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Changes in nutritional habits in the Mediterranean region

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Abstract. Great interest has been placed on the Mediterranean dietary patterns identified in early 1960s due to better health of populations living in countries around the Mediterranean basin as compared to United States of America or Northern Europe. Epidemiological and clinical trials have both confirmed the health benefits of traditional Mediterranean diets particularly with regard to cardiovascular health. Recent research has also confirmed the effectivenes of this diet in other aspects, such as lower risk for metabolic syndrome and cancer, reasoning for the promotion of Mediterranean diet in the primary prevention of major chronic diseases. Drastic changes can be observed in many Mediterranean countries with populations across age groups moving away from traditional dietary habits towards a modern, Western-like diet rich in calories, saturated fats and refined sugars. This raises serious concern as concomitant changes in the health status of the populations can be observed. Many countries of the region are in the very centre of health challenges in Europe, as vast increases in the prevalence of non-communicable diseases continue to burden the health systems and take a high death toll. Building up evidence in support of traditional Mediterranean diets as effective means in tackling the modern health challenges in the region is therefore warranted. In this paper, we provide an overview of important aspects related to this topic - traditional Mediterranean dietary habits and its health benefits, nutritional transition in the countries, and the current health status of the populations.

Keywords. Dietary pattern – Mediterranean diet – Non-communicable diseases – Modern diet.

Changements des modes alimentaires dans la région méditerranéenne

Resumé. *Les modes alimentaires méditerranéens identifiés au début des années 1960 font l'objet d'un grand intérêt, car les populations vivant dans les pays du bassin méditerranéen avaient une meilleure santé comparées à celles des États-Unis d'Amérique ou d'Europe du Nord. Il a été confirmé, par enquêtes épidémiologiques aussi bien que cliniques, les bienfaits santé des diètes traditionnelles méditerranéennes en ce qui concerne les maladies cardiovasculaires. Des recherches récentes ont également confirmé l'efficacité de cette diète à d'autres égards, tels qu'un moindre risque de syndrome métabolique et de cancer, raisons pour promouvoir la diète méditerranéenne dans la prévention primaire des principales maladies chroniques. Des changements drastiques sont observés dans de nombreux pays méditerranéens dont les populations de tout âge s'écartent des modes alimentaires traditionnels pour se tourner vers une diète moderne, occidentalisée et riche en calories, gras saturés et sucres raffinés. Ceci soulève de sérieuses préoccupations au vu des changements concomitants de l'état de santé des populations. Nombreux sont les pays aux prises avec ces enjeux de santé en Europe, conséquemment à la prévalence grandissante des maladies non transmissibles qui pèse lourd sur les systèmes de santé et entraîne un fort bilan de mortalité. Il s'avère donc nécessaire d'étayer le bien-fondé des diètes traditionnelles méditerranéennes comme moyen efficace de répondre aux défis modernes de santé dans la région. Cet article passe en revue des aspects importants liés à cette question - les modes alimentaires traditionnels méditerranéens et leurs bienfaits santé, la transition nutritionnelle dans les pays, et l'état actuel de santé des populations.*

Mots-clés. *Modes alimentaires – Diète méditerranéenne – Maladies non transmissibles – Diète moderne.*

I – Introduction

Countries in the Mediterranean basin are very diverse in socioeconomic and cultural perspective. Yet, this set of countries is unique in many aspects and is often considered as a single region, especially in sociocultural-based analyses. What is mostly defined as the Mediterranean region typically encompasses all the countries that have access to the Mediterranean Sea. This includes a range of countries in three different continents – Europe, Africa, and Asia: Cyprus, Greece, Albania, Montenegro, Bosnia and Herzegovina, Croatia, Slovenia, Italy, Malta, France, Spain, Morocco, Algeria, Tunisia, Libya, Egypt, Israel, Lebanon, Syria and Turkey. However, the appropriateness of the cultural, rather than the geographical definition of the Mediterranean region, becomes clear on the example of Portugal – although the country does not have a Mediterranean shore, its socio-cultural heritage can be described as even more typically Mediterranean than some of the above.

Dietary patterns are an important lifestyle constituent of this region and are deeply seeded in the culture. Although these patterns are not uniform and vary between sub-regions, countries and even regions within a single country, there are many common elements present that make the diet of the Mediterranean region unique. Efforts have been made to analyse the specificity of Mediterranean countries since it was recognized in large epidemiological studies that their populations generally experience lower rates of chronic diseases and have higher life expectancy. This notion could not be explained by socioeconomic factors, because a large proportion of the countries had poorer economic indicators than those whose populations were not as healthy. The importance of nutritional habits, in combination with other factors, e.g. physical activity in promoting good health in the Mediterranean region was increasingly recognized.

The pivotal importance of nutritional habits became even more greatly acknowledged after a clear correlation between nutritional transition and vast increases in rates of chronic diseases over time could be established. Namely, Mediterranean countries are not exception to global trends of shifting once traditional to modern diets. Drastic lifestyle changes accompanied by demographic changes seriously burden the health and other systems of these countries. What are the modern challenges of countries where traditional dietary components like olive oil, fruits and vegetables are being increasingly replaced by fast food and how can the return to traditional diets and lifestyle contribute to solving the growing health problem?

II – Mediterranean cuisine and the Mediterranean diet

The general believe that all countries in the Mediterranean follow a pretty uniform diet is a misconception. Traditional dietary habits in these countries are an integral part of their cultures and an expression of centuries long continuum. Consequently, the traditional cuisine of each country in the region has unique elements in every aspect, beginning from the way in which the food is prepared to when and how frequently is being eaten.

As for the food commodities per se that are consumed, they depend very much on the socio-cultural characteristics of a country, e.g. religion. Consumption of pork meet in any form, a tabu in the cuisine of predominantly Islamic countries of the Levant, North Africa, and in Turkey, is an integral part of the diet in other countries. In Spain, the consumption of pork meat is traditionally high, and has stayed well above the average of the European Union (EU) throughout the 2008-2013 period, reaching 50.2 and 40.0 kg/capita in 2013 for Spain and EU-27, respectively. A proportionally large consumption is also seen in Portugal and Italy (42.7 and 40.9 kg/capita, respectively), while below the average rates are found in France (32.2 kg/capita) [1].

Consumption of alcohol follows similar patterns. In many European countries of the Mediterranean region, alcohol and particularly wine consumption on regular basis has been a traditional element of the diet for centuries. Although the consumption of wine in Italy has

dropped in the past 5 decades, it still makes up 66% of total alcohol consumption according to the World Health Organization (WHO). Similarly high proportional wine consumption can still be observed in France (56%), Portugal (55%), Greece (47%), Montenegro (47%), and Croatia (45%). Even with constantly dropping rates of wine and total alcohol consumption, recently observed rates of total consumption in Spain, Portugal, Croatia, and France still remain above the European average. On the other hand, rates of alcohol consumption in Turkey are set far below the European standards (2.0 vs. 10.9 of litres of pure alcohol/capita during 2008-2010, respectively) [2].

Despite existing differences, numerous similarities characterize the traditional diets of the Mediterranean. These similarities are particularly evident when comparing the diets of neighbouring countries, giving rise to what could be called sub-regional traditional diets. Some of the dietary elements, however, reach far beyond the borders of sub-regions and are identical or highly similar in countries located on total geographical opposites of the Mediterranean basin.

Major focus was placed on lifestyle patterns of populations residing in the Mediterranean in the mid 20th century to unravel the contribution of traditional diet to good health that these populations were experiencing at the time as compared to others. The first study to thoroughly analyse the dietary habits in a population group in a Mediterranean country was conducted by the Rockefeller foundation in late 1940s. Based on the efforts of the Greek government to increase the standard of living in the population habitant to one of its main islands, a spectrum of factors ranging from dietary habits and health to agricultural practice was inspected and results were published in 1953. It was stated by Leland G. Allbaugh, the epidemiologist in charge of the study, that 'although the basic diet is probably much the same as it was in 2000 B.C., modified by the addition of sheep and some fruits in the Doric era and citrus fruits and tomatoes in the past millennium, the average diet of even the lowest group was adequate in total energy value and not grossly inadequate in any important aspect'[3]. Plant foods were the primary energy source in the diet of the inspected population constituting 61% of total energy intake, while only 7% were coming from food commodities of animal origin. For comparison, American food supply data at the time showed that considerably lower energy rates were derived from plant sources, and higher rates from animal foods (37% and 29%, respectively). Although roughly a double amount of energy in the Cretan diet (29%) was derived from fat and oils as compared to the American food supply data (15%), the absolutely most abundant fat source was olive oil and olives [4]. Although a direct comparison between dietary intake and food supply data is not strictly indicative, these findings suggest that more optimal nutritional habits were attributable to the Cretan population.

The characteristics of the Cretan diet at that time continuted to provoke interest in the nutritional and overall health community as well as wider public up until nowadays. Similar dietary patterns could be found in other regions of the Meditarranean, such as southern Italy [5]. Its main constituents were included in the so called Mediterranean diet – modern nutritional recommendations based on the traditional cuisine of some Mediterranean countries or their regions. Mediterranean diet is not, however, limited on Greece and Italy, as some of its elements are found in countries located on geographically distant parts of the Mediterranean basin – e.g. Syria, Turkey, Lebanon, and Tunisia, Morocco, Portugal and Spain. Interestingly, this diet is particularly based on the traditional dietary patterns of countries that had a strong olive cultivation in the 1960s [5].

The main food consituents of the Mediterranean diet, as illustrated in the nutritional pyramid below (Fig. 1), include fresh, largely non-processed plant foods (e.g., vegetables, fruits cereals, legumes, nuts, seeds), which are consumed in high amounts; frequent consumption of bread; low to moderate consumption of food commodities of animal origin, such as meat (red meat, poultry, fish), dairy products (cheese and yogurt), and eggs. Additionally, moderate and meal-accompanying consumption of wine is a typical element of the Meditarranean diet, albeit being limited to non-Islamic countries. Differences as to which food commodity is specifically consumed exist according to the sub-region, e.g., couscous is a traditional constituent of North-

African diet, pasta is frequently consumed in southern Europe, while bulgur is commonly eaten in countries of eastern Mediterranean. The composition of dietary fat in the Mediterranean diet is pretty unique. Olive oil is a vital constituent of the diet – it is consumed frequently and represents the main source of dietary fat. To the contrary, consumption of saturated fat is set to very low levels, the upper limits being 7-8% of energy derived from this type of dietary fat. Importantly, dietary elements are accompanied by another important, health-promoting lifestyle characteristic – physical activity on regular basis [5].

Fig. 1. Mediterranean diet: nutritional pyramid [6]

Recognizing the integrity and importance of the nutritional habits as a lifestyle element, rather than being simply a diet of the population resident to countries of the region, UNESCO acknowledged the Mediterranean diet as an intangible cultural heritage of Cyprus, Croatia, Spain, Greece, Italy, Morocco and Portugal. It was recognized that 'the Mediterranean diet involves a set of skills, knowledge, rituals, symbols and traditions concerning crops, harvesting, fishing, animal husbandry, conservation, processing, cooking, and particularly sharing and consumption of food. Eating together is the foundation of cultural identity and continuity of communities throughout the Mediterranean basin'[7].

III – Effects of the Mediterranean diet on health

The importance of diet, among other lifestyle factors, in developing risk factors and subsequently cardiovascular diseases was postulated in mid 20th century. Positive effects of the Mediterranean dietary habits were initially recognized in the Seven Countries Study. Started in 1958, this large longitudinal epidemiological study investigated the relationship between dietary habits and other lifestyle factors with cardiovascular health in middle-aged men in seven different countries – United States, Finland, Netherlands, Italy, former Yugoslawia, Greece and Japan. The pivotal importance of the study lies in identifying important risk factors for developing cardiovascular conditions, such as high blood pressure and elevated serum cholesterol levels, as well as establishing a clear correlation between the intake of saturated fat and serum cholesterol levels, saturated fat and incidence of coronary heart disease (CHD), and serum cholesterol levels and CHD incidence [8].

The central role of dietary patterns in promoting good cardiovascular health became clear as results of the study showed that there is a significantly higher rate of coronary death in Northern Europe and United States when compared to southern Europe, even when controlled for variables such as serum cholesterol and blood pressure. Typically, population cohorts in Greece consumed high levels of olive oil and fruits, the Italian diet was characterized by high consumption of vegetables, while the Dalmatian cohort residing on the Adriatic shore of former Yugoslawia had the highest levels of fish consumption in their diet. Accordingly, these cohorts experienced much lower CHD death rate [8]. Similarly, negative correlation between adherence to the Mediterranean diet and risk for CHD and stroke was found in middle-aged women in the Nurses' Health Study [9]. The incidence of fatal as well as non-fatal cardiovascular disease is negative correlated with greater adherence to the Mediterranean diet in initially health middle-aged adults [10]. Significant value of the Mediterranean diet in promoting overall health was also found in elderly men and women in the HALE Project. Specifically, diet characterized by high consumption of bread, legumes, fruits, vegetables, fat with high content of unsaturated fatty acids, moderate consumption of fish and low intake of dairy products and meat was associated with lower all-cause mortality in 70-90 year olds [11]. In line with these reults, a significant reduction in mortality caused by CHD and cancer was also found in a cohort of wider age range (20-86) adhering to Mediterranean diet [12].

Individuals already diagnosed with CHD experience lower risk of death when eating as recommended by the diet [13]. Moreover, this diet can generally reduce the severity of CHD, clinically apparent by biochemical indicators of myocardial damage [14]. Furthermore, combining the diet with other health-promoting lifestyle factors, such as physical activity, can also reduce the risk of recurrent cardiac events [15]. The protective role of the diet is most likely due to protective nature of its individual constituents, as moderate fish consumption[16] or exclusive use of olive oil[17], as recommended by the Meditarranean diet, can lower the likelihood of developing acute coronary syndromes. Also, long-term, exclusive olive oil use can also reduce the risk of developing cardiac dysfunction after the event [18]. To the contrary, consumption of red meat, which according to the Mediterranean diet should be consumed only in low amounts, is positively correlated with the likelihood of developing cardiac events [19]. Dairy products, such as yogurt and cheese, are an integral part of the diet, and they are suggested to offer a strong protective effect against heart disease [20]. Adherence to the Mediterranean diet seems to promote not only cardiac, but general cardiovascular health, as it is suggested to reduce inflammation and improve endothelial function [21]. Mediterranean diet, which addresses the type of fat that should be consumed but does not suggest low fat intake, seems to be more appropriate than low fat dietary regimes in terms of clinically relevant changes in cardiovascular risk factors and inflammation [22].

Emerging evidence suggest that traditional Mediterranean dietary habits to be associated with protective effects not only in the cardiovascular system, but promote overall health, including lower risk for cancer [23]. Adhering to such dietary patterns could, for instance, offer protective mechanisms agains pancreatic cancer [24], gastric cancer [25], colorectal cancer [26], liver cancer [27], prostate cancer [28], and breast cancer [29, 30]. Greater adherence to the diet is suggested to significantly lower the risk of overall cancer mortality (10%), with a remarkable 56% reduction in aerodigestive cancer-associated deaths [31].

Mediterranean diet is also suggested to be beneficial for metabolic health, as it was revealed in clinical and epidemiological studies that it positively influences components of the metabolic syndrome, such as blood pressure and lipid and glucose levels [32], as well as reduces vascular inflammation associated with metabolic syndrome [33]. Furthermore, nutritional habits close to the Mediterranean diet are correlated with a reduced risk of developing diabetes [34]. Its potential in weight loss management has also been reported [35].

Positive health effects of Mediterranean dietary patterns have also been suggested with regard to depressive disorders [36], cognitive decline in elderly[37, 38] as well as middle-aged adults [39], cerebral tissue loss associated with Alzheimer's disease [40], and Parkinson's disease [41, 42].

Usefulness and effectiveness of the Mediterrranean diet in the primary prevention of major chronic diseases carries is important for the public health perspective [43].

IV – Changes in the nutritional habits in the Mediterranean region

Similar to the rest of the European continent and in accordance with general global trends, the Mediterranean region has experienced great demographic and socio-cultural changes, that have transformed once very typical traditional diet into a modern one. A clear Westernization of dietary habits is present in a large part of Mediterranean countries [44].

Substantial changes have been reported in the dietary habits in the Cretan population over a 30 years period (1960-1991), which typically adhered to the standard definition of Mediterranean diet in the Seven Countries Study. A decrease in consumption of bread (51%), potatoes (67%), fruit (51%), eggs (62%), milk (22%), edible fats including olive oil (39%), sugar, honey, pastries and ice cream (15%), and alcohol (49%) was reported. In parallel, there was an increase in consumption of cereals (366%), legumes and pulses (288%), vegetables (46%), meat (24%), fish (244%), and cheese (100%) [45].

Fat represents an important macronutrient in the traditional Mediterranean diet, and typically delivers an equal amount of calories as carbohydrates (slightly about 40%), while 15% of energy requirements are covered by dietary protein. Concomitantly, the plant-animal fat ratio defined by the diet is 2.1, while 2.5% of energy were derived from alcohol and fiber intake was set on 27 g/day [46, 47]. According to a study from 2002, 17.8% of energy in Algerian subjects was derived from protein, while 34.5% and 47.3% were coming from fat and carbohydrates, respectively. In Egypt, protein and fat energy were slightly lower (15.8% and 26%, respectively), with carbohydrates delivering more than half of calories (58.1%). Similarly, in the Italian capital of Rome, the largest part of energy was derived from dietary carbohydrates (48%), while 18.1% was attributable to protein and 29.6% to fat. Subjects from Greece had a higher fat percentage than prior countries (37.9%), with carbohydrate levels slightly above 40%, and 13.6% energy being derived from protein. Notably, different fat-carbohydrates ratio than the one desribed above could be observed in all four inspected countries, with a shift in favor of dietary carbohydrates. In parallel, Greece was the only country where the plant-animal fat ratio was shifted in favor of plant food (2.7), while a marked shift in favor of animal fats was observed in Algeria and Italy/Rome (1.3), and a slight decrease in Egypt (1.8). A small increase in alcohol consumption was reported in Italy/Rome and Geece, delivering slighlty more than 4% and 3% of total calories, respectively. Decreased fiber intake was reported in all subject countries except Egypt, where a slight increase could be observed – 21.2 g/day in Algeria, 31.4 g/day in Egypt, 18.1 g/day in Italy/Rome, and 23.2 g/day in Greece. In short, the relative consumption of animal fats and dietary carbohydrates is higher than the defined at the cost of fat and plant foods, a characteric of modern Western diets [44].

Consumption of a range of food commodities in selected cohorts from the Seven Countries Study[48] and Multi-centre study of the Mediterranean Group for the Study of Diabetes (MGSD)[44] in male subjects in Greece and Italy is summarized in Table 1. In Greece, a decreased consumption of bread, potatoes, vegetables, fruit, eggs, milk, and fats can be observed, while a higher consumption of cereals, legumes, alcohol, meat, fish, cheese, sugar, pastries and other foodstuffs can be observed. In Italy, bread, vegetables, alcohol, meat, eggs, cheese, fats and sugars were consumed less, whilst potatoes, legumes, fruit, fish, milk, pastries as well as the consumption of other food commodities increased. Typical for the Mediterranean diet, fruits were consumed in highest net amounts in Greece and vegetables in Italy in early 1960s compared to other foodstuffs.

Diet of populations residing in Mediterranean countries has not only changed with regard to the relative composition in specific food commodities, but also in terms of the total amount of calories consumed by an average individual. In general, a more energy-rich diet is nowadays

consumed in Mediterranean countries. In the past 50 years (1961-2011), Lybian diet was modified in the way that it delivers more than double the amount of energy (107%). Comparably large increases in the total number of calories consumed on daily basis can be observed in Algeria (99%). Egyptian (71%), Tunisian (50%), and Moroccan diet (63%) have also become considerably more energy-dense. Relatively smaller increases can be observed in Turkey (24%), Greece and Spain (21%), and Italy (20%). However, it should be emphasised that an average person in these four countries consumed substantially more calories in early 1960s than an individual in Tunisia or Lybia did. Therefore, the relatively small increase in these countries sums up to considerably high number of total calories consumed in 2011 [49]. Consumption of a more energy-dense diet as apparent by the number of calories consumed is not indicative of the dietary quality. Thus, it remains questionable whether such energy-rich diets are also nutrient-rich, considering the fact that vitamin and mineral deficiencies are still highly prevalent in some of the Mediterranean countries, particularly in those located in the southern part of the basin.

Table 1. Changes in consumption of food commodities in g/day in Greece and Italy over time, [a]Seven Countries Study (Greece – Crete cohort, Italy – Rome railroad cohort)[48], [b] Men from the Multi-centre study of the Mediterranean Group for the Study of Diabetes (MGSD), Italy – Rome area only included [44]

	Greece[a]	Greece[b]	Italy[a]	Italy[b]
Bread	380	269	249	144
Cereals	30	76	113	113
Potatoes	190	47	29	31
Legumes	30	43	6	51
Vegetables	191	168	260	214
Alcohol	15	24	65	32
Fruit	464	354	150	236
Meat	35	82	226	101
Fish	18	33	30	40
Eggs	25	11	25	11
Cheese	13	67	33	29
Milk	235	153	77	126
Fats	95	42	51	13
Sugar	20	32	19	13
Pastries	0	45	12	103
Rest	107	390	56	165

Table 2. Total daily calories intake in selected Mediterranean countries in 1961 and 2011 [49]

Country	Kcal/day (1961)	Kcal/day (2011)	Relative change
Italy	2955	3539	+ 20%
Greece	2824	3433	+ 21%
Spain	2632	3183	+ 21%
Turkey	2957	3680	+ 24%
Tunisia	2240	3362	+ 50%
Morocco	2047	3334	+63%
Egypt	2076	3557	+ 71%
Algeria	1619	3220	+ 99%
Lybia	1549	3211	+ 107%

Increase in the consumption of animal fats, which are not a major constituent of the Mediterranean diet, is a clear sign of the nutritional shift affecting the populations of some of the Mediterranean countries. Figure 2 depicts the consumption of animal fats (kg/capita/yr) over a 50 year period (1961-2011) in Spain and Italy, and a 9 year period (1992-2011) in Croatia. An approximate 3-fold increase can be observed in Italy (3.50 vs 11.70 kg/capita/yr) and Spain (1.50 vs 4.90 kg/capita/yr), while a roughly 2-fold increase is attributable to the Croatian diet (4.40 vs 8.30 kg/capita/yr) [49].

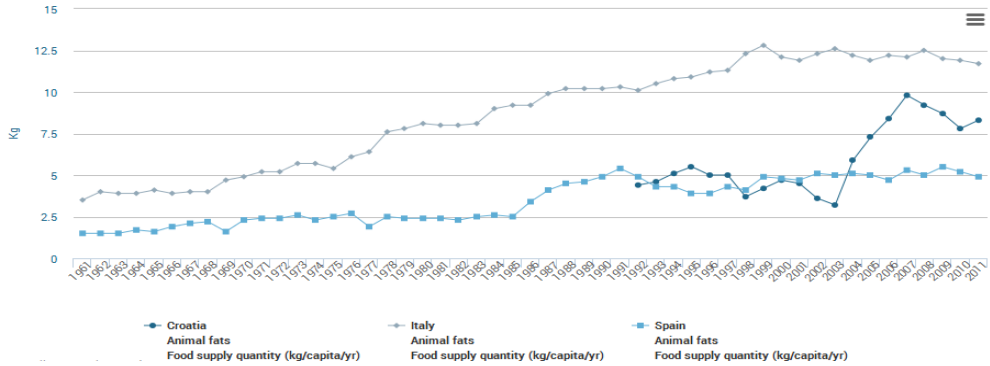

Fig. 2. Consumption of animal fats in Croatia, Italy and Spain over a 9- and 50-year period, respectively (kg/capita/yr) [49].

Higher intake of sugar, in line with global trends, can be observed in many countries of the region. The consumption of sugar in Egypt, Morocco, and Turkey through 1962-2011 is shown in Fig. 3. In Turkey, the anual consumption of sugar increased more than 4 times (6.80 vs 29.70 kg/capita/yr), while increasing rougly 3 times in Egypt (10.60 vs 28.70 kg/capita/yr). In Morocco, sugar intake was set relatively high even in early 1960s (27.90 kg/capita/yr), but has still increased over time reaching very high levels (37.70 kg/capita/yr) [49].

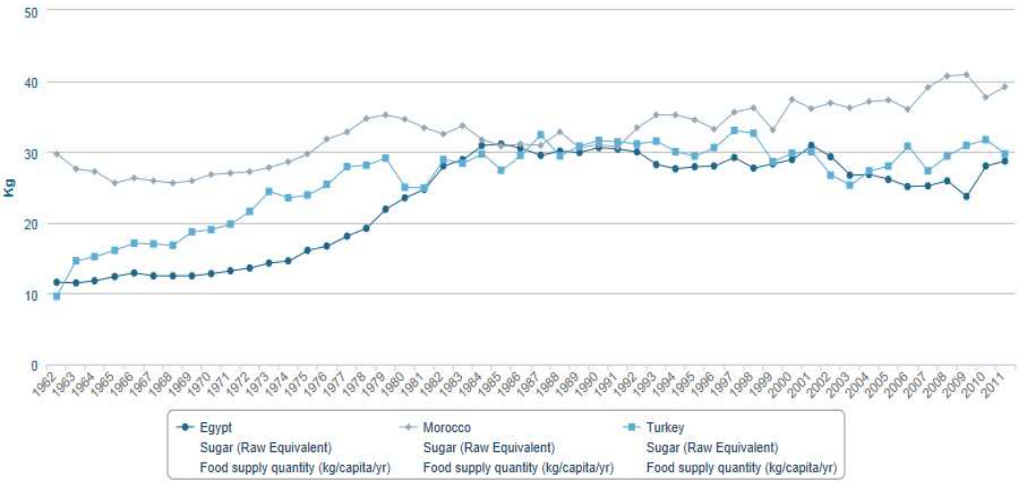

Fig. 3. Consumption of sugar (raw equivalent) through 1962-2011 period in Turkey, Morocco and Egypt (kg/capita/yr) [49].

Moving away from traditional Mediterranean dietary pattern towards a modern Western-like diet becomes apparent when analysing the ratio of plant foods vs animal-origin food. Substantial increases in meat consumption can be observed in many Mediterranean countries. Concomitantly, the consumption of vegetables has stayed fairly stable in parts of the region, with only minimal increases. In Greece, Malta and Portugal, meat consumption was set on similar levels in 1962 (21.00, 23.80 and 25.60 kg/capita/yr for Portugal, Greece and Malta, respectively) (Fig. 4). Overall, meat intake in these countries increased roughly 4 times over a 50-year period, reaching 80.60 kg/capita/yr in Greece, 84.50 kg/capita/yr in Malta, and 90.30 kg/capita/yr in Portugal [49].

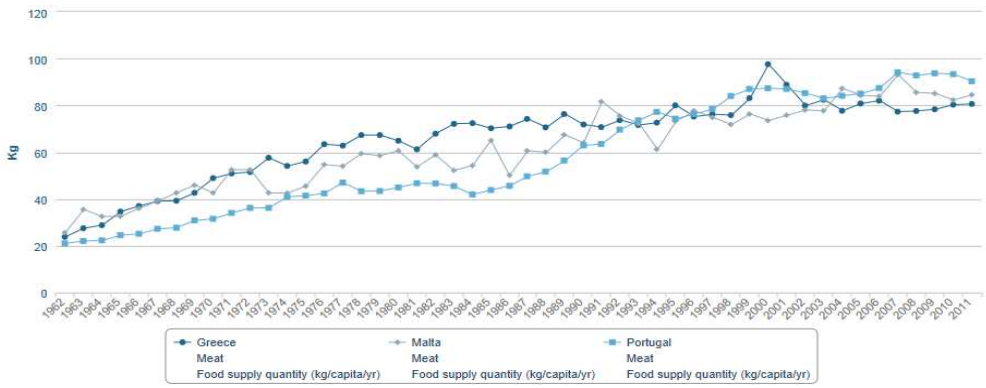

Fig. 4. Consumption of meat through 1962-2011 in Greece, Malta and Portugal (kg/capita/yr) [49].

In Portugal, vegetable intake in 1962 was 95.00 kg/capita/yr, while comparably high levels were found in Lebanon and Italy (123.60 and 124.00 kg/capita/yr, respectively). In Italy, vegetable intake grew only minimally and reached 144.50 kg/capita/yr in 2011, while higher increases were reported in Portugal (166.20 kg/capita/yr) and Lebanon (204.80 kg/capita/yr) [49] (Fig. 5).

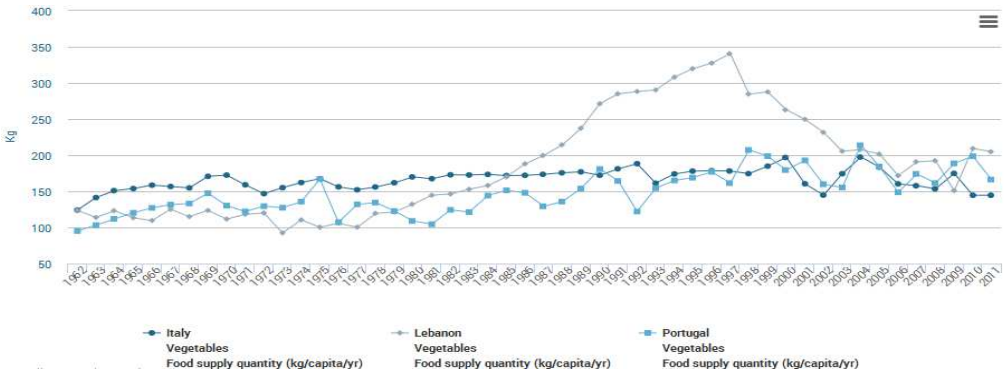

Fig. 5. Consumption of vegetables through 1962-2011 in Italy, Lebanon and Portugal (kg/capita/yr) [49].

Olive oil, a vital food commodity in the traditional Mediterranean diet, is being increasingly replaced by other fat sources, such as saturated fat typically found in red meat. That is, olive oil intake in many Meditteranean countries has remained at fairly stable levels in the past 50 years, or has even decreased in some countries. In 1962, olive oil intake was fairly low in Cyprus (2.50 kg/capita/yr), and it remained at the same level over the past 50 years, reaching 3.00

kg/capita/yr in 2011. Similarly, its consumption stayed stable in Italy in this period (9.90 and 11.60 kg/capita/yr in 1962 and 2011, respectively). Remarkably, a Tunisian individual consumed 3 times less olive oil in 2011 than it did in 1962 (3.10 and 9.10 kg/capita,/yr, respectively) [49] (Fig. 6).

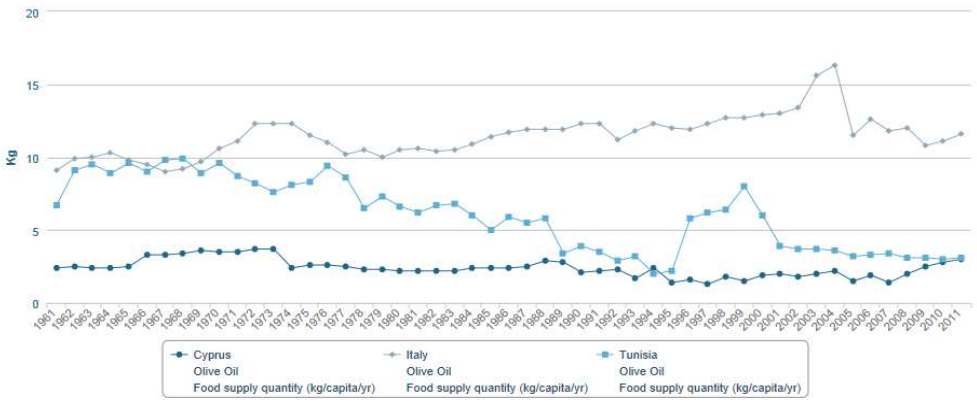

Fig. 6. Consumption of olive oil through 1962-2011 in Cyprus, Italy, and Tunisia (kg/capita/yr) [49].

Strong deviations from Mediterranean diet have been reported in younger adults [50, 51, 52], particularly in low intake of fruit and vegetables and high intake of meat and dairy products[50]. In addition, levels of adherence to the Mediterranean diet as low as 5% can be found in this population group, in conjuction with generally low diet quality [50]. Marked nutritional changes can also be observed in children, although adherence to the Mediterranean diet generally contributes to diet quality in this age group [53].

V – Health trends

The nutritional shift that most Mediterranean countries have experienced has brought marked changes in the health status of its populations. For instance, in the Cretan cohort of the Seven Countries Study, with changing dietary patterns, negative health-associated effects could also be observed. Significant increases were reported in total serum cholesterol (5.7 ± 0.7 *vs* 5.3 ± 0.7 mmol/L), body mass index (25.7 ± 3.5 vs 24 ± 2.4 kg/m^2), as well as systolic (152 ± 13.4 and 134.4 ± 11.1 mmHg) and diastolic blood pressure (4th phase: 97.1 ± 8.8 vs 89.2 ± 8.8 mmHg), in conjuction with marked, but not significant changes in weight (69.4 ± 9.03 and 64.5 ± 7.2 kg) for 1991 and 1960, respectively [45].

The global epidemic of obesity has also taken its toll in Mediterranean countries (Table 3). With the nutritional shift and diets that are becoming more energy-dense reaching levels as high as 3500 kcal/day, as presented above, and increasingly sedentary lifestyle, the number of overweight and obese individuals in many of the countries has reached alarming levels. In some countries, such as Turkey (61.9%), Spain (62%), and Egypt (67.9%), overweight has become a major public health problem affecting roughly two thirds of the population [54].

This dramatic upsurge in overweight and obesity clearly goes hand in hand with a high prevalence of non-communicable diseases, which account for between 63% and 95% of all deaths in the Mediterranean region (63% in Algeria, 72% in Tunisia, 82% in Egypt, 85% in Turkey, 87% in France, 90% in Malta, and 95% in Montenegro) [54].

Table 3. Obesity rates in selected countries in 2008 (%) [55]

Country	Obesity (%)
Morocco	16.4
France	18.2
Italy	19.8
Tunisia	22.3
Portugal	24.0
Croatia	24.2
Turkey	27.8
Egypt	33.1

VI – Conclusion

Traditional Mediterranean dietary patterns, as described in early 1960s, are an important lifestyle factor that served as a pillar of general health and well being in the population compared to other regions of the world at that time. Nutritional habits such as high consumption of olive oil, fruits and vegetables, and low intake of meat and other animal foods, is associated with a range of health benefits, such as decreased risk of cardiovascular diseases, metabolic conditions or even cancer. However, a clear 'Westernization' can be observed in many countries of the region over the past 50 years, introducing trends such as increasing intake of saturated fats and foodstuffs of animal origin. This nutritional shift is affecting a wide percentage of population, including children and young adults, and is accompanied by general lifestyle changes, such as decreasing levels of physical activity. These unfavorable changes are associated with negative health outcomes, such as the increasing prevalence of metabolic conditions and drastic upsurge of overweight and obesity in many of the countries. With a very high proportional mortality associated with non-communicable diseases, Mediterranean countries have been losing the reputation that they have enjoyed for a long time. Once known as the model region of good nutrition-good health relationship, the modern Mediterranean carries a huge burden of non-communicable diseases. A reverse in the nutritional transition and higher adherence to traditional dietary patterns represents an effective means in combating the modern health challenges in these countries and should be promoted through existing health systems.

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