International Journal of Nutrition Sciences

Journal Home Page: ijns.sums.ac.ir

ORIGINAL ARTICLE

The Effect of Parental Education on Mediterranean Diet Adherence among School Children in Shiraz, Southern Iran

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ARTICLE INFO

Keywords:
Adherence
Mediterranean diet
Parental education
Children
Iran

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Received: August 5, 2020
Revised: November 19, 2020
Accepted: December 4, 2020

ABSTRACT

Background: Recent changes in the actual Mediterranean diet include a reduced energy intake and a higher consumption of foods with low nutrient density. The aim of this study was to evaluate the effect of parental education on Mediterranean diet adherence among school children in Shiraz, Southern Iran.

Methods: In a cross-sectional study, 150 male 12-15 years school children in Shiraz, southern Iran were enrolled. Children and their parents completed standardized questionnaires, which evaluated parents' educational level and dietary habits. Anthropometric indices including weight, height, waist circumference and hip circumference were measured. Adherence to the Mediterranean diet was assessed. Data from 86 items food frequency questionnaire were used to calculate the score.

Results: Totally, 12.3% of children had high adherence to the Mediterranean diet. Logistic regression showed that adolescents' adherence to the Mediterranean diet had a significant relationship with the level of parent's education ($p<0.03$ among fathers and $p<0.01$ among mothers).

Conclusion: It was shown that adolescents' compliance with the Mediterranean diet had a significant relationship with the parents' educational level. The higher the level of parents' education, the more association with Mediterranean diet compliance was visible.

Please cite this article as: Kavian Z, Shamekhi Z, Abbasi E. The Effect of Parental Education on Mediterranean Diet Adherence among School Children in Shiraz, Southern Iran. Int J Nutr Sci. 2021;6(1):32-38. doi: 10.30476/IJNS.2021.87746.1108.

Introduction

The term "Mediterranean Diet" (MD) is widely used to describe the traditional eating habits of people around the Mediterranean Sea, especially in areas where olive trees grow. MD is defined by the common consumption of fruits, vegetables, whole grains, legumes, nuts and seeds, with olive oil as the main source of added fat. Other characteristics of MD include regular but moderate consumption of dairy products (milk, yogurt and cheese), low to moderate consumption of fish and poultry, little red meat and moderate drinking of wine (at meals) (1). The MD has been presented as one of the healthiest dietary patterns for prevention of degenerative diseases (2). Current consensus of the Mediterranean diet has been presented in Figure 1 (3).

So diet is an important aspect of one's life course. Urbanization, modernization, and technological

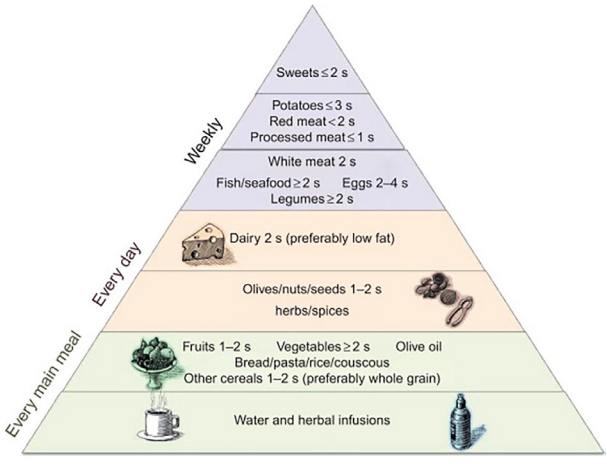

Figure 1: Current consensus of the Mediterranean diet adapted from Bach-Faig *et al.*'s study (3).

development, along with simultaneous changes in diet, physical activity, and body composition have led to rapid demographic and epidemiological changes in most countries in the Mediterranean region (4). These changes are the basis for the multidimensional phenomena of nutrition transition, characterized by the increase in energy intake, fats (especially of animal origin), sugars, and salty foods (5). Therefore, eating patterns can have a significant impact on healthy growth and development in children and adults (5).

Adolescence is a critical and complex phase in development of the individual's physical and emotional behaviors (6). Dietary and health behaviors and food preferences are usually developed during early childhood and that are continued till adulthood. Overeating and poor food choices are associated with a higher risk of some typical adult diseases including obesity (7). The prevalence of childhood obesity has increased dramatically over the past few decades in the United States and other countries, and obesity during adolescence is associated with significant medical complications (8).

Minimal adherence to MD is seen in children and adolescents, so there is an urgent need for a nutritional educational program to develop healthy eating habits at an early age that will have beneficial effects on adulthood (9). Epidemiological studies indicated that individuals would benefit from taking MD elements (10). Food habits are influenced by different factors (11), such as lifestyle that includes family meals, parental occupational status, maternal educational level, cultural and/or religious habits that can affect adolescents eating habits (12).

Obviously, a child's diet is largely affected by their parents who provide both the genes and the eating environments. In particular, mother's educational level is one of the key factors determining the quality of the child's diet. As the lower educational status is, it is accompanied by a worse dietary quality. Parents, especially mothers were shown to play an important role in education of both eating habits and food choices; this may act through their personal preferences, attitudes to food and their knowledge and understanding of the benefits of a healthy diet (4). Few studies have assessed the role of family habits and knowledge in the MD adherence. In addition, there is lack of evidence regarding the potential effect of parents' educational level on MD adherence among children especially in Iran.

Materials and Methods

A cross-sectional survey was performed among 150 male 12-15 years old school children in Shiraz, southern Iran. Sampling was done randomly based on a convenient method. The data were collected by a trained nutritionist through a questionnaire and an interview method. The sample size was calculated by a statistician with 95% confidence and 80% power. Mohammad Rasoolullah Boys High School (PBUH) in District 1 of Shiraz and Shahid Zolanvar Boys High School in District 2 of Shiraz were randomly enrolled. Totally 75 subjects were randomly selected from each of these schools. After completing the administrative procedure and obtaining permission from the educational department of the district, the study and data collection were started.

A permission was also obtained from the principal of each school. In addition, parents provided written consent for each student participating in the survey too. A validated 86-item food frequency questionnaire (FFQ) was used to assess usual dietary intake of the participants over the past year. United States Department of Agriculture (USDA) serving-sizes or household scales were used to measure each food item. The FFQ was filled and modified according to the Iranian Food Composition Table. FFQs were scored according to an 11-item validated Mediterranean diet scoring system (13). Each item was scored from 0 to 4, according to the protocol. Over- or under-reporters were determined as having standard deviation (SD) of the mean energy intake. Results of the quantitative variables were reported as mean±SD, and categorical variables were presented as percentage.

Participants were questioned about frequency of food intake for different food materials during the last month and were asked to report the frequency of their intake in terms of day, week or month. A global Mediterranean score based on the Mediterranean pyramid components was derived from the FFQ (Figure 1) (3). A partial score varying from 0 to 4 was attributed to each of the 11 components of the

pyramid. Components of the Mediterranean pyramid were grains, fruits, vegetables, legumes, nuts and seeds, olive oil, dairy products, fish, poultry, eggs, sweets and red meat/processed meat.

The total dietary score could therefore vary between 0 and 44 points (Appendix A). A score of 44 implied that an individual's food pattern would be fully compatible with the typical MD. For food groups at the bottom of the pyramid (grains, fruits, vegetables, legumes, nuts, seeds, olive oil, and fish), a high score reflected a high consumption. Inversely for food groups at the top of the pyramid (red meat/processed meat, sweets and eggs), a higher score was attributed a lower frequency of intake. For dairy products, an intake of 2-3 portions per day was considered as a typical Mediterranean intake and 4 points were allowed for such an intake. For poultry, 4 points were permitted, when the mean intake was 3 portions per week.

A score indicating the degree of adherence to the MD was calculated for each of the participants. The total dietary score could therefore vary between 0 and 44 points (Table 1). Patients were classified into two groups based on MD scores median: 21 or less than 21 (as low adherent) and 22 or over (as high adherent). Anthropometric measurements, including weight, height, and waist-circumference (WC) and hip circumference (HC) were conducted by a trained dietician. Weight was measured with minimal cloth without shoes using a digital scale and recorded to the nearest 100 g (Seca, Germany).

Height was measured using a tape meter without shoes. Body mass index (BMI) was calculated as weight in kg divided by squared height in meter (kg/m^2). WC was determined at the narrow middle part between the lowest rib and the iliac crest over light clothing, using a flexible tape measure, without any pressure to body surface and was recorded to the nearest 0.1 cm. Waist-hip ratio (WHR) was calculated by dividing waist in meter by hip circumference in meter.

Parental education was also collected through a questionnaire and was divided into 6 categories (Under the diploma, Diploma, Assistant, Bachelor, Masters, and Doctorate). Variables were compared using Chi-Squared test and Mann-Whitney test for analyzing quantitative independent variables. All statistical analyses were performed by SPSS software (version 24.0; SPSS Inc., Chicago, IL, USA). Descriptive statistics were used for participants' characteristics across the scores of MD adherence. In binary logistic regression, MD scores were defined as dependent variable. A p value ≤0.05 was considered statistically significant.

Results

Subjects had a mean age of 13.61±0.81 years, mean waist circumference of 77.88±13.71 cm, mean hip circumference of 86.33±15.46 cm and mean Mediterranean score of 20.70±4.33. Among the participants, 55.4% (n=82) had low and 44.6% (n=66) had high adherence to MD. The educational levels of mothers participated in the study were 10.8% (n=16) below the diploma,

Table 1: The Mediterranean score.

Score/ Variable	0	1	2	3	4
Whole grain products	<1 portion/day	1-2 portions/day	3-4 portions/day	5-6 portions/day	≥7 portions/day
Vegetable	<1 portion/day	1 portion/day	2 portion/day	3 portion/day	≥4 portion/day
Fruit	<1 portion/day	1 portion/day	2 portion/day	3 portion/day	≥4 portion/day
Legumes, nuts and seed	<0.5 portion/day	0.5 portion/day	1 portion/day	2 portions/day	>2 portions/day
Olive oil, olives and margarine made of olive oil	<1 time/day	1 time/day	2 times/day	3 times/day	4 times/day
Milk and dairy products	<1 portion/day or >4 portions/day	4 portions/day		1 portion/day	2-3 portions/day
Fish and sea food (other than breaded)	Never	<1 portion/week	1 portion/week	1 portion/week	3 portions/week
Poultry (other than breaded)	Never	<1 portion/week	1 portion/week or ≥4 portions/week	2 portions/week	3 portions/week
Eggs	≥7/week		5-6/week		0-4/week
Sweets	≥7 times/week	5-6 times/week	3-4 times/week	1-2 times/week	<1 time/week
Red meat/ processed meat	≥7 portions/week	5-6 portions/ week	3-4 portions/ week	1-2 portions/week	<1 portion/week

Table 2: Comparison of anthropometric indices, and Mediterranean score between the two groups)low and high adherence to Mediterranean diet).

Variable	Mediterranean diet score		*p* value
	Score 0-21	Score 22-41	
	Low adherence to MD (n=82)	High adherence to MD (n=66)	
Mediterranean score	17.59 (2.75)	24 (2.41)	0.20
Weight (kg)	57.81 (14.78)	54.69 (14.06)	0.20
Height (cm)	164.37 (10.53)	163.28 (9.88)	0.91
BMI (kg/m^2)	21.25 (4.5)	20.29 (3.7)	0.24
WHR	0.90 (0.13)	0.92 (0.17)	0.98
Hip (cm)	87.52 (16.44)	84.86 (14.13)	0.37
Waist (cm)	78.45 (14.30)	77.18 (13.01)	0.31

BMI: Body Mass Index, WHR: Waist to Hip Ratio.

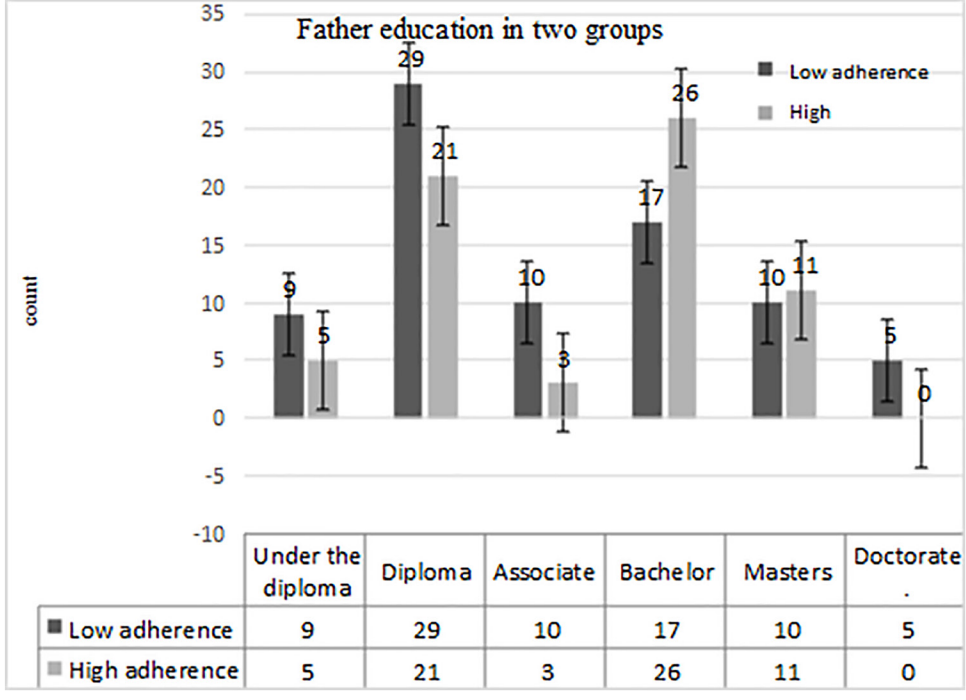

Figure 2: Comparison of the relationship between father's educational level between the two groups of low and high adherence.

51.4% (n=76) diploma, 6.1% (n=9) associate, 29.1% (n=43) bachelor, 2.7% (n=4) masters, and 0% (n=0) doctorate degrees. The educational levels of fathers participated in the study were 9.5% (n=14) below the diploma, 33.8% (n=50) diploma, 8.8% (n=13) associate, 29.1% (n=43) bachelor, 14.2% (n=21) masters, and3.4% (n=5) doctorate degrees. Logistic regression showed that adolescents' adherence to the MD had a significant relationship with the level of parent's education (p<0.03 in fathers and p<0.01 in mothers).

Table 2 illustrates the comparison of anthropometric indices, and Mediterranean score between the two groups)low adherence and high adherence to Mediterranean diet). Figure 2 shows the comparison of the relationship between father's educational level between the two groups of low and high adherence. It was demonstrated when the father's educational level increased, the number of people who had high adherence to the MD was more than the number of people who had low adherence to the MD. Figure 3 reveals the comparison of the relationship between mothers' education level between the two groups of low and high adherence. It was shown when the maternal education level increased, the number of people who had high adherence to the MD was more than the number of people with low adherence to the MD.

Discussion

The aim of this study was to evaluate the relationship between adherence to MD and parents' educational status. Approximately, 44.6% of the participants had followed MD patterns according to the Mediterranean score. Several studies have been conducted on this subject in Greece (11, 12, 14-16),

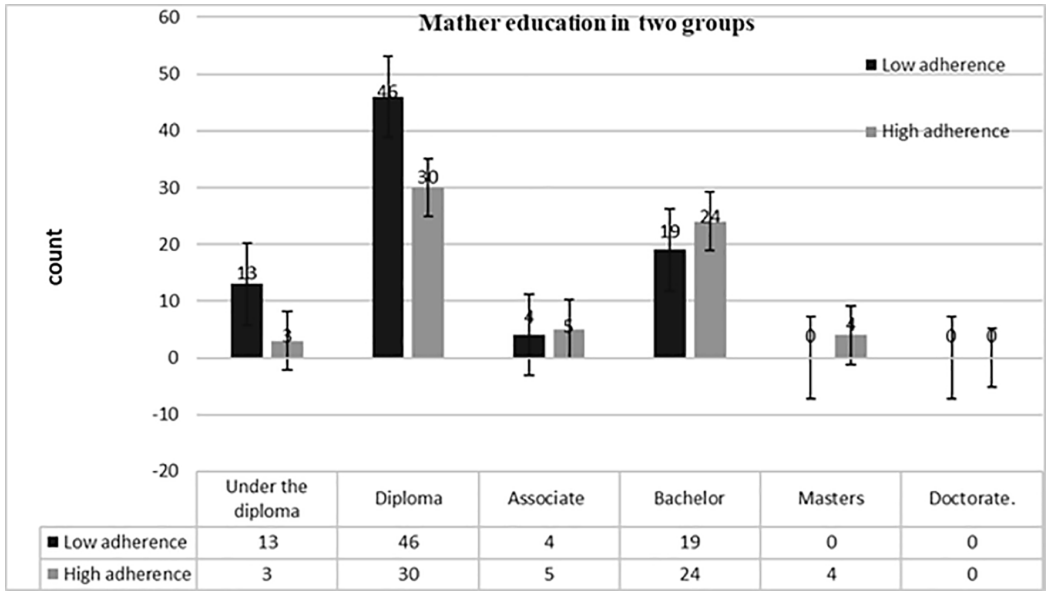

Figure 3: Comparison of the relationship between mothers' education level between the two groups of low adherence and high adherence.

Spain (10, 17-19), and Cyprus (20), while ours was the first study analyzing MD adherence in Iranian population. It was shown that following adherence to MD pattern global cardiovascular mortality reduced, as well as a decline in the risk of diabetes, tumors and neurodegenerative diseases, such as Alzheimer's and Parkinson's (21).

Adolescence is a critical and complex stage in a person's physical and emotional development, and diet and nutrition are one of the most important aspects of his life. Improper eating habits formed during childhood and adolescence can potentially increase the risk of some common adult diseases. Currently, a high percentage of obese children and adolescents suffer from metabolic complications such as insulin resistance, type 2 diabetes, dyslipidemia, and hepatic steatosis. This is also called metabolic syndrome, which only existed in adults until a decade ago (7).

In our study, significant association was seen between parent's education and adherence to MD patterns. In line with the result of our survey, previous studies have shown that lower levels of parental education have been associated with lower quality of diets (8, 11), while higher levels of parental education have been associated with greater adherence to the MD (19). In one study, maternal educational level was demonstrated to be associated with quality of diet and MD adherence (17). Another study indicated that parental educational level played an important role in the beneficial effect of MD on children's obesity status (22). Also, it was shown that mother's educational level had an important role for MD adherence (23). Additionally when the factors affecting quality and adherence to the MD in Greek were investigated, it was noticed that the adolescents MD adherence was correlated with maternal educational level (24).

The current study had some limitations. First, a small number of schools were enrolled, so the sample size was limited. Second, our sample was only male students. Third, only the level of parental education was assessed as a factor influencing the degree of MD adherence. These results are justified by the fact when parents were more aware of the importance of healthy eating, they were less likely allowed the influence of unhealthy external stimuli during childhood and adolescence. Between the ages of 8 and 12 years old, eating behaviors are usually still regulated by parents, especially by parents who are more focused on their child's education. More informed parents tended to have better dietary quality and frequent family meals, where healthy eating behaviors were usually promoted and external maladaptive eating behaviors could be addressed. This overview of studies conducted on children and adolescents showed that parental educational level, especially maternal education in associate degree level revealed a strong adherence to the MD patterns (17).

Conclusion

This study showed that adolescents' compliance with the MD illustrated a significant relationship with the level of education of parents, while the higher level of parent's education was, it was more associated with the MD compliance.

Acknowledgement

This study was not supported by any profit or

nonprofit organization.

Conflict of Interest

None declared.

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