Salud, Ciencia y Tecnología. 2025; 5:1767
doi: 10.56294/saludcyt20251767

REVIEW

Risk and clinical factors associated with diabetes and hypertension in Latin America

Factores de riesgo y clínicos asociados a la diabetes e hipertensión en Latinoamérica

Yelisa Estefanía Durán Pincay[1], Mercy Doménica Durán Pincay[2], Néstor Raúl Parrales Ponce[2], Lidia Fernanda Jijón Cañarte[1], Jenniffer Romina Cañarte Murillo[1]

[1]Universidad Estatal del Sur de Manabí, Facultad Ciencias de la Salud, Carrera de Laboratorio Clínico. Jipijapa. Ecuador.
[2]Universidad San Gregorio de Portoviejo, Área de la salud, Carrera de Medicina. Portoviejo. Ecuador.

Cite as: Durán Pincay YE, Durán Pincay MD, Parrales Ponce NR, Jijón Cañarte LF, Cañarte Murillo JR, Jaime Mora VA. Risk and clinical factors associated with diabetes and hypertension in Latin America. Salud, Ciencia y Tecnología. 2025; 5:1767. https://doi.org/10.56294/saludcyt20251767

Submitted: 22-11-2024 **Revised:** 01-03-2025 **Accepted:** 05-06-2025 **Published:** 06-06-2025

Editor: Prof. Dr. William Castillo-González

Corresponding author: Yelisa Estefanía Durán Pincay

ABSTRACT

Introduction: Diabetes mellitus and hypertension are interrelated diseases that strongly promote the spread of atherosclerotic cardiovascular disease within populations. The prevalence of hypertension doubles in the presence of diabetes and is associated with 35-75 % of diabetic cardiovascular and renal complications, which is why the aim of this study was to identify the epidemiological characteristics of diabetes associated with hypertension in Latin America, focusing on risk factors and clinical manifestations.
Method: a descriptive-analytical systematic review was carried out through a search of updated scientific material in academic databases such as Medline (via PubMed), academic Google and Web of Sciences, with a time range from 2020 to 2024, in Spanish and English.
Results: it was obtained that the most common risk factors for diabetes associated with hypertension include smoking, alcohol consumption, obesity and dyslipidemia, with the affectation in the average age of 57 years, the most frequent clinical manifestations of diabetes associated with hypertension include mainly nephropathy, heart disease and elevated blood pressure.
Conclusions: the risk factor was identified as frequent smoking in older people, this frequency is attributable to the higher prevalence of these conditions in the elderly and to its important contribution to the development of hypertension in diabetics, and the most frequent clinical manifestation is nephropathy.

Keywords: Hypertension; Diabetes; Risk Factors; Clinical Factors.

RESUMEN

Introducción: la diabetes mellitus y la hipertensión son enfermedades interrelacionadas que promueven fuertemente la propagación de la enfermedad cardiovascular aterosclerótica dentro de las poblaciones. La prevalencia de la hipertensión se duplica en presencia de diabetes y se asocia con el 35 a 75 % de las complicaciones cardiovasculares y renales, diabéticas, es por ello que el objetivo de este estudio fue identificar las características epidemiológicas de la diabetes asociada a la hipertensión en América Latina, centrándose en los factores de riesgo y manifestaciones clínicas.
Método: se planteó una revisión sistemática de tipo descriptivo-analítico, a través una búsqueda de material científico actualizado en bases de datos académicas como Medline (vía PubMed), Google académico y Web of Sciences, con un rango de tiempo del 2020 al 2024, en idioma español e inglés.
Resultados: se obtuvo que los factores de riesgo más comunes para la diabetes asociada a la hipertensión incluyen el tabaquismo, el consumo de alcohol, la obesidad y la dislipidemia, con la afectación en la edad promedio de 57 años, las manifestaciones clínicas más frecuentes de la diabetes asociada a la hipertensión

incluyen principalmente nefropatías, cardiopatías y elevación de la presión arterial.
Conclusiones: se identificó el factor de riesgo como el tabaquismo frecuente en personas con una mayor edad, dicha frecuencia es atribuible a mayor prevalencia de estas afecciones en los ancianos y a su importante contribución al desarrollo de hipertensión en los diabéticos, además la manifestación clínica más frecuente son las nefropatías.

Palabras clave: Hipertensión; Diabetes; Factores de Riesgo; Factores Clínicos.

INTRODUCTION

Hypertension is a primary non-communicable disease and is identified as a global disease burden that ranks as the third largest cause of disability-adjusted life years. Globally, there were 972 million hypertensive adults in 2000, and this number is on track to increase by 60 % to 1,56 billion by 2025.[1]

Diabetes mellitus and hypertension are interrelated diseases that strongly promote the spread of atherosclerotic cardiovascular disease within populations. The prevalence of hypertension doubles in the presence of diabetes and is associated with 35-75 % of diabetic cardiovascular and renal complications. In addition, it also contributes to diabetic retinopathy, which is the leading cause of newly diagnosed blindness.[2,3]

These two pathologies frequently coexist, suggesting that they have standard pathophysiological bases. Factors that induce both type 2 diabetes and hypertension include obesity-induced hyperinsulinemia, activation of the sympathetic nervous system, chronic inflammation, and changes in adipokines.[4,5]

Sedentary lifestyles and excessive caloric intake can lead to increased adiposity, which has been associated with an increased risk of worsening insulin resistance. Insulin resistance has, in turn, been linked to increased vascular oxidative stress, inflammation, and endothelial dysfunction, which is characterized by decreased vascular nitric oxide bioactivity. All of these promote vascular stiffness, resulting in persistent elevation of blood pressure and promotion of CVD.[6,7]

Hypertension (HTN) in people with diabetes mellitus is a severe disease characterized by persistent elevation of systemic blood pressure, defined as systolic blood pressure (SBP) greater than 130 mmHg and diastolic blood pressure (DBP) greater than 80 mmHg on two consecutive days or any previous diagnosis of HTN by health care providers.[8]

For laboratory diagnosis, tools such as basal glucose, plasma glucose, and HbA1c are used, and for anthropometric measurements, a body mass index ≥25 kg/m2 is used to associate diabetes with obesity.

Hypertension occurs in 50-80 % of patients with type 2 diabetes, representing more than 90 % of the diabetic population versus 30 % of patients with type 1 diabetes who develop hypertension. The fact that hypertension is prevalent in type 2 diabetes suggests that insulin resistance may play an essential role in the pathogenesis of hypertension.[9]

The World Health Organisation states that the prevalence of hypertension varies between regions and groups of countries according to their income level. The WHO African Region has the highest prevalence of hypertension (27 %), while the WHO Region of the Americas has the lowest prevalence of hypertension (18 %).[10]

In Ecuador, the overall prevalence of type 2 diabetes mellitus was 6,8 %, markedly higher among women compared to men; the risk of having type 2 diabetes mellitus in women was 5 times higher than in men, adjusting for age, ethnicity, employment, household income, and obesity. The prevalence in Jipijapa of people who are prone to diabetes is 50 %, who were classified as very high risk.

This research aims to identify the risk factors most prevalent in people with diabetes who develop hypertension and the clinical manifestations of diabetes associated with hypertension through a systematic review of the literature.

METHOD

Type and design of the study

The research was conducted through a systematic review of descriptive-analytic design, using different reliable sources and scientific articles.

Eligibility criteria

Inclusion criteria

To strengthen the study, we proceeded to include articles in the range of selection from 2020 to the present year, complete articles, doctoral theses, and articles related to the topic.

Exclusion Criteria

We proceeded to exclude articles that do not contain the established date, incomplete articles, paid articles,

information from unreliable sources, expert comments, repositories, theses, letters to the reader, symposiums, blogs, and unreliable websites.

Search strategies

A bibliographic review of scientific articles in Spanish, English, and French was carried out in journals indexed in Google Scholar, Scielo, PubMed, and Elsevier. To collect information, MeSH terms such as diabetes, malnutrition, age, sex, hypertension, and prevalence were used to select publications related to the proposed study topic. The data search period was framed between 2020 and 2024.

Ethical criteria

This study was carried out respecting the rights of each author, citing and referencing correctly according to Vancouver standards.

Handling of information

We proceeded to carry out an exhaustive investigation, during which 20 scientific articles were compiled to fulfil the objectives set out. We have a detailed classification in a flowchart.

Figure 1. Systematisation of studies through databases

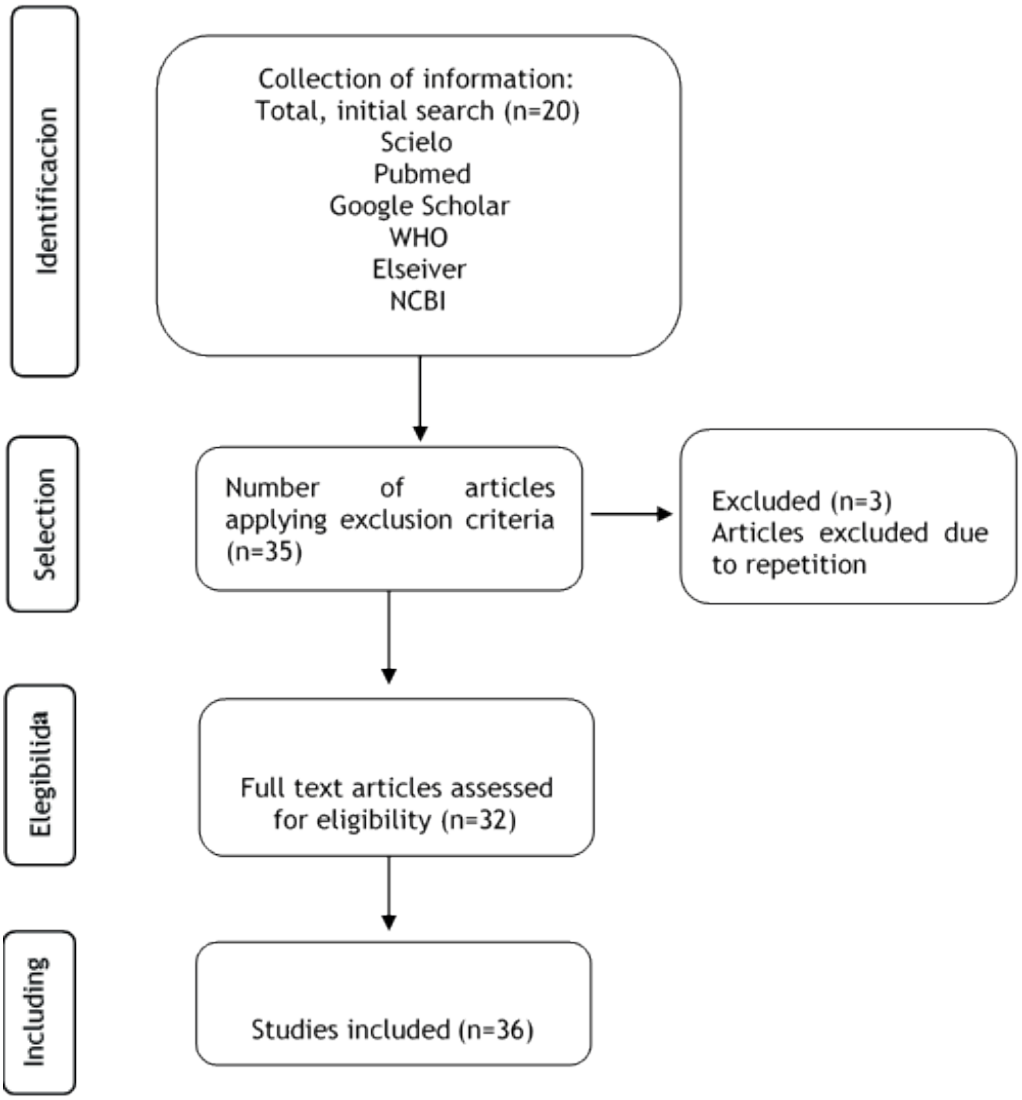

Figure 1. PRISMA flow chart used for the selection of articles. Search strategy and selection of scientific material for the development of this review article

RESULTS

Table 1. Risk factors most prevalent in people who have diabetes and develop hypertension

Author	Year of publication	Type of methodology	Sex	Age	Pathology	Risk factors
Alba Alexandra Mejía Navarro y col.[11]	2020	Descriptive, cross-sectional study	Men and women	>a 19 years	Diabetes/ Hypertension	xtra salt intake, alcohol, smoking, physical activity
Gabriela Margoth Uyaguari Matute y col.[12]	2021	Descriptive study	Men and women	18 a 65 years	Diabetes/ Hypertension	Family history, age, obesity and physical inactivity
Analía Graciela Soria y col.[13]	2021	Descriptive study	Men and women	>a 30 years	Diabetes/ Hypertension	
Nairovys Gómez Martínez y col.[14]	2021	Descriptive study	Men and women	60 a 90 years	Diabetes/ Hypertension	Smoking, alcohol consumption, salt intake, physical activity, body mass index and dyslipidaemia.
Eymard Torres y col.[15]	2021	Descriptive, observational, retrospective study.	Men and women	>a 18 años	Diabetes/ Hypertension	
Julio Armando Sánchez Delgado y col.[16]	2022	Retrospective, analytical, descriptive, retrospective study	Men and women	>a 60 years	Diabetes/ Hypertension	Inadequate diet, gender, family history, obesity, dyslipidaemia,
Jorge Serra Colina.[17]	2023	Descriptive study	Men and women	51 a 60 years	Diabetes/ Hypertension	Smoking, age, gender, family history
Elodia María Rivas Alpìzar y col.[18]	2023	Cross-sectional, descriptive correlational study	Women	>a 45 years	Diabetes/ Hypertension	Age, obesity, skin colour, smoking, physical activity, body mass index, elevated triglycerides and cholesterol,
Lucia Nivia Turro Mesa y col.[19]	2023	Descriptive study	Men and women	>a 60 years	Diabetes/ Hypertension	Smoking, hyperlipidaemia, obesity,
Rodrigo Zubieta Rodríguez[20]	2024	Descriptive retrospective cohort study	Men	70 years	Diabetes/ Hypertension	Smoking, gender, age

Analysis of results

Studies indicate that the most common risk factors for diabetes associated with hypertension include smoking, alcohol consumption, obesity, and dyslipidemia. An analysis by age reveals a mean age of approximately 57 years. These findings suggest that diabetes and hypertension predominantly affect older individuals and that obesity, together with smoking, are identified as the most prevalent risk factors.

Table 2. Clinical manifestations of hypertension-associated diabetes

Author	Year of publication	Type of methodology	Country	Sex	Clinical manifestations
Guillermo Medina Fuentes y col.[21]	2020	Descriptive observational cross-sectional study	Cuba	Men and women	Neuropathies, retinopathies, diabetic foot, elevated blood pressure
Geominia Maldonado Cantillo y col.[22]	2020	Descriptive, cross-sectional study	Cuba	Men and women	Cardiopathies, nephropathies
Víctor Gómez Coello Vásquez y col.[23]	2020	Descriptive, cross-sectional study	Ecuador	Men and women	Nephropathies, Cardiopathies, diabetic retinopathy
Natalia Menecier y col.[24]	2021	Descriptive cross-sectional study	Argentina	Men and women	Cardiopathies
Fausto Marcos Guerrero Toapanta y col.[25]	2021	Descriptive Study	Ecuador	Men and women	Nephropathies, cardiopathies
Patricio López Jaramillo y col.[26]	2021	Descriptive Study	Colombia	Men and women	Cardiopathies
Barbara Miladys Placencia López y col.[27]	2021	Descriptive, cross-sectional study	Ecuador	Men and women	High blood pressure, nephropathies, heart diseases
Eduardo René Valdés Ramos y col.[28]	2022	Descriptive cross-sectional study	Cuba	Men and women	Elevated blood pressure, Hypoxia

https://doi.org/10.56294/saludcyt20251767

Víctor David Franco y col.[29]	2022	Descriptive, cross-sectional study	El Salvador	Men and women	Nephropathies, thyroid disorders
Blanca Irene Semprún de Villasmil y col.[30]	2023	Descriptive, observational, cross-sectional study	Ecuador	Men and women	High blood pressure, heart disease

Analysis of Results

The most frequent clinical manifestations presented in table 2 of diabetes associated with hypertension include mainly nephropathies, heart disease, and elevated blood pressure. Neuropathies, retinopathies, diabetic foot, hypoxia, and thyroid abnormalities are less frequent but no less critical. Overall, renal and cardiovascular complications predominantly characterize the results obtained. Still, attention should be paid to any warning signs so they do not cause further bodily complications.

DISCUSSION

Type 2 diabetes is a complex disease in which genetic and environmental factors interact. The territory of Latin America and the Caribbean includes different ethnic groups, and some populations are believed to have a higher genetic disposition, such as black Caribbean or indigenous peoples. However, changes in the gene pool cannot provide a complete explanation for the rapid increase in cases in recent decades. Diabetes mellitus has increased steadily across the region, with some variations: higher prevalence in Mexico, Haiti, and Puerto Rico and lower prevalence in Colombia, Ecuador, Dominican Republic, Peru, and Uruguay.[31,32] According to estimates by the International Diabetes Federation, in 2019, there were 463 million people with diabetes worldwide, 9,3 % of all adults aged 20-79 years worldwide.[33,34] By 2045, an estimated 700 million people will be affected, an increase of 51 % in 26 years. The death rate from diabetes is estimated to be 11,3 % worldwide, with 46,2 % of these deaths occurring in people under the age of 60.[35,36] Risk factors such as sedentary lifestyle, dietary habits, alcohol consumption, and, to a lesser extent, tobacco use are risk factors for the development of type 2 diabetes mellitus in adults aged 40-70 years.[37]. Hypertension is a chronic non-communicable disease that affected approximately 1 270 [U1] million adults in 2019 and is projected to reach 1 560 million by 2025, with this increase being most significant in developing countries. It is considered a major risk factor for heart attacks and strokes, affecting 8,4 million and 7 million Americans in 2016, respectively. Based on the results obtained, several data are expressed whose mention makes two types of emphasis within the findings; recent studies have identified several common risk factors for diabetes associated with hypertension. According to Mejía Navarro et al., excessive salt consumption, alcohol consumption, smoking, and lack of physical activity are prevalent factors, and several authors emphasize several factors, such as Uyaguari Matute et al. highlight the relevance of family history, age, obesity, and physical inactivity. Soria et al. and Gómez Martínez et al. emphasize smoking, alcohol consumption, salt intake, and a sedentary lifestyle, with an additional concern for dyslipidemia and body mass index. David Flood et al. differ, stating that hypertension and diabetes have overlapping risk factors that lead to common pathways of complications, resulting in premature morbidity and mortality.

Increased glucose and blood pressure accelerate atherosclerosis, endothelial dysfunction, and vascular injury. These mechanisms result in macrovascular disease in the form of ischaemic heart disease, stroke, aortic disease, and peripheral arterial disease. Moreover, several studies have noted that specific clinical manifestations of diabetes in conjunction with hypertension often follow a pattern, as Medina Fuentes et al. state that common problems include neuropathies, retinopathies, diabetic foot disease, and hypertension. Similarly, Maldonado Cantillo et al. also report heart disease and nephropathy. Gómez Coello Vásquez et al. and Guerrero Toapanta highlight nephropathies and heart disease in Ecuador. In general, cardiovascular problems associated with diabetes mellitus are reported in Ecuador. Hiba Alsaadon et al. report the similarity of certain information but increase specific clinical characteristics, which, as a result, have been associated with hypertension and type 2 diabetes, and their coexistence is linked to diabetes-related complications such as stroke, coronary artery disease, kidney disease, retinopathy, and diabetic foot disease. It is therefore essential to carry out exploratory studies to increase and strengthen the knowledge and management of the association of this pathology using intervention case-control studies to determine the prevalent epidemiology, the correct diagnoses together with the proper treatment management and, above all, to investigate the age range to be able to inform the population of the need for greater care.

CONCLUSIONS

Frequent smoking was identified as a significant risk factor in older people, highlighting its contribution to the development of hypertension in diabetic patients. This finding underlines the relationship between aging and susceptibility to chronic diseases, with smoking acting as an aggravating factor. It also showed that nephropathies are the most prevalent clinical manifestation in this population, which reinforces the need for specific prevention strategies and interventions aimed at reducing smoking to mitigate associated complications

and improve patients' quality of life. This approach should include comprehensive measures that address risk factors and underlying conditions, with special attention to older adults and patients with comorbidities [U1]. I suggest that when using numbers with more than three digits, leave a space between the third and sixth digits and do not use commas or full stops. Example: 1 270.

REFERENCES

1. Alsaadon H, Afroz A, Karim A, al e. Hypertension and its related factors among patients with type 2 diabetes mellitus – a multi-hospital study in Bangladesh. BMC Public Health. 2022; 22(198). DOI: 10.1186/s12889-022-12509-1

2. Usui. Common metabolic features of hypertension and type 2 diabetes. Hypertension Research. 2023; 46: p. 1227–1233. DOI: 10.1038/s41440-023-01233-x

3. Naha S, Gardner M, Khangura D, al e. Hypertension in Diabetes. Endotext. 2021. Disponible en https://pubmed.ncbi.nlm.nih.gov/25905256/

4. Abate Belew M, Woldegiorgis Abate T, al e. Determinants of hypertension among diabetes patients attending selected comprehensive specialized hospitals of the Amhara Region, Ethiopia: An unmatched case-control study. PLos One. 2022; 17(12). DOI: 10.1371/journal.pone.0279245

5. Akalu Y, Belsti. Hypertension and Its Associated Factors Among Type 2 Diabetes Mellitus Patients at Debre Tabor General Hospital, Northwest Ethiopia. Diabetes Metab Syndr Obes. 2020; 12: p. 1621–1631. doi: 10.2147/DMSO.S254537

6. Wali Naseri , Ahmad Esmat , Daud Bahee M. Prevalence of hypertension in Type-2 diabetes mellitus. Ann Med Surg (Lond). 2022; 78. DOI: 10.1016/j.amsu.2022.103758

7. Guanghong , Sowers. Hypertension in Diabetes: An Update of Basic Mechanisms and Clinical Disease. Hypertension. 2021; 78(5). DOI: 10.1161/HYPERTENSIONAHA.121.17981

8. Organizacion Mundial de la Salud. OMS. [Online]; 2023. Acceso 29 de Juliode 2024. Disponible en: https://www.who.int/news-room/fact-sheets/detail/hypertension/?gad_source=1&gclid=Cj0KCQjw-5y1BhC-ARIsAAM_oKltt2sW-U7XVkYRI24MYAP5cTkFCLZ460U9IhomLfY4PCp2x2KaXTUaAv5GEALw_wcB.

9. Puig García M, Caicedo Montaño C, Márquez Figueroa M, al e. Prevalence and gender disparities of type 2 diabetes mellitus and obesity in Esmeraldas, Ecuador: a population-based survey in a hard-to-reach setting. Int J Equity Health. 2023; 22(124). DOI: 10.1186/s12939-023-01939-x

10. Galardy Domonguez Y, Delgado Lopez D, Parrales Choez A, al e. Riesgo de padecer diabetes en la poblacion urbana de Jipijapa. Revista Científica Arbitrada Multidisciplinaria PENTACIENCIAS. 2022; 4(4): p. 89-96. https://editorialalema.org/index.php/pentaciencias/article/view/230

11. Mejía Navarro , Mejía Navarro , Melchor Tenorio S. Frecuencia de hipertensión arterial en personas adultas del Barrio México, Puyo, Pastaza, Ecuador. Revista Cubana de Reumatología. 2020; 22(2).

12. Uyaguari Matute , Mesa Cano , Ramírez Coronel A, Martínez Suárez. Factores de riesgo para desarrollar diabetes mellitus II. Vive Revista de Salud. 2021; 4(10). Disponible en: http://www.scielo.org.bo/scielo.php?pid=S2664-32432021000100096&script=sci_abstract

13. Soria A, Guber R, Tefaha L, all e. Prevalencia de hipertensión arterial y factores de riesgo cardiovascular en una población rural expuesta al arsénico en Argentina. Rev Peru Med Exp Salud Pública. 2021; 38(4). Disponible en: http://www.scielo.org.pe/scielo.php?pid=S1726-46342021000400530&script=sci_abstract&tlng=pt

14. Gómez Martínez N, Vilema Vizuete , Guevara Zuñiga. Hipertensión arterial e incidencia de los factores de riesgo en adultos mayores. Dilemas contemporáneos: educación, política y valores. 2021; 8(3).Disponible en: http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S2007-78902021000500059

15. Torres , Arévalo H, Suarez I, Vega N. Perfil clínico de pacientes atendidos con diabetes mellitus tipo 2 en un programa de reversión. Revista de la Facultad de Medicina Humana. 2021; 21(1). Disponible en: http://

www.scielo.org.pe/scielo.php?pid=S2308-05312021000100145&script=sci_abstract

16. Sánchez Delgado , Sánchez Lara. Epidemiología de la diabetes mellitus tipo 2 y sus complicaciones. Revista Finlay. 2022; 12(2). Disponible en: https://revfinlay.sld.cu/index.php/finlay/article/view/1121/2113

17. Serra Colina J. Manejo de las enfermedades no transmisibles (ENTS). CENCOMED. 2023. Disponible en: https://jorcienciapdcl.sld.cu/index.php/jorcienciapdcl23/2023/schedConf/presentations

18. Rivas Alpìzar , García , Quintana Marrero A. Fenotipos hipertrigliceridemia e hipertensión-cintura abdominal alterada y su asociación con factores de riesgo cardiovascular en mujeres atendidas en Consulta Provincial de Climaterio. MediSur. 2023; 21(3). Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1727-897X2023000300593

19. Turro Mesa , del Río Caballero , Turro Caró , del Río Mesa G, Mesa Valiente. Características clínicas y epidemiológicas en pacientes hospitalizados por insuficiencia cardiaca. MEDISAN. 2023; 27(3). Disponible en: https://medisan.sld.cu/index.php/san/article/view/4106/html

20. Zubieta Rodríguez R, Gómez Valencia , Caro Angulo M, Bolívar Moreno L, Jiménez Cardozo. Caracterización clínica y epidemiológica de pacientes con falla cardiaca aguda. Revista Colombiana de Cardiología. 2024; 31(3). Disponible en: https://pesquisa.bvsalud.org/portal/resource/pt/biblio-1576246

21. Medina Fuentes G, Carbajales León , Carbajales León A. Características clínicas epidemiológicas de la diabetes mellitus en pacientes de un consultorio médico. REMIJ. 2020; 21(2): p. 1-13. Disponible en: https://remij.sld.cu/index.php/remij/article/view/291

22. Maldonado Cantillo , Rodríguez Salvá A, Díaz Perreira A, Londoño Agudelo , León Sánchez M. Comportamiento epidemiológico de la Hipertensión arterial en un Policlinico cubano. Horizonte sanitario. 2020; 19(1). Disponible en: http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S2007-74592020000100069

23. Gomez Coello Vásquez V, Caza M, Jácome Sánchez E. Prevlaencia de Diabetes Mellitus y sus complicaciones. Revista Médica Vozandes. 2020; 31(2): p. 49 - 55. Disponible en: https://revistamedicavozandes.com/wp-content/uploads/2021/01/06_A0_06.pdf

24. Menecier , Lomaglio. Hipertensión arterial, exceso de peso y obesidad abdominal, en mujeres adultas de la Puna de Catamarca, Argentina. Revista argentina de antropología biológica. 2021; 23(2). Disponible en: https://revistas.unlp.edu.ar/raab/article/view/9178

25. Guerrero Toapanta F, Vásquez Terán A, Alarcón Hinojosa M, all e. Caracterización demográfica y epidemiológica de pacientes críticos con lesiones por presión en el Hospital de Especialidades Carlos Andrade Marín. Revista Médica Científica CAMbios. 2021; 20(2): p. 4-19. Disponible en: https://revistahcam.iess.gob.ec/index.php/cambios/article/view/728

26. López Jaramillo P, López López J, Cohen D, all e. Epidemiología de la hipertensión arterial y la diabetes mellitus en América Latina. Curr Hipertensión Rev. 2021; 17(2): p. 112-120. DOI: 10.2174/1573402116999200917152952

27. Placencia López , Hernández Escobar A, Fienco Bacusoy , Reyes Chele. Vulnerabilidad de padecer Diabetes Mellitus tipo 2 en la comunidad de Joa. UNESUM - Ciencias Revista Científica Multidisciplinaria. 2021; 5(3): p. 239–246. Disponible en: https://revistas.unesum.edu.ec/index.php/unesumciencias/article/view/572

28. Valdés Ramos , Álvarez Aliaga A. Características clínicas de pacientes con diabetes mellitus complicados con cardiopatía isquémica. Revista Medica Multi Med. 2022; 26(2). Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1028-48182022000200004

29. Franco , López de Blanco. Características clínicas de pacientes diabéticos con manejo ambulatorio en el Instituto Salvadoreño del Seguro Social. Alerta. 2022; 5(1): p. 33-42.Disponible en: https://pesquisa.bvsalud.org/portal/resource/pt/biblio-1354418

30. Semprún de Villasmil B, Linares Giler S, Urdaneta Bracho J, all e. Factores de riesgo en pacientes

con diabetes mellitus tipo 2 con y sin hipertensión arterial. Lodana, Manabí-Ecuador. Revista Virtual de la Sociedad Paraguaya de Medicina Interna. 2023; 10(2): p. 29-42. Disponible en: http://scielo.iics.una.py/scielo.php?script=sci_arttext&pid=S2312-38932023000200029

31. Gallardo Rincón H, Cantoral A, Arrieta A, all e. Review: Type 2 diabetes in Latin America and the Caribbean: Regional and country comparison on prevalence, trends, costs and expanded prevention. Primary Care Diabetes. 2021; 15(2): p. 352-359. DOI: 10.1016/j.pcd.2020.10.001

32. Avilés Santa M, Monroig Rivera , Soto Soto A, Lindberg N. Current State of Diabetes Mellitus Prevalence, Awareness, Treatment, and Control in Latin America: Challenges and Innovative Solutions to Improve Health Outcomes Across the Continent. Current Diabetes Reports. 2020; 20(62). DOI: 10.1007/s11892-020-01341-9

33. Mehta R, Pichel D, Chen Ku C, all e. Latin American Expert Consensus for Comprehensive Management of Type 2 Diabetes from a Metabolic-Cardio-Renal Perspective for the Primary Care Physician. Diabetes Ther. 2021; 12(1): p. 1-20. DOI: 10.1007/s13300-020-00961-4

34. Zila Velasque J, Soriano Moreno D, Medina Ramirez S, all e. Prevalence of hypertension in adults living at altitude in Latin America and the Caribbean: A systematic review and meta-analysis. Plos One. 2023; 18(10). DOI: 10.1371/journal.pone.0292111

35. Flood D, Edwards E, Giovannini D, all e. Integrating hypertension and diabetes management in primary health care settings: HEARTS as a tool. Rev Panam Salud Publica. 2022; 46. DOI: 10.26633/RPSP.2022.213

36. Alsaadon H, Afroz A, Karim A, all e. Hypertension and its related factors among patients with type 2 diabetes mellitus – a multi-hospital study in Bangladesh. BMC Public Health. 2020; 22. DOI: 10.1186/s12889-022-12509-1

37. González, Z. Á., & Peña, Y. L. (2023). Abordando la diabetes mellitus: estrategias de prevención desde la evidencia científica actual: Addressing diabetes mellitus: prevention strategies based on current scientific evidence. LATAM Revista Latinoamericana de Ciencias Sociales y Humanidades, 4(5), 1189-1202. Disponible en: https://latam.redilat.org/index.php/lt/article/view/1387

FUNDING

The authors received no funding for this research.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHORSHIP CONTRIBUTION

Conceptualization: Yelisa Estefanía Durán Pincay, Mercy Doménica Durán Pincay, Vicente Augusto Jaime Mora, Néstor Raúl Parrales Ponce, Lidia Fernanda Jijón Cañarte, Jenniffer Romina Cañarte Murillo.

Data curation: Yelisa Estefanía Durán Pincay, Mercy Doménica Durán Pincay, Vicente Augusto Jaime Mora, Néstor Raúl Parrales Ponce, Lidia Fernanda Jijón Cañarte, Jenniffer Romina Cañarte Murillo.

Formal analysis: Yelisa Estefanía Durán Pincay, Mercy Doménica Durán Pincay, Vicente Augusto Jaime Mora, Néstor Raúl Parrales Ponce, Lidia Fernanda Jijón Cañarte, Jenniffer Romina Cañarte Murillo.

Research: Yelisa Estefanía Durán Pincay, Mercy Doménica Durán Pincay, Vicente Augusto Jaime Mora, Néstor Raúl Parrales Ponce, Lidia Fernanda Jijón Cañarte, Jenniffer Romina Cañarte Murillo.

Methodology: Yelisa Estefanía Durán Pincay, Mercy Doménica Durán Pincay, Vicente Augusto Jaime Mora, Néstor Raúl Parrales Ponce, Lidia Fernanda Jijón Cañarte, Jenniffer Romina Cañarte Murillo.

Project administration: Yelisa Estefanía Durán Pincay, Mercy Doménica Durán Pincay, Vicente Augusto Jaime Mora, Néstor Raúl Parrales Ponce, Lidia Fernanda Jijón Cañarte, Jenniffer Romina Cañarte Murillo.

Resources: Yelisa Estefanía Durán Pincay, Mercy Doménica Durán Pincay, Vicente Augusto Jaime Mora, Néstor Raúl Parrales Ponce, Lidia Fernanda Jijón Cañarte, Jenniffer Romina Cañarte Murillo.

Software: Yelisa Estefanía Durán Pincay, Mercy Doménica Durán Pincay, Vicente Augusto Jaime Mora, Néstor Raúl Parrales Ponce, Lidia Fernanda Jijón Cañarte, Jenniffer Romina Cañarte Murillo.

Supervision: Yelisa Estefanía Durán Pincay, Mercy Doménica Durán Pincay, Vicente Augusto Jaime Mora, Néstor Raúl Parrales Ponce, Lidia Fernanda Jijón Cañarte, Jenniffer Romina Cañarte Murillo.

Validation: Yelisa Estefanía Durán Pincay, Mercy Doménica Durán Pincay, Vicente Augusto Jaime Mora, Néstor Raúl Parrales Ponce, Lidia Fernanda Jijón Cañarte, Jenniffer Romina Cañarte Murillo.

Visualization: Yelisa Estefanía Durán Pincay, Mercy Doménica Durán Pincay, Vicente Augusto Jaime Mora,

Néstor Raúl Parrales Ponce, Lidia Fernanda Jijón Cañarte, Jenniffer Romina Cañarte Murillo.

Drafting - original draft: Yelisa Estefanía Durán Pincay, Mercy Doménica Durán Pincay, Fernanda Vicente Augusto Jaime Mora, Néstor Raúl Parrales Ponce, Lidia Fernanda Jijón Cañarte, Jenniffer Romina Cañarte Murillo.

Writing - proofreading and editing: Yelisa Estefanía Durán Pincay, Mercy Doménica Durán Pincay, Vicente Augusto Jaime Mora, Néstor Raúl Parrales Ponce, Lidia Fernanda Jijón Cañarte, Jenniffer Romina Cañarte Murillo.