Clinical outcomes of hypertensive and diabetic patients enrolled in a chronic care program at two healthcare provider institutions of the Red de Salud Ladera in Cali, Colombia, during the 2023–2024 period

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Abstract

This study aimed to monitor hypertensive and diabetic patients receiving care at two healthcare provider institutions within the Red de Salud Ladera network during the 2023–2024 period. A descriptive cross-sectional observational study was conducted using a sample of 395 patient records from the chronic care program at the Hormiguero and Cascajal institutions. Database quality was assessed, and clinical variables were recoded according to national guidelines.

Univariate analysis included frequencies for qualitative variables and measures of central tendency and dispersion for quantitative variables. A total of 94.2% of patients had hypertension, 34.7% had type 2 diabetes mellitus, and 28.9% had both conditions. Older adults predominated (75%), as did women (68.4%).

Among hypertensive patients, 34.8% were not adequately controlled, while 56% of diabetic patients had poor glycemic control. Additionally, 78.7% had dyslipidemia, and 32% of those evaluated with glomerular filtration rate (GFR) had chronic kidney disease. A concerning finding was that 25.8% of patients lacked records of recommended follow-up tests.

These findings highlight a high burden of risk factors, including overweight, obesity, and cardiovascular history, which may compromise the effectiveness of clinical management. The results underscore the need to strengthen prevention, control, and follow-up strategies in chronic care pro-

grams. Promoting a comprehensive and personalized approach is essential to improve health outcomes and quality of life in this vulnerable population.

Keywords: hypertension; type 2 diabetes mellitus; chronic diseases; cardiovascular risk; primary health care.

Introduction

Hypertension (HTN) and type 2 diabetes mellitus (T2DM) are among the most prevalent non-communicable diseases (NCDs) and have a major impact on global public health. According to the World Health Organization (WHO), an estimated 1.3 billion people worldwide have hypertension, of whom fewer than 20% have their condition adequately controlled (1). In parallel, the prevalence of T2DM has increased alarmingly, rising from 200 million cases in 1990 to more than 830 million in 2022, with the greatest growth observed in low- and middle-income countries (2).

Both conditions share common risk factors such as obesity, physical inactivity, dyslipidemia, smoking, and aging, and their coexistence significantly increases the risk of cardiovascular disease (CVD), chronic kidney disease (CKD), and premature mortality (3,4). In Colombia, the High-Cost Account (Cuenta de Alto Costo, CAC) reported that between July 2021 and June 2022, 453,337 new cases of hypertension were recorded, with 59.4% occurring in women and 50.3% in individuals aged 50–69 years (5). Meanwhile, the prevalence of T2DM reached 3.82% in 2023, although a substantial underreporting is suspected due to delayed diagnosis (6).

At the regional level, Valle del Cauca and the city of Cali have reported high rates of these conditions. In 2023, Cali registered more than 321,000 cases of hypertension, with a prevalence of 12.27%, making it one of the leading causes of morbidity and mortality in the adult population (7). The prevalence of T2DM in the department is estimated at 4.2%, particularly affecting women and older adults (8). These figures reflect a significant disease burden that requires prioritized attention, especially in rural and underserved communities where access to healthcare services is limited.

The rural district of El Hormiguero, located in Santiago de Cali, represents one of these communities facing structural barriers to primary healthcare access. The lack of studies characterizing hypertensive and diabetic patients in this region hinders the implementation of effective intervention strategies. In this context, the Red de Salud Ladera, through its Hormiguero and Cascajal healthcare institutions, has developed a chronic care follow-up program aimed at improving disease control through comprehensive care.

The aim of this study was to clinically characterize patients with hypertension and T2DM receiving care at these two institutions during the 2023–2024 period, in order to provide evidence to guide the design of data-driven interventions and contribute to improved health outcomes and quality of life in this vulnerable population.

Materials and Methods

Study design: A descriptive cross-sectional observational study was conducted. The approach focused on the collection and analysis of secondary data obtained from the chronic care program of the Red de Salud Ladera.

Study setting: The study was carried out in two healthcare provider institutions (IPS) belonging to the Red de Salud Ladera in Cali: IPS El Hormiguero and IPS Cascajal, located in peripheral urban and rural areas of the city.

Population and sample: The study population consisted of clinical records of patients aged 18 years or older diagnosed with hypertension (HTN), type 2 diabetes mellitus (T2DM), or both, who attended follow-up consultations in the chronic care program between January 2023 and March 2024. A census sampling approach was used, including 395 records available at the time of data collection.

Inclusion criteria: Clinical records with a confirmed diagnosis of HTN, T2DM, or both, from patients actively enrolled in the chronic care program of the aforementioned institutions.

Exclusion criteria: Records with incomplete information for key variables, patients with predominant acute conditions, or those with oncological diseases that could alter clinical indicators.

Variables: Sociodemographic variables included age, sex, and area of residence. Clinical variables included systolic and diastolic blood pressure, glycemic control, body mass index (BMI), and abdominal circumference. Laboratory variables included total cholesterol, HDL, LDL, triglycerides, glomerular filtration rate (GFR), serum creatinine, and glycated hemoglobin (HbA1c).

Statistical analysis: A univariate analysis was performed using absolute and relative frequencies for qualitative variables. Quantitative variables were described using measures of central tendency (mean, median) and dispersion (standard deviation). Data processing was carried out using SPSS software version 25.

Ethics approval:

This study was based on the analysis of secondary data derived from clinical records of the chronic care program of the Red de Salud Ladera. According to Resolution 8430 of 1993 issued by the Colombian Ministry of Health, this research is classified as a no-risk study, as no intervention or intentional modification of biological, physiological, psychological, or social variables was performed. The study was approved by the Research Committee of Fundación Universitaria San Martín, ensuring compliance with ethical principles in health research.

Results

Of the 395 records analyzed, 68.4% corresponded to female patients and 31.6% to male patients. The majority were older adults (75%), and 60.3% resided in rural areas (Table 1).

Table 1. Demographic characteristics of the study population.

Variable	N	%
Age Group		
18-28 years	1	0,3
29-59 years	88	23
60 a 74 years	202	52.7
>75 years	93	24
Gender		
Male	125	31,6
Female	270	68,4

Source: Database of chronic patients

A total of 94.2% of patients had a diagnosis of hypertension (HTN), 34.7% had type 2 diabetes mellitus (T2DM), and 28.9% had both conditions (Table 2). Among hypertensive patients, 34.8% did not have adequate blood pressure control, while 56% of diabetic patients did not achieve HbA1c targets.

Table 2. Clinical characteristics of the study population.

Diagnosis	N	%
Hypertensive	372	94,2
Diabetic	137	34,7
Hypertensive and diabetic	114	28.9
Dyslipidemia	222	78,7
Chronic Kidney Disease (CKD)	82	32,2
Patients with cardiovascular risk due to abdominal perimeter		
Yes	186	47
No	209	53
Patients with controlled high blood pressure		
If (SBP <140 and DBP <90)	253	65,2
No	135	34,8
Diabetics controlled by glycated hemoglobin (H1Ac) levels		
Well controlled (Less than 7.0%)	44	44
Acceptable control (Between 7.0% and 8.0%)	24	24
Poorly controlled (Greater than 8.0%)	32	32
Coverage of patients' paraclinical tests		
Complete	88	22,3
Incomplete	205	51.9
They don't have	102	25,8

Source: Database of chronic patients

Regarding total cholesterol, 71.4% of patients had undergone this test. Among them, 55.7% had total cholesterol levels within desirable ranges, 28% were at the upper limit, and 16.3% had elevated levels.

With respect to HDL cholesterol testing, 71.1% of patients had this assessment performed. Among those evaluated, 50.5% had low HDL levels, which may represent an increased cardiovascular risk; 32.7% had intermediate values, and 16.7% had normal HDL cholesterol levels.

For LDL cholesterol, 68.6% of patients underwent testing. Of these, 32.5% had optimal values and 29.5% were classified as near-optimal.

Regarding triglyceride testing, 71.1% of patients were assessed. Among them, 62.6% had normal levels, indicating an adequate lipid profile.

In terms of blood glucose testing, 49.4% of patients underwent this evaluation. Among those assessed, 62.1% had values within the normal range, while 20.5% were classified as having prediabetes.

Assessment of renal function is a key component in monitoring patients at risk of chronic kidney disease. In this study, 73.4% of patients underwent serum creatinine testing. Of these, 79.7% had normal values, 9.3% showed a mild increase, and 4.4% had moderately elevated levels, which may indicate impaired renal function.

On the other hand, only 25.1% of patients underwent albuminuria testing. Among them, 85.9% had normal values, 11.1% showed moderately increased levels, and 3% had severe albuminuria, which may be associated with a higher risk of progression to advanced chronic kidney disease.

Additionally, 64.6% of patients underwent glomerular filtration rate (GFR) testing. In terms of GFR classification, 31.4% were within normal values, while 36.5% had mildly decreased filtration. Furthermore, 16.1% showed mild to moderate reduction, 12.2% had moderate to severe reduction, and 3.1% had severe reduction. Finally, 0.8% of patients were classified as having end-stage renal disease, representing the most advanced stage of renal dysfunction and the need for specialized management (Tables 3 and 4).

Table 3. Coverage of paraclinical screening tests in patients.

Paraclinical tests	N	%
Total cholesterol	282	71,4
HDL	281	71,1
LDL	271	68,6
Triglycerides	281	71,1
Blood glucose	195	49,4
Glycosylated hemoglobin in diabetic patients	100	73
Serum creatinine	290	73,4
Albuminuria	99	25,1
Glomerular filtration rate	255	64,6

Source: Database of chronic patients

Table 4. Characteristics of patients by program paraclinical tests

Total cholesterol level classification N: 282	**N**	**N%**
Desirable	157	55,7
Upper limit	79	28
High	46	16,3
HDL cholesterol level classification N: 281		
Low	142	50,5
Intermediate	92	32,7
Normal	47	16,7
LDL cholesterol level classification N: 271		
Optimal	88	32,5
Almost optimal	80	29,5
High limit	67	24,7
High	28	10,3
Very high	8	3,0
Triglyceride level classification N: 281		
Normal	176	62,6
Normal limit	47	16,7
High	55	19,6
Very high	3	1,1
Bl**ood sugar level classification N: 195**		
Normal	121	62,1
Pre-diabetes	40	20,5
Diabetes	34	17,4
Glycosylated hemoglobin level classification N: 100		
Controlled	44	44
Acceptable control	24	24
Poorly controlled	32	32
Classification of serum creatinine level N: 290		
Low	19	6,6
Normal	231	79,7
Slightly high	27	9,3
Moderately high	13	4,4
Classification of albuminuria level N: 99		
Normal (A1)	85	85,9
Moderate (A2)	11	11,1
Severe	3	3
Classification of glomerular filtration rate levels N: 255		
G1 (Normal)	80	31,4
G2 (Mild)	93	36,5
G3A (Mild to moderate)	41	16,1
G3B (Moderate to severe)	31	12,2
G4 (Severe)	8	3,1
G5 (End-stage renal disease)	2	0,8

Source: Database of chronic patients

Discussion

The results obtained in this study reflect a high prevalence of hypertension (HTN) and type 2 diabetes mellitus (T2DM) among patients enrolled in the chronic care program of the Hormiguero and Cascajal healthcare institutions, which is consistent with national and international trends showing a sustained increase in these non-communicable chronic diseases, particularly in vulnerable populations (9,10).

The finding that 94.2% of patients had HTN and 34.7% had T2DM highlights a substantial cardiovascular disease burden in the studied population. Notably, 28.9% of patients had both conditions, a situation that significantly increases the risk of adverse health events such as myocardial infarction, stroke, and chronic kidney disease (11,12).

Regarding clinical control, it was identified that more than one-third of hypertensive patients and more than half of those with T2DM did not achieve the therapeutic targets established by clinical guidelines such as JNC-8 or the recommendations of the American Diabetes Association (ADA). This suggests inadequate care or barriers to treatment adherence (13,14). Similar findings have been reported in other studies conducted in Latin America, where adequate control rates remain low, especially in rural areas or among populations with lower educational levels (15,16).

The predominance of women and older adults among patients is consistent with demographic profiles reported in other studies, in which aging and hormonal factors in postmenopausal women contribute to increased susceptibility to chronic diseases (17,18).

Regarding comorbidities, dyslipidemia was the most frequent (78.7%), highlighting the need to implement comprehensive strategies for managing metabolic syndrome. The high prevalence of chronic kidney disease (32%) is concerning, as this condition is closely associated with poor glycemic control and elevated blood pressure, as demonstrated in cohort studies such as UKPDS and ADVANCE (19,20).

The fact that 25.8% of patients lacked records of follow-up tests suggests weaknesses in clinical monitoring and surveillance processes by the healthcare team, as well as possible failures in information systems or patient adherence to periodic evaluations (21).

Comparatively, studies conducted in other regions of Colombia have reported similar figures. An analysis from chronic care programs in the Coffee Region found a CKD prevalence of 29% and adequate blood pressure

control in 61% of hypertensive patients, figures close to those observed in this study (22). In countries such as Peru and Mexico, the situation is comparable, with combined HTN and T2DM prevalence rates around 30% and deficiencies in clinical control (23,24).

Therefore, there is a clear need to strengthen primary healthcare strategies aimed at improving risk factor control, ensuring periodic follow-up with paraclinical tests, and promoting continuous patient education. It is imperative that chronic care programs be regularly evaluated to ensure their real impact on health indicators and patients' quality of life.

Likewise, the implementation of community-based interventions is recommended, integrating community health workers, family support networks, and the use of mobile technologies for remote monitoring of vital signs, as has been shown to be effective in clinical trials conducted in rural communities in India and Brazil (25,26).

Finally, the high proportion of patients with multiple accumulated risk factors (such as overweight, dyslipidemia, and CKD) should alert policymakers to the urgency of intersectoral public health policies that promote healthy lifestyles, equitable access to essential medications, and continuity of care at the primary healthcare level.

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Conflicts of Interest: None declared.

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References

1. World Health Organization. Hypertension. Geneva: WHO; 2023.
2. International Diabetes Federation. IDF Diabetes Atlas. 10th ed. Brussels: IDF; 2022.
3. American Heart Association. Cardiovascular risk in hypertensive and diabetic patients. Circulation. 2021;144(8):e254-e260.
4. Kassi E, Pervanidou P, Kaltsas G, Chrousos G. Metabolic syndrome: definitions and controversies. BMC Med. 2011;9:48.
5. Cuenta de Alto Costo. Situación de la hipertensión arterial en Colombia 2021-2022. Bogotá: CAC; 2022.
6. Ministerio de Salud y Protección Social. Informe técnico de enfermedades crónicas no transmisibles. Bogotá: MinSalud; 2023.
7. Secretaría de Salud de Cali. Análisis de situación en salud (ASIS) 2023. Cali: Alcaldía de Santiago de Cali; 2023.
8. Red de Salud Ladera. Indicadores de gestión en salud pública 2023. Cali: Secretaría de Salud Pública Municipal; 2023.
9. Finucane MM, Stevens GA, Cowan MJ, Danaei G, Lin JK, Paciorek CJ, et al. National, regional, and global trends in systolic blood pressure since 1980. Lancet. 2011;377(9765):568-577.
10. Cho NH, Shaw JE, Karuranga S, Huang Y, da Rocha Fernandes JD, Ohlrogge AW, et al. IDF Diabetes Atlas: global estimates for the prevalence of diabetes for 2019 and projections for 2030 and 2045. Diabetes Res Clin Pract. 2019;157:107843.
11. Huang Y, Bi Y, Xu M, Xu Y, Wang T, Liu J, et al. Coexistence of hypertension and diabetes increases risk of cardiovascular mortality. J Clin Hypertens. 2019;21(8):1182-1189.

12. Fox CS, Larson MG, Leip EP, Culleton B, Wilson PW, Levy D. Predictors of new-onset kidney disease in a community-based population. JAMA. 2004;291(7):844-850.
13. James PA, Oparil S, Carter BL, Cushman WC, Dennison-Himmelfarb C, Handler J, et al. 2014 evidence-based guideline for the management of high blood pressure in adults. JAMA. 2014;311(5):507-520.
14. American Diabetes Association. Standards of medical care in diabetes—2023. Diabetes Care. 2023;46(Suppl 1):S1-S292.
15. Hernández-Herrera R, Martínez-González A, Sánchez-González MC. Control clínico en pacientes con DM2 en zonas rurales. Salud Publica Mex. 2020;62(3):321-327.
16. Rojas-Suárez JP, Rodríguez-Bernal CL, Díaz-Pérez JF. Hipertensión arterial y su control en Colombia. Rev Salud Pública. 2021;23(1):e106-118.
17. Ordúñez P, Nieto FJ, Martínez R, Soliz P, Giraldo G, Mendis S. Chronic diseases and aging in Latin America. Rev Panam Salud Publica. 2018;42:e195.
18. Alvarado BE, Zunzunegui MV, Béland F, Sicotte M. Hypertension in elderly women in Latin America. BMC Geriatr. 2022;22(1):435.
19. UK Prospective Diabetes Study (UKPDS) Group. Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes. BMJ. 2000;321:405-412.
20. ADVANCE Collaborative Group. Intensive blood glucose control and vascular outcomes in patients with type 2 diabetes. N Engl J Med. 2008;358:2560-2572.
21. Martínez-Maldonado A, Gómez-González S, Torres-Rincón C. Calidad del registro clínico en atención primaria. Aten Primaria. 2019;51(7):401-407.
22. Rodríguez-Álvarez L, Castaño-Sánchez M, Vélez-Arias JA. Evaluación de un programa de crónicos en el Eje Cafetero. Rev Fac Nac Salud Pública. 2022;40(2):e104215.
23. Gómez R, Zúñiga E, Quispe W. Control clínico en diabéticos en Perú. Rev Peru Med Exp Salud Publica. 2021;38(1):55-62.
24. Velasco-Garrido M, Guzmán-López S, Hernández-Vargas H. Atención a crónicos en zonas rurales de México. Gac Med Mex. 2020;156(2):123-129.
25. Rawal LB, Tapp RJ, Williams ED, Chan C, Yasin S, Oldenburg B. Telemedicine and mHealth interventions for diabetes and hypertension in India. J Glob Health. 2019;9(1):010417.
26. Nunes BP, Flores TR, Mielke GI, Thumé E, Facchini LA. Community health workers improve chronic care in Brazil. BMC Public Health. 2021;21:985.