Mediterranean diet: knowledge and adherence in Italian young people

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Abstract

Introduction. In November 2010 the Mediterranean Diet was recognized by the UNESCO as Intangible Cultural Heritage of Humanity. It is an heritage that brings together the dietary habits of the peoples of the Mediterranean countries, consolidated over the centuries remained almost unchanged until the 1950s. Numerous scientific studies have also shown that the Mediterranean Diet is an healthy diet that helps to prevent the main chronic diseases such as cardiovascular diseases, diabetes, bulimia and obesity and thanks to the antioxidant power of olive oil combined with vegetables consumption, an important means of cancer prevention. The aim of our study was to investigate the knowledge and the adherence to the Mediterranean diet of young people living in the Mediterranean area.

Materials and methods. The survey was carried out by administering a web-based anonymous questionnaire from March to May 2019 to Italian young people. In this survey we asked for socio-economic conditions, knowledge, awareness and adherence to the Mediterranean diet (through the KIDMED test) both in childhood and at present time. Parental educational status and family income were used as indicators of socio-economic status (SES).

Results. The sample was made up by 507 Italian young people between the ages of 17 and 35 (123 males and 384 females), with an average age of 22.88 years (DS 7.02). Only 11.4% knew the Mediterranean diet. During childhood 70.8% of respondents had breakfast and 58% ate fruit and vegetables daily. Today they have maintained the correct eating habits, in fact, 71.2% had breakfast, 60.2% ate fruit and 64.7% ate vegetables. In addition, only 48.3% eat fish and the majority of respondents consume carbohydrates (76.9%). To a lesser extent they consume junk foods like candy and various snacks (18.1%) or fast food meals (9.1%). Moreover, we asked for physical activity and we found that 48.9% did it. We found age, exercise and sex high significant variables (p<0.01). Higher adherence to MD was found in older interviewees.

Conclusions. Our study we found high knowledge to a Mediterranean diet into 90.5% of the sample and poor adherence into 23.5% of them, medium into 53.4% while higher only in 23.1% of the interviewees. Lower adherence was found among those who do not engage in physical activity and the two regressor with higher weight on the adherence to MD were "eat at home "and "eat fruit and vegetables". Furthermore, in our sample more increased the age more increased adherence to traditional diet models. _**Clin Ter 2020; 171 (5):e437-443. doi: 10.7417/CT.2020.2254**_

Key words: _Mediterranean Diet, Young, Health, Obesity_

Introduction

In November 2010 the Mediterranean diet was included in the List of Intangible Cultural Heritage of Humanity recognizing this heritage belonging to Italy, Morocco, Greece and Spain and in November 2013 this recognition was extended to Cyprus, Croatia and Portugal.

The importance of nutrition was underlined by the World Health Organization (WHO), according to which adequate nutrition and health are to be considered fundamental human rights related to each other. According to the WHO, there are almost 3 million lives that could be saved every year in the world thanks to a sufficient consumption of fruit and vegetables (1-3).

In June 2019 the High Level Event on the Mediterranean Diet, organized to discuss the issue of overweight and obesity, considered the Mediterranean diet fundamental due to its characteristics including a controlled quantity of fats, a low percentage of carbohydrates, a low glycemic index and a high content in dietary fiber, antioxidant compounds that contribute to reducing the risk of non-communicable diseases such as cardiovascular, metabolic, neurodegenerative and tumor diseases.

Previous studies have shown that the link between the Mediterranean diet and health has an important role on the quality of life of individuals both on physical and psychological status (4-9). Adherence to the diet has been evaluated in different population groups (adult, child, teenager) (10-12) and it has been observed that lifestyle changes directed towards unhealthy habits, especially in the young age groups, were due to an increasingly evident deviation towards a "western diet" richer in saturated fats, refined cereals, simple carbohydrates and processed foods (13).

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This phenomenon has been called "nutritional transition" and it is related to the high prevalence of overweight and obesity in countries that should adopt a traditional Mediterranean diet (14,15).

Other associated and influential factors could be considered: one of these is certainly the economic aspect (16), according to studies conducted both in America and in Europe, in fact, food cost is a determining element in the choice of it: foods with high energy density nutrient-free are more cheaply respect to fruit and vegetable (17-20); furthermore new production methods in the agricultural and zootechnical sector and new technologies for food preservation; finally media influence could be another important factor (21). Today young adults are living in a new society where technologies and globalization could lead to an exchange of traditions between culturally and ethnically different individuals; this could be applied also for eating habits and so it is important to highlight whether they still maintain the feed tradition of previous generations. Also, many studies have focused on adolescents and children, instead there has been a lack of studies that have investigated young and young adults. Thus, this study aimed to analyze both the knowledge and the adherence to the Mediterranean diet related to the various factors (socio-economic, demographic, technological and lifestyles) that influence young people living in the Mediterranean zone.

Materials and methods

The survey was carried out through the administration of an anonymous on line questionnaire from March to May 2019 to young people between 17 and 35 years old. We acquired information about the socio-economic conditions, the level of education, the daily feed habits, knowledge, awareness and adherence to the Mediterranean diet (through the KIDMED test). Parental educational status and family income were used as indicators of socio-economic status (SES).

Regarding the specific questions on the Mediterranean diet (MD) the knowledge (What is MD? What are the main foods of the Mediterranean diet?) and composition of the diet was investigated. KIDMED classifies individuals into three categories (KIDMED index) according to their answers to 16 yes or no questions. Twelve questions denote a positive connotation with respect to the MD and they are assigned a value of +1. Four denote a negative connotation with respect to the MD and they are assigned a value of –1. If the score is >8, the responder has an optimal MD. If the score falls between 4 and 7 improvements need to be made to reach optimal MD patterns. If the score is <3 the quality of the diet is very low.

Importance was also given to the eating habits of the sample in childhood (had breakfast, did 5 meals a day, ate since child fruit and vegetables, ate sweet and snacks, consume sugary drinks).

As far as lifestyle characteristics were concerned, we asked about their living and eating habits (where and with whom they live, where and with whom did they usually eat)

To determine physical activities, the adolescents were asked how much exercise they get at week.

Also, we asked for voluptuous habits (smoke, alcohol and coffee intake).

Data analysis

All the data analyses were performed by the use of STATA Software Version 14 and the level of statistical significance was set at $P < 0.05$. Continuous variables were presented as means± SD and categorical variables were presented as relative frequencies (%). To investigate impact of different socio-economic factors on AMD score, we used ordinary least squares (OLS). OLS is a statistical technique that is used to predict the value of one variable using other variables with the development of a mathematical equation that describes the relationship between the variable to be forecasted and the variables that are believed to be independent and impact the dependent variable.

Hence, we run ordinary least square (OLS) for total KIDMED score on independent variables such as age, sex, and no exercise, eat where, breakfast, fruit and vegetable, and sweet and snack as follows:

$$KIDMEDi = \beta_0 + \beta_1 age_i + \beta_2 sex_i + \beta_3 noexercise_i + \beta_4 eatwhere_i + \beta_5 breakfast_i + \beta_6 FruitVeg_i + \beta_7 SweetSnack_i + \varepsilon_i$$

Where $KIDMEDi$ refers a quantitative variable measuring AMD for each individual i, age_i, refers the individual's age (a continuous variable), $noexercise_i$ is a dummy variable which takes a value 1 if the individual practice no physical exercise and 0 otherwise, is a dummy variable that takes a value 1 if the respondent is female and 0 otherwise, $eatwhere_i$ is a dummy variable which takes a value 1 if a respondent usually eats at home and 0 otherwise, $breakfast_i$ is a dummy variable with 1 if the respondent eats breakfast always when he/she was a child and 0 otherwise, $FruitVeg_i$ is a dummy variable with value 1 if the respondent takes fruit and vegetable always when he/she was a child and 0 otherwise, is a dummy variable with value 1 if the respondent takes sweet and snacks always when he/she was a child and 0 otherwise $SweetSnack_i$ and ε_i is the error term of the regression. We estimate our model using robust standard errors (heteroscedasticity robust standard errors by the Huber-White correction so that our statistical inference is valid.

Results

The analyzed sample is composed of 507 subjects of which 123 males (24%) and 384 females (76%), with 84.8% of individuals aged between 17 and 25 years and 15.2% among the 26 and the 35. In Table 1 we reported socio-demographic characteristics of the sample. The mean age was 22.88 (SD 7.02).

Table 1. Socio-demographic characteristics

Gender	
Male	24%
Female	76%
Age	
17-25	84.8%
26-35	15.2%
Educational qualification	
Middle school	0.6%
Upper secondary school	83%
Graduation	16.4%
Profession	
Student	93.1%
Public employee	2.8%
Private employee	0.8%
Freelance	2.4%
Others	1%
Income	
On average (€ 25.000-30.000 for year)	41.4%
Below average	51.1%
Above average	5.3%
No reply	2.2%
Mother's educational qualification	
Elementary School	3.4%
Middle School	31.4%
Upper secondary school	43.4%
Graduation	20.5%
No reply	1.4%
Father's educational qualification	
Elementary School	4.3%
Middle School	32.5%
Upper secondary school	46.4%
Graduation	14.8%
No reply	2%

To evaluate knowledge to the Mediterranean diet we have examined the answers to the question "What are the main foods of the Mediterranean diet?" we found that 90.50% knew the MD and 8.30% did not know it (1.2% did not answer); we also examined the answers to the question "What is the Mediterranean diet? Define "only 11% of the subjects interviewed knew to answer correctly, instead the 68,8% did not replied positively (19.7% did not answer) while with the indication of typical Mediterranean diet food list almost all those interviewed replied positively.

Due to the influence of daily habits on nutrition we investigated where to eat and with whom. We found that in our sample 75.7% lived with their families, 17.6% lived with other people and only 6.3% lived alone (0.6% did not answer). Furthermore, they generally ate with their family (77.7%) and also almost all (94.3%) ate their meal at home. Only 5.3% ate out (2.7% ate at bars or restaurants and 2.6% to the university refectory) and 0.4% did no report their response. Finally, 11.2% ate alone and 10.9% with their friends or colleagues (0.2% did no answer).

We investigated the feed habits of the subjects interviewed in childhood (Table 2) and in the moment of the interview (Table 3) to compare the differences in relation to possible different lifestyle. From childhood 70.8% of the interviewees had breakfast, 39.6% had 5 daily meals, 58% always consumed fruit and vegetables, 31% ate sweets and snacks and 15% carbonated drinks.

Moreover, we asked for psychical activity and we found that 48.9% did it (0.6% did no answer). Also, only 9.9% of them did sport in a competitive way and 12 % had a specific diet and 2% a protein one. Type of sports practiced by the sample were represented in Figure 1.

Table 2. Food habits in childhood

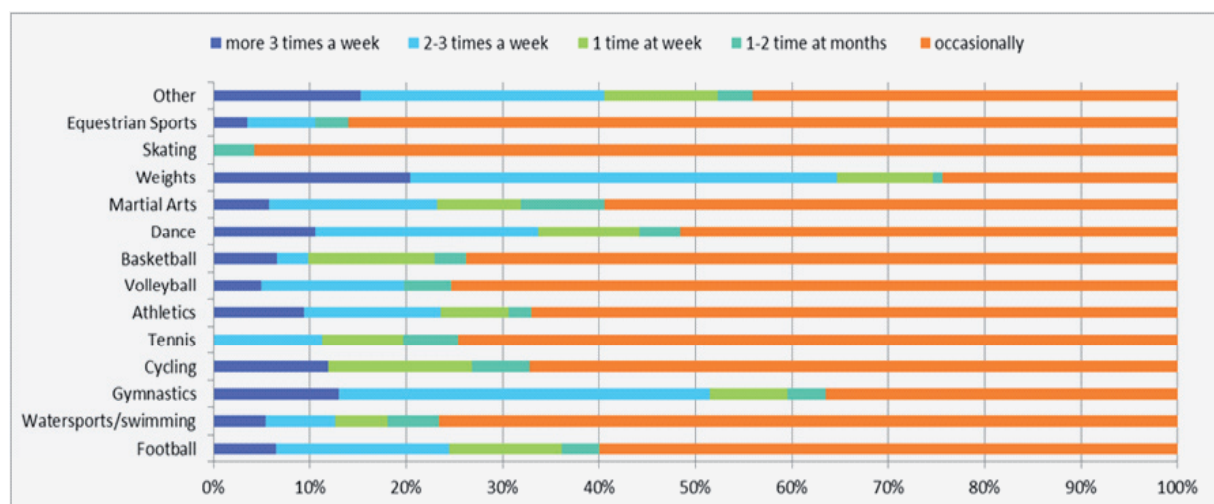|	Always	Sometimes	Never	No answer
Breakfast	70.8% (359/507)	21.1% (107/507)	7.3% (37/507)	0.8% (4/507)
5 meals a day	39.6% (201/507)	42.6% (216/507)	16.4% (83/507)	1.4% (7/507)
Consumption of fruit and vegetable	58% (294/507)	34.3% (174/507)	5.9% (30/507)	1.8% (9/507)
Consumption of sweets. sweets snacks	31% (157/507)	60.6% (307/507)	7% (36/507)	1.4% (7/507)
Consumption of carbonated or sugary drinks	15% (76/507)	60.4% (306/507)	23.2% (118/507)	1.4% (7/507)

Fig. 1. Type of sports practiced by the sample

Table3. Food habits in adulthood (Kidmed test) and Kidmed Index

Kidmed test	Yes	No
Takes a fruit or fruit juice every day	60.2%	39.8%
Has a second fruit every day	24.7%	75.3%
Has fresh or cooked vegetables regularly once a day	64.7%	35.3%
Has fresh or cooked vegetables more than once a day	32.7%	67.3%
Consumes fish regularly (at least 2–3/ week)	48.3%	51.7%
Goes >1/ week to a fast food restaurant (hamburger)	9.1%	90.9%
Likes pulses and eats them >1/week	68.6%	31.4%
Consumes pasta or rice almost every day (5 or more for week)	76.9%	23.1%
Has cereals or grains (bread. etc.) for breakfast	38.1%	61.9%
Consumes nuts regularly (at least 2–3/ week)	20.7%	79.3%
Uses olive oil at home	99.6%	0.4%
Skips breakfast	28.8%	71.2%
Has a dairy product for breakfast (yo-ghurt? milk. etc.)	63.3%	36.7%
Has commercially baked goods or pastries for breakfast	28.8%	71.2%
Takes two yoghurts and/or some cheese (40 g) daily	37.9%	62.1%
Takes sweets and candy several times every day	18.1%	81.9%
Kidmed Index		
Poor (≤ 3)	23.5% (119/507)	
Medium (4-7)	53.4% (271/507)	
High (≥ 8)	23.1% (117/507)	

Table 4. estimated result of linear regression

KIMED	beta coefficients	Standard errors	t-value
Age	0.046***	0.016	2.84
Sex	0.549**	0.273	-4.42
No exercise	-0.949***	0.215	2.01
Eat where	1.280**	0.564	2.27
Breakfast	0.872***	0.232	3.75
FruitVeg	1.311***	0.220	5.96
Sweet Snack	-0.547**	0.231	-2.37
constant	2.029***	0.710	2.86
Number of observations	489		
Adjusted R²	0.170		

note: 0.01 - ***; 0.05 - **; 0.1 - *; the standard errors are robust.

Finally, we asked for voluptuary habits such as smoke (classical cigarettes or electronic ones), alcohol intake and coffee use. We obtained that 75.9% of the sample did no smoke (while 1.2 % smoke more 10 cigarettes a day, 0.8% more than 20 a day, 8.1 % 1-2. a day and 3.7% 3-10 a day, 5.5% 5-10 a day and finally 3.9% 3-5 per day) and 14% drunk alcohol. Only 29.6% of the sample did not drink coffee.

Table 4 reports the empirical results of the OLS equation explained above in the method section. All the estimated coefficients of the independent variables had the expected sign and are statistically significant. Age appears to impact KIMED score positively with high statistical significance($p<0.01$). It means that higher adherence to MD is found in older interviewees. More specifically, holding all other variables fixed, as the age of the subject increases by 1 year, the KIDMED score increases by 0.046. Sex, more specifically being female is positively associated with KIMED score with 5 percent statistical significance level($p<0.05$). This confirms females have a higher KIMED score than males. Not practicing physical exercise, on the other hand, has a negative relationship with KIMED score with a high statistical significance ($p<0.01$), that it supports the view that those who do not practice physical exercise end up with lower KIMED score. Eating usually at home is also positively associated with KIMED score with a 5 percent significance level ($p<0.05$). Similarly, always eating fruits and vegetables impacts KIMED score positively with a high significance level ($p<0.01$). On the other hand, usually eating sweets and snacks is negatively related with KIMED score with 1 percent significance level ($p<0.01$). To summarize, our results show that where the individual eats as well as the type of food (fruit, vegetable, sweet or snack) the individual eats are important determinants of MD adherence. We also run further simulation exercises by including other SE factors on our regression model but the results show no statistical significance for the added variables.

Discussion

Our study highlight that the majority of young adults interviewed knew the Mediterranean diet even if only the minority of them knew how to define it. Furthermore, we found for MD poor adherence into 23.5% of the sample, medium into 53.4% while higher only into 23.1% of the interviewees. This was in line with other studies found in literature, although some studies had described a higher prevalence of adherence; i.e. Cavaliere et al. that investigated Italian population by three indexes, the food consumption index, the fat and salt consumption index, and the drink

consumption index found an adherence of 48% for the first index (22)

Our sample was most represented by university students, their parents have a lower-middle level education, with 51.1% of the sample with an income below the average (€ 25,000-30,000 for year).

A possible determining factor of low adherence is socio economic status: in fact, many studies

suggest that low SES could lead to poor dietary habits and overweight/obesity (22,23,24). However, in our study we did not find this aspect probably because MD is based on cereals, fresh fruits and vegetables, pulses and olive oil, products that every family produced or could acquire at relatively low prices in Sicily and, however, as above described they had in 49.9% a middle-high economic income.

Furthermore, we analyzed anthropometric characteristics and we found correlation with adherence to MD. In fact, it is of important to realize that in our sample the more the age increased the more the adherence to traditional diet models increased. This could be related to the today habits of young people that more and more often eat in fast food or in restaurants of other cultures for fashionable motivations (25-26).

Another important regressor studied was gender and particularly in our study we obtained a higher adherence in females according to other studies (27-31). This could be related to a greater inclination of females' university students (that in our survey represent the main part of the sample) to cook than their male counterparts and also, they care more about their physical appearance and health. This is correlated to the fact that university students did not live with their parents but with colleagues or foreign people.

Lower adherence was found among those who do not engage in physical activity, such as described by previous literature (28-32).

The two regressor with higher weight on the adherence to MD were "eat at home "and "eat fruit and vegetables". Maybe they were correlated because those who ate at home had a higher probability to eat vegetables and fruit than those who eat in another place. This was in line with other studies that showed that adolescents who lived or ate with parents had a higher adherence. Previous researches suggest that family structure influences some of the dietary habits of their children (21).

Likewise ate sweet or snack and had ever breakfast in childhood was associated with adherence to Mediterranean diet confirming previous studies that showed the nutrition and weight conditions in children were associated with obesity in adult. In fact, a previous review reported that around 55% of obese children go on to be obese in adolescence, around 80% of obese adolescents will still be obese in adulthood and around 70% will be obese over age 30 (33).

Furthermore, had ever breakfast in childhood and snack/junk food consummation was associated with children obesity together with other factors, such as parental educations (34).

There are several limitations of this study that should be kept in mind. One of these is that the sample of young people was recruited via social networks. Nowadays, most young people use social networks regardless of gender, social class, education, geographical area, etc. but still not everyone might be willing to answer an anonymous survey and we do not know anything about the non-responders. Second, the majority of responders were females. Males were, therefore, underrepresented, possibly leading to underestimation of factors that are more likely to occur in men. However, in student surveys, it is common to have higher female prevalence (35-37).

Another limitation of the study is the use of self-reported data as they could not be independently verified. The results could be affected by several biases (limited by online survey) as for instance selection bias and social desirability bias.

One strength is that it gives information on individual and family lifestyle which are associated with MD, emphasizing the importance of family habits, eating in family and nutrition education of young generations as a priority (38).

The results of this study highlight the importance to implement initiatives to promote healthier diet and lifestyle among people, especially in younger that became who are destined to become the adults and the elderly of tomorrow. We must remember, in fact, that nutrition and physical status (excluding obesity due to secondary causes) were two of the most important determining factors of not communicable diseases, such as cardiovascular diseases, mellitus diabetes etc... (39-42).

In particular, mild obesity was associated with the loss of one in ten and severe obesity the loss of one in four potential disease-free years during middle and later adulthood. This increasing loss of disease-free years as obesity becomes more severe occurred in both sexes, among smokers and non-smokers, the physical active and inactive, and across the socioeconomic hierarchy (43). Finally, other factors could have a role in obesogenic model such as smoking and alcohol intake; luckily in our sample a small percentage of people smoke (about 24%) and drank alcohol (about 14%) but the effectiveness of smoking cessation, physical activity/diet and alcohol reduction interventions together could have a high impact on reducing not communicable diseases. (44-45).

Finally, the effect on adherence to Mediterranean diet of all the variables that we studied is equal to 17%. Perhaps, other factors could contribute to adherence such as social determinants, globalization, etc. as previously described (46). Promotion programs, such as vaccination, water potabilization, prevention of HAIs remain the most important weapons in the hands of public health: it is, therefore, imperative to establish structured forms of primary prevention at territorial level in order to promote a greater adherence to the traditional Mediterranean diet because it is associated with a significant reduction in total mortality as previously described in literature (47-54)

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