

Fingerfoods: a clustered-randomized feasibility study to enhance fruit and vegetable consumption in Dutch patients with dementia in a nursing home

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Research article

Keywords: Fingerfoods, fruit and vegetable consumption, dementia, elderly, nursing homes, nutritional status, quality of life

Posted Date: January 15th, 2020

DOI: <https://doi.org/10.21203/rs.2.20839/v1>

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Version of Record: A version of this preprint was published on October 23rd, 2020. See the published version at <https://doi.org/10.1186/s12877-020-01792-5>.

Abstract

Background

Eating problems are highly prevalent in older patients with dementia and as a consequence, patients are at greater risk of becoming malnourished. Fingerfoods, snacks that can be picked with thumb and forefinger, could be used to counteract malnutrition in patients with dementia. The aim of this feasibility study was to evaluate whether providing fingerfoods as snacks was feasible for both patients with dementia and caregivers. Secondary objectives were to explore the effects of fingerfoods on total fruit and vegetable consumption, nutritional status and quality of life.

Methods

Institutionalised patients with dementia (N = 22, 86% female, mean age = 85 years) were included in this clustered randomized controlled feasibility trial in the Netherlands. The intervention group (N = 15) received their regular diet supplemented with fingerfoods, comprising quiches and cakes rich in fruit or vegetables, for 6 weeks. The control group (N = 7) received their regular diet. Daily fingerfood consumption of patients and attitude of caregivers towards the fingerfoods were recorded to measure feasibility of the intervention. Fruit and vegetable consumption (3-day food records), nutritional status (body mass index (BMI) and SNAQ rc scores) and quality of life (QoL) (QUALIDEM) were measured in the first and last intervention week. The effects of fingerfoods on these outcomes were analysed with paired t-tests, Chi-square tests and ANCOVA.

Results

Patients consumed on average 70 grams of fingerfoods daily, containing 41 grams of fruit/vegetables. The intervention was rated as positive by 58% of the caregivers. Changes in fruit and vegetable consumption, malnutrition risk and QoL scores during the study period did not significantly change in the intervention group compared to the control group.

Conclusion

This feasibility study showed that providing fingerfoods to patients with dementia seems feasible for both patients and caregivers and could provide a pragmatic approach to enhance fruit and vegetable consumption in institutionalized elderly. In future research, long-term effects of fingerfoods should be studied on larger scale to confirm these findings. Trial Registration: Requested.

Background

Dementia is a neurodegenerative syndrome, characterised by impairment of memory, thinking, language, ability to perform everyday activities, and changes in behaviour and character (1–3). In the Netherlands, at least 270,000 people have dementia, of whom 70,000 patients live in care- or nursing homes. Dementia is often associated with eating problems (4). According to a study of Volicer et al., eating problems were found in 76% of all institutionalised patients with dementia (5). As a result of eating problems, patients with dementia can for example seek out for foods between meals, prefer sweet foods more than before, or eat with their hands (6). Other examples include patients who forget how to use cutlery appropriately and that patients have problems with indicating how close food should be put to their mouth (7). In addition, patients with dementia may show defensive behaviour, which can result in refusal to eat (8).

These eating problems may lead to a low total food intake. A couple of cross-sectional studies have shown that malnutrition and risk of becoming malnourished was prevalent in 56% of elderly with dementia living in care and nursing homes, which was higher compared to elderly without dementia (46%) (9,10). Meijers et al. showed in a study in Dutch care homes that the prevalence of malnutrition was 22% in residents with dementia, compared to 14% in residents without dementia (11). As a consequence of malnutrition, patients are at greater risk to have an impaired immunity, delayed healing, and micronutrient deficiencies. Other consequences of malnutrition are fractures, osteoporosis, depression, hypothermia, bedsores, and a faster loss of independence (8,12). These factors affect physical health of patients with dementia and may impair quality of life (4).

A low total food intake may also cause a low fruit and vegetable consumption. Fruit and vegetables contain important vitamins and minerals and a low fruit and vegetable consumption may impair quality of life, for example by causing constipation (13,14). In the Netherlands, 70% of the community-dwelling elderly (70 years and older) does not meet the nutritional guideline for fruit consumption and 50% does not meet the guideline for vegetable consumption. It is assumed that this percentage is even higher in elderly living in care and nursing homes, though this has not been measured (15,16).

To counteract these health problems, caregivers have to pay more attention to ensure adequate nutrition in patients with dementia. However, this is contradicted by the high work load and increased stress amongst caregivers working in nursing homes (17). Nutrition for patients with dementia can even lead to increased stress for their caregivers, due to the possible defensive behaviour of patients with dementia (7,8,18). In the literature, a range of nutritional interventions has been described to counteract these problems, which showed positive effects on communication and behaviour of residents during dinner, but most interventions only showed small effects on increasing food intake (4,19,20).

A promising nutritional strategy for patients with dementia is the use of fingerfoods (7,12,20,21). Fingerfood is a general term for food that can be picked with thumb and forefinger; the use of cutlery is therefore not needed (12,22,23). For patients with dementia this means that fingerfoods can be eaten easily by hand and are quickly recognised (12). Additionally, fingerfoods are useful for patients with dementia who are restless, since it is not required to eat fingerfoods while sitting at the table (22–24). International studies have shown positive effects of fingerfoods on the enjoyment of eating, the amount eaten, and independence of patients with dementia (12,20,25–27). Additionally, fingerfoods can have a positive effect on quality of life, feeling of dignity, eating independence, and nutritional status of patients with dementia (12,20,22). Fingerfoods can be used to improve consumption of fruits and vegetables in patients with dementia as well (13,25). In the Netherlands, fingerfoods have been introduced in three nursing homes as pilot studies. In these pilots, where fingerfoods were used as

replacement for the main meals in small study groups, a lower total daily food intake was observed when using fingerfoods. However, independence and enjoyment of eating were higher and defensive behaviour was reduced (22,28).

In the current feasibility study, a small-scale fingerfoods intervention was conducted practice-based and evaluated. In contrast to previous studies, fingerfoods rich in fruit/vegetables were provided as snack besides regular main meals to patients with dementia living in a nursing home. We evaluated whether providing fingerfoods as snacks was feasible for both the patients and their caregivers. The secondary objectives of this study were to explore the influence of providing fingerfoods on the total fruit- and vegetable consumption, nutritional status and quality of life (QoL) of patients.

Methods

Study design

A 6 week feasibility study was conducted between October and December 2017 in a nursing home in the North of the Netherlands. The study design was a clustered randomized controlled trial, in which departments of the nursing home were randomly allocated to either the intervention or control group. This study was exempted from METC approval by the METC-WU. Written informed consent was signed by family as legal guardians of participants in this study, since the mental state of the participants (elderly with advanced dementia) made them unable to provide appropriate informed consent.

Study population

From all 24 patients living in the nursing home, 22 patients were included in the study after signing informed consent. These departments were enclosed, i.e. patients who lived in one department were therefore not able to go to the other departments. Exclusion criteria for participation to the study were: having a special diet or receiving enteral tube feeding which does not allow to eat fingerfoods, limited eating options due to chewing and/or swallowing difficulties, and severe illness which makes consumption of fingerfoods impossible for ≥ 2 days.

Intervention

The intervention group consisted of residents of two departments ($N = 16$). Residents were provided with regular meals, including morning and afternoon snacks as usually provided in the department. In addition, fingerfoods were served daily around 4 pm as snacks, on top of their regular meals and snacks. The control group consisted of residents living in one other department ($N = 8$). They were provided with regular meals, including morning and afternoon snacks as usually provided in the department, but they did not receive fingerfoods.

Fingerfoods were provided by the general kitchen of the nursing home. The researchers, dietician, and cook of the nursing home developed seven fingerfood recipes: one type of fingerfood for each day of the week. Fruit and vegetable contents of all fingerfoods were around 50% (Table 1). Caregivers provided the fingerfoods daily in two pieces of circa 5x5 cm for each resident, served on small plates. The caregivers encouraged consumption of the fingerfoods, but did not emphasize the health aspects; the fingerfoods were promoted as 'tasty snack' instead. If patients needed help with eating, caregivers assisted the patients with eating the fingerfoods.

Outcome variables

Fingerfoods

The caregivers recorded consumption of fingerfoods in the intervention group during the whole intervention period using a checklist. All types of fingerfoods were weighed during both the first and last week of the intervention using a calibrated scale. The average of these measurements was used to indicate portion sizes. Nutritional contents were calculated using Compl-eat (Version 1.0, Wageningen University, Wageningen)(29).

Attitude of caregivers towards fingerfoods

To measure feasibility of the intervention, an evaluation form was provided in week 6 of the intervention to caregivers and other personnel who had been involved in the project. The questionnaire on feasibility consisted of 5 open questions and 3 multiple-choice questions (22).

Fruit and vegetable consumption

Food diaries were completed by the researchers to measure nutritional intake between 2.00 and 8.00 pm before and at the end of the intervention period (t_0 and t_6), to assess compensation behaviour during dinner and to assess total daily fruit and vegetable consumption. The focus of this measurement was on the main meals (served between 5.30 and 6.30 pm), since this was the only meal where possible compensation for the fingerfoods was expected. The residents were randomly divided over three independent weekdays. From the food diaries, daily energy intake (during main meals) and total fruit and vegetable consumption were calculated using Compl-eat (Version 1.0, Wageningen University, Wageningen).

Nutritional status

Nutritional status was measured at t0 and t6 by means of the Short Nutritional Assessment Questionnaire for Residential Care (SNAQ^{rc}) (30), body weight, and body mass index (BMI). Body weight in kilograms was measured using a wheelchair scale. Body height was derived from patient information dossiers. To measure change in body weight, body weight measurements were compared with measurements from one month and six months prior to the start of the intervention. BMI was calculated as weight (kg) divided by squared height (m) (31).

Quality of life

To measure quality of life (QoL), the QUALIDEM questionnaire was used (32–34). Caregivers administered the QUALIDEM questionnaire to every resident at t0 and t6. The QUALIDEM questionnaire consists of 37 items which can be divided in 9 subscales on behavioural aspects of every resident during the past week (care relationship, positive affect, negative affect, restless tense behaviour, positive self-image, social relations, social isolation, feeling at home, and having something to do), rated from never to frequently (score 0 – 3) (33). For each subscale, the sum of scores of all questions was calculated with a higher sum score reflecting a higher QoL. Additionally, the sum of all questions was calculated to give an indication of overall QoL (32,34). The score of all subscales and total sum were linearly adapted to a scale of 0-100 to make the scores more comparable (32).

Other measurements

Baseline information (gender, age, dementia type, use of psychotropic medication, and use of other medication) of all residents was derived from patient information files and recorded anonymously.

Statistical analysis

SPSS (version 22, IBM SPSS Statistics, NY, USA) was used to analyse all data and for all tests, statistical significance was set at $P < 0.05$. Background characteristics and baseline outcome variables were compared between the control and intervention group. Normally distributed variables were presented as means and standard deviations, non-normally distributed variables were presented as medians and interquartile ranges (IQRs). To test differences of continuous variables between study groups at baseline, independent t-tests or Mann-Whitney-u were used. Categorical variables were presented as numbers and percentages. Chi-square tests were used to test differences of categorical variables between the study groups. If conditions of the Chi-square test were not fulfilled, Fisher exact tests were performed.

The differences in consumption between the types of fingerfoods were assessed with paired t-tests. Energy intake (in kcal) in both study groups during the main meals was compared between t0 and t6 with paired t-tests to check for compensation behaviour after consumption of the fingerfoods.

To measure the influence of fingerfood consumption on daily fruit and vegetable consumption, nutritional status and QoL, analyses of covariance (ANCOVA) were performed. In these analyses, fruit and vegetable consumption (mean daily consumption in grams; t6), nutritional status (BMI; t6), or QoL (overall QUALIDEM score; t6) were added as dependent variable, and condition (intervention or control group) was added as independent variable. Fruit and vegetable consumption (t0), nutritional status (t0) and QoL (t0) were added as covariates.

Paired t-tests were performed to test the effect of the fingerfoods intervention over time in the intervention and control group separately on fruit and vegetable consumption (mean daily consumption in grams; t0 and t6), nutritional status (BMI; t0 and t6) and quality of life (overall QUALIDEM score; t0 and t6). Besides, Chi-square tests or Fisher exact tests were used to measure changes in SNAQ^{rc} scores (as indicator for nutritional status).

Results

Study population

The study population mainly comprised females (86.3%; Table 2). The majority of patients in the intervention group was diagnosed with Alzheimer's disease ($N = 12$, 80%), whereas the majority of the control group was diagnosed with other types of dementia ($N = 3$, 43%) ($P = 0.036$). Mean BMI scores were slightly higher in the intervention group compared to the control group (24.5 ± 5.0 vs. 22.7 ± 2.9 kg/m²). Daily fruit consumption was significantly lower in the intervention group compared to the control group (median: 30.0 (34.5) vs. 72.0 (2.0); $P \leq 0.001$). Energy intake during dinner was significantly lower in the intervention group compared to the control group as well (311.8 ± 115.4 vs. 441.2 ± 75.8 kcal; $P = 0.014$). Patients in the control group had higher overall QUALIDEM scores compared to the intervention group (median: 80.2 (26.1) vs. 64.9 (23.4); Table 2).

Feasibility of the intervention

Fingerfood consumption

Patients in the intervention group received two pieces of fingerfoods daily, of which on average 1.4 pieces (70.1 gram) were consumed. These consumed portions contained on average 41 grams of fruit/vegetables (Table 3). There were differences in serving weight between the types of fingerfoods and the portion sizes of the majority of these types increased during the intervention period due to changes in the kitchen. Vegetable quiche was the fingerfood with the highest consumption (76% of the served portion consumed) and spinach quiche had the lowest consumption (64% consumed; Table 3), but the differences in consumption between the types of fingerfoods were not statistically significant. The consumption of fingerfoods did not lead to significant

caloric compensation during the main meals (mean difference = -49.3 ± 114.8 kcal; $t(14) = 1.7$; $P = 0.118$). In the control group, energy intake during the main meals significantly decreased during the study period (mean difference = -120.2 ± 100.1 kcal; $t(6) = 3.2$; $P = 0.019$).

Attitude of caregivers towards fingerfoods

In total, 20 caregivers and other staff members who had been involved in the fingerfood project completed an evaluation form, from which 12 individuals also completed the 3 multiple choice questions (Table 4). Seven caregivers (58%) indicated that eating fingerfoods by the residents was experienced as positive. Five caregivers mentioned that the fingerfoods created a restless atmosphere if patients needed extra help with eating (49%), 58% indicated that serving the fingerfoods required extra time compared to a regular afternoon snack and 25% mentioned that serving fingerfoods required too much time.

Changes in fruit and vegetable consumption, nutritional status and quality of life

Fruit and vegetable consumption

Fruit and vegetable consumption was significantly increased in the intervention group (both together and separate) during the study period (mean difference = 73.7 ± 50.9 grams; $t(14) = 5.6$; $P < 0.001$), whereas the increase in the control group was not statistically significant (Table 5). However, the ANCOVA analysis showed no significant difference in fruit and vegetable consumption between the intervention and control group ($F(1,19) = 0.34$; $P = 0.566$).

Nutritional status

During the six-weeks intervention period, BMI remained the same in both study groups and the ANCOVA analysis showed that fingerfoods consumption had no significant effects on BMI ($\beta_1 = -0.2 \pm 0.6$; $F(1,16) = 0.11$; $P = 0.746$; Table 5). The number of patients with a score 'well nourished' on the SNAQ increased in both the intervention and control group (+ 16% and + 4% respectively). All changes in SNAQ scores were non-significant (Figure 1).

Quality of life

QoL seemed to increase in the intervention group and to remain the same in the control group during the six-weeks intervention period, but this difference in changes in QoL was not significant ($\beta_1 = -0.2 \pm 5.4$; $F(1,19) = 0.00$; $P = 0.978$) (Table 5).

Discussion

The results of this feasibility study showed that fingerfoods provided a positive means to enhance fruit and vegetable consumption and total food intake for institutionalized patients as shown by consumption of the fingerfoods, however no significant changes in the intervention group compared to the control group were observed on fruit and vegetable consumption, nutritional status and QoL.

Fingerfoods and total food intake

In the current study, providing fingerfoods as snacks led to an increased total food intake: patients were willing to consume the fingerfoods and did not compensate for the fingerfoods during dinner. Pilot studies looking at the effects of fingerfoods interventions in patients with dementia, showed that fingerfoods led to a lower total food intake (22,28). However, in these studies, main meals were replaced with fingerfoods. Providing fingerfoods as snacks may therefore be more beneficial to increase food intake compared to providing fingerfoods as meal replacement.

Fruit and vegetable consumption

During the 6-weeks intervention period, patients consumed on average 41 grams of fruit or vegetables on top of their regular diet due to the fingerfoods, which resulted in an increase of 45% of their total daily fruit and vegetable consumption. Fingerfoods may, therefore, be a helpful tool to counteract the negative consequences of a too low fruit and vegetable consumption in patients with dementia (13,14). However, it should be noted that the increase in fruit consumption is an overestimation of the true effect of fingerfoods, as one department of the intervention group did not eat fruit during the baseline measurements, whereas the 3-day fruit record after 6 weeks showed that participants consumed fruit daily in this department. Also, the increase in fruit and vegetable consumption in the intervention group during the study period was not significant compared to the control group, although the results of the ANCOVA analysis could have underestimated the true effects of fingerfoods since the control group had a significantly higher fruit and vegetable consumption at baseline compared to the intervention group (35). A reason for the higher reported fruit and vegetable consumption in the control group may be coincidental differences in the daily menu between the control and intervention group. Besides, in the control group the percentage of patients who needed assistance with eating was lower compared to the intervention group (29% vs. 40%). This unequal distribution may have led to bias regarding the comparison of fruit/vegetable consumption between the intervention and control group (36). Hence, to investigate the effects of fingerfoods on fruit and vegetable consumption, a more comparable control group would be needed in future research.

Nutritional status

Nutritional status, measured as BMI and SNAQ^{rc}, did not significantly change as a consequence of the fingerfoods intervention. Nutritional status was expected to improve during the study, since the fingerfoods are an addition to the regular diet for the patients with dementia. An evaluation of a 6-week intervention on fingerfoods in patients with dementia in the United Kingdom as performed by Barrat et al. (12), showed that body weight slightly increased. In their study, exclusion criteria were stricter compared to our study: all patients with physical impairments were excluded (12). This may be a reason for the lack of effect in the current study, because physical impairments may counteract the ease of eating fingerfoods independently (4). Another possible reason for the lack of effect is that impact on weight gain might take place after a longer period of time than 6 weeks. Besides, body weight and height measurements were often lacking or not precise in the current study: performing these measurements in this population was challenging, due to defensive behaviour or physical impairments of patients. Therefore, body height was derived from patient files instead of performing measurements. These missing values and lack of accuracy led to lower power of the analyses, which was already low for the ANCOVA analyses. A study with a higher sample size should be conducted to further explore the effect of fingerfoods on patient's nutritional status.

Quality of life

Quality of life slightly increased in both the intervention group and control group during the study, but the changes were not statistically significant. The pilot studies performed in the Netherlands showed positive effects of fingerfoods as meal replacers on independence and defensive behaviour (22,28,37). The study of Barrat et al. showed positive effects of fingerfoods on independence and well-being (12). The high prevalence of patients with physical limitations in the study population may be a reason for the lack of the effect of fingerfoods on independence. Therefore, larger populations of patients who are capable of eating fingerfoods independently should be included in further studies. Next to this, fingerfoods in the current study were served as an addition to the regular meals, whereas in the Dutch pilot studies and in the study of Barrat et al. the main meals were replaced by fingerfoods (12,22,28,37). This could be a reason why the effect of fingerfoods on independence was higher in these studies compared to the current study. Quality of life in the current study was measured using the QUALIDEM. This questionnaire covers many aspects of QoL, but not all aspects are relevant in the case of fingerfoods. Additionally, fingerfoods rich in fruit and vegetables may have beneficial effects on stool frequency and in that way on QoL. Therefore, in further studies a questionnaire focusing on fingerfoods-specific QoL aspects (independence, defensive behaviour, well-being, stool frequency, feeling of dignity and enjoyment of eating) should be used to estimate the effect of fingerfoods on QoL more precisely (12–14,20,22,28,37).

Strengths & limitations

To the best of our knowledge, this was the first study with fingerfoods rich in fruit and vegetables served as snacks in patients with dementia in the Netherlands. Another strength of this study was the focus on both the effects on patients and the effects on caregivers working in the nursing home. Since the study was implemented bottom-up, ideas and suggestions of persons working in the field were taken into account before and during the study period, to improve the intervention and make the intervention more executable. The results and recommendations of this study can be used to improve the concept of fingerfoods as snacks, which can be helpful in implementing a successful larger scale fingerfoods intervention in further research.

A limitation of this study was the limited statistical power, because of a small sample size and relatively short intervention period. However, this was a feasibility study and provides valuable information for future larger studies. Another limitation was that the limited comparability between the intervention and control group due to some differences in baseline characteristics. Besides, slight changes were made in the daily eating rhythm and medication of patients in both study groups during the study. These changes may have influenced the effects of fingerfoods. However, as this is a practice-based study providing important information on how this intervention works a real-life primary care setting.

Another limitation was the lack of accuracy in several measurements (fingerfood consumption, 3-day food record, body weight and height), due to physical limitations and defensive behaviour of some participants. The accuracy of fingerfood consumption was reduced due to accidental changes in portion sizes of fingerfoods during the study period. Because of these limitations, the estimation of the true effects of fingerfoods on health outcomes was deteriorated.

This study was performed in a sample of Dutch patients with dementia living in a nursing home. The baseline characteristics of the study population indicate that this sample is representative for institutionalized patients with dementia in the Netherlands (11,38). However, it should be stated that the sample size was limited and there is large variety between patients and between departments in nursing homes.

Conclusion

The implementation of a fingerfoods intervention in a nursing home seems to be feasible for both patients with dementia and caregivers and could provide a pragmatic approach to enhance fruit and vegetable consumption in institutionalized elderly. However, fruit and vegetable consumption, nutritional status and quality of life were not significantly improved compared to patients not having received the fingerfoods. In further research, the recommendations derived from this feasibility study could be used for implementation of the fingerfoods concept on larger scale.

Abbreviations

ANCOVA: Analysis of Covariance, BMI: Body Mass Index, IQR: Interquartile range, QoL: Quality of Life, QUALIDEM: Dementia specific Quality of life measurement, SNAQ^{rc}: Short Nutritional Assessment Questionnaire for Residential Care

Declarations

Ethics approval and consent to participate

The Medical Ethical Reviewing Committee of Wageningen University granted an official waiver from requiring ethics approval for the study. Patients took part in the study whose family member as legal guardians signed the informed consent for this study, since the mental state of the participants (elderly with advanced dementia) made them unable to provide appropriate informed consent themselves.

Consent for publication

Not applicable.

Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available due to them containing information that could compromise research participant privacy but are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

This study was financially supported by the Dutch top Sector Horticulture & Starting Materials (KV1505-106), who approved the study design but had no role in the analyses and writing of this article.

Authors' contributions

AV participated in collecting and analysing the data, and was responsible for writing the article. MB was responsible for formulating the research questions, designing the study and analysing the data, and assisted with writing the article. OP participated in collecting and analysing the data, and assisted with writing the article. GP and OR participated in analysing the data and assisted with writing the article. ML and NW assisted with formulating the research questions and writing the article. PV participated in formulating the research questions and designing the study, and assisted with writing the article. All authors read and approved the final version of the manuscript.

Acknowledgements

The authors would like to thank ZuidOostZorg for assisting with the set-up of the study and the recruitment of participants; and the participants, their family and the personnel of ZuidOostZorg for their participation in the study.

Statement

This study adheres to the CONSORT guidelines.

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Tables

Table 1Nutritional contents of all fingerfoods varieties per portion^a

| | Broccoli quiche | Beetroot brownie | Spinach quiche | Pumpkin spice cake | Vegetable quiche | Banana cake | Clafoutis pear |
|------------------------------|-----------------|------------------|----------------|--------------------|------------------|-------------|----------------|
| Portion size (g) | 43.5 | 55.3 | 57.8 | 55.4 | 42.2 | 23.0 | 69.2 |
| F/V content ^b (g) | 28.1 | 28.8 | 43.7 | 25.9 | 21.6 | 14.0 | 31.8 |
| F/V content ^b (%) | 65% | 53% | 76% | 47% | 70% | 52% | 46% |
| Energy (kcal) | 51 | 139 | 51 | 100 | 42 | 41 | 95 |
| Protein (g) | 2.9 | 1.5 | 2.5 | 2.6 | 2.0 | 1.1 | 2.3 |
| Fats (g) | 3.9 | 7.4 | 3.8 | 1.6 | 3.2 | 0.7 | 1.3 |
| Saturated fats (g) | 2.4 | 2.7 | 2.2 | 0.4 | 1.9 | 0.2 | 0.5 |
| Carbohydrates (g) | 0.6 | 15.9 | 1.1 | 18.2 | 1.0 | 7.3 | 18.3 |
| Sugars (g) | 0.4 | 12.0 | 0.7 | 10.4 | 0.9 | 4.4 | 15.0 |
| Fibres (g) | 0.7 | 1.8 | 1.0 | 1.3 | 0.6 | 0.6 | 0.7 |

^a One portion was 5x5 cm, fingerfoods were served daily in two portions of 5x5 cm^b F/V content = fruit and vegetable content**Table 2**Baseline characteristics of 22 Dutch institutionalized patients with dementia presented as mean ± SD, median (IQR), or *N*(%)

| | Intervention group <i>N</i> =15 | Control group <i>N</i> = 7 | Difference <i>P</i> -value |
|---|------------------------------------|-------------------------------|-------------------------------|
| Gender (female) [<i>N</i> (%)] | 14 (93%) | 5 (71%) | 0.227 |
| Age (years) | 84.6 (9.8) | 85.0 (9.7) | 0.837 |
| Dementia type [<i>N</i> (%)] | | | 0.036 |
| Alzheimer | 12 (80%) | 2 (29%) | |
| Vascular | 1 (7%) | 1 (14%) | |
| Alzheimer + vascular | 1 (7%) | 1 (14%) | |
| Other | 1 (7%) | 3 (43%) | |
| Use of psychotropic medication, number [<i>N</i> (%)] ^a | | | 0.299 |
| 0 | 8 (53%) | 7 (100%) | |
| 1 | 4 (27%) | 0 (0%) | |
| ≥2 | 3 (20%) | 0 (0%) | |
| Use of other medication, number [<i>N</i> (%)] ^a | | | 0.583 |
| 0 – 1 | 7 (47%) | 2 (29%) | |
| 2 – 4 | 7 (47%) | 4 (57%) | |
| ≥ 5 | 1 (7%) | 1 (14%) | |
| Bodyweight (kg) | 67.1 (16.8) | 68.2 (22.3) | 0.910 |
| BMI (kg/m ²) | 24.5 ± 5.0 | 22.7 ± 2.9 | 0.604 |
| SNAQ ^{1c} score [<i>N</i> (%)] | | | 0.846 |
| Well nourished | 3 (20%) | 2 (29%) | |
| Moderately malnourished | 6 (40%) | 3 (43%) | |
| Severely malnourished | 6 (40%) | 2 (29%) | |
| Help needed with eating [<i>N</i> (%)] | | | 1.000 |
| Yes | 6 (40%) | 2 (29%) | |
| No | 9 (60%) | 5 (71%) | |
| Energy intake during dinner (kcal) ^{b,c} | 311.8 ± 115.4 | 441.2 ± 75.8 | 0.014 |
| Daily fruit consumption (g) ^c | 30.0 (34.5) | 72.0 (2.0) | <0.001 |
| Daily vegetable consumption (g) ^c | 67.1 (37.1) | 80.9 (39.2) | 0.891 |
| QUALIDEM total score (0-100) | 64.9 (23.4) | 80.2 (26.1) | 0.162 |

^a Number of types of medication used^b Dinner served daily between 5.30 and 6.30 pm^c Average of 3-day food record between 2 and 8 pm

Table 3

Average consumption per type of fingerfood and overall consumption

| | Broccoli quiche | Beetroot brownie | Spinach quiche | Pumpkin spice cake | Vegetable quiche | Banana cake | Clafoutis pear | Overall |
|--|-----------------|------------------|----------------|--------------------|------------------|-------------|----------------|---------|
| Portion size (pcs) ^{a,b} | 1.3 | 1.4 | 1.3 | 1.5 | 1.5 | 1.4 | 1.5 | 1.4 |
| Weight per portion consumed (g) ^a | 58.0 | 77.9 | 73.9 | 81.1 | 63.7 | 35.0 | 101.0 | 70.1 |
| Percentage consumed (%) ^{a,c} | 66.6 | 70.5 | 64.0 | 73.2 | 75.5 | 71.4 | 73.0 | 70.5 |
| Fruit/vegetable content (g) ^a | 37.7 | 41.3 | 56.1 | 38.1 | 44.6 | 18.2 | 46.5 | 41.0 |

^a Consumed on average

^b Portion size served = 2 pieces (pcs) fingerfood per day. One piece of fingerfood was 5x5 cm

^c Percentage of total average portion size served (2 pcs; total weight differed between every type of fingerfood)

Table 4

Main results of evaluation forms, filled in by caregivers and other personnel who had been involved in the fingerfood project (N=12).

| Questions evaluation form | Percentage |
|--|------------|
| How did you experience serving the fingerfoods? | |
| Easy | 50% |
| The same as serving a regular snack | 50% |
| Difficult | 0% |
| How did you experience the eating of fingerfoods by patients? | |
| Positive | 58% |
| Changing, dependent of fingerfood type | 42% |
| Other | 0% |
| What kind of atmosphere was created by (the eating of) fingerfoods? ^a | |
| Tranquillity | 18% |
| The atmosphere was the same as before | 36% |
| Restlessness if patients needed help | 46% |
| How much time did the serving of fingerfoods take? | |
| It only took little time | 25% |
| It took as much time as regular snacks | 17% |
| It took more time than regular snacks, but this was no problem | 33% |
| It took too much time | 25% |

^a Question was completed by 11 caregivers

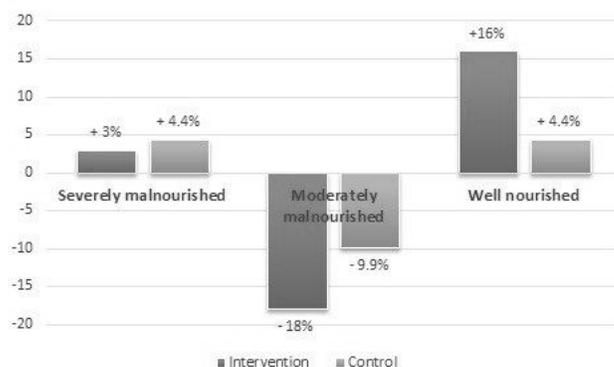


Figure 1

Changes in SNAQrc scores (%) during the 6 weeks study period for the intervention (N = 15) and control group (N = 7)

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [CONSORT2010Checklistfingerfoods.doc](#)

Table 5Effects of fingerfood consumption on fruit/vegetable consumption, nutritional status and quality of life (QoL) in institutionalised patients with dementia^a

| | Baseline | 6 weeks | ANCOVA analysis | | | | |
|---|--------------|--------------|-------------------------|-------------------------------|-----------------|--------------|---------|
| | Mean ± SD | Mean ± SD | Mean difference ± SD | Adjusted mean ^b | Effect size (β) | F-test (df) | P-value |
| <u>Fruit/vegetable consumption (g) (N = 22)</u> ^c | | | | | | | |
| Intervention | 91.7 ± 28.6 | 165.4 ± 46.3 | 73.7 ± 50.9* | 172.2 ± 13.2 | 16.3 ± 27.9 | 0.34 (1, 19) | 0.566 |
| Control | 141.7 ± 26.2 | 170.7 ± 46.5 | 29.0 ± 38.3 | 155.9 ± 21.4 | | | |
| <u>Nutritional status (BMI) (N = 19)</u> ^d | | | | | | | |
| Intervention | 24.6 ± 5.2 | 24.5 ± 5.0 | -0.1 ± 1.2 | 24.0 ± 0.3 | -0.2 ± 0.6 | 0.11 (1,16) | 0.746 |
| Control | 22.7 ± 2.9 | 22.9 ± 3.1 | 0.2 ± 0.8 | 24.2 ± 0.5 | | | |
| <u>Quality of life (QUALIDEM total score) (N = 22)</u> ^e | | | | | | | |
| Intervention | 65.5 ± 12.5 | 68.5 ± 14.1 | 3.0 ± 13.5 | 70.4 ± 3.0 | -0.2 ± 5.4 | 0.00(1,19) | 0.978 |
| Control | 74.0 ± 14.7 | 74.5 ± 14.7 | 0.5 ± 5.9 | 70.5 ± 4.4 | | | |

^a Intervention group received fingerfoods (high fruit/vegetable content) on top of normal diet, control group received normal diet only^b Covariate-adjusted means ± SE^c Mean fruit/vegetable consumption (g) per day, calculated from 3-day food record (t6), covariate: mean fruit/vegetable consumption (g) (t0)^d Nutritional status (BMI) (t6), covariate: nutritional status (BMI) (t0)^e QoL, total score of QUALIDEM questionnaire (0-100) (t6), covariate: QoL, total score of QUALIDEM questionnaire (0-00) (t0)

*Significant mean difference (paired t-test analysis: t-test (df) = 5.6 (14); P < 0.001)