ORIGINAL ARTICLE

Prevention of cardiovascular disease in adolescents in Primary Healthcare

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Received: 11/22/2022 - Approved: 01/23/2023

ABSTRACT

Introduction: cardiovascular diseases are increasingly appearing at younger ages. Risk factors are present in adolescents, who imitate adults and acquire unfavorable habits.
Objective: to design an action plan for the prevention of cardiovascular disease in adolescents belonging to the Family Doctor's Office 16-21 of the "Santa Clara" Polyclinic.
Methods: a research was conducted in health system and service, applied, with quali-quantitative approach, with 60 adolescents from the 16-21 Clinic during the period from April 2019 to July 2021. A nominal group of specialists was used, working with the ranking method of the Pan American Health Organization to identify priorities and the fishbone diagram for causal analysis.
Results: female sex and late adolescence predominated in the study and most of the adolescents were exposed to two risk factors. Inadequate nutrition was identified as the main risk factor (score=11) and in the causal analysis the diet high in salt, fats and sugars and the low consumption of fruits and vegetables and weak family food education, irregularity in complying with medical guidelines and insufficient work of the Basic Team in the community.
Conclusions: adolescents need health education to avoid the development of cardiovascular disease; the Basic Health Group and the family physician and nurse should be consistent when designing actions at the primary level of prevention in Primary Healthcare.
Key words: cardiovascular diseases; primary prevention; adolescent

RESUMEN

Introducción: las enfermedades cardiovasculares aparecen cada vez más en edades más tempranas. Los factores de riesgo están presentes en los adolescentes, que imitan a los adultos y adquieren hábitos desfavorables.

Objetivo: diseñar un plan de acción de prevención de la enfermedad cardiovascular para adolescentes pertenecientes al Consultorio del Médico de la Familia 16-21 del Policlínico "Santa Clara".
Métodos: se realizó una investigación en sistema y servicio de salud, aplicada, con enfoque cuali-cuantitativo, con 60 adolescentes del Consultorio 16-21 durante el período de abril de 2019 a julio de 2021. Se empleó un grupo nominal de especialistas que trabajaron con el método de ranqueo de la Organización Panamericana de la Salud para identificar prioridades y el diagrama de la espina de pescado para el análisis causal.
Resultados: en el estudio predominaron el sexo femenino y la adolescencia tardía y la mayor parte de los adolescentes se encontraban expuestos a dos factores de riesgo. Se identificaron la alimentación inadecuada como principal factor de riesgo (puntuación=11) y en el análisis causal la dieta elevada en sal, grasas y azúcares y el poco consumo de frutas y vegetales y la débil educación familiar alimentaria, la irregularidad en el cumplimiento con las orientaciones médicas y la insuficiente labor del Equipo Básico en la comunidad.
Conclusiones: los adolescentes necesitan educación sanitaria para evitar el desarrollo de la enfermedad cardiovascular; el Grupo Básico de Salud y el médico y la enfermera de la familia deben ser consecuentes al diseñar acciones del nivel primordial de prevención en la Atención Primaria de Salud.
Palabras clave: enfermedades cardiovasculares; prevención primaria; adolescente

INTRODUCTION

In recent decades, the world population has experienced an increase in chronic noncommunicable diseases, which are directly and indirectly responsible for morbidity, mortality, reduced productivity, loss of quality of life and high health care costs in adults in both developed and developing countries. Arterial hypertension, atherosclerosis, overweight, obesity, diabetes mellitus, dyslipidemias and smoking have increased the prevalence of cardiovascular diseases in adults and a worrying increase in cardiovascular risk factors in recent years in children and adolescents. They constitute diseases and risk factors for the development of chronic diseases with cardiovascular damage.[1]
In this context, current medicine tends to promote prevention and early diagnosis with the aim of identifying the disease in its early stages, for example, in subclinical vascular disease.[2]
Cardiovascular diseases account for 47% of all deaths in Europe,[3] in Latin America and the Caribbean they represent 31% of all deaths[4] and have been the leading cause of death in Cuba since 1970 (11.5 years of life potentially lost as a result of these diseases).[5,6] Mortality due to cardiovascular diseases in 2018, 2019 and 2020 was 228.2; 238.1 and 241 per 100 000 inhabitants, respectively.[7,8,9] It is important to perform a lifelong approach to control cardiovascular risk because both cardiovascular risk and prevention are dynamic and continuous as the patient ages or accumulates comorbidities.[5]
In relation to Villa Clara Province, during the last three years, heart diseases occupy the first place with a rate of 238.1; 238.5 and 239.6 per 100 000 inhabitants, respectively.[7,8,9] According to data from the Department of Chronic Non-communicable Diseases of the Municipal Health Directorate in Santa Clara cardiovascular diseases constitute the second cause of death in the municipality during 2018, 2019 and 2020 with a rate of 281.9; 218.9 and 240.4 per 100 000 inhabitants. The "Santa Clara" Polyclinic contributes the

most deaths from this cause in the same periods, with a rate of 258.9; 295.3 and 332.3 per 100 000 inhabitants; in both cases, the figures are above those of the province and the country.[10]

Currently, it is observed that children and adolescents replicate adult lifestyles and modern life, which are triggers for cardiovascular diseases, a phenomenon that is on the rise. Hence, in recent decades, morbidity and mortality due to cardiovascular diseases have increased and increasingly appear at earlier ages of life.

In the 16-21 Clinic of the "Santa Clara" Polyclinic there are pediatric patients with cardiovascular risk factors. Predisposing factors to these diseases appear since childhood and, although they remain silent, it is the faculty of health professionals to know their behavior in the area where they work daily in order to intervene on them in a timely manner. We propose to design an action plan for the prevention of cardiovascular disease in adolescents.

METHODS

Design and population

A health system and service research was carried out, applied, with a quali-quantitative approach, in the 16-21 Family Doctor's Clinic , belonging to the "Santa Clara" Teaching Polyclinic, in the City of Santa Clara, Villa Clara Province, during the period from April 2019 to July 2021.

We worked with the entire population, made up of 60 adolescents, who gave their consent to participate.

Variables of the study

Sex, age and pediatric groups: pre-adolescence, early adolescence, middle adolescence and late adolescence.

Number of risk factors (RF): no RF, between one and two RF, between three and four RF and between five and six RF.

Risk factors: inadequate diet, smoking (passive/active), physical activity, personal pathological history (PPP) of chronic non-communicable diseases (diabetes mellitus -DM-, arterial hypertension (AHT) and hyperlipidemia), family pathological history (FPH) of chronic non-communicable diseases (diabetes mellitus, arterial hypertension and cardiovascular disease -CVD-) and overweight-obesity.

Procedures/data collection and handling

A bibliographic review was carried out to obtain and deepen the knowledge that allowed the development of the theory, the real history of the problem and its trajectory, the analysis of the statistical information and the conceptual interpretation of the empirical data found related to the research problem.

The empirical methods used were observation, documentary analysis of the clinical histories in which the data resulting from the anamnesis, the physical examination of the planned childcare activity by dispensarization and the family health history were recorded, and the unstructured and open interview carried out in the field work. The information was triangulated in a data collection form.

The most frequent risk factors in adolescents were identified and a nominal group of 12 Specialists (three in Pediatrics and seven in General Comprehensive Medicine and two Bachelor's Degree in Nursing and Master's Degree in Science in comprehensive care for children) was presented. In the priority analysis using the Pan American Health Organization's ranking method, a value in the range of zero and two was given for each of the risk factors identified: two points-very frequent, one point-medium frequent and zero point-rare.
These values, reported by each participant, were summed by the person in charge of leading the group and subsequently the average score was obtained for each criterion in each problem, which was placed in a matrix made with the criteria: tendency (magnitude), frequency (number of people affected), severity, availability of resources, vulnerability (possible solution) and coherence with the planner's mission (according to the level of those who intend to solve it). The risk factor with the highest score was then added up and selected, the causal analysis was carried out with the help of the Ishikawa fishbone cause-effect diagram and an action plan was designed according to the primary levels of action in Primary Health Care.

Análisis estadístico
The data were stored in a Microsoft Excel data file and analyzed with the SPSS 20 program for Windows.
Qualitative variables were described by absolute frequency, proportion and percent and quantitative variables by arithmetic mean and standard deviation. A confidence level of 95% was set to explore the relationship between variables with the nonparametric Chi-square test of independence (X^2). The null hypothesis was rejected when the statistical significance was less than 0.05.
The results obtained were presented in tables and figures, analyzed and contrasted with those obtained by other authors and explained considering the current technical scientific development. A synthesis of the discussion was made in order to facilitate the way to reach conclusions.

Ethical aspects
he research was carried out with prior informed consent and the principles of bioethics: beneficence, non-maleficence, autonomy and justice were complied with.

RESULTS

The study population consisted of 60 patients, 33 were female (55%) and 27 were male (45%), with an average age of 15 (±3) years: minimum of nine and maximum of 18 years. For the female sex the mean population age was 14 years (±3) and for the male sex 16 (±).
As shown in Table 1, more adolescents were found in the late adolescence group (33, 55%) -55% were male-; for the rest of the pediatric groups the female sex was present in more than 50%. There was no significant association between sex and pediatric classification ($X^2 p>0.05$).

Table 1. Pediatric group and sex of the adolescents studied

Pediatric group	Sex				Total	
	Feminine		Masculine			
	No.	%*	No.	%*	No.	%**
Pre adolescence	10	66.7	5	33.3	15	25.0
Early adolescence	3	60.0	2	40.0	5	8.3
Middle adolescence	5	71.4	2	28.6	7	11.7
Late adolescence	15	45.5	18	54.5	33	55.0
Total	**33**	**55.0**	**27**	**45.0**	**60**	**100**

*Percentage with respect to the row, **percent of the total
Statistical significance of the Chi-square test of independence X^2p=0.415

Figure 1 shows the number of risk factors for cardiovascular disease identified among the adolescents. A total of 66.7% had between one and two risk factors and 25% had between three and four. Seventy-five percent (45) reported inadequate diet, 56.7% (34) were passive smokers and 31.7% (19) had inadequate physical activity (Table 2).

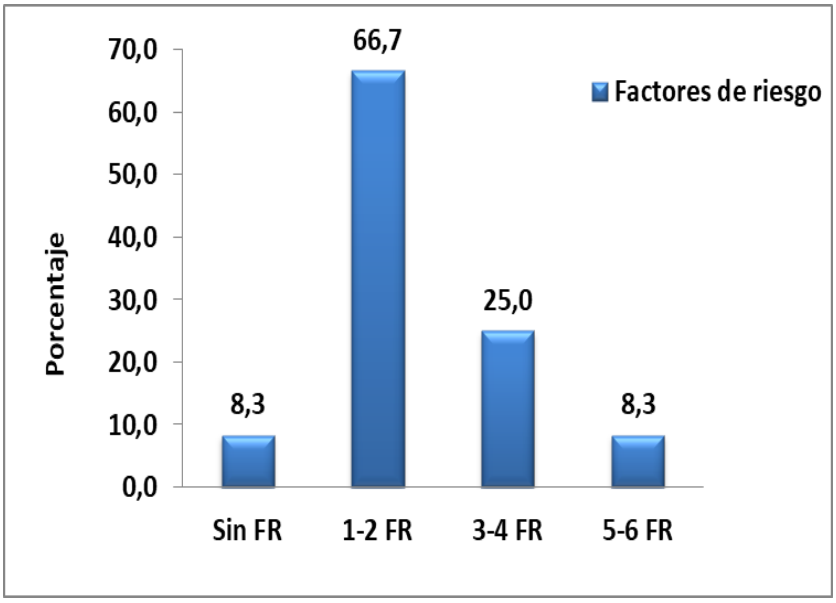

Figure 1. Cardiovascular risk factors in adolescents

Table 2. Risk factors identified in adolescents

Risk factor	No.	%
Inadequate nutrition	45	75.0
Passive smoking	34	56.7
Male sex	27	45.0
Inadequate physical activity	19	31.7
PPA (DM, AHT, CVD)	14	23.3
Active smoking	12	20.0
Overweight-obese	7	11.7
FPH (DM, AHT, Hyperlipidemia)	4	6.7

FPH: family pathological history; DM: diabetes mellitus; AHT: arterial hypertension; CVD: cardiovascular disease; PPA: personal pathologic antecedents

With the application of the ranking method, inadequate nutrition obtained the highest score (11), so we proceeded to the causal analysis with the Ishikawa cause and effect diagram.

In relation to the inadequate nutrition of adolescents, arguments related to the Cuban idiosyncrasy, food habits characterized by the consumption of animal fat, salt and sweets and the low consumption of fruits and vegetables were raised. Aspects related to the work of the health team and the doctor-patient relationship in primary health care were also raised. In this sense, irregularities in the compliance with medical guidelines and insufficient educational work in the individual, the family and the community were pointed out (Figure 2).

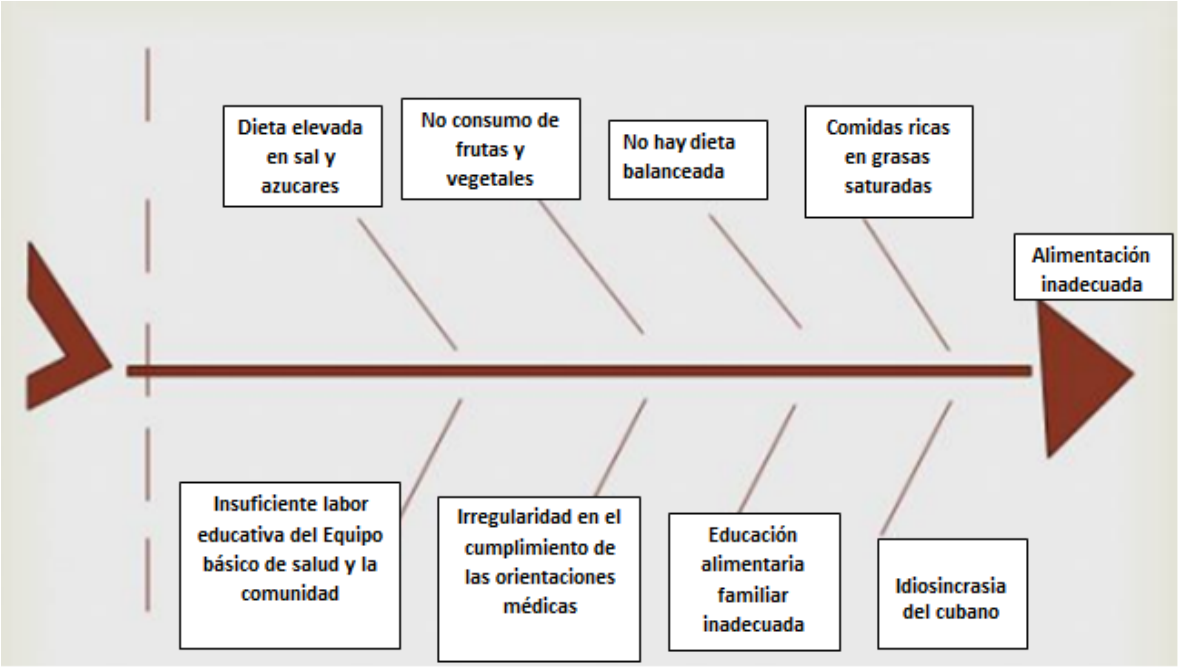

Figure 2. Causal analysis of inadequate nutrition

Because the causes are due to educational actions, the working group developed an action plan for the prevention of cardiovascular disease at the primary level of Primary Health Care (Table 3); the actions are health promotion activities, in other words, they have an educational character

- First action: disseminating the components of a balanced diet by means of banners and murals; this involves the creative participation of the adolescent, which in itself contributes to greater motivation in carrying out what health education is intended to achieve.
- Second action: holding educational talks to the family on healthy diet is of great importance. It is conducted by the family doctor or nurse, or by a health brigade member trained in the subject or a Nutrition Specialist in the health area. It should always be carried out respecting ethics and within the framework of the "family visit" work planned according to the "Comprehensive Care of the Family Physician and Nurse" program, the talks will not only be aimed at the child or adolescent but at all members of the family.
- Third action: community education campaign for better health and a healthy diet; it is carried out throughout the community through health hearings that should be coordinated with community leaders to achieve the greatest possible participation of families, it is led by the Basic Health Team and its logistics may include intersectoral participation with Culture and Sports Specialists.

- Fourth action: nutritional educational workshops; they should be carried out by a multidisciplinary group made up of specialists in psychology, pediatrics and nutrition and would work by age, starting with the creation of adolescent circles.

Table 3. Cardiovascular disease prevention actions for adolescents

Primary level of Primary Health Care **Activity:** to promote social, cultural and environmental lifestyle patterns that contribute to reduce the risk of cardiovascular disease **Objective:** to educate adolescents and family members on proper eating practices		
Action	**Resources and responsible**	**Evaluation**
Disseminate through banners and murals the components of a balanced diet	Health Brigaders and adolescents Cards, pencils and colors	Monthly
To conduct educational talks to the family on healthy diet	Basic Health Team; human resources	Monthly
Community education campaign for better health and a healthy diet ("sanitary hearings")	Social worker, Bachelor in Sports, health brigadista, Basic Health Team, community coordinator, etc.	Three-monthly
Nutritional educative workshop for groups of adolescents	Health team, Teachers of the Basic Work Group	Three-monthly

DISCUSSION

According to studies about this topic carried out in Colombia, in relation to the sociodemographic variables, a median age of 14, an average of 13.9, a minimum age of 10 years and a maximum of 18 years were found in relation to the age of the participants. There is a higher frequency of male gender (53%) and early adolescence was found to be 48%.[11]

In the Municipality of Encrucijada, Villa Clara Province, Cuba, in 2018, it was described that most adolescents went through the middle stage (30.1%) and 19.3% went through pre-adolescence; the female gender was more numerous (56.6%).[12]

When comparing both studies with the present one, it can be seen that, in the case of the former, the sex and pediatric groups do not coincide; in the latter, the female sex is more represented, but the predominant group of adolescents does not coincide.

Venezuelan authors found that 80.95% of the adolescents presented one risk factor, 11.90% two and 7.15% three or more cardiovascular risk factors.[13] This author does not agree with the data collected in this study.

In Ecuador it is reported that 22.8% had unhealthy diet, 1.3% healthy and 75.9% need dietary changes, which coincides with these results.[1] A study also shows identical results because risky dietary patterns represent 94.5%.[14]

In Cuba, 38.6% of adolescents presented between two and three risk factors and 7.2% did not present any predisposing characteristic or circumstance. Although the breakdown of the number of risk factors was not the same as that used in the present study, they agree that the majority of adolescents were exposed to two or three risk factors.[12]

Coincidentally, they agreed that two thirds of the subject population are at cardiovascular risk due to the presence of modifiable risk factors, first of all

poor dietary habits related to the consumption of "junk food" and saturated fat, followed by lack of regular physical activity.[11]

Obese children are three times more likely to develop arterial hypertension and other atherosclerosis-related diseases than non-obese children.[13] Of the children studied, 31.2% were overweight (overweight and obese). The mean age was 7.4 years, 49.6% were girls and 50.4% were boys, with a predominance of children classified as normal weight, followed by obese (16.8%) and overweight (14.4%). Of the overweight and obese children, 61.5% did not have a history of exclusive breastfeeding. The influence of prenatal factors such as maternal nutrition, birth weight and the absence of exclusive breastfeeding on the presence of overweight and obesity in school-aged children was demonstrated.[15]

In a medical office in Cuba, a predominance of female adolescents in the middle and late stages was reported, 6% of adolescents with hyperlipoproteinemia, 2.4% with hypertension and 1.2% with DM. A total of 38.6% presented between two and three risk factors and 7.2% did not present any predisposing characteristic or circumstance. As the years of life increased, adolescents were more exposed to unfavorable circumstances.[12]

Another study suggests that a high proportion of cardiovascular risk factors, including excess weight, abdominal obesity, high blood pressure and low physical condition, may increase morbidity and mortality due to cardiovascular disease in the long term, and that if no intervention is taken in the school population, these factors could increase their prevalence in the coming years and have serious consequences for public health. The analysis of these data is an important step before planning or proposing strategies to increase the practice of healthy lifestyle habits in schoolchildren aged 10 to 17 years.[16]

In a study conducted, it was established that adolescents presented cardiovascular risk factors such as dyslipidemia, overweight/obesity, hypertension, physical inactivity and smoking; likewise, the presence of a family history of cardiovascular disease was also recorded. In this regard, it is necessary to promote opportunities for intervention in the prevention and control of cardiovascular disease with actions aimed at health promotion and should be incorporated at community and national levels through mass communication educational campaigns aimed at combating smoking and promoting healthy eating, at least annual medical check-ups and disciplined physical activity from childhood; these actions should be aimed at parents, children and adolescents.[13]

Cardiovascular risk factors appear early in childhood and adolescence. The university students of Itá, Paraguay, had the following cardiovascular risk factors: overweight (27%), obesity (14%), increased abdominal circumference (26%), increased conicity index (45%), hypertension (18%), sedentary lifestyle (80%), smoking (0.5%) and alcohol intake (15%). According to abdominal circumference and sex, the cardiometabolic risk was high in 21%, moderate in 23% and no risk in 56%.[17]

Adult arterial hypertension has its origins in childhood and is a potential trigger of cardiovascular disease. A study was carried out in the Province of Pinar del Río, in the Municipality of San Juan y Martínez, in a sample of 203 adolescents (57.1% female and 42.9% male), among whom white skin color (66.5%) and family history of arterial hypertension (65%) predominated; other

cardiovascular risk factors were diabetes mellitus (24%), obesity (41%) and heart disease (36.5%), 37.9% smoked, 34% ingested alcoholic beverages. As for dietary habits, only 14.8% were apparently good; 59.1% had regular eating habits and 26.1% had bad eating habits. In relation to sedentary lifestyle, only 25.1% of the adolescents showed non-sedentary lifestyles. Regarding body mass index, most of the adolescents were normal weight (46.8%), 32% were overweight and 39% were obese. The results of this study do not coincide with those of the referred author.[18]

Obesity in infants and adolescents is a growing public health problem. Insulin resistance is a reduction in the physiological response of target tissues to insulin action. In a study conducted at the University of Guayaquil, Ecuador, 37.4% presented hypertriglyceridemia, 19.8% hyperglycemia and 51.6% insulin resistance. The highest average triglyceride levels were found in the 6 to 10 years age group and in the male sex. Statistical analysis showed a significant association between hypertriglyceridemia and insulin resistance ($p<0.05$) and that, as in this study, obesity is an important risk factor in infants.[19]

Tobacco use may become a problem in adolescence; adolescent smokers may become at the same long-term risk of cardiovascular disease or chronic obstructive pulmonary disease as adult smokers.[20]

In a retrospective analytical case-control study, the most important risk factors for developing cardiovascular disease in patients aged 50 years and younger were C-reactive protein, hypertension and smoking, whereas obesity and elevated creatinine and triglyceride values did not show an independent association, and will depend on the presence of other more important factors.[5]

Lipid abnormalities or dyslipidemia are major risk factors for the development of atherosclerosis and cardiovascular disease. Atherosclerosis may begin early in pediatric age, but will manifest clinically by adulthood. Prevention through health promotion and control of risk factors should be initiated early and the pediatrician should lead this process. Non-pharmacological treatment is indicated in all patients with dyslipidemia from two years of age and includes diet, physical activity, lifestyle changes, avoidance or treatment of obesity and control of other RF (arterial hypertension, smoking, stress and sedentary lifestyle).[21]

During adolescence, behaviors are learned that have important repercussions on health, which are strengthened in youth and are difficult to change in adulthood. The teaching of healthy lifestyle habits plays a very important role because it is at this stage that knowledge, skills and attitudes that allow the development of healthy behaviors should be acquired. It has been fully proven that the main health problems in young people are related to their lifestyles.[22]

It is important to educate at all stages of life and, in this regard, systems of actions, strategies and educational programs have been designed for the different age groups in the prevention and management of cardiovascular disease.

The World Health Organization ratified, for the prevention and control of noncommunicable diseases, the 2013-2020 Action Plan, which seeks to reduce the number of premature deaths from chronic noncommunicable diseases by 25% by 2025, and therefore encourages addressing the risk factors for these

diseases, particularly tobacco and alcohol consumption, physical inactivity, salt intake, and hypertension by promoting healthy practices such as eating at least five servings of fruits and vegetables a day and being physically active for 30 minutes or more every day, and conducting campaigns that help reduce tobacco use, encourage protection of non-smokers, and persuade young people to quit smoking; all for the prevention of myocardial infarction and stroke.[23]

An educational program is proposed with important guidelines to avoid interactions between food and drugs, mainly in elderly people with cardiovascular diseases.[24] A participatory nutritional intervention in high school adolescents, to achieve healthier dietary patterns and contribute to stop the epidemic of non-communicable diseases, used the school environment because students spend much of their time there, make some of their meals and because it was possible to count on the participation and support of teachers, who can contribute to more positive results. They considered that providing knowledge is an important strategy that, although not sufficient, is necessary to improve dietary habits. The study achieved an increase in knowledge in the promoter groups in two of the five schools and in one for the recipient groups. A reduction in the consumption of sugar added to milk was achieved in all adolescents and soft drinks in the promoter group. The adolescents participated actively and enthusiastically in the activities and gained an approach to the topic of food-nutrition. She concluded that nutrition education interventions are necessary to achieve healthier dietary patterns and contribute to stop the epidemic of non-communicable diseases.[25]

CONCLUSIONS

Los adolescentes necesitan educación sanitaria para evitar el desarrollo de la enfermedad cardiovascular; el Grupo Básico de Salud y el médico y la enfermera de la familia deben ser consecuentes y diseñar acciones del nivel primordial de prevención en la Atención Primaria de Salud; modificar los estilos de vida es una prioridad e implica hábitos alimentarios adecuados, la práctica de ejercicios físicos, el no consumo de tabaco y el control de las enfermedades crónicas no transmisibles.

BIBLIOGRAPHIC REFERENCES

1. Cando Cando IA. Factores de riesgo cardiovascular y estilos de vida, en adolescentes Escuela Fiscal Federico González Suárez, Sector EU05 San Miguel-Salcedo, 2015-2016 [thesis]. Ambato: Universidad Técnica de Ambato; 2016 [cited 04/15/2022]. Available at: http://repositorio.uta.edu.ec/jspui/bitstream/123456789/24278/1/IRMA%20CANDO%20THESIS.pdf
2. Mostaza JM, Pintó X, Armario P, Masana L, Ascaso JF, Valdivielso P. Estándares SEA 2019 para el control global del riesgo cardiovascular. Clin Investig Arterioscler [Internet]. 2019 [cited 04/15/2022];31(S1):1-43. Available at: https://www.elsevier.es/es-revista-clinica-e-investigacion-arteriosclerosis-15-articulo-estandares-sea-2019-el-control-S0214916819300464. https://doi.org/10.1016/j.arteri.2019.03.004

3. Hospital Universitario Nuestra Señora del Rosario [Internet]. Madrid: Hospital Universitario Nuestra Señora del Rosario; 2022 [update 25/04/2019; cited 04/15/2022]. Las enfermedades cardiovasculares causan el 47% de los fallecimientos en Europa. Available at: https://www.hospitalrosario.es/noticias/las-enfermedades-cardiovasculares-causan-fallecimientos-en-europa/
4. Bustinza Quiñonez KV. Factores predisponentes de enfermedades cardiovasculares en estudiantes universitarios de la Universidad Nacional del Altiplano-Puno, enero–abril 2014 [thesis] Perú: Universidad Nacional del Altiplano; 2016 [cited 04/15/2022]. Available at: https://repositorio.unap.edu.pe/bitstream/handle/UNAP/1843/Bustinza_Qui%C3%B1onez_Karina_Virginia.pdf
5. Berdú Saumell J, Chacón Parada T, Fonseca Aguilera A, Pérez Rivas RM. Factores de riesgo de las enfermedades cardiovasculares en pacientes de 50 años y menos. Multimed [Internet]. 2020 [cited 04/15/2022];24(4):772-791. Available at: http://scielo.sld.cu/pdf/mmed/v24n4/1028-4818-mmed-24-04-772.pdf
6. Fernández González EM, Figueroa Oliva DA. Tabaquismo y su relación con las enfermedades cardiovasculares. Rev Haban Cienc Méd [Internet]. 2018 [cited 04/15/2022];17(2):225-235. Available at: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1729-519X2018000200008
7. Ministerio de Salud Pública. Dirección de Registro Médicos y Estadísticas de Salud. Anuario Estadístico de Salud 2019 [Internet]. La Habana: Minsap; 2020 [cited 04/15/2022]. Available at: https://files.sld.cu/bvscuba/files/2020/05/Anuario-Electr%c3%b3nico-Espa%c3%b1ol-2019-ed-2020.pdf
8. Ministerio de Salud Pública. Dirección de Registro Médicos y Estadísticas de Salud. Anuario Estadístico de Salud 2020 [Internet]. La Habana: Minsap; 2021 [cited 04/15/2022]. Available at: https://files.sld.cu/bvscuba/files/2021/08/Anuario-Estadistico-Espa%c3%b1ol-2020-Definitivo.pdf
9. Ministerio de Salud Pública. Dirección de Registro Médicos y Estadísticas de Salud. Anuario Estadístico de Salud 2021 [Internet]. La Habana: Minsap; 2022 [cited 04/15/2022]. Available at: https://files.sld.cu/dne/files/2022/10/Anuario-Estadistico-de-Salud-2021.-Ed-2022.pdf
10. Dirección Municipal de Salud Santa Clara. Unidad Municipal de Higiene y Epidemiología. Comportamiento de las enfermedades no transmisibles. Santa Clara: Dirección Municipal de Salud Santa Clara; 2022.
11. Torres CI, Illera D, Acevedo DE, Cadena M, Meneses LC, Ordoñez PA, et al. Riesgo cardiovascular en una población adolescente de Timbío, Colombia. Rev Univ Ind Santander Salud [Internet]. 2018 [cited 04/15/2022];50(1):59-65. Available at: http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S0121-08072018000100059. https://dx.doi.org/10.18273/revsal.v50n1-2018006
12. Sotés Martínez JR, Rey Pino DR, Araujo García M. Factores de riesgo cardiovascular en adolescentes de un consultorio médico. Acta Méd Centro [Internet]. 2020 [cited 04/15/2022];14(1):18-29. Available at: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S2709-79272020000100018
13. Duin Balza A, Sosa-Canache B, Hernández-Hernández R, Camacho C, Camacho JC. Factores de riesgo cardiovascular en adolescentes. Rev Venezolana Salud Publica [Internet]. 2018 [cited 04/15/2022];6(2):17-25. Available at: https://revistas.uclave.org/index.php/rvsp/article/view/1955
14. Gorrita Pérez RR, Ruiz King Y, Hernández Martínez Y, Sánchez Lastre M. Factores de riesgo de enfermedades cardiovasculares y cerebrovasculares en adolescentes. Rev Cubana Pediatr [Internet]. 2015 [cited 04/15/2022];87(2):140-155. Available

at: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0034-75312015000200002&lng=es
15. Ferrer Arrocha M, Fernández Rodríguez C, González Pedroso MT. Factores de riesgo relacionados con el sobrepeso y la obesidad en niños de edad escolar. Rev Cubana Pediatr [Internet]. 2020 [cited 04/15/2022];92(2):e660. Available at: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0034-75312020000200004
16. Cardona-Gómez J. Factores de riesgo cardiovascular en adolescentes de 10 a 17 años escolarizados de la ciudad de Medellín, 2015. Rev Fac Nac Salud Pública [Internet]. 2019 [cited 04/15/2022];37(3):34-43. Available at: http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S0120-386X2019000300034. https://doi.org/0.17533/udea.rfnsp.v37n3a05
17. Real Delor R, López Ibarra F, Segovia Benítez D, López Esquivel N. Factores de riesgo cardiovascular y anomalías electrocardiográficas en estudiantes universitarios de Itá, Paraguay. An Fac Cienc Méd (Asunción) [Internet]. 2019 [cited 04/15/2022];52(2):23-34.Available at: http://scielo.iics.una.py/scielo.php?script=sci_arttext&pid=S1816-89492019000200023. https://doi.org/10.18004/anales/2019.052(02)23-034
18. Rojas-Concepción AA, Guerra-Chagime R, Guerra-González Y, Hernández-Peraza E, Forteza-Padrino O. Factores asociados a la hipertensión arterial en adolescentes de San Juan y Martínez, 2018. Rev Cubana Salud Pública [Internet]. 2020 [cited 04/15/2022];46(4):23-34. Available at: https://revsaludpublica.sld.cu/index.php/spu/article/view/2174
19. Cabrera-Jiménez FP, Palma-Estrada CM, Campos-Carbo LD, Valverde-Palma LG. La hipertrigliceridemia como marcador temprano de resistencia a la insulina en obesidad infanto-juvenil. Rev Cubana Pediatr [Internet]. 2018 [cited 04/15/2022];90(3):[aprox. 10 p.]. Available at: https://revpediatria.sld.cu/index.php/ped/article/view/485
20. Galbe Sánchez-Ventura J, Rando Diego Á, San Miguel Muñoz MJ, Colomer Revuelta J, Cortés Rico O, Esparza Olcina MJ, et al. Prevención del consumo de tabaco en la adolescencia. Rev Pediatr Aten Primaria [Internet]. 2020 [cited 04/15/2022];22(88):411-422. Available at: https://scielo.isciii.es/scielo.php?script=sci_arttext&pid=S1139-76322020000500021&lng=es
21. Gambetta JC, Araujo MB, Chiesa P. Dislipemias en la edad pediátrica. Importancia del diagnóstico y tratamiento precoces. Rev Urug Cardiol [Internet]. 2019 [cited 04/15/2022];34(3):208-238. Available at: http://www.scielo.edu.uy/scielo.php?script=sci_arttext&pid=S1688-04202019000300208&lng=es&nrm=iso&tlng=es. https://doi.org/10.29277/cardio.34.3.20
22. Suarez Villa ME, Navarro Agamez MJ, Caraballo Robles DR, López Mozo LV, Recalde Baena AC. Estilos de vida relacionados con factores de riesgo cardiovasculares en estudiantes Ciencias de la Salud. ENE [Internet]. 2020 [cited 04/15/2022];14(3):[aprox. 13 p.]. Available at: https://www.ene-enfermeria.org/ojs/index.php/ENE/article/view/1036
23. Organización Mundial de la Salud [Internet]. Ginebra: OMS; 2023 [update 19/01/2015; cited 04/15/2022]. Cada año, las enfermedades no transmisibles provocan 16 millones de defunciones prematuras, por lo que la OMS insta a redoblar esfuerzos; [aprox. 6 screens]. Available at: https://www.who.int/es/news/item/19-01-2015-noncommunicable-diseases-prematurely-take-16-million-lives-annually-who-urges-more-action
24. Jiménez Fernández L, Chala Tandrón JM, Armada Esmores Z, García Arcia M, Padrón Ortega R, García Arcia M, et al. Diseño de un programa educativo sobre interacciones entre alimentos y medicamentos en ancianos con enfermedades

cardiovasculares. CorSalud [Internet]. 2021 [cited 04/15/2022];13(2):179-188. Available at: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S2078-71702021000200179&lng=es&nrm=iso&tlng=es

25. Macías-Matos C, Basabe-Tuero B, Pita-Rodríguez G, Sanabria-González SA, Mercader-Camejo O, Herrera Javier D. Intervención nutricional participativa en adolescentes de enseñanza media del municipio Habana Vieja. Rev Cubana Salud Pública [Internet]. 2020 [cited 04/15/2022];46(3):e2039. Available at: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0864-34662020000300012

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

AUTHORS' CONTRIBUTION

ERCV: conceptualization, research, methodology, supervision, visualization.
YVQ: data curation, formal analysis, project management, research, methodology, visualization, writing (review and editing).
YGE: data curation, research, supervision, validation, writing (review and edit).
RMEC: visualization, writing (review and edit).
LMM: writing (reviewing and editing).