



NUTRITION EDUCATION AND COOKING CLASSES IMPROVE DIET QUALITY, NUTRIENT INTAKE, AND PSYCHOLOGICAL WELL-BEING OF HOME-DWELLING OLDER PEOPLE – A PILOT STUDY

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Abstract: *Objective:* To determine the impact of nutritional education combined with cooking classes on older people's nutrition and psychological well-being (PWB). *Design:* Intervention study using pre- and post-test comparisons. *Setting:* Non-governmental organization's cooking school facilities in Helsinki, Finland. *Participants:* 54 home-dwelling healthy older adults. *Main Outcome Measure:* Three-day food diaries, Index of Diet Quality (IDQ), and Psychological Well-Being scale (PWB) completed before and after the course were used to measure changes in overall diet quality, nutrient intake and, PWB. *Analysis:* Nutrient intake, IDQ, and PWB score were statistically compared using pre- and posttest analyzes with t-test paired bootstrap test. *Results:* Mean age of the participants was 69 years, and 90% were females. At baseline, 28 % had a diet with poor nutritional quality and 7% were at risk of malnutrition according to Mini-Nutritional Assessment. Participants improved IDQ ($p=.013$), vitamin C ($p=.019$) and fiber ($p=.027$) intakes, and PWB ($p=.02$). Effect sizes varied from small to moderate. *Conclusions:* Nutrition education and guidance combined with cooking classes may improve older adults' diet quality, nutrient intake, and PWB. New innovative practices are needed to train older people about nutrition and to socially activate them to prevent future nutritional problems.

Key words: Nutrition education, diet quality, older people, life-style, nutrition intervention.

Introduction

Aging is associated with an increased risk of poor diet quality and malnutrition (1-3). Decreased food intake in older people often leads to insufficient intake of energy, protein, and other nutrients, causing a deterioration in nutritional status. Poor diet quality, and malnutrition are associated with aging and diseases, and they increase morbidity and mortality (1, 2, 4-8)

Various studies of home-dwelling older individuals' dietary intakes have revealed that nutritional recommendations are not being met (3, 9-11). Furthermore, diet quality has been poor, nutrient intakes have been very low, and dietary patterns have been characterized as poor (3, 11).

Good nutrition and exercise promote healthy aging. Nutrition and good diet quality are associated with better

health, reduced risk of cognitive decline, and they postpone frailty and disability (4, 12-15).

Numerous nutritional interventions have been targeted to specific groups of older people. A nutrition educational program directed at caregivers of older individuals with Alzheimer's disease (AD) had a positive effect on AD patients' weights and their cognitive function (16). Educational interventions may improve fruit and vegetable intake and fiber intake among colon cancer survivors (17-18). There have also been some lifestyle interventions, including nutrition education targeted at healthy home-dwelling individuals that have shown improvements in fruit and vegetable intakes, fiber intake, and general nutritional patterns (19-21). Although these interventions have improved nutritional intake or nutritional patterns, no study has examined detailed intakes of micronutrients and the psychological well-being (PWB) of nutrition education on home-dwelling older individuals.

Older individuals are often very interested in their health and nutrition. Healthy older adults have the motivation and capacity to make necessary changes. The importance of preventing deterioration of nutrition in older individuals is why we targeted this intervention to

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the home-dwelling healthy older individuals. Our hypothesis was that self-efficacy and nutrition knowledge would improve dietary patterns. The aim of this pilot study was to examine whether nutrition education combined with cooking classes consisting of 3 sessions would have an impact on diet quality, nutrient intake, and PWB of healthy home-dwelling older individuals.

Methods

Home-dwelling older individuals participated in nutrition education and cooking classes consisting of three sessions. The classes were held in Helsinki, Finland, and were carried out as a part of a larger project organized by a Non-Governmental Organization (NGO). The project's goal was to spread information about nutrition of the older people, organize lectures, events, and to publish a book about nutrition of the older people among other activities. Participants were recruited through nutrition lectures, partner NGOs, and the project's internet site.

Inclusion criteria comprised participants filling the required forms before or at the beginning of the course, and being of 60 years or older during the course. Study participants received by mail a 3-day food diary with written instructions, a validated Index of Diet Quality (IDQ) questionnaire (22), and a background information questionnaire, which also included a validated PWB scale (23). All questionnaires and food diaries were checked at the beginning of the course by a nutritionist. The subjects were weighed, body mass index (BMI) calculated, and nutritional status assessed using Mini-Nutritional Assessment (MNA) (24).

The IDQ consists of 18 questions scored from 0 to 15 points, including questions on fruit and vegetable intake, fat quality, use of whole grains, use of fish, sugary beverages, sweets, and meal spacing. The statistically defined cut-off point is set at 10, values below indicating non-adherence and scores of 10–15 points good adherence to dietary recommendations. It has been especially designed for Finnish diet. The IDQ shows relatively high sensitivity and specificity in validation against 7-day food records and is suitable for assessing the health-promoting properties of a diet (22).

The nutrient intakes retrieved from three-day food diaries were analyzed using the Nutrica program (1999) developed for this purpose. The nutritionist checked all diaries and interviewed the participants face-to-face to ensure, for example, type of fat, milk and bread and amounts of food. The Nutrica program provides a detailed analysis of food diaries, including intakes of energy, protein, fiber, vitamins, and minerals.

The background information questionnaire included six validated questions on PWB (23). The questions inquire about (1) life satisfaction (yes/no), (2) feeling needed (yes/no), (3) having plans for the future (yes/no),

(4) having zest for life (yes/no), (5) feeling depressed (seldom or never/sometimes/often or always), and (6) suffering from loneliness (seldom or never/sometimes/often or always). We used a well-being score developed and well-validated by Routasalo et al. (2009) (23), where each question represented 0 ('no' in questions 1–4, 'often or always' in question 5 or 6), 0.5 ('sometimes' in question 5 or 6), or 1 ('yes' in questions 1–4, 'seldom or never' in question 5 or 6). The score was created by dividing the total score by the number of questions the participant had answered. Thus, a score of 1 represented the best well-being and 0 the poorest.

Each nutrition education and cooking course hosted between 8–14 participants, and in total, six courses of three sessions each were held. A nutrition education and cooking class session lasted four hours. The meetings started with an interactive nutrition lecture that lasted one hour, given by a nutritionist. The themes of the lectures were healthy nutrition and nutrition recommendations of older people, nutrition and brain health, and osteoporosis and nutrition. The participants were able to ask questions and make comments during the lecture. After the lecture, the cooking class started. The cooking classes were organized by a partner of a non-governmental organization (NGO) called the Martha Organization. Their professional cooking instructor taught the cooking classes. The meals prepared and the ingredients used were culturally familiar to older Finnish people. In each session a complete menu with various dishes was prepared and each of the participants prepared a part of the menu. The menus included salads, fish, meat and vegetable dishes, casseroles, healthy snacks, protein rich smoothies, desserts made from berries or fruits and home-made bread etc. The meals were healthy, easy to prepare, and nutrient dense. The participants were provided the recipes to take home after the classes. During the course the subjects received personal oral feedback consisting a face-to-face session with trained nutritionist. In addition the participants received written feedback on their diet. Subjects were given practical advice on how to complement possible inadequacies of their diet and how to improve their diet quality. The main focus of the nutritional advice was to increase diet quality of the participants. Good diet quality was considered to comprise generous servings of vegetables and fruits (≥ 5 portion, daily), sufficient energy and protein intake of fish, poultry, milk products, beans, nuts, or egg, good quality of fats, emphasizing the use of vegetable oils, good-quality spreads, nuts, seeds and fatty fish, whole grains, and low-fat milk products (14–15, 25). The dietary counselling was tailored according to each participants' individual needs. For example, if participants consumed insufficiently fruits, and vegetables, they were encouraged to increase their consumption, or if fat quality in their diets was poor, they were encouraged to eat more nuts and seed, use



vegetable oils, and good quality spreads instead of saturated fats. Whole grain product consumption was favored instead of processed carbohydrate use, and sufficient protein consumption encouraged. The participants were also advised to use 20 µg of vitamin D supplements daily (26). Some of the subjects used calcium supplements excessively, exceeding the upper limit (UL) for calcium. They were advised to reduce the use of calcium supplements when necessary. All subjects were given written information about healthy nutrition.

At the end of the course, the participants were asked to anonymously give a semi-structured feedback on the course. They responded to a questionnaire that contained items using a scale as well as open-ended questions.

After a four-months follow-up, the subject received by mail a 3-day food diary, the IDQ (22), and the PWB scale (23).

Statistical analysis

The results were expressed as means with SD and 95% confidence intervals (CI). Statistical comparison of changes in outcome measurements was performed by using bootstrap type t-test. The effect size was used to measure the strength of dietary change. Effect size ("d") was calculated by using the method of Cohen for paired samples (mean baseline scores minus mean follow-up, divided by the pooled standard deviation). Effect size of 0.20 was considered small, 0.50 medium, and 0.80 large. CIs for effect sizes were obtained by bias-corrected bootstrapping (5000 replications). Correlations among the variables were tested (adjusted with BMI and age). No adjustment was made for multiple testing. We used STATA (release 13.1, College Station, TX) for statistical analyses.

All participants signed an informed consent. The study protocol was approved by the Ethics Committee of the University of Helsinki.

Results

Of the participants (n=54), 90% were female. Mean age and BMI were 69 years and 27.4 kg/m², respectively. In total, 2 persons (3.6%) did not return the questionnaires after the follow-up time. Of the participants, 7 % were at risk of malnutrition, others had good nutritional status measured by the MNA (24). At baseline, 28 % of participants' diets were of poor nutritional quality, as measured by IDQ (22). The baseline characteristics are shown in Table 1. Lower than recommended intakes of folate (n=32, 60%), iron (n= 26, 48%), vitamin E (n=12, 22 %), vitamin C (n=11, 21%) and fiber (n =37, 69%) were observed.

Table 1

Baseline Characteristics of the Participants in Nutrition Education and Cooking Classes

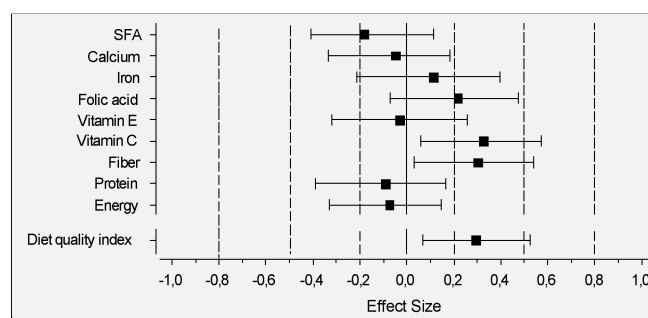
Characteristic	Participants (n=54)
Female, n (%)	49 (90%)
Age (years), mean (range)	69 (60–83)
BMI ¹ (kg / m ²) , mean (range)	27 (18.9–37.4)
<20	3%
20–23	12.1%
>23	84.5%
MNA ² score, mean (range)	26 (20–30)
Malnutrition <17	0
Risk of malnutrition 17–23.5	7 %
Good nutrition status >23.5	93 %
IDQ ³ score, mean (range)	10.6 (5.4–14)
Poor diet quality r<10	28%
Recommended diet quality >10	72%

1. BMI= body mass index; 2. MNA=Mini-Nutritional Assessment (Guigoz 2006); 3. IDQ= Index of Diet Quality (Mäkelä et al. 2012).

At baseline the IDQ was 10.6 points and at the end 11.1 points (estimated power of detected change was 0.75). After the four-month follow-up, the IDQ (p= .013) and vitamin C (p= .019), and fiber intake (p= .027) improved (Table 2). Intakes of other nutrients did not change significantly. PWB score also improved (p= .02). The effect size changes measured were small and were highest in vitamin C, fiber, and folate intakes. The effect sizes of change in IDQ and specific nutrients are shown in Figure 1.

Figure 1

Effect size of change in Index of Diet Quality (IDQ), energy and specific nutrients



The proportion of participants using vitamin D supplements increased from 67 % at baseline to 80 % at the end of the study. Many of the subjects used calcium supplements excessively, the use of calcium supplements dropped from 51 % at the baseline to 42 % after the follow-up period.

According to the anonymous feedback of participants, 98.2 % of the participants gave the course an overall rating of very good (60.3%) or good (37.9%). Moreover,



Table 2
Index of Diet Quality, Psychological scale, Energy and Specific Nutrient Intake at Baseline
and at the Four-month Follow-up

	Baseline mean (SD)	Change after 4 months Mean (95% CI)	p-value
IDQ ¹	10.6 (1.9)	+0.5 (0.1 to 1.0)	0.013
Psychological well-being score	0.87 (1.8)	+0.13 (0.01 to 0.6)	0.02
Energy (kcal)	1711 (442)	-32 (-124 to 64)	0.50
Protein (g)	82 (23.1)	-2.2 (-8.5 to 3.6)	0.47
Fiber (g)	22.9 (6.3)	+2.2 (0.3 to 4.2)	0.027
Vitamin C (mg)	112.6 (43.8)	+19.2 (4.4 to 37.5)	0.019
Vitamin E (mg)	12.8 (6.1)	-0.2 (-1.7 to 1.6)	0.83
Folic acid (μg)	287 (70)	+18.6 (-4.7 to 44.2)	0.14
Iron (mg)	10.3 (2.2)	+0.3 (-0.5 to 1.2)	0.48
Calcium (mg)	1007 (319)	-16.8 (-99.4 to 69.4)	0.69
SFA ² (g)	27.6 (12.9)	-1.9 (-4.9 to 0.7)	0.18

1. IDQ= Index of diet quality; 2. SFA= Saturated fatty acid

98.3% rated the nutrition education part of the course as very good (62.1%) or good (36.2%) and thought they learned new things. Overall, 94 % were satisfied with the personal feedback that the nutritionist gave them of their diet and diet quality. All of the participants said they would recommend the course to their friends and acquaintances.

Discussion

Our pilot study showed that healthy older participants may improve their diet quality as well as vitamin C and fiber intakes. The intervention had a favourable effect on participants' psychological well-being as a consequence of nutrition education, and cooking classes. Our results suggest that interventions tailored to everyday life, including food preparation and social activation may be effective in improving nutrition and psychological well-being in older people.

Our pilot study has several limitations. First, the lack of a control group does not allow us to rule out the Hawthorne effect. Second, it is impossible to interpret which part of intervention has effects on participants' nutrition: learning about healthy diet, improving cooking skills or socializing with each other. However, our study suggests that as such this package of nutrition education and cooking classes with social stimulation may have favourable effects on older people's diet quality. Third, our attempt to collect exact data on food consumption is limited because the 3-day food diaries may be affected by under- or over-reporting of the foods consumed. However, we performed check-ups to improve the accuracy of the food diaries. For example, we attempted to clarify the type of fats, breads, milk- and meat products, and amounts of food eaten with the participants during the course, and later via phone interviews after the follow-up period. Due to lack of resources, we were only able to follow the participants for four months, although a longer follow-up would have

allowed us to ascertain, whether the improved food habits would be retained. The power of our study is also fairly low. Therefore, we used effect sizes with confidence intervals to illustrate the size of the effect.

The effect of our intervention may be diluted by the ceiling effect. The fact, that our participants were healthy volunteers who already had a relatively good diet quality, nutrient intakes, and psychological well-being, and were still able to improve all of these, is encouraging. The effect sizes of the change were at best close to medium, due to the fact that the situation at the baseline was already quite good. The range of effect size changes seen here has also been observed in other intervention studies (20, 27).

Preventing the deterioration of nutritional status in older individuals is important. Previous interventions have been directed at specific groups, including older people with Alzheimer' patients' spouses (16) and cancer survivors (17). These interventions have been effective in improving participants' nutrition. Nutritional and lifestyle change studies have also been successful in addressing some nutritional issues in healthy older individuals (19-21, 28). Most of these interventions have been performed by means of minimal intervention, e.g. through phone-calls, newsletters, or manuals. Also, dietary counselling of home-dwelling older people was successful in improving nutritional status and albumin values (29). We had a more hands-on approach; we combined practical cooking skills and nutrition education to socially activate older adults. This approach takes advantage of participants' peer support and enhances their self-efficacy (23). In New Zealand, senior citizens have been offered nutrition and cooking classes free of charge in order to prevent future health problems and social isolation (30). No studies of the effectiveness of these courses have, however, been reported.

Nutrition education combined with cooking classes was a rewarding experience for the instructors as well as for the participants. Cooking and eating together created





an enjoyable environment, where the participants willingly adhered. The enthusiastic atmosphere between instructors and participants led to a lively interaction, where participants felt free to ask questions, make comments, and share experiences with one another. The courses created a positive learning and social environment. Many participants commented that they would have wanted to attend more classes at the end of the course.

Policy interventions or merely spreading information have only weak effect on improving diets (31). Thus, we need a stronger focus on adult learning methods having effects on behavioural change (32-33). Nutrition education combined with cooking classes in a relaxed atmosphere with peer support is anticipated to benefit especially older widowers, male spousal care-givers and other specific groups of older people with limited nutrition knowledge and cooking skills (9, 34-35).

Nutrition education, cooking, and eating together may also increase self-efficacy and prevent social isolation in older people. Our study suggests that PWB improved among the participants. This may be due to socializing but diet may also have effect on depression (36). As the older segment of the population in Western countries is growing, new and innovative practices are needed to cost-effectively improve and maintain older individuals' good nutrition and prevent the deterioration of nutritional status (37). More research on this approach is warranted. Our findings need to be supported in randomized controlled trials.

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Ethical standards: All participants signed an informed consent. The study protocol was approved by the Ethics Committee of the University of Helsinki

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