Food Habits and Anthropometric Measurements in a Group of Independent and Institutionalized Elderly People in Spain

Cristina Lasherás, Celestino González, Angeles M. Patterson and Serafina Fernández*

Functional Biology Department, Physiology, Medical Faculty, University of Oviedo, Julian Clavería s/n, 33006 Oviedo, Spain
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Summary Because of an increase in the number of elderly and the problems of nutrition associated with them, we considered it of interest to study the eating habits of 352 elderly persons (134 males and 218 females) 65 to 95 years of age in an urban area in the north of Spain (Oviedo). The purpose of this study was specifically to describe the differences in the eating habits of elderly institutionalized persons and those resident at home and to detect the nutritional status of 161 subjects living in institutions and 191 living at home. The weight, height, body mass index (BMI), and triceps skinfold (PTP) of each were recorded. To determine the eating habits, a questionnaire measuring the frequency of food consumption was distributed to the subjects. The mean age of the institutionalized elderly was greater than those living independently. The mean values of BMI indicated overweight in all cases, with values around those of obesity in independent females (BMI = 29.97). The value of PTP was found to be within normal limits, but a greater percentage of institutionalized subjects showed PTP values of less than P10 (males, 10.2%; females, 11%). Food habits showed that the consumption of fish and margarine/oil was greater in institutionalized subjects of both sexes. Independent males consumed more vegetables; females consumed more milk and greens. Milk, vegetables, fruit, and fish were the food groups with consumption frequencies less than those recommended. A greater percentage of noncompliance was seen among the institutionalized elderly. Key Words elderly, food habits, independently, institutionalized

* To whom correspondence should be addressed at Departamento de Biología Funcional. Fisiología. Facultad de Medicina. Universidad de Oviedo, Julian Clavería s/n 33006. Oviedo. Spain. E-mail: tinog@sci.cpd.uniovi.es
Throughout this century, improvements in nutrition, in the quality of the environment, and in health care have led to an increase in life expectancy in such a way that today most of the population survives to old age. Most studies carried out point toward a progressive increase in the proportion of people aged 65 or more and a decrease in younger age groups.

This sizable increase in elderly people is an evident social phenomenon with enormous economic and social repercussions, which have led to an increased interest in the study and care of this sector of the population. Demographic changes in Spain in the 20th century have brought about an important aging process there that is the most rapid in the world. On the other hand, families, which historically have assisted the elderly, have now changed to one institutionalization through the state/society in such a way that elderly people today receive more care in public institutions than from their families.

Elderly people are one sector of the population that presents a greater risk of suffering nutritional problems because many factors exist that determine their ingestion of food. The early detection of undernutrition by means of noninvasive anthropometric techniques are easily applicable to these persons. Apart from this common problem, the elderly people who are institutionalized present different characteristics, which make them an especially vulnerable group with a higher risk of nutritional deficiency.

A greater number of studies exist related to consumption habits in the elderly. However, few studies exist that analyze the differences in food habits between institutionalized and independent elderly Spanish people. The purpose of this study was therefore to describe the differences in eating habits and to detect the nutritional status in a group of elderly institutionalized persons and those resident at home in an urban area in the north of Spain (Oviedo).

POPULATION STUDY AND METHODOLOGY

The sample consisted of 352 elderly people from 65 to 95 years old, 134 males and 218 females. A total of 161 were institutionalized and the rest lived at home. The institutionalized elderly lived in two homes supported by State Social Security. Both were urban residences and were chosen for their location and ease of access. The sample of subjects living at home was selected after contacting two centers for pensioners in Oviedo itself. The criterion for inclusion of subjects in the sample were first that they should not be bedridden or confined to a wheelchair, and second that they should not be suffering from any terminal disease. All participants were mentally and physically capable of participating in the initial protocol of the study and gave their consent.

In a preliminary interview the subjects were informed of the objective of the study, and after they agreed to participate, a personal appointment was made to collect data.

Measurements were made first thing in the morning. Height was registered by...
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using an Ano-Sayol (exactness 1 mm). The subject was barefooted and in an upright position with the head in a Frankfort plane. To measure weight, a Seca weighing machine with a precision of 500 g was used. Triceps skinfold was measured with a Meikoska calibrator (exactness 0.2 mm). This measurement was made in the arm at the midpoint of the distance between the acromion and the olecranon. The measurement was made on three consecutive occasions and the mean value employed (17). Values above the 10th percentile (P_{10}) were considered acceptable for the PTP value (18). The body mass index was calculated from the anthropometric data (kg/m^2).

For evaluation of the diet, a questionnaire measuring the frequency of food consumption was used. This method allowed us to rapidly obtain an estimation of intake (19, 20), because significant positive correlations had been found by using this method between the estimations of the consumption of distinct nutrients with those observed by using others (7-d register, direct observation) (21, 22).

The choice of foodstuffs that formed part of the questionnaire drew from those that contribute principally to the intake of macro- and micronutrients in the Spanish diet. The questionnaire consisted of a list of 30 foodstuffs, and subjects could indicate their usual pattern of consumption on a daily, weekly, monthly, or yearly basis. To quantify the amounts, household and natural measures were used (such as spoonfuls, glasses, slices, rashers, and pieces of fruit), and whenever this was not possible, the subject was asked whether the quantity consumed was small, medium, or large in respect to a standard we had established. For the calculation, grams of food consumed were used according to age, sex, and culinary measures (23). The food intake of the institutionalized elderly were provided by the institution’s daily meal service system, inspected by dietitians, and was typical of institutions controlled by the State Social Security system.

Statistical analysis. Results were analyzed with respect to the basic criterion of subject residence. Results are expressed as the mean ± SD, and data corresponding to males and females are shown separately. In certain cases, variables are categorized and percentages are employed. To contrast the hypotheses relative to the differences between groups of institutionalized persons and those noninstitutionalized of the same sex, the \( \chi^2 \) test was employed for the categorized variables and Student's t test for the quantitative ones. We also used Pearson's correlation to examine the adjusted relationship between different variables. A probability \( \leq 0.05 \) was considered significant. Calculations were made by using Sigma and BIOESTAT Mc.GRAW HILL V. 1.10.

The study design was approved by the Oviedo University Hospital Committee for Ethical Research.

RESULTS

Table 1 shows the mean values for age and anthropometric parameters of the subjects. The ages of institutionalized subjects of both sexes are greater than those
Table 1. Age and anthropometric data of the sample.

|                | Males       |       | Females     |       |
|----------------|-------------|-------|-------------|-------|
|                | A (49)      | B (85)| A (109)     | B (106)|
| Number of      |             |       |             |       |
| subjects       |             |       |             |       |
| Age (years)    | 80.4 ± 42.1 * | 72.7 ± 56.9 *** | 80.3 ± 61.0  | 71.5 ± 89.6 *** |
| Height (cm)    | 162.9 ± 53.4 | 164.4 ± 81.5 | 153.3 ± 65.3 | 151.1 ± 72.0 |
| Weight (kg)    | 68.7 ± 86.7  | 72.1 ± 82.4  | 62.6 ± 124.2 | 68.7 ± 72.0 *** |
| BMI (kg/m²)    | 25.4 ± 2.9   | 26.6 ± 32.7  | 25.9 ± 4.3   | 29.9 ± 52.5 *** |
| PTP (mm)       | 20.8 ± 52.4  | 24.1 ± 73.9 * | 25.3 ± 70.8  | 33.9 ± 103.8 *** |
| % < P₁₀        | 10.2         | 5.9       | 11          | 3.8    |

A, institutionalized; B, independent (at home).

* Represents the mean value ± standard deviation.

*** A vs. B, p ≤ 0.001; * A vs. B, p ≤ 0.05.

Table 2. Consumption of groups of foodstuffs, categorized by sex and place of residence.

|                | Males       |       | Females     |       |
|----------------|-------------|-------|-------------|-------|
|                | A (48)      | B (82)| A (112)     | B (98) |
|                | (g/person/d) |       | (g/person/d) |       |
| Milk and       | 328.7 ± 160.0 * | 393.1 ± 214.6 | 349.1 ± 122.7*** | 459.8 ± 236.6 |
| derivatives    |             |       |             |       |
| Cereals        | 220.3 ± 56.8 | 200.2 ± 58.9 | 200.3 ± 66.7*** | 152.9 ± 66.4 |
| Eggs           | 14.0 ± 3.1   | 15.7 ± 11.4  | 13.8 ± 2.9    | 15.4 ± 14.2 |
| Sugar          | 15.7 ± 7.2   | 13.9 ± 13.5  | 16.5 ± 8.5*** | 11.4 ± 8.9 |
| Margarine/oil  | 40.4 ± 7.2***| 33.3 ± 4.5   | 38.4 ± 9.1*** | 33.5 ± 3.1 |
| Greens         | 192.6 ± 43.5 | 227.0 ± 122.2 | 150.3 ± 40.4*** | 203.8 ± 110.8 |
| Vegetables     | 9.6 ± 4.5*** | 20.4 ± 14.7  | 9.5 ± 4.6     | 10.7 ± 10.3 |
| Fruit          | 163.3 ± 84.5 | 168.4 ± 115  | 201.1 ± 96.6* | 169.2 ± 107.9 |
| Meat           | 98.1 ± 41.5  | 95.7 ± 51.7  | 82.4 ± 29     | 86.6 ± 50.8 |
| Fish           | 49.4 ± 19.4***| 34.1 ± 27.3  | 48.6 ± 19.2* | 38.0 ± 29.8 |
| Alcoholic      | 245.2 ± 389.7| 160.9 ± 235.4| 49.5 ± 84.9  | 34.9 ± 124.7 |
| beverages     | (cl/d)       |       |             |       |

A, institutionalized; B, independent (at home).

*** A vs. B, p ≤ 0.001; * A vs. B, p ≤ 0.05.

* Represents the mean value ± standard deviation. The number of subjects is shown in parentheses.
of the residents at home ($p \leq 0.001$). In relation to weight, independent females present figures significantly greater than institutionalized females ($p \leq 0.001$). The mean value of the BMI responds to the criterion of overweight ($\text{BMI} \geq 25 \text{ kg/m}^2$), with the exception of females living at home who present a diagnostic value near obesity, with significant differences in respect to the institutionalized group ($p \leq 0.001$). The mean values of PTP are within normal limits, but with significant differences between sexes and living conditions (males $p \leq 0.05$, females $p \leq 0.001$). The percentage of subjects with figures less than $P_{10}$ is greater in the institutionalized group of both sexes (10.2% males, 11% females).

Table 2 shows the consumption of food in grams/person/d of the different groups. Significant differences are seen in males in relation to the quantity of fish and margarine/oils ($p \leq 0.001$) that are consumed (greater in the institutionalized) and in that of vegetables ($p \leq 0.001$) consumed (greater in the noninstitutionalized). In females, greater consumption of milk and greens ($p \leq 0.001$) is seen among the noninstitutionalized and of cereals, sugar, margarine/oil, fruit, and fish ($p \leq 0.05$) among the institutionalized.

In the analysis of the contribution of energy of the different groups of foodstuffs (Figs. 1 and 2), it can be seen that this is very similar in both sexes and their living conditions. Cereals, margarine/oil, milk, and meat are responsible for more than 70% of the daily energy consumed. The most important difference between the sexes was the consumption of alcoholic beverages, which contributed to a total energetic value of 7.02% in institutionalized males and 5.09% in those living at home, compared with values of 1.6% and 1.3% in institutionalized females and those living at home.

Table 3 shows the percentage of elderly people that have never consumed certain groups of foodstuffs, or they consume them with a lesser frequency than the recommendations given by the Ministry of Health and Consumption for elderly people (23). A great many of those interviewed (from 57% to 100%, depending on the group) consume less than 0.5 liter of milk or its derivatives daily, most being those institutionalized (both sexes). Significant differences were seen in women ($p \leq 0.001$). The frequency of consumption of greens is generally acceptable even though it appears that a greater number of those who live at home (about 20%) do not consume them even once a day. Vegetables and fish are the foods elderly people most avoid. Concerning pulses, 16% of the females who lived at home never consumed them, and approximately 90% of those institutionalized (both sexes) did so less than twice a week. A significant difference was seen ($p \leq 0.001$). Concerning fish, we observed that from 70% to 90% of the elderly people studied ate fish fewer than 3 times a week. Differences were found among females (a greater proportion among the institutionalized). Meat appeared to be a more-acceptable food than fish by all persons studied, being consumed fewer than 3 times a week, a low percentage for the elderly. Fruit is another food that even though eaten by nearly all individuals, 60% to 80% of those studied consume fruit fewer than two times a day, that is, only once or not at all.
No significant relations were found between BMI and PTP and food habits (data not shown).

DISCUSSION

The mean height of the elderly (Table 1) is less than that of young adults, which in part is due to changes in growth that occur in later years (24), even though the most important cause determining this decrease is the change found that occurs in the spinal column during aging, which leads to a decrease in height of approximately 2.1 cm (nearly an inch) (25, 26). These changes, however, do not
permit a correct measurement of the height of an individual, the reason the height of a population may be underestimated and consequently the reason the BMI is overestimated. In our sample, cases of senile kyphosis were not found. The mean height and weight in our study are similar to those described in similar populations (27), or they are even slightly superior to the findings of other studies (6). Weight alone is not an indicator of nutritional state. Even though these measures are well defined in the adult population, their evaluation in the elderly is more difficult because the modifications produced during aging appear in part to be similar to those produced by undernutrition (3). According to the existing tables in Spain (6), the mean value of the PTP in institutionalized males is about P95, and that of females is about P75. In noninstitutionalized subjects of both sexes, figures were
Table 3. Percentage of elderly people with a frequency consumption less than that recommended for the different food groups.

| Food Group               | Males   | Females  |
|--------------------------|---------|----------|
|                          | A (48)  | B (82)   | A (112) | B (98)   |
| Milk and derivatives     |         |          |
| never                    | 2.0     | 2.3      | 0.0     | 1.9      |
| <0.5 L/d                 | 83.6    | 70.6     | 100***  | 57.5     |
| Greens                   |         |          |
| never                    | 0.0     | 1.2      | 0.0     | 2.8      |
| <once a day              | 2.0**   | 20.0     | 6.2**   | 17.9     |
| Vegetables               |         |          |
| never                    | 8.2     | 3.5      | 4.5**   | 16.0     |
| <twice a week            | 89.8*** | 51.8     | 94.6*** | 62.3     |
| Fruit                    |         |          |
| never                    | 0.0     | 4.7      | 0.0*    | 7.5      |
| <twice a day             | 79.6    | 70.6     | 73.2*   | 58.5     |
| Meat                     |         |          |
| never                    | 0.0     | 0.0      | 0.9     | 1.9      |
| <3 times a week          | 10.2    | 5.9      | 6.2     | 12.3     |
| Fish                     |         |          |
| never                    | 4.1     | 5.9      | 6.2     | 3.7      |
| <3 times a week          | 89.8    | 78.8     | 88.4**  | 71.7     |

A, institutionalized; B, independent (at home). The number of subjects is shown in parentheses.

*** A vs. B, p ≤ 0.001; ** A vs. B, p ≤ 0.01; * A vs. B, p ≤ 0.05.

above P95. The percentage of persons with scarce fat reserves was less than that found in other studies in rural and urban elderly populations resident at home (28). These results must be interpreted with caution, since the anthropometric measures in the elderly are not as precise as those obtained in adults because the elasticity and compressibility of the skin varies with age (29, 30) and because the relation between subcutaneous adipose tissue and total fat decreases with age (7).

The consumption of food as a source of energy and macronutrients establishes what the dietary habits of a population are. In this sense, the general characteristics of the diet of those who make up our sample are typical of developed countries. Milk products (Table 2) are the group of foodstuffs consumed in greater quantities by the males and the females of our study. This intake is intermediate to that described in groups of elderly Spanish people in the north of Spain (27, 31) and similar to those reported for other populations of elderly Europeans and Spanish people (3–6). Even though 98% of these individuals consume these products on a daily basis (Table 3), most do not do so in sufficient quantities.
The consumption of cereals by females who live at home (Table 1) is lowest (153 g), usually the result of a low intake of bread because this is a foodstuff that these elderly people believe makes fat. Furthermore, our consumption is intermediate to that found in other Spanish populations (31, 32), even though this is the food group that most contributes to the total daily energy of both sexes (Fig. 1).

The intake of margarine/oil (Table 2) is greater among institutionalized individuals, and this may be due to the greater consumption of margarines in their breakfasts because they form part of the usual menu of geriatric residences such as these institutions. No differences were found between sexes. The mean figures we found among the elderly who live at home are less than those of other studies (31, 33, 34), and our data show a greater consumption by elderly institutionalized persons than by those described by other authors in a similar population (35). However, we believe that these comparisons must be interpreted with caution because the consumption of oils is precisely one of the most difficult to quantify with a dietary questionnaire.

Greens are consumed in greater quantity (Table 2) by individuals who live at home, both males and females. This is also the group, however, that presents a significantly greater proportion of people who consume greens with a lesser frequency. It can therefore be deduced that those who consume them must do so in sufficiently greater quantities. Consumption in general is acceptable, and it is comparable with that of other European studies (36, 37), though it does not reach that described in other Spanish studies (31), with a consumption of this group of foodstuffs that is traditionally higher.

The daily consumption of fruit in our study is very low (Table 2), almost the lowest found in comparison with the different studies carried out in southern Europe, including Spanish and Italian ones, that is, those with a typical Mediterranean diet (31, 35, 37, 38). But it is similar to those described in populations in northern Europe (34, 36). Table 3 shows that even though most of those interviewed stated that they eat fruit, a large percentage of them do not consume fruit more than twice a day.

The consumption of meat is also exceptionally low and is slightly superior in males in comparison with females (Table 2). This appears to be in relation to a low quantity in each intake rather than to a smaller frequency of consumption, since about 90% state that they eat meat more than three times a week (Table 3). This food is usually avoided by the elderly because of the difficulty encountered when chewing it, for which reason the way of preparing it plays a major influence on its acceptance.

More worrisome is the consumption of fish, a foodstuff with a low frequency of consumption that exceeds 80% of the elderly people studied (Table 3). Consumption is greater in the institutionalized elderly than in those who live at home (Table 2), and this was highly related to fish being an expensive food, according to those interviewed. In spite of this, if we compare fish with consumption in the 18 participatory centers in the rest of Europe (39), it is surpassed by only four of these, data that coincide with the habits of high consumption of fish characterizing

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the Spanish population.

The intake of sugar is similarly low (Table 2), and it is significantly less in females who live at home compared with those institutionalized. These results are in accordance with the low consumption of sugar described in Spain (31,32).

The major difference with respect to the dietary habits of males and females in our study is found in alcoholic beverages (Table 2). Regular alcohol intake was reported by males. The commonest daily alcoholic beverage, mainly around mealtimes, was wine. It should be noted that a “bar culture” is common in Spain. That is, males usually have a glass of wine with their friends before eating lunch. Males, especially those institutionalized, consume a much greater quantity of alcoholic beverages than females do. Despite the advanced age of this population, regular alcohol use was prevalent in contrast to previous reports from communities of retired people (40–43). Heavy and abusive drinking was uncommon by our measures. In females, alcoholic beverages provide less than 2% of the total energetic value (Fig. 2), and in males they provide more than 5% (Fig. 1). These results agree with previous studies of community-dwelling elderly people (44, 45). Alcohol is therefore placed in fifth position before foodstuffs such as fruit, greens, fish, and vegetables.

We concluded that the elderly in our study have a very low consumption of fish, fruit, vegetables, and milk. This is true for both sexes and for the types of living conditions. Institutionalized elderly people are those who present a lesser frequency in the consumption of these foods. Dietary patterns in northern Spain are similar to other developed countries of Europe. The southern food pattern appears to be very healthy because it is rich in vegetables, fruit, and fish.

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