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The Mediterranean Diet in Italy: An Update

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The interest in the Mediterranean diet stems from the finding that coronary heart disease (CHD) mortality is lower in Southern Europe (in the countries bordering the Mediterranean Sea) than in Northern Europe. This benefit seems to be largely due to the relatively safe and even protective dietary habits of these regions [1–5], which consist of cereals, legumes, vegetables, fresh and dried fruit, fish and more rarely meat, olive oil, and wine consumed only with meals. Ancel Keys for the first time indicated that the dietary habits of people living along the Mediterranean Sea was very healthy and he termed it ‘Mediterranean diet’ [6].

Progenitors of this diet can be traced back to the time of the ancient Greeks, whose diet can be regarded as very similar to today’s Mediterranean diet [7]. The diet of the ancient Romans was also close to the Mediterranean one, although mainly during the time of the Republic, but not during the Empire. In Italy, during the Middle Ages, most people ate frugally, both because of shortage of food supply and, more interestingly, because of rules and suggestions from the Church. It is remarkable what is written about meals in the Order of St. Benedict, which date back to the 6th century: frugality was the rule, except for some additions when work was heavier than usual, abstaining from eating the meat of four-footed animals except for sick and weak people, drinking wine with moderation although ‘those to whom God gives the strength to abstain must know that they will earn their own reward’ [7].

In the 1950s, Italian society began to change from an ancient, rural, and agriculture-based system to a modern, urban, and industrialized one [8]. This had a strong impact on the eating habits of Italians, particularly in southern regions, with the consequent progressive dilution of the original healthy Mediterranean dietary traditions with new eating styles imported from the rest

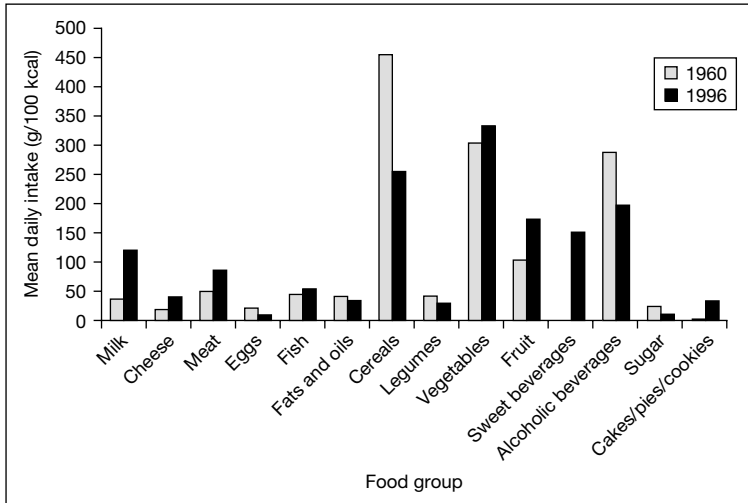


Fig. 1. Dietary habits of Italians.

of the industrialized world. In fact, over the last four decades the dietary habits of most Italians have undergone marked modifications (fig. 1), thus losing many of the health benefits of the Mediterranean diet [9, 10].

From the 1950s to the 1980s, the consumption of meat and fats in Italy increased almost four and three folds, respectively; a much smaller increase was reported for sugar, milk, fruit and vegetables (less than twofold), while no change in cereal consumption was detected [11]. Most of this revolution was nearly completed by the 1980s. From then on, advertising has become the main force leading nutritional preferences. However, some positive trends have begun to take place in more recent times, as reflected by national surveys conducted in 1980–1984 and 1994–1996 [12–14]. By comparing data from the two surveys using the food group approach of the market basket, and by measuring the contribution of the main food groups to the individual food intake, it appears that in about 10 years the contribution of oil and fats has almost halved and the intake of cholesterol-rich foods like meat and eggs has also decreased, although to a lesser extent.

These studies also detected a significant increase in the intake of fish and seafood. Fish consumption is a well-known feature of the Mediterranean diet and has been associated with improved cardiovascular prognosis. However, its availability is decreasing and the cost progressively increasing. Furthermore, pollution of the Mediterranean might discourage fish consumption [15]. In

relation to cardiovascular protection, it would be of public health interest to evaluate whether polyunsaturated fatty acids of vegetable origin might replace, to some extent, polyunsaturated fatty acid from seafood. Moreover, a marked increase in sweetened beverages has been reported [16]. This might affect caloric balance and promote obesity.

Dietary habits differ among the various regional areas in Italy [17]. This observation has also been supported by the already mentioned national survey of food consumption patterns in Italy [13], carried out in 1994–1996, on adolescents, adults, and the elderly. Nutritional data were analyzed by several criteria, including a geographical division of Italy into four areas: Northwest, Northeast, Central, and South. Although some degree of similarity of food habits was found between the Northern regional areas as well as between Central and Southern ones, an overall North to South gradient in the adherence to the Mediterranean diet was observed, with the Southern people still having more traditional Mediterranean dietary habits. In fact, data show higher consumption of cereals (bread, pizza, and pasta), legumes, tomatoes and seafood in Central and Southern regions as compared to the Northern ones. It is also interesting to note a higher olive oil and lower butter consumption in Southern regions. Very recently, Pala et al. [18] analyzed the dietary behavior of elderly Italians participating in the European Prospective Investigation into Cancer and Nutrition (EPIC). In the southern cohorts of Naples and Ragusa – two cities by the sea –, they found higher consumption of cooked vegetables, legumes, cabbage, fish and fresh fruit as compared to the Northern cohort of Varese, a city near the Alps. Added fats are mainly vegetable oils in Italy with a high preference for extra virgin olive oil, produced along the coastline almost everywhere in Italy, although it may be replaced by or rather mixed with, the less expensive seed oil in some families of low socioeconomic status [18]. Higher consumption of foods rich in saturated fats, particularly red meat, appears to be related to poorly educated males, while pasta, polenta, rice and other grains are still consumed widely by the Italian EPIC cohort [18]. Young people in general, but in particular less educated ones living in the South of Italy, tend to consume less fruit and vegetables [19].

In the past, major emphasis was put on the low saturated fat content of the Mediterranean diet, while more recent evidence has underlined the importance of plant foods (including carbohydrate and nondigestible fiber), and of a regular use of olive oil.

The aim of this review is to update the evidence on consumption of macronutrients (dietary fat and plant foods, carbohydrate and fiber) and some vitamins in Italy, mainly in view of an impact of dietary habits on CHD risk. However, there is also increasing interest in its potential benefit in relation to cancer protection.

Dietary Scores

Nutritional epidemiology has relied mostly upon studies on the relationship between diseases and a single or few nutrients or foods. Valuable as it may be, this methodology, however, does not take into account that people eat a variety of foods containing multiple nutrients with potential interactive effects. Although the single nutrient approach is ideal when evaluating conditions linked to a single dietary factor, like vitamin deficiencies, it may be inadequate when a disease has been associated with many dietary factors. In the case of CHD, for instance, the effect of a single nutrient may be too small to be detected, but the cumulative effect of multiple nutrients may become large enough. For these reasons, and also to characterize the dietary pattern of an individual or a group of people, especially in longitudinal studies, nutritionists have set up a complementary strategy, which is to analyze overall dietary patterns including the combination of the various foods and nutrients from the diet. Dietary patterns can be defined in several ways [20]. The approach mostly used to evaluate the Mediterranean dietary pattern is to elaborate dietary scores or indices that incorporate the food composition of the Mediterranean diet. Two major features of these scores are: the possibility to evaluate the intake of a set of different types of foods altogether rather than the intake of single components, and the possibility to establish the adherence of the group's or individual's diet to a particular dietary pattern, i.e. Western, Asian, Mediterranean, etc. The study of the overall food intake, instead of the single nutrient intake, has been advocated because of the synergistic or antagonistic effects that a single food can display. However, two major requirements have to be satisfied in order to obtain an accurate and valid nutritional methodology: a precise definition of the Mediterranean diet, and the validation of the dietary score by means of biomarkers. Various authors have identified different strategies to calculate the indices.

Alberti-Fidanza and co-workers have proposed the Mediterranean Adequacy Index (MAI), an overall indicator that characterizes a diet in comparison to a Reference Mediterranean Diet (RMD) [21, 22]. The MAI can be computed in two ways: (a) 18 food groups are considered, 10 typical of the RMD (bread, cereals, legumes, potatoes, vegetables, fruit, nuts, fish, red wine, vegetable oils) and 8 nontypical of the RMD (milk, dairy products, meat, eggs, animal fat and margarine, sweet beverages, cakes/pies/cookies, sugar); the sum of the percentages of the energy content of the intake of food groups typical of the RMD relative to the total energy intake, and the sum of the percentages of the energy content of the intake of food groups distant from the RMD relative to the total energy intake are calculated; the MAI equals to the ratio between the two values obtained; (b) the same 18 food groups are considered and the relative intakes

are expressed as g/day, g/1,000 kcal, or g/MJ; the MAI is equal to the ratio between the sum of one of the three measurement units of the 10 typical Mediterranean food groups and the sum of the eight nontypical Mediterranean food groups. In both ways, the higher the MAI value of the diet analyzed, the closer that diet is to a RMD. Most importantly, the MAI of random samples of men surveyed for their dietary habits in the 16 cohorts of the Seven Countries Study was inversely related to the 25-year death rates [23].

Trichopoulou et al. [24–26] worked out a Mediterranean Diet Score (MDS) that estimates the adherence to a traditional Greek Mediterranean diet. Nine food items were identified: vegetables, legumes, fruits, cereals, fish, monounsaturated lipids (or the sum of mono- and polyunsaturated lipids in the modified Mediterranean dietary score), meat, dairy products and ethanol. In particular lipids were evaluated as the ratio between monounsaturates (or the sum of monounsaturates and polyunsaturates) and saturates. A value of zero was assigned to each of the nine components specified, if the food considered was presumed to be beneficial and its individual consumption is below the sex-specific median consumption of that food in the individuals studied. A value of one was assigned if the same item is consumed in larger amounts compared to the same median value. The opposite procedure was applied to presumed detrimental components (meat and dairy products). For ethanol, a value of one was attributed to men consuming from 10 to 50 g of ethanol/day and to women consuming from 5 to 25 g of ethanol/day. The score is calculated by adding up the values obtained, and can range from zero (minimal adherence to the Mediterranean diet) to nine (maximal adherence). The authors found that a closer adherence to the Mediterranean diet was associated with a lower total mortality risk in Greek adults [27].

Huijbregts et al. [28] analyzed dietary patterns by means of the Healthy Diet Indicator (HDI), an indicator similar to that of Trichopoulou's group. Also in this case, nine items (either nutrients or food groups) were considered: saturated fatty acids, polyunsaturated fatty acids, protein, complex carbohydrates, dietary fiber, fruits and vegetables, pulses (plus nuts and seeds), cholesterol. Similarly to the MDS, values of zero or one were assigned to each item. The value of one was assigned if the consumption of that item was in the range recommended by the World Health Organization, otherwise the value was zero. The HDI was the sum of the nine values obtained and could vary from 0 to 10. The authors found an inverse significant association between HDI and 20-year all-causes mortality in elderly men from Finland, the Netherlands, and Italy.

More recently, Panagiotakos et al. [29] formulated a Mediterranean diet score by considering 11 main components of the Mediterranean diet including nonrefined cereals, fruits, vegetables, legumes, olive oil, fish, red meat, poultry; a score from 0 to 5 was assigned to each food group according to the frequency

these items were consumed, and a total score, ranging from 0 to 55, was obtained by adding them up. The higher the total score, the closer the eating pattern is to the Mediterranean diet. Also in this case, the Mediterranean diet score resulted directly related to the monounsaturated fat intake, the monounsaturated to saturated fat intake ratio, and inversely related to serum lipids, blood pressure, markers of inflammation and coagulation, and the risk of acute coronary syndromes.

Other authors have calculated more generic dietary scores that quantify how rich is a given diet in some components, with reasonable evidence supporting their beneficial effects on coronary artery disease [30] or that take into account a limited number of foods typical of the Mediterranean diet [31]. In the former work, a dietary pattern with a high heart-protecting score was associated with a reduced risk of peripheral arterial disease in Italian patients with type 2 diabetes. In the latter study, people who had suffered from myocardial infarction and were in the best dietary score quarter, presented a substantial reduction in the risk of early death compared to people in the worst score quarter.

Because the relationship among different dietary indices and all-causes mortality in the same population had never been investigated before, Knoops et al. [32] compared the MDS, MAI, and HDI scores in elderly men and women from 10 European countries in the HALE population. The authors concluded that all the three indices were inversely correlated with mortality to the same extent.

These approaches to quantify the nutritional changes of population groups simplify the understanding of the ‘nutritional transition’, a slight but continuous change occurring in human dietary habits worldwide.

Macronutrients and Coronary Heart Disease

The relationship between dietary fatty acids (FA) and coronary heart disease has been known for over 30 years [33–36], following the pioneering evidence from the Seven Countries Study, started in the 1960s. In general, a more frequent consumption of foods high in saturated FA (SFA) was associated with higher plasma cholesterol, glucose and blood pressure [35]. In these studies, the dietary surveys were performed by using recall methods whose limitations are well known. In particular, these methods rely upon human memory and are seldom representative of an individual’s usual long-term diet [37]. A major progress has therefore been the evaluation of the dietary intake of FA by a more objective and accurate methodology. This is represented by the chemical analysis of adipose tissue or plasma cholesteryl esters FA by gas-chromatographic technique [38–40].