

Original

Daily intake of macronutrients in a group of institutionalized elderly people in León. Spain

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Abstract

Monitoring of energy distribution of the three macronutrients of diet could be beneficial in order to improve the physiological status of elderly people. The objective of this study is to analyse total daily energy intake as well as the caloric contribution of the macronutrients and alcohol, which make up basic diet of five nursing homes in León (Spain). Dietary consumption was evaluated in a group of 107 elderly people, aged 65-98 years. A precise weighing method was used to conduct the control of food intake covering seven days. Protein, carbohydrates, fat, alcohol, dietary fiber and cholesterol intake were obtained. Weight, and Height also were measured. Total dietary energy intake was significantly higher in men (130.5%) than in women (115.6%), with regard to recommended value. Relative contribution of macronutrients to total energy intake is extremely unbalanced. Energy derived from protein was very high (16.7%), energy derived from fat was also very high, and significantly higher for females (39.6%) than for males (34.4%), whereas the proportion derived from carbohydrates was very low, although also significantly higher in females (41.5%) than in males (35.8%), due to the high energy percentage that make up the alcohol intake in males (9.1%). A review of the diet offered by nursing homes, not only directed at the adjustment of total energy intake but also with respect to alcohol intake and macronutrient content of foodstuffs used in the elaboration of the menus, would be required in order not to unbalance the caloric profile of the diet.

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Keywords: *Alcohol intake. Cholesterol intake. Daily energy intake. Dietary fiber intake. Fat quality. Institutionalized elderly people. Macronutrients intake.*

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INGESTIÓN DIARIA DE MACRONUTRIENTES POR UN GRUPO DE ANCIANOS INGRESADOS EN RESIDENCIAS DE LEÓN. ESPAÑA

Resumen

La supervisión de la distribución energética de los tres macronutrientes de la dieta podría mejorar el estado fisiológico de los ancianos. El objetivo de este estudio es analizar la ingestión energética diaria total y la contribución calórica de los macronutrientes y del alcohol, que representan la alimentación básica de cinco residencias para ancianos de León (España). Se ha examinado el consumo alimentario de un grupo de 107 ancianos, de 65 a 98 años. Se utilizó un método preciso de pesaje para controlar la ingestión de alimentos durante 7 días. Se calcularon la ingestión de proteínas, hidratos de carbono, grasas, alcohol, fibra dietética y colesterol. Asimismo, se midieron la talla y el peso. La ingestión energética total resultó significativamente mayor entre los varones (130,5%) que entre las mujeres (115,6%), por lo que se refiere a los valores recomendados. El aporte relativo de macronutrientes a la energía total estaba muy desequilibrado. La energía procedente de las proteínas era excesiva (16,7%), al igual que la de las grasas, sobre todo y de manera significativa entre las mujeres (39,6% frente al 34,4% de los varones), mientras que el porcentaje procedente de los hidratos de carbono era muy bajo, aunque significativamente mayor entre las mujeres (41,5%) que entre los varones (35,8%), debido al elevado porcentaje energético del alcohol para el sexo masculino (9,1%). Para que el perfil calórico de la dieta no se vea desequilibrado, es necesario revisar la alimentación proporcionada en las residencias de ancianos, no sólo para corregir la ingesta energética total sino para evaluar el consumo de alcohol y el contenido de macronutrientes utilizado para elaborar los menús.

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Palabras clave: *Ancianos. Calidad de la grasa. Ingestión energética diaria. Ingestión de alcohol. Ingestión de colesterol. Ingestión de fibra dietética. Ingestión de macronutrientes. Residencias de ancianos.*

Introduction

The aging process is a continuous and irreversible process. The rate of decline varies among individual subjects and can be modulated by three conceptually different influences, that have different relative weight in each individual: physiology (changes due to the action of time), pathology (adaptative sequels of previous diseases or surgeries suffered throughout one's life), and, finally, changes induced by the individual lifestyle, the environment, or by his/her different risk factor, including polypharmacy. Changes in nutrition and in nutritional status may be caused by any of these elements^{1,2}.

There is a great potential for nutritional intervention with the elderly to increase longevity and to improve physiological functions and the quality of living^{3,4}. Moreover, when nutritional assessment must be performed in a nursing-home other specific conceptual and practical difficulties may be added.

Therefore, we must consider that nursing-homes represent a very complex and heterogeneous world, with large differences in parameters as size, number of residents, financial or other dependences, programs and services offered, etc. The existing information on the characteristic and effects of nutritional status in people of an advanced age is still scarce⁵⁻⁸.

The aim of this study is, on one hand, to analyse total daily energy intake and macronutrient contribution, of the different menus which make up the basal diet of five nursing homes in Leon (Spain) and, on the other hand, to compare these values with the Recommended Dietary Intakes for elderly people. Population which belong to this age group.

Subjects and methods

Subjects

Dietary consumption was evaluated in a group of 124 elderly people, 60 males and 64 females, aged between 65 and 98 living in five nursing homes. Subjects were excluded according to the following categories detailed in a medical chart: Overt conditions of liver disease, chronic renal failure, inflammatory disease, active peptic ulcer, anaemia; consumption of medications known to affect intestinal absorption; consumption of glucocorticoids; or consumption of micronutrient tablets. Each participant was given an explanation as to the nature, purpose, and possible benefits of the study, and approved their participation by signing a written form of consent.

A precise weighing method was used to control food intake during seven days. Protein, carbohydrates, fat, alcohol, dietary fiber and cholesterol intakes were obtained. Total energy intake and caloric profile were calculated.

Weight was measured using an electronic weighing scale (SECA 714) and height using a stadiometer

Table I
Anthropometric Parameters

	<i>All subjects</i>		<i>Males</i>	<i>Females</i>
	<i>Mean ±SD</i>	<i>Range</i>	<i>n = 60</i>	<i>n = 64</i>
Age (years)	80,5 ± 6,5	65-98	78,7 ± 7,4	81,7 ± 5,6
Weight (kg)	64,5 ± 11,5	36,5-96	71,4 ± 10,2	58,6 ± 10,8*
Height (cm)	151,2 ± 8,1	130-167,8	157,8 ± 5,2	147,1 ± 6,7*
BMI (kg/m ²)	27,7 ± 4,5	17,9 ± 38,5	27,8 ± 3,8	27,7 ± 4,9

* P < 0.05.

(Ano Sayal). By using these values we calculated the Body Mass Index (BMI) (kg/m²).

The food database was collected from Spanish sources⁹. A nutritional program (using a macro procedure of a spreadsheet) including this food database was used.

Statistical analyses

Statistical analyses were carried out using Statistical Package for the social Sciences (SPSS PC+, version 9.0 Licence N.º 16201034). Food consumption and nutrient intakes were expressed per day. Mean values of selected characteristics were compared between males and females. Analysis of covariance was used. Two-tailed P values were considered statistically significant at P < 0.05.

Results

Anthropometrical data in our study are shown in Table 1.

Daily intake of macronutrients, alcohol, saturated fatty acids (SFA), monounsaturated fatty acids (MUFA), polyunsaturated fatty acids (PUFA), dietary fiber and cholesterol as well as energy intake are given in Table 2.

Caloric profile (energy provided by macronutrients and alcohol (%), respect to recommended pattern, for both men and women, are shown in fig. 1.

Discussion

The average age of 80.5 years in our study group was higher than that described in the majority of studies carried out on the nutritional status of elderly people^{4,10,11}. Height and Body Weight were significantly different between men and women. However, BMI was similar in both genders the same as other studies^{4,10} and higher than that described by Dror et al.¹² and Huijbregts et al.¹³, (table I).

The average energy intake value found in this study, as assessed by food intake, is high (2304 ± 848 kcal), and similar to that in other studies on elderly people^{3,8,12,14}, (table II). Dietary energy intake was significantly higher in men (130.5%) than in women

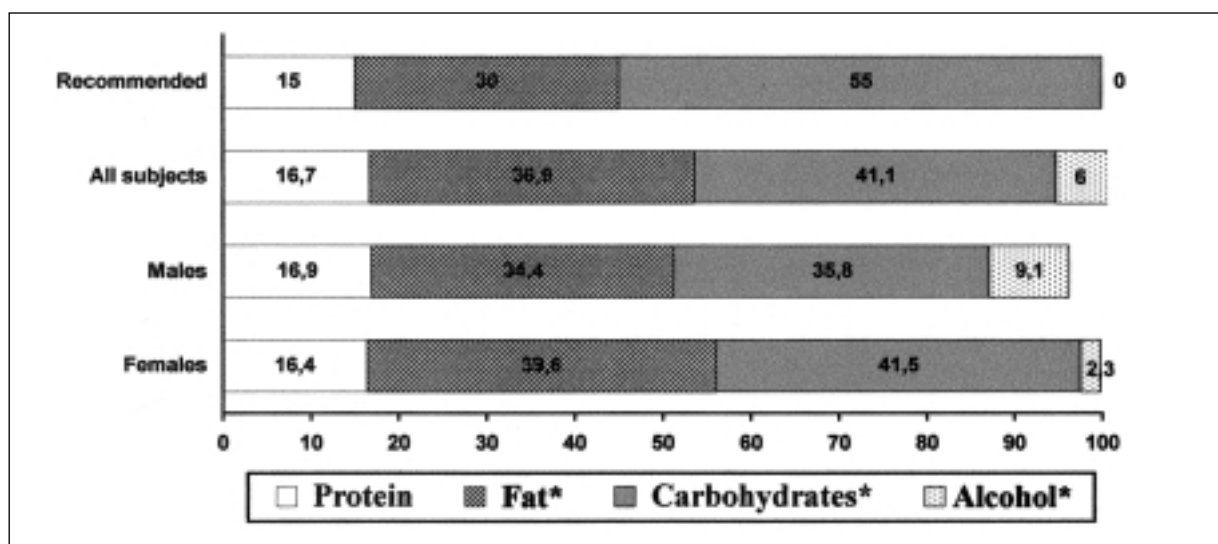


Fig. 1.—Energy contribution of macronutrients and alcohol (%). Differences between sexes. * $p < 0.05$.

Table II
Daily intake of nutrients, alcohol, dietary fiber and cholesterol

	All subjects		Males	Females
	Mean \pm SD	Range	n = 42	n = 65
Energy:				
(KJ)	9630.7 \pm 3544.6	4185.0-10633.9	11453.2 \pm 3043.0	8215.4 \pm 401.3*
(Kcal)	2304.1 \pm 848.0	1001.2-2544	2740.5 \pm 728.3	1965.4 \pm 96.0*
Protein (g)	96.22 \pm 25.13	44.8-161.5	116.16 \pm 41.10	80.75 \pm 15.44*
Fag (g)	94.49 \pm 27.39	39.36-158.2	104.81 \pm 52.44	86.48 \pm 12.08
SFA	31.62 \pm 9.84	18.98-75.52	31.96 \pm 7.76	31.38 \pm 11.11
MUFA	40.01 \pm 9.37	19.02-65.61	41.47 \pm 8.85	39.00 \pm 9.65
PUFA	14.97 \pm 3.32	5.64-26.67	15.08 \pm 2.97	14.90 \pm 3.56
Carbohydrates (g)	236.74 \pm 109.13	119.8-341.65	261.34 \pm 113.69	217.66 \pm 36.18
Alcohol (g)	20,3 \pm 8.3	0-44	35.47 \pm 10.6	6.54 \pm 1.86*
Dietary Fiber (g)	23.72 \pm 5.81	13.8-42.2	25.26 \pm 13.37	22.52 \pm 4.63
Cholesterol (mg)	334.95 \pm 101.94	70.5-514.4	382.88 \pm 85.72	310.56 \pm 65.30*

* $P < 0.05$. SFA: Saturated Fatty Acids; MUFA: Monounsaturated Fatty Acids; PUFA: Polyunsaturated Fatty Acids.

(115.6%), with regard to the recommended value¹⁵, (fig. 1).

The average protein intake, as is normal in developed countries, widely exceeds the recommended intakes (estimated at 56 g/day) and is greater ($p < 0.05$) in males (116.2 \pm 41.1 g) than in females (80.7 \pm 15.4 g). Lipid intake, similar in both men (104.8 \pm 52.4 g) and women (86.5 \pm 12.1 g) is higher than those obtained in other studies¹⁰. With regard to fat composition, MUFA are present in the diet in high quantities, 41.5 \pm 8.8 g, in men and 39.0 \pm 9.6 g, in women, as a consequence of the high consumption of olive oil. A high content of SFA and a low content of PUFA in the diet which represent 12.3% y 5.8%, respectively of the total energy intake must also be pointed out. Daily cholesterol intake (334.9 \pm 101.9 g) was higher than the recommended daily quantity in the diet and signifi-

cantly higher in men (382.9 \pm 85.7 g) than in women (310.6 \pm 65.3 g), and also higher than in other studies¹⁰. The average carbohydrate intake is very low, 236.7 \pm 109.1 g. The average dietary fiber intake of 23.7 g/day, is within the range of the other studies^{10, 20, 21} and close to the recommendation for Spanish people, 25-30 g/day²². Caloric profile, calculated as relative contribution of the macronutrients and alcohol (fig. 1), was very unbalanced. Energy derived from protein (16.7%) and from fat was very high, and significantly higher for females (39.6%) than for males (34.4%), whereas the proportion derived from carbohydrates was very low although significantly higher in females (41.5%) than in males (35.8%).

It must be added that, in percentage, the low intake of carbohydrates is also a consequence of high alcohol consumption, especially in men ($p < 0.001$) (35 \pm

11 g en males and 6 ± 1.9 g in females), which is close to the maximum limit recommended for adults who usually consume alcohol.

It would be important to take into account that the high alcohol intake could jeopardize the nutritional status of elderly people, not only because it displaces other foods in the diet, but also because it could decrease the absorption of thiamine and folic acid^{14, 23}.

Conclusions

Moreover, a good nursing-home policy requires collaboration among multiple professionals, including geriatricians, nurses, dietists, and therapist. It must be comprehensive, and has to include at least the following points: a) assessment of nutritional status at admission and periodically, b) to provide healthy foods and a well balanced diet, and c) to respond in every case to the nutritional needs of the resident. Questions derived from the heterogeneity of the resident population, with several degrees of disabilities, or chronic concomitant diseases must be taken also into account.

Relative contribution of macronutrients to total energy intake is extremely unbalanced. This fact is of special importance in males due to their high alcohol intake. There is a need to increase carbohydrate consumption and markedly decrease fat intake in most subjects. Particular attention should be paid to those subjects in whom alcohol and fat intake is extremely high and to those whose carbohydrates intake is very low. A review of the diet offered by nursing homes not only directed at the adjustment of total energy intake but also at macronutrient content of foodstuffs used in the elaboration of the menus would be required.

References

1. Ribera Casado JM: Nutritional problems in nursing homes with special reference to Spain; *The Journal of Nutrition. Health & Aging*, 2002, 6:84-90.
2. Eastwood C, Davies GJ, Gardiner FK and Dettmar PW: Energy intakes of institutionalized and free-living older people. *The Journal of Nutrition. Health & Aging*, 2002, 6:91-95.
3. Pérez Berbejal R, Moreno García N and Tuells Hernández J: Estimación del aporte energético y nutritivo de los menús ofertados en las residencias de tercera edad existentes en el área de Baix Vinalopo (Elche). *Nutr Clin*, 2000, XX:21-29.
4. Virtanen SM, Feskens EJM, Rasanen L et al.: Comparison of diets of diabetic and non-diabetic elderly men in Finland, The Netherlands and Italy. *Eur J Clin Nutr*, 2000, 54:181-186.
5. Ortega RM, Collado MA and Moreiras-Varela O: Valoración dietética del estado nutricional de dos colectivos de ancianos institucionalizados de diferente nivel socioeconómico. *Nutr Clin*, 1992, III:5.
6. Portillo MP, Echevarria A, González AB, Sáez de Pobes F, Vidaurre E and Rocandio AM: Valoración del estado nutricional en un colectivo de ancianos institucionalizados. *Nutr Clin*, 1994, 14:37-44.
7. Ortega RM, Andrés P, Redondo MR, Zamora MJ, López-Sobaler AM and Encinas Sotillos A: Dietary assessment of a group of elderly Spanish people. *Int J Food Sci Nutr*, 1995, 46:137-144.
8. Portillo MP, Guijarro J, Martín M, Rozas E and Abecia C: Estimación del aporte energético y nutritivo de las dietas en una residencia de ancianos del País Vasco. *Nutr Clin*, 1996, 16:29-37.
9. Moreiras O, Carbajal A and Cabrera M: La composición de los alimentos. Dpto. Nutr. Universidad Complutense de Madrid, 1996.
10. Moreiras O, Carbajal A, Perea I, Varela-Moreiras G and Ruiz-Roso B: Nutrición y salud de las personas de edad avanzada en Europa: Euronut Seneca. Estudio en España. 1. Introducción, diseño y metodología. *Rev Geriatr y Gerontol*, 1993, 28:197-208.
11. Ortega RM, Redondo MR, Zamora MJ, López-Sobaler AM, Andrés P and Encinas Sotillos A: Balance energético y perfil calórico en ancianos obesos o con sobrepeso en comparación con los de peso normal. *Med Clin (Barc)*, 1995, 104:526-529.
12. Dror Y, Stern F, Nemes L, Hart J and Grinblat J: Macronutrient Consumption and Nutritional Status in a Selected Well-Established Group of Elderly People in a Home for the Aged in Israel. *J Am Coll Nutr*, 1996, 15:475-480.
13. Huijbregts PPCW, Feskens EJM and Räsänen L: Dietary intake in five ageing cohorts of men in Finland, Italy and the Netherlands. *Eur J Clin Nutr*, 1995, 49:852-860.
14. Moreiras O, Carbajal A, Perea I, Varela-Moreiras G and Ruiz-Roso B: Nutrición y salud de las personas de edad avanzada en Europa: Euronut-Seneca. Estudio en España. 2. Estilo de vida. Estado de salud. Modelo dietética. Hábitos alimentarios. Valoración de la ingesta. *Rev. Esp Geriatr y Gerontol*, 1993, 28:209-229.
15. WHO (World Health Organization). Energy and protein requirements. Report of a joint FAO/WHO/ONU expert consultation. Technical report series 724, Ginebra. World Health Organization, 1985:71-80.
16. Pellet PL: Protein requirements in humans. *Am J Clin Nutr*, 1990, 51:723-737.
17. Munro HN: The challenges of research into nutrition and aging. In: Munro NH, Danford DE (eds.): *Nutrition, Aging and the Elderly*. New York: Plenum Press, 1989: 1-21.
18. Young VR: Macronutrient needs in the elderly. *Nutr Rev*, 1992, 50:454-462.
19. Campbell WW, Crim MC, Dallal GE, Young VR and Evans WJ: Increased protein requirements in elderly people: new data and retrospective reassessments. *Am J Clin Nutr*, 1994, 60:501-509.
20. Nes M, Andersen LF, Solvol K et al: Accuracy of a quantitative food frequency questionnaire applied in elderly Norwegian women. *Eur J Clin Nutr*, 1992, 46:809-822.
21. Fidanza F, Coli AM, Parretti D, Morucci P, Sarchielli P and Simonetti MS: Nutritional status of a group of self-sufficient institutionalised elderly people in Perugia (Italy). *Int J Vit Nutr Res*, 1992, 62:273-280.
22. Serra L, Aranceta J and Mataix J: Guías Alimentarias para la Población Española (Documento de Consenso, SENC). (ed) Sg. Colección Nutrición y Salud, 1995.
23. Russell RM: A discussion on ethanol-nutrient interactions in the elderly. *Drug-Nutr Interac*, 1985, 4:165-170.