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Mediterranean diet, academic performance and physical activity level in scholars

Adherencia a la dieta mediterránea, el rendimiento académico y el nivel de actividad física en edad escolar

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Abstract

The aims of the study were to describe and establish the possible relationships between adherence to the mediterranean diet, academic performance, and level of physical activity in Primary Education students from a center in the province of Seville. A cross-observational cross-sectional design was used. The sample consisted of 50 subjects (26 boys and 24 girls) aged between 9 and 10 years. For data collection, a self-register questionnaire, Kidmed test, IPAQ-A questionnaire and the grades of the common subjects were used. The results show that 50% of the subjects applied adherence to the optimal mediterranean diet, compared to 10% of subjects who applied a low adherence. On the other hand, 40% of the subjects showed the need to improve the dietary pattern to adapt to the mediterranean model. Regarding the level of physical activity, 60% of subjects were inactive or very few active, compared to 25% who were very active. Finally, an association between adherence to the mediterranean diet and the grades obtained in the different subjects (Contingency Coefficient = .442, $p < 0.05$), Mathematics (Contingency Coefficient = .484, $p < 0.05$) and Social Sciences (Contingency Coefficient = .490, $p < 0.05$)]. In conclusion, I can say that 50% of the subjects should improve their dietary pattern, that only 14% do the recommended physical activity and that there was an association between the addition to the mediterranean diet and the grades obtained in Artistic Education, Mathematics and Social Sciences.

Keywords

Mediterranean diet; physical activity; academic performance; scholars.

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Resumen

El objetivo del estudio fue describir y establecer las posibles relaciones entre la adherencia a la dieta mediterránea, rendimiento académico y nivel de actividad física en alumnos de Educación Primaria pertenecientes a un centro de la provincia de Sevilla. Se usó un diseño de corte transversal-observacional. La muestra estuvo compuesta por 50 sujetos (26 niños y 24 niñas) con edades comprendidas entre los 9 y 10 años. Para la recogida de datos se administraron un cuestionario autorregistro, test Kidmed, cuestionario IPAQ-A y las calificaciones de las asignaturas comunes. Los resultados muestran que el 50% de los sujetos tuvieron una adherencia a la dieta mediterránea óptima, frente al 10% de los sujetos que tuvieron una adherencia baja. Por otro lado, el 40% de los sujetos reflejó la necesidad de mejorar el patrón alimentario para adecuarlo al modelo mediterráneo. Respecto al nivel de actividad física, el 60% de los sujetos eran inactivos o muy pocos activos, frente al 25% que fueron muy activos. Por último, se halló una asociación entre la adherencia a la dieta mediterránea y las calificaciones obtenidas en las diferentes asignaturas [Educación Artística (Coeficiente contingencia= ,442, p<0,05), Matemáticas (Coeficiente contingencia= ,484, p<0,05) y Ciencias Sociales (Coeficiente contingencia= ,490, p<0,05)]. En conclusión, podemos decir que el 50% de los sujetos tiene que mejorar su patrón alimentario, que tan solo el 14% realiza la actividad física recomendada y que existió asociación entre la adherencia a la dieta mediterránea y las calificaciones obtenidas en Educación Artística, Matemáticas y Ciencias Sociales.

Palabras clave

Dieta mediterránea; actividad física; rendimiento académico; escolares.

Introduction

Currently, the increase in overweight and childhood obesity have been dramatic (AECOSAN, 2016, WHO, 2014), and is associated with a wide range of health complications, as well as an increased risk of cardiovascular disease and premature death in the adulthood (Estruch et al., 2013; Palmer et al., 2009). The reduction in the levels of practice of physical activity and the not following of the mediterranean diet are two of the fundamental factors that are causing this drastic increase (Owen, Sparling, Healy, Dunstan, & Matthews, 2010, Tognon et al., 2014). Moreover, childhood is considered a key period for the consolidation of personality, as well as the acquisition of an adequate lifestyle (Macias, Gordillo, & Camacho, 2012). It is an evidence that the acquisition of life patterns during childhood will last throughout life (Macias et al., 2012). On the other hand, there are several studies that have been developed about the

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impact on health and quality of life of health behaviors in this age group (Costarelli, Koretsi, & Georgitsogianni, 2013; Molinero et al., 2010).

Some studies highlight the progressive abandonment of the Mediterranean diet, which is more pronounced in urbanized areas compared to rural populations (Farajian et al., 2011; Lazarou & Kalavana, 2009), although at present there are no definitive conclusions about it (Karlén, Lowert, Chatziarsenis, Fälth-Magnusson, & Faresjö, nd; Serra-Majem, Ribas, et al., 2004).

In general, mediterranean diet includes not only a known nutritional pattern, also a social one, as well as gastronomic aspects that characterize a certain lifestyle. Mediterranean diet combines foods from local agriculture, recipes and traditional cooking methods of each geographical area, along with the practice of regular physical activity (Donini, Serra-Majem, Bulló, Gil, & Salas-Salvadó, 2015). This diet is characterized by being poor in saturated fats and rich in antioxidants, based mainly on the consumption of vegetables, fruits, legumes, fish, nuts and olive oil (Castro-Quezada, Román-Viñas, & Serra-Majem, 2014). Several studies show how this diet model plays a preventive role in the onset of cardiovascular, metabolic and oncological diseases, among others (Bulló, Lamuela-Raventós, & Salas-Salvadó, 2011; Nadtochiy & Redman, 2011).

As a result, in recent years there has been an increase the number of studies focused on the influence of the Mediterranean diet in this population. In addition, there is great interest in determining the relationship of the dietary habits of this population with other components of their lifestyle such as physical activity. In general, it has been shown that young people with a high adherence to this diet have greater physical benefits and show higher levels of quality of life related to health (Costarelli et al., 2013).

On the other hand, another factor that marks the childhood of school children and their relationship with the environment, not only in schools but in the family, is the academic performance obtained during the schooling stage. Thus, Álvarez-Bueno et al., (2017) show that physical activity, specifically Physical Education, improves classroom behavior and benefits several aspects of academic performance, especially skills related to mathematics and reading.

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Therefore, the aim of the study was to describe and establish the possible relationships between adherence to the Mediterranean diet, academic performance and physical activity level in primary school students belonging to a center in the province of Seville.

Material and method

Design and participants

In the present study a cross-sectional observational design was used. The sample consisted of 50 subjects (26 boys and 24 girls) aged between 9 and 10 years, belonging to a Primary Education Center in the province of Seville. The inclusion criterion was: belong to 3º of Primary Education. The exclusion criterion was established: students who had a cognitive problem that accepts the correct understanding of the questionnaires.

For their development the father, mother or legal guardian were informed of the purpose of the study both in written and oral form and signed an informed consent form. In addition, this research was carried out under the ethical considerations for the study with humans included in the Declaration of Helsinki (2008).

Measures and instruments

The different instruments used to collect information are described below:

- Self-registration: through this first part sociodemographic variable (age, gender ...) were collected.

- Adherence to the mediterranean diet: to assess adherence to the mediterranean diet, the KIDMED test (Serra-Majem, Ribas, et al., 2004) was used, which consists of 16 questions which must be answered affirmatively or negatively (if /do not). The affirmative answers in the 12 questions that represent a positive aspect in relation to the mediterranean diet add 1 point, while the affirmative answers in the questions (are 4) that represent a negative connotation subtract a point. The total score gives rise to a KIDMED index, which allows classifying the degree of adherence to the mediterranean diet in three groups:

  • From 0 to 3: very low-quality diet (adherence to the mediterranean diet low).

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• From 4 to 7: need for improvement in the food pattern to adapt it to the mediterranean model (medium adherence).

• From 8 to 12: optimal mediterranean diet (high adherence).

- Academic performance: to know the academic performance of the students, the grades of the common subjects were collected (Language, Mathematics, Physical Education, Art Education, English, Social Sciences and Natural Sciences). The academic assessment was codified from 1 to 5 where 5 is the highest grade (outstanding) and 1 is the minimum grade (insufficient).

- Physical activity: to assess physical activity, the IPAQ-A questionnaire, Physical Activity Questionnaire for Adolescents (Martínez-Gómez et al., 2009) was used. The IPAQ-A is a simple questionnaire that assesses the physical activity that the child performed in the last seven days. It consists of four groups or parts that ask the physical activity that the participants did during the time they were in school, the physical activity they did at home or around it as housework or tasks in the garden, physical activity what they did to go and return from somewhere and the physical activity they did during their free time (playing, doing sports, dancing, training and / or competing). From this questionnaire four levels of physical activity were established:

• Level 1 (inactive): he drives to school and hardly does physical education or active leisure.

• Level 2 (not very active): he goes on foot or by bike to school and next to the Physical Education classes, his activity does not reach an hour and his leisure is of light intensity.

• Level 3 (moderately active): goes on foot or by bike to school, does very active physical activity for at least one hour and his leisure, active and periodic of moderate intensity.

• Level 4 (very active): is one who goes on foot or by bike to school, conducts Physical Education classes and performs vigorous active sports.

Process

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In the first place, the project was presented to the director of the Center. Once the permit was granted, an informative circular was passed to the legal tutors of the subjects and the respective signed consents were collected. Then, the different questionnaires were handed out during the tutoring schedule. On a first day of tutoring, the self-registration questionnaire and the KIDMED test were self-administered, and on a second day the IPAQ-A questionnaire was self-administered. Finally, the grades of the common subjects were reported by each of the tutors of each group.

Statistical analysis

Descriptive statistics were presented as mean and standard deviation for continuous variables and in terms of frequency and percentages for categorical variables. The level of association was established by the contingency coefficient. For all tests, the level of significance was set at $p < 0.05$. For the processing and analysis of the data, the statistical package IBM-SPSS version 22.0 was used. (SPSS, Inc., Chicago, IL). The figures were made using the Graphpad version 7.0 for Windows package.

Results

The results found after the application of various statistical tests are shown below.

Figure 1 shows the degree of adherence to the mediterranean diet.

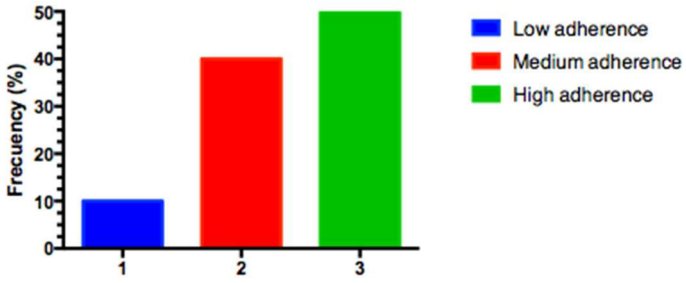

Figure 1. Degree of adherence to the Mediterranean diet (N = 50).

It is observed that 50% of the subjects had an adherence to the optimal mediterranean diet, compared to 10% of the subjects who had a low adherence. On the other hand, 40% of the subjects reflected the need to improve the food pattern to adapt it to the mediterranean model.

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Table 1 shows the distribution according to the subjects and the grade obtained.

Table 1. Distribution of the sample by subject and grade obtained (N=50) *

	F	E-D	C	B	A
Spanish Lenguage and Literature	2 (4%)	7 (14%)	8 (16%)	22 (44%)	11 (22%)
Mathematics	9 (18%)	7 (14%)	5 (10%)	19 (38%)	10 (20%)
English	8 (16%)	13 (26%)	14 (28%)	12 (24%)	3 (6%)
Physical Education	---	2 (4%)	15 (30%)	27 (54%)	6 (12%)
Art Education	---	8 (16%)	9 (18%)	25 (50%)	8 (16%)
Natural Science	4 (8%)	2 (4%)	12 (24%)	18 (36%)	14 (28%)
Social Science	9 (18%)	7 (14%)	12 (24%)	14 (28%)	8 (16%)

*Data presented as frequencies (%)

As shown in Figure 2, 60% of the subjects were inactive or very few active, compared to 25% who were very active. Only 14% of the subjects performed the physical activity recommended by the World Health Organization.

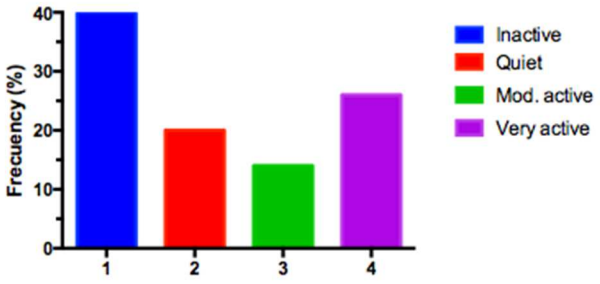

Figure 2. Level of physical activity practice of the subjects (N = 50)

Figure 3 shows the association between adherence to the Mediterranean diet and the grades obtained in the different subjects. It is observed that there is a statistically significant, moderate and directly proportional association between the adherence to the mediterranean diet and the subjects Art Education (Contingency coefficient = .442, p <0.05), Mathematics

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(Contingency coefficient = .484, p <0.05) and Social Sciences (Contingency coefficient = .490, p <0.05).

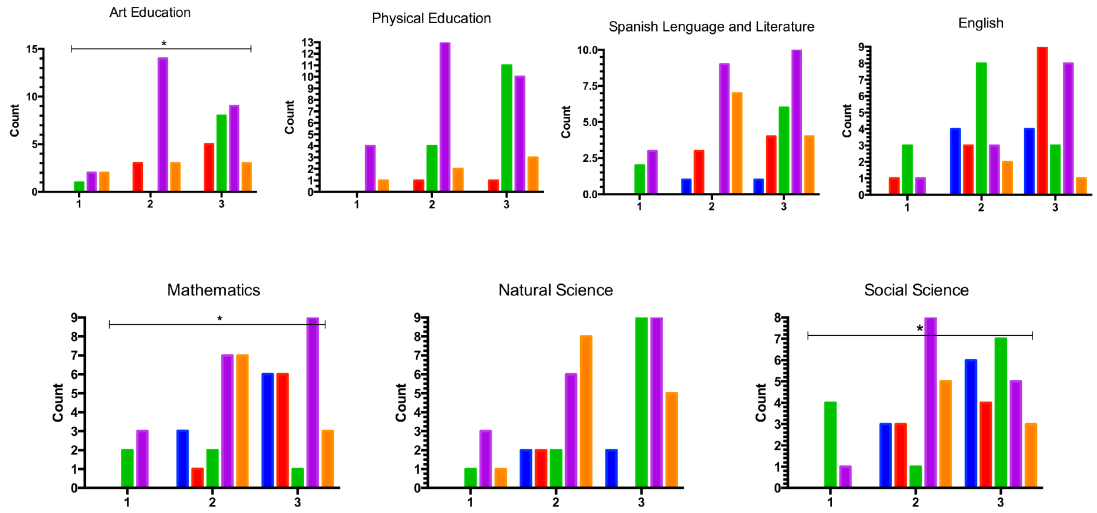

Figure 3. Association between adherence to the mediterranean diet and ratings (N = 50)

1 = Low adhesion; 2 = Medium adhesion; 3 = High adhesion * p <0.05

Table 2. Association bethween adherencia mediterránea diet and leve of physical activity (N=50)

	Inactive	Quiet	Mod. active	Very active	*p**
Low adherence	2	1	1	1	
Medium adherence	9	3	2	6	,970
High adherence	9	6	4	6	

**p<0,05*

Discussion and Conclusions

The objective of the study was to describe and establish the possible relationships between the adherence to the mediterranean diet, academic performance and level of physical activity in primary school students belonging to a center in the province of Seville.

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Regarding the adherence to the mediterranean diet, it is observed that half of the subjects (50%) had a medium or low adherence to the mediterranean diet and, therefore, they needed to improve their dietary pattern to adapt it to the mediterranean prototype. Results are in line with those obtained in the EnKid study, a pioneering study in the analysis of the adherence of the mediterranean diet at the national level (Serra-Majem, Trichopoulou, et al., 2004). However, comparing our data with the values obtained by Grao-Cruces et al., (2013) it is observed that these were lower, where young people showed a high adherence to the mediterranean diet (30.9%) compared to 69.1 % of subjects showing an adherence to the mediterranean diet medium-low.

Regarding the level of physical activity, it is observed that 60% of the subjects are inactive or very few active, compared to 25% that are very active. Only 14% of the subjects performed the physical activity recommended by the World Health Organization (2017).

In terms of academic performance, the results obtained in our study are similar to those reported by Oliver (2015) in the subjects of Physical Education and Art Education (they obtain a high grade) and Mathematics and Social Sciences as the subjects with the lowest grade.

On the other hand, based on the association between adherence to the Mediterranean diet and the level of physical activity, our study showed that there was no association. These results are contradictory with those found by Grao-Cruces et al., (2013) where it was observed that adolescents with a high adherence to the Mediterranean diet were more active than those who needed to improve the dietary pattern by adapting it to the Mediterranean. Although not always the most active children are inclined toward a healthier diet (Ottevaere et al., 2011), it is observed in previous studies dedicated to the study of adherence to the Mediterranean diet and physical activity, a greater adherence to said diet among subjects with a higher level of physical activity (Farajian et al., 2011, Schröder, Mendez, Ribas-Barba, Covas, & Serra-Majem, 2010).

Finally, it is worth mentioning the association between adherence to the mediterranean diet and academic performance. This association was statistically significant, moderate and directly proportional between the adherence to the mediterranean diet and the subjects of

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Artistic Education, Mathematics and Social Sciences. These results are consistent with those reported by Shi, Tubb, Fingers, Chen, & Caffrey (2013), which concluded that children who eat healthier foods and exercise show better health and fewer behavioral and academic problems. In addition, they indicate that the incidence of academic and behavioral problems in sedentary children was between 10-12% greater than that of physically active subjects. In turn, Álvarez-Bueno et al., (2017) show that physical activity, specifically physical education, improves classroom behavior and benefits several aspects of academic performance, especially skills related to mathematics and reading.

Therefore, we can conclude that 50% of subjects have to improve their dietary pattern, that only 14% perform the recommended physical activity and that there was an association between adherence to the mediterranean diet and the qualifications obtained in Art Education, Mathematics and Social Sciences.

However, like any research, it also has limitations that require further research to obtain data that contrast the results obtained (more global analysis of academic subjects, sex, levels of physical activity, among others).

Therefore, future research could highlight: increase the sample to investigate even more in the areas studied, include the role of the teacher, father, mother or guardian as an influential factor in the acquisition of healthy habits, analysis of variables by sex, courses or others.

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