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Review Article

Effects of Physical Exercise on Health and Well-Being of Individuals Living With a Dementia in Nursing Homes: A Systematic Review

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A B S T R A C T

Keywords:

Exercise
physical activity
dementia
Alzheimer
nursing home

Background: Physical exercise interventions have benefits for older individuals and improve the health and well-being of individuals living with a dementia, specifically those living in nursing homes.

Purpose: Report evidence from randomized controlled trials and cluster randomized control trials that evaluated the effects of physical exercise interventions on individuals living with a dementia in nursing homes.

Data sources: Web of Science, Scopus, Science Direct, Academic Search Complete, Proquest Central, British Medical Journal Database, PubMed, Cochrane Library, PEDro, Informat, Informa, and Nursing Consult were searched for relevant clinical trials and snowballing of recommended studies.

Study selection: One reviewer screened articles on inclusion criteria and identified relevant studies.

Data extraction: Data extraction was performed by 1 reviewer and checked by second and third reviewers. Two authors assessed the methodological quality and risk of bias of the relevant studies.

Data synthesis: Twelve study populations consisting of individuals living with a dementia in nursing homes were included ($n = 901$). Different types of physical exercises were undertaken: multimodal ($n = 6$), walking ($n = 5$), music and movement ($n = 2$), and hand exercises ($n = 1$). The parameters of the interventions varied across the studies. Most of the studies reported significant positive effects of physical exercise on cognition, agitation, mood, mobility, and functional ability for individuals living with dementia in nursing homes.

Limitations: The main limitations were the heterogeneity of design, small samples, and short interventions.

Conclusions: There is emerging evidence that physical exercise significantly benefits individuals living with a dementia in nursing homes. Higher quality research is required adopting more rigorous methods, including longer interventions and larger samples to determine optimum parameters of the physical exercise interventions evaluated.

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As global fertility rates decline and life expectancy rises, the aging population increases. In later life, the incidence of chronic conditions increases and an associated rise in the prevalence of age-related morbidities, such as dementia. Worldwide, there are 35.6 million individuals living with a dementia; 7.7 million new cases are diagnosed each year.¹ The most common form of dementia is Alzheimer Disease (60%–70% of cases) and other forms of dementia include vascular, Lewy bodies, frontotemporal, Parkinson, multi-infarct, and mixed.¹

Most individuals living with dementia have regular contact with healthcare services. The overall aim of healthcare services for individuals living with dementia is to optimize their health and well-being and that of their family carers, including treatment of the associated behavioral, psychological, and physical symptoms of dementia.¹ Dementia care services implement a range of strategies, such as psychosocial activities, behavior strategies, sensory stimulation, medication, and physical exercise, to achieve their goals of improving the health and well-being of individuals living with a dementia.² We know that physical exercise is beneficial for healthy older individuals by improving mobility, physical function, cognition and mood, and preventing falls.^{3,4} A Cochrane review reported that physical exercise significantly effects individuals with a dementia living in various

The authors declare no conflicts of interest.

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<http://dx.doi.org/10.1016/j.jamda.2015.08.016>

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settings, but further research was needed to explain the specific effects and what type of physical exercise is most beneficial.⁵

Thirty percent of individuals with a dementia live in nursing homes because of the disabling effects and increased dependency associated with dementia.⁶ A nursing home is an accommodation service in which an individual is provided with a high level of nursing and/or personal care, including care staff who provide these nursing and personal care needs as well as meals, cleaning, and furnishings and equipment for the provision of that care.⁷ Demands for nursing homes will increase as the prevalence of dementia continues to rise.⁸ In nursing homes, care services and interventions are provided by a range of practitioners, including nurses, occupational therapists, diversional therapists, and physical therapists. The main focus of the physical therapist is to direct the implementation of physical exercise strategies, which improves and maintains range of movement, strength, balance, mobility, and functional ability in individuals and contribute to improved quality of life for individuals living with a dementia in nursing homes. Physical exercise is defined as physical activity that is planned, structured, repetitive, and has a final or intermediate objective of improving or maintaining physical fitness.³ It is important to know what type of physical exercise best suits this population to ensure the work of physical therapists is evidence based and engages individuals living with a dementia physically and mentally.⁹ The purpose of this systematic review was to evaluate evidence from randomized controlled trials (RCTs) and cluster RCTs measuring the effects of physical exercise on the health and well-being of individuals living with a dementia in nursing homes. The influence of the studies on future research and clinical practice was also considered.

Methods

This systematic review was informed by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Statement.¹⁰

Data Searches and Study Selection

A comprehensive literature search was undertaken using a range of databases to retrieve relevant studies for the review: Web of Science, Scopus, ScienceDirect, Academic Search Complete, Proquest Central, British Medical Journal Database, PubMed, Cochrane Library, PEDro, Informit, Informa, and Nursing Consult. The search terms used were for population: “Dementia” and “Alzheimer’s”; for intervention: “Exercise,” “Physical activity,” “Physical intervention,” “Physiotherapy,” “Physical therapy,” and “Walking”; for setting: “Nursing home,” “Residential accommodation,” “Aged care facility,” “Long term care,” “Care home,” and “Rest home”; for outcome: “Physical function,” “Healthcare outcome measure,” “Behaviors,” and “Agitation.” In addition, snowballing was used to locate additional references.

The titles and abstracts of all studies found in the database searches and from snowballing were screened and duplicates and irrelevant studies excluded. From the remaining studies, the full text was read to identify relevant information and checked against the inclusion criteria. Studies were eligible if they (1) involved participants diagnosed with a dementia; (2) used a physical exercise intervention; (3) set in a nursing home; (4) were a RCT or cluster RCT; and (5) published in English. The references of review papers identified were also checked for additional relevant studies that could have been missed in the database searches.

Methodological Quality Assessment

The quality of the studies was critically appraised using the Joanna Briggs Institute Critical Appraisal Tool: Meta-Analysis of Statistics Assessment and Review Instrument critical appraisal tool for

randomized control/pseudo-RCTs.¹¹ Ten items were considered; they evaluated the randomization process, blinding, intention to treat analysis, homogeneity of groups, outcome measures, and statistical analysis (Table 1). Each item was either answered “yes” or “no.” When there was insufficient information to answer the question or it was unclear, “no” was recorded. After completing the evaluation of a paper, it was given a score out of 10, and the score increased with higher methodological quality. Two reviewers scored all selected studies, differences between reviewers were discussed, and an agreement was reached on the final score allocated to the study. If agreement could not be met, a third reviewer scored the studies. A cut-off value of the mean score minus 1 standard deviation was used to ensure only high quality studies were included in the review.

Data Extraction and Analysis

Data extraction was completed by 1 reviewer using a standardized extraction form. This was checked by second and third reviewers, and any obscurities discussed to avoid potential errors or misinterpretation of results. A meta-analysis was not possible because of the large variability between the studies: physical exercise intervention, parameters applied, outcome measures, who conducted the intervention, and type of dementia among the participants (not specified in the majority of the studies).

Results

A Preferred Reporting Items for Systematic Reviews and Meta-Analyses Consort Statement summarized the outcomes of the literature search (Figure 1). Screening the titles and abstracts found 1722 (94%) irrelevant and duplicated studies. Full texts of the remaining 102 studies were read, and the inclusion criteria applied: 15 eligible studies of which 3 were excluded because of low methodological quality. Twelve studies were included in the systematic review: 11 RCTs^{12–24} and 1 cluster RCTs,²⁵ of which 1 RCT had generated 3 separate publications. Williams C (personal communication, July 16, 2015) and Roach K (personal communication, July 22, 2015) verified through email communications that each publication was drawn from the same sample.^{14,22,23}

Methodological Quality

The methodological quality of the studies was assessed using the Meta-Analysis of Statistics Assessment and Review Instrument critical appraisal tool for randomized/pseudo-RCTs (from the Joanna Briggs Institute Critical Appraisal Tools) (Table 1).¹¹ Both reviewers were able to agree on the scores for all studies without the need to consult the third reviewer. Fifty-seven percent of the studies received a score of 7 or above that suggests the results were less likely to be biased.^{12,15,17,18,20,22,25} Eight was the highest score obtained: achieved by 4 studies.^{12,15,17,18} Three studies obtained a score of less than 5 (cut-off value) so were excluded from the systematic review because of their high risk of bias.^{26–28} Most studies obtained points for the method used to conduct the outcome measures and use of appropriate statistical analysis. As is the case with many clinical trials, it was not possible to blind participants to the intervention allocation in which they would participate; therefore, no studies received a score for this quality. Common shortcomings in methodological quality were lack of allocator blinding and detail about attrition and intention to treat analysis.

Participant Characteristics and Sample Size

The selected studies were undertaken across different continents: Europe (n = 8), North America (n = 1), South America (n = 1), Canada

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