

YOUTH, MEDITERRANEAN DIET AND PHYSICAL ACTIVITY: A CROSS SECTIONAL STUDY

GIOVANI, DIETA MEDITERRANEA E ATTIVITÀ FISICA: STUDIO TRASVERSALE

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Abstract

Adherence to the Mediterranean diet (AMD) and a good level of physical activity (LPA) are associated with a better quality of life and lower mortality and morbidity.

The purpose of the study is to evaluate AMD and LPA in relation to socio-economic factors, knowledge and attitudes through an online questionnaire. The KIDMED and IPAQ questionnaires were used to evaluate AMD and LPA.

648 subjects, 70 males and 578 females, aged between 15 and 30 years were recruited. 57.87% of subjects have high AMD, 35.80% medium and 6.33% low; 12.96% of the subjects are inactive, 41.98% sufficiently active, 45.06% active or very active.

Multivariate analysis highlights negative association between AMD and smoking (OR:0.553, $p=0.004$) and alcohol (OR:0.399, $p=0.001$), positive with sport (OR:14.345, $p=0.002$), level of knowledge (OR:1.547, $p=0.001$) and information obtained from healthcare professionals (OR:3.969, $p=0.018$).

For the IPAQ score, there is a negative association with BMI (OR:0.909, $p=0.015$). Instead, the positive association with KIDMED is confirmed (OR:1.195, $p=0.002$).

In conclusion, the results emphasize the importance of knowledge and authority of the source of information, as well as confirming the association between incorrect lifestyles. It is essential to increase the training opportunities for young people through authoritative professional figures.

L'aderenza alla dieta mediterranea (ADM) e un buon livello di attività fisica (LAF) sono associati ad una migliore qualità della vita ed a una minore mortalità e morbilità.

L'obiettivo dello studio è valutare ADM e LAF in relazione a fattori socioeconomici, conoscenze e attitudini tramite un questionario online. I questionari KIDMED e IPAQ sono stati usati per valutare ADM e LAF.

Sono stati reclutati 648 soggetti, 70 maschi e 578 femmine, di età tra 15 e 30 anni. Il 57.87% dei soggetti ha alta ADM, il 35.80% media e il 6.33% bassa; il 12.96% dei soggetti è inattivo, il 41.98% sufficientemente attivo, il 45.06% attivo o molto attivo.

L'analisi multivariata evidenzia associazione negativa tra ADM e fumo (OR:0.553, $p=0.004$) e alcol (OR:0.399, $p=0.001$), positiva con lo sport (OR:14.345, $p=0.002$), il livello di conoscenze (OR:1.547, $p=0.001$) e informazioni

reperite da personale sanitario (OR:3.969, $p=0.018$).

Per l'IPAQ score, vi è un'associazione negativa con il BMI (OR:0.909, $p=0.015$). Si conferma, invece, l'associazione positiva con il KIDMED (OR:1.195, $p=0.002$).

In conclusione, i risultati pongono l'accento sull'importanza della conoscenza e dell'autorità della fonte di informazioni, oltre a confermare cognizioni già note come l'associazione tra stili di vita errati. Risulta fondamentale aumentare le opportunità di formazione per i giovani tramite figure professionali autorevoli in un determinato setting.

Keywords

Mediterranean Diet, KIDMED, IPAQ, knowledge

Dieta Mediterranea, KIDMED, IPAQ, conoscenze

Introduction

Adolescence and young adulthood are important transitional periods, during which long-term health behaviour patterns are formed and established. These life stages are critical as many changes occur during it, such as the development of self-identity, leaving home, and increased autonomy in decision-making. Adolescents and young adults should have good dietary habits with adequate nutrient intakes but they often tend to follow a poor diet, marked by low consumption of fruits and vegetables and high consumption of fast food and sugar-sweetened beverages. This can influence not only their concurrent health but also their future risk for a number of chronic diseases at a later age. The Mediterranean diet pattern, originating from the traditional Mediterranean diet (MD), has been consistently linked to a lower risk for a number of chronic diseases such as cardiovascular disease (Atkins et al., 2014) and cancer (Schwingshackl & Hoffmann, 2014).

1. Background

The MD is characterized by the intake of a great amount of vegetables, fruits, bread and other forms of cereal, rice, beans and nuts. It also includes virgin olive oil as the principal source of fat, moderate amounts of dairy products (basically cheese and yogurt), moderate amounts of fish, red meat in low amounts, and wine consumed in little quantities, normally accompanying meals. The importance of this dietary pattern is related to being a balanced and varied diet and providing most of the recommended macronutrients in their right proportion. It is characterized by a low content of saturated fatty acids and a high content in monounsaturated fatty acids, as well as high amounts of fiber and complex carbohydrates, and important amounts of antioxidants. All of them play an important role in the prevention of cardiovascular and cerebrovascular diseases, diabetes, obesity, neurodegenerative illnesses and cancer, that have been attributed to the MD (Bulló, Lamuela-Raventós, & Salas-Salvadó, 2011).

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.

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 (Galilea-Zabalza et al., 2018). Adherence to the diet has been evaluated in different population groups (adult, child, teenager) (Archerio et al., 2018) (Zurita-Ortega, San Román-Mata, Chacón-Cuberos, Castro-Sánchez, & Muros, 2018) 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 (Tsakiraki, Grammatikopoulou, Stylianou, & Tsigga, 2011).

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 (Grosso et al., 2017) (Belahsen, 2014).

Other associated and influential factors could be considered. One of these is certainly the economic aspect (Albuquerque et al., 2017), 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 (Rao, Afshin, Singh, & Mozaffarian, 2013); furthermore, media influence could be another important factor (Papadaki & Mavrikaki, 2015). Today adolescents and 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.

Many studies have focused on Mediterranean diet, but there has been a lack of studies that have investigated young and young adults and the relationship with knowledge, attitudes, the level of physical activity and other socio-economic and demographic factors.

Thus, this study aimed to analyze the knowledge, the adherence to the Mediterranean diet and the levels of physical activity related to the various factors (socio-economic, demographic and lifestyles) that influence young people living in the Mediterranean zone in Italy.

2. Methods

Study Design

This cross-sectional study was conducted by recruiting 648 subjects between February and April 2021 and involving young people in a totally anonymous way and in compliance with the provisions of Article 5 of European Regulation (EU) 2016/679 on the processing of personal data.

The aforementioned data was collected through the Google Forms tool, this allowed, in the current historical moment, to obtain a sample of fair size, without having to resort to physical travel.

All subjects aged between 12 and 30 years, in compliance with the limits established by the tools used (IPAQ (Sember et al., 2020) and KIDMED (Štefan et al., 2017)), able to understand the questionnaire were considered eligible. No exclusion criteria concerning sex, race or social class were applied.

A sample size calculation was not carried out since it was impossible to predict the origin, age and other characteristics of the population that would have joined the survey. However, the size of our population is comparable to that of studies on the same topic conducted in similar settings (Navarro-González et al., 2014; Pérez-Gallardo et al., 2015; Rodrigo Vega, Ejeda Manzanera, Gonzalez Panero, & Mijancos Gurruchaga, 2014).

Informed consent was obtained from all participants. All methods are in accordance with guidelines and regulations of international relevance.

The questionnaire

The questionnaire, created using the Google forms tool, was distributed electronically, via a link, and saw the participation of the public from Instagram and TikTok social profiles relating to topics such as nutrition and physical activity; the platform of the Pegaso Telematic University; the institutional newsletter of the Pegaso Telematic University; word of mouth.

The survey consists of 63 questions.

Socio-economic factors were recorded through questions on level of education, on the level of education of the parents, on the parent's profession and on the residential area (rural or urban).

Lifestyles, on the other hand, were assessed through questions on the quantity of cigarettes consumed daily, on the frequency of alcohol consumption and on participation or not in physical or sporting activities (competitive or non-competitive).

Theoretical knowledge section is on topics such as macronutrients, correct daily intake of water, effects of alcohol, importance of fruit and vegetables in a healthy diet, importance of a healthy diet for the prevention of various diseases (hypertension, hypercholesterolemia, meta-

bolic syndrome, hyperinsulinemia, heart disease), need to include every single macronutrient in the diet, thus avoiding the total exclusion of sweets or fats, importance of physical activity as a form of prevention and / or treatment of pathologies and the influence of physical activity on mood and self-esteem. A point was assigned for each correct answer and a score was created by adding the partial scores.

Attitudes were recorded through questions on the level of physical activity habitually performed, motivating the answer in the event that no activity was carried out, on the interest in deepening knowledge in the field of healthy lifestyles and on the personal perception of the physical activity and proper nutrition have on the state of physical health.

Adherence to the Mediterranean diet

Adherence to the Mediterranean diet was assessed through the KIDMED. The KIDMED test (Mediterranean Diet Quality Index for children and teenagers) is a tool to evaluate the adherence to the MD for children and youths. It was developed and validated by Serra-Majem et al. (Serra-Majem, García-Closas, Ribas, Pérez-Rodrigo, & Aranceta, 2001). The index ranges from 0 to 12 and is based on a 16-questions test that can be self-administered or conducted by interview (pediatrician, dietitian, etc.). Questions denoting a negative connotation with respect to the MD are assigned a value of -1, and those with a positive aspect +1. The sums of the values from the administered test are classified into three levels and ranks adherence to the Mediterranean diet as high (more than 7 points), medium (between 4 and 7 points) or low (below 4 points) (Štefan et al., 2017).

Physical activity level

The level of physical activity carried out by the sample was assessed through the IPAQ questionnaire, in its short version. The short form of IPAQ (IPAQ-SF) comprises nine items. IPAQ-SF is an open-ended questionnaire, last 7-days recall, available in English and many other languages, covering four domains of PA (leisure time PA, domestic activities, work-related PA, transport-related PA) in each of four types of PA (sitting, walking, moderate-intensity activities and vigorous-intensity activities). The outcome of the IPAQ-SF is MET min/week and PA category score (Cleland, Ferguson, Ellis, & Hunter, 2018).

Statistical analysis

The normal distribution of the population was assessed by the Shapiro-Wilk test, resulting not normal. Values of $p < 0.05$ were considered statistically significant. The descriptive statistics were performed using the Chi Square test, Fisher's exact test and Kruskal-Wallis test, as appropriate. For the multivariate analysis, a knowledge score was created and the KIDMED and IPAQ scores were used as continuous variables. A multivariate logistic regression model was used to evaluate the association between the variables. The selected outcome variables are: knowledge, KIDMED and IPAQ. The models were adjusted for gender, age, BMI, smoking, dwelling, educational qualification, sport, sport mode (agonist, non-competitive), parental qualification, alcohol, source of information, need for additional information and other outcome variables.

The analyzes were carried out with the STATA v. 15.

3. Results

A total of 648 subjects were recruited, 70 males and 578 females (10.80% vs 89.20%), aged between 15 and 30 years. The median age is 19, the IQR (interquartile range) is 17-22.

According to KIDMED, 57.87% of subjects have a high AMD, 35.80% a medium adherence and 6.33% low.

As for LPA measured by the IPAQ score, 12.96% of subjects are inactive, 41.98% sufficiently active, 45.06% active or very active.

Stratifying the population by category of AMD, the variables associated, in a statistically

significant way, with the KIDMED score are smoking, sport, IPAQ score, alcohol, source of information.

Specifically, heavy smokers and heavy drinkers are less adherent to the Mediterranean diet (54.49% vs 42.11%, $p = 0.035$ and 56.16% vs 0%, $p = 0.003$, respectively), while those who play sports (63.86% vs 39.75%, $p < 0.000$) and, in particular, non-competitive sportsmen (57.02% vs 65.95%, $p < 0.000$) and those who are classified as “active” according to the IPAQ score (33.33% vs 65.41%, $p < 0.000$) are highly adherent to the MD.

Finally, those who obtain information from healthcare personnel (69.32% vs 1.59%, $p < 0.000$) or from the coach (66.67% vs 3.92%, $p = 0.006$), obtain higher scores in the KIDMED score.

No difference between the three groups (low, medium and high AMD) is found for the score that evaluates the knowledge and the remaining variables analyzed.

Stratifying the same variables by LPA, males are more active than females (65.71% vs 42.56%, $p = 0.001$). There is also a statistically significant association with the BMI class. In particular, underweight or normal weight subjects tend to be more active than frankly obese subjects (61.54% and 44.37% vs 32.00%, $p = 0.001$). Subjects who smoke more than 10 cigarettes per day are on average less active than non-smokers (21.05% vs 43.25%, $p = 0.002$).

Those who play sports and, in particular, competitive athletes are more frequently active (51.95% vs 24.22%, $p < 0.000$; 67.54% vs 47.18%, $p < 0.000$).

Furthermore, an association was found between AMD and the LPA since subjects with high adherence are also more frequently active (50.93% vs 41.46%, $p < 0.000$).

Finally, those who find information from the coach are more active (56.86% vs 5.39%, $p < 0.000$).

As for attitudes, most of the subjects (63.89%) believe that proper nutrition and habitual physical activity can have positive repercussions on health and the development of pathologies; 68.98% thought it useful for correct lifestyles to be included in teaching at school; 69.60% would like to know more about the influence that food and physical activity have on life, health and the future.

The multivariate analysis confirms the negative association between AMD and smoking (OR: 0.593 [95% CI 0.399-0.881], $p = 0.010$) and alcohol (OR: 0.399 [95% CI 0.228 -0.698], $p = 0.001$).

Furthermore, subjects who play sports are 14 times more likely to be highly adherent to the MD (OR: 14.345 [95% CI 2.664-77.249], $p = 0.002$). Finally, there is a positive association between high AMD, level of knowledge (OR: 1.547 [95% CI 1.204-1.986], $p = 0.001$) and information obtained from health personnel (OR: 3.969 [95% CI 1.261 -12.495], $p = 0.018$).

The multivariate logistic regression analysis for the evaluation of associations with the IPAQ score.

There is a negative association with BMI (OR: 0.909 [95% CI 0.842-0.982], $p = 0.015$). In particular, for every one point increase in BMI, there is about a once less chance of being active.

On the other hand, the positive association with the KIDMED score is confirmed (OR: 1.195 [95% CI 1.068-1.337], $p = 0.002$): for each increase of one point in the KIDMED score there is a of one time higher probability of being active.

4. Discussion

In the present study, 57.87% of subjects, according to KIDMED, have a high adherence to the Mediterranean diet, while, as regards physical activity measured by the IPAQ score, 45.06% of the young people interviewed were active or very active.

There is also a negative association between adherence to the Mediterranean diet and abuse of smoking and alcohol, while sport, good knowledge and information obtained from health sources seem to increase the probability of achieving high scores in the KIDMED score.

These values seem to be positively associated with physical activity while the negative association between BMI and IPAQ is confirmed.

Cabrera et al. report a prevalence of high and low adherence to the Mediterranean diet very different from what was found in this study (García Cabrera et al., 2015). Specifically, analyzing eighteen cross-sectional studies with a total sample of 24067 people, the overall percentage of high adherence to the Mediterranean diet was 10% (95% CI 0.07-0.13), while the low adherence was 21% (95% CI 0.14-0.27) (García Cabrera et al., 2015). It is important to emphasize that the sample came from countries in the Mediterranean area but none from Italy.

However, in a study by Hadjimbei et al. conducted among university students on the island of Cyprus, the prevalences are slightly more similar to what is reported in this study with 26.9% of students classified as highly adherent and 21.8% as poorly adhering to the Mediterranean diet (Hadjimbei, Botsaris, Gekas, & Panayiotou, 2016).

Fiore et al., in a study conducted on medical university students, reported that 20.8% of the subjects were in the “low adherence” category, 56.5% in “medium adherence” and 22.7% in “high adherence” (Fiore et al., 2015).

According to Bibiloni et al., about 30% of the adolescents showed high adherence to the Mediterranean diet and 15.7% showed poor adherence (Bibiloni, Pons, & Tur, 2016).

Rosi et al. report the values relating to some Italian populations in which, however, most of the subjects settle in the “average adherent to the Mediterranean diet” range (Rosi, Paoletta, Biasini, Scazzina, & Adolescents, 2019).

Regarding physical activity, Ahmad et al. report that 61.1% of respondents were classified as active (Ahmad et al., 2018).

In our population, subjects seem to be much more oriented towards healthy lifestyles. The authors believe they can explain these results since the recruitment and sponsorship of the questionnaire took place mainly through Instagram and TikTok channels that deal with nutrition and physical activity.

However, it must be borne in mind that the recruitment took place during the lockdown period due to the COVID-19 pandemic. This timing may have influenced the parameters of the IPAQ score.

To the best of our knowledge, this is one of the few studies that investigates the relationships between socio-demographic factors, knowledge, adherence to the Mediterranean diet and physical activity.

Bibiloni et al., in a 2015 study conducted on adolescents from the Balearic Islands reported that adherence to the Mediterranean diet appears to be greater in males and correlated with the level of parental education, sedentary lifestyle, physical activity and have breakfast every day (Bibiloni et al., 2016).

In a study by Grao-Cruces et al, however, 30.9% of adolescents reported an optimal quality diet, with a higher percentage in rural areas ($p < 0.05$). Adherence was lower in older adolescents ($p < 0.001$), it was not different between genders or according to anthropometric variables. Adolescents who were more satisfied with their lives ($p < 0.001$), more active ($p < 0.001$), more scholars ($p < 0.001$) and less sedentary ($p < 0.001$) showed greater adherence to the Mediterranean diet model (Grao-Cruces et al., 2013).

The results of our study partly confirm what is already known but introduce an important novelty which is identified in the fundamental importance of the variable knowledge.

Fauci et al. investigated the knowledge of the Mediterranean diet without, however, relating this variable to adherence to the Mediterranean diet itself (La Fauci et al., 2020).

The authors believe that the main strength of this study is to introduce the variable “knowledge” as a score that can be related to the remaining outcome variables. Knowledge, in fact, is strongly correlated with the KIDMED score where, on the other hand, other historically associated socio-demographic parameters, such as the level of education of the parents, residing in rural areas, are not associated.

The second strong point, moreover, is the use of a validated tool for the definition of physical activity. This makes it possible to make the evaluation more objective and to include in a single score a plurality of variables that have so far been analyzed in the existing literature

(hours on the computer, hours sitting, hours of walking, etc.).

The study, however, also has weaknesses. First of all, it was conducted during the lockdown and this may have influenced the evaluation of the IPAQ score. Furthermore, as already mentioned, the selection of the population through social channels dealing with healthy and fitness issues, may have directed the results of the study. However, we believe that the statistical analysis and rigorous survey methodology used can mitigate the effects of these biases.

Conclusions

In conclusion, the results of this study are extremely encouraging since they emphasize the importance of knowledge and authority of the source of information, as well as confirming the association between incorrect lifestyles.

Therefore, it is essential to increase the intellectual training opportunities for young people through authoritative professional figures. Healthcare professionals, including doctors, dietitians and pharmacists, should combine their experience with that of trainers and athletic trainers in order to provide more comprehensive guidance to young people and direct them towards healthier lifestyles.

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