

Hypertension in Clinical Practice: Control Rate in Short Term and Associated Factors in the Cardiology Department of the University Hospital Gabriel Touré (UH-GT) in Bamako (Mali)

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Abstract

Introduction: Hypertension (HTN) is for many decades a worldwide major risk factor for cardiovascular disease. However, hypertension control rates are globally low in the world. Studies on observance have been published in Mali but there is to our knowledge no published data about HTN control rate. We therefore conducted this study to assess the control rate in short term after 3 months management and to look for factors associated with HTN control.

Materials and Methods: This study designed as prospective was conducted in the cardiology department of the University Hospital Gabriel Touré (UH-GT) from March 24 to September 24, 2017. All outpatients aged 18 years and more who came for visit and with hypertension as diagnose were involved. All patients have consented to participate in the study. Sociodemographic and data on physical examination including measures for BP, height, weight, waist circumference (WC) and direct costs as reported by the patients were recorded. Patients were asked about medication discontinuation and if yes why and then they were informed about the need to take regularly medication. The concept of chronic disease was explained to them. A formulary served to collect data that were inserted into a Microsoft Access database and analyzed using SPSS version 18. After describing of sociodemographics and continuous variables,

crosstabs and finally a logistic regression was performed to look for blood pressure control predictors. **Results:** There was no statistical difference in sociodemographics between older and newly diagnosed patients. At 3 months globally 40.90% (31.1 for old Patients and 09.8% for new Patients) of the sample were controlled (**Figure 1**). For old patients, hypertension control rate at inclusion was 12.78% and reached 49.44% at 3 months (**Figure 2**). After logistic regression only HTN duration was significant predictor with Odd-ratio of 0.365 [0.213 - 0.624] 95% CI and p -value < 0.001 (old patients as reference). During the study period therapeutic regimen remained unchanged in 73.1% (44.4 for old Patients and 28.7 for new Patients. Calcium channel blocker (CCB), diuretics (DIU) and ACE-inhibitors (ACE-I) were the most prescribed drugs without statistical difference between patients with and without blood pressure under control. **Conclusion:** Short term hypertension control rate is low and patient follow-up must incorporate information at each visit as well as information through others channels for preventing hypertension. The duration of hypertension was found to be predictor for hypertension control.

Keywords

Hypertension, Control Rate, Old Patient, New Patient, Medication, Bamako, Outpatient

1. Introduction

Hypertension (HTN) has been recognized for many decades as worldwide major risk factor for cardiovascular disease. HTN is a major public health issue not only responsible for near 9.4 million deaths yearly but represent a high economic burden mainly for low- and middle-income countries [1]. Based on estimations, the number of hypertensive patients will rise from 26.4% in 2000 to 29.2% in 2025 representing 1.56 billion adults [2]. Moreover, it exists different patterns in cardiovascular mortality and also HTN, low- and middle-income countries being more affected [3].

These facts make it clear that HTN should be addressed through different components [1] among them integrated primary care program for control of HTN.

However, hypertension control rates are globally low in the world ranging from 34% to 66% in North-America [4] [5] [6]. There are also improvements in control rate as published by McAlister [7], Gupta [8] in urban Indian population but any improvement in awareness, treatment and control rates in India [9]. Even in particular group such HIV-patients, the control rate of HTN remains low [9]. Globally there is a marked difference in control rate between countries [10].

Many factors have such blood pressure (BP) prior HTN diagnostic, awareness of hypertension and lifestyle modification been identified as common for HTN control [11] or access to a regular source of health care and modification of lifestyle for He J *et al.* [12].

Studies on observance have been published in Mali but there is to our knowledge no published data about HTN control rate. We therefore conducted this study to assess the control rate in short term after 3 months management and to look for factors associated with HTN control.

2. Methods

This study designed as prospective was conducted in the cardiology department of the UH-GT from March 24 to September 24 2017. All outpatients aged 18 years and more who came for visit and with hypertension as diagnosis were involved. All patients have consented to participate in the study.

A formulary has been filled for each patient and data concerned sociodemographic and data on physical examination including measures for BP, height, weight, waist circumference (WC) and direct costs as reported by the patients. At each visit patients were first asked about medication discontinuation and if yes why and then they were informed about the need to take regularly medication. The concept of chronic disease was explained to them.

All anthropometrical measures were done following WHO recommendations. Calculated value was body mass index (BMI) as weight (Kg)/height (m) squared.

High blood pressure (HBP) was retained for BP values of ≥ 140 mmHg systolic and ≥ 90 mmHg diastolic.

General obesity (Gob) was defined for BMI ≥ 30 Kg/m² and abdominal Obesity (AOB) for WC ≥ 102 cm for men and ≥ 88 cm for women. At each visit patients have been informed about hypertension and the need to continually take medicine.

Following classifications were used:

1) based on duration: old Patients for patients known as hypertensive patients before inclusion in the study and new Patients for patients newly diagnosed as hypertensive patients.

2) based on hypertension control at 3 months: in Ctrl(+) for patients with blood pressure controlled and Ctrl(-) for those which blood pressure was not controlled.

Collected data were inserted in a Microsoft access database, which was built for this purpose and analysis was done using SPSS version 18 with appropriate statistical tests.

We first describe sociodemographics, continuous variables and crosstabs looking for difference between old and new patients and also between Ctrl(-) and Ctrl(+). Finally we perform a logistic regression to look for blood pressure control predictors.

3. Results

Our sample was representative making more than one third of the patients seen in the study period. It involved 286 patients with 180 old Patients and 106 new Patients with 68.2% being female, 46.2% from age group 60 and more. Patients

were unschooled in 81.5%, from low income group in 58.4% (**Table 1**). There was no statistical difference in sociodemographics between older and newly diagnosed patients.

Tobacco smoking, Diabetes, dyslipidemia and high uric acid (HUA) were other cardiovascular risk factors found in respectively 4.8, 10.4, 12.5 and 17.8% of all cases (**Table 1**) without statistical difference between older and newly diagnosed patients.

Among continuous variables, only systolic blood pressure (SBP) was higher for new Patients ($p = 0.014$). Age, creatinine clearance, heart rate, weight, height, WC, BMI, diastolic blood pressure (DBP) haven't show any statistically significant difference (**Table 2**).

At 3 months globally 40.90% (31.1 for old Patients and 09.8% for new Patients) of the sample were controlled (**Figure 1**).

For old Patients hypertension control rate at inclusion was 12.78% and reached 49.44% at 3 months.

During the study period therapeutic regimen remained unchanged in 73.1% (44.4 for old Patients and 28.7 for new Patients (**Table 3**). There were 2 old Patients by whom temporarily discontinuation or breaking was noted.

Table 1. Sociodemographics and risk factors of the sample of 286 hypertensive patients.

Variables		Old Patients	New Patients	Total	<i>p</i>
Sex	Male	17.5	14.3	91	0.056
	Female	45.5	22.7	195	
Age group	<30	01.7	01.4	9	0.701
	30 - 44	10.5	05.2	45	
	45 - 59	23.1	11.9	100	
	≥60	27.6	18.5	132	
School attending (years)	0	50.3	31.1	233	0.692
	1 - 9	1.7	0.7	7	
	10 and more	10.8	05.2	46	
Income*	Low	37.1	21.3	167	0.645
	Middle	21.3	11.9	95	
	NA	04.5	03.8	24	
Tobacco smoking	No	59.8	35.3	272	0.915
	Yes	3.1	1.7	14	
Diabetes	No	5.63	33.2	256	0.962
	Yes	06.6	03.8	30	
Dyslipidemia	No	54.9	32.5	250	0.899
	Yes	08.0	04.5	36	
Hyperuricemia	No	51.4	30.8	235	0.773
	Yes	11.5	06.3	51	

*Income: based on monthly salary. Low for <90 USD, Middle for ≥90 and <540 USD, NA: No Answer.

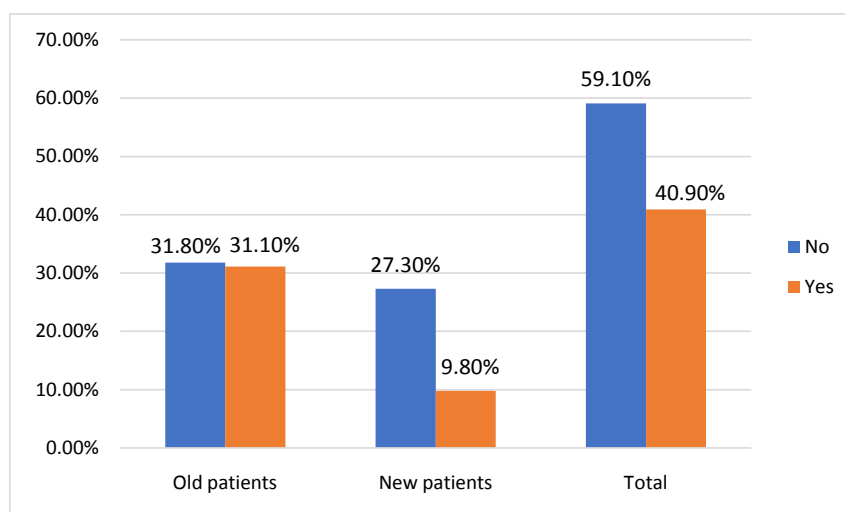
Table 2. Distribution of descriptives in the sample of 289 hypertensive patients.

Variables	Old Patients			New Patients			Total			p
	Mean	N	SD	Mean	N	SD	Mean	N	SD	
Age (years)	55.04	180	12.761	55.53	106	12.709	55.22	286	12.722	0.754
*CrCl at inclusion	85.61	145	29.176	84.85	79	30.266	85.34	224	29.499	0.855
HR*	82.39	178	15.385	85.82	106	15.285	83.67	284	15.411	0.069
Weight (Kg)	74.22	180	16.401	73.84	106	15.553	74.08	286	16.065	0.848
Height (cm)	164.69	180	7.353	165.53	106	7.148	165.00	286	7.276	0.347
WC**	93.69	180	14.897	91.52	106	12.695	92.89	286	14.137	0.209
BMI***	28.45	180	6.148	27.83	106	5.778	28.22	286	6.011	0.394
SBP*	156.93	178	26.459	165.63	104	31.747	160.14	282	28.777	0.014
DBP**	95.08	178	14.076	96.57	104	19.108	95.63	282	16.098	0.456
MAP***	115.70	178	16.609	119.59	104	21.170	117.13	282	18.481	0.088

*Creatinine clearance; *heart rate; **Waist circumference; ***Body mass index; *Systolic blood pressure; **Diastolic blood pressure; ***Mean arterial pressure.

Table 3. Distribution of therapeutical regimen changes.

Molecules Changed	Old patients (%)	New patients (%)	Total
No	44.4	28.7	209
1 added	9.4	5.9	044
2 added	0.3	0.0	001
1 added, 1 replaced	01.4	0.0	004
1 retired	0.3	0.3	002
1 retired, 1 replaced	0.3	0.3	002
1 replaced	5.9	1.4	021
2 replaced	0.7	0.3	003
Total	62.9	37.1	286

**Figure 1.** Blood pressure control rate at 3 months.

Calcium channel blocker (CCB), diuretics (DIU) and ACE-inhibitors (ACE-I) were the most prescribed drugs without statistical difference between patients with and without blood pressure under control (**Figure 2**).

Old patients had higher prescriptions rate for all antihypertensive classes except for angiotensin receptor type 2 (ARA2) with a statistical significant difference for beta-blocker (BB). There was always more CCB, DIU and ACE-I as most prescribed antihypertensive molecules (**Figure 3**).

By looking for factors related to blood pressure control, we found only HTN duration as significant predictor. Odd-ratio for HBP duration with old patients as reference was 0.365 [0.213 - 0.624] 95% CI and *p*-value < 0.001 meaning that new patients were less likely to have their blood pressure controlled (**Table 4**). Old patients had mostly tritherapy whereas new one had monotherapy prescribed (**Figure 4**).

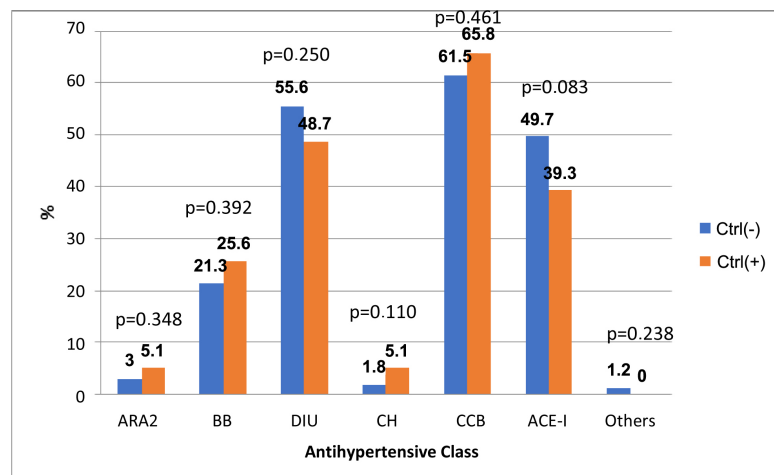


Figure 2. Antihypertensive molecules and control status. ARA2: angiotensin receptor typ 2 antagonist, BB: beta-blocker, DIU: diuretic, CH: central antihypertensivum, CCB: calcium channel blocker, ACE-I: angiotensin converting enzyme inhibitor.

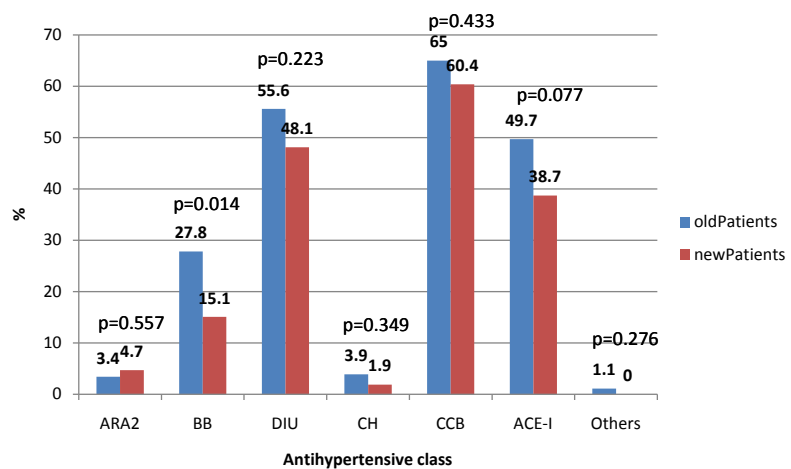


Figure 3. Antihypertensive molecules related to duration category. ARA2: angiotensin receptor typ 2 antagonist, BB: beta-blocker, DIU: diuretic, CH: central antihypertensivum, CCB: calcium channel blocker, ACE-I: angiotensin converting enzyme inhibitor.

Table 4. Factors associated with blood pressure control.

Factors	OR	95% C.I. for OR	
		Lower	Upper
Sex Male as reference $\chi^2(1) = 0.154$ ($p = 0.695$)	1.161	0.552	2.440
Age in years < 30 as reference $\chi^2(3) = 1.446$, $p = 0.695$			
30 - 44	0.727	0.154	3.436
45 - 59	0.955	0.216	4.226
60 and more	0.691	0.157	3.039
School attending in years 0 as reference $\chi^2(2) = 1.230$, $p = 0.541$			
1 - 9	2.539	0.488	13.222
10+	1.111	0.500	2.468
Income Level Low as reference $\chi^2(1) = 1.895$, $p = 0.169$	0.617	0.311	1.227
Tobacco smoking No as reference $\chi^2(1) = 0.026$, $p = 0.872$	0.902	0.258	3.152
Diabetes No as reference $\chi^2(1) = 0.446$, $p = 0.504$	1.326	0.579	3.035
WC* Normal as reference $\chi^2(1) = 0.036$, $p = 0.849$	0.934	0.460	1.893
BM**I Normal as reference $\chi^2(2) = 1.899$, $p = 0.387$			
Overweight	1.034	0.520	2.057
Obesity	0.658	0.278	1.558
HTN*** duration Old patients as reference $\chi^2(1)=13.578$, $p < 0.001$	0.365	0.213	0.624

*waist circumference; **body mass index; ***hypertension.

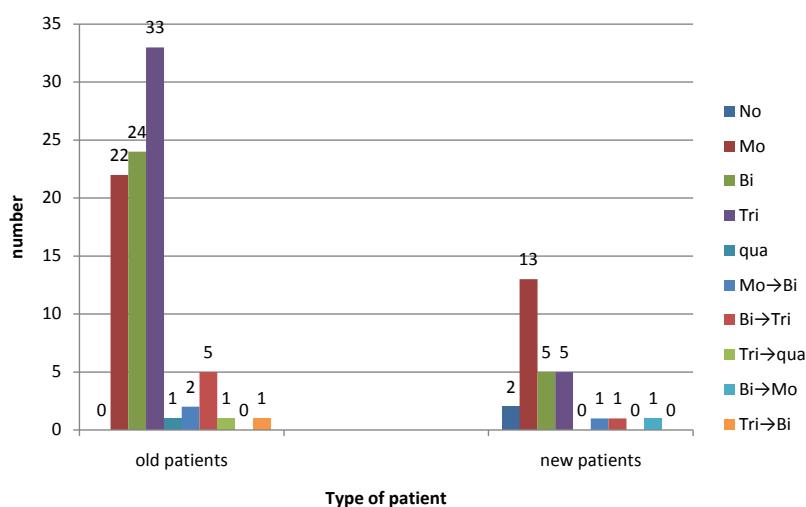


Figure 4. Repartition of number of prescribed molecules in relation to patient type. No: no medication; Mo: monotherapy; Bi: bitherapy; Tri: tritherapy; Qua: quadritherapy.

4. Discussion

Our study, the first in its kind presents some interesting findings about HTN and its control rate in hospital area:

- 1) The sample with more patients in low income category and mostly un-schooled reflects the population structure in our country.
- 2) Typical cardiovascular risk factors such as tobacco, Diabetes, dyslipidemia

were found as in most studies [13] [14] [15].

3) As shown in **Figure 1** control rate at 3 months remains low with 40.90% old patients having a higher control rate of 31.1. We didn't find previous data on hypertension control rate in Mali. HBP control rate is generally poor in most countries with 14.9% in some regions of China [16] but varied considerably from 27% in England to 66% in Canada [4]. Trends showed increasing but this remains low for example 2 - 21 for all, 12 - 37 for aware and 9% to 49% for treated hypertensive patients [8].

We saw an increase in control rate for old patients in the short term. This could be due to close follow-up and provided information in the study time. He *et al.* [12] pointed out the fact that a regular source of health care and modification of lifestyle are important factors in the control of hypertension in the community. That could explain why our old patients had a higher control rate

1) Some factors were found to be associated with a better control rate of HTN such as repeated blood pressure measure, being aware of HTN diagnosis and taking lifestyle modification [11]. In our study lifestyle modifications could not be assessed as they need time longer than just 3 months.

2) Our patients got with decreasing proportion CCB, DIU and ACE-I in the same order as for old and new patients well for patients with and without controlled HBP according to recommendations. Control rate remained low despite as for most countries [17] even we know from the COMFORT study that adherence to antihypertensive drug regimen is related to blood pressure control [18]. More over combination antihypertensive therapy is often needed to reach BP goal [19].

We could not test strategy as described by Kamel *et al.* [20] due to cost issues, most of our patients being without medical insurance. It appeared also clear that medication is necessary for blood pressure control as shown in **Figure 4**. Only 2 patients had their hypertension controlled without medication.

5. Limits

Our study extended only about 3 months and will not give information about control rate in long term and also about the sustainability of controlled blood pressure. It will be also interesting to try to repeat the same study in a year looking for trends in the hypertension control rate or further looking for associated factors.

6. Conclusion

Our study gave control rate in short period; sustainability should be assessed in a longer time. Hypertension duration was the only factor which was associated with its control. Fast all patients need medication.

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