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Efficacy of video-music therapy on quality of life improvement in a group of patients with Alzheimer's disease: a pre-post study

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Abstract. *Background and aim of the study:* Alzheimer's disease is the most common degenerative dementia with a predominantly senile onset. The difficult management of altered behaviour related to this disorder, poorly responsive to pharmacological treatments, has stimulated growth in non-pharmacological interventions, such as music therapy, whose effectiveness has not been supported by the literature up to now. The aim of this study was to evaluate the efficacy of video-music therapy on quality of life improvement in Patients affected by Alzheimer's Disease (AD). *Methods:* A pre-post study was conducted in a residential facility. 32 AD Patients, who attended this facility daily to participate in supportive and rehabilitative programs, were treated with 2 cycles of 6 video-music-therapy sessions, which consisted of folk music and video, recalling local traditions. In order to investigate their cognitive status, Mini Mental State Examination (MMSE) was administered and Patients were divided into stages according to MMSE scores. After each session of video-music-therapy, Quality of Life in Alzheimer's Disease Scale (QOL-AD) was administered to our Patients. *Results:* 21 AD Patients completed the 2 cycles of video-music therapy. Among them, only the Patients with questionable, mild and moderate neurocognitive impairment (MMSE Stages 1, 2, 3) reported an improvement in their quality of life, whereas the Patients with severe deterioration (MMSE stage 4) did not report any change. Many items of QOL-AD improved, showing a statistically significantly correlation to each other. *Conclusions:* Video-music therapy was a valuable tool for improving the quality of life only in Patients affected by less severe neurocognitive impairment.

Key words: Quality of life, video-music therapy, non-pharmacological therapy, Alzheimer's Disease, dementia

Background and aim of the work

Currently, worldwide, 47 million people are affected by dementia. In Europe, 4.7% of the over-60 population is affected by Alzheimer's disease (1), which is, up to now, a progressive and incurable form of dementia (2). The treatments for AD are aimed at keeping patients autonomous as long as possible, ameliorating cognitive and non-cognitive symptoms, the so-called Behavioural and Psychological Symptoms of Dementia (BPSD) (3): hallucinations, delusions, anxiety and agitation, wandering, etc. (4). These symptoms are frequently associated with burnout of caregivers (5), high healthcare costs (6) and often require the institutionalization of AD patients (7). Antipsychotic drugs currently available for treatment of BPSD are associated with an increased risk of stroke, myocardial infarction and death in patients with dementia (8, 9).

Cholinesterase inhibitor drugs are partially effective treatments for the management of neuropsychiatric symptoms of AD, which represent priority goals of public health (10). The non-drug treatments, including music therapy (MT), have shown promising results, improving both cognitive and behavioural alterations of AD (11-14). Music therapy is defined by the World Federation of Music Therapy as "the use of music and/or its musical elements (sound, rhythm, melody and harmony) by a qualified music therapist, with a client or group, in a process designed to facilitate and promote communication, relationships, learning, mobilization, expression, organization and other relevant therapeutic objectives in order to meet physical, emotional, mental, social and cognitive needs" (15). Music therapy has been used in the treatment of schizophrenia for decades, and, up to now, it is often used as adjunct therapy for improvingmood, negative and positive symptoms (16). Recently, the clinical application has been spreading out into adjunctive treatment for different diseases, including neoplasm, central nervous system disorders, other psychiatric illness, and so on (17). Its use is grounded in neurophysiological theories and research, which highlight the influence of music on cognitive processes and motor learning principles (18). In AD, the rationale of MT is supported by the clinical observations regarding the preservation of music receptivity even in the last and more severe stages of AD (19), when memory, language and communication skills are heavily deteriorated and there is a decline in most cognitive functions (20). In these conditions, MT can offer the opportunity to communicate through non-verbal language, representing a valuable support for the therapeutic relationship with AD Patients (21). In fact, the use of music can represent an intervention for improving the therapeutic relationship by means of sharing musical experiences (22). In particular, the use of folk music is able to stimulate reminiscences from the past of the elderly (20). The biological reasons for music therapy efficacy are unknown and many mechanisms might underlie these benefits, including an increase of natural killer cells which are able to destroy dysfunctional cells (23) and an increase of serum melatonin levels (24). Many studies have indicated the beneficial effects of MT on reducing anxiety and depression of patients with dementia (25-32). A few studies have also indicated a moderate increase in cognitive function (33), but research of music therapy efficacy on BPSD is controversial (20). In the meta-analysis of Ueda et al. (32), moderate effects of MT on BPSD improvement were observed, but not on cognitive function. In some clinical practice guidelines for dementia, music therapy is "recommended although there isn't strong scientific evidence" (34). The Italian Psycho-geriatric Association also recommended MT approach on BPSD, although the studies on this topic have some limitations (35). Many systematic reviews have analyzed the studies of the efficacy of MT in reducing depression, anxiety, agitation and improving cognitive functions, but the poor quality of these studies did not allow one to draw conclusive results (36-40). The last Cochrane systematic review did not find sufficiently strong evidence to conclude that this non-pharmacological intervention was effective for dementia (41). Few studies have analyzed the impact of music therapy on the quality of life of Patients with AD (42).

The aim of this study was to analyse the effects of video-music therapy (folk music associated with the projection of local festival movies) on the perceived quality of life in Patients with AD.

Methods

Study design, ethics approval and consent to participate

This pre-post study was performed in accordance with the Declaration of Helsinki. It was approved by the management of the residential facility where the study was conducted. Each participant or his/her legal guardian gave informed consent to participate in this study. The anonymity and confidentiality of participants were assured and their decision to participate voluntarily was respected.

The sample

The convenience sample included all participants with AD (n=32), who daily attended the residential facility of Northern Italy, where the study was conducted.

Inclusion criteria: the Patients who participated in a minimum of two sessions for each cycle of video-music therapy.

Exclusion criteria: the Patients who presented severe visual and/or hearing impairment.

The procedures

In 2014, video-music therapy (VMT) was administered in 12 sessions, divided into two cycles of 6 sessions each separated by an interval of 5 months; 2 sessions per week were presented. The VMT sessions were conducted by the same professionals in the same space (meeting room). Each VMT session, which lasted 1 hour, was structured with the same defined temporal sequence in order to favor stability and regularity. During VMT, the participants were invited to watch two videos: the first, with images of local folk traditions, for example feasts with traditional costumes and typical foods (duration of 15 seconds for each image projection), associated with folk music in the background, and the second video with images of local folk music dances. During the video projection, the participants could freely express their feeling, singing, dancing, moving their heads.

At the conclusion of the two VMT cycles, the Patients who completed this treatment and a group of folk dancers were invited to participate in a party organized in the residential facility in order to create a sort of link between the video-musical experience and reality.

The instruments

The following questionnaires were administered:

- Quality of Life Questionnaire in Alzheimer's Disease Scale (QOL-AD), aimed at assessing the quality of life for people with dementia (43, 44) through short-term structured interviews, consisting of 13 items rated on a 4-point scale: 1 "poor", 2 "fair", 3 "good" and 4 "excellent", for a total score ranged from 13 to 52;

- Mini Mental State Examination (MMSE), in order to investigate cognitive function and its changes over time, applicable even in severe forms of mental deterioration (45). It consists of 11 items with a maximum score of 30. The cognitive functions of Patients can be grouped into 4 stages of cognitive impairment according to the MMSE score ranges: 26-29 (stage 1) for questionable, 21-25 (stage 2) for mild, 11-20 (stage 3) for moderate, and 0-10 (stage 4) for severe dementia (46).

After each session of VMT, QOL-AD was administered to all Patients who had participated in the session. MMSE was administered to all participants at the beginning of VMT in order to correlate the cognitive functioning with QOL-ADoutcomes.

Statistical analysis

The descriptive analysis was performed, through the determination of mean and standard deviation of the variables with a 95% CI. The parametric statistical analysis was performed using ANOVA and T-TEST to highlight the significant differences. The multiple comparison was carried out through the Honestly Significant Difference (HSD) method of Tukey. The instruments were assessed by Cronbach's alpha whereas categorical variables were calculated through the cross-tabulation with chi-square. The Spearman correlation coefficient (Rho) has allowed us to determine the correlation among QOL-AD items. All statistical calculations were analyzed using SPSS version 23.0 (SPSS Inc., Chicago, IL, USA).

Results

Only 21 Patients from our sample were included in this research because they participated in a minimum of 4 sessions per cycle: 8 males (38%) and 13 females (62%), who were 81.1 (±9.1 SD) years old on average. 12 Patients (57%) were widower, 5 (24%) married and 4 (19%) single or divorced. Most of them (95%) lived with their family. According to MMSE scores, we identified 7 Patients (33%) with questionable (stage 1), 3 (14%) with mild (stage 2), 6 (29%) with moderate (stage 3) and 5 (24%) with severe cognitive impairment (stage 4). The QOL-AD had a good internal reliability (α=0.840) of all items, both in the first (α=0.834) and in the second cycle (α=0.851). The test of equality of averages, obtained through the sum of the scale Likert

scores of all items (Range=13-52), showed a statistically significant difference between the quality of life perceived by patients during the first and the second VMT cycle (t=-3.373, p=.001). At the end of the second cycle (12th session), the value (27.23±6.14) was statistically significantly in different from that QOL-AD global value reported at the beginning of VMT (34.9±6.05), showing an improvement in Patients' life quality (t=-3.537, p=.001). In addition, the ANOVA confirmed the statistically significant difference among the sessions and cycles of VMT on the quality of life, as shown in Table 1 (F=3.131, p<0.001). The multiple comparison at the Tukey HSD showed that the positive effect of video-music therapy was detectable atthe 9th session (MD=-8.664, p=0.003) and at the 10th session (MD=-7.669, p=0.15). The interruption between the first and the second cycle of video-music therapy did not affect the result, since we did not find any statistically significant difference in QOL-AD scores between the end of the first cycle (6th session) and the beginning of the second cycle (7th session).The improvement of the quality of life was not observed in all subjects of our sample: the patients with severe cognitive impairment (stage 4 on the MMSE) did not report any benefit from this treatment (m=28.96, SD=6.338), whereas all other Patients showed a good response to treatment (F=8.658; p<0.000, ANOVA; Table 2). The multiple comparison among the Patients at stage 4 and all others highlighted statistically significant differences in the quality of life perception (p<0.001, Tukey HSD; Table 3). The Patients at 1st, 2nd

Table 3. Multiple comparison of Patients' QOL-AD scores divided by MMSE stages

MMSE (I)	MMSE (J)	Mean Difference (I-J)	Standard Error	P
4	1	-4.38	1.14	.001
	2	-5.97	1.36	.000
	3	-4.62	1.16	.001

Table 1. The quality of life perception (QOL-AD scores) in each video-music therapy session in all Patients (ANOVA)

Cycles	Sessions	N. Participants in each session	QOL-AD scores (mean±SD)	Standard Error	95% Confidence Intervals	F	P
1°	1	13	27.23±6.14	1.70	23.52-30.94		
	2	10	29±7.59	2.40	23.57-34.43		
	3	16	30.19±5.81	1.45	27.09-33.28		
	4	14	34.57±4.80	1.28	31.8-37.34		
	5	16	30.44±5.92	1.48	27.28-33.59		
	6	14	33.64±5.26	1.40	30.61-36.68		
						3.131	0.001
2°	7	16	31.06±8.20	2.05	26.69-35.43		
	8	19	34.05±4.56	1.05	31.85-36.25		
	9	18	33±6.58	1.55	29.73-36.27		
	10	20	33.85±5.27	1.18	31.38-36.32		
	11	19	35.89±3.25	0.74	34.33-37.46		
	12	20	34.9±6.05	1.35	32.07-37.73		

Table 2. The quality of life perception (QOL-AD scores) in all Patients divided by MMSE stages

MMSE stages	N. Participants in all sessions	QOL-AD scores (mean±SD)	Standard Error	95% Confidence Intervals	F	P
1	56	33.34±5.42	0.72	31.89-34.79		
2	29	34.93±4.29	0.80	33.3-36.56	8.66	.000
3	52	33.58±6.23	0.86	31.84-35.31		
4	47	28.96±6.34	0.92	27.1-30.82		

and 3rd MMSE stages showed a gradual improvement of their quality of life concomitant with the progress of the video-music therapy sessions in a statistically significant way (F=3.339; p<0.000, ANOVA; Table 4). In particular, the perception of life quality at the 12th sessionwas statistically significantly improved in comparison with the first session (37.2±3.821 vs 28.4±5.582; t=-4.695, p=<.0001; Table 4).

We observed that many answers to items of QOL-AD expressed by Patients at 1, 2 and 3 MMSE stages were statistically significantly correlated among themselves (Spearman's rank correlation coefficient, p=.000), as shown in Table 5. The Patients at stage 4 were excluded from this analysis since they did not report any improvement of quality of life.

Discussion

Our Patients presented a good, and sometimes enthusiastic, participation in VMT with acceptable behavior oriented towards physical contact, interactions with others, applause and verbalizations of satisfaction. During the sessions, a reduction of wandering and aggressive behavior were reported, indirectly suggesting a good capacity of our Patients to focus their attention on VMT. Our sample was small but well representative of AD Patients, who were equally distributed by gender and stages of illness. The QOL-AD showed a good internal reliability in the two cycles of video-music, suggesting questionnaire validity in collecting informative and representative data, as supported by other studies which highlighted the validity and reliability of QOL-AD, even in people with MMSE scores of 3-11 (47). In accordance with most studies which observed the efficacy of music therapy on reducing anxiety and depression and improving well-being of AD Patients, our research found that VMT can ameliorate the quality of life of individuals affected by AD. In particular, our study found that the items of QOL-AD related to a better perception of life as whole were: "physical health", "energy", "mood", "memory", "friends", "self as a whole" and "ability to do things for fun". Among these items, "mood", "ability to do things for fun" and "physical health" showed higher correlation. These data suggest that VMT can increase contact with other people (friends, caregivers and other Patients), improve communications and contribute to individuals' ability to interact socially (38). Moreover, it can reduce anxiety and loneliness and, in the meantime, develop positive feelings of vitality and mental well-being, making the person more self-confident and independent (30). We obtained these positive results only in the groups of Patients with questionable, mild and moderate AD but not in those with severe AD, who did not obtain any benefit. These data are in line with some studies (28, 44, 47, 48), which observed a good efficacy of this therapy

Table 4. The quality of life perception in our Patients at MMSE stages 1, 2 and 3 (ANOVA)

Cycles	Sessions	N. Participants in each session	QOL-AD scores (mean±SD)	Standard Error	95% Confidence Intervals	F	P
1°	1	10	28.4±5.58	1.76	24.41-32.39		
	2	7	30.57±8.02	3.03	23.16-37.99		
	3	12	30.92±6.34	1.83	26.88-34.95		
	4	12	35.42±4.62	1.33	32.48-38.35		
	5	11	31.64±6.33	1.91	27.38-35.89		
	6	10	33.7±4.76	1.51	30.29-37.11		
						3.339	.000
2°	7	13	31.46±7.99	2.21	26.64-36.29		
	8	16	34.5±3.78	0.94	32.49-36.51		
	9	13	35.08±4.25	1.18	32.51-37.65		
	10	15	35.6±3.83	0.99	33.48-37.72		
	11	14	36.79±3.12	0.83	34.99-38.59		
	12	15	37.2±3.82	0.99	35.08-39.32		

Table 5. Items of QOL-AD statistically significantly related to each other in Patients at MMSE stages 1, 2 and 3

Quality of Life: AD (Interview Version for the person with dementia)	
Items	Items statistically significantly correlated (Spearman's rank correlation coefficient) p=.000
Physical health	Energy (ρ=.414), Mood (ρ=.448), Friends (ρ=.423), Ability to do things for fun (ρ=.455), and Life as a whole (ρ=.515)
Energy	Mood (ρ=.699), Memory (ρ=.406), Friends (ρ=.477), Ability to do things for fun (ρ=.414) and Life as a whole (ρ=.441)
Mood	No statistically significant correlation
Living situation	Family (ρ=.489) and Money (ρ=.485)
Memory	Energy (ρ=.406) and Life as a whole (ρ=.408)
Family	Living situation (ρ=.489)
Marriage	No statistically significant correlation
Friends	Physical health (ρ=.423), Energy (ρ=.477), Mood (ρ=.506), Self as a whole (ρ=.523), Ability to do things for fun (ρ=.412) and Life as a whole (ρ=.490)
Self as a whole	Friends (ρ=.523) and Life as a whole (ρ=.401)
Ability to do chores around the house	Ability to do things for fun (ρ=.426)
Ability to do things for fun	Life as a whole (ρ=.455), Energy (ρ=.414), Mood (ρ=.491), Friends (ρ=.412), Ability to do chores around the house (ρ=.426)
Money	Living situation (ρ=.485)
Life as a whole	Physical health (ρ=.515), Energy (ρ=.441), Mood (ρ=.582), Memory (ρ=.408), Friends (ρ=. 490), Self as a whole (ρ=.401) and Ability to do things for fun (ρ=.522)

only in the less severe stages of dementia. This result could indicate that music receptivity can be lost in this AD stage or, alternatively, that severe cognitive and physical impairment do not permit Patients to focus attention on video-music stimulation. The improvement of quality of life reported by our Patients was progressive from the beginning of VMT to the end of the second cycle and stable long-term, since the 5-month interval between the end of the first cycle (6th session) and the beginning of the second cycle (7th session) did not produce any significant change in the QOL-AD outcomes. In addition, this result is in line with other studies which underlined that the length of the intervention period was directly associated with the effects of the music therapy, because interventions of more that 3-month's duration strongly decreased anxiety (32).

Advantages and limits

The advantages of this study are represented by the investigation of a complex non-pharmacological therapy such as VMT which has not been completely studied up to now in a sample of AD Patients. The limits are represented by the small sample size and the use of local folk music even for Patients coming from other Italian regions.

Conclusions

Our study suggests that VMT improves the quality of life of Patients with less severe Alzheimer's Dementia.These results, in line with other authors, suggest that this therapy can represent a promising non-pharmacological and non-invasive intervention for the management of dementia. It can be useful to improve both the quality of life and the relationships of AD Patients, favoring mental well-being without adverse effects. In addition, it can be considered a support to standard care of dementia and its behavioral and psychological symptoms.

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