Nutrición Hospitalaria

Trabajo Original

Nutrición en el anciano

Menus offered in long-term care homes: quality of meal service and nutritional analysis
Menús ofertados en residencias de mayores: calidad del servicio de las comidas y análisis nutricional

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Abstract

Background: Institutionalization is a risk factor for malnutrition. Low energy intake and/or nutrient deficiencies are considered to be the main causes.

Objective: To evaluate the quality of meals and meal service as well as the nutritional value of the main menus (regular menu, menu for diabetics, and pureed menu) offered in three long-term care (LTC) homes located in the metropolitan area of Granada (Spain).

Methods: Cross-sectional study. A validated "quality of meals and meal service" set of indicators was applied. The menus were assessed by weighed food records on 14 consecutive days. The results were compared with the dietary reference intakes (DRIs) and the recommended number of servings.

Results: Important deficiencies in the quality of meals and meal service have been reported. Average energy varies from 1,788 to 2,124 kcal/day in the regular menus, from 1,687 to 1,924 kcal/day in the menus for diabetics, and from 1,518 to 1,639 kcal/day in the pureed menus. Average protein varied from 71.4 to 75.4 g/day, from 72.6 to 76.1 g/day, and from 50.5 to 54.7 g/day, respectively. None of the menus complied with the recommendations for fiber, potassium, magnesium, iodine, vitamin D, vitamin E, folate, nor for vegetables, fruit, milk products, olive oil, legumes, or nuts.

Conclusions: It is necessary to ensure the implementation of regular routines for controlling the quality of meals and meal service as well as the nutritional value of the menus offered in LTC homes.

Resumen

Introducción: la institucionalización es un factor de riesgo de malnutrición. Se considera que las principales causas son una baja ingesta energética y/o deficiencias nutricionales.

Objetivo: evaluar la calidad de las comidas y el servicio de comidas así como el valor nutricional de los principales menús (menú basal, menú para diabéticos y menú triturado) ofrecidos en tres residencias de mayores de la provincia de Granada (España).

Método: estudio transversal. Se aplicó el set de indicadores denominado "calidad de las comidas y el servicio de comidas". Los menús se evaluaron por registro de pesada de alimentos durante 14 días consecutivos. Los resultados se compararon con las ingestas dietéticas de referencia (DRI) y el número de raciones recomendadas.

Resultados: se encontraron importantes deficiencias en la calidad de las comidas y el servicio de las mismas. La energía media varió de 1.788 a 2.124 kcal/día en los menús basales, de 1.687 a 1.924 kcal/día en los menús para diabéticos, y de 1.518 a 1.639 kcal/día en los menús triturados. La proteína media varió de 71,4 a 75,4 g/día, de 72,6 a 76,1 g/día, y de 50,5 a 54,7 g/día, respectivamente. Ninguno de los menús cumplió las recomendaciones de fibra, potasio, magnesio, yodo, vitaminas D y E y folato, ni de verduras, fruta, productos lácteos, aceite de oliva, legumbres o frutos secos.

Conclusiones: es necesario asegurar la implementación de protocolos de actuación que permitan controlar la calidad de las comidas y el servicio de las mismas, así como el valor nutricional de los menús ofertados en las residencias.

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INTRODUCTION

Malnutrition is one of the principal geriatric syndromes in people over the age of 70. It is usually related to a low quality of life in the elderly as a result of an increased disability, the progress of chronic and acute diseases, immune system deterioration, longer hospital stays, more hospital readmissions, and, ultimately, a raised rate of morbidity and mortality associated with an increased use of sanitary, economic, and social resources (1-3).

The prevalence of malnutrition varies from 3-5% in the community-dwelling population to more than 60% in institutionalized older adults (4). Low-energy intake and/or nutrient deficiencies are considered to be the main causes of malnutrition in institutionalized people (5). A low-energy intake could be caused by multiple common age-related health problems, polypharmacy, anorexia, or disability (6,7). Moreover, other factors related to long-term care (LTC) homes should be considered to ensure an adequate food intake in institutionalized people. Some of them are the lack of tailoring meals to the needs and preferences of the residents, monotonous menus, mealtime atmosphere, lack of sufficient meal assistants, and the scarcity of records regarding dietary habits (8-13).

Although low dietary intake in LTC residents has been well documented, the quality of meal service and the nutritional value of the menus have not been sufficiently investigated. Therefore, the aim of this study was to evaluate the quality of meals and meal service as well as the nutritional value of the main menus (regular menu, menu for diabetics, and pureed menu) offered in three LTC homes located in the metropolitan area of Granada (southeastern of Spain).

MATERIALS AND METHODS

CHARACTERISTICS OF LTC HOMES

This is a cross-sectional study conducted at three LTC homes located in Granada. Home A, home B, and home C were recruited to participate in a larger study called the Granada Sarcopenia Study (GSS). The health professional team consists of a physician, nurses, physiotherapists, a psychologist, occupational therapists, and social workers. Data were collected by a registered dietitian.

The University of Granada Ethics Committee approved the study protocol, and the manager of each LTC home signed an agreement of participation. All participants were informed about the study procedures and provided written informed consent before participation, or, if unable, proxy-informed consent was obtained from their substitute decision maker.

MENUS SERVED AT THE LTC HOMES

The menus served at the LTC homes consisted of traditional Spanish food, which is based on the Mediterranean diet. Three main menus were cooked in the residence facilities: regular menu, menu for diabetics, and pureed menu. The menu for diabetics and the pureed menu were prepared from the regular menu, and all of them were prescribed by the physician. According to these menus, the residents are not allowed to choose their food. Only in one of them (home A), two options were offered for lunch, and in this study, we analyzed the choice made most frequently. The structure of the meals was quite similar in all of the LTC homes, with four or five meals being offered per day. For breakfast, milk and bread or biscuits were served. At each meal (lunch and dinner), two dishes, bread, and a dessert were served (with the exception of the pureed menu, in which only one dish was served). In the afternoon, milk and cookies were offered. At midday and before dinner, some liquids were served, such as juices, infusions, or water. After dinner, milk or yogurt was served in special cases (for example, for diabetic residents). The menus are not shown.

ASSESSMENT OF QUALITY OF MEALS AND MEAL SERVICE

A validated "quality of meals and meal service" set of indicators (14) was applied, which included 13 indicators: structural (from 1 to 6), process (from 7 to 10), and outcome (from 11 to 13) (Table I). The indicator set covers three domains related to meal satisfaction in the elderly: food, food service, and choice and assessment by a nutrition screening tool (Mini Nutritional Assessment short form [MNA-SF]).

NUTRITIONAL ANALYSIS

The menus were assessed by weighed food records on 14 consecutive days. The recipes' ingredients were weighed, and the medium portion was determined. Small quantities of food were weighed to the nearest 1 g, using a digital kitchen scale with 5 kg capacity (BC-275; Fagor, Guipúzcoa, Spain). Higher amounts of food were measured with a digital weight scale to the nearest 0.1 kg, with a 5 kg to 180 kg capacity (Mod. 494, Jata, Bizkaia, Spain).

DETERMINATION OF ENERGY AND NUTRIENTS

Energy and nutrient content of the menus were quantified using the computer program Nutrire®, a dietary assessment software that uses Spanish food composition tables developed by Jiménez-Cruz et al. (15). Missing values in the database were extrapolated from similar products or copied from other database (CESNID) (16). In other cases, some products (e.g., cream soups or desserts made from powder) were registered with only the nutritional content found on the product label. The results were compared with the dietary reference intakes (DRIs) for people 70 years of age or older (17,18). The estimated average requirement (EAR) or the adequate intake (AI) (if EAR was not available) were considered. These recommendations were selected because participants in the GSS presented an age range between 70 and 106 years.

Table I. Quality of meals and meal service set of indicators (13) applied to three long term care homes

	Home A	Home B	Home C
Structural indicators			
IND1: A procedure for screening and caring for malnourished residents is established	25%	25%	100%
Crit1a: Is a standardized weighing policy available?	No	No	Yes
Crit1b: Is a validated screening instrument available?	No	No	Yes
Crit1c: Is an action plan for malnourished residents available?	Yes	Yes	Yes
Crit1d: Is a staff member referred to as responsible for the screening and treatment policy?	No	No	Yes
IND2: A policy for tailoring meals to the preferences and needs of the residents is established	25%	25%	75%
Crit2a: Is a structural consultation established with kitchen staff and staff of at least two different care disciplines?	No	No	No
Crit2b: Is a procedure established to involve residents in compiling the menu?	No	No	Yes
Crit2c: Is a procedure established for systematically inquiring the residents about food, food service and choice?	No	No	Yes
Crit2d: Is it possible for residents to individually adjust the taste of their meals (e.g., presence of sauces, flavors, etc.)?	Yes	Yes	Yes
IND3: Recipes are tailored to the needs of the residents	0%	33%	33%
Crit3a: Are written recipes available for the staff preparing the meals?	No	Yes	Yes
Crit3b: Are specific recipes available for residents with chewing and swallowing difficulties?	No	No	No
Crit3c: Are the recipes systematically reviewed?	No	No	No
IND4: Staff involved in meal care has the right competences	66%	66%	66%
Crit4a: Has the chef de cuisine an appropriate diploma to execute his/her function in the kitchen?	Yes	Yes	Yes
Crit4b: Did the chef de cuisine follow a supplementary education in tailoring meals to the elderly?	No	No	No
Crit4c: Is training in meal care provided for each feeding assistant?	Yes	Yes	Yes
IND5: A vision on meal care is established	100%	100%	100%
Crit5a: Is a vision on meal care written?	Yes	Yes	Yes
Crit5b: Has the vision on meal care been communicated to the staff involved in meal care?	Yes	Yes	Yes
Crit5c: Has the vision on meal care been communicated to the residents?	Yes	Yes	Yes
IND6: The food being served is varied	100%	100%	100%
Crit6: Is a system that guarantees variation in food used?	Yes	Yes	Yes
Process indicators			
IND7: The proportion of residents whose weight change was documented (between last month and the month before)	0%	0%	0%
IND8: The proportion of residents with documented results of a malnutrition screening (during the last three months)	0%	0%	47%
IND9: The proportion of residents whose eating habits were documented (at least twice during the last year)	0%	0%	100%
IND10: The amount of residents per meal assistant, who need help with the principal meal.	6	8	8
Outcome indicators			
IND11: The prevalence of residents with risk of malnutrition	56%	50%	58%
IND12: The prevalence of malnourished residents	9%	25%	30%
IND13: The prevalence of residents expressing mealtime satisfaction	88%	66%	78%

ASSESSMENT OF FOOD GROUPS

The number of servings from the main food groups was estimated from the medium offered portion, taking into consideration the recommended portion size (19). The number of servings per day (grain foods, vegetables, fruit, olive oil, and milk and dairy products) or per week (legumes, lean meats and poultry, fish and shellfish, nuts, and eggs) was calculated. Fats, fatty meats and lunch meats, sugar, chocolate, and bakery were only occasionally recommended, but we calculated the servings offered per week, because they were served quite often. The results of this assessment were compared with the recommended number of servings (RNS) in the Spanish guide to healthy eating adapted to elderly people (19).

STATISTICAL ANALYSES

Descriptive statistics (mean ± standard deviation) were used to report the nutritional information of the menus offered for LTC homes. Differences among LTC homes were assessed using regular menus as a reference. The menu for diabetics and the pureed menu were compared with their pertinent regular menu for the LTC home. To run these analyses, Student's t-test or Mann-Whitney U test were used, checking for the normal distribution of variables. Statistical analysis was performed using Stata 14.0 (Stata Corp, College Station, TX, USA), and the significance level was set at $p < 0.05$.

RESULTS

Three types of menus were analyzed for 14 days in three LTC homes, resulting in more than 500 analyzed plates in 126 days. The quality of meals and meal service is shown in table I, illustrating the details and results of the 13 analyzed indicators. The structural indicators with the best results were indicators 5 and 6, which means that the vision on meal care was well established in every LTC home as well as an appropriate variety of food. Similarly, indicator 4 had good results, showing that the staff involved in meal care had the right competencies. Indicator 4 did not reach a 100%, because the chefs did not have specific education in tailoring meals to the elderly. On the other hand, the structural indicator with the worst results was indicator 3, because of the lack of specific recipes for dysphagia and the absence of a system for reviewing the recipes systematically. The two other indicators in this section had different results depending on the LTC home. A procedure for screening and caring for malnourished residents was completely established only in one LTC home, and a policy for tailoring meals to the preferences and needs of the residents was not 100% established in any of the LTC homes. Process indicators were also assessed, calculating the proportion of residents in four different items. Any of the three LTC homes recorded weight each month, and only in one of them weight was checked every six months. In the same manner, eating habits and malnutrition were not documented in two LTC homes.

Uniquely in home C malnutrition was assessed and eating habits were documented periodically. Indicator number 10 showed the amount of residents per meal assistant: six residents per meal assistant in home A, eight in home B, and eight in home C. Finally, outcome indicators showed the results of malnutrition after applying the MNA-SF tool in each group of residents. We found a similar prevalence of risk of malnutrition in all of the LTC homes studied (56% in home A, 50% in home B, and 58% in home C), a varied prevalence of malnourished residents (9%, 25%, and 30%, respectively), and a different prevalence of residents reporting being satisfied with the mealtime quality (88%, 66%, and 78%, respectively).

ENERGY AND NUTRIENT CONTENTS

The results of the nutritional analysis regarding energy and nutrients are shown in table II, according to each type of menu and LTC home. Average energy varies from 1,788 to 2,124 kcal/day in regular menus, from 1,687 to 1,924 kcal/day in menus for diabetics, and from 1,518 to 1,639 kcal/day in pureed menus ($p < 0.05$). Home A had the menus with the highest caloric content, whereas home C menus had the lowest. Regarding protein, if when comparing it with the recommended dietary allowance (RDA), protein content in regular menus and menus for diabetics is adequate, but pureed menus do not reach the recommendation. The amount of carbohydrates is above the minimum established, but fiber was insufficient. When comparing the menu for diabetics with its correspondent regular menu, from which it was prepared, we found a significant reduction of carbohydrates ($p < 0.05$), as well as a reduction of calories and an increase of fiber (only significant in home A). Even so, fiber was still insufficient. In the same way, the comparison of pureed menus with their corresponding regular menus resulted in a significant reduction of calories and all macronutrients, with the exception of carbohydrates in home C, where an increase was found. Regarding micronutrient content, the comparison between the menus offered and DRIs is presented in figure 1 for regular menus, figure 2 for menus for diabetics, and figure 3 for pureed menus. Six minerals had less than 100% of the EAR (or AI) in some or all of the menus (potassium, magnesium, zinc, iodine, calcium and selenium) as well as five vitamins (vitamins D, E, C, B_3 and folate). Pureed menus offered the lowest amount of micronutrients.

The results of the nutritional analysis by food groups are shown in table III. This table contains the food servings offered per day or week and their comparison with the number of servings recommended in the Spanish guide to healthy eating (19). None of the nine menus met recommendations for vegetables, fruit, milk products, olive oil, legumes, or nuts, and six of them did not meet the recommendation for fish and shellfish. Pureed menus were also below the recommendations for grain foods and lean meat. Moreover, pureed menus offered less than one serving of eggs per week, which is a very low amount. The food groups whose recommendation is defined as "occasionally" (other fats, fatty meats, and sweet products) could not be directly compared, but it seems evident that some of the averages were quite high, especially in regular menus.

Table II. Comparison of offered menus at three long-term care homes and the dietary reference intakes for calories, macronutrients and micronutrients

Nutrients	EAR/AI	Regular menu			Menu for diabetics			Pureed menu		
		Home A	Home B	Home C	Home A	Home B	Home C	Home A	Home B	Home C
Energy, kcal		2,124 ± 230	2,022 ± 203	1,788 ± 178	1,759 ± 223*	1,924 ± 217	1,687 ± 178	1,518 ± 82*	1,639 ± 109*	1,636 ± 75*
Protein, g	0.66 g/kg	71.4 ± 12.3	75.4 ± 11.0	71.6 ± 11.3	73.8 ± 12.2	76.1 ± 10.8	72.6 ± 11.3	50.5 ± 5*	54.7 ± 9.5*	52.8 ± 4.2*
Carbohydrates, g	100	261.0 ± 21.5	272.0 ± 30.2	226.1 ± 16.1	209.0 ± 22.2*	246.1 ± 29.8*	198.4 ± 15.5*	244.7 ± 14.1*	246.0 ± 20.6*	266.4 ± 8.0*
Fiber, g	30 M/21 F†	18.7 ± 2.3	17.6 ± 4.6	15.7 ± 4.0	28.2 ± 2.3*	17.7 ± 4.6	18.3 ± 4.0	15.0 ± 1.5*	14.2 ± 2.2*	13.9 ± 1.7
Lipid, g		88.3 ± 17.2	70.3 ± 12.9	66.3 ± 15.0	69.8 ± 17.7*	70.6 ± 12.9	67.0 ± 15.0	37.5 ± 4.1*	48.5 ± 6.6*	39.9 ± 7.7*
SFA, g		28.7 ± 7.6	13.6 ± 3.2	14.4 ± 2.8	17.0 ± 7.6 *	13.7 ± 3.2	14.8 ± 2.8	17.4 ± 1.1*	9.8 ± 1.6*	10.4 ± 2.9*
MUFA, g		30.0 ± 9.3	30.2 ± 7.7	27.5 ± 11.4	24.3 ± 9.5	30.2 ± 7.7	27.7 ± 11.4	9.6 ± 2.0*	17.7 ± 4.8*	12.3 ± 3.6*
PUFA, g		11.9 ± 4.4	7.7 ± 4.2	6.7 ± 2.1	12.3 ± 5.1	7.7 ± 4.2	6.8 ± 2.1	2.0 ± 0.8*	5.8 ± 2.1	2.2 ± 1.0*
Cholesterol, mg		329.7 ± 179.2	308.2 ± 120.7	250.7 ± 143.7	244.3 ± 154.4	309.0 ± 120.7	252.2 ± 143.7	115.4 ± 25.0*	163.6 ± 64.3*	88.5 ± 28.6*
Potassium, mg	4,700†	2,277.9 ± 349.1	2,514.3 ± 546.3	2,162.4 ± 390.6	2,398.2 ± 347.9	2,521.5 ± 538.9	2,247.8 ± 390.6	1,707.9 ± 57.2*	2,097.1 ± 281.5*	1,435.6 ± 174.1*
Calcium, mg	1,000	1,125.6 ± 98.5	1,162.0 ± 164.6	1,033.8 ± 119.3	1,038.0 ± 103.0*	1,171.5 ± 155.2	1,046.1 ± 118.9	882.9 ± 53.6*	938.4 ± 57.6*	911.3 ± 31.2*
Phosphorus, mg	580	1,160.9 ± 174.4	1,285.2 ± 195.6	1,206.4 ± 203.7	1,326.2 ± 181.6*	1,298.9 ± 191.5	1,278.6 ± 203.7	945.5 ± 45.6*	980.0 ± 101.8*	885.4 ± 46.2*
Magnesium, mg	350 M/265 F	229.8 ± 29.3	247.4 ± 34.4	227.4 ± 40.0	289.2 ± 29.7*	244.8 ± 35.0	254.8 ± 39.8	221.9 ± 15.2	190.8 ± 22.1*	199.3 ± 15.4*
Iron, mg	6 M/5 F	10.7 ± 3.6	10.4 ± 1.8	8.5 ± 2.0	10.95 ± 3.7*	10.4 ± 1.7	9.1 ± 2.0	7.3 ± 0.7*	7.8 ± 1.8*	6.0 ± 0.5*
Zinc, mg	9.4 M/6.8 F	7.8 ± 1.3	8.2 ± 1.3	6.8 ± 1.2	11.0 ± 1.4	8.4 ± 1.4	8.4 ± 1.2	4.4 ± 0.6*	5.0 ± 0.5*	4.5 ± 0.7*
Selenium, µg	45	73.8 ± 25.1	70.8 ± 16.0	67.3 ± 21.4	94.1 ± 24.6	72.6 ± 15.6	76.1 ± 21.4	28.4 ± 14.0*	44.4 ± 14.1*	24.0 ± 5.4*
Iodine, µg	95	94.3 ± 15.6	33.3 ± 17.0	23.5 ± 12.4	23.5 ± 13.3*	33.1 ± 17.0	23.5 ± 12.4	71.8 ± 2.8*	48.5 ± 16.7*	10.6 ± 8.3*
Copper, µg	700	896.3 ± 176.0	1,029.0 ± 329.2	701.2 ± 200.4	1,068.1 ± 184.7*	1,037.0 ± 331.5	779.3 ± 200.4	914.5 ± 103.5	779.9 ± 158.4*	1,151.8 ± 427.5*
Vitamin A, µg eq	625 M/500 F	1,502.2 ± 527.1	2,344.3 ± 1,289.1	1,493.7 ± 846.2	1,270.7 ± 545.3	2,344.6 ± 1,292.0	1,500.4 ± 846.2	1,046.4 ± 229.5*	1,644.5 ± 692.2	1,202.0 ± 804.6
Vitamin D, µg	10 M/10 F	2.4 ± 1.4	2.1 ± 2.1	2.4 ± 3.3	1.3 ± 1.4*	2.1 ± 2.1	2.4 ± 3.3	0.9 ± 0.0*	0.5 ± 0.9*	0.1 ± 0.1*
Vitamin E, mg eq	12	6.4 ± 2.7	8.8 ± 2.1	7.1 ± 2.9	7.0 ± 2.6	8.8 ± 2.2	7.6 ± 2.9	2.0 ± 0.8*	6.5 ± 1.7*	4.1 ± 1.0*
Vitamin C, mg	75 M/60 F	155.4 ± 24.3	125.8 ± 51.2	63.4 ± 16.8	144.3 ± 24.9	125.5 ± 51.5	63.4 ± 16.8	57.3 ± 7.8*	85.3 ± 25.5*	65.0 ± 29.6
B_1, mg	1 M/0.9 F	1.3 ± 0.4	1.3 ± 0.3	1.1 ± 0.4	1.59 ± 0.4	1.3 ± 0.3	1.2 ± 0.4	0.9 ± 0.1*	0.9 ± 0.2*	0.7 ± 0.1*
B_2, mg	1.1 M/0.9 F	1.6 ± 0.2	1.6 ± 0.2	1.5 ± 0.3	1.7 ± 0.2	1.6 ± 0.2	1.6 ± 0.3	1.3 ± 0.9*	1.3 ± 0.1*	1.2 ± 0.6*
B_6, mg	1.4 M/1.3 F	1.4 ± 0.4	1.5 ± 0.3	1.4 ± 0.5	1.4 ± 0.3	1.5 ± 0.3	1.4 ± 0.5	1.5 ± 0.1	1.2 ± 0.3*	1.0 ± 0.1*
B_{12}, µg	2	4.1 ± 2.1	3.7 ± 0.9	3.7 ± 1.1	4.0 ± 2.1	3.8 ± 0.9	3.7 ± 1.1	2.1 ± 0.3*	3.6 ± 1.7	2.2 ± 0.4*
B_3, mg	12 M/11 F	10.4 ± 2.4	11.5 ± 3.3	13.0 ± 5.7	13.3 ± 2.4*	11.6 ± 3.3	14.3 ± 5.7	10.2 ± 1.7	8.5 ± 2.9*	7.6 ± 1.4*
Folate, µg	320	218.8 ± 44.1	190.0 ± 68.5	156.1 ± 35.8	230.1 ± 44.9	191.7 ± 68.5	162.9 ± 35.8	118.2 ± 9.2*	122.6 ± 27.4*	105.4 ± 18.3*

Note: Results are expressed as means ± SD. EAR: Estimated average requirement; AI: Adequate intake. EAR/AI is indicated for both male (M) and female (F) unless otherwise stated. †Represents an AI rather than an EAR.

*Statistically significant difference (p < 0.05) using the regular menu as reference.

Table III. Comparison of offered menus at three long term care homes with the recommended number of servings

Food groups	RNS	Regular menu			Menu for diabetics			Pureed menu		
		Home A	Home B	Home C	Home A	Home B	Home C	Home A	Home B	Home C
Servings per day										
Grain foods	4 to 6	4.0 ± 0.2	4.0 ± 0.3	3.8 ± 0.2	4.0 ± 0.2	4.0 ± 0.3	3.8 ± 0.2	3.9 ± 0.1	2.2 ± 0.1	5.1 ± 0.1
Vegetables	≥ 2	0.9 ± 0.1	1.6 ± 1.5	1.2 ± 0.2	0.9 ± 0.1	1.6 ± 1.5	1.2 ± 0.2	0.2 ± 0.0	1.0 ± 0.1	0.6 ± 0.1
Fruit	≥ 3	2.2 ± 0.8	1.1 ± 0.6	1.1 ± 0.9	2.2 ± 0.8	1.1 ± 0.6	1.1 ± 0.9	2.0 ± 0.0	1.0 ± 0.0	1.0 ± 0.1
Milk and dairy products	≥ 3	2.5 ± 0.8	2.8 ± 1.3	2.6 ± 0.9	2.5 ± 0.8	2.8 ± 1.3	2.6 ± 0.9	2.5 ± 0.0	2.9 ± 0.0	2.5 ± 0.0
Olive oil	3 to 5	1.5 ± 1.7	1.0 ± 0.0	1.5 ± 0.2	1.5 ± 1.7	1.0 ± 0.0	1.5 ± 0.2	0.3 ± 0.1	1.0 ± 0.0	1.0 ± 0.2
Servings per week										
Legumes	2 to 3	1.3 ± 0.4	0.9 ± 0.5	0.5 ± 0.0	1.3 ± 0.4	0.9 ± 0.5	0.5 ± 0.0	0.6 ± 0.5	0.3 ± 0.4	0.3 ± 0.4
Lean meats and poultry	2 to 4	3.5 ± 1.1	3.3 ± 1.1	4 ± 1.4	3.5 ± 1.1	3.3 ± 1.1	4 ± 1.4	2.1 ± 0.2	1.9 ± 0.1	1.8 ± 0.0
Fish and shellfish	3 to 4	2.5 ± 1.4	4.3 ± 0.8	4.4 ± 0.1	2.5 ± 1.4	4.3 ± 0.8	4.4 ± 0.1	0.9 ± 0.5	2.0 ± 0.7	0.3 ± 0.0
Nuts	2 to 7	0.3 ± 0.4	0.0 ± 0.0	0.3 ± 0.4	0.3 ± 0.4	0.0 ± 0.0	0.3 ± 0.4	0.0 ± 0.0	0.0 ± 0.0	0.2 ± 0.2
Eggs	≤ 3	4.0 ± 1.1	3.8 ± 1.1	2.3 ± 0.4	4.0 ± 1.1	3.8 ± 1.1	2.3 ± 0.4	0.0 ± 0.0	0.7 ± 0.2	0.2 ± 0.2
Occasionally										
Fats (others)	-	16.5 ± 13.4	14.1 ± 1.2	9.5 ± 2.1	16.5 ± 13.4	14.1 ± 1.2	9.5 ± 2.1	0.3 ± 0.4	7.8 ± 0.7	2.4 ± 2.3
Fatty meats and lunch meats	-	4.0 ± 2.5	1.8 ± 0.4	3 ± 0.7	4.0 ± 2.5	1.8 ± 0.4	3.0 ± 0.7	0.3 ± 0.4	1.2 ± 0.2	0.9 ± 1.4
Sugar, chocolate and bakery	-	15.3 ± 1.1	26.0 ± 0.0	10 ± 0.0	0.0 ± 0.0	7.0 ± 0.0	1.5 ± 0.7	14.0 ± 0.0	20.4 ± 6.9	7.0 ± 0.0

Note: Results are expressed as means ± SD. RNS: recommended number of servings from the Spanish Guide to Healthy Eating (19) adapted to elderly people.

Since only a few residents received oral fluid supplements, these were not included in the analysis. In the same manner, other kinds of supplementation were not taken into consideration, as it is quite uncommon to offer micronutrient tablets to LTC residents in Spain.

DISCUSSION

QUALITY OF MEALS AND MEAL SERVICE

As far as we know, this is the first study that applies the "quality of meals and meal service" set of indicators (14). Every LTC home should aspire to obtain 100% for each structural indicator. However, as previously mentioned, that only occurred in two of them (indicators 5 and 6) (Table I). These results helped to detect areas for improvement, such as establishing a procedure for screening malnutrition in all LTC homes, a policy for tailoring meals to the preferences and needs, and having and reviewing written recipes for the staff to prepare both regular and texture-modified menus. In the same manner, process indicators should tend to the best result. Moreover, it is important not only to carry out the activities of documenting the weight change, the results of malnutrition screening and eating habits, but also to do it as frequently as recommended (Table I). On the other hand, the prevalence of risk of malnutrition and already malnourished residents is notable, and this is a risk factor for other complications and for mortality (20). Finally, the prevalence of residents satisfied with mealtime could be considered as quite good, although it should aspire to reach 100% of the residents (Table I).

The "quality of meals and meal service" set of indicators suggests that a meal and meal service quality improvement process should be multidisciplinary (14). Other screening instruments were previously developed, but as far as we know, the checklist was not validated in one of them (21), or they were assessing only one of the meals in another one (22). Nevertheless, other researchers have analyzed the quality of meals in LTC homes using their own methodology (23-25).

ENERGY AND NUTRIENT CONTENTS

Regular menus are the most demanded menus in LTC homes, the best planned menus, and the most studied menus in research. However, regular menus are not meeting the dietary recommendations (Table II). Regarding macronutrients, the protein contribution of regular menus meets the RDA. However, it is remarkable that numerous researchers are suggesting that the RDA of protein for older adults is too low (26,27). Regarding micronutrients, the regular menus failed to meet the dietary recommendations (Fig. 1). The results are consistent with previous studies (28-31), but differ from others which indicated an appropriate nutritional value (24,32,33). Some of the discrepancies between studies may be caused by differences in the characteristics of the LTC homes, differences in the recommendations used as reference, or the study's methodology.
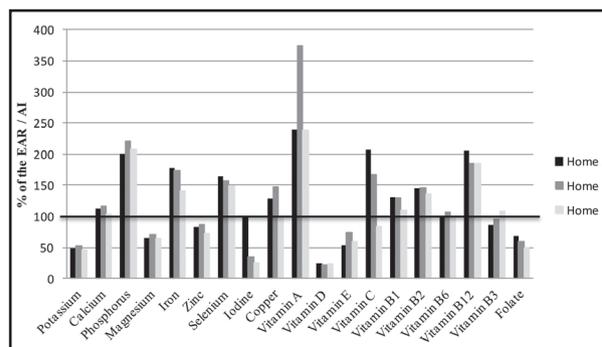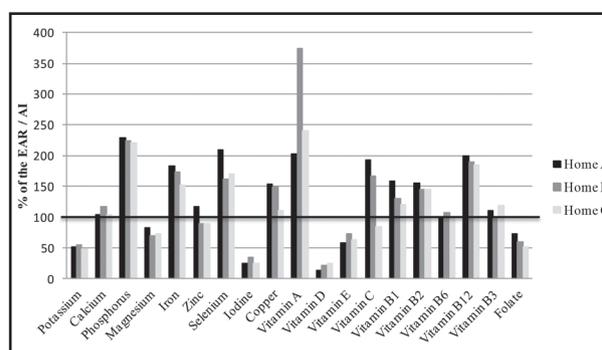

Figure 1.
Percentage of the EAR or AI covered by micronutrients in the regular menus.

The menus for diabetics are obtained by introducing small changes in the regular menus (adding sweeteners instead of sugar, offering brown bread instead of white bread, or serving skim milk instead of whole milk). Changes were notable in the energy and macronutrients, leading to a reduction of carbohydrates and energy as well as an increase of fiber (Table II). The differences in calories and fiber were only significant in home A. Micronutrients deficiencies in the menu for diabetics were similar to deficiencies in the regular menus (Fig. 2).

With respect to pureed menus, it is important to highlight that patients needing a texture-modified diet do not have a calorie or nutrient requirement different from people of the same age and sex, unless a condition or disease coexists (34). Therefore, pureed menus should differ from regular menus only in their modified texture. In contrast, the analyzed pureed menus were far less caloric and less nutritious, as observed in a previous study (35) (Table II, Fig. 3).
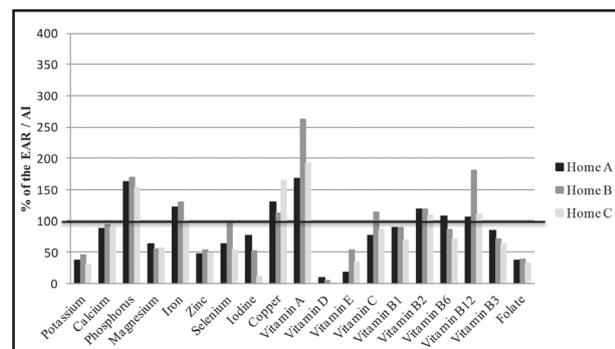
SERVINGS BY FOOD GROUPS

The assessment of menus served in LTC homes usually focuses on energy and nutrients, and only a few studies have analyzed

Figure 2.
Percentage of the EAR or AI covered by micronutrients in the menus for diabetics.

Figure 3.

Percentage of the EAR or AI covered by micronutrients in the pureed menus.

the number of food servings offered in these setting (28). In the present study, none of the analyzed menus met the minimum servings of vegetables, fruit, milk products, olive oil, legumes, or nuts (Table III). Olive oil was not the principal added fat in LTC kitchens, and others kind of oils were chosen. These food groups are important components of the Mediterranean diet, so menus were not correctly based on this diet, whose benefits in elderly people are well documented.

STRENGTHS AND LIMITATIONS

The principal strength of this study is that menus were assessed by weighed food records on 14 consecutive days, a method that is considered to be the gold standard (36). Therefore, results provided an accurate measurement of energy, macronutrients, and micronutrients. Moreover, apart from studying the nutritional quality of the menus, the quality of meals and meal services was assessed, offering an overall vision of the situation in LTC homes and how this situation could be improved. Nevertheless, the results cannot be generalized, and further studies are needed to confirm our findings.

CONCLUSIONS

The menus analyzed are not meeting the dietary recommendations, and the quality of their meal services can be improved. It would be necessary to ensure the implementation of regular routines in LTC homes for controlling the quality of meals and meal service, tailoring meals to the needs and preferences of the residents, and using a nutrition screening tool to evaluate their nutritional status. These actions could lead to a decrease of the high prevalence of malnutrition in these institutions.

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