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Original

Food habits and nutritional status of elderly people living in a Spanish mediterranean city

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Abstract

Aims: **The aim of this study was to assess the food habits and nutritional status of free-living, non-institutionalised, elderly people of Torrevieja, a Spanish city located in the Mediterranean coast.**

Methods: **Anthropometric and dietary survey (two 24 hour recalls) were assessed in 200 (83 men and 117 women) free-living elderly people (average age 72.3 ± 6.6 years).**

Results: **Just married women accomplished the recommended energy intake. The contribution of macronutrients to the total energy intake was different from the Recommended Intake for the elderly, since it was too derived from proteins, fats, SFA and sugars, but in only small amounts was derived from complex carbohydrates. High percentages of elderly persons showed inadequate intake of calcium, zinc, magnesium, potassium, copper, iodine, folic acid, vitamin A, vitamin D, vitamin E, and riboflavin. Men showed lower micronutrient intake than women.**

Conclusions: **An increase in dietary complex carbohydrate, and a decrease in protein and fats, especially SFA, is recommended. It would be desirable to increase the consumption of fruits, vegetables, whole cereals, fish and skimmed dairy products.**

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Key words: *Elderly. Non-institutionalised. Nutritional assessment. PRI. Dietary intake.*

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HÁBITOS ALIMENTARIOS Y ESTADO NUTRICIONAL DE ANCIANOS QUE VIVEN EN UNA CIUDAD ESPAÑOLA DEL MEDITERRÁNEO

Resumen

Objetivo: **El objetivo de este estudio fue valorar los hábitos alimentarios y el estado nutricional de un grupo de ancianos de Torrevieja que viven de forma no institucionalizada.**

Métodos: **Las medidas antropométricas y el análisis de la dieta (2 cuestionarios de recuerdo de 24 horas) se utilizaron en 200 personas (83 hombres y 117 mujeres) ancianos que viven independientes (media de edad 72,3 ± 6,6 años).**

Resultados: **Las mujeres casadas cumplían con las recomendaciones diarias de ingesta de energía. La contribución de los macronutrientes a la ingesta energética total fue diferente de las ingestas recomendadas a los ancianos, debido al exceso de ingesta de proteínas, grasas, AGS, y azúcares simples, sin embargto solo una pequeña cantidad derivaba de carbohidratos complejos. Un alto porcentaje de ancianos mostraron ingesta inadecuada de calcio, zinc, magnesio, potasio, cobre, iodo,ácido fólico, vitamina A, vitamina D, vitamina E y riboflavina. Los hombres mostraron menor ingesta de micronutrientes que las mujeres.**

Conclusión: **Un incremento de carbohidratos complejos y una disminución en la ingesta de proteínas y grasas, sobretodo saturadas es lo que se recomienda. Sería interesante incrementar el consumo de vegetales, frutas, cereales integrales, pescado y productos lácteos desnatados. Además de suplementar la dieta, especialmente con calcio, vitamina E y ocasionalmente vitamina D, podría ser útil para mejorar el estado de salud y el estado nutricional de los ancianos que viven en Torrevieja.**

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Palabras clave: *Ancianos. No-institucionalizados. Valoración nutricional. Ingesta dietética.*

Introduction

Demographic data show an increased life expectancy of the world population. This increase is more evident in developed than in developing countries. It can be attributed to increased survival of people because of nutrition, medicine, vaccination, and drug development. It is estimated that by the year 2015, people over 65 y-o will be 14.7% of the North American population, and 17.6% of the European, and it is expected to reach 20% and 23.5%, respectively by the year 2030.[1]

In an aging population there are increased chronic disabilities and diseases, which are linked with loss of autonomy and high health risk. Physical activity decreases with aging and results in overall lower energy needs and lower caloric intake. However, the requirement for protein, vitamins, minerals, fibre and water do not decrease.[2]

It is imperative that people make healthful food choices because diet influences health. Pathologies such as obesity, cardiovascular disease, type 2 diabetes, certain types of cancer, and osteoporosis are attributable to poor dietary intakes. Socioeconomic status affects food choices and dietary quality. Food price is among the many factors that influence old people's food choices. Consequently, it affects energy intake and nutrient quality of diets. The comparatively low cost of energy-dense foods, in combination with low educational status, could be a reason for the prevalence of obesity among the income persons.[3]

The aim of this study was the nutritional assessment of free-living, non-institutionalised, elderly people of a Spanish Mediterranean city.

Materials and methods

The population in the study consisted of free-living, non-institutionalised, elderly people of Torrevieja, a Spanish Mediterranean city, with age ranged from 65 to 89 y-o. The sample size was 200 individuals (83 men and 117 women). Subjects were assigned at random. All subjects gave their written informed consent. Subjects were mentally and physically capable of responding to an interview schedule.[4]

The information was collected through personal interview using a structured questionnaire, followed by a physical examination to measure blood pressure and anthropometric characteristics. The dietary questionnaires included a 24-hour diet recall and a quantitative food frequency questionnaire covering 145 food items. Information on smoking habits, physical activity and alcohol intake was collected using validated questionnaires.[5]

Height was determined to the nearest mm using a digital stadiometer (range 60-200 cm) (Kawe, Asperg, Germany), with the subject's head in the Frankfurt plane. Body weight was determined to the nearest 100 g using a digital electronic weighing scale (range: 0.1-150 kg) (Seca Model 812, Hamburg, Germany). Measurements were made first in the morning. The subjects were weighed in bare feet and light underwear, in agreement with standard techniques and following international standards recommended by the WHO. The Body Mass Index (BMI) was computed as weight in kilograms/height in meters squared. BMI was used to measure prevalence overweight and obesity, according to WHO criteria; above 24.9 kg/m^2 was considered to be overweight and those with BMI over 29.9 kg/m^2 as obese.[4,6,7]

The validated questionnaire[5] also included information on aspects of health, a brief medical history and their record family (parents, brother and grandparents). Blood pressure was measured on the right arm after a 5-minute rest, using a mercury sphygmomanometer (Omron Model HEM-432C, Dalian, China). Systolic and diastolic blood pressure was identified at the beginning of the first and fifth phases of the Korotkoff sounds. Two consecutive readings were recorded and their average was considered for the analysis.[8]

The energy and nutrient intake were calculated from two 24-hour recall obtained in two non-consecutive days. Conversion of food into energy and nutrients was made using a self-made computerized program based on Spanish[9] and European food composition tables.[10] Daily intake was compared to Population Daily Recommended intake for Europeans,[11] when Spanish data were not available.

Statistical analysis

Analyses were performed with SPSS version 13.0. Mean values and SD are shown. Unpaired Student's t-test was used to test differences between means by gender and ANOVA one-way test by age group. Significant differences between marital status were calculated by means of χ^2. Sequential Bonferroni's test was applied to control type-I error.

Results

Characteristics of the sample analysed showed that in both marital statuses the majority was 70-79 y-o (48.8% not married and 45.8% married. Followed by the 65-69 y-o population that included 37.8& not married and 39.0% married. Finally, 80-89 y-o people included 13.4% not married and 15.3% married. Men analysed were more likely to be married (54.2%), while women analysed were single, widowed or divorced (76.8%).

Anthropometric, lifestyle, and clinical characteristics are showed in table I. A high prevalence of overweight (48.5%) and obesity 18.5%) was found among the studied population (data not shown). The average BMI was 27.3 kg/m^2 in men and 27.2 kg/m^2 in women, and BMI was higher in married than in not married women. This difference was not registered in men.

Table I
Anthropometric, lifestyle, and clinical characteristics of the studied population

	Men (n = 83)			*Women (n = 117)*		
	Not married[a]	*Married*	*P*	*Not married*[a]	*Married*	*P*
Marital status						
BMI (kg/m^2)	27.1	27,4		26,3	27,9	*
Prevalence of overweight (%)						
Yes	10.8	39.8		29.1	17.9	
No	12.0	37.3		24.8	28.2	
Prevalence of obesity (%)						
Yes	1.2	15.7		10.3	9.4	
No	21.7	61.4		43.6	36.8	
Entertainment						
Watching TV (%)						*
Yes	22.9	77.1		47.9	46.2	
No	0	0		6.0	0	
"Siesta" sleeping (%)						
Yes	18.1	51.8		30.8	23.1	
No	4.8	25.3		23.1	23.1	
Outdoor activity (walking, cycling ...) (%)			*			
Yes	22.9	68.7		44.4	40.2	
No	0	8.4		9.4	6.0	
Other intense exercises (dancing, tennis, swimming ...) (%)						
Yes	4.8	36.1		23.1	20.5	
No	18.1	41.0		30.8	25.6	
Chronic conditions						
Coronary heart diseases (%)						
Yes	9.6	44.6		23.1	25.6	
No	13.3	32.5		30.8	20.5	
Hypertension (%)			*			
Yes	4.8	36.1		30.8	23.1	
No	18.1	41.0		23.1	23.1	
Diabetes (%)						
Yes	9.6	20.5		23.1	17.9	
No	13.3	56.6		30.8	28.2	
Blood pressure						
SBP (mm Hg)[b]	132 ± 11	131 ± 18		131 ± 16	130 ± 14	
DBP (mm Hg)[c]	74 ± 12	72 ± 11		77 ± 9	77 ± 8	
Current habits						
Current smoking habit (%)			*			
Yes	14.5	16.9		6.0	7.7	
No	8.4	60.2		47.9	38.5	
Alcohol consumption (%)						*
Yes	10.8	26.5		0.9	7.7	
No	12.0	50.6		53.0	38.5	

*($p < 0.05$) Significant differences between married and not married people by multivariate analysis.
[a]Single, widowed and divorced.
[b]Systolic Blood Pressure.
[c]Diastolic Blood Pressure.

Moreover, elderly married women showed higher mean BMI than those living alone (single, widowed and divorced) (data not shown). The prevalence of overweight and obesity did not show significant differences in married and not married men and women.

Questions about entertainment included watching TV, "siesta" sleeping and outdoor activities. All of men analysed watched TV, and almost all women. There were significant differences among married and "not married" women ($p < 0.05$). The majority of men slept "siesta", while "not married" women slept "siesta" more frequently than married women.

Outdoor physical activity (walking, cycling…) are referred to light or moderate physical activity. Most of men practice these types of exercises and there were significant differences ($p < 0.05$) between married and not married. The practice of intense exercise in men was less frequently.

Table II
Daily energy, macronutrient and micronutrient intakes (mean ± SD) according to marital status of old people

	Men (n = 83)			*Women (n = 117)*		
	Not married[a]	*Married*	*P*	*Not married*[a]	*Married*	*P*
Energy (kcal)	1,977 ± 635	2,016 ± 408		1,952 ± 427	2,344 ± 698	*
Protein (g)	115.9 ± 60.8	105.8 ± 25.8		109.8 ± 26.2	125.2 ± 39.7	*
Carbohydrate (g)	184.6 ± 37.9	198.6 ± 61.8		200.2 ± 60.0	220.7 ± 66.4	
Fat (g)	86.2 ± 35.6	88.8 ± 23.9		80.4 ± 24.0	107.4 ± 48.4	*
% Energy from protein	23.4 ± 12.3	21.0 ± 5.1		22.5 ± 5.4	21.4 ± 6.8	
% Energy from fats	39.2 ± 16.2	39.6 ± 10.7		37.1 ± 11.1	41.2 ± 18.6	
% Energy from carbohydrates	37.3 ± 7.7	39.4 ± 12.3		41.0 ± 12.3	37.7 ± 11.3	
MUFA (g)	39.7 ± 13.8	37.8 ± 11.0		33.8 ± 11.5	44.1 ± 17.2	*
PUFA (g)	10.6 ± 7.3	9.9 ± 4.5		9.9 ± 5.1	12.2 ± 6.4	*
SFA (g)	21.4 ± 12.9	21.3 ± 7.4		19.9 ± 7.9	27.6 ± 17.3	*
Cholesterol (mg)	291.6 ± 222.7	334.3 ± 124.0		301.6 ± 109.1	412.4 ± 192.7	*
Dietary fibre (g)	25.9 ± 6.4	26.2 ± 8.6		33.5 ± 11.5	33.0 ± 15.1	
Vitamins						
Vitamin A (µg/d)	1,844.1 ± 1,362.6	1,240.3 ± 497.8		1,740.7 ± 880.9	1,919.4 ± 1,141.2	
Vitamin C (mg/d)	228.6 ± 96.1	254.6 ± 133.7		331.5 ± 124.0	301.9 ± 158.8	
Vitamin D (µg/d)	4.2 ± 5.9	4.1 ± 4.4		3.9 ± 4.4	3.4 ± 2.8	
Vitamin E (mg/d)	8.7 ± 2.7	9.5 ± 3.7		11.2 ± 3.1	11.9 ± 6.1	
Thiamin (B_1) (mg/d)	1.5 ± 0.7	1.5 ± 0.4		1.9 ± 0.5	2.0 ± 0.7	
Riboflavin (B_2) (mg/d)	2.0 ± 0.8	8.5 ± 3.9		10.7 ± 4.3	7.8 ± 3.5	
Niacin (B_3) (mg/d)	40.2 ± 22.8	40.9 ± 9.4		43.6 ± 10.9	46.5 ± 14.6	
Pyridoxine (B_6) (mg/d)	2.7 ± 1.5	2.6 ± 0.6		3.0 ± 0.7	3.1 ± 1.1	
Cobalamin (B_{12}) (µg/d)	12.3 ± 10.4	9.4 ± 5.0		9.8 ± 3.0	11.9 ± 7.2	
Folic acid (µg/d)	309.7 ± 159.5	393.3 ± 168.7		505.5 ± 248.1	505.4 ± 379.4	
Minerals						
Calcium (mg/d)	537.3 ± 67.7	604.8 ± 82.3		1,101.6 ± 459.6	1,043.9 ± 322.8	
Iron (mg/d)	16.5 ± 6.8	16.3 ± 3.5		18.2 ± 4.7	20.1 ± 7.4	
Zinc (mg/d)	10.9 ± 4.4	10.0 ± 2.0		10.8 ± 3.0	15.5 ± 2.0	
Magnesium (mg/d)	374.9 ± 136.4	410.6 ± 98.1		454.2 ± 142.3	474.8 ± 166.9	
Sodium (mg/d)	1711.5 ± 1179.2	1,616.4 ± 557.0		1,889.0 ± 729.2	2,188.5 ± 1,058.2	
Potassium (mg/d)	4346.5 ± 1880.1	4,393.8 ± 1,172.7		5,215.7 ± 1,708.4	5,329.9 ± 2,028.6	
Phosphorus (mg/d)	1820.6 ± 541.8	1,667.8 ± 488.3		1,968.7 ± 698.7	1,938.1 ± 623.7	
Copper (mg/d)	1.1 ± 0.5	1.1 ± 0.4		1.5 ± 0.5	1.5 ± 0.8	
Manganese (mg/d)	3.4 ± 1.2	3.1 ± 0.9		3.4 ± 0.8	3.5 ± 1.3	
Iodine (µg /d)	14.8 ± 3.5	14.5 ± 6.1		13.7 ± 3.8	16.4 ± 6.6	

*($p < 0.05$) Significant differences between "married" and "not married" by unpaired student's t test.
[a]Single, widowed and divorced.

Chronic diseases more frequently observed among the studied population were cardiovascular diseases, hypertension and diabetes. Hypertension was higher in married than not married old men ($p < 0.05$), but not in women.

More men than women were current smokers and drinkers. However, just significant differences were found among married and not married men for smoking habit and women for alcohol consumption.

Table II shows energy, macronutrient and micronutrient daily intake in men and women according to marital status. No significant differences were observed on energy, macronutrient and micronutrient intake of married and not married men. Widow men were the lowest energy intake group (data not shown).

The contribution of macronutrients to the total energy intake was high derived from protein, fats, SFA and sugars, but in only small amounts was derived from complex carbohydrates. There were not significant differences between women and men. However, energy intake was significantly higher ($p < 0.05$) in married than not married women. The contribution of protein and fat to energy intake was higher in married than in not married women ($p < 0.05$), but no differences were observed on carbohydrate contribution. Moreover, married women showed higher MUFA, PUFA and SFA intakes than not married ($p < 0.05$). The cholesterol intake was also higher in married women than not married women. The participants in this study had adequate intakes of dietary fibre in both genders.

There were no significant differences for vitamin and mineral intake between married and not married men and women. However, women's intake of most micronutrients, except vitamin D, was higher than that of the men.

Table III shows the protein and micronutrient daily intake of elderly analysed people compared with Population Daily Recommended intake (PRI) for Europeans.[11] Protein intake is too high. Sodium and iron intakes were higher than recommendations. Mineral intake of women was higher than men. High percentages of elderly persons showed inadequate intake of calcium, zinc, magnesium, potassium, copper, iodine, folic acid, vitamin A, vitamin D, vitamin E, and riboflavin. Men showed lower micronutrient intake than women.

Discussion

The aging process involves modifications in nutritional and physiological status, such as a decrease in body weight and height, and a reduction in fat-free mass associated with an increase in fat mass. The WHO Expert Committee on Physical Status stressed the need for local gender- and age-specific reference values for the elderly. The anthropometric standards derived from adult populations may not be appropriate for the elderly because of body composition changes occurring during aging. Specific anthropometric reference data for the elderly are necessary.[12]

The relation between BMI and illness/mortality in elderly persons has been well established. The average BMI in our study, as well as the high prevalence of overweight and obesity, is close to those obtained on other European elderly persons, such as English, Italian, and Hungarian old people[13,14,15] but also in Spanish elderly.[16,17]

Our results show that men and women practised mainly light or moderate exercise. Carmeli et al.[18] confirmed in elderly adults the positive effects of an exercise program on functional performance. The improvement in functional abilities did not correlate with muscle strength, body weight or body fat. Raguso et al.[19] observed in elderly subjects that leisure-time physical activity, considered as any spontaneous activities such as hobbies and recreational sports, does not seem to prevent muscle mass loss and body fat, however, improved body composition, higher fat-free soft tissue and lower fat mass. Changes in fitness, total energy expenditure and body composition with age are an inevitable consequence of the aging process.[20] Our results also are in accordance with previous works.[4,21]

Stathokos et al.[22] observed health disorders, mainly cardiovascular diseases and hypertension, in old people. Taking into account that cardiovascular diseases and hypertension are the most common diseases among the studied population, we think that the studied people are submitted to treatment, so when we measured the blood pressure it was within normal range. Our results are similar to previous works[15,21,23] that analysed elderly people from America, Spain and Hungary respectively.

Smoking habit and alcohol consumption of the studied population are similar to previous results.[17,22]

Energy intake was lower than recommendations, and just married women accomplished the recommended energy intake. The low energy intake of men and women observed in our study is similar to previous works on other old people.[17,24,25] Old people need to take more care over their diet because they have small appetites and eat less than they used, but they could also have several dental care problems associated to aging that could have effects on the adequate nutrition. Shahar et al.[26] associated the old people's low energy intake with low appetite and higher drugs use.

Moreover, in our study widow men were the lowest energy intake group. Our results are according with previous studies that showed widowed are vulnerable nutritionally because they cook with minor frequency, they show a low variety of food intake and they skip meals.[27]

The studied population showed no balanced distribution of nutrient intake, with a high protein and fat intake, and carbohydrate shortage. These results are similar to those obtained by Anderson and Hana.[28] Tur et al.[29] pointed out that these factors could contribute to the generation of obesity. Usually, it is recommended that the contribution of fats to energy intake would be lower than 30%.[30] However, a nitrogen balance study designed to determine protein requirements of old women pointed out that the reported protein might be adequate.[2]

Main sources of fat in the Spanish diet are added fats for cooking, mainly olive oil.[31] The observed SFA intake is higher than 100% PRI, while PUFA intake is lower than PRI. It is interesting the high MUFA consumption in both genders, but the studied people are living in a Mediterranean city and mainly they could intake olive oil. These results are according with Stathokos et al.[22] Moreover, the high level of fat intake in married women may be due to their high consumption of animal products, such as meat, fish, milk and dairy products.

High percentages of elderly people show moderate (< 2/3 PRI) and high (< 1/3 PRI) risk of inadequate micronutrient intake, particularly for calcium, zinc, magnesium, potassium, copper, iodine, folic acid, vitamin A, vitamin D, vitamin E, and riboflavin. According to recent nutritional surveys in Spain, above 25% of the non-institutionalised aged population shows intakes that are lower than the reference values.[32]

Micronutrient intake in men had a lower percent PRI than those for women for most vitamins studied (except vitamin D). Data analysis showed that the vitamin D intake of both genders and marital status was lower than 50% of recommendations for Europeans. Our results are according with Sibai et al.[4] that observed the dietary

Table III

Daily protein and micronutrient intake of elderly people compared with Population Daily Recommended Intake (PRI) for Europeans

	Men								*Women*							
	Not married				*Married*				*Not married*				*Married*			
	% PRI	*< PRI[a]*	*2/3 PRI[a]*	*1/3 PRI[a]*	*% PRI*	*< PRI[a]*	*2/3 PRI[a]*	*1/3 PRI[a]*	*% PRI*	*< PRI[a]*	*2/3 PRI[a]*	*1/3 PRI[a]*	*% PRI*	*< PRI[a]*	*2/3 PRI[a]*	*1/3 PRI[a]*
Proteins (g)	207	0	0	0	189	2	0	0	234	0	0	0	266	0	0	0
Vitamins																
Vitamin A (µg/d)	263	16	16	5	177	12	6	2	290	5	0	0	320	6	4	0
Vitamin C (mg/d)	508	0	0	0	566	0	0	0	737	0	0	0	671	2	0	0
Vitamin D (µg/d)	42	84	84	79	41	83	80	67	39	92	84	62	34	100	82	65
Vitamin E (mg/d)	73	84	53	0	79	84	34	3	93	63	14	2	99	67	22	2
Thiamin (B_1) (mg/d)	148	0	0	0	151	6	0	0	381	0	0	0	400	0	0	0
Riboflavin (B_2)(mg/d)	127	37	0	0	528	23	3	0	821	5	0	0	599	6	0	0
Niacin (B_3) (mg/d)	223	0	0	0	227	0	0	0	311	0	0	0	332	0	0	0
Pyridoxine (B_6) (mg/d)	181	0	0	0	170	3	0	0	271	0	0	0	280	2	0	0
Cobalamin (B_{12}) (µg/d)	880	0	0	0	671	0	0	0	697	0	0	0	850	0	0	0
Folic acid (µg/d)	155	32	11	0	197	12	6	0	253	8	6	0	253	17	7	0
Minerals																
Calcium (mg/d)	157	10	0	0	149	12	5	3	193	9	5	0	188	7	4	0
Iron (mg/d)	164	0	0	0	163	0	0	0	182	0	0	0	201	4	0	0
Zinc (mg/d)	115	47	0	0	105	48	3	0	154	9	0	0	221	6	0	0
Magnesium (mg/d)	68	84	63	0	75	86	38	0	83	81	30	0	86	72	43	0
Sodium (mg/d)	298	0	0	0	281	0	0	0	328	0	0	0	381	0	0	0
Potassium (mg/d)	140	26	0	0	142	16	0	0	168	11	2	0	172	15	2	0
Phosphorus (mg/d)	260	0	0	0	238	0	0	0	281	0	0	0	277	0	0	0
Copper (mg/d)	104	58	16	0	104	45	11	0	139	16	11	0	139	31	17	0
Iodine (µg /d)	11	100	100	100	11	100	100	100	10	100	100	100	13	100	100	100

[a]Percentage of population under PRI, 2/3PRI and 1/3 PRI.

intake of vitamin D deficient in elderly people, and thus they were at high risk of osteoporosis. Tur et al.[17] also observed vitamin D deficiency even taking into account that the high daily sunshine hours of the city where the analysed elderly people were living.

The intake of several vitamins (A, E and C) that act as dietary antioxidants was also studied. Vitamins A and C intake were higher than PRI for Europeans, while vitamin E level was lower. In the case of vitamin E, intakes were lower for men than women. Deficient intakes have been reported previously in Spain and other countries.[33,34] These levels could be improved with a high intake of nuts, almonds, and whole cereals. In the elderly, a higher daily intake of fruits and vegetables is associated with an improved antioxidant status in comparison to subjects consuming diets poor in fruits and vegetables.[35]

In our study, the intake of vitamins of B group was below the PRI for Europeans in both genders and marital status. However, Green et al.[36] observed low level of folic acid in women and Ortega et al.[37] observed best vitamin intakes in married subjects. Minerals intake, mainly Mg and I, was lower than the PRI for Europeans in both genders and marital status. A Mg deficit is known to participate in the clinical pattern of aging, leading mainly to neuromuscular, cardiovascular, and renal symptoms, and a higher bone mineral density. An inverse correlation with coronary artery diseases has been also associated to magnesium intake.[4]

Our results are according with Capita and Alonso-Calleja[33] that found high amounts of sodium and iron in their nutritional studies. The high sodium intake is undesirable because of the contribution of sodium to the development of hypertension and cardiovascular diseases and its association with increased bone loss with age. Efforts should be made to reduce their sodium intake. Iron deficiency is associated with anaemia.

The higher density of most nutrients in women's diet is at least partly due to the higher consumption of vegetables and fruits. A high micronutrient density also has been found in women from other countries. These data suggest that women are more conscious about food intake than men.[38]

Our results show that Zn and Cu intake were also higher in women than men. Zn is a micronutrient of particular concern to elderly people, since its deficiency can alter wound-healing process, decreases taste acuity and reduces immune system function.[4] Tur et al.[39] also observed inadequate intakes for Zn and Se in old people. The intake of several minerals (Se, Zn, Cu, Mg) that act as dietary antioxidants could be taking into account in elderly people to prevent future diseases.

Conclusions

Nutritional status and food habits in elderly people living in a Mediterranean city should be improved for getting an adequate energy intake and equilibrated diet. Trichopoulou et al.[40] recommend a high consumption of olive oil, legumes, unrefined cereals, fruits, and vegetables, a moderate consumption of dairy products, a moderate to high consumption of fish, a low consumption of meat and meat products, and a moderate consumption of wine. Williams and Hord[41] recommended moderate physical exercise for 30-45 minutes a day, 5 days a week. Moderate activity is equivalent to taking a brisk walk, which should increase heart rate and respiration, involve large muscle groups, and produce sweat.

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