

Original Paper

Associations Between Obesity, Breakfast-Time Food Habits and Intake of Energy and Nutrients in a Group of Elderly Madrid Residents

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Key words: overweight, obesity, breakfast habits, elderly, body mass index

Objective: The objective of this study was to gain more knowledge about the breakfast habits of different groups of elderly people and to investigate the differences in breakfast habits between overweight and normal weight elderly subjects.

Methods: A study was made of the food preferences, dietary habits and the intake of energy and nutrients at breakfast in a group of 122 elderly Spanish people (65 men and 57 women) aged 75.7 ± 8.7 years. Study participants were divided into two groups: overweight and obese subjects (O) with a body mass index (BMI) ≥ 25 kg/m² (58% of the population), and normal weight subjects (NW) with a BMI < 25 kg/m² (42% of the population). The members of each group were further divided into subgroups according to age (≥ 80 years of age (Y) and ≤ 79 (Z)), to determine if this factor gave rise to any differences in breakfast habits or modified existing differences between NW and O subjects.

Results: NW subjects more frequently indicated a preference for fruit (Y), juices (Y) and bread (Y and Z) as breakfast foods, and showed less preference for churros (Y) (a traditional Spanish breakfast fritter) than did O subjects.

NW subjects consumed more varied breakfasts, taking both a greater number of foods and more groups of foods. They also spent a longer time eating their breakfasts and consumed greater quantities of food than did O subjects.

The breakfasts of NW subjects covered a higher percentage of their theoretical energy expenditure and provided greater contributions of fiber, vitamin E and iron to meet recommended intakes than did those of O subjects.

Age did not produce any statistically significant differences in subjects' breakfast habits.

Conclusion: The shorter length of time spent eating breakfast, the consumption of smaller quantities and less varied diets and the different composition of NW and O breakfasts, could indicate the existence of less healthy breakfast habits among overweight and obese subjects. It is also possible that less adequate breakfast habits contribute to the appearance and further development of obesity.

INTRODUCTION

Nutrition in the elderly is of great interest since it plays an important role in the maintenance of health and optimum functional capacity [1,2].

In all developed societies, the number of aged persons is increasing rapidly [2]. So too is the incidence of obesity [3-5],

a condition that impairs both the health and quality of life of the elderly.

The majority of well-designed, large, epidemiological studies have shown that excessive weight, as indicated by a high body mass index (BMI) (kg/m²), is associated with an increased risk of diseases such as diabetes mellitus, hypertension and coronary heart disease and consequently with increased mortality rates [6,7]. It is therefore important to understand

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more about this problem and to provide measures that will lead to both its prevention and correction [7,8].

Recently it has been shown that the distribution of food intake over the day, and not just the total food intake, can have a decisive influence in the prevention of obesity [9]. The frequency of food intake, as well as the total quantity and type of food consumed affect an individual's energetic balance [10]. An increase in feeding frequency and a shift in daily energy intake towards the beginning of the day have been associated with lower body weights [11].

The custom of having no breakfast, or the consumption of an inadequate breakfast, is a frequent problem that has been reported in different studies [12-14]. Several authors have commented that these types of behavior at breakfast lead to less adequate food habits throughout the rest of the day [14-16]. Recently the consumption of an inadequate breakfast has been related to an increased risk of obesity [9,15,17-23]. Therefore, though the elimination of breakfast is seen by some as a means to lose weight, in practice it is not an efficient way of treating obesity [22].

The aim of this investigation was to gain more knowledge about the breakfast habits of different groups of elderly people and to investigate the relationship between breakfast habits and maintenance of normal or excess body weight.

MATERIALS AND METHODS

A study was made of the food preferences, dietary habits and the intake of energy and nutrients at breakfast in a group of

122 elderly Spanish people (65 men and 57 women). Study subjects were aged between 65 and 95 years and were residents of the Comunidad Autónoma de Madrid, Spain. The characteristics of the experimental population are given in Table 1.

The size of the sample population was determined by examining the variability observed in breakfast energy intake in a similar group of people [9]. The minimum size for the sample was found to be 92 participants for a precision of 1 standard error.

In order to avoid a possible dependence of results on place of residence, the sample population included both institutionalized subjects who lived in an old people's home run by the State Social Security Service, and persons living independently who attended a Social Security Health Center. The sample was chosen by block multistage sampling. This allowed the random choice of the old people's home and the geriatric medical practice that would participate in the study. The nature of the study was explained to all subjects. They gave written approval of their inclusion. Those who volunteered to take part made up 86% of those living in the State Home at the time of the study and 76% of those who attended the Health Center between October and November of 1991.

Elderly persons with serious mental deterioration, neoplasms, liver malfunction, diabetes or other endocrine disorders were excluded from the study. Also excluded were those undergoing dietetic treatment to lose or gain weight, those who did not provide all the information asked of them, and those who did not attend their appointment at the time of the anthropometric study. Those who took medications likely to alter appetite e.g., anti-neoplasia drugs, steroids or anabolic drugs,

Table 1. Characteristics of the Experimental Population

	Total (n = 122)		NW (n = 51)		O (n = 71)		Multiple regression analysis
	≤79 years (n = 94)	≥80 years (n = 28)	≤79 years (n = 36)	≥80 years (n = 15)	≤79 years (n = 58)	≥80 years (n = 13)	
(X ± SD)							
Age (years)	71.0 ± 5.0	86.5 ± 3.3	70.8 ± 4.7	86.5 ± 4.1	71.0 ± 5.2	86.4 ± 2.4	R
Weight (kg)	67.0 ± 11.5	56.1 ± 13.5	58.2 ± 11.0	46.6 ± 9.1	72.3 ± 8.0	67.2 ± 8.3	S,A,R,B
Height (m)	1.6 ± 0.1	1.5 ± 0.1	1.6 ± 0.1	1.5 ± 0.1	11.6 ± 0.1	1.5 ± 0.1	S,A,R
BMI (kg/m ²)	26.5 ± 4.2	25.8 ± 5.4	22.6 ± 2.4	21.5 ± 2.9	29.0 ± 3.1	30.4 ± 3.1	B
(%)							
Sex:							
Male	54.3	21.4	58.3	13.3	57.8	30.8	
Female	45.7	78.6	41.7	86.7	48.2	69.2	
Residence:							
State home	21.3	82.1	25.0	86.7	18.9	76.9	
Own home	78.7	17.9	75.0	13.3	81.1	23.1	
Breakfast taken:							
Yes	93.6	100	94.4	100	93.1	100	
No	6.4	0	5.6	0	6.9	0	

BMI: Body mass index.

S, A, R, B: Differences with respect to sex (S), age (A), place of residence (R) (institutionalized or independent) and body mass index (B), using multiple regression analysis.

NW = Normal weight subjects, O = Overweight and obese subjects.

were also excluded. The final participants in the study represented 66% of the institutionalized and 65% of the Health Center attendees.

None of the subjects were alcoholic though 14% of overweight or obese subjects were smokers. 15% of those of lesser weight also smoked. 13% of overweight/obese subjects and 9% of normal-weight subjects took vitamin supplements. 7.8% of the overweight/obese habitually took mineral supplements compared to 8.4% of those with normal weight.

The study was approved by the Human Research Review Committee of the Universidad Complutense of Madrid, Faculty of Pharmacy.

Study of Preferred Foods

Preferred breakfast foods were recorded in a questionnaire that was designed with the wider scope of recording preferred foods for all meals.

Food Habits at Breakfast

For institutionalized subjects, all foodstuffs consumed were registered by means of "precise individual weighing" of food.

Subjects living independently were followed using a prospective method involving the keeping of a "weighed food record". Kitchen scales were provided to all subjects to facilitate the weighing of food. After the questionnaires were completed, they were returned in person. A qualified nutritionist inspected the records to ensure that they were complete and that sufficient detail had been recorded. During the same interview, a "food frequency intake" questionnaire was completed to amplify and complement the dietary data collected. In cases of discrepancy between data collected by these two methods, the subject was eliminated from the study. For all subjects the study lasted 5 consecutive days (including a Sunday).

Breakfast was defined as all foods taken at the first meal of the day, at whatever hour but always before 11 a.m. [24]. Foods consumed were recorded as g per person per day and were grouped in agreement with the Food Composition Tables of the Institute of Nutrition [25].

In order to establish breakfast variety, the number of foods and the number of food groups included in this meal were counted. The time that institutionalized subjects spent at breakfast was observed and recorded while independently living subjects were asked to indicate the length of time they spent at breakfast.

Physical Activity

All subjects recorded physical activity for what they considered to be a typical day during the experimental period. The questionnaire was a modified version of that previously published by Dalloso et al [26], based on the self-assessment of time spent walking, standing and in physically active leisure etc. Answers provided by institutionalized subjects were veri-

fied by observing their activity patterns over the 5 days in which food intake was followed.

Dietetic Survey

The energy and nutrient content of all food ingested was determined using the "Spanish Food Composition Tables" [25]. Tables of "Recommended Intakes of Energy and Nutrients for the Spanish Population" issued by the Department of Nutrition [27] were followed to calculate the Recommended Intakes (RI) for this population.

The estimation of energy expenditure was made taking into account equations proposed by the World Health Organization (WHO) [28] and multiplying by an activity ratio in accordance with the criteria of various authors and expert groups [27-30]. From these data, the contribution of breakfast to recommended intakes of nutrients and theoretical energy expenditure were determined.

Anthropometric Survey

Measurements were made first thing in the morning. Subjects wore only underwear and were without shoes, in agreement with standard techniques and following international norms recommended by the WHO [31]. Weight and height were determined using a digital electronic weighing scale (Seca alpha; Rue Lavoisier 91430, Igmy, France, range: 0.1-150 kg) and a digital stadiometer (Harpender Pfifter 450; Badem, Padum Aveny, Carlstadt, NJ, USA) (range 70-205 cm) respectively. From the anthropometric data the BMI was calculated.

Subjects were divided into two groups according to Garrow [32]: overweight and obese subjects (O) with a body mass index ≥ 25 kg/m² and normal-weight subjects (NW) with a BMI < 25.

Statistical Analysis

Results are shown as means and SD, or as the percentage of subjects who took particular food items. NW and O subjects were further divided into subgroups according to age: those ≥ 80 years of age (Y) and those ≤ 79 (Z).

The chi-square test (with continuity correction or Yates' correction, given that sample size was < 200) was used to study the possible relationship between BMI and sex and place of residence, in order to discard its interaction with these variables as the source of observed differences. The results of this analysis showed that no relationship existed between BMI and these variables. The same method was used to show that there were no significant differences between overweight/obese subjects and those of normal weight with respect to disease (depression, hypertension, heart diseases, hyperlipidaemia, gallbladder disorders, intestinal disorders e.g., constipation or diarrhoea), the consumption of medicines (hypotensive medication, digitalic drugs, Ca canal blockers, diuretics, laxatives,

anti-ulceration medication, analgesics, antidepressants and sedatives), vitamin-mineral supplements, tobacco and alcohol.

The analysis of contrast of differences between proportions performed using an approximation of the binomial to the normal distribution employing continuity correction. Multiple regression analysis was used to determine the influence of age (A), sex (S), place of residence (R) and body mass index (B) on each of the parameters studied. Differences of $p < 0.05$ were considered significant. Coefficients of the linear correlation between dietary and anthropometric data were also calculated.

RESULTS

Table 1 shows the most important characteristics of the experimental population.

NW subjects indicated more frequently a preference for fruit (Y), juices (Y), and bread (Y and Z) as breakfast foods, and less frequently foods such as churros (Y) (a traditional Spanish breakfast fritter) than did O subjects (Table 2).

The breakfasts of NW subjects included a greater number of foods and a greater number of food groups. NW subjects also spent longer periods of time at breakfast. Further, their breakfasts made a greater contribution to the covering of daily energy expenditure (Table 3). The percentage of subjects whose breakfasts provided less than 20% of the theoretical energy expenditure was higher among O subjects, 62% compared to 45% in NW subjects.

NW subjects consumed a greater quantity of sugar and fruit at breakfast than did O subjects (Table 4).

In O subjects, breakfast provided a lower percentage of the recommended intake of fiber, vitamin E and iron (Table 5).

DISCUSSION

Sixty percent of subjects had BMI ≥ 25 kg/m². Obesity (defined as BMI > 30 [32]) affected 17% of subjects. These percentages are similar to those observed in other European elderly groups [33].

Clinical studies designed to establish food preferences show that these are conditioned differently in obese and normal-weight people. Obese subjects tend to prefer foods rich in fats and sugars [34]. In the experimental population, O subjects (Y) showed preferences for breakfast foods such as churros. NW subjects preferred fruit (Y), juices (Y) and bread (Y and Z) (Table 2). The difference in food preferences between these two groups is quite clear. It would be logical to assume that these preferences condition the consumption of food types [35,36] throughout the day, as well as at breakfast.

Amongst NW subjects, breakfasts consumed were similar to those indicated as preferred: a drink, usually coffee made with milk, with bread, breakfast pastries or biscuits accompanied by butter/margarine and jam. This is similar to that reported for other groups of elderly Spanish people [37]. NW subjects cited fruit as their favorite foods more often than did O subjects

Table 2. Breakfast Food Preferences (% Answers)

	Total (n = 122)		NW (n = 51)		O (n = 71)		ACDP
	≤ 79 years (n = 94)	≥ 80 years (n = 28)	≤ 79 years (n = 36)	≥ 80 years (n = 15)	≤ 79 years (n = 58)	≥ 80 years (n = 13)	
Coffee made w/milk	60.2	43.9	57.9	64.2	61.8	53.8	
Milk alone	7.4	4.9	8.9	0	9.1	0	
Chocolate	8.3	9.8	0	14.2	14.5	15.4	
Tea	1.9	2.4	2.6	0	1.8	7.7	
Other infusions	1.9	0	2.6	0	1.0	0	
Juices	10.1	0	13.1	0	9.1	0	Y
Other	6.0	34.2	4.4	14.5	4.5	23.1	
Nothing	4.6	2.4	10.5	7.1	1.8	0	
Sandwiches	1.2	1.7	1.7	3.8	1.2	0	
Bread	20.9	21.0	25.6	34.6	17.1	6.7	Y,Z
Breakfast pastries	12.3	8.8	6.9	7.7	17.1	6.7	
Churros	11.7	7.0	5.1	3.8	17.1	20.0	Y
Biscuits	4.9	3.5	3.4	0	6.1	13.3	
Fruit	5.6	3.5	8.6	3.8	2.4	0	
Butter/margarine	13.6	10.5	12.1	15.4	14.6	6.7	
Jam	13.6	8.8	12.1	19.2	14.6	0	
Cold meats/salami	1.2	0	1.7	0	1.2	0	
Yoghurt	1.2	0	1.7	0	1.2	0	
Others	10.7	29.9	19.4	11.7	3.8	26.6	Y
Nothing	7.0	5.3	1.7	0	3.6	20.0	

ACDP = Analysis of contrast of differences between proportions.

Y, Z = Significant differences between NW and O aged ≤ 79 years (Y) and NW and O aged ≥ 80 years (Z).

NW = normal weight subjects, O = overweight and obese subjects.

Table 3. Breakfast Variety, Time Spent at Breakfast and % of Daily Energy Provided by Breakfast ($X \pm SD$)

	Total (n = 122)		NW (n = 51)		O (n = 71)		Multiple regression analysis
	≤79 years (n = 94)	≥80 years (n = 28)	≤79 years (n = 36)	≥80 years (n = 15)	≤79 years (n = 58)	≥80 years (n = 13)	
· N° of foods (n°/5 days)	4.9 ± 2.1	6.0 ± 1.6	5.4 ± 2.2	6.3 ± 1.4	4.6 ± 1.9	5.5 ± 1.4	R,B
· N° of food groups (n°/5 days)	3.7 ± 1.2	4.3 ± 0.9	4.0 ± 1.2	4.6 ± 0.8	3.6 ± 1.2	4.0 ± 0.9	R,B
· Time spent at breakfast (min/day)	15.4 ± 7.8	20.4 ± 7.2	18.7 ± 8.2	22.3 ± 7.5	13.4 ± 6.7	17.3 ± 5.6	B
· Energy provided by breakfast (% of intake/day)	18.3 ± 6.2	21.2 ± 4.6	19.9 ± 5.3	22.6 ± 4.5	17.4 ± 6.2	19.3 ± 4.3	
(% of expenditure/day)	18.2 ± 7.7	21.3 ± 7.4	22.5 ± 7.4	24.4 ± 8.4	15.5 ± 6.3	17.2 ± 3.3	R,B

BMI = Body mass index.

S, A, R, B: differences with respect to sex (S), age (A), place of residence (R) (institutionalized or independent) and body mass index (B), using multiple regression analysis. NW = normal weight subjects, O = overweight and obese subjects.

Table 4. Foods Taken at Breakfast (g/day) ($X \pm SD$)

	Total (n = 122)		NW (n = 51)		O (n = 71)		Multiple regression analysis
	≤79 years (n = 94)	>80 years (n = 28)	≤80 Years (n = 36)	>80 Years (n = 15)	≤80 Years (n = 58)	>80 Years (n = 13)	
Total	321.6 ± 132.9	338.4 ± 109.8	358.0 ± 109.2	321.5 ± 116.8	296.5 ± 134.6	346.1 ± 99.1	R
Cereals	41.1 ± 24.5	34.6 ± 9.8	45.3 ± 24.7	36.2 ± 11.9	38.1 ± 22.5	32.3 ± 6.7	S
Milk products	185.8 ± 91.4	188.7 ± 57.8	186.2 ± 97.5	187.4 ± 65.9	186.8 ± 84.8	190.7 ± 52.3	
Eggs	0.3 ± 2.7	0	0.8 ± 4.4	0	0	0	
Sugar	8.2 ± 12.5	10.2 ± 9.8	12.2 ± 18.0	12.2 ± 9.7	5.8 ± 6.6	7.6 ± 10.0	B
Oils	4.4 ± 6.6	6.2 ± 4.3	5.5 ± 8.2	7.4 ± 3.4	3.9 ± 5.4	4.5 ± 4.8	S
Fruit	58.8 ± 87.3	97.7 ± 67.1	86.1 ± 101.1	78.3 ± 48.1	39.8 ± 71.0	109.8 ± 74.2	R,B
Meats	1.3 ± 6.1	0	0.9 ± 5.1	0	1.6 ± 6.7	0	
Fish	0.1 ± 1.0	0	0.3 ± 1.7	0	0	0	
Drinks	20.3 ± 50.3	0	20.1 ± 45.7	0	18.9 ± 52.2	0	
Others	1.1 ± 5.1	0.3 ± 1.5	0.6 ± 2.8	0	1.5 ± 6.2	0.7 ± 2.3	

BMI = Body mass index.

S, A, R, B = differences with respect to sex (S), age (A), place of residence (R) (institutionalized or independent) and body mass index (B), using multiple regression analysis.

NW = normal weight subjects, O = overweight and obese subjects.

(Table 2) and their fruit consumption was higher (Table 4). However, though O subjects frequently showed they preferred foods rich in sugars and fats (Table 2), they showed lesser intakes of these foods compared to NW subjects (Table 4).

Several studies have indicated that the elimination of breakfast, or the consumption of an inadequate breakfast, are related to the development of excess weight since foods richer in energy are selected throughout the rest of the day [15,19–21]. Though in the present experimental population the numbers of O and NW subjects who skipped breakfast were similar (Table 1), subjects with greater BMI consumed breakfasts of less variety (Table 3) which provided a lower percentage of the daily energy intake (NS) and theoretical energy expenditure ($p < 0.05$) (Table 3).

Situations in which available food is monotonous are usually accompanied by loss of body weight [38]. Yet it is also true that some studies have revealed obese individuals to have low variety diets - the authors themselves have shown this to be the

case in adolescents [39] and in the elderly [40]. In the present study it was seen that O subjects had less varied breakfasts both in terms of number of foods ($p < 0.05$) and number of food groups ($p < 0.05$). BMI was also negatively correlated to breakfast variety ($r = -0.1883$, $p < 0.05$).

BMI was also seen to be negatively correlated to the time spent eating breakfast ($r = -0.2780$, $p < 0.05$). NW subjects spent more time at breakfast than did O subjects ($p < 0.001$) (Table 3). The time spent at this meal was similar to that observed in French elderly people by Andersson-Hassan & Hoint-Pradier [41]. Similarly, Barkeling et al [42] observed that obese children ate faster ($p < 0.05$) and did not slow down their eating rate towards the end of the meal ($p < 0.05$) as much as normal weight children. These authors suggest that a deficient satiety signal, or an impaired response to such a signal in obese subjects, could possibly explain the differences. It is possible that something similar could occur in the obese subjects of the present investigation.

Table 5. Contribution of Breakfast to the Covering of Recommended Intakes (% of Recommended Intakes) (X ± SD)

	Total (n = 122)		NW (n = 51)		O (n = 71)		Multiple regression analysis
	≤79 years (n = 94)	≥80 years (n = 28)	≤79 years (n = 36)	>80 years (n = 15)	≤79 years (n = 58)	>80 years (n = 13)	
Protein	21.6 ± 8.3	21.9 ± 6.6	22.6 ± 6.7	22.2 ± 7.7	21.2 ± 8.7	21.3 ± 5.7	S
Fiber	11.9 ± 11.2	12.0 ± 5.3	15.3 ± 12.8	11.7 ± 5.1	9.6 ± 9.3	11.5 ± 5.0	B
Vitamin C	30.3 ± 38.2	23.8 ± 29.1	38.9 ± 41.3	12.5 ± 5.5	24.3 ± 35.8	33.6 ± 39.1	
Thiamin	18.4 ± 9.4	21.3 ± 8.1	20.6 ± 9.1	19.6 ± 6.8	18.0 ± 8.9	22.3 ± 8.9	
Riboflavine	31.2 ± 14.3	36.1 ± 11.7	31.9 ± 14.8	30.5 ± 13.6	31.0 ± 13.7	35.3 ± 10.3	S
Pyridoxine	9.5 ± 4.6	8.2 ± 3.9	10.9 ± 4.7	7.4 ± 2.6	8.6 ± 4.3	8.8 ± 5.0	R
Niacin	18.9 ± 7.9	20.3 ± 6.5	19.9 ± 6.9	20.3 ± 7.1	18.4 ± 8.0	20.0 ± 6.2	
Folates	10.0 ± 8.8	10.4 ± 7.6	12.8 ± 10.8	8.2 ± 3.2	8.3 ± 7.0	12.5 ± 10.4	
Vitamin B ₁₂	28.2 ± 13.8	28.3 ± 8.7	28.9 ± 14.3	28.1 ± 9.9	28.0 ± 13.1	28.6 ± 7.8	
Vitamin A	13.1 ± 9.5	18.7 ± 8.1	14.2 ± 10.4	20.2 ± 8.2	12.6 ± 8.9	16.3 ± 7.4	S,R
Vitamin D	4.3 ± 6.4	2.3 ± 1.9	4.5 ± 7.8	2.9 ± 2.4	4.1 ± 5.3	1.7 ± 0.9	
Vitamin E	5.0 ± 8.6	4.7 ± 2.0	8.0 ± 12.7	4.8 ± 2.2	3.3 ± 4.0	4.3 ± 1.6	B
Iron	11.2 ± 5.7	10.4 ± 3.4	13.4 ± 5.7	9.9 ± 3.1	9.8 ± 5.1	10.6 ± 3.7	B
Calcium	33.0 ± 14.2	31.8 ± 9.9	33.9 ± 13.6	31.0 ± 10.6	32.6 ± 13.8	32.6 ± 9.7	
Magnesium	11.5 ± 6.2	10.7 ± 6.5	12.6 ± 6.1	9.7 ± 3.6	10.8 ± 6.1	11.7 ± 8.9	
Iodine	142.8 ± 77.8	170.0 ± 56.8	142.9 ± 84.0	173.5 ± 64.6	143.8 ± 72.7	165.5 ± 51.1	S
Zinc	8.6 ± 3.9	9.3 ± 2.9	9.3 ± 3.3	9.0 ± 3.0	8.2 ± 4.1	9.4 ± 2.9	

BMI = body mass index.

S, A, R, B = differences with respect to sex (S), age (A), place of residence (R) (institutionalized or independent) and body mass index (B), using multiple regression analysis.

NW = normal weight subjects, O = overweight and obese subjects.

Grande [13] and Thoulon-Page [43] consider that breakfast should provide between 20 and 25% of daily energy. Yet in this report only 38% of O subjects and more than half of NW subjects (55%) consumed breakfasts that can be considered satisfactory, given that they provided more than 20% coverage of the daily energy expenditure. The breakfasts of NW subjects provided a greater percentage of the theoretical energy expenditure ($p < 0.05$) than did those of O subjects (Table 3) and BMI was negatively associated with the contribution of breakfast to the covering of theoretical energy expenditure ($r = -0.3281, p < 0.05$). These results agree with those obtained by Summerbell and Moody [9], Bellisle et al [17], Desjeux et al [18], Schlundt et al [22] and Wolfe et al [23].

Summerbell and Moody [9] found that the amount of energy consumed at breakfast was inversely related to BMI in a group of adolescents, though these authors also indicate that feeding patterns were not related to BMI within other age groups (student, young adult, middle-aged, elderly). Many other studies have reported that obese children show a characteristic feeding profile with an increase in consumption of energy in the second half of the day [18]. Similarly, Wolfe et al [23] showed that fatter children were more likely to skip breakfast than normal weight children.

Bellisle et al [17], in a study of the diet of 339 French schoolchildren aged between 7 and 12 years, showed that obese and overweight children had a less favourable distribution of energy intake over the length of the day. These children ate less at breakfast and more at dinner than their leaner peers. The energy value of breakfast was inversely related to body size.

The results suggest a possible contribution of disturbed metabolic and/or behavioral daily cycles in the development of excess body weight.

Schlundt et al [22] studied 52 moderately obese adult women stratified according to their baseline breakfast-eating habits and randomly assigned a weight-loss program. The no-breakfast group ate two meals per day and the breakfast group ate three meals per day. The energy content of the two weight-loss programs was identical. The results of this study led these authors to conclude that eating breakfast helped reduce dietary fat and minimize impulsive snacking. Eating breakfast may therefore be an important part of a weight-reduction program.

With respect to individual foods, NW subjects took greater quantities of fruit and sugar than O subjects (Table 4). The higher intake of sugar observed in NW subjects might be due to their worrying less about their body weight or that O subjects underestimate (consciously or unconsciously) their sugar consumption. O subjects frequently used artificial sweeteners and avoided the consumption of butter and margarine, probably due to their worries over body weight. Their consumption of fats and oils was somewhat less (NS) than that of NW subjects. However, it must be remembered though that several studies have pointed out that obese individuals tend to underestimate their food intake [44,45]. If obese individuals do underreport food intake, it might be suspected that this would apply primarily to high-fat and highly sugared foods. Consumption of these foods is often associated with guilt and shame. If they underestimate the intake of food rich in sugar and/or fat, then

true sugar and fat intakes would be higher than those found in this study.

Ojofeitimi [46] advises that fruits be taken at breakfast since they prevent intestinal problems such as constipation. Also, several institutions recommend the consumption of 2 to 4 servings of fruit per day to prevent the appearance of degenerative illnesses [47,48]. Studies performed on different groups of Spanish elderly people [49,50] have shown that the consumption of fruit is less than recommended. The inclusion of fruit in the breakfast meal is of great interest since it could improve the diet as a whole. Among the subjects of the present study, the consumption of fruit at breakfast was higher in those of lesser BMI ($p < 0.05$). This tendency coincides with that observed in other studies that have found less favorable eating behaviour in obese adolescents [39] and obese old people [40] than in those of normal weight.

The breakfast of the studied subjects made a significant contribution to the average elderly individual's daily nutrient intake (Table 5), in agreement with the observations of Morgan and Zabik [51], who studied the breakfast habits of 561 elderly American citizens over a 7-day period.

The breakfasts of NW subjects made a greater contribution to recommended intakes of fibre, vitamin E and iron than did those of O subjects (Table 5).

With respect to fiber intake, Miller et al [52] found that both obese men and women consumed significantly less dietary fiber than comparable lean men and women. In agreement with these authors, the results of the present study show that the intake of fibre at breakfast was higher in NW subjects (Table 5).

Age was seen to produce no statistically significant differences in subjects' breakfast habits (Tables 3-5).

CONCLUSION

The shorter time spent at breakfast and the consumption of less varied and smaller meals at this time of day, as well as the differences seen in the composition of NW and O subjects' breakfasts, could indicate the existence of less healthy food habits among overweight and obese subjects. It is also possible that less adequate forms of feeding behavior at breakfast contribute to the appearance and development of obesity.

These results agree with others studies, suggesting that people with healthier life styles have a more appropriate diet and care more about their breakfast composition and their general state of health [19,53,54].

REFERENCES

1. Barth MM, Ames BD: Attitudes, knowledge and problem-solving approach of Michigan dietitians about aging. *J Am Diet Assoc* 89:1753-1757, 1989.

2. Chandra RK, Imbach A, Moore C, Skelton D, Woolcott D: Nutrition of the elderly. *Can Med Assoc J* 145:1475-1487, 1991.
3. Durmin JVGA: The prevalence of obesity in the UK. *Bibl Nutr Dieta* 37:11-17, 1986.
4. Forman M, Trowbridge FL, Gentry EM, Marks IS, Hogelin GC: Overweight adult in the United States: the behavioral risk factor surveys. *Am J Clin Nutr* 44:410-416, 1986.
5. Ministerio de Sanidad y Consumo: Indicadores de salud. In "Segunda evaluación en España del programa regional europeo Salud para todos." Madrid: Ministerio de Sanidad y Consumo, pp 181-183, 1993.
6. Garrison RJ, Kannel WB: A new approach for estimating healthy body weights. *Int J Obes* 17:417-423, 1993.
7. Gutiérrez-Fisac JL, Regidor E, Rodríguez C: Prevalencia de la obesidad en España. *Med Clin (Barc)* 102:10-13, 1993.
8. Alastrue A: Antropometría y obesidad. *Med Clin (Barc)* 102:16-19, 1994.
9. Summerbell CD, Moody RC: Feeding pattern in human. The relationship between feeding pattern and body weight. (Abstract). *Proc Nutr Soc* 51:50A, 1992.
10. Hill JO, Anderson JC, Ling D, Yakubu F: Effects of meal frequency on energy utilization in rats. *Am J Clin Nutr* 41:356-362, 1988.
11. Adams CE, Morgan KJ: Periodicity of eating: implications for human food consumption. *Nutr Res* 1:525-550, 1981.
12. Graham MV, Uphold CR: Health perceptions and behaviours of school-age boys and girls. *J Community Health Nurs* 9(2):77-86, 1992.
13. Grande-Covian F: El papel del desayuno en la distribución calórica de la dieta. In "Problemática del desayuno en la nutrición de los españoles." Publicaciones Serie Divulgación N° 3. Madrid: Fundación Española de la Nutrición, 1984.
14. Ortega RM, Requejo AM, Andrés P, Ortega A, Redondo M, López-Sobaler A, Navia B, Quintas E, López-Bonilla D: Tendencias de consumo de alimentos en niños en función de sus hábitos de desayuno. *Nutr Clin* 15:31-38, 1995.
15. Morgan KJ, Zabik ME, Stampely GL: The role of breakfast in diet adequacy of the U.S. adult population. *J Am Coll Nutr* 5(6):551-563, 1986.
16. Stephen AM, Dahl WJ, Sieber GM: The influence of type of milk and breakfast cereal consumption on daily intake of fat and non-starch polysaccharide in University student. (Abstract). *Proc Nutr Soc* 51:17A, 1992.
17. Bellisle F, Rolland-Cachera MF, Deheeger M, Guilloud-Bataille M: Obesity and food intake in children: evidence for a role of metabolic and/or behavioral daily rhythms. *Appetite* 11(2):111-118, 1988.
18. Desjeux JF, Machinot S, Greneche MO, Dufour C: Le bilan énergétique de l'enfant obèse. *Med Inf* 86:351-363, 1979.
19. Ikeda J, Nagata H, Higashi A, Aoike A, Kawai K, Baba K, Miyayama M: Effects of food intake, dietary habits and life style on health status as determined by clinical blood tests of adult men. *Nippon Kosho Eisei Zasshi* 39:428-436, 1992.
20. Kusaka Y, Kondou H, Morimoto K: Healthy lifestyles are associated with higher natural killer cell activity. *Prev Med* 21:602-615, 1992.
21. Revicki D, Sobal J, DeForge B: Smoking status and the practice of other unhealthy behaviours. *Fam Med* 23:361-364, 1991.

22. Schlundt DG, Hill JO, Sbrocco T, Pope-Cordle J, Sharp T: The role of breakfast in the treatment of obesity: a randomized clinical trial. *Am J Clin Nutr* 55:645-651, 1992.
23. Wolfe WS, Campbell CC, Frongillo EA Jr, Haas JD, Melnik TA: Overweight schoolchildren in New York State: prevalence and characteristics. *Am J Public Health* 84:807-813, 1994.
24. Mur de Frenne L, Fleta J, Moreno L: Ingesta de alimentos a lo largo de todo el día en niños zaragozanos. *Nutr Clin* 2:19-30, 1994.
25. Instituto de Nutrición (CSIC): "Tablas de Composición de Alimentos." Madrid: Instituto de Nutrición. 1994.
26. Dalloso HM, Morgan K, Basseij EJ, Ebrahim SBJ, Fentem PH, Arie THD: Levels of customary physical activity among the old and very old living at home. *J Epidemiol Community Health* 42:121-127, 1988.
27. Departamento de Nutrición: "Tablas de Ingestas Recomendadas de Energía y Nutrientes para la Población Española." Madrid: Departamento de Nutrición, 1994.
28. WHO (World Health Organization): "Energy and Protein Requirements. Report of a Joint FAO/WHO/ONU Expert Consultation." Technical report series 724. Geneva: World Health Organization, pp 71-80, 1985.
29. National Research Council: "Diet and Health. Implications for Reducing Chronic Disease Risk." Committee on Diet and Health, Food and Nutrition Board, Commission on Life Sciences. Washington, DC: National Academy Press. 1989.
30. Young VR: Energy requirements in the elderly. *Nutr Rev* 50:95-101, 1992.
31. WHO: Methodology of nutritional surveillance. Technical report series 53, Geneva: WHO, pp 20, 1976.
32. Garrow JS: "Treat Obesity Seriously- a Clinical Manual." London: Churchill Livingstone, 1981.
33. De Groot CPGM, Sette S, Zajkas G, Carbajal A, Amorim-Cruz JA: Euronut-SENECA study on nutrition and the elderly. Nutritional status: Anthropometry. *Eur J Clin Nutr* 45:31-42, 1991.
34. Drewnowski A: Fast and food acceptance. In Gaull GE, Kotsonis FN, McKey MA, (eds): "Nutrition in the '90s, Current Controversies and Analysis." New York: Marcel Dekker, Inc., pp 25-39, 1991.
35. Parraga IM: Determinants of food consumption. *J Am Diet Assoc* 90: 661-663, 1990.
36. Tuorila H, Pangborn RM: Prediction of reported consumption of selected fat containing foods. *Appetite* 11:81-95, 1988.
37. Moreiras O, Carbajal A, Perea I, Varela-Moreiras G, 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 Dietético. Hábitos alimentarios. Valoración de la ingesta. *Rev Esp Geriatr Gerontol* 28:209-229, 1993.
38. Broker P, Lods JC: Folate deficiency in geriatrics patients. In Zittoun J, Cooper BA, (eds): "Folates and Cobalamins." Berlin: Springer-Verlag. pp. 179-189, 1989.
39. Ortega RM, Requejo AM, Andrés P, López-Sobaler A, Redondo MR, González-Fernández M: Relationship between diet composition and body mass index in a group of Spanish adolescents. *Br J Nutr* (in press), 1996.
40. Ortega RM, Redondo MR, Zamora MJ, López-Sobaler A, Andrés P: Eating behaviour and energy and nutrient intake in overweight/obese and normal-weight spanish elderly. *Ann Nutr Metab* (In press).
41. Andersson-Hassan E, Hoint-Pradier F: Les comportements et consommations alimentaires des personnes âgées. *Med et Nutr* 2:91-97, 1990.
42. Barkeling B, Ekman S, Rossner S: Eating behaviour in obese and normal weight 11-year-old children. *Int J Obes* 16(5):355-360, 1992.
43. Thoulon-Page CH: "Alimentación de las Personas Sanas." In "Cuadernos de dietética". Barcelona: Masson SA, pp 32-40, 1991.
44. Johnson RK, Goran MI, Poehlman ET: Correlates of over- and underreporting of energy intake in healthy older men and women. *Am J Clin Nutr* 59:1286-1290, 1994.
45. Poehlman ET: Energy expenditure and requirements in aging humans. *J Nutr* 122:2057-2065, 1992.
46. Ojofeitimi EO: Food consumption patterns and bowel movements of final-year nursing students in Ile-Ife, Nigeria. *Eur J Clin Nutr* 42:611-616, 1988.
47. US Department of Health and Human Services: "Dietary Guidelines for Americans, Nutrition and Your Health," 3rd ed. Home and Garden Bulletin, № 232. USDA, 1990.
48. National Academy of Sciences: "Report on Diet and Health." *Nutr Rev* 47:142-149, 1989.
49. Ortega RM, Andrés P, Fernández M, Encinas-Sotillos A, Gaspar MJ: Parental death from cardiovascular disease and dietary habits in an elderly group. *Br J Nutr* 71:259-270, 1994.
50. Ortega RM, Andrés P, Redondo MR, Zamora MJ, López-Sobaler AM, Encinas-Sotillos A: Dietary assessment of a group of elderly Spanish people. *Int J Food Sci Nutr* 46(2):137-144, 1995.
51. Morgan KJ, Zabik ME: The influence of ready-to-eat cereal consumption at breakfast on nutrient intakes of individuals 62 years and older. *J Am Coll Nutr* 3:27-44, 1984.
52. Miller WC, Niederpruem MG, Wallace J, Lindeman A: Dietary fat, sugar, and fibre predict body fat content. *J Am Diet Assoc* 94: 612-615, 1994.
53. Breslow L, Breslow N: Health practices and disability: some evidence from Alameda County. *Prev Med* 22:86-95, 1993.
54. Sobal J, Revicki D, DeForge BR: Patterns of interrelations among health-promotion behaviours. *Am J Prev Med* 8:351-359, 1992.

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