

Medication adherence among hypertensive patients at Monkole Hospital Center

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ABSTRACT

Introduction

Improving medication adherence is essential for the effective management of hypertension.

Purpose

This study aimed to assess the level of antihypertensive medication adherence among adult hypertensive patients at Monkole Hospital Center, evaluate their knowledge of hypertension complications, and identify predictive factors for good adherence.

Methods

A cross-sectional study was conducted on a sample of 121 hypertensive patients attending the Internal Medicine Department of Monkole Hospital Center from 1 August 2021 to 31 December 2021. Data were collected through interviews using a structured questionnaire. Medication adherence was assessed using the Girerd scale. Factors associated with adherence were identified using binary logistic regression analysis. Adjusted odds ratios (AOR) and 95% confidence intervals (CI) were calculated with SPSS version 25. A P-value < 0.05 was considered statistically significant.

Results

Among the 121 hypertensive patients, 32.2% demonstrated good adherence, 44.6% had minimal adherence problems, and 23.1% had poor adherence. Overall, 76.8% were classified as good adherents. More than half of the participants (52.9%) were female, with a mean age of 55.8 ± 10.9 years. Patients younger than 50 years (AOR = 0.136, 95% CI = 0.048–0.897, P = 0.000) and single patients (AOR = 0.086, 95% CI = 0.012–0.629, P = 0.016) were less adherent compared to those aged 50 years or older and married patients.

Conclusion

Patients at Monkole Hospital Center were generally classified as good adherents based on the Girerd scale. More than half of the patients were informed about their disease by doctors. Older age and being married were associated with better medication adherence.

INTRODUCTION

Medication adherence is defined as an individual's ability to take treatment as prescribed. It is the most important predictor of treatment success, particularly in the management of chronic diseases such as hypertension (Asgedom, 2018; Lee, 2017; Solomon, 2023). Hypertension is considered one of the most challenging public health problems worldwide and is reported to be the leading risk factor for cardiovascular death and hospitalisation (Makoso et al., 2020; Schutte et al., 2023). It affects both developed and developing countries (Ibrahim & Damasceno, 2012; Kjeldsen, 2018). According to the 2017 Global Burden of Disease (GBD), hypertension is expected to affect 1.56 billion people globally by 2025, representing a 60% increase in prevalence (GBD, 2018). Several African countries have reported an increase in risk factors for hypertension, resulting in a high prevalence of the disease (Dai, 2022).

In the Democratic Republic of Congo (DRC), the prevalence of hypertension ranges from 9.9% to 49.3%. Epidemiological data show that hypertension contributes to more than 12.5% of morbidity and 14.7% of mortality among non-communicable diseases, with an estimated prevalence of 38.5% in men and 33.3% in women (Chelo et al., 2023a; Mbaz et al., 2021; Munyapara et al., 2014; Vuvu et al., 2019). Hypertension causes numerous complications, including cardiac, cerebral, vascular, renal, and ophthalmological complications. However, effective treatment can reduce these complications. Therefore, adherence to antihypertensive medication is a key step in controlling blood pressure and preventing complications (Asgedom, 2018; Lee, 2017). Unfortunately, due to the asymptomatic nature of hypertension and the indefinite duration of treatment, medication adherence remains a significant challenge for hypertensive patients.

A number of rigorous assessments reviewed in a World Health Organization (WHO) study found that the proportion of patients with chronic diseases adhering to their treatment is only 50% in developed countries (Essomba et al., 2017), and it is believed to be much lower in developing countries. Furthermore, studies have shown that patient characteristics such as age, culture, education, and socioeconomic status significantly influence adherence (Solomon, 2023).

Several studies have been conducted to assess adherence levels among hypertensive patients, with reports indicating non-adherence rates ranging from 30% to 70%. The factors associated with non-adherence are varied, including socio-demographic variables, duration of treatment, number of tablets per dose, lack of knowledge about the treatment and complications of hypertension, ignorance of the severity of hypertension, high cost of treatment, and low monthly income (Abegaz et al., 2017; Asgedom et al., 2018; Chelo, 2023; Ikama et al., 2013; Laouan et al., 2024; Lukaya-Mupinsie, 2021). While some of these factors were linked to adherence, others did not show a statistically significant association.

Antihypertensive treatment is lifelong and has been shown to reduce the incidence and severity of cardiovascular complications. Studying medication adherence and identifying the factors that influence it is a critical step towards improving the management of hypertensive patients. In the DRC, few studies have been conducted on medication adherence among hypertensive patients. For instance, Chelo et al. (2023b) assessed treatment adherence in Goma, Lulebo et al. (2015) identified predictors of non-adherence in primary healthcare facilities in Kinshasa, and Lukaya-Mupinsie (2021) conducted a qualitative study on the factors affecting non-adherence.

The aim of this study is to assess the quality of adherence to antihypertensive medication among adult hypertensive patients at a secondary healthcare facility, evaluate their knowledge of hypertension complications, and identify predictive factors for good adherence. This study will contribute to filling the gap in available data on medication adherence in the DRC, particularly in Kinshasa.

METHODS

We conducted a descriptive and analytical cross-sectional study from 1 August 2021 to 31 December 2021 among outpatients at the Monkole Hospital Center (CHM). CHM is a general referral hospital in Kinshasa. A convenience sampling method was used, and 121 patients participated in the study. All hypertensive patients aged 18 years and older who had been on antihypertensive medication for at least six months and were willing to participate were

included. Patients who refused to take part in the study were excluded.

Informed consent was obtained from patients after explaining the purpose of the study, and anonymity and confidentiality of their data were guaranteed. Patients were followed consecutively according to the schedule of consultations, which took place on Mondays, Tuesdays, Thursdays, and Fridays. Data were collected through a face-to-face interview using a structured questionnaire written in French to assess socio-demographic (age, sex, marital status, level of education, occupation, monthly income), clinical, and therapeutic characteristics, including treatment protocol, number of tablets taken daily, use of traditional medicine, and medication adherence. Translation into Lingala, the local language, was provided for patients who did not speak French.

Medication adherence was assessed using the **Girerd Adherence Assessment Test** (Girerd et al., 2001), which consists of six yes/no questions (Table 1). This test measures the level of adherence in adults, is simple and effective, and is integrated into the care process. Based on the answers, adherence was classified as follows: good adherence if the total number of "yes" answers was 0, minimal adherence problem for one or two "yes" answers, and poor adherence for three or more "yes" answers.

The test also identifies factors contributing to poor adherence and raises patients' awareness of the importance of adherence. This assessment method is neither costly nor coercive, making it well-suited to our context.

Table 1:
Adherence Evaluation Test

Questions	Answers	
	Yes	No
1. This morning, did you forget to take your medication?		
2. Since the last consultation, was your medication enough for your daily required intake?		
3. Have you ever taken your treatment later than usual?		
4. Have you ever missed your treatment because you forgot?		
5. Did you ever stop taking your treatment because you felt it did more harm than good?		
6. Do you think you have too many tablets to take in a day?		

Test interpretation

Total YES = 0 Good adherence
 Total YES = 1 or 2 Minimal adherence problem
 Total YES ≥ 3 Poor adherence

The high cost of treatment and low monthly income have been identified in the literature as factors associated with poor adherence (Laouan et al., 2024; Lukaya-Mupinsie, 2021). In the Democratic Republic of Congo (DRC), most of the population has a low income, and few are covered by health insurance. Given this context, achieving a minimal adherence problem can be considered a success.

To identify predictors of good adherence, patients with minimal adherence problems were classified as good observers. Patients were then divided into two groups: poor observers (total "yes" ≥ 3) and good observers (total "yes" < 3).

Knowledge of Hypertension Complications

An open-ended question was used to assess patients' knowledge of hypertension complications. Responses were classified into five categories: renal, cardiac, cerebral, vascular, and ocular complications. Each category mentioned earned the patient one point, even if more than one complication within the category was identified.

Patients received a knowledge score ranging from 1 to 5, which was analysed according to their characteristics. Table 2 summarises the categories of complications and their corresponding scores.

Table 2:
Presentation of Scores According to Categories Mentioned

Complications	Score
Brain	1
Brain, Kidney	2
Brain, Kidney, Heart	3
Brain, Kidney, Heart, Vascular	4
Brain, Kidney, Heart, Vascular, Ocular	5

Duration of Antihypertensive Treatment

A threshold of five years was set for the duration of antihypertensive treatment. Patients who had been on treatment for at least five years were considered to have become familiar with their treatment and gained knowledge of the disease and its management. Two groups were defined: those treated for less than five years and those treated for at least five years.

Data Processing and Analysis

Data were entered into Excel and analysed using IBM® SPSS® Statistics version 25. Qualitative variables were

expressed as percentages, while quantitative variables were expressed as means ± standard deviation. The chi-squared test or Fisher's exact test was used for univariate analysis of factors associated with medication adherence. Binary logistic regression was applied to identify predictors of adherence. Variables with a *p*-value less than 0.05 were considered statistically significant.

Ethics

The study was conducted with the approval of the hospital ethics committee. Informed consent was obtained from all patients.

RESULTS

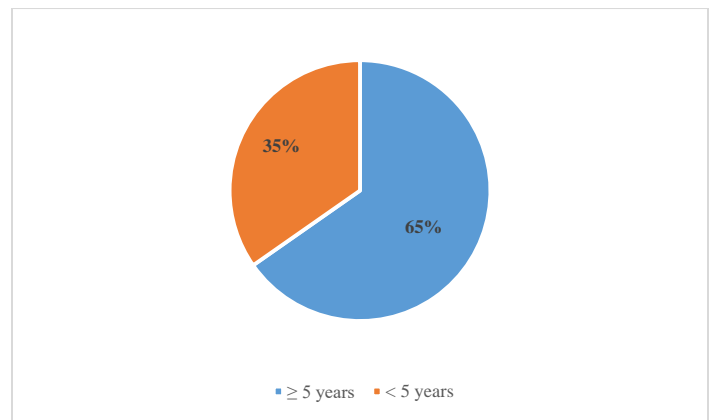
Socio-demographic and clinical characteristics of hypertensive patients

A total of 121 hypertensive patients were included in this study. As shown in Table 3, more than half (52.9%) of the participants were female, with a sex ratio (M/F) of 0.89. The mean age was 55.8 (±10.9) years, ranging from 30 to 76 years. Regarding marital status, over three-quarters (80.2%) of the patients were married, while only 7.4% were single. In terms of education, about two-thirds (67.8%) of hypertensive patients had completed higher education, 23.1% were secondary school graduates, 5.8% had a primary level, and 3.3% had no formal education. There was a predominance of executives (60.3%), followed by housewives (23.1%), pensioners (13.3%), and the unemployed (3.3%). Concerning the duration of antihypertensive treatment, 79 patients (65.0%) had been on treatment for at least 5 years (Figure 1). As for monthly income, the majority of patients declined to disclose it.

Table 3:
Socio-demographic characteristics of hypertensive patients

	Frequency (n)	Proportion (%)
Age (years)	mean ± SD	55.8 ± 10.9
≥ 50	85	70.2
< 50	36	29.8
Sex (n=121)		
Female	64	52.9
Male	57	47.1
Marital status (n=121)		
Married	97	80.2
Widow(er)	15	12.4
Single	9	7.4
Education level (n=121)		
Higher education	82	67.8
Secondary education	28	23.1
Primary education	7	5.8
No formal education	4	3.3
Occupation (n=121)		
Employed	73	60.3
Housewife	28	23.1
Retired	16	13.3
Unemployed	4	3.3

Figure 1:
Proportion of hypertensive patients according to the duration of antihypertensive treatment (n=121)



In addition to socio-demographic characteristics, we collected clinical and therapeutic data (Table 4). All patients were aware of their treatment, and more than 80.0% accepted it. Less than 2% reported using traditional medicine. Nearly 45.0% of patients were either on monotherapy (42.1%) or dual therapy (43.8%), while 14.1% were on triple therapy or more. Among those taking antihypertensive medication, 18 patients (14.9%) were

reluctant to take their medication and indicated that they were ready to stop because daily medication intake was bothersome.

Table 4:
Clinical characteristics and therapeutic parameters of hypertensive patients

Parameters	Frequency (n)	Proportion (%)
Treatment acceptability (n=121)		
Yes	103	85.1
No	18	14.9
Patient knowledge of treatment		
Yes	121	100
No	0	0
Use of other products		
Yes	11	9.1
No	110	90.9
Use of traditional medicine		
Yes	2	1.7
No	119	98.3
Medication therapy		
Monotherapy	51	42.1
Bitherapy	53	43.8
Triotherapy or more	17	14.1

Information to Patients About High Blood Pressure at First Prescription

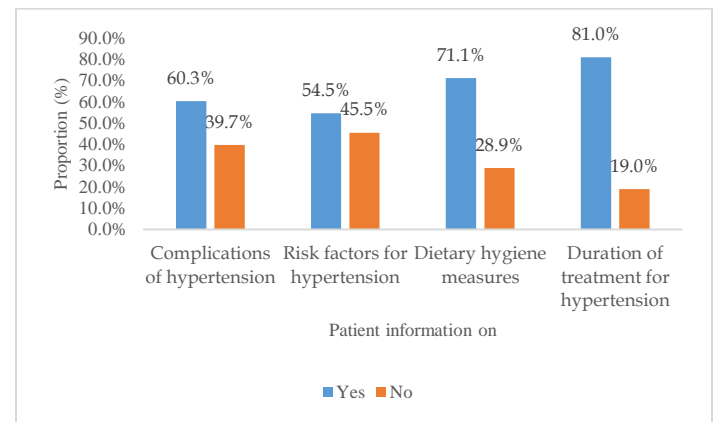
We assessed whether the patients surveyed were informed about the complications and risk factors of hypertension, the duration of antihypertensive treatment, and the hygiene and dietary measures recommended at the time of their first prescription (Figure 2). The results show that nearly two-thirds of the patients (60.3%) received information about the complications of hypertension during their first prescription.

The sources of information on hypertension complications mentioned by the patients were doctors (66.9%, n=81), nurses and pharmacists (18.2%, n=22), and friends and family (14.9%, n=18). Regarding the risk factors for hypertension, 66 patients (54.5%) were informed about their specific risk factors. The most commonly mentioned factors included anxiety, smoking, a diet high in salt and fat, excessive alcohol consumption, and stress.

Additionally, almost three-quarters of the patients (70.1%) reported receiving information on dietary measures to follow (Figure 2). These measures included adopting a low-salt diet, reducing alcohol consumption, engaging in moderate physical activity, and following a low-fat diet. Given that hypertension treatment is lifelong, 98 out of 121

patients (80.0%) were informed that they would need to remain on treatment for life.

Figure 2:
Patient Education on Hypertension at First Prescription (n=121)



Knowledge of Hypertension Complications

Of the 121 patients surveyed, 110 (95.9%) scored between 1 and 5 on the knowledge scale for complications of hypertension, while 5 patients (4.1%) scored 0. More than half (58.7%) of the patients could only name one complication, as shown in Table 5.

This table shows that over 90% of the patients surveyed were aware of at least one complication of hypertension. Although all major complications were mentioned, brain-related complications were the most frequently cited. Additionally, 21.5% of the participants mentioned other symptoms that were unrelated to hypertension complications, as presented in Table 6.

Table 5:
Distribution of Patients by Knowledge Score of Hypertension Complications (n=121)

Complications Cited	Score	Frequency (n)	Proportion (%)
Brain	1	71	58.7
Brain, Kidney	2	17	14.0
Brain, Kidney, Heart	3	13	10.7
Brain, Kidney, Heart, Ocular	4	9	7.5
Brain, Kidney, Heart, Ocular, Vascular	5	6	5.0
None	0	5	4.1

Table 6:
Other Symptoms Listed by Patients as Complications of Hypertension (n = 26)

Other Complications Cited	Frequency (n)	Proportion (%)
Dead cases	21	80.8
Symptoms (fever, headache, dizziness)	3	11.5
Health problems unrelated to hypertension (mental disorders, hearing problems)	2	7.7

Quality of Medication Adherence

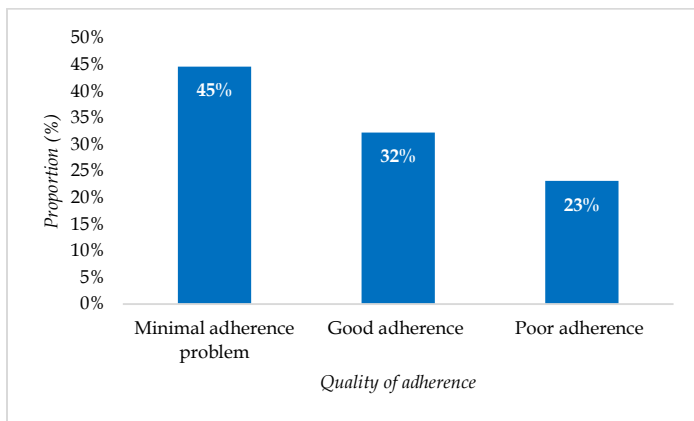
The distribution of patients according to their responses in the adherence assessment test is shown in **Table 7**. Almost 60% of patients reported delays in taking their medication. Fewer than 2% never took their treatment because they felt that, on some days, the medication did more harm than good. Approximately 40% of patients had run out of medication at least once. This issue was more prevalent among patients on contract who obtained their medication from the hospital. When the hospital dispensary ran out of stock, these patients struggled to adhere to their treatment.

Based on their responses, patients were categorised according to their level of adherence (**Figure 3**).

Table 7: Distribution of Patients by Response to the Adherence Assessment Test (n = 121)

Measured Parameters	Frequency (n)	Proportion (%)
Delayed in taking medication	69	57.0
Medication breakdown	49	40.5
Morning forgetfulness	34	28.0
Memory failure	34	28.0
Too many pills to take	15	12.4
Poor perception of therapeutic effect	2	1.6

Figure 3: Quality of Medication Adherence Among Patients Surveyed (n = 121)



Antihypertensive Medication Adherence and Associated Factors

We investigated whether socio-demographic and clinical factors could improve adherence. As shown in **Table 8**, no significant difference was found between the three levels of medication adherence for any factor except age ($P = 0.000$).

To identify factors predictive of good or optimal medication adherence, patients were divided into two groups: good adherence and poor adherence. Based on this categorisation, 93 hypertensive patients (76.9%) had good adherence, while the remaining 28 patients (23.1%) had poor adherence.

The univariate analysis of socio-demographic and clinical factors for medication adherence is shown in **Table 9**. Two factors were significantly associated with medication adherence: age ($P = 0.000$) and marital status ($P = 0.038$). The results of the logistic regression analysis for factors associated with good medication adherence are shown in **Table 10**.

Table 8: Quality of Medication Adherence According to Socio-Demographic and Clinical Factors (n=121)

Factors	Medication adherence, n (%)				P-value
	Good (n=39)	Minimal problem (n=54)	Poor (n=28)		
Gender	Men	23(40.4)	24 (42.1)	10 (17.5)	0,168
	Women	16 (25.0)	30 (46.9)	18 (28.1)	
Age (in years)	≥ 50	32 (37.6)	43 (50.6)	10 (11.8)	0.000
	< 50	7 (19.4)	11 (30.6)	18 (50.0)	
Marital status	Married	29 (29.9)	47 (48.5)	21 (21.6)	0.059
	Widow(er)	8 (53.3)	5 (33.3)	2 (13.3)	
	Single	2 (22.2)	2 (22.2)	5 (55.6)	
Education level	Higher education	29 (35.4)	32 (39.0)	21 (25.6)	0.051
	High school	7 (25.0)	18 (64.3)	3 (10.7)	
	Primary	3 (42.9)	3 (42.9)	1 (14.3)	
	Out of school	0 (0.0)	1 (25)	3 (75)	
Duration of antihypertensive treatment (in years)	≥5	27 (34,2)	36 (45.6)	16 (20.3)	0.568
	< 5	12 (28.6)	18 (42.9)	12 (28.6)	
Patients receiving information about hypertension complications	Yes	24 (32.9)	32 (43.8)	17 (23.3)	0.975
	No	15 (31.3)	22 (45.8)	11 (22.9)	

Table 9:
Factors Associated with Good Medication Adherence (n=121)

Factors	Medication Adherence Level n (%)	Crude OR [95% CI]	P*-value
	Good Observers (n=93)	Poor Observers (n=28)	
Gender			
Men	47 (82.5)	10 (17.5)	
Women	46 (71.9)	18 (28.1)	0.544 [0.227-1.302]
Age (in years)			
≥ 50	75 (88.2)	10 (11.8)	
< 50	18 (50.0)	18 (50.0)	0.133 [0.053-0.337]
Marital Status			
Married	76 (78.4)	21 (21.6)	
Widow(er)	13 (86.7)	2 (13.3)	1.796 [0.375-8.591]
Single	4 (44.4)	5 (55.6)	0.221 [0.054-0.897]
Education Level			
Higher Education	61 (74.4)	21 (25.6)	
High School	25 (89.3)	3 (10.7)	2.869 [0.785-10.486]
Primary	6 (85.7)	1 (14.3)	2.066 [0.235-18.169]
Out of School	1 (25.0)	3 (75.0)	0.115 [0.011-1.164]
Duration of Antihypertensive Treatment (years)			
≥ 5	63 (79.7)	16 (20.3)	
< 5	30 (71.4)	12 (28.6)	0.635 [0.267-1.509]
Patients Who Received Information on Complications			
Yes	56 (76.7)	17 (23.3)	
No	37 (77.1)	11 (22.9)	1.021 [0.430-2.424]

Table 10:
Binary Logistic Regression Analysis of Factors Associated with Good Medication Adherence in Hypertensive Patients

Variables	AOR	[95% CI]	P-value
Age (in years)			
≥ 50	–	–	–
< 50	0.136	[0.048-0.385]	0.000
Marital Status			
Married	–	–	–
Widow(er)	1.494	[0.190-11.757]	0.703
Single	0.086	[0.012-0.629]	0.016

DISCUSSION

Socio-Demographic, Clinical, and Therapeutic Characteristics of Hypertensive Patients

This study was conducted to evaluate the quality of antihypertensive medication adherence in adult

hypertensive patients. The study included 121 hypertensive patients with a mean age of 55.76 ± 10.91 years, which is consistent with data reported in several studies conducted in Africa (Chelo et al., 2023b; Essomba et al., 2017a; Laouan et al., 2024; Dia et al., 2019; Yayehd et al., 2013). This age distribution could be explained by the fact that the prevalence of hypertension increases with age (Perrine et al., 2019; Dia et al., 2019; Yayehd et al., 2013). In terms of gender, a female predominance was observed, with 52.9% women and 47.1% men, resulting in a male/female sex ratio of 0.89. Female predominance has been reported in several studies conducted in Africa, and the results of this study are consistent with those reported in Togo (56.19%) (Pio et al., 2013), the Republic of Congo (57.5%) (Ikama et al., 2013), and the Democratic Republic of Congo (76.0%) (Lulebo et al., 2015). Female sex hormones play a significant protective role on the vasculature, shielding women from hypertension. After menopause, however, the risk of arterial hypertension in women increases, rapidly reaching or even exceeding that of men. The high prevalence of hypertension in women is thought to be due to the decline in oestrogen after menopause, which reduces cardioprotection and makes women more susceptible to cardiovascular diseases, including hypertension (Pitha et al., 2023). The predominance of women could also be explained by the fact that they are generally more concerned about their health and tend to visit health facilities more often.

Regarding educational level, more than two-thirds of the patients in this study had attended primary, secondary, or university education (Table 3). This finding corroborates the results of Chelo et al. (2023b) in Goma, Laouan et al. (2024) in Niger, and Essomba et al. (2017) in Cameroon, where almost 60% of participants had at least secondary education. However, this contrasts with the findings of Lulebo et al. (2015) in Kinshasa, where 40.5% of participants had at least secondary education. This difference may be attributed to variations in the health facilities where the studies were conducted. Lulebo et al. (2015) conducted their study in primary healthcare facilities, while our study was carried out in a general referral hospital. Additionally, approximately 60% of the patients in our survey were managers.

Among the participants, 80.2% were married, compared to 45.6% in the study by Lulebo et al. (2015). Both studies were conducted in Kinshasa, but in different social contexts. This proportion of married patients is similar to that found in the study by Chelo et al. (2023b), whose sample size (167) is close to ours (121).

Antihypertensive monotherapy was prescribed to 42.1% of patients, dual therapy to 43.8%, and triple therapy to 14.1% (Table 4). The higher proportion of patients on multiple therapies in our study could be explained by the fact that the majority of these patients had been followed for more than five years. These results are consistent with those of Chelo et al. (2023b) in Goma and Pio et al. (2013) in Lomé. These authors found monotherapy in 44.3% and 41.04%, respectively; dual therapy in 46.1% and 52.62%; and triple therapy or more in 9.5% and 6.34%. This similarity can be explained by the therapeutic protocol for arterial hypertension, which recommends starting with monotherapy and, if the blood pressure target is not reached, advancing to dual therapy. If blood pressure remains uncontrolled, triple therapy can be used.

Quality of Antihypertensive Medication Adherence in Adult Hypertensive Patients

Adherence with antihypertensive medication is crucial for blood pressure control. Good medication adherence reduces the risk of developing complications and cardiovascular events, thereby improving the achievement of therapeutic goals. This study was conducted to assess the quality of antihypertensive medication adherence in adult hypertensive patients.

Objective methods for assessing medication adherence, such as therapeutic monitoring and measurement of serum or urine drug concentrations, exist. However, these methods require expensive equipment. Thus, we used the standardized questionnaire developed by Girerd et al. (2001), which, while validated, is not highly objective. Using this test, we found "good adherence" in 32.2% of cases, "minimal adherence problems" in 44.6%, and "poor adherence" in 23.1% (Figure 3). These results are similar to those found by Laouan et al. (2024) in Niger, where 30% of patients had good adherence, 52.0% had minimal adherence problems, and 17.3% had poor adherence. Like our study, Laouan et al. conducted their study in a referral

hospital with a sample size of 150 hypertensive patients, similar to ours. Other authors, such as Chelo et al. (2023b) and Pio et al. (2013), also used the Girerd test to assess medication adherence and found a higher proportion of patients with poor adherence, almost twice as high as in our study (43.7% and 52.3%). This discrepancy may be attributed to the fact that in our study, 65.0% of patients had been treated for at least five years, while the studies by Chelo et al. (2023b) in Goma and Pio et al. (2013) in Lomé focused on patients treated for at least one and three months, respectively.

To assess factors associated with medication adherence, we grouped patients with good adherence and minimal adherence problems, revealing that 76.8% of patients were good observers (Table 9). Several studies conducted in Africa have assessed adherence in hypertensive patients using either the Girerd test or Morisky's Medication Adherence Scale. These studies report a range of good adherence from 26.2% to 82.6%. This variability can be attributed to differences in sampling, length of follow-up, and the settings in which the studies were conducted, among other factors. The rate of 76.8% reported in our study is close to that of Ikama et al. (2013) in Congo Brazzaville (67.4%) and Laouan et al. (2024) in Niger (82.6%), slightly higher than that found by Chelo et al. (2023b) in Goma (56.3%), but much higher than that found by Essomba et al. (2017) in Cameroon (26.2%), who studied 404 hypertensive patients. This significant difference may be related to the sample size, which was much larger in their study.

Adherence is a multifactorial process that varies between patients and over time. However, our study shows that the problems encountered by more than 40% of our surveyed patients were late medication intake (57%) or running out of medication (40.5%). These findings align with those of Chelo et al. (2023b) and Essomba et al. (2017), who also assessed medication adherence using the Girerd test in hospitals that serve patients from diverse backgrounds.

The problem of drug stock-outs reported by patients could be attributed to the hospital pharmacy not receiving supplies on time to alleviate stock-out problems. Additionally, the socio-economic situation of the patients plays a role. CHM is a general referral hospital that

receives patients from all walks of life. Convention patients go to the pharmacy to collect their medication after a prescription has been issued, while non-convention patients must purchase the medication themselves, requiring financial resources. Several studies have reported the influence of treatment costs on medication adherence (Pio et al., 2013). However, the hospital pharmacy should improve its services to minimize these disruptions, which negatively affect adherence.

Knowledge of Hypertension Complications and Patient Education

Information about hypertension and therapeutic education allows patients to acquire the necessary knowledge to balance their aspirations and achieve optimal disease control. More than half of the patients surveyed were informed at the time of their first prescription about the complications and risk factors of hypertension, the duration of treatment, and the hygiene and dietary measures to observe (Figure 2). Similar findings were reported by Laouan et al. (2024) in Niger, where doctors were the first source of information mentioned by patients. In our study, more than half of the respondents received information directly from their doctor. These results are much better than those found by Tougouma et al. (2018) in Burkina Faso, where nurses were the source of information for 50% of participants, and doctors for only 11.67%. This difference may be explained by the methodology used to constitute the sample.

Cerebral complications were the most frequently reported. This could be explained by the fact that these are the complications most commonly mentioned by doctors during consultations. One of the cerebral complications is stroke, and patients who have had a stroke are easily identifiable. It is important to inform patients about other complications of hypertension to enhance their knowledge. As hypertension is a chronic disease, understanding its pathology, particularly its complications and risk factors, can significantly impact medication adherence (Chelo et al., 2023b; Ikama et al., 2013; Lulebo et al., 2015). Although this study found that more than 75% of patients were good adherents, the association between knowledge of hypertension complications and adherence was not investigated. However, we did examine the relationship between being informed about hypertension

complications at the time of the first prescription and good adherence.

Predictors of Good Medication Adherence

Many factors seem to influence medication adherence in individuals with high blood pressure, and these factors vary from study to study. In this study, we examined socio-demographic, clinical, and therapeutic factors. We found that age ($p = 0.000$) and marital status ($p < 0.05$) influence medication adherence in hypertensive patients. The role of age in medication adherence is controversial in the literature. Some studies found no relationship between age and medication adherence in hypertensive patients (Chelo et al., 2023b; Esomba, 2017; Lulebo et al., 2015), while other authors found poorer adherence in older subjects (Ikama et al., 2013; Laouan, 2024). In our study, advanced age (over 50 years) was associated with better adherence. Patients under 50 years of age were the least compliant (adjusted odds ratio [AOR] = 0.136; 95% confidence interval [CI]: 0.048–0.385). This may be explained by the fact that 70% of hypertensive patients in this study were aged 50 years or older, suggesting that younger patients may be underdiagnosed. The contradictory results between this study and the studies by Chelo and Lulebo, both conducted in the Democratic Republic of Congo, may be due to differences in the age distribution of patients and the study sites. In Chelo's study, patients were divided into three age groups, while the study by Lulebo et al. was conducted in primary healthcare facilities, whereas our study was conducted in a secondary healthcare facility.

In contrast to other studies conducted in Africa, where no association between marital status and medication adherence was found (Chelo et al., 2023b; Ikama et al., 2023), this study shows that single hypertensive individuals are less adherent than married individuals (odds ratio [OR] = 0.086; 95% CI: 0.012–0.629). This could be explained by the fact that married individuals may receive more support from their partners, who can remind them to take care of themselves if they have health problems.

Some studies associate educational level with medication adherence (Chelo et al., 2023b; Laouan, 2024); however, our study found no association between educational level

and medication adherence ($p > 0.05$). Regarding gender, duration of treatment, and patient information on hypertension complications at the time of initial treatment, no associations were found between these factors and medication adherence.

This study has identified certain factors that positively influence medication adherence in hypertensive patients. However, a study with a larger cohort, which includes additional parameters not considered here, would provide more reliable information to improve the management of high blood pressure.

Strengths of the Study

One strength of this study is the absolute zero refusal rate. In fact, no patient approached refused to answer, despite the possibility that fear of being judged poorly may have encouraged patients to agree to answer the questionnaire. This study has provided a useful database to enhance patient adherence.

Limitations of the Study

This study examined the level of adherence in treated hypertensive patients; however, it has some limitations, including the small sample size and the method used. A larger sample size would have had a greater impact and would better reflect medication adherence. We used the method proposed and validated by Girerd et al. (2001), which remains a subjective measure, heavily relying on the truthfulness of patients' statements. The study may have been affected by reporting bias, where patients may have influenced their answers to appear more compliant, as well as recall bias.

CONCLUSION

Medication adherence is crucial to the success of antihypertensive treatment. This study shows that patients followed at Monkole Hospital Center are generally good observers. More than half of the patients were informed about their condition by their doctor from the first prescription. However, emphasis on therapeutic education is necessary to prevent delays in taking antihypertensive medications and to ensure their availability.

To better understand the determinants of adherence among Congolese hypertensive patients, a study involving

a very large sample that considers all possible factors affecting adherence is needed.

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Ethical Approval: The study was approved by the CHM Ethics Committee. Informed consent was obtained from all patients. The study also adhered to the tenets of the Declaration of Helsinki.

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ORCID iDs:

Baningime, M. C.^{1,2}: Nil identified

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