Dietary Intakes in Ireland of a Healthy Elderly Population

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Abstract

The aim of this paper is to assess the adequacy of the diet of individuals over 60 yr of age, participating in the 1990 Irish National Nutritional Survey. A nationwide random sample based on the most recently updated electoral register was used. Demographic information was collected. Anthropometric measurements were taken and nutrient intake was assessed using the 7-day dietary history method. The randomly selected sample of 1213 subjects was considered to be representative of the Irish population. Of those selected, 163 individuals were over 60 yr of age, 79 of whom were male and 84 female. Mean energy intakes including alcohol for males and females were 9.55 ± 3.09MJ and 7.07 ± 2.39MJ respectively. The main sources of energy were bread, meat and meat products, potatoes and milk. As percentage energy, protein, fat and carbohydrate intakes were 14.90 per cent, 33.97 per cent and 48.22 per cent for men and 15.39 per cent, 34.09 per cent and 49.37 per cent for women respectively. Except for vitamin D and folate, micronutrient intakes were adequate. The body mass index (BMI [weight/height^2] kg/m^2) for men was 25.6 and for women 26.4. Fewer than 27.8 per cent of the males and 20.2 per cent of females take part in regular physical activity. In conclusion, the diet of a healthy elderly population in Ireland is nutritionally adequate with macronutrient intake in keeping with the recommended guidelines. Overall energy intakes are lower than those of a younger age group and may account for the lower intakes of certain micronutrients. An increase in fruit and vegetable consumption would improve vitamin and mineral intake. In order to allow for a higher energy intake an increase in physical activity is desirable.

Introduction

It has been forecasted that during the final quarter of this century, there will be a doubling in the world population over 65 yr of age[1]. A similar trend is evident in Ireland[2] with data from the 1991 census revealing that 11.4 per cent of the Irish population is aged 65 yr and over[3].

This expansion in longevity, however, does not necessarily imply an improvement in the quality of life experienced by these elderly individuals. As future gains in life expectancy will be minimal, a shift in focus to improving the quality of the additional yrs that have been gained, is now essential. A good nutritional status has been identified as being of paramount importance in determining quality of life[4]. Previous studies have shown that the diet among specific groups of elderly individuals is nutritionally inadequate[5].

As a result of the ageing process, the elderly have not only physiological problems which effect nutrient intake and absorption but also social, economic and psychological as well. Physiologically, there is a decline in the efficiency of most body systems. Such changes are reflected in the gastrointestinal tract by a decrease in the production of hydrochloric acid secretion which reduces the absorption of iron and calcium, and a decreased intrinsic factor limits vitamin B12 absorption. Nutrient status in the elderly is a complex function compromising not only dietary nutrient content but also nutrient-nutrient, drug-nutrient, and disease-nutrient interactions all of which may affect availability or utilization of what is ingested in the diet. In Ireland, there have been relatively few direct dietary intake studies providing information on the food consumption of elderly people. This paper is the first to evaluate macro and micronutrient intakes of elderly people participating in the 1990 Irish National Nutritional Survey.

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Methods

Selection of the sample

The aim of this paper is to give an overall picture of the dietary intake of those individuals in the Irish population aged 60 yr and over, who participated in the 1990 National Nutritional Survey. A nationwide random sample based on the most recently updated electoral register (April 1988) was used. The list of names was generated by the Economic and Social Research Institute. A two-stage stratified sample was taken. The primary sampling units were the polling districts into which the electoral register is divided. The polling districts were stratified by geographical region and selected with probability proportional to size. In all a sample of 40 polling districts were selected. From each polling district a sample of 35 names was selected. This procedure ensured that each person on the electoral register had an equal chance of being selected. Starting at the top of the list each person was contacted and asked to participate in the study.

Survey Questionnaire and Data Collection.

All subjects were initially contacted by letter, then

subsequently by a local recruiter who was appointed by a market research firm (Field Research of Ireland Ltd.). The recruiter visited the selected subjects, explained the purpose of the survey and arranged interview times. Attempts were made on 3 separate occasions to contact a person before they were excluded from the list.

The interviews were conducted by a dietitian on a one to one basis in the subject's own home. Background information was collected using a questionnaire which included questions on age, occupation, marital status, smoking and drinking habits, sporting activities and social class. Anthropometric measurements were taken. Height was measured using a folding stadiometer. Weight was recorded on a Soehnle digital personal weighing scale. Weight was recorded in light indoor clothing and no allowance was made for weight of clothing when weight was reported. Mid upper arm circumference and wrist diameter were measured. Mid-calf circumference was measured in males only. No biochemical or blood pressure measurements were taken. To ensure standardisation the dietitians were trained in measurement techniques. Nutrient intake was assessed by the 7 day dietary history method using a photographic atlas as an aid[6]. The photographic atlas contained 120 photographs of foods commonly eaten in Ireland.

The questionnaire was developed and evaluated by the National Surveillance Unit of the Department of Health, Dublin. The completed questionnaires were returned to the survey co-ordinator for checking. The data was re-checked by the statistical operations research laboratory at Trinity College Dublin and was then analysed. The nutrient content of the food intake was determined using a computerised version of the McCance and Widdowson food tables. The data base was modified to take account of Irish breads[6].

The survey was carried out with the full backing and assistance of the Department of Health. Dietitians were aware of their ethical responsibilities with survey participants and confidentiality contracts were signed by all of those involved in the collection and handling of the data. The data management was in accordance with the Data Protection Act, 1989.

Statistics

All data were analysed on a Macintosh computer using SPSS statistics package. All data are presented as means and standard deviations.

Results

The randomly selected sample of 1213 subjects was considered to be representative of the Irish population. The response rate for the group was 68 per cent. In this sample there were a total of 163 individuals aged over 60 yr, 79 of whom were male and 84 female. Mean age was 70.30 ± 6.99 for men and 70.21 ± 7.67 for women.

Table I lists some of the characteristics of those surveyed. A profile of individual meal patterns reveal that greater than 91.7 per cent of men and 88.6 per cent of women consume 3 meals daily. Mean body mass index (BMI) for men was 25.6 ± 3.8 and for women 26.4 ± 4.9 with only 27.8 per cent of men and 20.25 per cent of women taking part in regular physical activity.

TABLE I
Characteristics of Elderly Population Participating in the Survey.

Characteristics	*Men (n=79)*	*Women (n=84)*
Mean age (years)	70.3±6.99	70.2±7.67
BMI	25.6±3.8	26.4±4.9
Daily use of		
Breakfast %	89.9	92.9
Lunch %	89.9	91.7
Dinner %	88.6	92.9
Regular Physical Activity %	27.8	20.2
Nutritional Supplements %		
General Mineral Supplement	1.3	1.2
Evening Primrose Oil	1.3	—
Cod Liver Oil	3.8	2.4
Multivitamin	1.3	2.4
Vitamin C	—	2.4
Calcium	—	1.2
Iron	—	2.4

Mean energy intakes, including alcohol, for males and females were 9.55 ± 3.09MJ (2282.45 ± 738.51kcal) and 7.07 ± 2.39MJ (1689.73 ± 571.21kcal) respectively. Of those females surveyed, over 50 per cent had intakes below this mean value, with a further 10 per cent taking 4.57MJ a day or less. While males had a higher energy intake than their female counterparts, 50 per cent of the sample had intakes well below the mean value of 9.55MJ, with 10 per cent consuming 5.81MJ a day or less. The main sources of energy were bread, accounting for 23 per cent of intake in males and 22 per cent in females, meat and meat products accounting for 14 per cent of male and 15 per cent of females energy intake, while potatoes other than chips and milk each provided 10 per cent of energy for both males and females.

Macronutrient intakes, are summarised in Table II. Protein intakes were above the recommended levels of between 12 per cent to 14 per cent of energy, with men consuming 14.90 per cent and women 15.39 per cent of their energy as protein.

TABLE II
Daily Intakes of Macronutrients and Alcohol

	Men Mean ± SD (n=79)	Women Mean ± SD (n=84)
Protein %	14.79±2.8	16.4±3.2
Fat %	33.9±6.0	33.8±6.1
Carbohydrate %	48.6±7.0	49.0±6.9
Alcohol %	2.9±4.1	0.7±1.5
Energy (MJ/d)	9.55±3.09	7.07±2.39
Protein (g/d)	84.42±26.95	67.0±16.75
Fat (g/d)	86.12±34.79	64.08±26.39
Carbohydrate (g/d)	293.50±104.03	22.72±87.64
Alcohol (g/dl)	9.82±14.9	1.59±3.41

Mean fat intakes for both males and females, contributed to less than 35 per cent of total energy intake (including alcohol), with less than 15 per cent of the population sampled having an intake in excess of 40 per cent of energy from fat. Meat and meat products, were the main contributors to the fat content of the Irish diet in these elderly individuals, accounting for 25 per cent of fat intake in men and 27 per cent in women. The other major sources of fat intake were spreadable fats, providing 23 per cent of fat intake for males 17 per cent for females. Milk provided 15 per cent and 19 per cent of dietary fat for males and females respectively.

Carbohydrate intake contributed favourably to the overall energy content of the diet, providing 49.37 per cent of energy for men and 48.22 per cent for women. Bread contributed to 36 per cent of carbohydrate intake for men and 24 per cent for women. Potatoes accounted for 21 per cent and 18 per cent of carbohydrate intake for men and women respectively. Ninety-five per cent of those surveyed ate potatoes daily. While vegetables of some variety other than potatoes were eaten by almost everyone, intake levels were low with less than 125 grams per day per person being consumed. Fruit consumption for both men and women was also very low with for example, fewer than 26 per cent of men and 31 per cent of women consuming oranges regularly. The other main sources of carbohydrate, table sugar, biscuits and cakes contribute 11 per cent each of carbohydrate intake for men and 8 per cent and 13 per cent respectively for women.

Fibre intakes recorded in this group were notably low with men consuming 20g / day and women 17.9g / day. At least 90 per cent of the sample, both male and female did not reach the recommended fibre intake level of 30g / day. Bread and potatoes were the main sources of fibre in the diet. Breakfast cereals accounted for 11 per cent of fibre intake in men and 8 per cent in women. Actual breakfast cereal intake was 66 grammes for women and 88 grammes for men daily.

Table III summarises the micronutrient intake. Vitamin D and folate are the only micronutrients below recommended levels when intakes are compared to reference nutrient intake (RNI) values for both the male and female groups[7].

TABLE III
Mean daily intakes of vitamins and minerals and comparisons with recommended guidelines (DHSS 1991 RNI[7]).

	Men (n=79) Mean ±	RNI	Women (n=84) Mean ±	RNI
Vitamin C (mg)	60.3 (34.7)	40	55.09 (35.88)	40
Vitamin A (μg) R.E.	701.6 (1094)	700	606.44 (945.62)	600
Vitamin B12 (μg)	4.65 (4.79)	1.5	4.13 (4.19)	1.5
Vitamin D (μg)	1.90 (1.75)	10	1.85 (1.54)	10
Vitamin E (mg)	3.65 (1.59)	4	2.9 (1.07)	3
Iron (mg)	11.38 (4.11)	8.7	9.2 (3.13)	8.7
Zinc (mg)	11.27 (4.31)	9.5	8.43 (2.04)	7
Folic (μg)	188.4 (78.2)	200	165.5 (61.67)	200
Thiamin (mg)	1.49 (0.58)	0.0	1.17 (0.43)	0.8
Riboflavin (mg)	1.87 (0.75)	1.3	1.63 (0.64)	1.1
Calcium (mg)	966.1 (444.3)	700	774 (296.59	700
Vitamin B6 (mg)	1.64 (0.61)	1.4	1.24 (0.41)	1.2

Dairy produce provides in excess of 11 per cent of all the vitamins and minerals listed in Table III, it provides greater than 40 per cent of riboflavin, calcium, vitamin B12 and vitamin D intake for both men and women. Another important source of micronutrient intake is potato. Potatoes account for greater than 33 per cent of vitamin C intake, 32 per cent of vitamin B6, and 10 per cent of riboflavin and thiamin intakes for both men and women. Bread provides 30 per cent of dietary iron and 31 per cent of dietary folate for men and 25 per cent of dietary iron and dietary folate for women. Bread also contributes greater than 19 per cent of calcium intake for both men and women. Meat is the other main provider of dietary iron, 23 per cent of intake for men and 21 per cent for women. Meat also provides vitamin B12, zinc and nicotinic acid to the diet of these individuals.

Discussion.

The data from this study indicate that the diet of a healthy elderly population in Ireland is nutritionally adequate and meets with accepted nutritional standards. However, it also reveals certain areas of weakness where modification of present intakes may prove beneficial

Mean energy intakes in the population studied are lower than those of a younger age group in Ireland[8]. Other studies have documented this trend towards a decrease energy intake with advancing age, with very low intakes more prevalent in elderly women[9]. Previous work by Fogarty and Nolan, also reported low energy intakes in an elderly Irish population[10]. Reported dietary intakes from the more recent Survey in Europe on Nutrition and the Elderly, a Concerted Action (SENECA survey) show a variation in mean energy intakes between the countries studied[11]. The highest mean intake recorded was 12.7MJ/day and the lowest 8.2MJ/day for men, and for women the highest mean value was 10.9MJ/day and the lowest 6.3MJ/day. In more than half of the 12 countries studied energy intakes were greater than Irish intakes for both men and women. The low energy intake may be in part responsible for the low intake of certain micronutrients recorded for this age group. Indeed, it has been shown that diets low in energy often fail to meet micronutrient requirements[12].

Macronutrient intakes expressed as percentage of energy were adequate for this group of elderly individuals. This is certainly one of the more positive findings of this survey, with intakes very close to those recommended by the Irish Food Advisory Committee[13].

Protein intakes were slightly above that recommended, at 12-14 per cent of total energy. This compares favourably to the protein intakes for both men and women reported in the SENECA study[11]. In general, an adequate protein intake is not a problem for this age group.

Fat intakes, expressed as either absolute values or as a percentage of energy, are lower than those found in the majority of other European countries surveyed in the

SENECA study[11]. Irish fat intakes are also much lower than those reported by the Dutch nutritional surveillance[14]. It is likely that most of this fat is saturated as meat and meat products and spreadable fats are the major contributors of fat to the diet. In the SENECA study northern European countries had a higher saturated fat intake then their southern counterparts, although absolute fat intakes in the southern countries were higher. The polyunsaturated and monounsaturated/saturated fat ratio when calculated for the combined data of men and women was highest in the south. As foods contributing to the fat content of the diet are a valuable sources of macro and micronutrients any change in fat intake for this group should mainly consist of a reduction in saturated fat. This could be achieved by a substitution where possible, of foods with a high saturated fat content for those of a lower saturated fat content. Energy intakes should not be reduced in this age group.

Absolute carbohydrate intakes for this group are much higher than those reported for the majority of other countries detailed in the SENECA study[11]. This is a nutritionally favourable position and contributed to by the high consumption of both bread and potatoes in this age group.

Bread was the major source of iron for men accounting for 30 per cent of intake where as meat provided 23 per cent. The potato remains important within the diet of these individuals with 95 per cent of those surveyed eating potatoes daily. This, coupled with relatively low intakes of fruit, results in the potato being the major contributor of vitamin C intake in this elderly population. The low fibre intakes reported in this study are consistent with the fact that most of the bread consumed is white. In addition, current fruit and vegetable intake does not compensate for the low cereal fibre intake. Similar low fibre intakes have been reported elsewhere. In Britain Davies et al found mean fibre intakes of 18grams/day with again greater than 95 per cent not reaching NACNE (National Advisory Committee on Nutritional Education) recommendation[15]. High fibre intakes may be difficult to attain in this age group for a combination of reasons e.g., poor dentition, inability to consume volume of food. However, an increase from present intakes would be beneficial.

When comparisons are made with RNI values outlined in the COMA report vitamin D and folate appear to be the only micronutrients at risk for this age group[8]. These findings are in agreement with the Dutch survey[14] and also with work carried out by Bailey et al in the Britain[16], with most micronutrients in this age group found to be above national recommended intakes. The SENECA survey found serum folate status to be adequate in all centres with serum vitamin B6 deficiency widespread[17]. The biochemical values for vitamin status must be interpretated with caution as 'normal' values for the elderly are not clearly known as typified by, elderly patients with neuropsychiatric disorders due to vitamin B12 deficiency whose serum vitamin B12 concentrations may be in the normal range[18]. Given the complexity of micronutrient status in the elderly further investigations in this area are neccessary.

Data from the SENECA study, shows most of the countries surveyed had micronutrient intakes well above those recorded in this particular study[19]. We can conclude that while micronutrient intakes are adequate in this section of the Irish population, they are in fact low when compared to their European counterparts. This is of concern in this age group, as during times of stress or illness body stores may become quickly exhausted placing these elderly individuals at risk. Obviously, an increase in fresh fruit and vegetables consumption would be desirable and improve present vitamin and mineral intakes. It is interesting to note that only 1.3 per cent of men and 2.4 per cent of women surveyed consumed a vitamin or mineral supplement (Table I).

The data suggest that the diet of a healthy elderly population in Ireland is nutritionally adequate. Bread, potatoes, meat and meat products and milk are the staple components of the diets of these individuals. These foods provide the majority of energy, carbohydrate and a range of vitamins and minerals. While intakes of protein, fat and carbohydrate expressed as percentage energy, are in keeping with the recommended guidelines, overall energy intakes are low. Increases in micronutrient intake with emphasis on increasing fruit and vegetable consumption may improve vitamin and mineral intake. In order to allow for a higher energy intake in the females without increasing weight, an increase in physical activity would also be desirable.

Sponsorship: This survey was supported by a grant from the Kellogg Company of Ireland Ltd.

References

1. Coni, N., Davison, W., Webster, S. Ageing: The Facts. (2 ed.). London: Oxford University Press, 1992.
2. Kinsella, K. Changes in Life expectancy 1900-1990. Am. J. Clin. Nutr. 1992; 55: 1196S-1202S.
3. Central Statistics Office and General Medical Service Report. 1993.
4. Granier, E. Nutrition and the older adult. Dysphagia 1990; 4(4): 196-201.
5. Mowe, M., Bohmer, T., Kindt, E. Reduced nutritional status in an elderly population is probable before disease and possibly contributes to the development of disease. Am. J. Clin. Nutr. 1994; 59: 317-324.
6. Lee, P., Cunningham, K. Irish National Nutritional Survey: Dublin Irish Nutrition and Dietetic Institute, 1990.
7. Department of Health and Social Security. Dietary reference values for food energy and nutrients for the United Kingdom. 1991 No. 41. London: HMSO.
8. Hurson, M., Sugrue, S. Changes in pattern of nutrient intake with advancing age in a healthy Irish population. Proceedings of the Nutrition Society 1995; 54(3): 202A.
9. Munro H, Suter P, Russel R. Nutritional requirements of the elderly. Ann. Rev. Nutr. 1987; 7:23-49.
10. Fogarty, J., Nolan, G. Assessment of the nutritional status of rural and urban elderly living at home. Ir. Med. J. 1992; 85: 14-16.

11. Euronut SENECA Investigators. Intake of energy and nutrients. Eur. J. Clin. Nutr. 1991; 45 (Supp 3), 105-119.
12. Howarth, C. C. Dietary intake studies in elderly people. World Rev. Nutr. Diet. 1989; 59: 1-70.
13. Food Advisory Committee. Guidelines for preparing information to the general public on healthy eating. 1984 Department of Health, Health Promotion Unit, Dublin.
14. Lowik, M. R. H., Westenbrink, R. D., Hulshof, K. F. A. M., Kistemaker, C., Hermus, R. J. J. H. Nutrition and ageing: Dietary intakee of "apparently healthy "elderly. (Dutch Nutrition Surveillance System). J. Amer. Coll. Nutrit. 1989; 8(4): 347-356.
15. Davies, L., Holdsworth, M. D., MacFarlane, D. Dietary fibre intakes in the united Kingdom before and after retirement from work. Hum. Nutr. appl. Nutr. 1986; 10: 431-435.
16. Bailey, A. L., Maisey, S., Southon, S., Wright, A. J. A., Finglas, P. M., Fulcher, R. A. Relationships between micronutrient intake and biochemical indicators of nutrient adequacy in a 'free living' elderly UK population. 1997; 77: 225-242.
17. Euronut SENECA Investigators. Nutritional status: blood vitamins A, E, B6, B12, folic acid and carotene. 1991; Eur. J. Clin. Nutr. 1991; 45 (Supp 3), 63-82.
18. Lindenbaum, J., Savage, D. G., Stabler, S. P., Allen, R. H. Diagnosis of cobalamin deficiency I: usefulness of serum cobalamin, methylmalonic acid and total homocysteine concentrations. Am. J. Hematol. 1990; 34: 90-98.
19. Euronut SENECA Investigators. Intake of vitamins and minerals. Eur. J. Clin. Nutr. 1991; 45 (Supp 3), 121-138.