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Mini Review

A Pilot Feasibility Study on the Effect of Dance on Patients with Dementia

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ABSTRACT

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Dementia is a common neurocognitive disorder, leading to dependence, reduced quality of life and functional decline. There are some symptomatic drug treatments, but there is no cure for the disease. Some non-pharmacological treatments such as music therapy, social activities and exercise are known to affect brain plasticity. In this way, non-drug therapy probably influences the quality of life and functioning of patients with dementia. An effective multidimensional intervention, combining these interventions, might be dance. This mixed-method pilot study evaluates the feasibility of in-hospital dancing for 12 community-dwelling people with dementia. Ten 1-hour dance sessions were held, led by professional dance teachers. Feasibility was indicated by attendance rate, falls, injuries, session-observations and a group interview with participants. Secondary quantitative outcomes were pre- and postintervention quality of life, gait speed and hand grip strength. Program adherence was high, there were no drop-outs and no falls nor serious injuries. Participants expressed a positive effect on physical and psychological well-being. Secondary endpoints showed a statistically significant increase in hand grip strength of the dominant hand (increase from 26 kg to 28 kg p=0.004). No significant changes in quality of life, gait speed and hand grip strength of the non-dominant hand were found. This pilot study shows that in-hospital dance sessions are feasible, enjoyable and safe for community-dwelling people with mild dementia, however the benefits of the intervention may be limited. An effectiveness study on combining physical exercise, music and cognitive stimulation together as dance instead of taking those therapies individually is needed.

INTRODUCTION

Dementia is a progressive disease of cognitive decline with a global prevalence of 57.4 million cases in 2019. The number of people with dementia is expected to increase to 152.8 million cases worldwide in 2050 [1]. The disease is a major cause of dependence, reduced quality of life and functional decline in elderly. There are some symptomatic pharmacological treatments, such as acetylcholinesterase inhibitors. However there is no cure or disease modifying therapy and the effects of symptomatic drugs are moderate [2]. Therefore, non-pharmacological options, such as music therapy, cognitive stimulation therapy and exercise are also being explored and advised [3]. There is evidence that music reduces behavioral and emotional disorders, exercise improves/maintains activities of daily living and cognitive





Gerontology And Geriatric Research

SCIENTIFIC LITERATURE

stimulation improves cognition [4]. The likely mechanism of these non-pharmacological interventions is the increase in brain plasticity [5]. Dance is an intervention combining exercise, social interaction, music and cognitive stimulation. This holistic intervention might activate areas of the brain such as the prefrontal cortex, which is responsible for executive functions and social cognitive responses [6,7]. Furthermore dance has shown to have a significant moderate effect on global cognition [8]. Dance interventions targeting older people with dementia are appreciated and enjoyed [9]. The aim of this study was to investigate the feasibility of an in-hospital dance intervention for community-dwelling people with dementia. We hypothesized that organizing a dance intervention is feasible and could have positive effects.

MATERIALS AND METHODS

We conducted a mixed-method pilot study. Inclusion criteria were (1) Age \geq 70 years, (2) community-dwelling with a diagnosis of dementia of any etiology, (3) mentally competent to give informed consent, (4) ability to walk 4 meters with or without aid. Exclusion criteria were (1) non-Dutch or non-English speaking, (2) severe visual or hearing impairment. Participants were recruited at the Alzheimer cafes, dementia support groups and the outpatient clinic of the Catharina Hospital in the region of Eindhoven in the year 2018. The levels of disease severity and the dementia subtype of the participants were variable. The diagnosis was confirmed by the patients themselves, their geriatricians or their caregivers. Initially 28 persons enrolled. After receiving further information 13 persons were willing to join. Verbal and written informed consent was obtained. One person was not able to give informed consent, therefore a total of 12 participants were included. Ethical approval (registration number R18.034) was obtained from the Medical research Ethics Committees United (MEC-U). At baseline data on age, gender and MMSE-score [10] were obtained (Table 1).

Table 1: Baseline characteristics.		
Gender (female,%)	6 (50%)	
Mean age in years (range)	78 (67-87)	
Mean MMSE-score (range)	22.6 (16-30)	

Ten 1-hour dance sessions, led by professional dance teachers, were held during an intervention period of 7 weeks. Each session was attended by one or more observers. Session frequency was increased from once a week the first 4 weeks to twice a week the last 3 weeks. Dance sessions were organized at the Catharina Hospital in Eindhoven, The Netherlands. Each session comprised a short warm-up seated on a chair, a main part of improvised movements, interaction and short choreographed combinations. And a cool-down for closure of the session. Movements were inspired by different dance styles such as classical ballet, contemporary dance, tango and contact improvisation techniques. Participants were invited to interact with others and to participate in the creative process through intrinsic motivation.

The primary outcome measure of feasibility was assessed through session observations on falls and injuries, group interviews with participants and program adherence rates. In the interviews the following issues were explored: motivation for attending the sessions, opinion about the sessions, group experience, safety and injuries, personal effects of the intervention and recommendations for future research.

Secondary quantitative data on quality of life, gait speed and hand grip strength was collected pre- and post-intervention to asses within-group changes. The QOL-AD questionnaire was used to measure Quality of Life, defined as an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns [11]. The QOL-AD is a self-reported 13-items questionnaire a higher score reflects greater quality of life. The assessment is scored on a 4-point Likert score ranging from 1 (poor) to 4 (excellent); the total scores range from 13 to 52. The Dutch version was used [12]. The 4-meter gait speed was used as a proxy for functional capacity, performance of ADL and mobility [13]. A hand held dynamometer was used to measure grip strength as an indicator of frailty [14].

Quantitative outcome measures were compared using a paired-samples t-test, comparing pre- and post-test data to assess within-group changes. (Table 2) Statistical analysis was performed with IBM SPSS Statistics version 25 and p-value of <0.05 was considered statistically significant.

Qualitative data from class observations and interviews with participants were coded by the first author.





RESULTS

Primary endpoints

There were no serious injuries or falls and no dropouts. The overall attendance rate was high (99%) indicating an engagement with the program. In group interviews all participants expressed that they found the intervention enjoyable and some een noticed an improvement in selfesteem, mood and social well-being.

"A certain solidarity arose."

"Dancing made us very happy and cheerful. I will miss it."

"We encouraged each other."

"People are shocked when I tell them I have Alzheimer's, but when I dance I feel that I'm still myself." "We have gained more self-worth through dancing."

"During the sessions I was fully engaged and I wasn't thinking about other things at all."

Participants expressed functional effects, for example on flexibility and stamina.

"I had troubles walking, but now I can walk smoothly again."

"My muscle aches went away from dancing."

"I became a lot more flexible."

Participants expressed various reasons why they enrolled in the study. Their motivation varied from wanting to contribute to science, hoping for knowledge acquisition, wanting to counter their cognitive decline and looking for social interaction.

"My cognitive function declines, I wanted to do something about that."

They all agreed that it was enjoyable to dance independently of their caregivers.

"I didn't miss my partner, it was nice to do something for myself." Secondary endpoints

Hand grip strength improved significantly from 26kg to 28kg (p=0.004) in the dominant hand. A non-significant improvement in strength of the non-dominant hand showed. No significant changes were found in quality of life and in gait speed. At baseline the mean gait speed was 1.0 m/s (0.79-1,52) and at the end of the study the mean gait speed was 1.1 m/s (0.63-1.60). For gait speed the most common used cutoff point is 1.0 m/s, slower walking speed could identify persons at high risk of health-related outcomes [14]. The values found in this study are in line with the normative values for elderly [15].

Table 2: Within-group changes, before and after the intervention.

	Pre-intervention N=12	Post-intervention N=12	P-value
4m walk test ¹			
Mean (m/s)	1.0 (0.79-1,52)	1.1 (0.63-1.60)	0.286
Hand grip strength ²			
Right hand (kg)	26 (14 - 40)	28 (18 - 44)	0.004
Left hand (kg)	24 (14 - 44)	26 (12 - 50)	0.064
Quality of Life			
QoL-AD score	38 (27 - 46)	37 (27 - 44)	0.312

¹Average of 2 attempts, pre-intervention all participants walked without aid, post-intervention 1 participant used a walker. ²Highest score of 3 attempts, all participants were right-handed.

DISCUSSION

This study shows that it is feasible, enjoyable and safe to organize in-hospital dance sessions for community-dwelling people with mild dementia. We found a high attendance rate, no drop-outs and no serious adverse events of falls. Although not being an effectiveness study, we found that dance sessions improved hand grip strength. This might indicate a positive effect on physical functioning [16]. However gait speed and quality of life measures did not improve. The participants, both men and women, were enthusiastic about the dance intervention. A strength of our study is that it included a relatively large percentage of men (50%), compared to other studies on the effects of dance where mostly women participated [17-21].

Several study limitations should be noted. First, as it was a pilot study, the group size and intervention period were both limited. Second, participants had a fairly high MMSE-score at baseline, with only 5 participants scoring <24. This might indicate that our participants have very early stage dementia, but there were no data of CDR-scores or education levels. Third, there might be a ceiling-effect on quality of life, as scores were reasonably high at baseline. A mean QOL-AD score of 38 at baseline, indicates that people scored a mean of 3 points, indicating an average score of 'good' on each item of the questionnaire. Fourth, gait speed did not improve. An explanation might be that post-intervention measures took place right after the last dance session. Fatigue may have influenced the gait speed measures. In future research it would be interesting to include people with more advanced stages of dementia and with more signs of frailty.



CONCLUSIONS: LESSONS LEARNED AND FUTURE WORK

According to this pilot study it is both safe and feasible to set up a larger-scale follow-up study. We would advise including other physical measures, such as dynamic balance, static equilibrium and coordination, these being amenable to training by dance intervention. We would advise delaying postmeasurements until well after the intervention, to reduce the influence of fatigue.

AUTHOR CONTRIBUTIONS

"Conceptualization, all authors; methodology, all authors; formal analysis, M. Tijsma, C. Van der Linden.; investigation, M. Tijsma, C. Van der Linden, J. Wilmer; data curation, M. Tijsma.; writing—original draft preparation, M. Tijsma; writing—review and editing, all authors.; visualization, M. Tijsma.; supervision, C. van der Linden.; project administration, M. Tijsma.; funding acquisition, M. Tijsma. All authors have read and agreed to the published version of the manuscript."

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Institutional review board statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board (or Ethics Committee) of Medical research Ethics Committees United (MEC-U) (protocol code R18.034, date of approval: 23-10-2018)."

Informed consent statement: Informed consent was obtained from all subjects involved in the study.

DATA AVAILABILITY STATEMENT

Not applicable.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

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Gerontology And Geriatric Research



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05