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Review

Exercise training for managing behavioral and psychological symptoms in people with dementia: A systematic review and meta-analysis

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ABSTRACT

This systematic review and meta-analysis of randomized controlled trials assessed the effects of exercise on behavioral and psychological symptoms of dementia (BPSD, including depression) in people with dementia (PWD). Secondary outcomes for the effects of exercise were mortality and antipsychotic use. Twenty studies were included in this review ($n = 18$ in the meta-analysis). Most studies used a multicomponent exercise training ($n = 13$) as intervention; the control group was often a usual care ($n = 10$) or a socially-active ($n = 8$) group. Exercise did not reduce global levels of BPSD ($n = 4$. Weighted mean difference -3.884 ; 95% CI -8.969 – 1.201 ; $I^2 = 69.4\%$). Exercise significantly reduced depression levels in PWD ($n = 7$). Standardized mean difference -0.306 ; 95% CI -0.571 to -0.041 ; $I^2 = 46.8\%$; similar patterns were obtained in sensitivity analysis performed among studies with: institutionalized people ($p = 0.038$), multicomponent training ($p = 0.056$), social control group ($p = 0.08$), and low risk of attrition bias ($p = 0.11$). Exploratory analysis showed that the principal BPSD (other than depression) positively affected by exercise was aberrant motor behavior. Exercise had no effect on mortality. Data on antipsychotics were scarce. In conclusion, exercise reduces depression levels in PWD. Future studies should examine whether exercise reduces the use (and doses) of antipsychotics and other drugs often used to manage BPSD.

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1. Introduction

Behavioral and psychological symptoms of dementia (BPSD) are common in people with dementia (PWD) (Lyketsos et al., 2002; Seitz et al., 2010) and constitute a major concern in the care of PWD, since these symptoms have a strong negative impact on the health of both patients (Chan et al., 2011; Lyketsos et al., 2011; Russ et al., 2011) and caregivers (Alzheimer's Association, 2014; Fauth and Gibbons, 2014; Richardson et al., 2013; Schmidt et al., 2012). Because pharmacological approaches to treatment of BPSD involve the use of potentially harmful drugs (Ballard et al., 2009a; Schneider et al., 2005; Seitz et al., 2013), with limited effectiveness against placebo (Schneider et al., 2006; Seitz et al., 2013; Sink et al., 2005), non-pharmacological interventions are considered as first-line treatment for the management of BPSD (Ballard and Corbett, 2010; Brodaty and Arasaratnam, 2012).

Physical exercise, which is defined as planned, structured, repetitive, and purposeful physical activity, has been regarded by experts in the field of dementia as a potentially effective non-pharmacological intervention for treating BPSD (Ballard and Corbett, 2010; Ballard et al., 2009b; Leone et al., 2008; Seitz et al., 2012), especially depression (Ballard and Corbett, 2010; Ballard et al., 2009b). However, very little information has been gathered on the impact of exercise on BPSD in PWD. One critical narrative review concluded that the effect of exercise on BPSD is still unclear (Thuné-Boyle et al., 2012). Whereas exercise appears to be beneficial in reducing some BPSD such as depression, the role of exercise on other BPSD such as anxiety and apathy is still unknown. A Cochrane systematic review and meta-analysis (Forbes et al., 2013) recently updated the evidence about the effects of exercise on several health outcomes for PWD. However, that review mainly focused on cognitive function and functional decline; only one study provided quantitative data for analysis on overall BPSD and five on depression (no information was available for each single BPSD other than depression). The authors of that review concluded that exercise training revealed no significant effects on BPSD levels and on depression. Furthermore, to our knowledge, no systematic review and/or meta-analysis has examined the effect of exercise training on use of antipsychotic drugs among PWD. The main purpose of this systematic review of randomized controlled trials (RCT) with pre-planned meta-analysis was to examine the effects of exercise training on BPSD in PWD compared with controls. The secondary aims of this study were to investigate the effects of exercise training on mortality and on use of antipsychotics.

2. Methods

The protocol of this systematic review and meta-analysis has been registered in the PROSPERO database (registration number CRD42013004907) (De Souto Barreto et al., 2013). The full protocol can be seen in Supplementary material (S1). The reporting of this study follows the PRISMA guidelines (Moher et al., 2009).

2.1. Search strategy and eligibility criteria

Two waves of electronic searches were performed: an initial search performed between June 21 and 24, 2013, and an updating search performed on March 6, 2015. Both the initial and updating searches have applied exactly the same procedures and searched for studies in PubMed, the Cochrane Central Register of Controlled Trials, SportDiscus, PEDro, Web of Science, PsychInfo, and Scielo. Full search strategy (Higgins and Green, 2011a) can be seen in Supplementary material S1. No language restrictions were applied. In the initial search (June 2013), no publication date restriction was used (see results in Supplementary material S2); the updating search was restricted to studies published from June 2013 onwards.

Two raters screened the title/abstract of articles independently. Potentially eligible articles were then accessed in full. Divergences between raters on article eligibility were resolved by a third rater, who screened the studies independently (100% consensus on article eligibility was reached).

Articles were eligible if they met all the following criteria: (1) the study must be a RCT; (2) the study must compare the effects of one or more exercise interventions against a control group (usual care or an active-control group without exercise, such as a "talk group"); (3) more than 50% of the study population must be composed of PWD; (4) the study must have evaluated at least one of the outcomes of this review (BPSD, mortality, changes in antipsychotic use). No restrictions were applied with regard to intervention length or characteristics of the exercise intervention (type, frequency, intensity, duration).

2.2. Main outcome

BPSD. Since we expected that most studies investigating BPSD in PWD would use the Neuropsychiatric Inventory (NPI) (Cummings et al., 1994) assessment tool, we looked at the ten behavioral and two neurovegetative areas that compose the NPI. Behavioral areas were delusions, hallucinations, agitation/aggression, depression/dysphoria, anxiety, elation/euphoria, apathy/indifference, disinhibition, irritability/lability, and aberrant motor behavior, and neurovegetative areas were sleep and nighttime behavior disorders, and appetite and eating disorders. Addition of the ten behavioral areas in the NPI results in a global BPSD score (continuous variable), which constitutes the main outcome of this study. Scores for each domain investigated by NPI subscales were also analysed (continuous variables). Studies that investigated global BPSD levels or single BPSDs using assessment tools other than the NPI were also eligible.

2.3. Secondary outcomes

Mortality and changes (between baseline and post-intervention) in the use of antipsychotic drugs (binary variables).

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