.

Proving to be an efficient way to treat Alzheimer's disease, H.Fukui's team found that music therapy can increase the production of 17-estradiol and testosterone, two hormones thought to have a protective effect against Alzheimer's [2]. During music therapy, people with Alzheimer's disease can communicate verbally with the therapist by listening to music and songs [7]. The findings show that music therapy can reduce the occurrence of problem behaviors such as vagus. In addition, music therapy has the potential to replace poor hormone replacement therapy. In the initial survey, the researchers selected 12 songs as music for the treatment based on participants' preferences. Then the therapist sang the chosen song without a microphone and accompanied the keyboard sound with an amplifier. For three consecutive days, each subject's behavior was assessed the day before, during, and the day after training.

3. Effect of Singing in Music Therapy on the Treatment of Alzheimer's Disease

Singing is widely used to treat dementia. According to Sato M et al., they observed 10 patients with attention deficit disorder after 6 months of therapy using karaoke to sing their favorite songs [6]. Karaoke, a method of automatically playing songs to accompany patients, is popular because of its variety. The results of the study showed that after six months of music therapy, patients' Japanese Crow color progressive matrix time decreased and neuropsychiatric symptoms improved. In addition, Meilan Garcia JJ et al. compared different types of mood music [6]. They realized that recalling autobiographical experiences, especially distant memories of sad mood music is the most effective way.

Karaoke is a form of musical entertainment that originated in Japan. Its name consists of "KARA" and "OKE", meaning "empty" and "orchestra" respectively [2]. Karaoke has become a very popular way of entertainment worldwide, whether it is men or women, no matter what era or age group of people, are very familiar with it. During the experiment, participants need to enjoy the accompaniment and their own singing voice at the same time, and judge the gap between the two in order to control their singing. These steps take place simultaneously, allowing one to enjoy the music effortlessly. In addition to entertainment, karaoke has another important application, which is the treatment of dementia patients. Continuous intervention is very important for the treatment of dementia, both drug and non-drug. However, even if the intervention method is very effective, if the task is tiring, boring or uninteresting, it is difficult for the patient to stick to it. Singing, as a happy and fun activity, should be an easily accepted and ongoing form of therapy for people with dementia. Through singing, patients are able to have fun while also continuing to receive treatments that help them relieve their symptoms and improve their quality of life [8].

Researcher Masayuki Satoh and his team conducted a study on dementia patients using a non-drug singing intervention. The intervention included six months of karaoke training in a famous method (YUBA method) [2]. The researchers studied the effects of this intervention using neuropsychological assessments. The results showed that patients who received music therapy had significantly different neuropsychological assessment outcomes from those who did not receive music therapy. To further understand the changes in the cognitive process of singing, the researchers also used fMRI technology to detect during karaoke singing. The results showed that music therapy increased psychomotor speed in people with dementia, but did not make changes to other cognitive functions, such as intelligence and memory. However, after 6 months of intervention, the patient's behavioral and psychological symptoms (BPSD) improved. The outcome of this study further confirm the

positive effects of music therapy on BPSD, which is also consistent with the results reported in the existing literature.

4. Effects of Rhythm and Movement in Music Therapy on the Treatment of Alzheimer's Disease

The scope of music therapy is not only limited to the music itself, but also includes singing, dancing, playing an instrument, rhythm and other activities. Researcher Sarkamo T. and her team divided patients with dementia into three groups: rhythm-action singing, reminiscence-discussion, and control [6]. After 10 weeks of intervention, the study found that patients in both the singing and listening groups had improved mood and cognitive abilities. In addition, researcher Gomez G. M. and colleagues conducted a six-week intervention with 42 people with mild to moderate attention deficit disorder, asking them not only to listen to their favorite music, but also to dance, play an instrument, and so on. The results showed that music, in combination with other activities, can promote cognitive conditions in people with attention deficit disorder while relieving neuropsychiatric symptoms [6].

In Korea, a dual-task paradigm combining concurrent tasks and rhythmic cues has been presented as an efficient intervention strategy during cognitive rehabilitation in the elderly [7]. Playing an instrument with both hands can be used as achieving a dual-tasking paradigm, as auditory-motor interactions occur during the movement of the upper body to produce sound through the instrument. Especially for two-handed playing of musical instruments with rhythmical cues and rhythmic changes has been implicated in cognitive flexibility and executive control in elder grown ups. According to the results of a study designed to look at changes in EF in patients with attention deficit disorder in early old age (over 80 years old). To achieve this, the researchers adopted a dual-task paradigm and developed a music therapy. In the experiment, the participants had to perform a drum performance, changing the hand movement and rhythm to achieve the therapeutic effect. To enhance the therapeutic effect, live music accompaniment and singing were also introduced into the intervention to increase the intrinsic motivation and engagement levels of the participants. This treatment combines upper limb motor control with attention control and uses musical elements such as rhythmic patterns or prosody to treat. In addition, another study in patients with Parkinson's disease came to a similar conclusion that a modern drumming intervention based on the task improved participants' attention control and motor function. Through these studies, there is a potential to improve cognitive function in music therapy in elderly patients with early attention deficit disorder and could provide new approaches and strategies for treating related conditions such as Parkinson's disease [9,10].

5. Discussion

Studies of dual-task-based music therapy interventions in older patients' attention deficit disorder found that individual differences were observed depending on the extent to which participants participated in the intervention. At the same time, the patients' cognitive and motor performance also changed. These findings have clinical implications for addressing changes in EF (executive function) and may be related to changes in timing and cognitive measures of participants' participation in specific types of drum performances.

According to the results of the study, there were differences in the amount of time the participants spent on the three different drumming styles. Older participants, in particular, need to adopt certain strategies to maintain equitable participation levels when performing dual task interventions, and also need to provide support to monitor their participation. The results showed that because participants B were less involved in the more complex intervention tasks, they had the worst performance on the EF measure after the intervention. This finding suggests that brain activity is closely related to dual cognitive-motor tasks, and that people with AD may interfere with the completion of task-specific actions due to limited attention. Taken together, these results have important implications for

understanding the relationship between two-handed drumming and cognitive function and how older adults and people with AD perform on dual tasks.

Participating in the performance of music, we can improve our cognitive abilities and make them more flexible. In addition, drumming is an important part of the music creation process, which involves the movement of the upper limbs. By playing drums, we can exercise our upper limb muscles and play an important role in music creation. In addition to its effects on the body, music can also affect our cognitive abilities. Research has found that music can affect several cognitive areas, one of which is beneficial for people with attention deficit disorder. This means that by undergoing music therapy, people with attention deficit disorder can improve their attention problems. Interestingly, dual-task-based music therapy was shown to protect cognitive function in older patients with early attention deficit disorder. This type of music therapy combines music playing with other cognitive tasks to improve the patient's cognitive abilities by performing both tasks simultaneously. However, it is important to note that there are some limitations to these findings. Because only three cases were included in the study, the generalisability of the conclusions may be affected. Further studies are needed to expand the sample size to verify the generalizations of these findings.

6. Conclusion

Music therapy can improve patients' living standards during illness. Studies have shown that music therapy has positive effects on patients at behavioral, cognitive and social levels. It can improve or stabilize the patient's cognition of direction, events, time, social skills in society, survival skills, memories buried deep in the mind or recent short memory, positive and negative emotions. In addition, music therapy can stimulate such functions and reduce behavioral problems caused by stress. Therefore, music therapy is considered an effective treatment that can help people with attention deficit disorder improve their living standards and cope with the challenges posed by the disease. In addition, music therapy is a promising, low cost, can bring peace of mind to patients, patients' families of a non-drug treatment means, it is a enjoy type, almost no side effects worth studying new treatment. However, in order to further support the use of this technique, controlled studies are needed to verify its effects. It is important to note that this study used an internal subject design, so caution must be exercised when interpreting the findings.

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