

# Adherence to pharmacological and nonpharmacological treatment in ambulatory hypertensive patients at a healthcare institution

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## Abstract

**Objective:** to evaluate adherence to the pharmacological and nonpharmacological antihypertensive treatment prescribed for ambulatory patients at a secondary and tertiary care institution in Valledupar.

**Materials and method:** a descriptive, cross-sectional, single-center study. Hypertensive patients over the age of 18 seen in the outpatient or cardiac rehabilitation department at an institution in the city of Valledupar from January 2 to March 31, 2020, were included and interviewed to assess their pharmacological adherence using the Morisky-Green test, and their nonpharmacological adherence through self-report. People with mental disorders rendering them incapable of responding to the interview were excluded.

**Results:** of the 333 total participants, 127 were considered adherent to pharmacological treatment according to the Morisky-Green test (38.1%, 95% CI: 32.9-42.4%), with no differences found by sex ( $p=0.66$ ), age ( $p=0.27$ ), health insurance status ( $p=0.19$ ), socioeconomic status ( $p=0.11$ ), marital status ( $p=0.36$ ), educational level ( $p=0.19$ ), area of residence ( $p=0.45$ ), number of medications used ( $p=0.82$ ), length of treatment in years ( $p=0.34$ ) or the medical service in which they received care ( $p=0.66$ ). In addition, only 18.9% (95% CI 14.7-23.1%) adhered to all the nonpharmacological treatment guidelines and 9.6% (95% CI: 6.4-12.7%) adhered to both pharmacological and non-pharmacological treatment.

**Conclusions:** in this report, adherence to antihypertensive treatment was only found in approximately one-third of the patients (38.1%), and therefore multidisciplinary work is needed to educate patients and families, involving them in treatment decisions and improving adherence. (*Acta Med Colomb* 2024; 49. DOI: <https://doi.org/10.36104/amc.2024.2746>).

**Keywords:** *treatment compliance and adherence, essential hypertension, healthy lifestyle, administration of pharmacological treatment, ambulatory care.*

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## Introduction

The World Health Organization (WHO) defines adherence as the degree to which people's behavior, such as taking medications, following a diet or changing lifestyle habits, corresponds to the guidelines given by a healthcare provider. Noncompliance with chronic treatment, and its negative clinical and financial consequences, is a priority public health topic (1). Adherence to prescribed antihypertensive treatment and lifestyle changes contributes to the burden of uncontrolled hypertension (2-4) and more adverse cardiovascular outcomes. Despite the success of various programs in achieving high rates of adherence to both non-pharmacological (lifestyle change) (5) and pharmacologi-

cal (6) regimens, this problem continues to be widespread. Internationally, there is an estimated 52 to 74% adherence to pharmacological treatment (7).

Nonadherence to antihypertensive medication is common and varies with age, sex, the type of antihypertensive and other factors such as general healthcare system affiliation (8).

In Colombia, hypertension is defined as a blood pressure equal to or greater than 140/90 mmHg (9), and prevalence is estimated at 24% in people 18 years old or older (10), with adherence to pharmacological treatment ranging from 39-74% (11-13).

The objective of this study was to evaluate adherence to antihypertensive treatment, considering both pharmacologi-

cal and nonpharmacological measures, in people 18 years old or older seen as outpatients at a secondary and tertiary care institution in the city of Valledupar (Cesar), and the sociodemographic or treatment factors that could be related to better adherence.

## Materials and method

This was a descriptive, cross-sectional study at a single center. Patients over the age of 18 with a diagnosis of hypertension who were seen in the outpatient or cardiac rehabilitation department of a secondary and tertiary care institution in the city of Valledupar between January 2 and March 31, 2020, were included. People with mental disorders which prevented them from answering the survey were excluded.

A sample size to estimate a proportion for a finite population, considering an available population (n) of 2,490 people, an expected adherence to the therapeutic regimen (p) of 0.5 to maximize the sample size, using the WHO figures as reference, with a range of error (d) of 5% and a 95% confidence interval, was calculated as follows:

$$n = \frac{N \cdot Z_{\alpha/2}^2 \cdot p \cdot q}{d^2 \cdot (N-1) + Z_{\alpha/2}^2 \cdot p \cdot q} = \frac{2490 \cdot 1,96^2 \cdot 0,5 \cdot 0,5}{0,05^2 \cdot 2489 + 1,96^2 \cdot 0,5 \cdot 0,5} = 332,92 \approx 333$$

Therefore, a sample of 333 people was taken, who were selected using nonprobabilistic convenience sampling. The Morisky-Green test was used to evaluate patients' adherence to antihypertensive treatment. This test has been validated for various chronic diseases and was originally developed to evaluate adherence to medications in patients with hypertension (14). It consists of four contrast questions with dichotomous yes/no answers, which reflect the patients' behavior with regard to adherence:

1. Do you ever forget to take the medications to treat your illness?
2. Do you take your medications at the prescribed times?
3. Do you stop taking your medications when you feel better?
4. Do you stop taking your medications if you feel worse?

The patient is considered compliant if he/she responds as follows: No/Yes/No/No.

A nurse was responsible for collecting the demographic and clinical information along with the pharmacological and nonpharmacological adherence factors included in the Ministry of Health's Clinical Practice Guideline (15) as part of the treatment for hypertension. The data collection form included aspects such as sociodemographic and clinical characteristics and adherence to the pharmacological and nonpharmacological treatment regimen.

Blood pressure was taken following international guidelines (16), with the patient seated and at rest for at least five minutes. A properly validated and calibrated Welch Allyn® sphygmomanometer was used to take the blood pressure. With the patient's arm supported, the cuff was placed on the patient's upper arm, at the level of the right atrium (the

midpoint of the sternum). A cuff size that covered 80% of the arm circumference was selected.

For auscultatory readings, a palpated estimate of the radial pulse obliteration pressure was used to estimate the SAP. The cuff was inflated to 20-30 mmHg above this level for auscultatory BP measurement. Then the cuff pressure was deflated at 2 mmHg per second and the systolic pressure was recorded as the onset of the first Korotkoff sound, and the disappearance of all Korotkoff sounds was recorded as the diastolic pressure, using the closest even number.

The data are presented as percentages for qualitative variables and medians with interquartile range for continuous variables. The Lilliefors-corrected Kolmogorov-Smirnov test was used to evaluate the normality of the data, which was significant (p=0.027); therefore, a nonparametric Mann-Whitney U or Kruskal-Wallis test was used to evaluate the difference in means, depending on whether the variable was binary or polytomous, respectively. The categorical variables were analyzed using the Chi square test, except when the expected frequencies were less than 5, when Fisher's exact test was used. P values <0.05 were taken to indicate a statistically significant correlation, with 95% confidence intervals.

## Results

A total of 333 patient surveys were conducted in the outpatient and cardiac rehabilitation departments from January to March 2020. Females predominated (63.1%), the median age was 65 years (Q1-Q3: 57-73 years); the subsidized insurance regimen was predominant (50.2%), as was socioeconomic level 1 (53.2%), and 35.2% of the participants were married. Regarding place of residence, 88.9% were from urban areas, and the highest level of education for 22.2% was primary school. Table 1 describes the participants' sociodemographic characteristics.

Out of the total 333 participants, 127 were considered adherent to pharmacological treatment, according to the Morisky-Green test (38.1%, 95%CI: 32.9-42.4%), with no differences by sex (p=0.66), age (p=0.27), health insurance (p=0.19), socioeconomic level (p=0.11), marital status (p=0.36), schooling (p=0.19), area of residence (p=0.45), number of medications taken (p=0.82), number of years of treatment (p=0.34) or patient care department (p=0.66). The information regarding the patient care received is described in Table 2.

The reasons patients gave for not taking the prescribed medications included: forgetting doses (27.9%), needing help from someone else (6.3%), feeling well (5.4%), delays in the health insurance agency supplying the medication (3.6%) and having adverse reactions to the medication (0.9%).

For nonpharmacological treatment, adherence was as follows: 94.5% did not smoke; regarding diet, 87.4% reported a low-sodium diet, 83.8% a low-sugar diet and 50.2% a low-fat diet, and 83.5% reported an adequate intake of fruits and vegetables; and 43.2% followed the exercise guidelines.

**Table 1.** Sociodemographic characteristics of the participants.

Variable	n	(%)
<b>Sex</b>		
Female	210	63.1
Male	123	36.9
<b>Age</b>		
<60 years	109	32.7
≥60 years	224	67.3
<b>Type of health insurance</b>		
Subsidized	167	50.2
Contributive	138	41.4
Prepaid	19	5.7
Special	9	2.7
<b>Area of residence</b>		
Urban	296	88.9
Rural	37	11.1
<b>Marital status</b>		
Married	118	35.4
Cohabiting	73	21.9
Single	58	17.4
Separated	28	8.4
Widowed	56	16.8
<b>Socioeconomic level</b>		
1	177	53.2
2	95	28.5
3	38	11.4
4	13	3.9
5	8	2.4
6	2	0.6
<b>Schooling</b>		
No schooling	39	11.5
Incomplete primary	59	17.7
Complete primary	74	22.2
Incomplete secondary	43	12.9
Complete secondary	59	17.7
Technical or technological	29	8.7
Professional	15	4.5
Graduate studies	15	4.5
<b>Healthcare department</b>		
Outpatient	238	71.5
Cardiac rehabilitation	95	28.5

However, only 18.9% (95%CI: 14.7-23.1%) followed all the recommendations, and 9.6% (95%CI: 6.4-12.7%) followed both the pharmacological and nonpharmacological treatment.

Furthermore, 256 participants, 76.9% (95%CI: 72.4-81.4%), had blood pressures under 140 mmHg systolic and 90 mmHg diastolic at the office visit, and therefore were

**Table 2.** Pharmacological treatment.

Description	n	%
<b>Type of medication</b>		
Angiotensin II receptor antagonists	276	82.9
Beta blockers	164	49.2
Calcium antagonists	113	33.9
Diuretics	40	12.0
Angiotensin converting enzyme inhibitors	33	9.9
Other	10	3
<b>Number of medications</b>		
One	110	33.0
Two	166	49.8
Three	44	13.2
Four or more	13	3.9
<b>Length of treatment</b>		
<1 year	42	12.6
1-5 years	103	30.9
6-10 years	84	25.2
>10 years	104	31.2
<b>Attendance at scheduled appointments</b>		
Sometimes	17	5.1
Almost always	54	16.2
Always	262	78.7

considered controlled, with a statistically significant relationship with keeping the assigned appointments ( $p=0.01$ ) and going to cardiac rehabilitation ( $p=0.002$ ), with the MAP being approximately 6 mmHg higher in patients seen in the outpatient department compared to those in cardiac rehabilitation ( $p<0.001$ ). The rest of the evaluated variables, including pharmacological adherence, sociodemographic variables and hypertension treatment variables were statistically significant ( $p>0.05$ ).

## Discussion

Cardiovascular diseases are the main cause of death worldwide. More than 70% of the cases can be attributed to a small group of modifiable risk factors. Hypertension is the greatest risk factor, accounting for slightly more than one fifth of the population attributable fraction, as seen in a prospective study that enrolled 155,722 participants in 21 countries with no history of cardiovascular disease (17). This highlights the importance of treatment adherence to achieve the blood pressure targets and thus have a greater impact on the reduction of cardiovascular mortality around the world. In this regard, lack of adherence continues to be

a key barrier in achieving better patient outcomes.

The adherence reported in our study is slightly lower than reported in other countries. In the United States, 149 patients with uncontrolled hypertension were evaluated (monitored with electronic pill boxes), 58% of whom adhered to treatment, defined as taking at least 80% of the prescribed antihypertensive medication (18).

Another study evaluated adherence to antihypertensive medications in 1,348 hypertensive patients in the United Kingdom and Czechoslovakia, who were suspected of not adhering to treatment or having resistant hypertension. They were evaluated through antihypertensive medication detection using high-resolution liquid chromatography with tandem mass spectrometry on urine and serum samples from the patients. Partial and complete nonadherence ranged from 20 to 27% and 12 to 14%, respectively (19).

In studies in Colombia, for example, using the Morinsky-Green test for adherence, Castaño-Castrillón et al. (11) reported 45% complete adherence in the city of Manizales, while Ramírez (13) reported 39.7% adherence in Norte de Santander, similar to the results reported in our study.

According to WHO, treatment adherence is a multidimensional phenomenon determined by reciprocal action between five dimensions (1):

1. Social and economic factors like age, race, sex and socioeconomic and educational level.
2. Healthcare team or system factors: some negative effects include poorly developed healthcare services, deficient medication distribution systems, lack of knowledge and training of healthcare staff in chronic disease control, overburdened healthcare staff, lack of incentives and feedback on performance, short office visits, little capacity of the system to educate patients and provide follow up, inability to establish community support and capacity for self care, and lack of awareness of adherence and effective interventions to improve it.
3. Condition-related factors: some powerful determinants of treatment adherence are related to the severity of the symptoms, the degree of disability (physical, psychological, social and vocational), the speed of progression and severity of the disease and the availability of effective treatments.
4. Therapy-related factors: the most notable factors are those related to the complexity of the treatment regimen, the length of treatment, previous treatment failures, frequent treatment changes, the imminence of beneficial effects, and side effects and the availability of medical support to treat them.
5. Patient-related factors: representing the patients' resources, knowledge, attitudes, beliefs, perceptions and expectations.

In this context, a study on the global epidemiology, burden of disease and effective interventions for hypertension revealed that the use and efficacy of hypertension treatment varied widely from one country to another. The factors af-

fecting these differences include the country's financial resources, health insurance coverage, and healthcare facilities; the frequency with which people interact with physicians and non-physician healthcare staff; the availability of clear and widely adopted clinical guidelines; and the availability of medications. Therefore, broadening treatment coverage and improving its community effectiveness can substantially reduce the healthcare burden of hypertension (20).

With regard to the issue presented, WHO proposes the HEARTS strategy as a model for cardiovascular risk management (including hypertension, diabetes and dyslipidemia) in primary healthcare in the Americas by 2025. Despite having treatment protocols and clinical practice guidelines that facilitate clinical decision making, there are still limitations in their implementation. Therefore, the idea is to integrate this initiative into the healthcare services in a transparent and progressive way to promote the adoption of global best practices in the prevention and control of cardiovascular disease (CVD) and improve healthcare service performance through hypertension control and promotion of secondary prevention, with an emphasis on primary healthcare (21).

In Colombia, the impact of the HEARTS strategy implementation was evaluated in a quasi-experimental study which showed that 76% of the patients were at their target blood pressure at their first follow-up visit, which increased to 84.1% at the second follow-up, with this increase being statistically significant. This had a favorable impact on hypertensive patients' blood pressure figures, with additional benefits in cardiovascular risk reduction variables (22).

These studies are similar to the reality proposed by the results of the current study, as healthcare professionals are confident that they can predict their patients' adherence to antihypertensive medications; however, no method is both practical and highly accurate. Although certain sociodemographic characteristics or clinical diagnoses are statistically associated with adherence to pharmacological antihypertensive therapy, a combination of these characteristics is not sufficiently accurate to allow physicians to predict if their patients will follow treatment (23), which is similar to our findings in which the different evaluated variables were not statistically significantly related to adherence to the proposed treatment.

As far as nonpharmacological treatment, adherence to each of the individual aspects evaluated was greater than adherence to pharmacological treatment. However, total adherence to the lifestyle treatment guidelines was close to 20%, probably related to the fact that patients often have trouble remembering and following the lifestyle recommendations given during office visits. In addition, information on the connection between exercise, weight loss or other lifestyle changes and their impact on blood pressure control must be reinforced during medical care, since patients may have mistaken information or be unaware of some aspects.

In addition to what was mentioned above, the PURE study showed that Colombia has a high prevalence of hyper-



tension coupled with very low levels of awareness, treatment and control. However, wide differences were found which seem to be associated with sociodemographic inequalities (24). Nevertheless, the common belief that patients alone are responsible for taking their treatment reflects a mistaken concept of how other factors affect people's behavior and their ability to adhere to treatment.

It is important to mention that 76.9% of the patients in our study had controlled blood pressure at the time of follow up, despite considerably lower adherence figures, which suggests that most treated patients are taking enough medication to control their hypertension, a fact which was also seen in an American study (25).

On the other hand, since our institution is a secondary and tertiary care facility, the patients have more comorbidities and resistant cases come for specialized care. Therefore, new multicenter studies are needed involving different levels of care, with this being a good opportunity to implement the HEARTS modules and show their effectiveness in treating hypertension.

## Conclusion

Pharmacological therapy and lifestyle changes contribute to blood pressure control; however, adherence to these treatment guidelines is low. Therefore, a multidisciplinary effort is needed in which physicians can educate patients and their families while involving them in decision making on treatment. Although there was no relationship between the evaluated sociodemographic variables, patients who kept their medical appointments and those who attended a cardiac rehabilitation program had the best blood pressure control.

## Reference

1. **Organización Mundial de la Salud.** Adherencia a los tratamientos a largo plazo. *OMS* [Internet]. [citado 2 de abril de 2024]. Disponible en: <https://iris.paho.org/bitstream/handle/10665.2/41182/adherencia-largo-plazo.pdf?sequence=1&isAllowed=y>
2. **Hamdidouche I, Jullien V, Boutouyrie P, Billaud E, Azizi M, Laurent S.** Drug adherence in hypertension. *Journal of Hypertension*. 2017 Jun;35(6):1133-44.
3. **Mazzaglia G, Ambrosioni E, Alacqua M, Filippi A, Sessa E, Immordino V, et al.** Adherence to antihypertensive medications and cardiovascular morbidity among newly diagnosed hypertensive patients. *Circulation*;120(16):1598-605.
4. **Matsumura K, Arima H, Tominaga M, Ohtsubo T, Sasaguri T, Fujii K, et al.** Impact of antihypertensive medication adherence on blood pressure control in hypertension: the COMFORT study. *QJM*. 2013;106(10):909-14.
5. **Beckmann SL, Os I, Kjeldsen SE, Eide IK, Westheim AS, Hjermann I.** Effect of Dietary Counselling on Blood Pressure and Arterial Plasma Catecholamines in Primary Hypertension. *American Journal of Hypertension*. 1995;8(7):704-11
6. **Jaffe MG, Lee GA, Young JD, Sidney S, Go AS.** Improved Blood Pressure Control Associated With a Large-Scale Hypertension Program. *JAMA*. 2013;310(7):699.
7. **Sandy R, Connor U.** Variation in medication adherence across patient behavioral segments: a multi-country study in hypertension. *Patient Prefer Adherence*. 2015;9:1539-48.
8. **Egan BM, Zhao Y, Axon RN.** US Trends in Prevalence, Awareness, Treatment, and Control of Hypertension, 1988-2008. *JAMA*. 2010;303(20):2043
9. **Moya L, Moreno J, Lombo M, Guerrero C, Aristizábal D, Vera A, et al.** Consenso de expertos sobre el manejo clínico de la hipertensión arterial en Colombia. Sociedad Colombiana de Cardiología y Cirugía. *Revista Colombiana de Cardiología*. 2018;25:4-26.
10. **Sánchez MSZ, Sánchez CPZ, López PAC, Sanabria MS, Hernández SCH.** Prevalencia de hipertensión arterial en Colombia: *Acta Médica Colombiana*. 2019;44(4).
11. **Castañó C, Echeverri R, Giraldo C, Cardona J, Maldonado A, Meza G, et al.** Adherencia al tratamiento de pacientes hipertensos atendidos en Assbasalud ESE, Manizales (Colombia) 2011. *Revista de la Facultad de Medicina*. 2012;60(3):179-197
12. **Romero G, Parra D, Sanchez R, Rojas L.** Adherencia terapéutica de pacientes con hipertensión arterial y diabetes mellitus tipo 2 de Bucaramanga. Colombia. *Revista de Universidad Industrial de Santander Salud*. 2017;49(1):37-44
13. **Ramírez Pinzón CJ.** Adherencia a la farmacoterapia en pacientes hipertensos ambulatorios que asisten al programa de control de hipertensión arterial en el Hospital Jorge Cristo Sahium, Norte de Santander (Colombia). *Cienc Tecnol Salud Vis Ocul*. 28 de enero de 2015;12(2):27.
14. **Morisky DE, Green LW, Levine DM.** Concurrent and predictive validity of a self-reported measure of medication adherence. *Med Care*. 1986;24(1):67-74.
15. **Ministerio de salud y protección social.** Guías de práctica clínica: Hipertensión arterial primaria (HTA). *Centro Nacional de Investigación en Evidencia y Tecnologías en Salud CINETS* [Internet]. [citado 2 de abril de 2024]. Disponible en: [https://www.medicosgeneralescolombianos.com/images/Guias\\_2013/gpc\\_18prof\\_sal\\_hta.pdf](https://www.medicosgeneralescolombianos.com/images/Guias_2013/gpc_18prof_sal_hta.pdf)
16. **Whelton PK, Carey RM, Aronow WS, Casey DE, Collins KJ, Dennison Himmelfarb C, et al.** 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults. *Journal of the American College of Cardiology*. 2018;71(19):e127-248.
17. **Yusuf S, Joseph P, Rangarajan S, Islam S, Mentz A, Hystad P, et al.** Modifiable risk factors, cardiovascular disease and mortality in 155,722 individuals from 21 high-, middle-, and low-income countries. *Lancet*. 2020;395(10226):795-808.
18. **Gallagher BD, Muntner P, Moise N, Lin JJ, Kronish IM.** Are two commonly used self-report questionnaires useful for identifying antihypertensive medication non-adherence? *J Hypertens*. 2015;33(5):1108-13.
19. **Gupta P, Patel P, Štrauch B, Lai FY, Akbarov A, Marešová V, et al.** Risk Factors for Nonadherence to Antihypertensive Treatment. *Hypertension*. 2017;69(6):1113-20.
20. **Zhou B, Perel P, Mensah GA, Ezzati M.** Global epidemiology, health burden and effective interventions for elevated blood pressure and hypertension. *Nat Rev Cardiol*. 2021;18(11):785-802.
21. **OPS/OMS.** HEARTS en las Américas. *Organización Panamericana de la Salud* [Internet]. 2024 [citado 2 de abril de 2024]. Disponible en: <https://www.paho.org/es/heart-america>
22. **Rivas Rivas S, Serna Tobón DC, Mahecha Gallego KY, Tejada Cardona MP, Castrillón Spitia JD, Moreno Gutierrez PA, et al.** Impacto de la Iniciativa HEARTS en una institución de salud de segundo nivel en Colombia. *Revista Panamericana de Salud Pública*. 2022;46:1.
23. **Steiner JF, Ho PM, Beaty BL, Dickinson LM, Hanratty R, Zeng C, et al.** Sociodemographic and Clinical Characteristics Are Not Clinically Useful Predictors of Refill Adherence in Patients With Hypertension. *Circulation: Cardiovascular Quality and Outcomes*. septiembre de 2009;2(5):451-7.
24. **Camacho PA, Gomez-Arbelaez D, Molina DI, Sanchez G, Arcos E, Narvaez C, et al.** Social disparities explain differences in hypertension prevalence, detection and control in Colombia. *Journal of Hypertension*. 2016;34(12):2344.
25. **Muntner P, Hardy ST, Fine LJ, Jaeger BC, Wozniak G, Levitan EB, et al.** Trends in Blood Pressure Control Among US Adults With Hypertension, 1999-2000 to 2017-2018. *JAMA*. 22 de septiembre de 2020;324(12):1190-200.

