



Original / *Pediatría*

Analysis of the life-style and dietary habits of a population of adolescents

Emilio González-Jiménez¹, Gustavo R. Cañadas², Rafael Fernández-Castillo³ and Guillermo Arturo Cañadas-De la Fuente⁴

¹Department of Nursing. Faculty of Health Sciences (Melilla Campus). University of Granada. ²Department of Mathematics Didactics. Faculty of Education Sciences. University of Granada. ³Department of Nursing. Faculty of Health Sciences (Ceuta Campus). University of Granada. ⁴Department of Nursing. Faculty of Health Sciences. University of Granada. Spain.

Abstract

Objectives: The aims of this study were: (i) to ascertain whether the nutritional status of a population of secondary school students had improved after an educational intervention; (ii) to analyze whether students had adopted healthier eating and exercise habits after participating in a health education intervention; (iii) to discover whether the students spent less time on sedentary leisure activities after the intervention.

Sample and methodology: The population of the sample consisted of 138 adolescents, age range was between 14-19 years old: 67 males (48.6%) and 71 females (51.4%). They were students at two public secondary schools in the city of Almería (Spain). In the first phase (15-30 september 2011) of this three-phase study, the nutritional status of the students was assessed by means of anthropometry. In the second phase (1 october 2012-15 june 2012), the students participated in an educational intervention that fomented awareness of the benefits derived from healthy eating habits and physical exercise. In the third and final phase (16-31 june 2012), the effectiveness of the intervention was evaluated.

Results: After the intervention, statistically significant differences ($p < 0.000$) were found in relation to the nutritional status of all the students evaluated, regardless of their sex. In reference to the adoption of healthy habits after the intervention, statistical significant differences were observed in the Krece Plus test ($p < 0.000$) and in the practice of physical exercise ($p = 0.006$). In the case of sedentary leisure activities, there was also a statistically significant reduction ($p < 0.000$) in the number of hours spent watching television for both male and female subjects.

Conclusion: The results of this study show the effectiveness of the contents, activities, and duration of this health education intervention to encourage the subjects to modify their dietary and exercise habits.

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Correspondence: Guillermo A. Cañadas-De la Fuente.
Departamento de Enfermería. Facultad de Ciencias de la Salud.
Universidad de Granada.
Avda. Madrid, s/n.
18071 Granada. Spain.
E-mail: gacf@ugr.es

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ANÁLISIS DE HÁBITOS EN SALUD Y ESTILO DE VIDA EN UNA POBLACIÓN DE ADOLESCENTES

Resumen

Objetivos: En primer lugar verificar una posible mejora del estado nutricional en una población de alumnos tras el desarrollo de una intervención educativa. Comprobar la adopción de hábitos alimentarios y de actividad física saludables por los alumnos, tras el desarrollo de una intervención educativa en salud. Por último, verificar una reducción en el tiempo que los alumnos dedican al ocio sedentario.

Muestra y metodología: La población de estudio estaba compuesta por 138 adolescentes de entre 14 y 19 años de edad, 67 chicos (48,6%) y 71 chicas (51,4%), pertenecientes a dos centros educativos públicos de la ciudad de Almería (España). El estudio se articuló en tres fases. Una primera etapa, que comprendería la segunda quincena del mes de septiembre de 2011. En ella se realizó una valoración del estado nutricional de todos los alumnos mediante antropometría. Una segunda etapa (desde octubre de 2011 hasta la primera quincena de junio de 2012), donde tendría lugar la intervención educativa sobre alimentación saludable y actividad física. Y una última fase (segunda quincena de junio de 2012), donde sería evaluada la eficacia de la intervención desarrollada.

Resultados: Tras la intervención, se encontraron diferencias estadísticamente significativa ($p < 0,000$) con una mejora del estado nutricional de todos los alumnos valorados con independencia de su sexo. Respecto de la adopción de hábitos saludables, se observaron diferencias estadísticamente significativas en las puntuaciones del test Krece plus ($p < 0,000$) y en la práctica de actividad física ($p = 0,006$) tras la intervención. En el caso de la variable ocio sedentario, tras la intervención educativa, se puso de manifiesto una reducción también estadísticamente significativa ($p < 0,000$) en ambos sexos en el número de horas dedicadas a ver la televisión.

Conclusiones: Los resultados alcanzados ponen de manifiesto la efectividad de los procedimientos aplicados en esta intervención para modificar hábitos alimentarios.

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Palabras clave: *Intervención educativa de enfermería. Obesidad. Adolescentes. Estado nutricional. Actividad física. Ocio. Sedentario.*

Introduction

Obesity is currently the most common nutritional disorder among children and adolescents¹. A comparison of the results of studies carried out in the 1980s and those of recent studies shows that the number of overweight and obese children and adolescents has tripled in the last thirty years^{2,3}. One possible cause is the widespread availability and consumption of high-calorie foods with low nutritional value as well as a growing tendency towards sedentary lifestyles, especially in urban populations⁴. Moreover, when subjects live in family environments where unhealthy eating habits predominate, this further complicates the situation. According to González⁵, a person's eating habits (e.g. rejection and preferences for certain foods) are strongly conditioned by family environment during infancy and childhood.

Furthermore, the recent increase in childhood obesity has led to the early occurrence of many pathologies that until now were more likely not to surface until adulthood⁶. Metabolic disorders such as hypercholesterolemia, insulin resistance (with the ensuing risk of type 2 diabetes mellitus), high blood pressure, and arteriosclerosis are now increasingly frequent in young people in Spain⁷⁻⁹. These data highlight the fact that obesity is now a serious health problem for children and adolescents, and thus must be addressed at a very young age. In this sense, prevention measures should first begin in primary schools, where the development and implementation of nutrition education programs should be actively encouraged^{10,11}.

Up until now, studies have confirmed the effectiveness of educational interventions that foment healthy eating habits and physical exercise in school children. An added advantage is that such interventions awaken the interest and heighten the awareness of students and even teachers at the schools where they take place¹²⁻¹⁴. Needless to say, this kind of appeal is extremely important when it comes to obtaining successful results and encouraging healthier eating habits and lifestyle choices. In this sense, recent research shows that health education interventions by nursing professionals, which foment good dietary habits and the practice of physical exercise, improve the nutritional status of young school children^{15,16}.

Therefore, the objectives of this research were to verify the improvement in nutritional status in a group of 138 students belonging to two high schools in the city of Almería. Second, verify the adoption of eating habits and healthy physical activity as a result of a health education intervention.

Objectives

This study had the following specific objectives:

- to ascertain whether the nutritional status of a population of 138 secondary school students had

improved (i.e. reduction in the body mass index values) after a health education intervention;

- to find out whether students had adopted healthier eating and exercise habits after participating in a health education intervention;
- to discover whether the students spent less time on sedentary leisure activities after the intervention.

Sample

The sample population was composed of 138 adolescents, ages ranged from 14-19 years of age: 67 males (48.6%) and 71 females (51.4%). They were not selected by random sampling procedure but participation in the research was determined by their presence in the centre on the dates the study was being conducted. The subjects were students at two public secondary schools in the city of Almería (Spain). An important condition for inclusion in the study was that subjects had to be healthy and not have any type of endocrine dysfunction or physical disorder. To participate, each student also had to have the authorization of his/her parents or tutors, who gave their informed written consent. All students who did not meet these criteria were not candidate to participate in the study.

Methodology

The intervention took place during the school year from september 2011 to june 2012. The study was carried out in three phases. In the first phase (15-30 september 2011), the nutritional status of the students was assessed. Anthropometric techniques were used to determine weight, height, and body mass index, depending on the age and sex of the subject. The assessment was based on the national standards of Sobradillo et al¹⁷. The second phase (1 october 2012-15 june 2012) lasted eight months and two weeks. During this period, the educational intervention on healthy eating habits and physical exercise took place. In reference to nutrition, there were three workshops, which informed the subjects of habits and guidelines for healthy eating. The three workshops were given during the first week in october, january, and april, respectively. The students attended the workshop, accompanied by their parents or tutors. Besides teaching the students about the advantages of a well-balanced diet, this workshop responded to doubts and answered the questions of the students and their parents. In regards to exercise and after prior agreement with the physical education teacher in each center, a battery of games and activities were set up for the students to do in physical education class three days per week.

In the third and final phase (16-31 june 2012), the effectiveness of the intervention was assessed, based on the degree of improvement of the nutritional status of the students and healthy lifestyle habits during the

period of the educational intervention. For this purpose, we analyzed the variables by comparing mean values before and after the intervention. The variables analyzed included the body mass index (BMI), score on the Krece Plus quick test and the number of hours per day spent on watching television (sedentary leisure activity). The Krece Plus quick test was developed and validated for Kid². The test measures the adequacy of feeding to the Mediterranean diet (considered as correct nutritionally). According to the score obtained in the test, is quantified from 0 to 10 the eating habits of the student, which subsequently can be classified as: low nutritional level (fix urgently dietary habits), mid-level (improvements in the power necessary) and high level. Likewise, the Krece Plus quick test size lifestyle based on the daily average hours that watch TV and sport after school hours per week. Depending on the score obtained in this test, the style of life of the child was classified as inadequate, regular or optimal.

Descriptive analyses of the variables measured in the sample were made. T test related samples, was used to compare groups, before and after the intervention in the case of quantitative variables, and in the case of qualitative variables 2 test. We compare the application of statistical tests of significance and effect size measures (specifically, Cohen's d) and the Cramer's V as a measure of Association. The data were analyzed with SPSS Statistics 19 for Windows.

During the development of the study, was observed the ethical standards proposed by the Committee on research and clinical trials in the Declaration of Helsinki.

Results

The obtained results show overall improvement by the students in their nutritional status (normal weight, overweight and obesity). The group of students in a situation of normal weight happens to be from 85 to 102, while overweight students decreased from 22 to 20 and the obese from 31 to 16. The students should improve their eating habits; those who have low nutri-

tional level and must be urgently corrected their dietary habits become of 57 to 44, while students with mid-level increase of 56 to 67 and the high level of 25 to 39.

The qualitative study of the nutritional status variables and the three levels of Krece Plus Test with the sex and age variables were performed using the χ^2 statistic. Results in table I show that before the teaching process just existed a relationship between nutritional status and sex, where men tend to a normal weight and the women and obese status. On the other hand, the subsequent results show association in three of the four comparisons; seeing that women have improved their nutrition and also the youngest group have improved their status and their nutritional level.

In regards to the body mass index measures significant differences are obtained before (22.9 ± 4.106) and after (21.6 ± 3.332) of the intervention, by t-test for related samples ($p < 0.000$), with size moderate effect ($d = 0.348$). Afterwards, the means of the two groups are regarded as different, which indicates a decline in body mass index values and thus an improvement in the nutritional status of the students after the intervention. When the sample is studied by sex, there are significant differences between the two groups, but in both male and female subjects, there is a reduction in body mass index. These results are reflected more clearly in table II.

In addition, the values in the test Krece plus increased significantly after the intervention ($p < 0.000$), although with low effect size ($d = 0.123$), resulting in an improvement of the nutritional level in terms of eating habits (Fig. 1). Statistically significant differences were also found for physical exercise activity ($P < 0.000$) with effect size associated $d=0.16$. When this same study was independently performed for male and female subjects, there were statistically significant differences in the case of the female subjects, but not in the case of the males (Table II).

Finally, we studied the time that the subjects spent watching television to see whether the intervention had had any impact on this variable. Their BMI was thus measured before (Mean = 3.08 ± 1.6591) and afterwards (Mean = 2.185 ± 1.393). Using the T test for related samples are obtained statistically significant

Table I
Study using the χ^2 test

Time	Variables estudiadas	Statics	V. Cramer	p*
Before	Nutritional Status and Sex	25,828	0,455	0,000
	Krece Plus Levels and Sex	2,590	0,274	0,144
	Nutritional status and age levels	4,861	0,197	0,088
	Krece Plus levels and age levels	4,667	0,193	0,097
After	Nutritional Status and Sex	18,074	0,380	0,000
	Krece Plus Levels and Sex	0,713	0,076	0,700
	Nutritional status and age levels	18,584	0,386	0,000
	Krece Plus levels and age levels	6,812	0,233	0,033

*Chi-squared test.

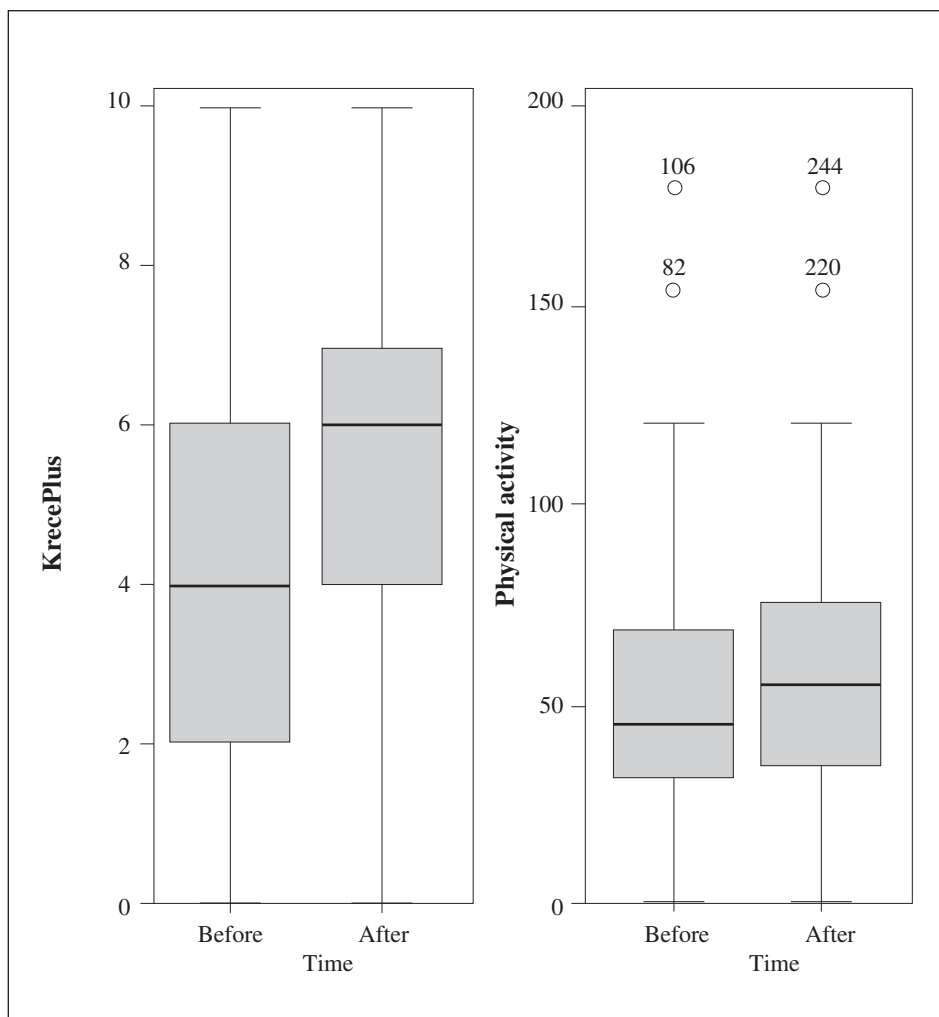


Fig. 1.—Krece Plus and physical activity before and after the intervention.

Table II
Distribution of the variables before and after depending on the sex

	Sex	Mean ± DP (Before)	Mean ± DP (After)	d Cohen	p*
BMI	Female	24,557 ± 4,124	22,993 ± 3,547	0,407	0,000
	Male	21,217 ± 3,336	20,029 ± 2,262	0,417	0,000
Krece Plus	Female	4,282 ± 2,799	5,394 ± 2,759	0,4	0,000
	Male	4,508 ± 2,982	4,985 ± 2,711	0,168	0,133
Physical Activity	Female	4,233 ± 2,461	4,858 ± 3,028	0,227	0,002
	Male	3,769 ± 3,021	4,939 ± 3,363	0,366	0,000
Hours of tv.	Female	3,049 ± 1,57	2,225 ± 2,311	0,417	0,000
	Male	3,112 ± 1,76	2,142 ± 2,484	0,451	0,000

*Student t test for two dependent samples.

differences ($p < 0.000$) obtaining an effect size associated with moderate value-high ($d = 0.5841$). Afterwards, the means of the two groups were considered to be different, which reflected a reduction in the time spent watching television. In the case of male and

female subjects, a gradual reduction can be observed (Table II).

Students were separated into two levels for the variable age. The first level includes students aged between 14 and 16 years, and on the second level students aged

between 17 and 19 years old. Table III shows better results in the group of the youngest students into the four variables of interest.

Discussion / Conclusion

The increase in the prevalence of overweight and obesity in school children has become a serious public health problem¹⁸. The results obtained in this study show that health education interventions in schools are an effective way of addressing this problem and reducing levels of overweight and obesity among the very young. Admittedly, when the sample was analyzed by sex, the results confirmed certain differences in the improvement of the subjects' nutritional status after nine months of education intervention. More specifically, the female subjects experienced a greater reduction in their mean BMI in comparison to the male subjects. These results are in consonance with those in González¹⁹ who studied a sample population of school children in the province of Granada (Spain) and found that the girls were better at following the dietary guidelines given during the nutritional intervention. Furthermore, in consonance with González-Cross et al.²⁰, it was found that the differences in body composition between both sexes could also be an important factor in the rate of body mass index reduction in this population.

In relation to healthy habits, the Krece Plus test showed a statistically significant improvement in the acquisition of healthy eating habits after the intervention. All of the students went from a very low nutritional level before the intervention to a medium nutritional level after the nine months of nutritional intervention. While this improvement was higher among girls, reaching higher scores to the guys on the Kreceplus test. Also, at the age variable and coinciding with what was described by González¹⁹, was the youngest age group

(14-16 years) who were taken to a greater degree of healthy eating habits.

In the same way as in other studies^{21,22}, the obtained results confirm the effectiveness of the workshops as well as the students' interest in their contents and awareness-raising activities. In reference to physical activity, the results showed a major adhesion to the practice of physical activity between the boys, who increased substantially the average time, dedicated every day to the achievement of physical exercise, outside of school.

Taking into consideration the variable age, was the younger age group (14-16 years) that more hours dedicated to the realization of physical exercise, outside the school field after the intervention. This last circumstance of great interest if we consider the early age as a key factor in the adoption of healthy living habits²².

As for sedentary leisure activities (number of hours spent watching television each day), the results confirmed a significant decrease in both sexes after the nine months of educational intervention. This coincided with the results obtained by Aranceta-Bartrina et al.² in the Enkid study.

In view of the obtained results, and according with earlier studies²³⁻²⁵, the results highlight the effectiveness of the procedures applied in this intervention to improve the nutritional status of the population studied, modify their eating habits and physical activity and thereby reduce the degree of sedentary lifestyle.

Therefore, get the students to become aware of the importance of maintaining a healthy diet as well as of the need to practice physical activity and reduce sedentary lifestyle have been the three major achievements of this study.

Competing interest

The authors declare that there are no conflicts of interest.

Table III
Variables of interest before and after the intervention according to age

	Age (years)	Mean ± DP (Before)	Mean ± DP (After)	d Cohen	p*
BMI	14-16	19,146 ± 8,66	18,091 ± 7,979	0,127	0,000
	17-19	23,411 ± 3,876	22,396 ± 3,814	0,264	0,000
Krece Plus	14-16	3,733 ± 2,804	4,756 ± 3,014	0,351	0,000
	17-19	4,375 ± 3,443	4,604 ± 2,915	0,072	0,453
Physical Activity	14-16	3,331 ± 2,24	4,494 ± 2,976	0,441	0,000
	17-19	5,052 ± 3,193	5,552 ± 3,448	0,151	0,005
Hours of tv.	14-16	2,939 ± 1,994	1,633 ± 1,291	0,777	0,000
	17-19	2,583 ± 1,467	2,344 ± 1,404	0,167	0,195

*Student t test for two dependent samples.

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