Impacto de un programa de promoción de alimentación saludable en el IMC y en los hábitos de alimentación en alumnos de educación secundaria

Impact of a programme for the promotion of healthy eating in the BMI and students in secondary education in eating habits

Impacto de um programa para promover a alimentação saudável no IMC e hábitos alimentares em estudantes secundários

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Resumen

La obesidad ha aumentado en forma epidémica en las dos últimas décadas y se presenta a edades cada vez más tempranas. Las intervenciones educativas, enfocadas en dar soluciones a los problemas alimentarios y nutricios que afectan a los escolares, son reconocidas como un complemento esencial de las acciones dirigidas a mejorar la seguridad alimentaria de los escolares. El objetivo es analizar el impacto de un programa de

promoción de alimentación saludable en el IMC y en los hábitos de alimentación (HA), en alumnos de educación secundaria. Los métodos utilizados fueron **e**studio experimental, longitudinal y de correlación en 418 estudiantes de educación secundaria en la ciudad de Mexicali, donde se formaron dos grupos: experimental y de control. En los resultados se encontró disminución de peso en el grupo experimental y aumento de peso en el grupo de control (X^2.001); asimismo, en el grupo experimental se observaron mejores hábitos de alimentación después de la aplicación del Programa, no así en el consumo de comida rápida y golosinas (p=<0.05). En ambos grupos se logró buen conocimiento sobre nutrientes y alimentos: 93.3 % y 94.5 % respectivamente. En relación a los hábitos de alimentación, el grupo experimental presentó buenos hábitos en 91.4 % (p=<0.05). En conclusión, se observaron efectos positivos en el grupo experimental a corto plazo, en el IMC y en HA; sin embargo, no se puede saber si los efectos van a perdurar.

Palabras clave: obesidad, alimentación, educación, escolares.

Abstract

Obesity has become an epidemic in the last two decades and is presented at increasingly younger ages. Educational interventions, focused on providing solutions to food and bountiful problems affecting schoolchildren, are recognized as an essential complement actions aimed at improving the food security of the students. The objective is to analyze the impact of a programme for the promotion of healthy eating in the BMI and eating habits (EH), in secondary education students. The methods used were experimental, longitudinal and correlation in 418 students of secondary education in the city of Mexicali, where two groups were formed: experimental and control. In the results we found weight loss in the experimental group and weight gain in the control group (X^2.001); also, in the experimental group is observed better eating habits after the application of the programme, not so in the consumption of food fast and sweets (p=<0.05). In both groups was achieved good knowledge on nutrients and foods: 93.3% and 94.5% respectively. In relation to eating habits, the experimental group presented good habits at 91.4% (p=<0.05). In conclusion, there were positive effects in the experimental group in the short term, in the BMIand EH; however, no is can know if those effects will last.

Key words: obesity, nutrition, education, school.

Resumo

A obesidade tem aumentado de forma epidêmica nos últimos duas décadas e é apresentado em idade cada vez menores. As intervenções educativas, com foco no fornecimento de soluções para problemas alimentares e nutricionais que afectam as crianças em idade escolar são reconhecidos como um complemento essencial para as acções destinadas a melhorar a segurança alimentar da escola. O objetivo é analisar o impacto de um programa para promover a alimentação saudável no IMC e hábitos alimentares (HA) em estudantes do ensino médio. Os métodos utilizados foram experimental, longitudinal e estudo de correlação de 418 estudantes do ensino médio na cidade de Mexicali, onde foram formados dois grupos: experimental e controle. Resulta em perda de peso foi encontrado no grupo experimental e ganho de peso no grupo de controlo (X2.001); Também no grupo experimental foram observados melhores hábitos alimentares após a aplicação do programa, e não no consumo de fast food e doces (p = <0,05). 93,3% e 94,5%, respectivamente, em ambos os grupos bom conhecimento sobre nutrientes e alimentos foi alcançado. Em relação aos hábitos alimentares, o grupo experimental apresentou bons hábitos em 91,4% (p = <0,05). Em conclusão, os efeitos positivos no grupo experimental a curto prazo, e HA IMC foram observadas; no entanto, não é possível saber se os efeitos vão durar.

Palavras-chave: obesidade, nutrição, educação, escola.

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Introduction

Currently, Mexico is going through a nutritional transition characterized by Westernization of the diet, in which there is more availability of processed foods added with high amounts of fats, sugars and salt, increase in the consumption of fast food and ready meals out of home, greater exposure to publicity about industrialized food, increased availability of these and very important decrease in physical activity, which has caused increasing overweight and obesity. Esto afecta a personas de todas las edades en zonas urbanas y rurales, y propicia el aumento de la prevalencia de enfermedades crónicas no trasmisibles (Arroyo et al., 2006).

According to the National Health and Nutrition Survey (Gutierrez et al., 2012), current levels of overweight and obesity in the Mexican population is a threat to the health system. The national prevalence of overweight and obesity in schoolchildren in 2012, using the who criteria, was 34.4%. (32% girls and 36.9% boys). As for the Group of teenagers, the reported results were 35% with overweight or obesity, i.e. more than 6 million people between 12 and 19 years old. in addition, reports that one of every five adolescents are overweight and one in ten has obesity. The prevalence of overweight among adolescents has increased almost three times from 1998 to 2012 (López, 2013; Gutiérrez et al., 2012).

On the other hand, the ENSANUT (by its name in Spanish) (2012) of Baja California, reported an increase in the prevalence of overweight more obesity in teenagers who live in urban localities; the number of overweight more obesity rose from 35.8% in 2006 to 41.5% in 2012 (Gutiérrez et al., 2102).

The diet of young people poses a particular challenge, since in this group match a series of emotional, physiological and environmental changes. At this stage of his life begin to select their own food, come to study away from home, and to make their food purchases and are quite receptive to trends in food, advertising, etc. All this determines their own styles and customs in feed, which will keep throughout his life (Ponce, Ruiz Esparza, Magaña, Arizona and Mayagoitia, 2011).

Currently, young people increasingly at younger ages enjoy greater independence and autonomy which is reflected, among many other things, in their food, since they decide what to eat, where, how, when and with whom. Due to current lifestyles have changed their eating habits, don't eat at appropriate hours, skipping any meals, eat over-react hours, consume fast food with high calorie content and disproportionate servings, taken abundant sugar-sweetened drinks, and this make aside good nutrition (Ponce et al., 2011).

Study on Mexican adolescents reported that 38.3% do not eat breakfast daily (42.1% women, 33.9% men; $p = 0.03$), and 47.6% no dinner daily (55.6% women, 38.4% men; $p = 0.007$). On the other hand, it reveals that more than two-thirds of teens (76.9%) does not consume fruits and vegetables daily (76.4% women, 77.5% men) (Macedo et al., 2008).

This situation arises also in other works on adolescents. In a study carried out in Belgium (Matthys, De Henauw, Devos and De Backer, 2003), is found that 50% of them teenage consumes less than the amount recommended of fruits and vegetables (5 portions by day); similar results presented Von Post-Skagegard et to the. (2002) in Sweden, where the majority of the population teen consumed fruits and vegetables less than a time by day (Macedo et al., 2008).

In London, a study by Johnson et al. (2001) found in adolescents than the average consumption of this food group was 3.8 ± 2.3 servings a day. Another study in a Canadian population (Starkey, Johnson and Gray, 2001) shows a "more appropriate" consumption, with an average of 5.7 servings per day in women and 5 servings per day for men; however, it is noteworthy that in this work the "chips" were included in the group of fruits and vegetables, which is why perhaps the consumption of this group appears to be recommended (Macedo et al., 2008).

In part this is because the cost of this type of food is cheaper and they are available at all times and anywhere. Moreover, the food preferences of adolescents are very defined :, prefer meat to fish, dairy products, fruits and vegetables, and especially fats, refined sugars and flours (Macedo et al., 2008).

Food at this stage of life -at As in all ages must meet the general characteristics of the correct power: that is, it must be comprehensive, balanced, sufficient, varied, safe and appropriate to the particular circumstances of the individual. To this end, each meal should include sufficient amounts and with the widest possible range of each of the food groups in order to obtain the necessary nutrients in optimal proportions.

The effects of diet and lifestyle in general take decades to manifest; therefore, it is difficult to convince young people of the importance of taking early preventive measures (Castillo, Balaguer and García-Merita, 2007).

Healthy or balanced diet is defined as "one that provides an adequate and varied amount of food, providing qualitative nutrients and quantity necessary for the normal functioning of the body, at present and in the future" (Olvera Gonzalez, 2010, p.315). A varied diet that includes all food in correct proportion is a balanced diet (Aranceta, 2001).

Thus, the main objectives to follow in the feeding of young people should be nutritional needs, avoid imbalances, deficiencies and excesses between nutrients, acquire correct dietary habits, and start through dietary prevention of chronic diseases (Ponce et al., 2011).

Moreover, in Mexico there are several programs and policies implemented in order to improve nutrition, which follow a similar program worldwide pattern. In most bearing in mind that health communication is a valuable tool to modify undesirable behavior and reinforce positive (Barquera et al., 2005).

When information on food and nutrition is provided by health professionals parallel to an academic program taught by Professor way, better results are obtained in nutrition education (Ortega et al., 2004).

Moreover, in addition to the acquisition of information and knowledge, it is important to stimulate a somewhat difficult critical condition on nutritional health, a process in the adolescent period.

Thus, nutrition education should be continuous and not only focus on increasing knowledge on the subject; should contribute to the appropriation of a healthy lifestyle, possibly for life (Pérez, 2007).

It is therefore necessary to create or strengthen nutrition education programs that can be implemented according to the needs of each population, economic strata and age group, considering that one of the main elements of learning is motivation, which might be a good strategy to get attitudes and habits and preconceived ideas into good habits and behaviors (Martinez et al., 2009).

The aim of this study was to analyze the impact of a program to promote healthy eating in eating habits and BMI of secondary students.

Methodology

Experimental, longitudinal and correlation applied to 415 students of secondary education studies.
The studies were carried out in three phases, for which two groups with students from first to third year of secondary selected randomly and according to schedule classes were formed. The experimental group (GE) consisted of 151 students and control group (CG) by 267 students.

a) Pre intervention phase: from the first moment unveiled the program to teachers, parents and students to start with data collection. students selected their participation through a previous conversation, which clearly explained the purpose of the study and authorization to do this was requested also emphasized that the study was anonymous and that its purpose was purely scientific was requested . In this way the student signed the informed consent.
Subsequently he conducted the survey from baseline, which was the first nutritional objective evaluation, assessment of knowledge of nutrients, foods and eating habits. The tools used were measuring weight, height for obtaining BMI and waist circumference, and test nutrition Krece Plus for the population of 4-14 years to identify eating habits (Serra, Ribas Garcia, Perez and Aranceta, 2003).

b) Intervention phase: it consisted of the implementation of the Promotion healthy eating program "Healthy Eating" with the aim of educating the student from first to third grade high school about healthy eating through a workshop with clear didactic interventions and objective and continuous intervention of the student, with the completion of various individual and team activities. The program consisted of six units and was taught over the course of two months, totaling 28 hours.

The first unit, the Frame, part of a presentation of the program to the group, in which an overview of the current state of nutrition in Mexico and the problem of overweight and obesity occurs. diagnostic questionnaire general knowledge about food and food consumption were applied to evaluate eating habits.

The second unit, Healthy Diet, aims to create in students an interest in healthy eating and their relationship to a healthier life, through discovering what constitutes a healthy diet and guidelines to follow to get, differentiate the concepts of nutrient and food, know how to be distributing and serving food throughout the day, food related families and their frequency of consumption according to the plate of good eating, how to value and recognize their own food preferences.

In the third unit, healthy breakfast, the aim was to emphasize the importance of carrying out a healthy breakfast, through knowledge of the positive effects of a healthy breakfast in students and identify the food groups that should be part of an adequate breakfast.

The fourth unit, Colaciones midmorning and midafternoon, aimed to promote accountability of healthy eating; for this the importance of proper nutrition in collations emphasized, as well as knowing the various options of healthy food that can be consumed and their properties.

The fifth unit, Healthy Eating, was aimed to promote nutrition education among young people and their responsibility for their own food, for which they were released food groups

to be included in a healthy menu as well as the frequency of consumption and proper ration of each group.

Finally, in the sixth unit, healthy dinner, the importance of the habit of eating a healthy dinner in young and healthy food consumption was emphasized.

Each unit began with a brief explanation of the topic. With the active participation individually and in teams it was constructing knowledge through different dynamics, finally obtaining individual development of a healthy menu.

c) In the post-intervention phase again measuring weight and height cc was made, and the same questionnaires were applied.

Statistic analysis

The distribution of variables in order to apply the appropriate tests comparative analysis, descriptive statistics (frequency, mean and standard deviation) was determined. For correlating variables used Pearson X2. In cases where the variable came from a normal random variable Student t test was used for paired samples. For all inferential analysis the alpha error was set at 0.05. For data analysis SPSS v 22 for Windows we were used.

Results

In the initial phase, Pre intervention, the sample consisted of 418 freshmen to junior year, 191 (45.7%) men and 227 (54.3%) women, with a mean age of 12.9 years, a minimum age of 11 years and a maximum of 15 years, an average of 57.7 kg weight., height of 157.2 cm and 22.8 BMI kgm2.

Table 1. Student characteristics in both sexes, from first to third year. secondary No.22

N=418

Variable	Pre intervención	
	Hombre Media/*Ds* n=191	Mujer Media/*Ds* n=227
Edad (años)	12.8+ 1.0	12.9 + .938
Peso (Kg)	57.2 + 18.3	55.9 + 15.8
Talla (cm)	159.1 + 12.1	155.7+ 13.3
Circunferencia de cintura (cm)	82.0 + 14.3	84.3 + 13.2
IMC	23.2 + 14.2	22.5 + 5.4

Fuente: cuestionario

Two groups, the experimental group (GE), consisting of 151 students in three grades, 65 (43%) men and 86 (57%) women and the Control Group (CG) consisting of 267 were divided; 126 (45.4%) men and 141 (54.6%) women of the three grades.

Table 2. Anthropometry students, Pre intervention phase, GE and GC, of both sexes, from first to third year at No.22 Secondary

N=418

Variable	GE n= 151		GC n= 267	
	Hombre Media/*Ds* n=65	Mujer Media/*Ds* n=86	Hombre Media/*Ds* n=126	Mujer Media/*Ds* n=141
Edad (años)	12.7 + 1.0	12.9 + 1.0	12.9 + 1	12.9 + .88
Peso (Kg)	58.5 + 19.3	56.6 + 15.5	56.6 + 17.8	55.4 + 16
Talla (cm)	159.4 + 11.2	157.1 + 7.0	158 + 12.5	154.9 + 15.9
Circunferencia de cintura (cm)	82.8 + 14.0	85.6 + 12.8	81.5 + 14.5	83.5 + 13.4
IMC	22.7 + 5.7	22.9 + 5.4	23.5 + 17	22.3 + 5.5

Fuente: cuestionario

A prevalence of overweight or obesity of 40.6% in the general population, 47.0% in the experimental group and 37.1% in the control group was found; in Table 3 sex differences are shown. The prevalence of overweight and obesity was higher in females. It can be seen in Table 2, the prevalence of waist circumference greater than 80 cm in women.

Table 3. Nutritional status in both groups, phase Pre intervention, students first to third year of Secondary School No.22

N=418

Variable	GE n= 151			GC n= 267		
	Frecuencia (%)			Frecuencia (%)		
	Hombre	Mujer	Total %	Hombre	Mujer	Total %
Bajo peso	19 (12.6)	26 (17.2)	45 (29.8)	41 (15.4)	32 (12)	73 (27.3)
Normo peso	18 (11.9)	17 (11.3)	35 (23.2)	39 (14.6)	56 (21)	95 (35.6)
Sobre peso	16 (10.6)	26 (17.2)	42 (27.8)	23 (8.6)	30 (11.2)	53 (19.8)
Obesidad	12 (7.9)	17 (11.3)	29 (19.2)	23 (8.6)	23 (8.6)	46 (17.2)
Total	65 (43)	86 (57)	151 (100)	126 (45)	141 (54)	267 (100)

Fuente: cuestionario

Before starting the program Healthy Eating (PASA), it was evaluated in the total sample the degree of knowledge of nutrients and foods, reporting 37.1% (15.8% men, 21.3% women) with good knowledge, 44.3% (22.2 % men and 22.0% women) Regular knowledge and 18.7% (7.7% men and 11.0 women) deficient knowledge (table 4 and Figure 1).

Table 4. Degree of knowledge about nutrients and food in students, Pre intervention phase, GE and GC, in both sexes, from first to third year of secondary No.22

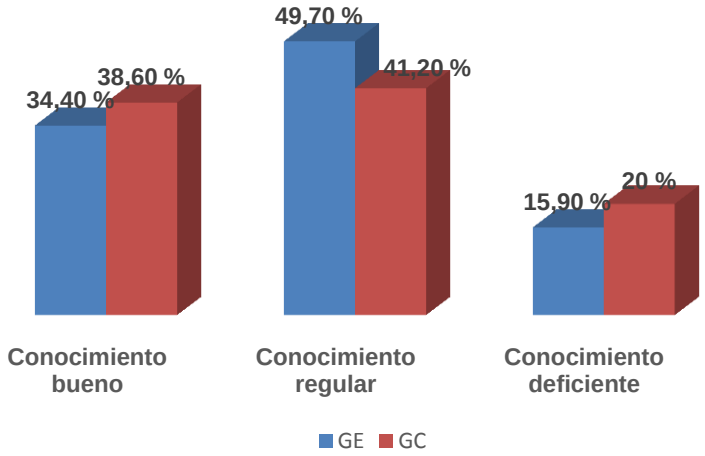
N=418

Variable	GE n= 151			GC n= 267		
	Frecuencia (%)			Frecuencia (%)		
	Hombre	Mujer	Total %	Hombre	Mujer	Total %
Conocimiento bueno	19 (12.6)	33 (21.9)	52 (34.4)	47 (17.6)	56 (21.0)	103 (38.6)
Conocimiento regular	36 (23.8)	39 (25.8)	75 (49.7)	57 (21.3)	53 (19.9)	110 (41.2)
Conocimiento deficiente	10 (6.6)	14 (9.3)	24 (15.9)	22 (8.2)	32 (12.0)	54 (20.2)
Total	65 (43)	78 (57)	151 (100)	126 (47.2)	141 (52.8)	267 (100)

Fuente: cuestionario

Graph 1. Degree of knowledge about nutrients and food in students, Pre intervention phase, GE and GC, in both sexes, from first to third year of secondary No.22

N=418

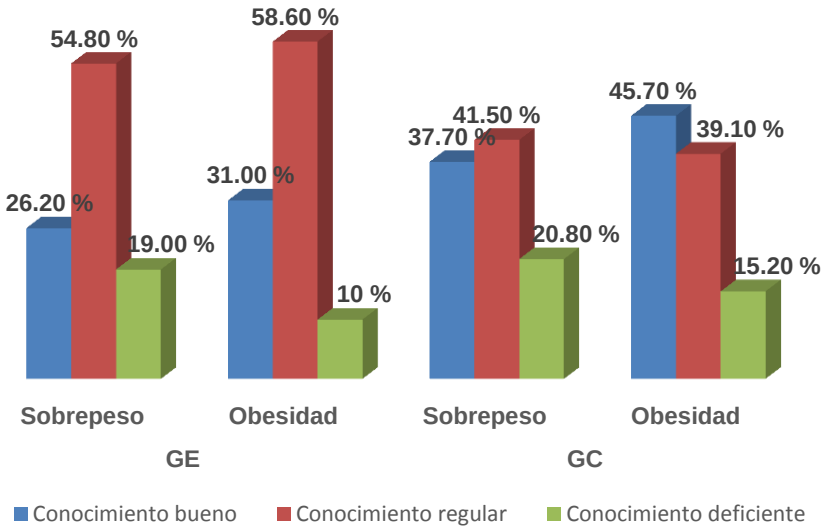


Fuente: cuestionario

As the degree of knowledge of nutrients and food in the GE, you can see that students with overweight and obesity have a regular knowledge in 54.8% and 58.5% respectively (Graph 2).

Graph 2. Degree of knowledge about nutrients and food in students of both sexes, Pre intervention phase, GE and GC, overweight and obese from first to third year of secondary No.22

n= 71



Fuente: cuestionario

Regarding eating habits, Pre intervention phase both sexes, they set good habits 13.2% vs 18.7% GC GE; regular in 43.7% vs 33.3% GC GE and GE deficient in 43.0% vs 47.9% GC; (Table 5 and Graph 3).

Table 5. Eating habits in students, Pre intervention phase, GE and GC in both sexes, from first to third year of Secondary School No.22

N=418

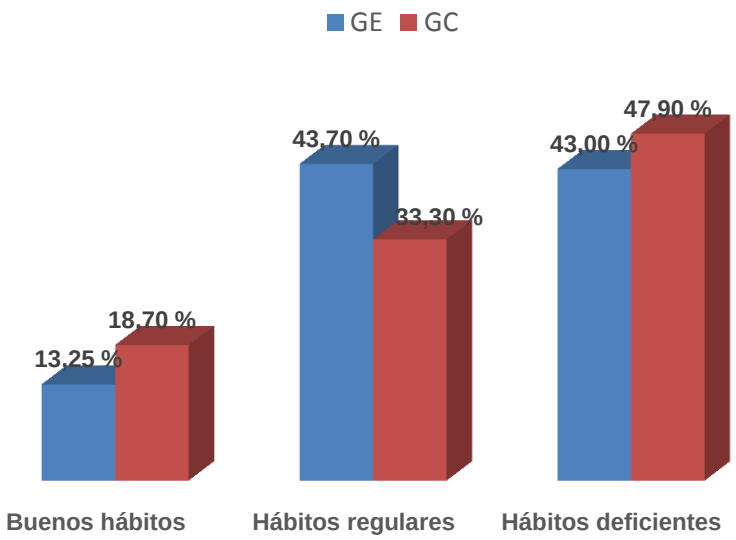
Variable	GE n= 151		GC n= 267	
	Frecuencia (%)		Frecuencia (%)	
	Hombre	Mujer	Hombre	Mujer
Buenos hábitos	6 (1.2)	37 (43.0)	24 (19.0)	26 (18.4)
Hábitos regulares	29 (44.6)	35 (40.7)	45 (35.7)	44 (31.2)
Hábitos deficientes	30 (46.2)	14 (16.2)	57 (45.2)	71 (50.4)
Total	65 (43.0)	86 (57.0)	126 (47.2)	141 (52.8)

Fuente: cuestionario

A significant correlation between overweight and obesity with eating habits X2 Pearson (.040) and degree of knowledge of food and nutrients X2 Pearson (.046) is. Furthermore, a significant correlation between eating habits and degree of knowledge, X2 Pearson (.033).

Graph 3. Eating habits in students Pre intervention phase, GE and GC, in both sexes, from first to third year of secondary No.22

N=418

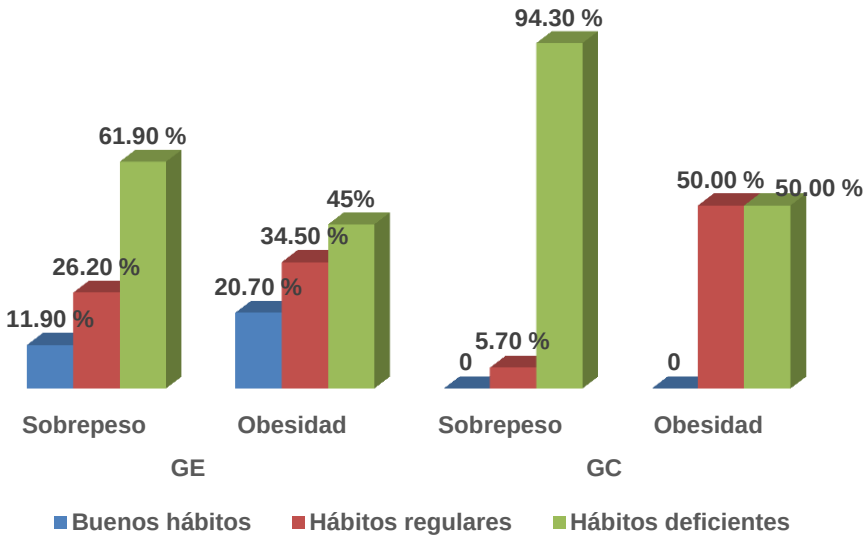


Fuente: cuestionario

As for the relationship between overweight and obesity with eating habits, 61.9% poor feeding habits in the GE overweight and 45% in the group with obesity it is observed. Moreover, in the GC, overweight and obese students presented 94.3% and 50% respectively poor feeding habits (Graph 4).

Graph 4. Eating habits in overweight and obese students, Pre intervention phase, GE and GC, in both sexes, from first to third year of Secondary School No.22

N=418



Fuente: cuestionario

With regard to eating habits in both groups can be observed similar habits and food consumption and a significant correlation in the GC with the daily consumption of sweets X2 Pearson (.002) (Table 6).

Table 6. Eating habits, Pre intervention phase, GE and GC, in both sexes, from first to third year of Secondary School No.22

N=418

Variable	GE (%)		Total (%)	GC (%)		Total (%)
	Hombre	Mujer		Hombre	Mujer	
Desayuna	41.5	58.1	89.4	41.8	58.2	79.4
Desayuna en ocasiones	40.9	59.1	76.2	47.3	52.7	68.2
Desayuna lácteos	44.8	55.2	63.3	47.9	52.1	53.9
Desayuna cereal	46.5	53.5	66.9	47.7	52.3	64.4
Desayuna pan industrial	35.3	64.7	11.3	39.4	60.6	12.4
Consume fruta todos los días	45.4	54.6	64.2	49.4	50.6	67.4
Consume una segunda fruta al día	46.7	53.3	49.7	50.4	49.6	44.6
Consume verdura una vez al día	41.1	58.9	74.2	47.2	52.8	73.0
Consume verdura más de una vez al día	44.4	55.6	35.8	50.0	50.0	42.7
Consume pescado con regularidad	40.9	59.1	43.7	47.6	52.4	39.5
Consume carne con regularidad	39.5	60.5	79.3	46.5	53.5	79.8
Consume legumbres	46.0	54.0	82.1	46.2	53.8	84.3
Consume pasta, arroz casi diario	39.1	60.9	42.4	41.4	58.6	47.9
Consume comida rápida	46.7	53.3	29.8	46.8	53.2	41.0
Consume golosinas diario	40.8	59.2	47.0	41.9	58.1	34.8*
Consume bebidas alcohólicas	27.3	72.7	7.3	43.8	56.3	6.0

Fuente: cuestionario, * p< 0.05

In the Post intervention phase the following results were found:

Average age of 13 years, with a minimum age of 12 years and a maximum of 15 years, an average of 57.7 kg weight., Height of 157.2 cm and 22.8 kgm2 BMI (Table 7).

Table 7. Student characteristics, Post intervention, in general, both sexes, from first to third year, High No.22

N=418

Variable	Post intervención	
	Hombre Media/*Ds* n=191	Mujer Media/*Ds* n=227
Edad (años)	13.0+ 1.0	13.0 ± .999
Peso (Kg)	57.6 ± 17.9	54.6 ± 14.8
Talla (cm)	156.9 ± 20.0	158 ± .90
Circunferencia de cintura (cm)	79.5 ± 14.2	80.7 ± 12.0
IMC	33.1 ± 4.8	32.1 ± 4.6

Fuente cuestionario

You can observe a decrease in weight in the experimental group and a slight increase in GC ($p < 0.01$), an increase in BMI ($p < 0.01$) (Table 8).

Table 8. Anthropometry students Post intervention phase, GE and GC, in both sexes, from first to third year of Secondary School No.22

N=418

Variable	GE n= 151	GC n= 267
	Media/*Ds*	Media/*Ds*
Edad (años)	13 (1.0)	13.1 (1.0)
Peso (Kg)	55.6 (15) *	56.3 (17.1) *
Talla (cm)	157.6 (9.2)	158.3 (8.6)
Circunferencia de cintura (cm)	80.7 (12.5)	80 (13.0)
IMC (Kg/m^2)	22.3 (5.5)	23.7 (19) *

Fuente cuestionario *p<0.01

Prevalence of overweight or obesity of 44.2% in the general population, 33.8% in GE and 44.6% in the GC, in both sexes; Table 9 sex differences are shown. The prevalence of overweight and obesity was higher in males in the GC.

Table 9. Nutritional status in both groups, phase Post intervention, students from first to third year of Secondary School No.22

N=418

Variable	GE n=151			GC n= 267		
	Frecuencia (%)			Frecuencia (%)		
	Hombre	Mujer	Total %	Hombre	Mujer	Total %
Bajo peso	16 (24.6)	17 (19.8)	32 (21.9)	30 (23.8)	32 (22.7)	62 (23.2)
Normo peso	31 (47.7)	36 (41.9)	67 (44.4)	39 (31.0)	47 (33.3)	86 (32.2)
Sobre peso	13 (20.0)	27 (31.4)	40 (26.5)	22 (17.5)	34 (24.1)	56 (21.0)
Obesidad	5 (7.7)	6 (7.0)	11 (7.3)	35 (27.8)	28 (19.9)	63 (23.6)
Total	65 (43.0)	86 (57.0)	151 (100)	126 (47.2)	141 (52.8)	267 (100)

Fuente: cuestionario

It was evaluated in the total sample the degree of knowledge of nutrients and foods, reporting good knowledge 91.1% (94.4% men, 83.3% women); Regular knowledge 8.1% (4.6% men and 11.2% women) and poor 0.7% (1.0% in men and 0.4% in women) knowledge. By comparing the degree of knowledge by groups, you can see a higher percentage in the good knowledge in GE, 93.4% in the GC, 90.3% (Table 10).

Table 10. Knowledge of food nutrients and students, Post intervention phase, GE and GC, in both sexes, from first to third year of Secondary School No.22

N=418

Variable	GE n=151			GC n= 267		
	Frecuencia (%)			Frecuencia (%)		
	Hombre	Mujer	Total %	Hombre	Mujer	Total %
Conocimiento bueno	63 (96.9)	78 (90.7)	141 (93.4)	115 (91.3)	126 (89.4)	241 (90.3)
Conocimiento regular	1 (1.5)	8 (9.3)	9 (6.0)	11 (8.7)	15 (10.6)	26 (9.7)
Conocimiento deficiente	1 (1.5)	0	0	0	0	0
Total	65 (100)	86 (100)	151 (100)	130 (100)	137 (100)	267 (100)

Fuente: cuestionario

As the degree of knowledge of food nutrients and students with overweight or obesity in GE, 88.8% had a good degree of knowledge.

Regarding eating habits in the post-intervention phase, you can see better eating habits in GE; It shows that there are better eating habits in males in both groups (Table 11). In figure 5 it can be seen that significantly improve eating habits in both groups.

Table 11. Eating habits in students, post-intervention phase, GE and GC in both sexes, from first to third year of secondary No.22

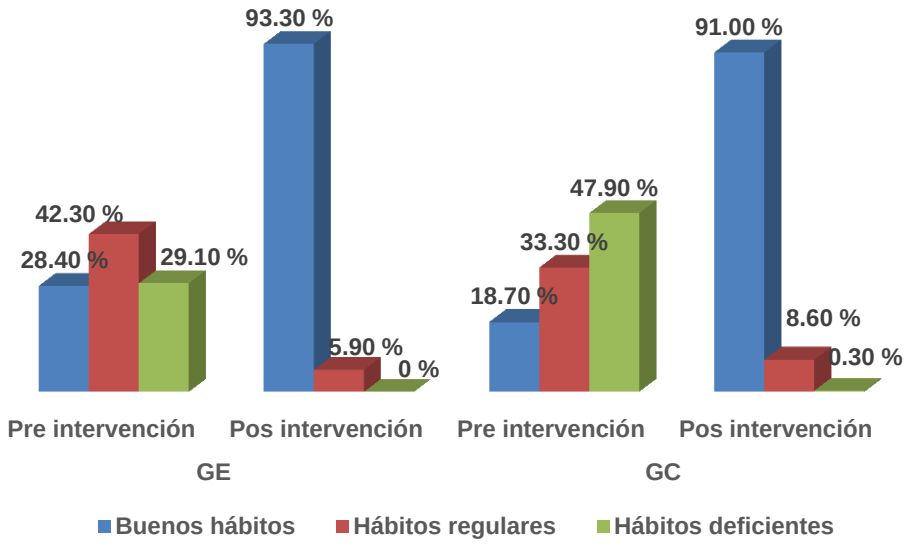
N=418

Hábitos alimentarios	GE n=151		GC n= 267	
	Frecuencia (%)		Frecuencia (%)	
	Hombre	Mujer	Hombre	Mujer
Buenos hábitos	63 (96.9)	78 (90.7)	118 (93.7)	125 (88.7)
Hábitos regulares	1 (1.5)	8 (9.3)	7 (5.6)	16 (11.3)
Hábitos deficientes	0	0	1 (0.8)	0
Total	65 (43.0)	86 (57.0)	126	141

Fuente: cuestionario

Graph 5. Eating habits in students, Phase Pre and Post intervention intervention and control groups, in both sexes, from first to third year of Secondary School No.22

N=418



Regarding eating habits, which better eating habits are observed, but not in the consumption of fast food and snacks (p = <0.05) (Table 12).

Table 12. Eating habits, Post intervention phase, GE and GC, in both sexes, from first to third year of Secondary School No.22

N=418

Variable	GE n= 151 (%)		Total (%)	GC n=267 (%)		Total (%)
	Hombre	Mujer		Hombre	Mujer	
Desayuna	89.2	80.2	84.1	82.3	74.5	78.3
Desayuna en ocasiones	72,3	64.0	67.5	54.6	56.9	55.8
Desayuna lácteos	67.7	65.9	66.7	64.6	62.5	63.5
Desayuna cereal	81.5	72.1	76.2	73.1	73.7	73.4
Desayuna pan industrial	4.6	14.0	9.9	9.2	14.6	12.0
Consume fruta todos los días	66.2	68.6	67.5	67.7	70.1	68.9
Consume una segunda fruta al día	46.2	41.9	43.7	44.6	45.3	44.9
Consume verdura una vez al día	75.4	79.1	77.5	73.8	77.4	75.7
Consume verdura más de una vez al día	33.8	40.7	37.7	41.5	42.3	41.9
Consume pescado con regularidad	46.2	50.0	48.3	43.1	38.7	40.8
Consume carne con regularidad	86.2	89.5	88.1	83.8	83.2	83.5
Consume legumbres	87.7	86.9	87.2	83.8	83.2	83.5
Consume pasta, arroz casi diario	55.4	53.5	54.3	43.8	50.4	47.2
Consume comida rápida	26.2	40.7	34.4*	37.7	40.1	39.0
Consume dulces y golosinas diario	32.3	51.2	43.0*	24.6	46.0	35.6*
Consume bebidas alcohólicas	3.1	7.0	5.3	6.9	4.4	5.6

Fuente: cuestionario
P < (0,05); *= significativo

X^2 Pearson ·021

Table 13 shows initial characteristics and post intervention of subjects grouped by sex are present. It is observed that there is a decrease in weight, and BMI Cc primarily in GE (p ≤0,001).

Table 13. Anthropometry students pre and post intervention phase, GE and GC, in both sexes, from first to third year of Secondary School No.22

N=418

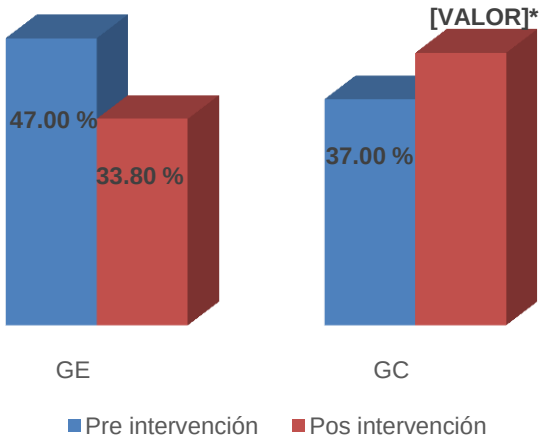
Variable	GE n= 151			GC n=267		
	Pre I n= 151	Pos I n= 151	P=	Pre I n= 267	Pos I n= 267	P=
	Media/*Ds*	Media/*Ds*		Media/*Ds*	Media/*Ds*	
Peso (Kg)	57.4 (17)	55.6 (14)	0.01	56 (16)	56.3 (17)	0.01
Talla (cm)	155.6 (11.4)	158 (9)	NS	156.8 (14)	158 (86)	0.01
Circunferencia de cintura (cm)	84.4 (13.3)	80.7 (13)	0.01	82.6 (13)	80.0 (13)	0.01
IMC (Kg/m^2)	22.8 (5.1)	22.3 (5.5)	0.01	22.8 (12)	23.7 (19)	0.01

NS = No significativo; P < (0,01) = significativo

Decreased overweight or obesity in the GE and increased GC subsequent intervention in the GC shown in Figure 6 the increase was significant in both overweight and obesity (X 2.001).

Graph 6. Prevalence of overweight and obesity, pre and post-intervention phase, GE and GC, in both sexes, from first to third year of secondary No.22

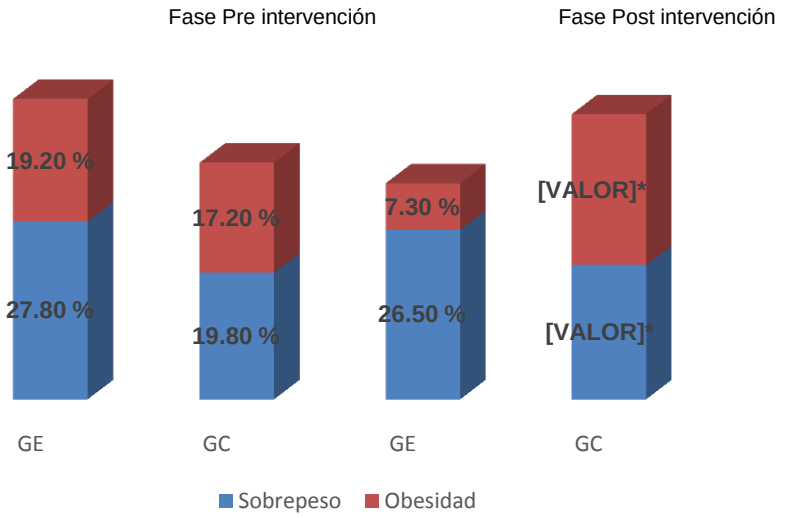
N=418



Fuente: cuestionario
(P < 0,05); *= significativo

Graph 7. Prevalence of overweight and obesity, pre and post-intervention phase, GE and GC in both sexes, from first to third year of Secondary School No.22

N=418



Fuente: cuestionario ($p < 0.05$) *= significativo

It can be seen in Table 14 that after the intervention in the GE, an increase in the consumption of dairy, cereal, fruit, vegetables, fish, meat, vegetables, rice and pasta found. Moreover, an increase in the consumption of fast food (x 2 Pearson 4.63, p = <0.05) and treats reported (X^2 Pearson 7.329, p=<0.05).

Table 14. Eating habits, pre and post-intervention phase, GE in both sexes, from first to third year of secondary No.22

n= 151

Variable	GE (%) Pre intervención		Total (%)	GE (%) Pos intervención		Total (%)
	Hombre	Mujer		Hombre	Mujer	
Desayuna	41.5	58.1	89.4	89.2	80.2	84.1
Desayuna lácteos	44.8	55.2	63.3	67.7	65.9	**66.7**
Desayuna cereal	46.5	53.5	66.9	81.5	72.1	**76.2**
Desayuna pan industrial	35.3	64.7	11.3	4.6	14.0	**9.9**
Consume fruta todos los días	45.4	54.6	64.2	66.2	68.6	**67.5**
Consume una segunda fruta al día	46.7	53.3	49.7	46.2	41.9	43.7
Consume verdura una vez al día	41.1	58.9	74.2	75.4	79.1	**77.5**
Consume verdura más de una vez al día	44.4	55.6	35.8	33.8	40.7	**37.7**
Consume pescado con regularidad	40.9	59.1	43.7	46.2	50.0	**48.3**
Consume carne con regularidad	39.5	60.5	79.3	86.2	89.5	**88.1**
Consume legumbres	46.0	54.0	82.1	87.7	86.9	**87.2**
Consume pasta, arroz casi diario	39.1	60.9	42.4	55.4	53.5	**54.3**
Consume comida rápida	46.7	53.3	29.8	26.2	40.7	**34.4***
Consume golosinas diario	40.8	59.2	47.0	32.3	51.2	43.0*
Consume bebidas alcohólicas	27.3	72.7	7.3	3.1	7.0	5.3

Fuente: cuestionario
(P < 0,05); *= significativo

In the GC, feeding habits remained constant after surgery, resulting in significant increased consumption of sweets and candies (x 2 Pearson 12,818, p = <0.05), on the other hand, industrial consumption of bread increased.

Table 15. Eating habits, pre and post-intervention phase, CG, in both sexes, from first to third year of Secondary School No.22

Variable	GC (%) Pre intervención		Total (%)	GC (%) Pos intervención		Total (%)
	Hombre	Mujer		Hombre	Mujer	
Desayuna	41.8	58.2	79.4	82.3	74.5	78.3
Desayuna en ocasiones	47.3	52.7	68.2	54.6	56.9	55.8
Desayuna lácteos	47.9	52.1	53.9	64.6	62.5	63.5
Desayuna cereal	47.7	52.3	64.4	73.1	73.7	73.4
Desayuna pan industrial	39.4	60.6	12.4	9.2	14.6	**12.0**
Consume fruta todos los días	49.4	50.6	67.4	67.7	70.1	68.9
Consume una segunda fruta al día	50.4	49.6	44.6	44.6	45.3	44.9
Consume verdura una vez al día	47.2	52.8	73.0	73.8	77.4	75.7
Consume verdura más de una vez al día	50.0	50.0	42.7	41.5	42.3	41.9
Consume pescado con regularidad	47.6	52.4	39.5	43.1	38.7	40.8
Consume carne con regularidad	46.5	53.5	79.8	83.8	83.2	83.5
Consume legumbres	46.2	53.8	84.3	83.8	83.2	83.5
Consume pasta, arroz casi diario	41.4	58.6	47.9	43.8	50.4	47.2
Consume comida rápida	46.8	53.2	41.0	37.7	40.1	39.0
Consume dulces y golosinas diario	41.9	58.1	34.8*	24.6	46.0	**35.6***
Consume bebidas alcohólicas	43.8	56.3	6.0	6.9	4.4	5.6

Fuente: cuestionario
P < 0,05); *= significativo

Discussion

The prevalence of overweight or obesity showed a decrease in GE, from 47% in the pre-intervention period, to 33.8% at the stage of post-intervention prevalence it is above the average reported in the ENSANUT (2012) in the state of Baja California (Gutierrez et al., 2012). Moreover, weight decreased in the GE and increased in the post-intervention GC, the results agree with those obtained in previous study where weight reduction was observed (Martinez et al., 2009).

Regarding eating habits some differences with Martinez et al study found. (2009), where in evaluating the quality of the habits the following was reported: 82.9% eat breakfast every day compared to 84% of this study, higher intake of fish (58.7% vs. 48.3%), industrialized bread (22.5% against 9.9%), milk (90.7% versus 66.7%) at breakfast and fruit (80.7% vs. 67.5%). However, in this study compared to the study by Martinez et al. (2009), increased consumption of fast food was found (34.4% vs. 10.4%), pasta or rice almost daily (54.3% vs. 39.6%), cereal (76.2% vs. 67.3%), vegetables (76.2% vs. to 74.8%) and candy making several times a day (43% vs. 19.5%).

Thus, in the same study good eating habits 58.6% were reported, compared with the results obtained in this research (13.2%), regular habits in 50.4% versus 43.7% and 6.7% with bad habits against 43%, which allows to immediately identify unhealthy lifestyle linked to consuming processed foods increasingly eating habits way. However, after the intervention, an improvement was noted in eating habits, the same occurring in the study by Martinez et al. (2009), where good habits went from 30.0% to 58.6% and 13.2% present study to 91.4%.

The results of this study differ with those reported in the study in Mexican adolescents, where 38.3% do not eat breakfast daily (42.1% female, 33.9% male; p = 0.03), and 47.6% no dinner daily (55.6% women 38.4% male; p = 0.007). On the other hand, it shows that more than two-thirds of the adolescents (76.9%) do not eat fruits and vegetables daily (76.4% female, 77.5% male) (Macedo et al., 2008).

This situation also occurs in other studies on adolescents. In a study in Belgium (. Matthys et al, 2003) found that 50% of adolescents consume less than the recommended amount of fruits and vegetables (5 servings per day) amount; Similar results presented Von Post-Skagegard et al. (2002), where most adolescents consume fruits and vegetables less than once a day (Barquera et al., 2005).

Johnson et al. (2002) found in adolescents than the average consumption of fruits and vegetables was 3.8 ± 2.3 servings per day. In the study of Ayechu and Durá (2010) it reported that 39.8% took daily a second piece of fruit and vegetables 26.7%. Another study in a Canadian population by Starkey et al. (2001), shows a more adequate consumption, with an average of 5.7 servings per day in women and 5 servings per day for men; however, it is noteworthy that in this work the fries were included in the group of fruits and vegetables, which is why perhaps the consumption of this group appears to be as recommended in this population (Macedo et al., 2008). Moreover, the food preferences of adolescents are very defined: prefer meat to fish, dairy products, fruits and vegetables, and especially fats, refined flours and sugars (Macedo et al., 2008).

In the study by Luz de Santiago (2012), an increase in consumption of salad and vegetables cooked for meals of 11.7% are observed, whereas in the control group the increase was 2.1%, similar results were found in this study to report an increase of 74.2% to 77.5% in the experimental group.

From the results the need for the general population is clear, particularly adolescents, receiving nutrition education. Teens should learn that the Mediterranean diet, prototype healthy eating, helps to maintain optimal health and that although includes all meals, frequency of consumption should follow the guidelines of the plate of good food (Serra et al ., 2003; Luz de Santiago, 2012). Therefore, dietary rules applicable to these adolescents would basically increase the daily consumption of fresh fruit and vegetables fresh and / or raw, pasta and / or rice, nuts (hazelnuts, almonds, walnuts, peanuts, pine nuts, etc.), milk and dairy products, especially yogurt and / or cheese, as well as vegetables and fish at least 2 or 3 times a week (Perez et al., 2007; Ayechu et al, 2010)..

Conclusions

From the data obtained in this study it can be concluded that an educational program of nutritional intervention applied to a group of teenagers for two months, had a positive effect on BMI and generated a change of eating habits according to the degree of knowledge about nutrients and food.

It is very important to consider that the main objective of nutrition recommendations, such as eating habits in this period of life, is optimal nutritional status and maintain an adequate rate of growth, which will lead to improved health status at this stage and in adulthood and prevent chronic diseases nutritional base that can occur in later stages.

Further studies are needed to verify the effects of an intervention program longer and larger numbers of subjects and assess whether program effects are durable.

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