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RESEARCH ARTICLE

Current and past factors affecting the quality of aging in a sample of Spanish elderly

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Abstract

Aging is a multifactorial process influenced by both biological and sociocultural factors. The objective of this study was to identify current and past factors with an impact on the quality of aging in a sample of people 65 years of age or older born in the postwar period after the Spanish civil war. Socioeconomic, health, anthropometric, and food consumption data were collected in public Leisure Centers for the elderly in Madrid. The sample consists of 587 people (64.6% women), with a mean age of 71.8 ±5.3 years. Following the World Health Organization (WHO) guidelines regarding what is considered Healthy Aging, an index called the Index of Quality of Aging was calculated from four variables: the Mini Mental State Examination score, perception of health, satisfaction with life and the number of diseases that affect daily life. Another index called the Diet Inflammation Index was created based on the inflammatory or anti-inflammatory potential of different foods. The Index of Quality of Ageing was used as a dependent variable in linear regression models for men and women. Differences by gender were observed in the factors that influence the quality of aging. Education had a positive influence on men quality of ageing while it does not on women. In these, a relationship between the quality of the current diet and the quality of aging was observed.

Keywords: Healthy aging; anti-inflammatory diet; gender

Introduction

Aging is a multifactorial process influenced by both biological and sociocultural factors. It is characterized by a progressive loss of functionality and a higher probability of mortality. Healthy Aging is the process of developing and maintaining the functional ability that enables wellbeing in older age (WHO 2015). The skills considered good indicators of functional capacity are those that allow older people to satisfy their basic needs; learn, make decisions; being able to move without help, maintain relationships and carry out productive activities within the society in which they live. According to the WHO, functional capacity will depend on the intrinsic capacity of each individual (mental and physical capacities), the environmental conditions of their surroundings, and interaction with them (WHO 2015). Although certain population genetics studies propose that around 25% of the inter-individual variability observed in lifespan is of genetic origin (Cox et al 2019, Non-Communicable Diseases Risk Factor Collaboration (NCD-RisC) 2016, Kirkwood 2008), the remaining 75% is due to environmental factors, which effect the entire life cycle. Therefore, it is a plastic process, and among the interventions that can promote longevity and reduce susceptibility to diseases are those that reduce cellular damage or favor its repair

mechanisms (Mathers 2015). In the study of the aging process, it is therefore important to consider all stages of a person's life, that is, the life-course approach must be incorporated into the research (WHO 2018; Halfon et al. 2018). The life-course approach is defined as a sequence of age phases that people are normally expected to pass through as they progress from birth to death. It is based on the complex interplay of biological, cultural, psychological, and social protective and risk factors that occur across the span of a person's life.

In this sense, healthy diet is of great importance in the correct course of the aging process (Haveman-Nies et al. 2003). On the one hand, aging is a process with added nutritional needs and, in some cases, difficulties accessing certain foods, for various reasons, from economic to mobility difficulties, chewing, etc. (Minuti et al. 2015). During this process, chronic degenerative diseases can accumulate. Some of them present with inflammatory processes, with inflammation itself being a cause of cellular damage. (Woods et al. 2012). Hence the great importance of the preventive role played by some foods that contain nutrients with an anti-inflammatory effect. A pro-inflammatory diet is one that increases the levels of pro-inflammatory biomarkers, such as reactive protein-C (PCR), interleukins 6 and 8 (IL-6, IL-8), or tumor necrosis factor alpha (TNF-a). PCR is a key inflammatory marker, occurs in the local epithelium and liver in response to certain cytokines, and induces more inflammatory processes by recruiting monocytes, mediating the absorption of low-density lipoproteins by endothelial macrophages, or increasing the concentration of molecules involved in cell adhesion (King 2005). This type of diet is characterized by the consumption of foods high in saturated fatty acids and sugars, such as meats and processed foods (Da Silva and Rudkowska 2015). An anti-inflammatory diet, on the other hand, is associated with high levels of anti-inflammatory markers (IL-10 and TNF-b) that are mainly found in vegetables, fruit, fish and legumes, that is, foods with high levels of unsaturated fatty acids, fiber, vitamin C, Calcium, Phosphorus or Magnesium (Davis et al. 2019; Bawaked et al. 2017; Da Silva and Rudkowska 2015; Barbaresko et al. 2013; Calder et al. 2011).

Because diet is a determining factor in both health and quality of life, the life-course approach in the study of the aging process proposes that the diet of people in the early stages of their life cycle, especially at critical moments in which accelerations in growth occur with both added nutritional and energy requirements, could influence the subsequent appearance of diseases and the course of the aging process itself under the most favorable conditions possible (Mummert, Schoen and Lampl 2018; Wijnstok et al. 2013; WHO 2002). There is a wealth of scientific evidence regarding the impact of people's living conditions in the early stages of their lives on the subsequent appearance of diseases and the aging process (Wijnstok et al. 2013; Owen et al. 2005; WHO 2002). It is difficult to obtain detailed information on what older people ate when they were children or adolescents, but anthropometric measures offer indirect information on these nutritional conditions. The relationship between malnutrition in childhood and short stature in adults is reflected in numerous publications, as well as the impact that improvements in the hygienic-sanitary and nutritional conditions of a population have on the increase in height observed in successive generations, the so-called secular changes (Wijnstok et al. 2013; Hauspie, Vercauteren and Susanne 2012; Malina 2004; Cole 2003; Padez 2003). The contribution of the different body segments to height is different depending on the moment of the growth and development process. One particular feature of the human growth pattern is that, between birth and puberty, the legs grow relatively faster than other segments of the postcranial skeleton and, specifically, during the pubertal growth spurt, the tibia. Therefore, the length of the tibia is in turn a good estimator of how the process of child growth and development took place. In living people, the tibia cannot be measured, but knee height is considered a good estimator of its length (Bogin and Varela-Silva 2010). In addition, knee height can be used to estimate height in older people to minimize the effect of decreased height associated with the aging process. Another measure that is also used to estimate the height of older people avoiding the effect of the decrease in height associated with aging is the arms span.

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The objective of this study was to assess the influence of current diet, specifically the inflammatory potential of diet, and of indicators of past conditions (education, tibia length), on the quality of aging in a sample of women and men aged 65 years or older.

Material and methods

Sample

This is a cross-sectional design study. The project was carried out within the framework of a contract previously signed between the Regional Service of Social Welfare of the Community of Madrid and the Autonomous University of Madrid for research on aging. The data were collected in public cultural and leisure centers of the Community of Madrid where the elderly go to carry out cultural activities such as reading workshops, physical exercise, dance, etc.

Access to the centers was granted with prior authorization from the center's management. Before starting work in each center, the person in charge of the investigation met with the center's management and with workers. In these previous meetings it was explained what the study would consist of and the spaces necessary for data collection. Subsequently, the workers of each center disseminated the study and organized appointments for each of the people who voluntarily wanted to collaborate. Once contacted, each day four members of the research team went to the center, one collected sociodemographic and health information, another collected information on eating habits and lifestyles, and two trained anthropometrists collected anthropometric measurements.

All participants took part voluntarily and signed an informed consent form. The data were anonymized in the database to ensure confidentiality.

A sample consisting of 789 participants was obtained. For this study only those older than 65 years were considered (64.6% women), with a mean age of 71.8 ± 5.3 years (65 years to 90).

Variables

Information was collected on the following variables:

Sociodemographic: Sex, age, years of formal education.

Health:

Number of diseases diagnosed, number of diseases that affect the daily life (poor vision, low strength in the lower extremities, osteoarticular pain and all those that can affect balance, restrict safe mobility, increase the probability of falls, etc.) (Rodríguez-Lopez et al. 2012).

Perceived health (1. Very bad, 2. Bad, 3. Good 4. Very Good and 5. Excellent).

Life satisfaction 'Taking all things into consideration, how satisfied are you with your life' an adaptation of the ESAP (European Survey on Aging Protocol) was used, for emotional-motivational functioning that includes satisfaction with life in 4 categories (1. Disagree, 2. Agree, 3. Slightly agree and 4. Strongly agree) (Fernández-Ballesteros et al. 2004).

Cognitive deterioration measured using the Mini Mental State Examination (MMSE) (Folstein, Folstein and Mchugh 1975), a test divided into 5 blocks that collect information on the abilities of people for orientation, registration, calculation, memory, and language, with a maximum score of 30 points.

Anthropometric:

Weight (kg) and height (m).

Arms span (cm) was measured by placing the person standing with the arms crossed fully extended. The person was placed completely close to a wall on which a measurement scale was placed, the length between the end of the middle finger of the left hand and the right hand was measured with a field anthropometer.

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Knee height (cm) measured with the person sitting on a surface with the foot flat on the ground and a 90-degree angle between the knee and calf.

These measures were collected following the International Biological Program methodology (Weiner and Lourie 1969).

Food consumption:

The frequency of daily or weekly consumption of fruits, vegetables, meat, fish, milk, yogurt, cheese, eggs, manufactured pastries, type of culinary fat was assesed by using an adaptation of the Mediterranean Islands Study Food Frequency Questionnaire (MEDIS-FFQ) (Zaragoza-Martí et al 2018).

Vegetables: <2 times/week; 3-6 times/week; > = 1 time/day
Fruits: 1 - 2 times/week; 3-6 times/week; 1 time/day; > 1 time/day
Meat: Never; 1-2 times/week; 3-6 times/week; > = 1 time/day
Fish: <= 2 times/week; 3-4 times/week; > = 5 times/week
Eggs: Never; 1-2 times/week; 3-4 times/week; > = 5 times/week
Milk: Never; 1-2 times/week; > = 1 time/day
Yogurt: <= 2 times/week; 3-5 times/week; > = 1 time/day
Cheese: Never; 1-2 times/week; 3-6 times/week; > = 1 time/day
Manufactured pastries: Never; 1-2 times/week; 3-6 times/week; > = 1 time/day
Culinary fat: olive oil; olive and sunflower oil; sunflower oil; others

Alcohol and tobacco use:

Tobacco (1. Smoker, 2. Former smoker, 3. Never smoked)

Alcohol consumption (1. Yes, 2. No). All alcoholic beverages consumed were considered for category 1, the most frequent being beer and wine. Category 2 groups those who have never consumed any type of alcohol.

Indexes:

With the collected variables, new ones were created, which are described below.

Body Mass Index (BMI):

Weight (kg)/Height (m^2).

The BMI was also considered in three categories following the cut-off points proposed by the WHO:

Normal weight, between 20 and 24.99; overweight, between 25 and 29.99 and obese, values equal to or greater than 30.

The BMI was also calculated using the arms span instead of height (Weight (kg)/Arms span(m^2)).

Index of Quality of Ageing (QAI): It was calculated by adding the categories of the variables number of diseases that affect daily life, health perception, satisfaction with life and MMSE, following the indications of Fernández-Ballesteros et al., (2011). Given the variability in age (65 to 90 years), a regression was made with QAI as dependent variable and age as independent variable. The scores obtained were saved as corrected QAI values for each individual.

This index was subsequently adjusted to eliminate the effect of age. The age-adjusted index was used as a dependent variable in regression models.

Diet Inflammation Index (DII):

A diet inflammation index was calculated, following the indications of Cavicchia et al. 2009, which determined the 'inflammatory potential' of different food and beverage components from their predicted effects on C-reactive protein (CRP), a known biomarker of inflammation and Davis et al. (2019) assigned values to the different categories of food consumption, those values were used in our work. Values 0, 1 or 2 were assigned to the consumption frequencies of each food

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with a negative or positive sign. To assign values to the different categories of food consumption, those proposed by Davis et al 2019 were used. The negative sign indicates an anti-inflammatory effect, and the positive sign indicates a pro-inflammatory effect. Fruit, vegetables, fish, and oil were considered anti-inflammatory foods. The values for each frequency of consumption were as follows:

Fruit, vegetables, and fish.

0. Never or sporadically
−1. 3 to 6 times/week
−2. > = 7 times/week.

Culinary fat used daily.

0. Other vegetable oils
−1. Olive and sunflower oil
−2. Olive oil

Meat, manufactured pastries, and processed foods were considered pro-inflammatory foods, with the following values assigned to the frequencies of consumption:

0. Never or sporadically
+1. 3 to 6 times/week
+2. > = 7 times/week

These items were added together, and a score was obtained for each participant that varied between −8 and +2, with the highest positive values being indicators of a more pro-inflammatory diet and vice versa.

Statistical methods

Data was statistically analyzed with SPSS 26.0. Before describing the variables and applying the statistical tests, the fit of the quantitative variables to the normal distribution was verified using the Kolmogorov-Smirnoff test.

Comparisons of quantitative variables between men and women were made with Student's t or the Mann Whitney U test, respectively, depending on whether or not they fit the normal distribution. The association between qualitative variables was made with the Chi-square test.

The QAI adjusted for age, was used as a dependent variable in Multiple Linear Regression models for men and women. Years of formal education, arms span, contribution of knee height to total height (variables considered indicators of past conditions), and DII (indicator of the quality of current diet), were introduced as explanatory variables in the models.

Results

Table 1 show the characteristics of the sample. Regarding sociodemographic characteristics, there are more widowed women than men and they have significantly fewer years of formal education. Women reached a lower level of education than men, 47% of women are housewives (does not appear in the table).

The percentage of women who perceive their health as fair or poor is significantly higher than that of men and they are also less satisfied with their lives than men. Regarding physical and mental health, women have more diagnostic illnesses and more illnesses that affect their daily lives than men and the mean value obtained for the Mini-mental State Examination is lower than that

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Table 1. Characteristics of the sample by gender

	Men	Women	Total	Chi-square/T-Student (*)
	Mean (std) /N (%)	Mean (std) /N (%)	Mean (std) /N (%)	p-value
Age (years)	72.20 (5.6)	71.67 (5.1)	71.87 (5.3)	0.243
Years of formal education	7.93 (6.6)	6.71 (4.7)	7.13 (5.5)	**0.013**
Level of studies reached				
No formal education	48 (23.2)	119 (31.4)	167 (28.5)	<**0.001**
Primary	84 (40.6)	176 (47.2)	260 (44.9)	
Secondary	26 (12.6)	40 (10.6)	66 (11.3)	
Universitary	47 (27.4)	41 (10.8)	90 (15.4)	
Civil status				
Single/divorced	12 (5.8)	49 (13.0)	41 (10.4)	<**0.001**
Married/stable couple	176 (84.6)	190 (50.4)	366 (62.6)	
Widower/widow	20 (9.6)	138 (36.6)	158 (27.0)	
Perception of health				
Poor	12 (5.8)	43 (11.4)	556 (9.4)	**0.003**
Fair	69 (33.3)	158 (41.8)	227 (38.85)	
Good	89 (43.0)	138 (36.5)	227 (38.8)	
Very good	37 (17.9)	39 (10.13	76 (13.0)	
Satisfaction with life				
Disagree	4 (2.0)	22 (6.1)	26 (4.6)	<**0.001**
Slightly agree	19 (9.5)	74 (20.4)	93 (16.5)	
Agree	131 (65.2)	204 (56.4)	335 (59.5)	
Strongly agree	49 (23.4)	62 (17.1)	109 (19.4)	
Number diagnosed diseases	1.90 (1.6)	2.20 (1.5)	2.09 (1.6)	**0.003**
Number of diseases affect daily life*	0.98(1.3)	1.32 (1.6)	1.20 (1.6)	**0.010**
MMSE score	27.59 (3.0)	26.75 (3.2)	27.06 (3.1)	**0.002**
Weight (kg)	78.09 (11.0)	69.90 (30.5)	72.73 (25.8)	<**0.001**
Height (m)	1.65 (0.7)	1.52 (0.6)	1.57 (8.9)	<**0.001**
Arms span*	1.66 (0.8)	1.56 (0.6)		<**0.001**
BMI (Weight_kg/Height_m^2)*	28.59 (3.4)	29.39 (4.5)	29.11(4.2)	0.051
BMI (Weight kg/Arms span_m^2)*	28,25 (4.0)	28,65 (12.6)	28.51 (10.4)	0.668
BMI categories (Height)				
Normal weight	29 (14.9)	53 (14.3)	82 (14.5)	0.070
Overweight	105 (54.2)	167 (45.2)	272 (48.2)	
Obesity	60 (30.9)	150 (40.5)	210 (37.3)	

(*Continued*)

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Table 1. (*Continued*)

	Men	Women	Total	Chi-square/T-Student (*)
	Mean (std) /N (%)	Mean (std) /N (%)	Mean (std) /N (%)	p-value
BMI categories (Arms span)				
Normal weight	42 (21.6)	94 (25.4)	136 (24.1)	0.563
Overweight	95 (49.0)	167 (45.1)	262 (46.5)	
Obesity	57 (29.4)	109 (29.5)	166 (29.4)	
Knee height (cm)	50.50 (3.4)	47.55 (2.4)	48.59 (3.2)	<**0.001**
Contribution of knee height to total height (%)	30.6 (1.7)	31.2 (1.2)	31.0 (1.5)	<**0.001**
Diet inflammation index*	-4.71 (1.20)	-5.00 (1.12)	-4.90 (1.8)	0.070
Aging quality index (QAI)	36.05 (3.3)	34.44 (3.80)	35.02 (3.7)	<**0.001**

*Non parametric test (U Mann Whitney test)

of men. The height for the entire sample is low, especially in women. The mean value of the BMI of the total sample corresponds to overweight. Although no significant differences are observed in the prevalence of overweight and obesity between men and women, it is noteworthy that the prevalence of overweight is higher in men while obesity is more prevalent in women.

On the other hand, no differences were observed between the sexes in the mean score obtained for the dietary inflammatory index. It is noteworthy that the average value of the DII has a negative sign, which would indicate that the diet has good quality in terms of its anti-inflammatory potential.

Men had significantly higher mean values than women for the ageing quality index.

With respect to the frequency of food consumption, significant differences are observed between the sexes, women consume fruit, yogurt, meat, fish, and eggs more frequently than men (Table 2). There are also differences in the consumption of alcohol and tobacco, the frequency of alcohol consumption is higher in men, as well as the frequency of smokers and ex-smokers. Most women never smoked.

Table 3 shows the frequencies for the Dietary Inflammatory Index and their obtained for each food and the median of the total score of the diet obtained considering all the foods. Although there are no differences between men and women in the total score, women obtain higher anti-inflammatory values than men for fish and higher pro-inflammatory scores for meat.

Table 4 shows the results of the regression models for men and women. For men, the years of formal education, the arms span and the contribution of knee height to total height are directly related to the quality of aging. For women, the arms span and DII are statistically significant. The arms span has a positive association with the quality of ageing, and a higher DII inflammation index is associated with a lower quality of ageing.

Discussion

The objective of this study was to identify current and past factors with an impact on the quality of aging in a sample of Spanish people 65 years of age or older born in the postwar period after the Spanish civil war. For the calculation of the Index of Quality of Ageing used in this study, the WHO guidelines have been followed regarding what is considered Healthy Aging, that is, the process of developing and maintaining the functional ability that enables wellbeing in older age

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Table 2. Frequency of consumption of food, alcohol, and tobacco

	Men	Women	Total	Chi-square
	N (%)	N (%)	N (%)	p-value
Vegetables/salad				
< 2 times a week	23 (11.2)	39 (10.3)	62 (10.6)	0.210
3 – 6 times a week	51 (24.9)	72 (19.0)	123 (21.1)	
>= once a day	131 (63.9)	267 (70.6)	398 (68.3)	
Fruit/natural juice				
1 – 2 times a week	12 (5.9)	9 (2.4)	21 (3.6)	
3 – 6 times a week	7 (3.4)	8 (2.1)	15 (2.6)	**0.001**
Once a day	129 (62.9)	195 (51.6)	324 (55.6)	
> once a day	57 (27.8)	166 (43.9)	223 (38.3)	
Meat				
Never	9 (4.4)	20 (5.3)	29 (5.0)	
1 – 2 times a week	102 (49.8)	148 (39.2)	250 (42.9)	**0.008**
3 – 6 times a week	85 (41.5)	165 (43.7)	250 (42.9)	
>=once a day	9 (4.4)	45 (11.9)	54 (9.3)	
Fish				
<= 2 times a week	97 (47.3)	138 (36.5)	235 (40.3)	**0.030**
3 – 4 times a week	73 (35.6)	152 (40.2)	225 (38.6)	
>= 5 times a week	35 (17.1)	88 (23.3)	123 (21.1)	
Eggs				
Never	14 (6.9)	30 (8.0)	44 (7.6)	
1 – 2 times a week	166 (81.8)	261 (69.8)	427 (74.0)	**0.010**
3 – 4 times a week	19 (9.4)	70 (18.7)	89 (15.4)	
>= 5 times a week	4 (2.0)	13 (3.5)	17 (2.9)	
Milk				
Never	16 (7.8)	19 (5.0)	35 (6.0)	0.197
1-6 times a week	9 (4.4)	10 (2.6)	19 (3.3)	
>= once a day	180 (87.8)	349 (92.3)	529 (90.7)	
Yogurt				
<= 2 times a week	70 (34.1)	64 (17.0)	134 (23.0)	**<0.001**
3 – 5 times a week	52 (25.4)	102 (27.1)	154 (26.5)	
>= once a day	83 (40.5)	211 (56.0)	294 (50.5)	
Cheese				
Never	82 (40.0)	123 (32.8)	205 (35.3)	
1-2 times a week	36 (17.6)	76 (20.3)	112 (19.3)	0.350
3 – 6 times a week	16 (7.8)	28 (7.5)	44 (7.6)	
>= once a day	71 (34.6)	148 (39.5)	219 (37.8)	

(*Continued*)

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Table 2. (*Continued*)

	Men	Women	Total	Chi-square
	N (%)	N (%)	N (%)	p-value
Industrial pastries				
Never	130 (63.7)	255 (67.5)	385 (66.2)	
1 – 2 times a week	33 (16.2)	64(16.9)	97 (16.7)	0.561
3 – 6 times a week	7 (3.4)	12 (3.2)	19 (3.3)	
>= once a day	34 (16.7)	47 (12.4)	81 (13.9)	
Alcohol consumption				
Yes	143 (70.1)	134 (35.7)	277 (47.8)	<**0.001**
No	61 (29.9)	241 (64.3)	302 (52.2)	
Tobacco consumption				
Smoker	25 (12.2)	12 (3.2)	37 (6.4)	
Former smoker	116 (56.6)	48 (12.8)	164 (28.3)	<**0.001**
Never smoked	64 (31.2)	315 (84.0)	379 (65.3)	

(WHO 2015). Mental and physical capacities (MMSE, diseases that affect daily life) have been considered, as well as other subjective variables that indicate perception and satisfaction with life that show the ability to adapt to the social conditions of their surroundings, and interaction with them.

Years of formal education, arms span as an estimator of the total height reached by the person, and knee height as an indicator of the contribution of the tibia to total height have been used as indicators of past conditions. These anthropometric indicators provide information on the economic and nutritional conditions in which the growth and development process of these people took place.

The average height of the entire sample is low compared with other European populations born in the same decades, especially in the case of women (Cavelaars et al. 2000). This, together with the low level of education, could be indicating poor living conditions during the growth and development process, consistent with the historical moment in which the subjects of the sample were born and grew up, during the Spanish Civil War and the post-war period. The educational level of this sample is similar to the data shown by the report of the Superior Council of Scientific Investigations (Pérez Díaz et al., 2020) that show as in 2011, 59% of the Spanish population over 65 years of age had completed or incomplete primary education and 6% were illiterate.

The post-war period in Spain was strongly marked by an economic recession that particularly punished the most disadvantaged classes (Richards 1999), who faced difficulties accessing basic and staple food products such as wheat or oil (Cazorla 2000; Barciela-López 1989). Studies carried out between 1941 and 1943, by the Institute of Medical Research led by Dr. Jiménez Díaz and by the Head of Hygiene and Food of the General Directorate of Health, conclude that the caloric value of the diet of lower-income families remained below half the recommended minimum and that even some of the families with the highest incomes did not reach that amount (Núñez Díaz-Balart et al. 2009; Peset 1978). They also found deficits in the consumption of proteins, vitamins, and calcium, critical nutrients during the growth and development process of children (Peset 1978). Both final height and body proportions reached in adulthood depend on the interaction between genetic and environmental factors during the growth and development process. Short stature due to relatively short legs is generally a marker of an adverse environment

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Table 3. Inflammatory potential of diet by food groups in men and women

	Men	Women	Total	Chi-square
Inflammation factor score	N (%)	N (%)	N (%)	p-value
Legumes				
(-2)	133 (64.3)	268 (70.7)	401 (68.4)	0.231
(-1)	51 (24.6)	72 (19.0)	123 (21.0)	
(0)	23 (11.1)	39 (10.3)	62 (10.6)	
Fruits				
(-2)	188 (90.8)	362 (95.5)	550 (93.9)	<0.063
(-1)	7 (3.4)	8 (2.1)	15 (2.5)	
(0)	12 (5.8)	9 (2.4)	21 (3.6)	
Fish				
(-2)	15 (7.2)	42 (11.1)	57 (9.7)	0.033
(-1)	95 (45.9)	199 (52.5)	294 (50.2)	
(0)	97 (46.9)	138 (36.4)	235 (40.1)	
Culinary fats				
(-2)	193 (94.6)	357 (94.9)	550 (94.8)	0.726
(-1)	11 (5.4)	18 (4.8)	29 (5.0)	
(0)	0 (0.0)	1 (0.3)	1 (0.2)	
Meat				
(0)	111(53.6)	168 (44.3)	279 (47.6)	0.011
(1)	85 (41.1)	165 (43.5)	250(42.7)	
(2)	11 (5.3)	46 (12.2)	57 (9.7)	
Processed foods				
(0)	163 (78.7)	319 (84.2)	482 (82.3)	0.259
(1)	12 (5.8)	16 (4.2)	28 (4.7)	
(2)	32 (15.5)	44 (11.6)	76 (13.0)	
Industrial pastries				
(0)	163 (79.9)	320 (84.7)	483 (83.0)	0.340
(1)	12 (5.9)	16 (4.2)	28 (4.8)	
(2)	29 (14.2)	42 (11.1)	71 (12.2)	
	Median (P25; P75)	**Median (P25; P75)**	**Median (P25; P75)**	**U-Mann-Withney** p-value
Diet Inflammation Index score	-5 (-6; -3)	-5 (-6; -4)	-5 (-6; -4)	0.094

(Bogin and Varela-Silva 2010). Diet is a determining factor in this process, especially the availability of nutrients with structural functions, such as proteins and calcium, at times of growth acceleration. A deficit in these nutrients results in short, short-legged adult individuals.

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Table 4. Predictive model for healthy aging based on past conditions and current food quality

	Unstandardized Coefficients	Standardized Coefficients	p
Men			
(Constant)	32.829		0.000
Number of years of formal education	0.027	0.179	0.014
Arms span	0.024	0.194	0.018
Contribution of knee height to total height	0.154	0.248	0.003
Diet inflammation Index	-0.064	-0.120	0.097
Dependent variable: Index of Quality of Ageing adjusted by age Adjusted $R^2 = 0.117$			
Women			
(Constant)	26.198		0.000
Number of years of formal education	0.012	0.065	0.212
Arms span	0.036	0.255	<0.001
Contribution of knee height to total height	0.016	0.022	0.675
Diet inflammation Index	-0.069	-0.143	0.006

Dependent variable: Index of Quality of Ageing adjusted by age
Adjusted $R^2 = 0.108$

The prevalence of overweight is also very high; considering the BMI values, 85% of the sample is overweight or obese. This prevalence is slightly reduced when using the BMI calculated with the arms span, which decreases the effect of height loss associated with age, but still, 76% of the sample remains in the overweight and obesity categories. These results also coincide with those observed in other populations in which there is a paradox that people with malnutrition problems in their first few years of life have a higher risk of developing overweight or obesity in adulthood (Barker 2007; Gluckman, Hanson, Beedle 2007).

Adverse living conditions were also determining factors in the lack of access to education and later in the access to skilled jobs that would facilitate better living conditions throughout the life cycle of these people (Viñao 2014). The social and economic situation affected men and women differently, influencing, among other issues, the level of education achieved, which was higher in the former as a result of historical differences between men and women regarding access to education in this age group for the Spanish population. In this study, these data are verified: more than 70% of the sample only attended primary school or did not have a formal education, and only 15% studied at university. Among women, the percentage of primary or incomplete primary studies is 78.6% and that of university studies does not reach 11%.

The high prevalence of individuals with low levels of education has strong implications, as the results show that low education predicts low scores for healthy aging. However, the finding that level of educational has less impact on the quality of aging among women than that of men is interesting. This is probably due to the fact that the material living conditions of the women in this sample have depended more on the work and education level of their husbands than on their own; this is supported by the high percentage of women who are housewives and in low-skilled professions, and the high percentage of married women and widows (Pérez Díaz et al., 2020). The economic dependency of women who have not held paid employment during their lives is a factor that can affect their material living conditions during aging. Older women

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have, on average, fewer material resources due to the inequality experienced in the early stages of their lives (WHO 2007). As a result of gender segregation in the labor market and women's less stable work histories, women are less likely to be covered by pensions. Their pensions are, on average, lower than men's (Moen, 1996), and they are more likely to live in poverty than older men, especially in old age. This situation, together with the lack of social recognition of caregiving responsibilities (mothering, grandmothering, care for elderly, sick and dependent people), may also explain the lower satisfaction with life shown by the women in this sample, which coincides with the results of other studies (WHO 2007).

Regarding current diet, this is a sample with a fairly good eating pattern. The consumption of fruits and vegetables is moderate; the recommendations of 5 a day for fruit and vegetables are not met, but most of the subjects in the sample consume these foods more than twice a day. In this regard, the sample obtained values considered high according to the criteria of the Healthy Eating Index for the Spanish population (Norte-Navarro and Ortiz Moncada 2011). The consumption of meat and dairy is better adjusted to the specific recommendations, with an abundant consumption of fish. It is also worth highlighting as positive aspects the almost unique use of olive oil as a fat for culinary preparations and the low consumption of processed foods and manufactured pastries.

Women have a healthier diet than men. These results are also repeated in other studies, in general the eating and tobacco and alcohol consumption behavior of older women is better than that of men (Yuan et al. 2016; Leblanc et al 2015). However, they present more illnesses, both diagnosed and diseases that affect their daily life, which would indicate that there are other factors with a greater impact on your health than diet (WHO 2007).

Therefore, in the study of the aging process it is necessary to take into account past life conditions.A greater understanding of the systemic, sociocultural, and psychological factors underlying such differences should be considered when studying the aging process, since it can help to design appropriate health and care strategies for the elderly. Our results support the importance of the gender perspective when analyzing the determining factors that affect the quality of aging from early stages of the life cycle (Ko et al. 2019).

In this regard, as recommended by the WHO, we must position ourselves in a more holistic approach considering the life course approach of Healthy Aging. Healthy Aging depends on an individual's Intrinsic Capacities and their socio-economic and physical environments, and the interactions between them not only in older age, but across their lives (WHO 2015; Araujo et al. 2017; Jin et al. 2015). In women, the burden of care and other activities associated with gender roles, which are not considered in this article, might explain these differences.

As limitations of this study, we can consider the unequal proportion of sexes in the sample; however, this corresponds to the demographic characteristics of the Spanish population and of the majority of the richest countries. There are more widows than widowers, due fundamentally to increased life expectancy in women compared with men. However, it is a very homogeneous sample in terms of age, and all anthropometric measurements and questionnaires have been carried out in person, which minimizes the bias of some studies with larger samples but working with self-reported data. The sample was chosen on purpose with the intention of working with active elderly people without major health limitations that could lead to dietary restrictions.

Conclusions

There are differences between men and women in the quality of aging, with women having less quality.

The level of education achieved influences the quality of aging among men but not among women. The number of years of formal education is a good indicator of past conditions, since at the historical moment when these people were children and young people, the underprivileged did not have access to education.

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The living conditions of the past influence the quality of aging in both sexes.

The anti-inflammatory potential of food is a protective factor and is positively associated with higher quality of aging in women but not in men.

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This project was approved by the ethics committee of the Universidad Autónoma de Madrid (Ref: CEI 106-2082). The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

The authors have no conflicts of interest to declare.

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