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Physical activity and physical fitness of nursing home residents with cognitive impairment: A pilot study

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ABSTRACT

Physical activity and physical fitness are important for health, functional mobility and performance of everyday activities. To date, little attention has been given to physical activity and physical fitness among nursing home residents with cognitive impairment. Therefore, the main aim of this study was to examine physical activity behavior and physical fitness of institutionalized older adults with cognitive impairment and to investigate their interrelations. Forty-eight older adults with cognitive impairment (83.9 ± 7.7 years; 72.9% women) and 22 without cognitive impairment (82.2 ± 8.8 years; 54.5% women) participated. Physical activity was objectively assessed with accelerometers and physical fitness components (muscular strength, flexibility, balance, body composition and reaction time) were evaluated with physical fitness field tests. Nursing home residents with cognitive impairment spent only ~1 min per day in moderate physical activity and ~89 min in light physical activity. In average they accumulated 863 (± 599) steps per day and spent 87.2% of the accelerometer wear time in sedentary behavior. Participants' physical fitness components were markedly low and according to the cut-offs used for interpreting the results a great number of nursing home residents had an increased risk of associated health problems, functional impairment and of falling. The performance in some physical fitness tests was positively associated with physical activity. Participants without cognitive impairment had higher levels of physical activity and physical fitness than their counterparts with cognitive impairment. These results indicate that nursing home residents, especially those with cognitive impairment, have low levels of physical activity, spent a high proportion of daytime in sedentary behavior and have low physical fitness. Nursing homes should implement health promotion strategies targeting physical activity and physical fitness of their residents.

1. Introduction

The aging process leads to inevitable life changes and is characterized by a progressive loss of physiological and psychological functions. Aging is accompanied by several neurocognitive changes and disorders including mild cognitive impairment and dementia (Alzheimer's Association, 2015; Sachdev et al., 2014). Neurocognitive disorders are associated with the decline in general functional capacity, independence and autonomy, which can have considerable negative impacts on the quality of life (Bárrios et al., 2013; Giebel et al., 2014; Missotten et al., 2008).

As the population is getting older, Alzheimer's disease and other dementia are becoming a very challenging health issue due to high cost of care, morbidity and mortality (Alzheimer's Association, 2015). At the present, pharmacologic interventions seem to have a reduced effectiveness in the treatment of individuals with mild cognitive impairment or dementia and in the improvement of their quality of life and well-being (Alzheimer's Association, n.d.; Cooper et al., 2013). Physical activity and exercise could be a non-pharmacological strategy for helping people with neurocognitive disorders. Research has shown that the regular practice of physical activity is associated with several health and cognitive benefits in healthy adults (e.g., Garber et al., 2011) and that greater levels of physical activity are associated with decreased risk of a future diagnosis of mild cognitive impairment or dementia (e.g., Schlosser Covell et al., 2015). Furthermore, there is an evidence that exercise either alone or combined with cognitive training, can be effective for improving the cognitive function and functional status of older adults with and without cognitive impairment (Heyn et al., 2004; Law et al., 2014).

The World Health Organization's global strategy on diet, physical

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activity, and health asks for a greater focus on national monitoring and surveillance of patterns of physical activity and on the identification of specific high-risk groups and measures to respond to their needs (World Health Assembly, 2004). This would aid in identifying groups to target with more efficient physical activity promotion strategies, including policy formulation, planning interventions to promote physical activity, and its accurate evaluation of such physical activity promotion actions (US Department of Health Human Services, 2005). Presently, the information on the physical activity and sedentary behavior of people with cognitive impairment is scarce, as they are not typically included in large-scale population studies. Furthermore, in comparison with studies of community-dwelling older adults, there are a limited number of studies that measured objectively the physical activity behavior of institutionalized older adults.

Persons with cognitive disorders often need long-term care that leads to institutionalization (Heyn et al., 2004; Sullivan and Asselin, 2013). It seems that the lives of older adults change in many ways when they enter long term care institutions (Sullivan and Asselin, 2013), and within these settings there is generally a lack of proper environmental stimulation and physical activity opportunities (Heyn et al., 2004; Lobo et al., 2008). Thus, it is possible that the decline of physical activity and physical fitness which started before – and might lead to institutionalization (Pereira et al., 2015) –, continues within nursing home residences (Frändin et al., 2016).

Unfortunately, there is a lack of information about physical activity and physical fitness of people with cognitive impairment in nursing home residents. For instance, although in Portugal 16.5% of the population is of 65 years or more of which at least 10% are institutionalized (Instituto Nacional de Estatística, 2004), to our knowledge there is only one study that investigated, specifically, the physical activity behavior of institutionalized older adults (Lobo et al., 2008), although it did not include people with cognitive impairment or evaluated physical fitness. With these basic facts in mind, our main purpose of this study is to examine the physical activity behavior and physical fitness in institutionalized older people with cognitive impairment and to investigate their interrelations. To facilitate the interpretation of the data and to improve our understanding on the subject, we also included a group of older adults without cognitive impairment living in the same nursing home residences.

2. Material and methods

2.1. Study design and participants

The volunteers for this cross-sectional were older adults from 4 nursing home residences in the region of Leiria (Portugal). Seventy older adults were included according to the inclusion criteria: living in a nursing home residence, age of 65 years or more and being capable of walking without the assistance of any other person. A group with cognitive impairment (GCI, 48 older adults) and a group without cognitive impairment (GWCI, 22 older adults) were formed considering the participants' scores on the Portuguese version of the Mini-Mental State Examination with cut-offs of ≤ 15 point for illiterate persons, ≤ 22 for persons ranging from 1 to 11 years of school education, and ≤ 27 for persons with > 11 years of school education (Guerreiro et al., 1994).

Table 1 shows the general characteristics of the participants. Old and very old people constituted the sample and in general they had low educational levels. All participants or their legal representatives were informed about the objectives of this study and they gave their informed consent prior to participation. The study was approved by the University of Évora ethics committee and conducted in accordance with the Declaration of Helsinki.

2.2. Procedures

A trained kinesiologist collected physical fitness and physical activity data. Physical fitness evaluation was performed in two sessions (one session per day). Afterwards, the participants and nursing home personnel were instructed on the proper use of the accelerometer. For most participants, especially those with cognitive impairment, the nursing home personnel were responsible for attaching the accelerometer in the correct place in the morning and for removing it at the end of the day. In some cases, the institutions were not able to guarantee this procedure, and therefore it was not possible to collect accelerometer data. Participants were asked if they had fallen during the last 12 months. Those who said yes, had and to describe the occurrence and this information was checked subsequently with the nursing home personnel. A clinical psychologist administered the Mini-Mental State Examination.

Table 1
Descriptive characteristics of the participants.

	GCI (n = 48)	Min-max	GWCI (n = 22)	Min-max
Age (years)	83.9 (7.7)	65–106	82.2 (8.8)	65–100
Education (years)	2.4 (2.2)	0–9	4.6 (3.0)*	0–15
MMSE (points)	14.9 (4.9)	3–22	25.8 (2.2)*	23–30
Height (cm)	150 (8.0)	142–174	155 (9.0)	142–178
Weight (kg)	60.4 (12.1)	35–101	73.4 (11.5)*	51–100
Gender (% women)	72.9%	–	54.5%	–

Note. GCI, group with cognitive impairment; GWCI, group without cognitive impairment. MMSE, Mini Mental State Examination. Data are mean (SD).
* $p < 0.01$ for comparison between groups.

2.3. Physical activity

Habitual physical activity was accessed by accelerometry (model GT1M; ActiGraph, For Walton Beach, FL). The GT1M (3.8 × 3.7 × 1.8 cm; 27 g) measures the acceleration of normal human movements, ignoring high frequency vibrations associated with mechanical equipment. All the data were downloaded using ActiGraph software and stored in a database computer. ActiGraph accelerometer measurements are frequent in physical activity research with older adults and have been shown to be valid and reliable for quantifying physical activity in adults (e.g., Silva et al., 2010).

It was asked that participants use the accelerometer during the day hours for 7 consecutive days, except during water activities. The device was securely attached on the right hip, near the iliac crest. The accelerometers were activated on the first day at 6:30 a.m. and data were recorded in 60-s epochs. The accelerometer activation and data download were performed using the software Actilife Lifestyle (Version 3.2). Processing was done with the program MAHUffe (http://www.mrc-epid.cam.ac.uk/research/resources/materials-transfer disclaimer/physical-activity-downloads/) from the original downloaded files from the accelerometer. We included the results from participants with at least 3 valid days and a minimum wear time of 8 h per day. Periods of at least 60 consecutive min of zero intensity counts were considered nonwear time.

Physical activity variables evaluated by accelerometry included minutes per day spent in different intensities of activity, mean time (minutes per day) of total physical activity (light, moderate, and vigorous), average physical activity (counts per minute), and number of steps per day. The time spent at different levels of physical activity was calculated using the following criteria: sedentary: < 100 counts per min; light: 100–2019 counts per min; moderate: 2020–5998 counts per min; vigorous: > 5999 counts per min (Baptista et al., 2012). The pattern of hourly mean physical activity counts per min was studied for the period between 7:00 h and 20.00 h. This period was chosen since it corresponds to the hours of the day where more that 50% of the participants used the accelerometer.