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Original Study

Effects of a Home-Based and Volunteer-Administered Physical Training, Nutritional, and Social Support Program on Malnutrition and Frailty in Older Persons: A Randomized Controlled Trial

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A B S T R A C T

Objectives: The aim of this study was to examine the effects of a home-based and volunteer-administered physical training and nutritional intervention program compared with social support intervention on nutritional and frailty status in prefrail and frail community-dwelling older persons.
Design: This was a randomized controlled trial in which community-dwelling persons (mean age = 83 years) were recruited and randomly assigned to the physical training and nutritional intervention group (PTN, n = 39) and the social support group (SoSu, n = 41). The study was conducted by trained lay nonprofessionals.
Setting: The community-dwelling older persons in both groups were visited twice a week by trained nonprofessional volunteers (buddies) in Vienna, Austria.
Participants: Eighty prefrail and frail adults aged 65 years or older.
Intervention: In the PTN group, both the buddies and older persons performed 6 strength exercises within a circuit training session and discussed nutrition-related aspects. The active control group (SoSu) had the opportunity to perform cognitive training in addition to the social contact.
Measurements: Outcome measures as nutritional (Mini Nutritional Assessment long form [MNA-LF]) and frailty status (Frailty Instrument for Primary Care of the Survey of Health, Ageing and Retirement in Europe [SHARE-FI]) were obtained at baseline and after 12 weeks.
Results: Significant improvements in the MNA-LF score (1.54 points, 95% confidence interval [CI] 0.51 −2.56; $P = .004$) and the SHARE-FI score (−0.71 discrete factor score values, 95% CI −1.07, −0.35; $P < .001$) were observed in the PTN group after 12 weeks. In both groups, the prevalence of impaired nutritional status and frailty decreased significantly over time. The prevalence of impaired nutritional status decreased by 25% in the PTN group and by 23% in the SoSu group. Moreover, the prevalence of frailty decreased by 17% in the PTN group and by 16% in the SoSu group. The presence of impaired nutritional status at baseline was independently associated with greater changes in the nutritional (adjusted odds ratio [OR] 3.18, 95% CI 1.26−7.98; $P = .014$) and frailty status (adjusted OR 3.16, 95% CI 1.01 −9.93; $P = .049$) after 12 weeks.
Conclusion: The results indicate that a home-based physical training, nutritional, and social support intervention conducted by nonprofessionals is feasible and can help to tackle malnutrition and frailty in older persons living at home. Furthermore, social support alone also can result in improvement. In particular, older adults with impaired nutritional status at baseline can benefit more from the intervention. Such a home visit program might also have the potential to prevent future health risks and could allay isolation and loneliness.

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Over the past decades, older persons, especially those older than 80 years, have become the fastest growing segment of the population. In the European Union, the number of older persons is forecast to grow from 24 million (5%) in 2010 to 62 million (12%) in 2060.[1]

In this older population, nutrition-related problems are common. The prevalence of nutritional risk was found to be 35% in a cohort of community-dwelling persons older than 85 years.[2] Malnutrition can lead to serious health problems.[3–5] There is also evidence that the role of nutrition is important in the prevention and postponement of disability.[6–9] Malnutrition is also associated with a higher risk of frailty, which contributes to its pathogenesis.[10] Frailty is a geriatric syndrome that is often linked with other geriatric conditions, such as sarcopenia, malnutrition, inflammation, physical disability, cognitive impairment, and comorbidity.[10–12] Poor muscle strength and low physical activity are the most prevalent frailty components in community-dwelling older adults.[13] In previous studies, findings have suggested that there is an overlap between malnutrition and frailty.[14–16] Indeed, a quarter to a half of people older than 85 years are estimated to be frail.[17] Recent studies have suggested that malnutrition and frailty might be reversible conditions when treated by nutritional and physical training interventions conducted by health professionals.[18–24] Due to the epidemiologic trend, prevention of malnutrition and frailty in older persons is becoming one of the greatest challenges for our social system. However, older persons are often not able to leave the house and attend a group-based program and, furthermore, the resources of professionals in public health care systems are limited.[25] Therefore, in addition to the services provided by the health professionals, volunteers are required to deliver interventions, such as nutritional education, physical training, and social support, to prevent malnutrition and frailty and to allay isolation and loneliness, particularly for those who are at home or find it challenging to leave the house. Consequently, these interventions might be able to support the independent and active life of older persons at home.[25,26] Programs that include some type of social support, such as a buddy system, have great potential to increase participation and adherence, through building, strengthening, and maintaining social networks that provide supportive relationships for behavioral change.[26] Furthermore, social support has been identified as an important key element in the maintenance of several health behaviors.[27]

To the best of our knowledge, no studies to date have explored whether a physical training, nutrition, and social support intervention delivered by trained nonprofessional volunteers can modify the nutritional and frailty status of older persons living at home. Hence, the aim of this study was to explore the effects of a home-based and volunteer-administered physical training and nutritional program compared with social support intervention alone on nutritional and frailty status in prefrail and frail older persons living at home.

Methods

Study Design

The study comprised a randomized controlled trial comparing a physical training and nutritional intervention program (PTN group) versus a social support intervention (SoSu group) carried out by lay nonprofessional volunteers in community-dwelling older persons at home. The study was conducted between September 2013 and July 2015 in Vienna, Austria. The details of the design and methods of the study have been previously published.[28]

Participants

The older persons were recruited in 3 Viennese hospital wards between January 2014 and April 2014. In addition, following articles about the study in local newspapers and a report on television, other potential participants indicated their interest and were screened for eligibility between April 2014 and October 2014. The eligibility criteria for recruitment were persons at risk of malnutrition or malnourished persons, according to the Mini Nutritional Assessment short form (MNA-SF)[29]; prefrail or frail, according to the Frailty Instrument for Primary Care of the Survey of Health, Ageing, and Retirement in Europe (SHARE-FI)[30]; older than 65 years; living in Vienna; ability to walk; and signed informed consent. Exclusion criteria were impaired cognitive function, according to the Mini Mental State Examination (MMSE $\leq$17 points)[31,32]; planned admission to a nursing home; undergoing chemo- or radiotherapy; comorbidities (eg, insulin-treated diabetes mellitus); chronic obstructive pulmonary disease (COPD) stage III or IV; chronic kidney insufficiency; and persons classified as nursing level 6 or 7. In Austria, nursing levels 6 and 7 are intended for people whose disability requires 180 hours per month of care or more.

The nonprofessional volunteers were recruited between September 2013 and September 2014 in cooperation with a nongovernmental organization in Vienna ("Wiener Hilfswerk"), which has extensive experience of organizing volunteer work. The eligibility criterion for recruitment was persons older than 50 years.[28]

The study was approved by the local ethics committee of the Medical University of Vienna (Reference number: 1416/2013) and complied with the Declaration of Helsinki.[33] The protocol was also registered at clinicaltrials.gov (Identifier: NCT01991639). The study methods were in accordance with the CONSORT guidelines for reporting randomized trials.[34]

Sample Size

Details of the sample size calculation have been previously published.[28] On the basis of an assumed 20% dropout rate (including loss to follow-up), we estimated that a total sample size of 80 persons (40 in each group) was required for 80% statistical power to detect a clinically relevant difference of 2 kg (SD 3) in handgrip strength between the PTN and SoSu groups at 12 weeks.[28]

Randomization of Groups

Participants were randomly assigned to the PTN group or the SoSu group, stratified by using sex-specific handgrip strength thresholds (men $<$22 kg and women $<$15 kg, based on the results of the prestudy[35]) with the "Randomizer for Clinical Trials 1.8.1."[36] The community-dwelling older persons in both groups were visited twice a week by nonprofessional volunteers, called buddies. Due to these home visits, the older persons in both groups gain further social contacts. Each session was approximately 1 hour in duration over the 12 weeks. Before the home visits, buddies were trained by the project team 4 times for 3 hours each session, regarding basic knowledge on aging, frailty and malnutrition, nutrition-related aspects, strength training, and psychological issues. During the program, the buddies were equipped with a documentation book, in which they recorded the details of each home visit.[28]

Physical Training and Nutrition (PTN) Group

The aim of the nutritional intervention was to ensure adequate fluid, protein, and energy intake, preferably by regular foods and beverages, without the use of nutritional supplements. Therefore, buddies discussed nutritional-related messages with the older persons, with the aid of a guidebook. This booklet, which was designed by nutritional scientists, included 3 main nutritional aspects: fluid intake, animal and plant protein intake, and energy intake. In total, 8 nutritional-related messages could be discussed, including a section for individual goal setting and tools to reinforce the self-efficacy.