Archives of Gerontology and Geriatrics 50 (2010) 351–355

Contents lists available at ScienceDirect

Archives of Gerontology and Geriatrics

journal homepage: www.elsevier.com/locate/archger

Physical and social functional abilities seem to be maintained by a multifaceted randomized controlled nutritional intervention among old (>65 years) Danish nursing home residents

Anne Marie Beck [a,*], Karin Damkjær [a], Liv W. Sørbye [b]

[a] Department of Nutrition, National Food Institute, Technical University of Denmark, Moerkhoej Bygade 19, DK-2860 Soeborg, Denmark
[b] Diakonhjemmet University College, Diakonvejen 4, 0370 Oslo, Norway

ARTICLE INFO

Article history:
Received 2 February 2009
Received in revised form 26 May 2009
Accepted 28 May 2009
Available online 10 July 2009

Keywords:
Chocolate
Home made oral supplements
Moderate intensity group exercise
Oral care
Nursing home

ABSTRACT

The purpose was to test the hypothesis that a multifaceted 11 weeks randomized controlled intervention would have a significant influence of functional abilities in old nursing home residents. Participants were 121 old (>65 years) residents in seven Danish nursing homes. The intervention consisted of nutrition (chocolate, homemade oral supplements), group exercise (moderate intensity) and oral care. Measurements taken were weight, body mass index (BMI), energy and protein intake, and functional abilities (activities of daily living = ADL, cognitive performance, and social engagement). The results showed that the nutrition and exercise were well accepted. After 11 weeks the change in % weight (1.3 vs. −0.6%, $p = 0.005$), % BMI (0.4 vs. −0.2%, $p = 0.003$), energy intake (0.7 vs. −0.3 MJ/day, $p = 0.084$) and protein intake (5 vs. −2 g/day, $p = 0.012$) was higher in the intervention group than in the control group. Also, after 11 weeks, social and physical function had decreased in the control group but was unchanged in the intervention group. The difference between groups was significant in relation to social engagement ($p = 0.009$). After the end of the intervention both groups had lost weight and physical function. Cognitive performance did not change, at any time. In conclusion, it seems possible to maintain social (and physical) functional abilities in old nursing home residents by means of a multifaceted intervention.

1. Introduction

It has been generally agreed that the risk of undernutrition, rather than overnutrition is the main cause for concern in elderly people, particularly those who are hospitalized or institutionalized (Milne et al., 2005).

In Denmark, as in other Western countries the prevalence of low BMI and weight loss is very high among old people living in nursing homes (Beck and Ovesen, 2002). Low BMI and weight loss has been shown to have serious consequences and can result in compromised quality of life, chronic disability, decline in physical, cognitive and social functional abilities, increased health care cost and death (Bates et al., 2002).

Nursing home residents may be expected to benefit from energy and protein supplementation in all these matters. Nevertheless, a recent Cochrane review on nine randomized controlled trials (RCT) performed among old people (minimum average age of 65 years) in nursing homes or long-term care concluded that the only observed benefit was a weight gain (2.5% (95% CI: 1.7–3.2%, $p < 0.001$) (Milne et al., 2005).

The reasons for poor nutritional status in older people are multifaceted and e.g., eating dependency, low physical and cognitive functional abilities and chewing problems increase the likelihood of both low BMI and weight loss (Blaum et al., 1995). Few nutritional intervention studies have taken this in consideration. In the Cochrane review only two studies among nursing home residents included, respectively high-intensity (Fiatarone et al., 1994) and moderate intensity exercise (Bonnefoy et al., 2003) and none focused on oral care. In addition, the majority of the studies have used commercial supplements, which may not be well accepted. Finally, data about benefits in relation to functional abilities are limited (Milne et al., 2005).

The aim of this study was to test the hypothesis that a multifaceted 11 weeks RCT, comprising nutrition, group exercise and oral care would have a significant influence of functional abilities in old nursing home residents.

2. Subjects and methods

2.1. Study design

Inclusion criteria: nursing home residents aged 65 and older who could be weighed, were non-terminal, non-hospitalized, and living in one of seven nursing homes in Denmark (in Copenhagen

* Corresponding author. Tel.: +45 72 347 423; fax: +45 72 347 119.
E-mail address: ambe@food.dtu.dk (A.M. Beck).

0167-4943/$ – see front matter © 2009 Elsevier Ireland Ltd. All rights reserved.
doi:10.1016/j.archger.2009.05.018

and surrounding municipalities). The nursing homes were recruited because they had shown a continuous interest in nutritional aspects and the potential benefits for the residents prior to the study. All the nursing homes asked accepted the invitation.

The Ethics Committee of Copenhagen approved the study protocol, and informed consent was given by the residents or by proxy.

The nursing homes were included prospectively from January to April 2006. Following the baseline assessments, which were completed in two weeks, residents at each nursing home were allocated to the intervention or the control group according to their date of birth. Residents were divided into two groups of equal size with residents born at the beginning of a month allocated to the intervention group and residents born at the end of the month allocated to the control group. This protocol was carried out in order to minimize the risk of bias as a result of factors associated with the facility.

Each nursing home appointed persons among the staff who assisted with procedures regarding nutritional supplementation and data collection. AMB and KD visited the nursing homes at least once weekly to monitor compliance and discuss problems in relation to the intervention.

2.2. Intervention strategies

2.2.1. Nutrition

All the residents allocated to the intervention group were offered: 25 g chocolate (500 kJ and 1.3 g protein) and 150 ml hot chocolate (900 kJ and 5.7 g protein) or 150 ml homemade oral supplement (840 kJ and 6.9 g protein) every day for 11 weeks. The homemade milk-based oral supplement was based on the recipe from the individual nursing home kitchen, adjusted to an equal content of energy.

The intervention group received 150 ml of a homemade oral "training" supplement immediately after training (based on Esmarck et al., 2001; Rosendahl et al., 2006). It consisted of cream and cocoa milk (1020 kJ and 4.7 g protein) twice a week. When a resident did not attend the physical training, the oral supplement was offered when possible. All in all, the nutrition intervention provided an average of 1.7 MJ and 9 g protein/day per person.

Additionally, a Gratin-diet (with a soft consistency of smooth pureed, finely sieved, homogeneous, and cohesive foods) was offered to residents in the intervention group with chewing and swallowing problems. It was recommended to serve the Gratin-diet at lunch and dinner (based on Beck and Ovesen, 2004). No placebo was provided for the control group and normal nutritional care, including oral supplements were maintained during the intervention period.

2.2.2. Exercise

The intervention group attended an exercise program of moderate intensity 45–60 min group sessions twice a week (based on Rydwik et al., 2005), supervised by the physiotherapists. The program was individualized according to a baseline assessment and performed in groups of 2–5 residents.

The program started with a 6–7 min warm-up session with activities which involved large muscle groups, including swinging the arms, marching in place, walking forwards and sideways and range of motion exercises. This was followed by a circuit program consisting of (1) functional strength training of upper and lower extremities and trunk and (2) progressive dynamic balance training including weight shifts in sitting and standing position, walking on different surfaces and ball bounces. The level of exercise was evaluated regularly to ensure that the same relative training intensity was maintained in terms of load, number of repetitions, exercise duration and degree of difficulty in balance training. The exercise program was given as a supplement to the standard physiotherapy and residents in both groups received physiotherapy as usual during the intervention period. After 5–6 weeks the staff was invited to attend an exercise session.

2.2.3. Oral care

The intervention group was offered oral care 1–2 times a week in order to reduce the prevalence of plaque. The residents were asked/assessed for mouth problems/concerns and advice where given with regard to optimizing the oral care (based on Ekstrand et al., 1998). The dental hygienist performed the oral care. The staff was invited to attend the sessions. In both groups standard oral care was maintained during the intervention period.

2.3. Assessments

2.3.1. Compliance with the intervention strategies

The staff documented the consumption of the chocolate and the homemade oral supplements (recorded as 1, 3/4, 1/4, or 1/4 portion consumed), daily. The physiotherapists, who supervised the exercise, documented the consumption of the homemade oral "training" supplements. After each training bout, the physiotherapists' documented attendance to the training, the intensity achieved and eventually adverse events (based on Rickli and Jones, 2001) in a structured report. The dental hygienist documented compliance with the oral care.

All the recordings included specific notes about any problems with the different intervention strategies, i.e. reasons for lack of intake of the nutrition, reasons for not attending the training and reasons for not performing the oral care.

2.3.2. Resident assessment instrument (RAI)/minimum data set (MDS)

The MDS assesses information on functional, nutritional, medical, cognitive, psychological and social status through a comprehensive and standardized procedure. Each item of the MDS has its own explicit definition and coding conventions, and a manual is used to standardize how to ask questions, what to observe, and whom to contact for information (Morris and Nonemarker, 1991; Hawes et al., 1995). The data used in this study is based on MDS version 2.0 (www.inter-rai.org). The nurses affiliated to the project assessed resident performance all round the clock during the previous 7 days (in some cases 30 days or longer). Collected information was discussed and cross-checked with the nurse staff and medical records.

2.3.3. Height, weight, BMI and dietary intake

Height and weight were measured according to specific instructions given in the MDS (Morris and Nonemarker, 1991). Two measures of weight were conducted each time and both results recorded to provide an average. BMI was then calculated from the average body weight and height (kg/m^2).

A 3-day estimated dietary record was performed (from Tuesday to Thursday), supervised by the registered dietician affiliated to the project. Pre-printed record sheets were used to record information about the food served during the registration period and free space for other foods. Participants and nursing home staff received instructions by the registered dietician on how to fill in the dietary record, with special focus on leftovers. Additionally, dietary records were inspected and ambiguous entries clarified including fat content in milk, use of butter on bread. Standardized household measures and average portions were used to assess food portion size if information was missing (Andersen et al., 1996). The intake of energy and nutrients was calculated by means of the computer program DANKOST 2000 (Danish Catering Centre) based on the Danish food composition tables (www.foodcomp.dk). The data-