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Characterization of mortality from cardiovascular diseases: Cuba, 2013-2022

Caracterización de la mortalidad por enfermedades cardiovasculares: Cuba, 2013-2022

Marielys Grillo Martín[1] ✉, Noydelis Miranda Lores[1] ✉, Damian Valdés Santiago[2] ✉

[1]Instituto de Cardiología y Cirugía Cardiovascular. La Habana, Cuba.
[2]Universidad de La Habana, Facultad de Matemática y Computación. La Habana, Cuba.

ABSTRACT

Introduction: cardiovascular diseases are the main cause of death in Cuba and the world. Statistics management contributes to identifying areas of greater risk and need, allows the effective allocation of resources for the prevention and treatment of these diseases and facilitates the implementation of programs to reduce morbidity and mortality.
Objective: to characterize the mortality from cardiovascular diseases in Cuba, in the 2013-2022 decade.
Method: an ecological study was carried out. Statistical health yearbooks published from 2014 to 2023 were reviewed. The gross rates of mortality from heart and brain diseases were considered in all ages, according to sex and years of life potentially lost by those causes. Mortality rates adjusted by age and the number of deaths were taken into account by the main cardiovascular diseases and their distribution by age group.
Results: a tendency to increase the gross rates of mortality from cardiovascular diseases was evidenced. Mortality rates adjusted by age showed a similar tendency. Heart diseases stood out as responsible for a greater number of deaths and potentially lost years. Mortality rates for cardiovascular diseases were higher in male sex and the number of deceased increase in correspondence with the increase in age.
Conclusions: it is necessary to evaluate and rethink current strategies in cardiovascular prevention and develop new guidelines that guarantee adequate balance between effective primary prevention and quality medical assistance.

Keywords: Mortality; Cardiovascular Diseases; Cuba.

RESUMEN

Introducción: las enfermedades cardiovasculares son la principal causa de muerte en Cuba y el mundo. El manejo de las estadísticas contribuye a identificar áreas de mayor riesgo y necesidad, permite la asignación efectiva de recursos para la prevención y tratamiento de estas enfermedades y facilita la implementación de programas para reducir la morbilidad y mortalidad.
Objetivo: caracterizar la mortalidad por enfermedades cardiovasculares en Cuba, en el decenio 2013-2022.
Método: se realizó un estudio ecológico. Se revisaron los Anuarios Estadísticos de Salud publicados desde el 2014 al 2023. Se consideraron las tasas brutas de mortalidad por enfermedades del corazón y cerebrovasculares en todas las edades, según el sexo y los años de vida potencialmente perdidos por esas causas. Se tuvieron en cuenta las tasas de mortalidad ajustada por edad y el número de defunciones por las principales enfermedades cardiovasculares y su distribución por grupo de edades.
Resultados: se evidenció una tendencia al incremento de las tasas brutas de mortalidad por enfermedades cardiovasculares. Las tasas de mortalidad ajustada por edad mostraron una tendencia similar. Las

enfermedades del corazón destacaron como responsables de un mayor número de fallecidos y de años de vida potencialmente perdidos. Las tasas de mortalidad para las enfermedades cardiovasculares fueron superiores en el sexo masculino y el número de fallecidos aumentó en correspondencia con el incremento de la edad.
Conclusiones: resulta necesario evaluar y repensar las estrategias actuales en prevención cardiovascular y desarrollar nuevas directrices que garanticen un balance adecuado entre prevención primaria efectiva y asistencia médica de calidad.

Palabras clave: Mortalidad; Enfermedades Cardiovasculares; Cuba.

INTRODUCTION

Cardiovascular diseases (CVD) are the leading cause of death worldwide and generate one of the highest burdens of morbidity and disability. In 2017, according to data provided by the World Health Organization (WHO), they caused the deaths of 17,8 million people worldwide.[1] Currently, they affect both sexes equally and are increasingly present in working-age populations, contributing to the loss of potential years of healthy life and generating an unprecedented economic and social impact.[1,2]

Heart and cerebrovascular diseases are responsible for the highest number of cardiovascular deaths, accounting for 60 % of total cardiovascular mortality. It is estimated that one-third of these deaths occur prematurely in people under the age of 70. Similarly, they are a major cause of disability, contributing substantially to the unstoppable rise in healthcare costs. Consequently, it is estimated that by 2030, around 23,6 million people will die from some form of CVD, and it is expected that in the future, they will continue to be the leading cause of death.[1,2]

However, the situation regarding CVD is not the same in all countries. Over the last two decades, there has been a shift in the burden of mortality from high-income countries to low- and middle-income countries, due to a combination of demographic and socioeconomic factors, urbanization processes, and cardiovascular risk behaviors, which have resulted in divergent epidemiological trends. On the other hand, interventions in developed countries aimed at preventing and treating CVD and its risk factors have contributed to a decline in CVD mortality rates. This is reflected in a decrease in risk factors in high-income countries, while in low- and middle-income countries they have increased. It should be noted that 85 % of the world's population lives in low- and middle-income countries, which therefore contribute to a greater extent to CVD rates.[1,2,3]

The Latin American and Caribbean region is no exception to this reality.[3,4] In 2016, the regional CVD mortality rate was 150,7 per 100 000 inhabitants, but rates varied substantially between countries. The rate recorded in Guyana, which was the highest (443,5/100 000), was six times higher than that recorded in Canada, which was the lowest (75,8/100 000).[5] According to the results of one study, in 2017 there were 14 million new cases of CVD, 80 million people with some form of CVD, and 2 million deaths from this cause.[6] It should be emphasized that the CVD crisis is closely related to the rise in risk factors and the aging of the population.

Similarly, in Cuba, CVD ranks among the top ten causes of death, among all causes and ages in the country. Annual crude mortality rates from heart disease and cerebrovascular disease, across all ages, have been steadily rising since 1970.[7,8,9] Consequently, the management of statistics on causes of death from CVD is considered relevant, as it helps to identify areas of greatest risk and need, enabling the effective allocation of resources for the prevention and treatment of these diseases and facilitating the implementation of programs to reduce CVD morbidity and mortality. The authors set themselves the objective of characterizing mortality from cardiovascular diseases in Cuba in the decade 2013-2022.

METHOD

An ecological study was conducted to characterize mortality from cardiovascular disease in Cuba in the decade 2013-2022.

The source of information for this study was the statistical yearbooks published from 2014 to 2023 by the Directorate of Medical Records and Health Statistics of the Cuban Ministry of Public Health, corresponding to the years 2013 to 2022. The lists with the corresponding codes for heart disease (I05-I52) and cerebrovascular disease (I60-I69) were used, according to the revision of the International Classification of Diseases (ICD-10).[10]

The crude mortality rates for heart disease and cerebrovascular disease were considered for all ages, according to sex and years of potential life lost per 1,000 inhabitants aged 1 to 74 years for these causes. In addition, age-adjusted mortality rates were taken into account, based on the 1981 population structure (last published census), as well as the number of deaths from major cardiovascular diseases and their distribution by age group.

The data were analyzed automatically. *Microsoft Office Excel 2010* was used to create and fill in the database. Statistical analysis was performed using the *jamovi* program, version 2.5.6.[11] Summary measures

were determined for qualitative variables (absolute frequencies and rates). The results were expressed in tables and graphs for better understanding and analysis.

RESULTS

Figure 1 shows an upward trend in crude mortality rates for heart and cerebrovascular diseases from 2013 to 2022. In addition, heart disease stood out as the leading cause of death, with mortality rates ranging from 204,5 to 400,3 per 100 000 inhabitants.

In 2021, there was an increase in deaths from CVD, which coincided with the peak of the COVID-19 pandemic. (figure 1)
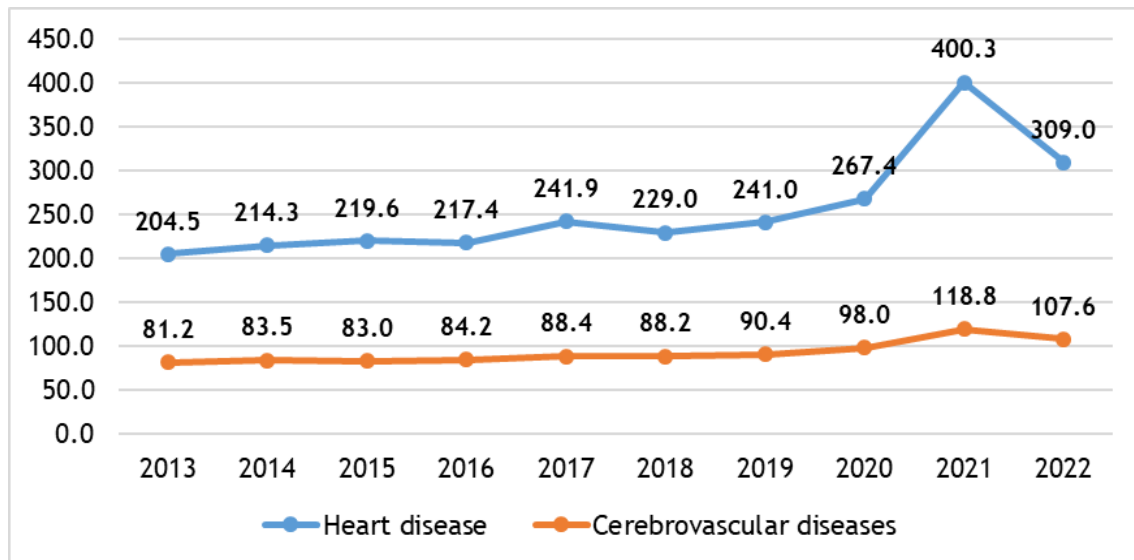

Figure 1. Crude mortality rate from cardiovascular disease. Cuba, 2013-2022
Note: Rate per 100 000 inhabitants.

Figure 2 compares the crude mortality rates and age-adjusted mortality rates, based on the 1981 population structure, for heart disease and cerebrovascular disease in the period 2013-2022. It shows how age-adjusted mortality rates presented a clear upward trend, similar to crude mortality rates. (figure 2)
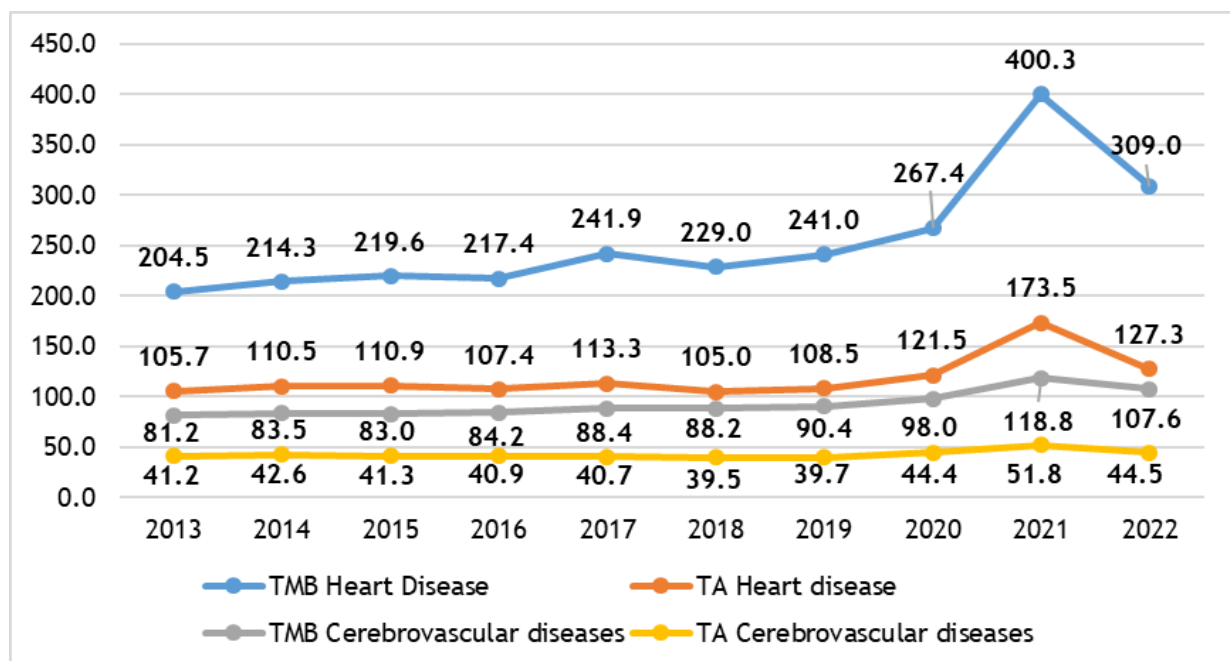

Figure 2. Crude and age-adjusted mortality rates for cardiovascular diseases. Cuba, 2013-2022
Note: BMR: Crude mortality rate per 100 000 inhabitants; AMR: Age-adjusted mortality rate per 1 000 inhabitants.

Figure 3 shows an analysis of potential years of life lost due to heart disease and cerebrovascular disease. This is an accurate indicator of premature mortality, showing the number of years of life lost when death occurs before a certain age, which in Cuba has been set at 74 years.

Among CVDs, heart disease was responsible for the greatest number of potential years of life lost. The observed trend is upward. (figure 3)
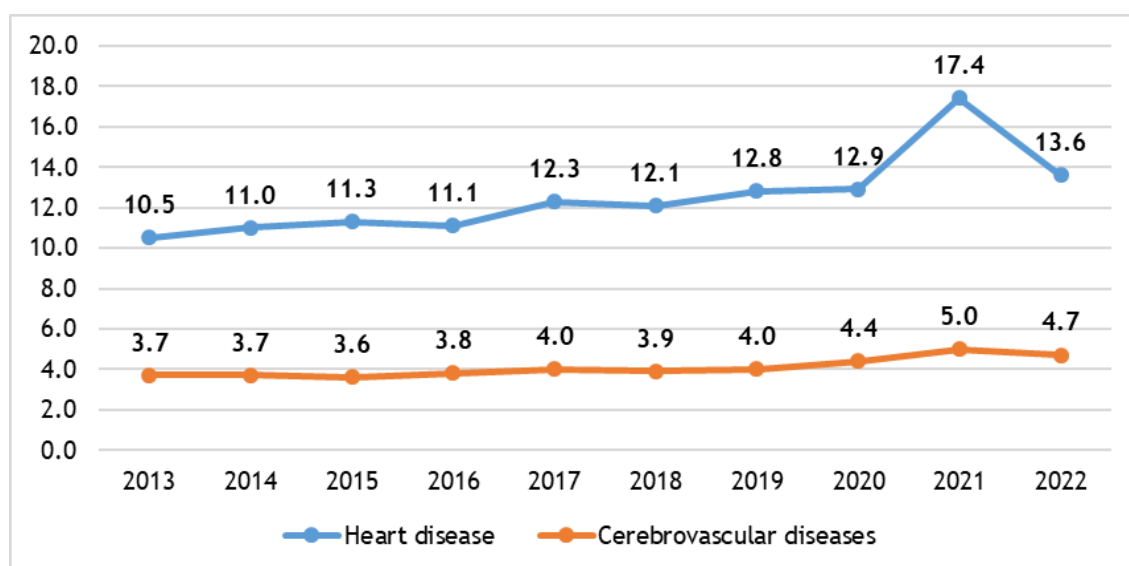

Figure 3. Potential years of life lost due to cardiovascular diseases as causes of death, per 1 000 inhabitants aged 1-74. Cuba, 2013-2022

Figure 4 shows the trend in crude mortality rates for the main CVDs by sex. As can be seen, mortality rates for heart disease were higher in males. As for cerebrovascular diseases, rates were higher in males, except in 2013 and 2015, when they were very similar in both sexes. (figure 4)
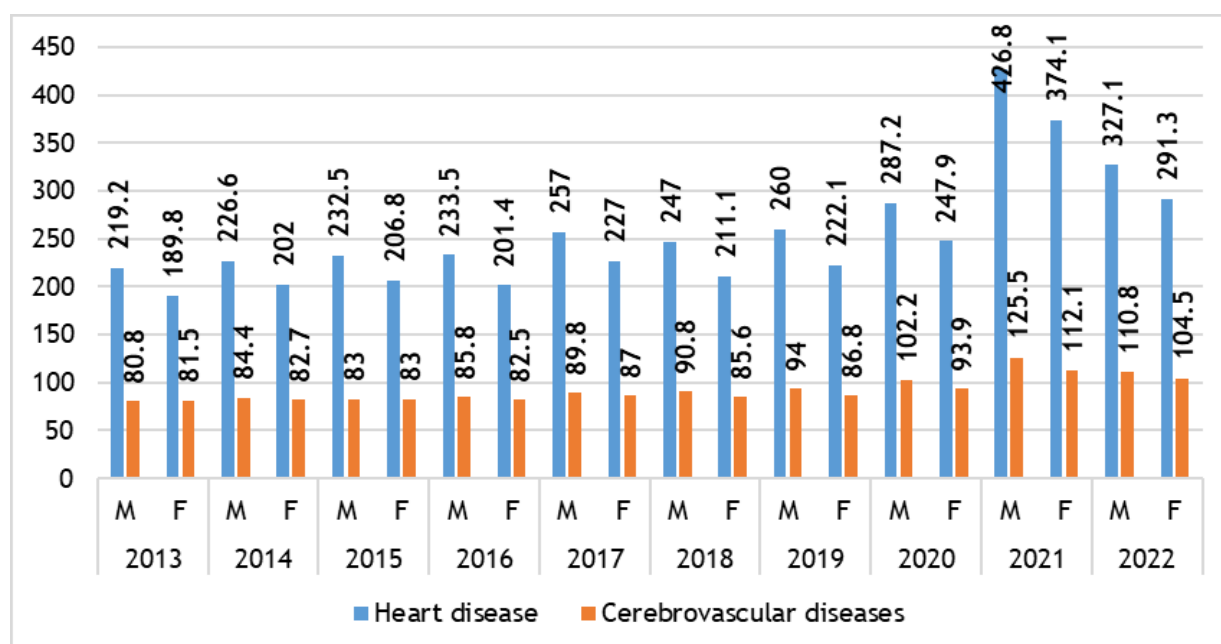

Figure 4. Crude mortality rate from cardiovascular diseases by sex. Cuba, 2013-2022
Note: CMR: Crude mortality rate per 100,000 inhabitants.

Table 1 below shows the number of deaths from the main CVDs by age group. There is a clear increase in the number of deaths with increasing age. There are no marked differences between age groups in the years studied, except in 2021. (table 1)

Table 1. Deaths from cardiovascular diseases by age group. Cuba, 2013-2022						
Years	**Age group**					
	20 years	**20-39**	**40-59**	**60-79**	**≥ 80 years**	**Total**
2013	50	244	3 465	13 169	14 729	31 657
2014	50	249	3 535	13 769	15 279	32 882
2015	43	248	3 696	14 243	15 541	33 771
2016	36	278	3 788	11 991	15 647	31 740
2017	40	262	4 000	16 144	16 634	37 080
2018	36	280	4 002	15 458	15 779	35 555
2019	47	169	4 193	16 106	16 111	36 626
2020	30	295	4 365	17 256	17 605	39 551
2021	51	356	5 214	23 299	26 868	55 788
2022	57	286	4 156	18 935	20 799	44 233
Total	440	2 667	40 414	160 370	174 992	378 883

DISCUSSION

Since the 1960s, Cuba has made remarkable progress in the public health sector, leading to the development of a system that guarantees universal coverage and effective access to health services. This has resulted in a unique epidemiological and demographic situation in a developing country: a decline in communicable diseases, in contrast to a predominance of noncommunicable diseases and, as a consequence, a gradual and accelerated aging of the population, with a new disease and mortality profile similar to that of developed countries.[1,12]

According to the WHO, CVDs are a group of disorders of the heart and blood vessels and include heart disease, cerebrovascular disease, and diseases of the arteries, arterioles, and capillaries, with the first two causing the highest number of deaths.[13] In this regard, atherosclerotic disease is the pathophysiological mechanism underlying the occurrence of these diseases and results from the combined and continuous interaction between a predisposing genetic load and the presence of multiple risk factors that interact with each other, which enhances their onset.[5,13,14,15] It follows that, in order to address the issue of CVD, the epidemiological situation of its main risk factors must first be understood.

Cuba has a robust system for monitoring risk factors and noncommunicable diseases, with reliable data integrated into the statistical information system. In addition, four population surveys have been conducted: National Risk Factor Surveys I, II, and III, and the National Health Survey (1995, 2001, 2010, 2018-2019), representative at both the provincial and national levels, to determine risk factors in the population.[12,16]

Survey reports show an upward trend in risk factors related to CVD, which has a negative impact on the progression of these diseases. High blood pressure (HBP) and tobacco use are the main risk factors related to morbidity and mortality from CVD.[1,2,16] However, attention should also be paid to patients with diabetes mellitus, hyperlipoproteinemia, overweight/obesity, and a sedentary lifestyle.

Firstly, according to the results of the National Health Survey, the prevalence of HTN in Cuba was 37,3 %, higher in females (40,2 %) and in people with black skin color (44,9 %). HTN increased with age.[17]

With regard to the data provided by the three previous surveys, there was an increase in the prevalence of HTN among known hypertensive patients and those receiving outpatient care, but not among new cases, which decreased in relation to those found in the Third National Risk Factor Survey. An increase was observed in the number of patients under control among those receiving treatment. The number of patients under control among those known to be hypertensive also increased, although more modestly. However, the number of patients receiving treatment among those known to be hypertensive decreased compared to those identified in the Third National Risk Factor Survey.[17]

It is striking that the prevalence of hypertension reported in the surveys was higher than that recorded by primary care providers during the dispensing process, according to the statistical yearbooks of the Ministry of Public Health for those years; in other words, there was a significant number of people with the disease who had not been diagnosed by the primary health care system. This gap in registration could be linked to poor care and follow-up of these unknown and, therefore, uncontrolled patients.[17,18]

It is a priority to promote active screening for HTN in the general population and in possible risk groups, in order to make an early diagnosis and implement appropriate treatment. This would ensure adequate monitoring and control of the disease, with significant health and economic benefits for both the individual suffering from it and the country as a whole. In addition, it would contribute decisively to reducing morbidity and mortality from CVD.

Tobacco consumption is a very important component of the country's disease burden, given its prevalence

in the Cuban population. However, an analysis of the results obtained after conducting the surveys showed that prevalence in Cuba continues to decline. In the First National Risk Factor Survey, the prevalence was 36,8 %, in the Second Survey it was 32,1 %, and in the Third Survey it was 23,7 %. The National Health Survey showed even lower figures, with a prevalence of 21,6 %. It should be noted that the onset of tobacco use at an early age has increased.[1,2,16] In this context, it is considered that there is still a long way to go. Special attention should be given to those individuals who are starting to use tobacco, especially adolescents and young people.

Physical inactivity is another highly prevalent risk factor. The Third National Risk Factor Survey, using the IPAQ (International Physical Activity Questionnaire), made it possible for the first time to use this instrument at the country level to classify the population. Sixty-seven point two percent of individuals were classified as active, 6,2 % as irregularly active, and 2,65 % as sedentary, with a tendency toward decreased physical activity as age increased.[19] However, when analyzing the data provided by the surveys, an increase in the prevalence of insufficient physical activity among individuals was observed. In the First National Risk Factor Survey, the prevalence was 33,2 %, in the Second Survey it was 38,3 %, and in the Third Survey it was 40,4 %, while in the National Health Survey it was evident in more than half of the population (56,3 %). [16]

Accordingly, obesity and overweight are common risk factors in Cuba, which require special attention. According to the Third National Risk Factor Survey, the prevalence of overweight and obese patients was 29,8 % and 15,1 %, respectively, with a predominance of females in both categories.[19] On the other hand, the National Health Survey provided even more alarming results. The prevalence of overweight and obese patients rose to 35,1 % and 21,4 %, respectively, and was higher among males, with 20 % overweight and 21,8 % obese, compared to females, who were 19,9 % overweight and 17,9 % obese.

As for diabetes mellitus, the National Health Survey showed a prevalence of 10,1 %, at the expense of females.[19] The 2019 health statistics yearbook showed the same superiority of females over males, with 77,7 % and 55,6 %, respectively.[20]

On another note, the Third National Risk Factor Survey detected hypertriglyceridemia in 14,7 % of the population, with an increase from the mid-forties onwards, and hypercholesterolemia in 8,4 %.[19] According to the National Health Survey, hypertriglyceridemia and hypercholesterolemia were found in 18,1 % and 9,7 % of the population, respectively.[16] The challenges still facing the national health system in controlling dyslipidemia are clear.

Cardiovascular diseases are a matter of utmost importance, given their devastating social impact, as they are among the leading causes of morbidity and mortality in the country. Their risk factors are numerous, but mostly modifiable, so any effort made to eliminate or control them will contribute decisively to reducing morbidity and mortality from CVD in Cuba.

Accordingly, active screening of patients with CVD or its risk factors is necessary, as well as adequate dispensing of medication to the population, which would result in adequate follow-up and control of the patient, with the implementation of timely medical treatment if necessary.

However, the key lies in the primary prevention of CVD and its risk factors, since once these are established, they constitute a defeat for public health professionals and their intervention becomes more complex. It is necessary to implement educational interventions for the entire population, promote healthy lifestyles, and encourage changes in attitudes among individuals, families, and communities. In this regard, it is crucial to address work with children, since it is at this age that good or bad habits are formed that will accompany them into adulthood. All of this would result in individual responsibility for health care and an awareness of cardiovascular risk.

CONCLUSIONS

It is necessary to evaluate and rethink current cardiovascular prevention strategies and develop new guidelines that ensure an adequate balance between effective primary prevention and quality medical care.

BIBLIOGRAPHICAL REFERENCES

1. GBD. Global, regional, and national age-sex-specific mortality for 282 causes of death in 195 countries and territories, 1980-2017: a systematic analysis for the Global Burden of Disease Study 2017. Lancet. 2018;392(10159):1736-88. Disponible en: https://doi.org/10.1016/S0140-6736(18)322003-7

2. World Health Organization. Improving hypertension control in 3 million people: country experiences of programme development and implementation. Geneva: WHO; 2020. ISBN: 9789240012714. Disponible en: https://iris.who.int/handle/10665/336019

3. Ordunez P, Tajer C, Gaziano T, Rodríguez YA, Rosende A, Jaffe MG. La aplicación HEARTS: una herramienta clínica para la gestión del riesgo cardiovascular y la hipertensión en atención primaria de salud. Rev Panam Salud Pública. 2022;46:e46. Disponible en: https://doi.org/10.26633/RPSP.2022.46

4. OECD/The World Bank. Mortalidad por enfermedades cardiovasculares. In: Health at a Glance: Latin America and the Caribbean 2020. Paris: OECD Publishing; 2020. p. 72-73. Disponible en: https://doi.org/10.1787/f09e3793-ess

5. Organización Panamericana de la Salud. Las ENT de un vistazo: Mortalidad de las enfermedades no transmisibles y prevalencia de sus factores de riesgo en la Región de las Américas. Washington (DC): OPS; 2019. Disponible en: https://iris.paho.org/handle/10665.2/51572

6. Martinez R, Soliz P, Mujica OJ, Reveiz L, Campbell NRC, Ordunez P. The slowdown in the reduction rate of premature mortality from cardiovascular diseases puts the Americas at risk of achieving SDG 3.4: A population trend analysis of 37 countries from 1990 to 2017. J Clin Hypertens (Greenwich). 2020;22(8):1296-1309. Disponible en: https://doi.org/10.1111/jch.13922

7. Dueñas Herrera AF, Armas Rojas NB, Henry Vera G, Martínez Fernández CR. Mortalidad prematura por enfermedades cardiovasculares en Cuba. Rev Cuba Cardiol Cir Cardiovasc. 2018;24(4):420-6. Disponible en: http://www.revcardiologia.sld.cu/index.php/revcardiologia/article/view/819

8. Ordúñez García PO, Cooper RS, Espinosa Brito AD, Iraola Ferrer MD, Bernal Muñoz JL, La Rosa Linares Y. Enfermedades cardiovasculares en Cuba: determinantes para una epidemia y desafíos para la prevención y control. Rev Cubana Salud Pública. 2005;31(4). Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0864-34662005000400002&lng=es

9. Revueltas-Agüero M, Benítez-Martínez M, Hinojosa-Álvarez MC, Venero-Fernández S, Molina-Esquivel E, Betancourt-Bethencourt JA. Caracterización de la mortalidad por enfermedades cardiovasculares: Cuba, 2009-2018. AMC. 2021;25(1):e7707. Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1025-02552021000100003&lng=es

10. Organización Panamericana de la Salud. Clasificación estadística internacional de enfermedades y problemas relacionados con la salud, décima revisión (CIE-10). Washington (DC): OPS; 1995. ISBN: 92 75 31554 X. Disponible en: https://www.apps.who.int

11. Şahin M, Aybek E. Jamovi: An Easy to Use Statistical Software for the Social Scientists. Int J Assess Tools Educ. 2019;:670-92. Disponible en: https://eric.ed.gov/?id=EJ1243495

12. Landrove-Rodríguez O, Morejón-Giraldoni A, Venero-Fernández S, Suárez-Medina R, Almaguer-López M, Pallarols-Mariño E, et al. Enfermedades no transmisibles: factores de riesgo y acciones para su prevención y control en Cuba. Rev Panam Salud Publica. 2018;42:e23. Disponible en: https://doi.org/10.26633/RPSP.2018.23

13. Visseren FLJ, Mach F, Smulders YM, Carballo D, Koskinas KC, Back M, et al.; ESC Scientific Document Group. 2021 ESC Guidelines on cardiovascular disease prevention in clinical practice. Eur Heart J. 2021;42(34):3227-37. Disponible en: https://doi.org/10.1093/eurheartj/ehab484

14. Viera AJ, Reamy BV Jr. Cardiovascular disease prevention: risk assessment. FP Essent. 2022;520:8-14. PMID: 36069717. Disponible en: https://pubmed.ncbi.nlm.nih.gov/36069717/

15. Grillo Martín M, Mezquia de Pedro N, González García S. Tablas de predicción de riesgo cardiovascular empleadas en Cuba. Rev Cuba Cardiol Cir Cardiovasc. 2023;29(1). Disponible en: https://revcardiologia.sld.cu/index.php/revcardiologia/article/view/1408

16. Colectivo de autores. Enfermedades no transmisibles en Cuba. La Habana: Editorial Ciencias Médicas; 2022. Disponible en: http://www.bvscuba.sld.cu/libro/enfermedades-no-transmisibles-en-cuba

17. Revueltas-Agüero M, Molina-Esquivel E, Suárez-Medina R, Bonet-Gorbea M, Varona-Pérez P, Benítez-Martínez M. La hipertensión arterial en Cuba según la Encuesta Nacional de Salud 2018-2019. AMC. 2022;26:e9239. Disponible en: https://revistaamc.sld.cu/index.php/amc/article/view/9239

18. Revueltas-Agüero M, Molina-Esquivel E, Benítez-Martínez M, Hinojosa-Álvarez MC, Venero-Fernández S, Betancourt-Bethencourt JA. Caracterización de la prevalencia y mortalidad por hipertensión arterial en Cuba, decenio 2009-2018. Rev Haban Cienc Méd. 2021;20(2):e3457. Disponible en: http://www.revhabanera.sld.cu/

index.php/rhab/article/view/3457

19. Bonet M, Varona P, La Rosa MC, García RG, Suárez R, Arcia N, et al. III Encuesta nacional de factores de riesgo y actividades preventivas de enfermedades no transmisibles. Cuba 2010-2011. La Habana: Editorial Ciencias Médicas; 2014. ISBN: 978-959-212-894-1.

20. Ministerio de Salud Pública. Anuario Estadístico de Salud 2019. Dirección de Registros Médicos y Estadísticas de Salud. La Habana; 2020. ISSN (electrónico): 1561-4433.

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CONFLICT OF INTEREST

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AUTHOR CONTRIBUTION

Conceptualization: Marielys Grillo Martín, Noydelis Miranda Lores.
Data curation: Marielys Grillo Martín, Damian Valdés Santiago.
Formal analysis: Marielys Grillo Martín, Damian Valdés Santiago.
Research: Marielys Grillo Martín, Noydelis Miranda Lores, Damian Valdés Santiago.
Methodology: Marielys Grillo Martín, Damian Valdés Santiago.
Project management: Marielys Grillo Martín.
Resources: Marielys Grillo Martín, Damian Valdés Santiago.
Software: Marielys Grillo Martín, Damian Valdés Santiago.
Supervision: Marielys Grillo Martín, Damian Valdés Santiago.
Validation: Marielys Grillo Martín, Damian Valdés Santiago.
Visualization: Marielys Grillo Martín, Damian Valdés Santiago.
Writing – original draft: Marielys Grillo Martín, Noydelis Miranda Lores.
Writing – review and editing: Marielys Grillo Martín, Damian Valdés Santiago.