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Does Music Therapy Intervention have an effect on the Emotional Behavior of Alzheimer Patients?

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A SELECTIVE EVIDENCE BASED MEDICINE REVIEW

In Partial Fulfillment of the Requirements For

The Degree of Master of Science

Health Sciences – Physician Assistant

Department of Physician Assistant Studies
Philadelphia College of Osteopathic Medicine
Philadelphia, Pennsylvania

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Abstract

OBJECTIVE: The objective of this selective EBM review is to determine whether or not music therapy intervention have an effect on emotional behavior of Alzheimer patients. Behavior variables measuring are agitation and anxiety.

STUDY DESIGN: Systematic review of two randomized, controlled trials published in 2009 and 2014, respectively, and one randomized control case study published in 2006.

DATA SOURCE: Three published studies comparing music therapy intervention on behavioral modifications with Alzheimer patients were found using PubMed and Medline

OUTCOMES MEASURES: All three studies measure behavior in Alzheimer patients based on a variety of well validated measures, Behavior Pathology in Alzheimer's Disease Rating Scale (BEHAVE-AD), Cohen-Mansfield Agitation Inventory (CMAI) and the Hamilton Scale.

RESULTS: Svandottir et al showed a significant reduction in anxiety, activity disturbances and aggressiveness with music therapy intervention, Guétin et al results confirmed the valuable effect that music intervention has on decreasing anxiety in Alzheimer patients and Narme et al study showed an improvement in the emotional state of Alzheimer patient.

CONCLUSIONS: The data show benefit to music therapy as a safe and effective method for treating agitation and anxiety in Alzheimer patients. We can conclude that music therapy is effective in reducing severity in behavioral mood. Future studies should aim to report data with larger sample sizes and with different music genres as variables.

KEY WORDS: Alzheimer Disease, Dementia, Music Therapy

INTRODUCTION

Dementia/Alzheimer Disease (AD) is a progressive chronic deterioration of selective functions such as memory loss, cognitive function and motor loss due to loss of brain cells with amyloid depositions in the brain.⁵ This paper evaluates two blinded, randomized controlled trials and one case control study comparing the effect on music therapy on the emotional behavior of Alzheimer patients.

In the United States there are currently 5.4 million people diagnosed with Alzheimer's, within that number an estimated 5.2 million people are age 65 and older, and 200,000 of the diagnoses are under age 65; by the year 2050, it is estimated that in the United States the number of people age 65 and older with Alzheimer's disease will triple, from 5.2 million to 13.8 million.⁵ Of the top 10 causes of death Alzheimer is the only disease in the list that cannot be cured, prevented or even slow the rate of disease progression.⁵ In 2016, it is estimated to cost the United States \$236 billion for healthcare, long term care and hospice for people with diagnosed and living with Alzheimer's and other dementias, under half of the costs is covered by Medicare.⁵ Nearly one in every five Medicare dollars is spent on people with Alzheimer's and other dementias.⁵ “There is not exact estimate available but studies have shown increase in utilization was attributed to AD for inpatient services, pharmacy, ER visits, and home health care AD patients were far more likely to be hospitalized for infections, pneumonia and falls”⁴

There is currently no known cure for Alzheimer's; however certain pharmacologic medications have been used to help behavioral function such as SSRI drugs.⁶ Researchers believe that decrease intellectual function are due to organic disease of cerebral hemispheres or subcortical structures sufficient enough to interfere with social/occupational function are caused by a loss of brain cells with the development of amyloid deposition senile plaques and

neurofibrillary tangles (tau proteins) that develop at a faster rate in AD than in normal aging process.^{5,6}

Unfortunately, there is no gold standard treatment for Alzheimer Disease. Treatments to help with cognitive and behavioral improvement are pharmacologic drugs such as Ach-esterase inhibitors: Donepezil, NMDA antagonist: Memantine, SSRI for depression: Escitalopram. Certain nonpharmacological treatments have also been effective in helping with behavioral improvement in AD patients such as familiar surroundings and daily routines and musical therapy.

While all the treatment methods mentioned above have been shown to improve symptoms in some people with AD, no treatment is effective for everyone. Musical therapy may be an effective alternative with behavioral modifications in reducing anxiety and agitation in AD patients.

OBJECTIVE

The objective of this selective EBM review is to determine whether or not music therapy intervention has an effect on emotional behavior of Alzheimer patients.

METHODS

This review focused on patients that have been diagnosed with Alzheimer disease. The intervention studied was music therapy as behavioral treatment. Svansdottir et al. studied music therapy group against controlled group with no music intervention; the therapy group received 18 sessions of music therapy, each lasting 30 minutes, three times a week for 6 weeks but the control group had no change of care.³ Guétin et al. compared two groups of Alzheimer patients comparing a music therapy group with a controlled group without music therapy; the duration of

follow-up was 24 weeks between two Alzheimer groups the treated group participated in weekly sessions of individual, receptive music therapy. The principal endpoint, measured at weeks 1, 4, 8, 16 and 24.² Narme et al compared a cooking therapy group and music therapy group with patients with moderate to severe dementia. The interventions took place for a duration of one hour, twice a week, for a period of 4 weeks (total 8 hours).¹ Though many outcomes were evaluated in each study, the outcome of focus for the review was a reduction in behavioral function of anxiety and agitation in Alzheimer patients when using music therapy. Two of the studies were randomized control trials (RCT) and one of the studies was a case control RCT study. Each article was published in a peer-reviewed journal and all articles were published in English. Databases accessed included PubMed and Medline and searches were done with the keywords “Alzheimer Disease,” “Dementia” and “Music therapy”. Articles were selected by the author based on relevance and inclusion of patient oriented outcomes (POEMS). Inclusion criteria included recent studies that were RCTs or case control studies and patients diagnosed with AD. Exclusion criteria included patients with other neurological disorders. Statistical data analysis was reported using p-value, standard deviation, mean and ANOVA. Table 1 displays the demographics and characteristics of these studies.

Table 1: Demographics and Characteristics of Included Studies

Study	Type	# Pts	Age (yrs)	Inclusion criteria	Exclusion Criteria	W/D	Interventions
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Narme, 2014 (1)	RCT	48	N/A	Native French speaking patients that met the diagnostic criteria for dementia of the Alzheimer's type or mixed dementia according to the DSM-IV. Used Mini-Mental State Examination (MMSE), and only participants with a score equal to or below 20	Participants with a high musical expertise, as assessed by the Musical Experience Questionnaire were excluded	23% lost	The interventions took place for a duration of one hour, twice a week, for a period of 4 weeks (total 8 hours). During the music sessions, music was played on a CD player. The excerpts covered different styles of music
Guétin, 2009 (2)	RCT	30	70-95	Mild to moderate stages of AD. Each patient was required to have a baseline Mini Mental State Evaluation (MMSE) score of between 12 and 25 and Hamilton Anxiety Scale score of 12.	Life-threatening illness during the envisaged study period were not included in the study. Likewise, patients with other neurological disorders	N/A	The duration of follow-up was 24 weeks between two AD groups control versus music therapy. The treated group participated in weekly sessions of individual, receptive music therapy.
Svansdottir, 2006 (3)	RCT	47	71-87	patients had been diagnosed with AD using ICD-10 and had moderate or severe dementia according to stages 5-7 on the Global Deterioration Scale.	Patients with other types of dementia.	20% loss	The therapy group received 18 sessions of music therapy, each lasting 30 minutes, 3 times a wks for 6 wks but the control group had no change of care.

OUTCOMES MEASURED

Changes in behavioral function in Alzheimer patients when using music therapy addressing the outcomes of anxiety and agitation were measured using Behavior Pathology in Alzheimer's Disease Rating Scale (BEHAVE-AD) scoring 7 different emotional behaviors. Limited information on how BEHAVE-AD is scored;³ The Hamilton Scale, with the total score ranging from 0 to 56. This scale consists of 14 items covering all of the sectors of psychosomatic anxiety;² and Cohen-Mansfield Agitation Inventory (CMAI) to rate agitated behavior and their frequency.¹ Preliminary analyses were conducted using the Mann-Whitney U test to verify that

both groups (music and cooking) were well matched at baseline measures in terms of demographic characteristics, cognitive and behavioral status. To determine who responded to treatment, Spearman's non-parametric correlations were conducted between benefits observed during intervention and patients' characteristics.¹

RESULTS

Results from each study were presented as continuous data that could not be converted to dichotomous data; therefore, relative risk reduction (RRR), absolute risk reduction (ARR), or numbers needed to treat (NNT) were not calculated for this review. Notably, no adverse effects or harm to patients secondary to treatment were reported in any of the studies. Patients were recruited by Svansdottir et al. from two nursing homes and two psychogeriatric wards totally 47 patients in the age range 71-87 years. At the time of the trial all of these patients had been diagnosed with AD according to ICD-10 and had moderate or severe dementia according to stages 5–7 on the Global Deterioration Scale.³ Guétin et al. recruited patients were required to have a baseline Mini Mental State Evaluation (MMSE) score of between 12 and 25 and a baseline Hamilton Anxiety Scale score of at least 12. The included patients were men or women aged 70–95 years, with adequate verbal or written expression, visual and hearing abilities (hearing aids not permitted) in order to carry out the tests. All of the patients had been receiving stable anticholinergic treatment for 6 months.² Narme et al recruited a total of 48 participants were recruited at the Wilson nursing home in Reims University Hospital. They met the diagnostic criteria for dementia of the Alzheimer's type or mixed dementia according to the DSM-IV.¹ The severity of dementia was assessed by the Mini-Mental State Examination (MMSE), and only participants with a score equal to or below 20 (moderate or severe stages)

were included. Only native French speakers were recruited in order to ensure familiarity with the songs selected for music sessions.¹

The study conducted by Svansdottir et al consisted of 38 participants with moderate or severe Alzheimer's disease (AD) assigned randomly to a music therapy group and a control group. The control group n=18 participants and music therapy group n=20 participants during a 6-week period were measured with the Behavior Pathology in Alzheimer's Disease Rating Scale (BEHAVE-AD). Analysis was sum of scores of activity for disturbances, aggressiveness and anxiety. For participants that did not complete the whole intervention few data are available; the dropout rate was significant as eight patients (17.4%) moved from the psychogeriatric ward to a nursing home (n=5), deteriorated (n=2) or died (n=1). Thus 38 patients were able to participate in all of the sessions.³

To analyze their data Svansdottir et al used change in mean from baseline. Music Therapy group Aggressiveness mean from baseline; before treatment mean 0.7, after treatment 1.2 and four weeks post treatment 1.1. The mean change from baseline for Control group no music therapy before treatment 1.3, after treatment 1.3 and post treatment 4 weeks 0.8. Music Therapy group Affective disturbance before treatment mean 0.3, after treatment 0.6 and four weeks post treatment 0.5. Control group no music therapy mean before treatment 0.5, after treatment 0.4 and post treatment 4 weeks 0.1. Music Therapy group Anxieties and Phobias mean before treatment 1.0, after treatment 0.7 and four weeks post treatment 0.8. Control group no music therapy mean before treatment 0.2, after treatment 0.4 and post treatment 4 weeks 0.3. When three of the seven categories of the BEHAVE-AD (activity disturbances, aggressiveness

and anxiety) were put together, there was a significant reduction in symptoms in the therapy group ($p < 0.01$) but not in the control group ($p = 0.5$). Table 2 summarizes these results.

Table 2: Comparison of pre and post Music intervention on Behavior (Svansdottir et al³)

	Therapy Group			Control Group		
	Before tx	After tx	4 post tx	Before tx	After tx	4 post tx
Aggressiveness	0.7	1.2	1.1	1.3	1.3	0.8
Affective disturbance	0.3	0.6	0.5	0.5	0.4	0.1
Anxieties/Phobias	1.0	0.7	0.8	0.2	0.4	0.3

Narme et al conducted a study consisting of 48 patients analyzing agitated behaviors and their frequency were rated using the CMAI, with higher scores corresponding to greater occurrence of agitated behaviors (total score out of 203). The NPI is a brief interview filled out by professional caregivers, which examines the frequency and severity of several domains of behavioral functioning (e.g., delusions, hallucinations, agitation/aggression, disinhibition, sleep abnormalities). For this study we analyzed the agitation/aggression behavior variable. For participants that did not complete the whole intervention few data are available.

To analyze their data, Narme et al used mean change from baseline and standard deviation as the variables measured. Behavioral functioning (agitated behaviors) Music therapy group Baseline BL-1= -, BL-0 =41.4 ±12.9; Music therapy intervention group 1MID= 33.1 ± 10.6, 1END= 37.5 ± 16.4; Music therapy after intervention group POST+2= 35.2 ± 9.2, POST+4=40.2 ±15.4. There was no significant difference at IEND $p=0.1$, POST+2 $p=0.06$ and POST+4 $p=0.4$ Cooking therapy Baseline group BL-1= -, BL-0= 41.6 ±15.2; Cooking therapy intervention group 1MID= 34 ± 9.1, 1END= 31.8 ± 5.6; Cooking therapy after intervention group POST+2= 34.9 ± 9.6, POST+4=34 ±7.6. There was a decrease in agitated behavior for all

evaluations, IMID $p=.005$, IEND $p=0.001$, POST+2 $p=0.003$, and POST+4 $p=0.007$. Table 3 summarizes these results.

Table 3: Comparison of pre and post Music intervention on Agitation (Narme et al¹)

Agitation	Baseline		During Intervention		After Intervention	
	BL-1	BL0	I MID	I END	POST + 2	Post +4
Music	-	41.4 ± 12.9	33.1 ± 10.6	37.5 ± 16.4	35.2 ± 9.2	40.2 ± 15.4
Cooking	-	41.6 ± 15.2	34 ± 9.1	31.8 ± 5.6	34.9 ± 9.6	34 ± 7.6

The final study conducted by Guétin et al was a single-centre, comparative, controlled, randomized study, with blinded assessment of its results. Follow-up was 24 weeks in the study. The treated group ($n = 15$) participated in weekly sessions of individual, receptive music therapy; while control group ($n = 15$) participated under the same conditions in reading sessions. The Level of anxiety (Hamilton Scale) measured at 1, 4, 8, 16 and 24 weeks for endpoint results.

To analyze data Guétin et al used ANOVA with repeated measures (D0, W4, W8 and W16) showed a significant difference ($p<0.0001$); the between D0 and W16 groups progressed in a different manner during follow-up. At D0, level of anxiety was comparable between the 2 groups: 22 (± 5.3) for the music therapy group and 21.1 (± 5.6) for the control group. At W16 for music therapy a further decrease, 8.4 (± 3.7) versus 20.8 (± 6.2) for the control group. The changes between D0 and W16 were significantly different between the 2 groups as regards this endpoint ($p< 0.001$). After 16 weeks, the improvement corresponded to approximately 13.2 (± 5.2) points, in the music therapy group. In the control group, this improvement was in the region of 0.9 (± 7.4) points. ANOVA evidenced a significant difference ($p<.0001$) at W24; the difference between D0 and W24, and also between W16 and W24. A score of 10.6 (± 6.3) was obtained in the music therapy group versus 20.5 (± 5.4) in the control group at W24. The

difference between D0 and W24 appeared to be significant regarding this endpoint ($p = 0.002$), together with the difference between W16 and W24. Table 4 summarizes these results.

Table 4: Comparison of Anxiety (Guétin et al²)

Anxiety	Music therapy	Control	
Value	Mean \pm SD	Mean \pm SD	P value
D0	22.0 \pm 5.3	21.1 \pm 5.6	Not significant
W4	15.5 \pm 3.7	20.7 \pm 4.7	0.002
W8	12.6 \pm 5.2	22.2 \pm 4.5	<0.001
W 16	8.4 \pm 3.7	20.8 \pm 6.2	<0.001
W 24	10.6 \pm 6.3	20.5 \pm 5.4	<0.001
D0- W4	-6.5 \pm 5.2	-0.4 \pm 2.7	<0.001
W4-W8	-2.9 \pm 5.5	0.8 \pm 3.9	Not significant
W8-W16	-4.6 \pm 4.8	-1.4 \pm 5.9	Not significant
D0-16	-13.2 \pm 5.2	-0.9 \pm 7.4	<0.001
D0-W24	-11.5 \pm 7.2	-1.5 \pm 6.8	0.002
D16-W24	2.1 \pm 3.7	-0.8 \pm 2.8	0.046

DISCUSSION

This systematic review demonstrated possible improvement in anxiety and agitation in Alzheimer patient's by using music therapy intervention in place of or in addition to standard Alzheimer treatment therapies. The three studies showed improvement in anxiety and agitation; however, the limitations of these studies raises questions about the true efficacy of music therapy as an intervention for relief of certain behavioral modifications in Alzheimer disease.

A number of limitations existed within the three studies reviewed. Each study consisted of a relatively small sample size (each < 50 patients), which could potentially skew the validity of the significance of each result.^{1,2,3} The smallest of the sample sizes came from the study conducted by Guétin et al., which only consisted of 30 individuals. The dropout ratio was also significant 20% or higher in two of the studies and there was limited data on participants that did not complete the studies.^{1,2}

In the study Svansdottir et al. the outcomes are limited because the study showed an effect using only one type of music therapy, the active participation of the patient along with the therapist, both with instruments and by singing. The study did not compare other types of music therapy such as passive listening. There was also no comparison between different types of music genres.³

Limitations in the Narme et al. was the control treatment cooking was used versus a “noncontact” group to test the hypothesis that music would have an effect over and above a non-specific effect due to patient’s stimulation.¹ In the study the participants preferences should be taken into account in allocating activities to subjects; participants could possibly benefit more from the particular kind of intervention they favor.

In the study Guétin et al. it was suggested that further studies focusing on neurobiological using electrophysiological, positron emission tomography, functional MRI or morphological cerebral MRI studies will give a better understanding into the physiological mechanisms used during this type of non-medicinal-based therapy.²

While music therapy may be an effective therapy for behavioral modification in Alzheimer patients, particularly in combination with other therapies, access may be problematic for patients. Music therapy is not covered by a patient’s insurance, so regular music therapy sessions may place additional financial strain on patients. Lastly, not all nursing home facilities offer music therapy. The studies did not evaluate if home practice alone, without the assistance of a therapist, would be beneficial in reducing Alzheimer patient’s anxiety and agitation.

CONCLUSION

The studies reviewed in order to answer the question “does music therapy intervention have an effect on the emotional behavior of Alzheimer patients” show evidence in support of the hypothesis. Results of the three studies show benefit to music therapy as a safe and effective method for treating agitation and anxiety in Alzheimer patients. We can conclude that music therapy is effective in reducing severity in behavioral mood. Music therapy is a low-risk treatment option that may prove to be beneficial to those dealing with this incurable disease. Future studies are necessary before routinely recommending music therapy as an effective treatment for reducing symptoms of anxiety and agitation in Alzheimer disease. Future studies should include a sample size large enough to generalize findings and data on drop outs of participants. It is also essential to study the effects of different genres of music as well as giving participants their choice on music category. Finally, the studies should use neuroimaging such as MRI or PET to look on the brain during these interventions.

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