Research Article

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The Effect of Music Therapy in the Treatment of Alzheimer's Patients: A Systematic Review and Meta-Analysis Study

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Abstract

The aim of this study was to evaluate the effect of music therapy in the treatment of Alzheimer's patients. The present study was conducted by reviewing available texts of e-books and databases including PubMed, Scopus, and web of science. The quality of reporting of all articles was evaluated by using the Consolidated Standards of Reporting Trials checklist. CMA2 software was used to estimate the difference between the mean standard score of MMSE test for Alzheimer's patients before and after music therapy. Forest diagrams were used to calculate the standard mean difference between Standard Mean Difference and CI with 95% confidence. I2 was used to determine the amount of heterogeneity between studies (P-value <0.05 or I2> 50%) and funnel diagrams were used to assess the probability of diffusion bias. 692 articles were obtained. Finally, 7 articles entered the meta-analysis stage, which took into account several different conditions and groups in each article, 16 studies were included in the meta-analysis. Findings showed that music can significantly improve the performance of patients with Alzheimer's disease and performance improvement in them with moderate severity and also in studies with a period of 3 months or less and with non-daily exercise has been meaningful.

Keywords: Music Therapy, Alzheimer's, Systematic Review, and Meta-Analysis

1. Introduction

The prevalence of dementia is increasing worldwide. It is recognized as a research priority because dementia plays a significant role in health care. The most common cause of dementia in developed countries is Alzheimer's disease [1,2]. Alzheimer's disease is the most common form of dementia, which according to the World Health Organization 2017 affected about 50 million people [3]. It is estimated that the number of patients will double every 20 years and will reach 43.2 million by 2020 and 81.1 million by 2040 [4]. Alzheimer's is the sixth leading cause of death among all age groups and the fifth leading cause of death among people 65 and older [5]. Alzheimer's disease is an irreversible disease that has no cure and needs special care. The most important symptoms of this disease are cognitive and behavioral disorders. In addition, disease progression is associated with depression and anxiety [6].

Medications are effective in improving cognition and relieving patients' behavioral symptoms, but many approved medications have only minor benefits for the patient. On the other hand, research for non-pharmacological interventions to reduce the symptoms of Alzheimer's disease has increased. Music-based interventions are widely accepted as a potential non-pharmacological treatment for Alzheimer's patients to treat their cognitive or behavioral symptoms. The results of various studies show that music can have a positive effect on the memory and cognitive function of patients [7-11]. The results of various studies also show the effect of music on reducing stress and improving sleep in patients. Music-based interventions have increasingly attracted the attention of researchers and health care providers because, in terms of implementation, it is a cheap and easily applicable treatment method and is very enjoyable for patients [12-16].
Due to the increasing trend of aging and diseases of this period such as dementia and Alzheimer's, health systems should pay special attention to non-pharmacological interventions. Because music has a wide range of effects on the treatment of Alzheimer's patients. The aim of this study was to review the effects of music therapy in the treatment of Alzheimer's patients.

2. Method

The aim of this study was to systematically review and meta-analyze published articles on the effects of music therapy in the treatment of Alzheimer's patients. Accordingly, Persian language articles published in scientific-research journals in the country and English language articles published in domestic and foreign journals were searched. In this study, the guidelines for performing and reporting meta-analysis, and preferential cases for systematic review and meta-analysis (PRISMA) were followed.

2.1 Search Strategy

1- Use the keyword Alzheimer, music, therapy, treat, treatment, and its combinations to create a suitable strategy for searching English language articles in PubMed, Scopus, web of science databases.

2- No time limit was set for searching for articles.

2.2 Study Selection

1- Various articles reported the effect of music in the treatment of Alzheimer's disease.
2-Articles that used the MMSE tool to assess patients' status.
3- Articles whose full text did not exist were excluded from the study.
4 - Studies that have only studied Alzheimer's disease and studies that have examined dementia, in general, have been excluded from the study.

2.3 Data Extraction and Data Synthesis

Articles were searched by two researchers. The criteria for including and deleting articles based on the title and abstract of articles were performed by two researchers independently. Reference management software (Endnote X6) was used to organize and evaluate titles and abstracts and identify duplicate articles. Disagreements at each stage were resolved with the agreement of two researchers or with the review of a third researcher.

After deleting the articles that did not meet the inclusion criteria, the full text of all the articles that met the inclusion criteria was prepared and reviewed in this review.

The quality of reporting of all articles after extraction from the target databases was evaluated by two evaluators using the Consolidated Standards of Reporting Trials (CONSORT: 2010) checklist (Appendix 1). This checklist was selected due to its specificity for evaluating interventional studies, especially clinical trial studies, and translating and validating it into Persian to evaluate the articles in this study. CONSORT evaluation tool is one of the most important and widely used tools for evaluating clinical trial articles, which was introduced in the mid-1990s by a group of clinical trial experts, statisticians, and epidemiologists as an international solution and standard method in clinical trial reporting. According to the latest version of the guidelines in this checklist, Consort 2010 contains 37 items to evaluate the 6 main sections of clinical trial studies. These 6 sections include title and abstract, introduction, materials and methods, results, discussion, and other information. Each of which also includes different sections [17-20].

In the next step, the text of the articles was reviewed and their results were extracted by researchers using a standard and pre-compiled form (data extraction table). The extracted information included: authors, year of publication, country of study, type of study, mean age, duration of the study, before and after MMSE score, intervention conditions, and outcome of the intervention.

MMSE short mental state test; It is a cognitive test that is commonly used as part of the assessment for possible dementia. This test is a paper-based test with a maximum score of 30, with lower scores indicating more severe cognitive problems. The cut-off point for MMSE defines the normal cognitive function and is usually placed at 24, although theoretically it can be located anywhere from 1 to 30 [21,22].

CMA 2 (comprehensive meta-analysis) software (Englewood, NJ, USA) was used to estimate the mean overall score of MMSE test in Alzheimer's patients before and after music therapy. Forest diagrams were used to calculate the Standard Mean Difference and CI with 95% confidence. I2 was used to determine the amount of heterogeneity between studies (P-value <0.05 or I2> 50%). Funnel diagrams were used to assess the probability of diffusion bias.

4. Result

Based on the search in the databases and using the specified keywords, 692 articles were obtained, and by removing duplicate cases, 564 articles entered the screening stage. Finally, after screening based on title, abstract and full text, 7 articles entered the meta-analysis stage. A total of 16 studies were included in the meta-analysis, taking into account several different conditions and different groups in each article.

Studies were divided into different types including a randomized clinical trial, repeated measures, and before and after. Participants in the study were over 65 years old and the highest mean age of participants was 85.2 6 6 and the lowest was 68.9 7. 7.1. The sample size of the studied groups varied from 10 to 42 people and also the duration of treatment and intervention period from 2 weeks to 6 months in different studies and patients with different mild, moderate and severe spectrums of Alzheimer's disease. Studies show that music therapy has different effects on Alzheimer's patients. Of course, most studies show a positive effect, but a small number of studies, it has shown a negative effect.

The mean score of participants in different studies was calculated before and after music therapy, which was entered into CMA2 software. The standard mean difference (Standard Mean Difference) of MMSE score in the studies was calculated and based on meta-analysis, this index for The total number of studies was 0.333 in the fixed mode and 0.357 in the random mode. Given that the value of p.value = 0.00 and the value = 65.85 I2 was obtained, the data are heterogeneous and the report of the mean difference as 0.357 with (0.592-0.123) CI is correct. Given that this interval does not include zero, this relationship is significant (Figure 1).

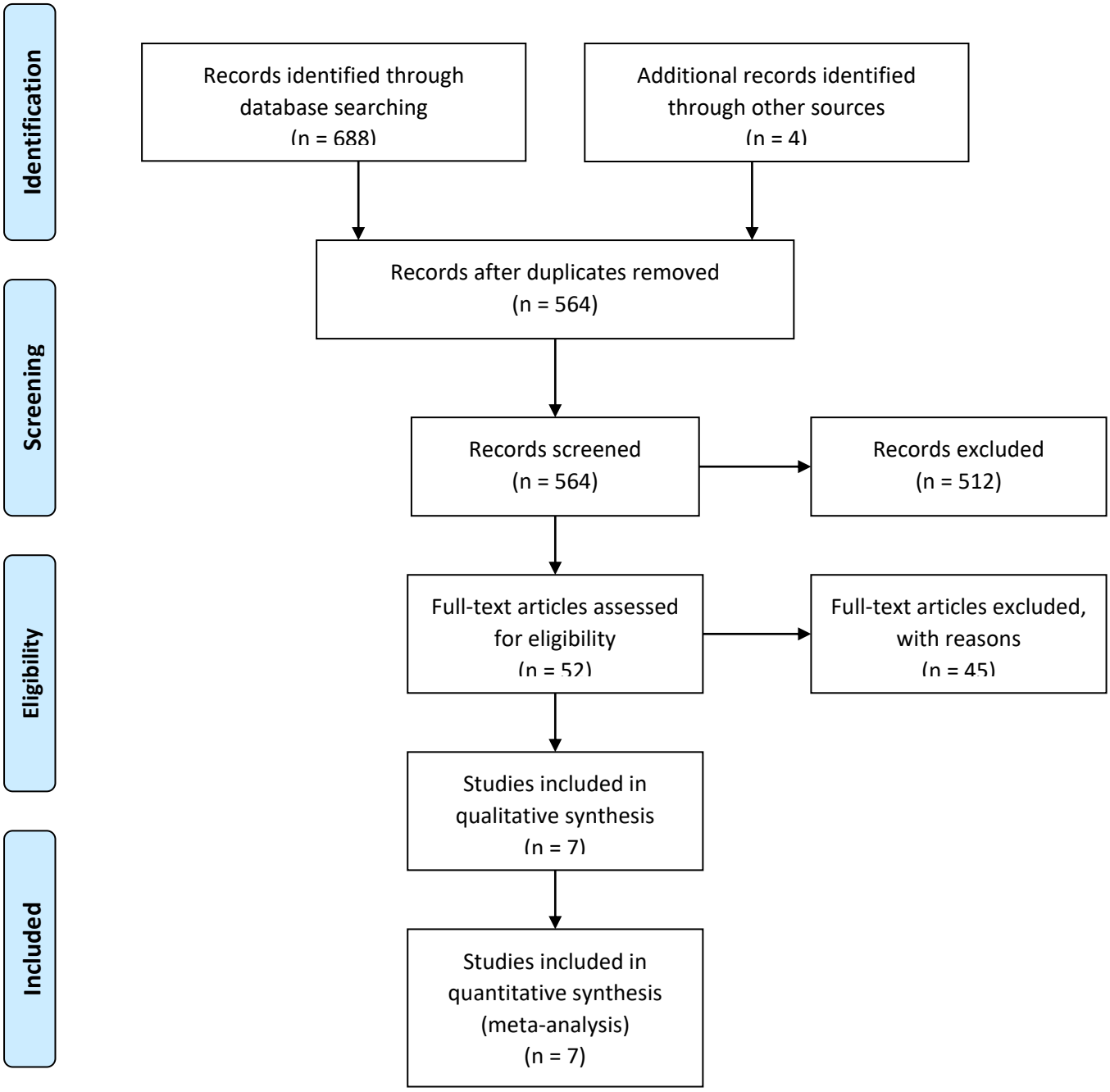

Figure 1: Selection and entry of studies into a meta-analysis

Also, other analyzes based on classification based on identifiable variables in studies such as disease severity, duration of music therapy, and interval of exercises were performed, the results of which are as follows. (Results are reported in hybrid mode.)

In the classification based on the severity of the disease, the studies were divided into three groups of patients: mild, moderate, and severe, of which 7 studies were in the mild category, 6 studies were in the middle class and 3 studies were in a severe category. The standard mean difference for mild patients is 0.283 with (0.579 - -0.032) CI and for moderate patients is 0.515 with (0.970- 00.06) CI and for severe patients is 0.287 with (0.940 - 0.366) CI for this variable is 0.005 = p.value Which shows the significant difference between the groups. As can be seen, the largest standard difference in the MMSE test is observed in the average patient. This difference is significant only in this group (Figure 2).

In the classification based on the length of the intervention period (music therapy), the studies were divided into two groups less than and equal to 3 months and more than 3 months. The results of the analysis show that the interventions lasted more than 3 months (7 studies). The difference between the mean standard of MMSE test of patients is 0.140 with (0.452 - 0.172-) CI and

the interventions performed in 3 months or less (9 studies), the difference between the mean standard of MMSE test of patients is 0.518 with (0.836 -0.201) CI Which for this variable is 0.004 = p.value. As can be seen, the largest mean difference in the MMSE test is observed in the interventions in 3 months or less, and this difference is significant in this group (Figure 3).

In the classification based on music therapy practice, the studies were divided into two groups daily practice and non-daily practice. The results of the analysis show that in 10 studies that were associated with daily practice, the difference between the mean MMSE test of patients was 0.209 with (0.472 - 0.054-) and in 6 studies that were associated with non-daily exercise, the difference between the mean standard of patients' MMSE test was 0.632 with (1.014 - 0.250) CI, which for this variable is associated with p.value = 0.002. Which indicates a significant difference between the two groups. As can be seen, the non-daily exercise group had a higher mean difference and this difference is significant (Figure 4).

To evaluate the diffusion bias, we used a funnel diagram (Figure 5). The results showed that due to the relative symmetry of the studies on both sides, the probability of diffusion bias between the studies is low.

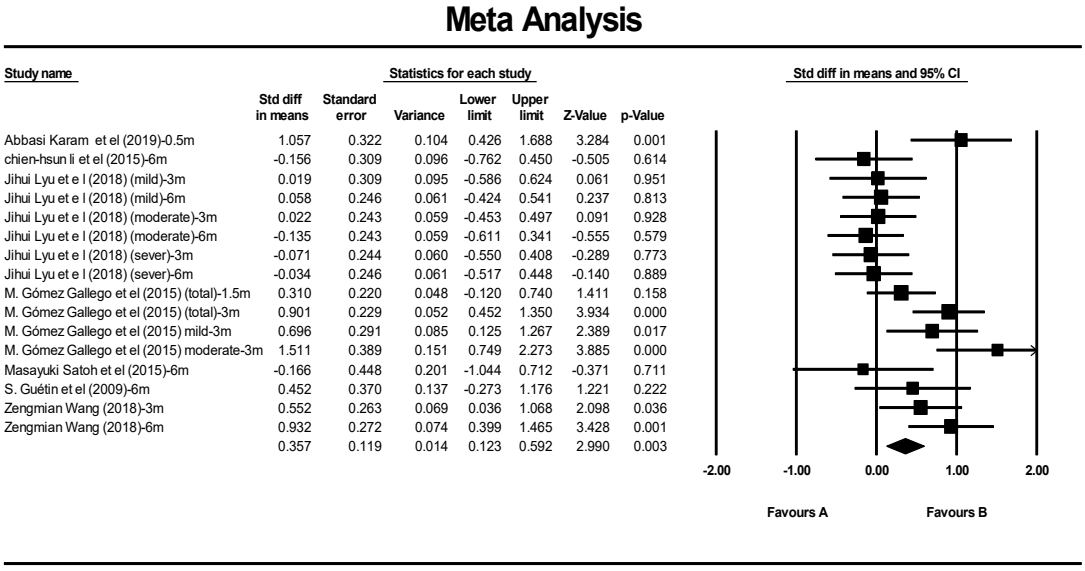

Figure 2: Accumulation chart of mean scores (classification based on disease severity)

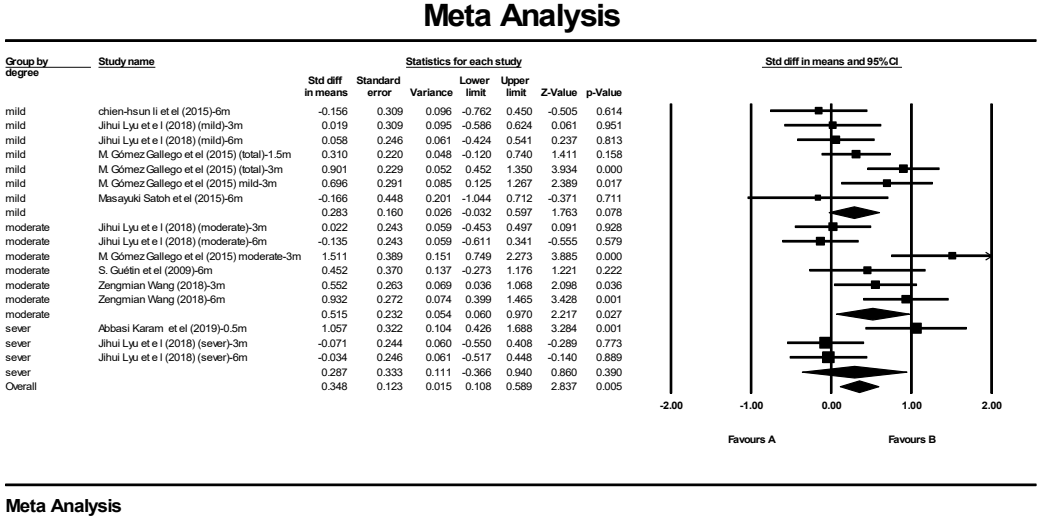

Figure 3: Grade accumulation diagram (classification based on the length of music therapy)

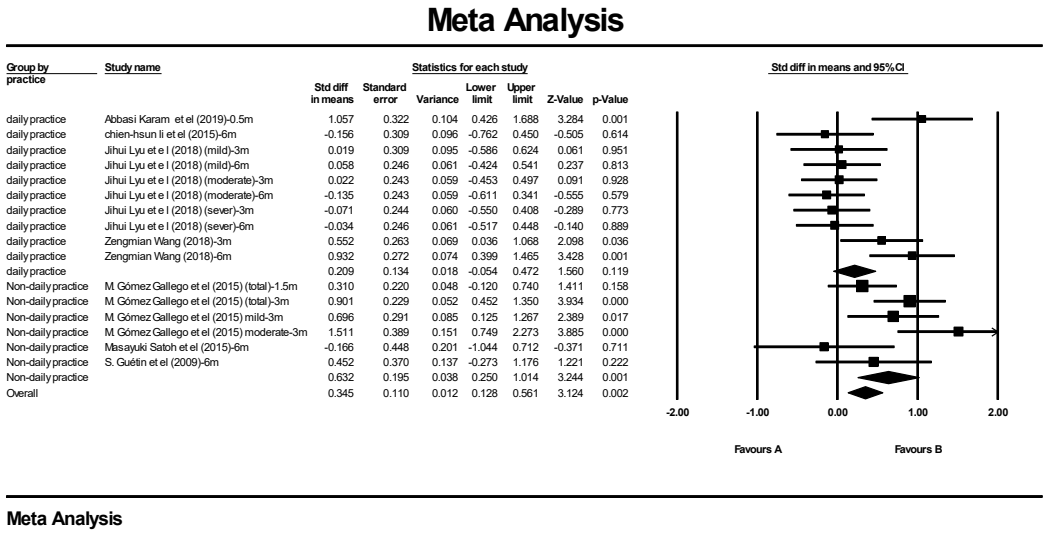

Figure 4: Accumulation chart of average scores (classification based on training time)

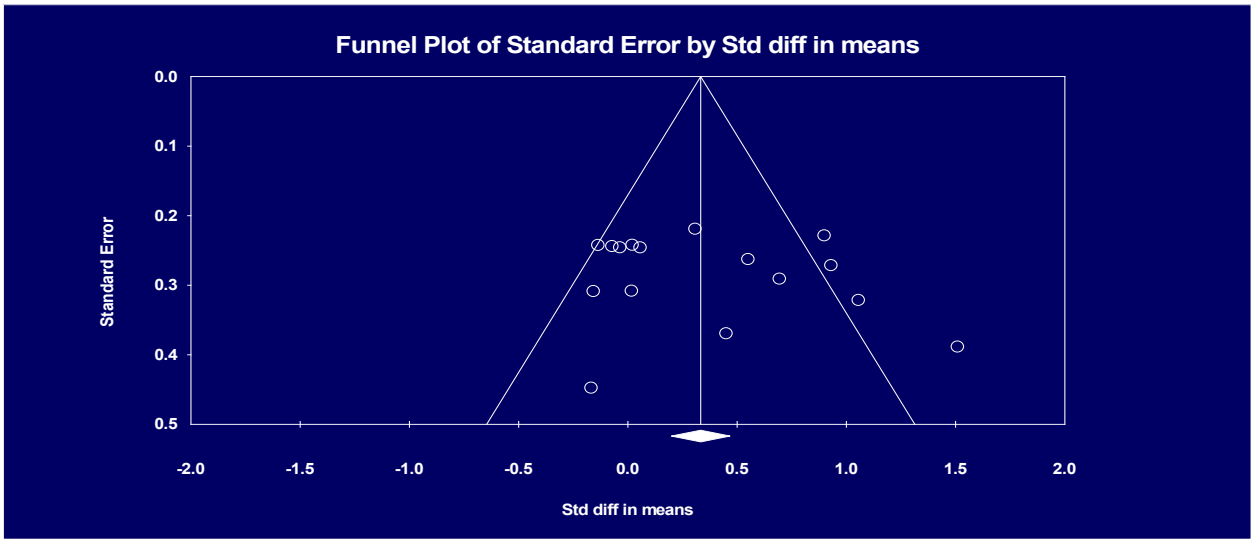

Figure 5: Funnel diagram of studies included in the meta-analysis

5. Discussion

According to the findings of this study which showed that music can significantly improve the performance of Alzheimer's patients and also research on the relationship between music and the performance of the elderly shows a significant relationship. The use of music for the elderly with Alzheimer's disease, in addition to motivating, physical and mental mobility, can be effective in improving the cognitive functions of this population.

In recent years, music therapy has been considered one of the most common treatments and it has been shown that music therapy reduces the level of anxiety in Alzheimer's patients. Music is used not only in the treatment of various patients but also in healthy people can lead to relaxation, reduce stress and improve mood. The brain functions in such a way that it responds positively and appropriately to musical stimuli and, as an automatic function in general and in particular affects intelligence, memory, and imagination, improves the function of attention and memory. Music has neuropsychological benefits such as creating positive emotions and increasing mood, feeling calm, reducing heart rate, blood pressure, and respiration rate, and reducing pain, fear, and anxiety. music and its neurophysiological effects have been considered by many researchers and are used to improve health, reduce stress and keep patients away from unpleasant symptoms. Pleasant music therapy reduces the effects of Alzheimer's disease by improving memory and enhancing learning and information retention by activating the right side of the brain The results of a systematic review published in 2017 show that music therapy affects cognition (memory, attention, and language), emotions, and behavior (anxiety, depression, and arousal). In Alzheimer's patients, music therapy is recommended as a non-pharmacological treatment for some cognitive, emotional, and behavioral symptoms [23-27].

Music therapy along with other methods such as dance, art, video games, physical exercise, etc. is interestingly useful. Service providers should also adopt a non-pharmacological strategy according to the preference and physical endurance of each patient

to increase the effectiveness of medication methods. Various studies have also pointed to the positive effect of music therapy along with drug therapies. The side effects of music therapy are rare unless the individual's music is reminiscent of a disturbing memory or experience that would not be enjoyable. The patient should be reassured and helped to focus on pleasant thoughts and choose appropriate music. However, more research and evidence are needed to make a definitive claim about the effect of music therapy on this disease [28-31].

Highlights

Music can significantly improve the performance of patients with Alzheimer's disease
and performance improvement in them with moderate severity and also in studies with a
period of 3 months or less and with non-daily exercise has been meaningful.

Alzheimer's disease is a multifactorial disorder that makes any of these age-related factors, treatment progress, and clinical interventions difficult.

Music protects the brain against diseases such as dementia and Alzheimer' s and
improves cognitive skills.

Conclusion

Alzheimer's disease is a multifactorial disorder that makes any of these age-related factors, treatment progress, and clinical interventions difficult. Music therapy can be used as an effective intervention in homes, daycare centers, and nursing homes. Music protects the brain against diseases such as dementia and Alzheimer's and improves cognitive skills.

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