

Editorial

Plant foods, Mediterranean diet and Health

There is considerable evidence that Mediterranean- inspired diets have beneficial effects on endothelial dysfunction and markers of vascular inflammation. However, elucidation of mechanism is not a prerequisite for undertaking effective public health measures. The central elements of the Mediterranean diet are variety, reduction of saturated lipids and animal proteins, emphasis on olive oil and abundance of plant food, particularly vegetables, legumes and fruits. Plant foods may act through multiple ways including their considerable antioxidant capacity. However, an extensive survey of 11-year old school children in nine European Countries has documented that average vegetable and fruit intake, particularly vegetable intake, does not reach WHO population goals or national recommendations. Given the importance of school ages, both from the physiological point of view and for establishing healthy long-term dietary habits, nutritional campaigns should have as a primary objective an increase of consumption of vegetables and fruits in these age groups. Data from the European-wide DAFNE data bank indicate that, among adults, the large differences in vegetable and fruit consumption are gradually levelling out, but there is still a need to increase vegetable consumption in Central/Northern European countries, in order to reach recommended levels. A parallel emphasis in olive oil consumption, at the expense of saturated fats, and reduction of foods of animal origin, would allow the diffusion of the Mediterranean-inspired patterns across Europe and the spread of the benefits of these dietary patterns among larger population groups.

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Dietary patterns and their socio-demographic determinants in ten European countries.

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Diet comprises interacting nutrient and non-nutrient constituents and accordingly, research has shifted towards studying inclusive food-based approaches focusing on dietary patterns. An understanding of the food combinations that consumers choose to eat together is necessary for providing nutrition guidance. Although few attempts have been made to internationally describe dietary patterns,¹ the dietary patterns prevailing in ten European countries in recent years, and their socio-demographic determinants have been described² using the databank developed in the context of the Data Food Networking (DAFNE) project.³

The DAFNE databank

The DAFNE databank comprises data collected in the regularly undertaken, nationally representative household budget surveys (HBS), which aim at collecting information on all goods available to household members for a reference period (including purchases, contributions from own production and items offered as gifts). The data collection is accomplished so as to capture seasonal variation and bulk purchases. Information is also collected on the socio-demographic characteristics of the household members, allowing linkage of dietary habits to explanatory factors.⁴

The HBS data of ten European countries (Belgium, France, Finland, Germany, Greece, Italy, Norway, Portugal, Spain and the UK) are post-harmonized according to the DAFNE methodology.⁵ Individual food availability is estimated considering the size of the household, gender, and age of the household members. To identify distinct dietary patterns, each country's average food availability is compared to the overall mean values calculated using the data of all ten countries together.

Dietary choices of ten European populations

The identified dietary choices point towards a progressive narrowing of differences between North and South Europe. Some variations remain however, particularly in the case of pulses and added lipids. Greece, Italy and Spain still follow a Mediterranean pattern of lipid intake with a preference for olive oil, which is distinct from the pattern found in Northern countries with preferences for margarine and animal fat.

The large differences in fruit and vegetable consumption

identified in the 1960s are levelling out, as several of the Central/North European countries record values which are close to those of the Mediterranean region. Furthermore, fruit juice consumption is identified as a characteristic of the Northern diet, particularly in Germany and Finland. Over the years, Mediterranean countries have increased their meat consumption and now appear to lead in the availability of red meat.

The daily household availability of alcoholic and non alcoholic beverages is above the overall countries' mean in Central and North Europe, with some country-specific particularities being present. The household availability of wine is higher in France, beer is preferred in Germany and Finland and soft drinks in Norway and the UK.

Identification of dietary patterns

Two major dietary patterns (DP) emerged through principal component analysis. The first one (DP1) indicates households with a variety of food purchases, including fruits, vegetables, cereals, meat, fish and dairy products. The second one (DP2) is characterized by the non-acquisition of plant foods, and by purchases of beverages and foods that could be consumed without elaborate preparation. In short, the first pattern is designated as "wide-range food" buyers and the second as "beverage and convenience food" buyers.

Among the Mediterranean populations, DP1 is more common among households with a retired head and less common among adults living alone. DP2, which indicates a possible departure from traditional eating choices, is positively associated with higher education and with households including children, and negatively associated with households that include retirees.

In Central and North Europe, DP1 ("wide-range food" buyers) is positively associated with being retired and inversely associated with manual work in all countries, and with higher education in Belgium and France. DP2 ("beverage and convenience food" buyers), is more common in urban or semi-urban areas and among Scandinavian adults living alone.

Nutrition monitoring is an important aspect of public health, given the increasing pace of change in food choices. Databases that are comparable across Europe and regularly updated can prove to be useful tools for monitoring and for multi-level targeting.



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Mediterranean Diet and Cardiovascular Health

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Diets high in fruits, vegetables, legumes, and whole grains and which include fish, nuts, and low-fat dairy products have protective cardiovascular effects. The main characteristics of the Mediterranean diet include an abundance of plant food (fruits, vegetables, whole-grain cereals, nuts, and legumes); olive oil as the principal source of fat; fish and poultry consumed in low-to-moderate amounts; relatively low consumption of red meat; and moderate consumption of wine, normally with meals. So, the dietary patterns that prevail in the Mediterranean region have many common characteristics: total lipid intake may be high, as in Greece (around or in excess of 40% of total energy intake), or moderate, as in Italy (around 30% of total energy intake). The Italian variant of the Mediterranean diet is characterized by a higher consumption of pasta, whereas in Spain, fish consumption is particularly high.



evidence from randomized trials in primary prevention settings. It may be misleading to focus on a single element of the diet which may explain, at least in part, the disappointing and frustrating results obtained in trials with vitamin supplementation, prematurely thought to be “the magic bullet” preventing a whole myriad of chronic diseases. For example, Miller and colleagues recently reported the results of a carefully conducted meta-analysis of clinical trials of vitamin E supplementation. They concluded that high doses of this agent increase the risk for death. Their meta-analysis involved data from 19 randomized trials, which recorded 12 504 deaths. Overall, being randomly assigned to receive vitamin E had no effect, either positive or negative. However, the data suggested a decreased risk for death associated with vitamin E in trials that used lower doses (<400 IU) and showed a statistically significant trend toward increased risk at doses of 400 IU and above.

The results of intervention studies aimed at evaluating whether Mediterranean-type diets may be superior to the classic dietary counselling in secondary prevention of coronary heart disease have been all encouraging. Esposito and colleagues explored possible mechanisms underlying a dietary intervention. The authors randomized 180 patients (99 men, 81 women) with metabolic syndrome to an intervention group that followed a Mediterranean-style diet (n = 90) or a control group compared that followed a cardiac-prudent diet with fat intake less than 30% (n = 90). Physical activity increased equally in both groups. After 2 years, body weight decreased more in the intervention group than in the control group, but even after controlling for weight loss, inflammatory markers and insulin resistance declined more in the intervention than in the control group, while endothelial function improved. Only 40 patients in the intervention group still had metabolic syndrome after 2 years compared with 78 patients on the control diet. These results suggest a plausible mechanism for the beneficial effects of the Mediterranean diet.

The traditional Mediterranean diet encompasses these dietary characteristics

Other compounds of the Mediterranean diet, the antioxidants, which exist in abundance in vegetables, fruit, beverages and also in virgin olive oil, may contribute to the prevention of coronary heart disease, and possibly several forms of cancer and other diseases, thus providing a plausible explanation for its apparent benefits. A shortage of antioxidants in the diet might promote coronary heart disease. For example, a single high-fat meal rich in saturated fat (Western meal) impairs endothelial functions in healthy subjects; this does not occur when the same subjects eat an isocaloric high-carbohydrate meal (pizza). Consumption of a high-fat meal together with vegetable foods rich in natural antioxidants largely prevent the negative effects on endothelial function (1,5). In particular, endothelial dysfunction acutely triggered by the consumption of a high-fat meal rich in saturated fatty acids is reduced by the simultaneous consumption of a vegetable serving including pepper (100 g), tomatoes (100 g), and carrots (200 g).

There is no magic bullet

Oxidative processes are important in the development of atherosclerosis, an epidemiological associations have provided support for the potential health benefits of foods rich in natural antioxidants. This, antioxidant-vitamin supplementation has been proposed for the treatment and prevention of coronary disease. Epidemiological associations do not indicate causality, however. The protective effects of vegetables and fruit are not observed with pharmacological doses of plant foods or their constituents. At present, there is little direct experimental

Public health perspective

From a public health perspective it is not essential to wait for elucidation of every mechanism underlying health promotion activities and interventions. Given the simplicity of the diet quality score, increasing the intake of recommended foods represents a practical recommendation for improving health. A recent statement (2004) from the American Heart Association declares that the most prudent and scientifically supportable recommendation for the general population is to consume a balanced diet with emphasis on antioxidant-rich fruits and vegetables, and whole grains. When diet provides a sufficient supply of antioxidants, there is no need for supplements.

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INTAKE OF FRUIT AND VEGETABLES IN A SAMPLE OF 11-YEAR OLD CHILDREN IN NINE EUROPEAN COUNTRIES

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Introduction

The importance of fruit and vegetables for providing essential nutrients such as folate, vitamin C, and betacarotene and other compounds of non-vitamin nature, has been emphasized by several reports^[1-5]. A number of international recommendations^[1,3,4] and population targets^[2] have been published regarding the desirable level of consumption of fruit and vegetables. The WHO population goal^[3] for fruit and vegetable intake is 400 grams per day.

Fruit and vegetable intake of children has previously been studied in some national^[6-8] surveys, in household budget surveys^[9] and in the Health Behaviour in School Children Study (HBSC)^[10].

The survey

The Pro Children survey of in total more than 13.000 11-year old schoolchildren was conducted in nine countries (Austria, Belgium, Denmark, Iceland, Netherlands, Norway, Portugal, Spain and Sweden) during October – December 2003. Nationally representative samples of schools were drawn in each country with the exception of Austria and Belgium, where regional representation was used (eastern Austria and Flanders).

The dietary questionnaire was comprised of two sections; a precoded 24-hour recall component asking in detail about yesterday's fruit and vegetable intake, and a food frequency (FFQ) part. The instrument has been further described by Haraldsdottir et al^[11].

The results from the 24-hour recalls regarding vegetables were merged into four subgroups; salad, raw vegetables, cooked vegetables and soup vegetables.

Results

Girls had a significantly higher fruit, vegetable and total fruit and vegetable intake than boys ($P < 0.000$). The highest overall fruit intakes were found in Austria, Denmark and Portugal. Fruit intakes were lowest in Iceland and Spain. Children in Portugal, Sweden and Belgium showed the highest overall vegetable intakes in this study. The countries with the lowest vegetable intakes were Iceland and Spain.

Figure 1 presents the average fruit intake in grams per day per country.

Figure 2 shows vegetable intake in g/day per country indicating the type of vegetables eaten.

Discussion

Children in all countries showed relatively low intakes of both fruit and vegetables with consistently lower intakes of vegetables. Boys had in general a lower fruit and vegetable intake than girls. The higher intake of raw vegetables

in the Northern countries might reflect different preferences, but could also have been due to culturally dependent factors related to food preparation and availability.

The main limitation of the 24-h-recall in this pre-coded instrument was that intakes were recorded for one weekday only and therefore did not reflect usual intake. Another problem was the season in which the data were collected. October and November are in many countries, except for Spain, the period when nationally or locally grown fruit, berries and vegetables are available in vast amounts. This could mean that data collected at other times of the year could be even lower in fruit and vegetable intake, again with the exception of Spain.

Generally, the results of the present study were in line with results from earlier studies on fruit and vegetable intake in the participating countries^[7, 14-20] when taking the differences in methodology and year of survey into account.

The WHO population goal represents the population average that is judged to be consistent with the maintenance of health. No clear guidelines on how to interpret the population goal for intake evaluation purposes could be identified. After exclusion of juice intake, the results showed that mean intakes of fruit and vegetables in all countries were lower than the WHO population goal. Children in Austria and Portugal, with the highest intakes of fruit and vegetables, both reached a mean intake of around 264 grams per day. The percentage of participants reaching the WHO population goal of 400 grams of fruit and vegetables ranges from 6.4 in Icelandic girls to 24.3 in Austrian girls; with a total mean of 17.3%.

National recommendations were in most cases higher than the WHO population goal. Some countries used the same recommendations for adults and children. The recommendations sometimes included guidelines for interpretation of survey results; Spain, Denmark and Portugal specified that portions were supposed to be used for evaluation of intake. The average intake in all countries failed to reach their own nationally recommended levels in this study.

Conclusions

The average fruit and vegetable intake did not reach WHO population goals or national recommendations in any country when fruit juice was excluded. The fruit and vegetable intake was highly variable across Europe, for total amounts and types of vegetables eaten. Vegetable intake was clearly lower than fruit intake. A large proportion of the investigated group stated a frequency of intake which was less than once a day of fruit and vegetables respectively.

Figure 1
Mean consumption of fruit g/day

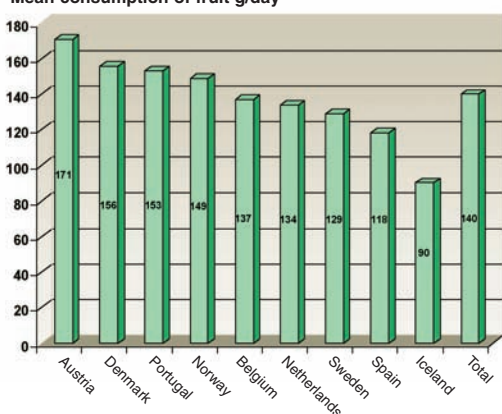


Figure 2
Mean consumption of vegetables, shown as sub-groups and total, g/day

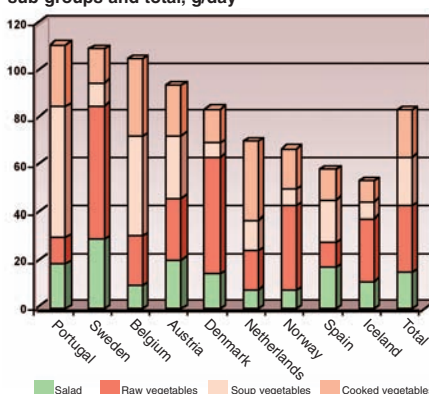


Table 1. Percentage of 11-year old children with fruit plus vegetable intake ≥ 400 grams, by gender and country

Country	Total		Girls		Boys	
	n	%	n	%	n	%
Austria	400	24.1	212	24.3	188	23.9
Belgium	253	19.1	108	17.8	145	20.3
Denmark	394	21.2	218	23.7	176	18.7
Iceland	92	7.8	36	6.4	56	9.1
Netherlands	130	11.9	77	13.1	53	10.5
Norway	202	17.5	109	19.2	93	15.8
Portugal	453	21.4	227	20.4	226	22.5
Spain	125	9.7	45	7.5	80	11.6
Sweden	250	18.3	136	19.7	114	16.8
Total	2299	17.6	1168	17.9	1131	17.3

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