



## Patients-related predictors of poor adherence to antihypertensive treatment in Congo-Brazzaville: a cross-sectional study

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### ABSTRACT

Studies suggest that poor adherence to hypertension treatment is responsible for about two-thirds of uncontrolled hypertension, leading to complications such as stroke. Yet, patients-associated factors explaining poor adherence to antihypertensive treatment in Africa remains under-researched. This study aimed at assessing the level of compliance in hypertensive patients and identifying patients-related predictors of poor compliance. The study was a prospective cross-sectional. The data was collected during a six-month period. Participants were recruited from outpatients' departments in three urban hospitals in Congo-Brazzaville. Bivariate and multivariate analyses (using T-test and chi-2) were performed to identify predictors of poor compliance. In total, 212 hypertensive patients were included. Their mean age was  $58.3 \pm 10.6$  years (range 34 – 81). Compliance was poor in 69 (32.5%) and good or fair in 143 cases (67.5%). Bivariate analysis indicated several patient-related factors that could predict poor adherence. However, after adjustment by logistic regression, only knowledge of the treatment and perception of the severity of complications of hypertension showed statistically significant associations with poor compliance ( $p = 0.0170$  and  $p = 0.0373$  respectively). Efforts to enhance patients' awareness about hypertension's treatment and severity of the complications associated with the disease are called for in this particular context.

**Keywords:** compliance, adherence, hypertension, treatment, Congo

### INTRODUCTION

Until about two decades ago, cardiovascular diseases were regarded as diseases affecting wealthier individuals and societies. However, as a result of a combination of factors relating to life-style changes, including urbanization, adoption of new nutritional regimes etc., low-income countries are now reporting high incidences of cardiovascular diseases<sup>1</sup>. Notably, the sub-Saharan African region is experiencing a significant increase in the burden of cardiovascular diseases<sup>2</sup>. Cardiovascular conditions constitute a serious public health issue due to the severity of their complications as well as the economic burden they pose for households

already living in poverty<sup>3</sup>. In addition, cardiovascular diseases result in increased demand for advanced and expensive health services in countries where health services are already facing challenges raised by infectious diseases, malnutrition, pregnancy outcomes and shortage in human resources<sup>3</sup>. Thus, cardiovascular diseases distort already weakened health systems.

Hypertension is one of these cardiovascular diseases. Considerable progress has been made in the treatment of hypertension. The benefits of hypertension treatment on blood pressure control and subsequent reduction of morbidity and

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mortality are well documented. However, despite these advances, treatment compliance among patients with hypertension has remained low, thus complicating blood pressure (BP) control. A French study has found that less than half, i.e. only 44.9% of the patients who responded to a survey had controlled their hypertension<sup>4</sup>. Absence of compliance to treatment is among the main causes of poor blood pressure control<sup>5, 6</sup>. Clinical studies suggest that poor adherence to treatment would be responsible for two-thirds of uncontrolled hypertension<sup>7, 8</sup>. Factors explaining poor adherence to antihypertensive therapy are numerous. They might depend not only on the patients themselves but also on health care providers, health system and the community<sup>9</sup>.

According to the literature, the degree of adherence to antihypertensive treatment is variable depending on the profiles of hypertensive populations<sup>10, 11</sup>. Recent studies from Africa indicate variable prevalence rates ranging between 19 and 38% depending on countries and contexts<sup>12</sup>. In Brazzaville, the prevalence of hypertension was found to be high at 32.5%<sup>13</sup>. There are no quantitative data in Congo Brazzaville on the extent of adherence to antihypertensive therapy. As hypertension is increasingly becoming a major public health issue in lower middle income countries such as Congo Brazzaville, it is timely that policymakers and health care professionals gain understanding of factors that might affect positively or negatively patients' compliance to antihypertensive treatment.

### **Aim**

The aim of this study was to assess the level of compliance and identify predictors of poor treatment compliance in hypertensive patients treated in urban hospitals in Congo Brazzaville.

## **METHOD**

### **Setting**

This study was conducted in outpatient cardiologic departments of three Congolese hospitals: the University Hospital of Brazzaville, the Army's Central Hospital of Brazzaville and the Loandjili General Hospital in Pointe Noire.

### **Design and sampling**

This study was a cross-sectional study collecting data over a period of six months, from the 6<sup>th</sup> of

December 2010 to the 10<sup>th</sup> of June 2011. The study population was made of people with diagnosed high BP and following a treatment at a health facility. In order to determine the appropriate sample, we departed from the size of the population in the concerned cities of Brazzaville and Pointe Noire estimated at two million inhabitants. We considered the population aged 25 years and more as being at risk of high BP, which represents 34.3% of the population in Congo<sup>14</sup>, that is 686 000 persons. Based on prevalence data available in the literature from other countries<sup>15</sup> and Congo<sup>16</sup>, we considered a conservative high BP prevalence rate of about 15% in the population, which corresponds to about 102 900 persons. Of these potential patients, we hypothesized that given the current low awareness level of cardiovascular among the population and the poor national response to the problems, the proportion of those diagnosed would at best reach 1% (i.e. 1 029 persons), of whom not more than 40% would be under proper medical treatment (411 patients) per year in the concerned settings. Thus, initial sample size calculations indicated that with margin of error of 5%, and 95% confidence interval, the required sample size was of 199 patients.

To be included, the patients had to be at least 18 years of age and be under treatment for hypertension for at least six months. Pregnant women with hypertension were excluded.

### **Data collection**

Objective and rigorous evaluation of compliance remains a problematic endeavor. However, simple means such as self-administered questionnaires have demonstrated some effectiveness comparable to that of more sophisticated tools such as electronic pill<sup>10, 17</sup>. For this study, we used a test developed and validated by Girerd and colleagues<sup>10</sup>. This tool is made up of a set of six closed questions to which the patient answers "yes" or "no". To investigate predictors of poor adherence, we created two groups: noncompliant patients (total yes  $\geq$  3) and compliant ones (total yes  $<$  3).

The collected data included two groups of variables: socio-demographic data (age, sex, occupation, level of education, marital status), and clinical and therapeutic parameters. The latter included the time from the BP diagnosis,

treatments characteristics (names of drugs and dosages), and patient's knowledge of the treatment. Knowledge of the administered treatment, whether good or bad, was assessed by the correlation between patients' statements and the actual treatment prescribed by the doctor. Other variables of interest that were explored included the severity of hypertension as perceived by the patient; the possession and actual use of a device for self-measurement of BP; the existence, or lack thereof, of a resource-person who provides support throughout the treatment; the presence, or lack thereof, of co-morbid chronic condition and the presence of complications due to hypertension.

### Statistical analysis

The data collected was entered in Epi-Info Version 3.5.1 and analyzed using SPSS for Windows Version 11.1. Quantitative variables were represented by their frequencies or mean and standard deviation, and qualitative variables by their absolute and relative frequencies. To test the significance of selected predictors of (poor) compliance, we used logistic regression ( $p \leq 0.05$ ). T-test and chi-2 test were used for comparison of continuous and categorical variables, respectively.

### Ethical considerations

Ethical approval was obtained from the Ethics Committee of the Faculty of Health Sciences of Marien Ngouabi University, Brazzaville. All

respondents provided an informed consent prior to their participation in the study.

## RESULTS

### Socio-demographic background

A total of 212 hypertensive patients were included. Hospitals contributed to the sample in the following proportions: 102 patients (48.1%) from the University Hospital of Brazzaville; 80 patients (37.7%) from Loandjili General Hospital and 30 patients (14.2%) from the Army Central Hospital.

Their mean age was  $58.3 \pm 10.6$  years (range 34 – 81). There were 122 women (57.5%) with a mean age of  $58.9 \pm 10.8$  years and 90 men (42.5%), mean age  $57.5 \pm 10.4$  years. The age difference between the sexes was not significant ( $p = 0.3$ ). Table 1 shows the distribution of patients according to age. As to marital status, 140 respondents (66.0%) were married and 72 (34.0%) unmarried, widowed or divorced. With regard to the level of education, 48 patients (22.6%) had no formal education at all, 39 (18.4%) had completed primary education, 76 (35.8%) completed secondary education and 49 (23.1%) tertiary education. As to age-distribution, about two-third (64%) of the patients were in the range between 50 and 69 years old: 69 (32.5%) and 67 (31.6%) were respectively between 60-69 and 50-59 years old. Table 1 below can be referred to for more details.

**Table 1 Distribution of patients per age-groups**

Age-groups	n	%
< 40	14	6,6
40-49	28	13,2
50-59	67	31,6
60-69	69	32,5
70-79	32	15,1
$\geq 80$	2	0,9
Total	212	100

With regard to employment status, a significant proportion of the patients were unemployed (30%),

followed by civil servants (28%), see **Figure 1**.

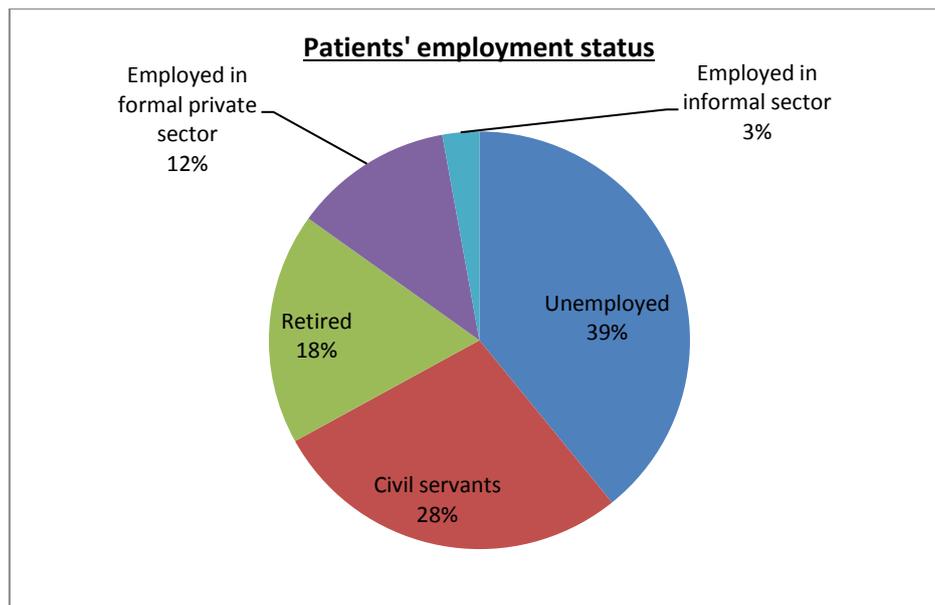


Figure 1 Distribution of patients as per employment status

#### Level of compliance and bivariate analysis of associations

Compliance was found as being good in 45 cases (21.2%), fairly good, i.e. with minimal compliance issues in 98 cases (46.2%), and poor in 69 (32.5%).

On average, non-compliant patients were older than compliant ones. Other background variables had no statistically significant association with poor adherence.

Table 2 Association between compliance and background variables

Independent variables	Compliance		OR (IC 95%)	p
	Poor	Good		
Age (Mean ± SD)	60.4±10.5	57.2±10.6		0.04
Gender				
F	34 (49.3%)	88 (61.5%)	0.6 (0.34-1.08)	0.06
M	35 (50.7%)	55 (38.5%)		
Civil status				
Single	29 (42%)	43 (30.1%)	1.68 (0.3-3.06)	0.08
Married	40 (58%)	100 (69.9%)		
Employment				
Employed	43 (62.3%)	106 (74.1%)	0.69 (0.47-1.03)	0.07
Unemployed	26 (37.7%)	37 (25.9%)		
Social security				
Insured	65 (94.2%)	131 (91.6%)	1.48 (0.46-4.8)	0.5
Uninsured	4 (5.8%)	12 (8.4%)		

### ***Patients' perceptions, attitudes and practices relative to treatment***

An analysis was performed of the association between compliance level and a number of potential predictors that had to do with patients' views and attitudes, for instance with regards to knowledge of treatment and its complications, financial burden that the treatment implies, etc.

Material factors were also assessed such as the possession of an electric tensiometer for self-measurement of BP as well as practical arrangements like the availability of relatives to remind patients to take the medication. All these factors were statistically associated with poor compliance (**Table 3**).

**Table 3 Patients-related predictors**

Independent variables	Compliance		OR (IC 95%)	p
	Poor	Good		
<b>Knowledge of the treatment</b>				
No	39 (56.5%)	34 (23.8%)	4.16 (2.25-7.68)	< 10 <sup>-5</sup>
Yes	30 (43.5%)	109 (76.2%)		
<b>Knowledge of high BP-related complications</b>				
No	39 (56.5%)	44 (30.8%)	2.9 (1.61-5.29)	0.0003
Yes	30 (43.5%)	99 (69.2%)		
<b>Who pays for the medicine</b>				
Other	44 (63.8%)	64 (44.8%)	2.17 (1.20-3.92)	0.009
Patient	25 (36.2%)	79 (55.2%)		
<b>Knowledge of the severity of hypertension</b>				
No	18 (26.1%)	14 (9.8%)	3.25 (1.5-7.02)	0.001
Yes	51 (73.9%)	129 (90.2%)		
<b>Costly medication</b>				
No	28 (40.6%)	88 (61.5%)	0.42 (0.23-0.76)	0.004
Yes	41 (59.4%)	55 (38.5%)		
<b>Own tensiometer for self-monitoring of BP</b>				
No	60 (87%)	97 (67.8%)	3.16 (1.44-6.92)	0.002
Yes	9 (13%)	46 (32.2%)		
<b>Existence of a family member to remind the patient to take medication</b>				
Yes	31 (44.9%)	87 (60.8%)	0.52 (0.29-0.93)	0.03
No	38 (55.1%)	56 (39.2%)		

### Multivariate analysis

After adjustment by logistic regression, only knowledge of the treatment and perception of the severity of hypertension appeared to have a

significant statistical effect on the significant of compliance (Table 4).

**Table 4 Results after logistic regression**

Independent variables	O R (95% CI)	Coefficient	p
Knowledge of the treatment	0,36 (0,15-0,83)	-1,023	0,017
Knowledge of high BP-related complications	0,77 (0,32-1,83)	-0,264	0,5514
The patient buys the drugs himself	1,02(0,43-2,35)	0,017	0,968
Knowledge of the severity of hypertension	0,34 (0,13-0,94)	-1,065	0,0373
High cost of treatment	1,84 (0,93-3,64)	0,610	0,0791
Own tensiometer for self BP control	0,54 (0,21-1,40)	-0,607	0,2082
Existence of a family member reminding the patient about taking medication	1,59 (0,75-3,37)	0,465	0,2226

### DISCUSSION

The urgency of addressing issues related to prevention, treatment and care of cardiovascular diseases cannot be overstated in a country like Congo where these disease cause up to 33% of deaths occurring in the country. According to WHO, 40% (41.4% of males and 38.6% of females) in Congo are at risk of having raised blood pressure<sup>18</sup>.

Low level of adherence to treatment is one of many causes of poor control of high BP<sup>19</sup>. In this study, one out of three patients (32.5%) interviewed were non-adherent to hypertensive treatment. While this proportion is high, it is not worse than what was found in similar African settings. A study from Ivory Coast reported a 19% proportion of poor adherence<sup>11</sup>. One Nigerian study found that 49% of patients were noncompliant<sup>20</sup>. Overall, it has been shown that this proportion ranges between 12 and 38%<sup>12</sup>. Studies from Greece, Brazil, France and USA respectively reported rates of 15%<sup>21</sup>, between 20-40%<sup>22</sup>, 8%<sup>10</sup> and 14%<sup>23</sup>. This variability of data reflects, to some extent, differences in measurement methods, study populations and, sampling and monitoring periods. Remarkably, poor compliance is lower in settings with less accessible and poorer quality health services.

Adherence is determined by several factors, including patient-related and treatment-related ones, technological ones and even interpersonal factors - between patients and health workers<sup>12</sup>. However, the associations between predictive factors and adherence are not always

straightforward. In this study, bivariate analysis indicated that noncompliant patients were likely to be older, had poorer knowledge of hypertensive treatment and of the severity of the condition and associated complications. In the literature, the effect of age on adherence is controversial. Some studies have indicated that younger patients were less compliant than older ones. Other studies have reported poor adherence among the elder patient population<sup>4, 24-26</sup>. Such adherence problems among the elderly may be related to cognitive impairments which are common at that stage of life<sup>27</sup>. The level of compliance had no relationship with gender in our study. The same observation was made elsewhere<sup>10, 28</sup>. In effect, certain authors have found poorer adherence among male patients<sup>29</sup>.

In addition, patients who were not responsible for purchasing the drugs, who perceived the treatment to be too costly, who did not own a personal self-BP monitoring device, and those who received no support from family member reminding them about taking drugs were likely to be more non-compliant than the others. Financial issues were also found to affect adherence. Our findings show a link between patients' perception of high cost of treatment with poor adherence. This can be interpreted as patients resorting to rationing their drugs consumption in order to reduce costs, a strategy that, ultimately, results in non-compliance to treatment<sup>30</sup>. Moreover, it was found that the purchase of drugs by a person other than the patients themselves was a risk factor for poor compliance. Therefore, whether or not the patient

supports the financial burden of the medication has an impact on their accountability for the treatment.

The importance of cost-related factors should be considered against the background of the predominance of out-of-pocket payments as the most frequent payment method for treatment in Congo. This also explains why, in this study, social security coverage had no association whatsoever with compliance. In Ivory Coast, Adoubi et al (2006) found that lack of health insurance was a risk factor for poor compliance<sup>11</sup>. In Adoubi and colleagues' study, 49.4% of the patients had health insurance, as compared to 7.5% in this study<sup>11</sup>. Health insurance coverage is still very low in the Congolese setting. However, it has also been shown elsewhere that cost-sharing had a negative association with compliance among poorer compliant<sup>31</sup>.

After adjustment for background variables, knowledge of the treatment and perception of the severity of hypertension were the sole factors associated with compliance. Both factors are patient-related, but the health system can play a fundamental role in improving and sustaining these determinants (e.g. through health education). It is critical that health professionals develop strategies aimed at inducing real changes in patients' behavior. In other words, patients need to be empowered to become the true drivers of the therapeutic process<sup>32</sup>. Appropriate approaches should not only inform them, but educate and motivate patients to acquire adequate skills enabling them to reach a balance between their aspirations and the optimal control of the disease within the framework of their daily life<sup>33, 34</sup>. Several programs to educate patients about the disease and treatment goals have demonstrated their influence on improving adherence especially when they incorporate the concepts of sociology and lifestyle<sup>35</sup>. In this perspective, innovative and context specific communication strategies have been called for<sup>36</sup>.

Karakurt and colleagues (2012) showed that patients' lack of knowledge related to the complications of hypertension had a statistically significant relationship with not taking medicines as prescribed<sup>37</sup>. Girerd et al. (2001) had similar findings in France<sup>10</sup>. Understanding potential complications

of hypertension could be in itself a motivating factor for adherence to treatment. For this to happen, patients need to be aware of the seriousness of their condition and all risks involved, yet without being worried unnecessarily<sup>26, 38</sup>.

Developing strategies that improve knowledge, raise awareness and provide skills for patients' empowerment is a fundamental task that health services need to address in responding to the increasing cardiovascular diseases burden in low-income countries. This study might carry some limitations. First, it was conducted in tertiary hospitals. These patients were not ordinary Congolese patients, but rather better off patients. Poorer patients might be experiencing worse problem of access to care and of adherence to treatment. It is however unclear whether patients treated at primary health care facilities would appear more or lesser adherent. That could be an interesting question for further research.

Objective and rigorous measure of adherence to hypertension remains a challenge because there currently is no reference method. In this study, we used an instrument developed by Girerd et al. (2001), which is a questionnaire based on six closed-ended questions<sup>10</sup>. It classifies hypertensive patients into three groups: good compliant, those with minimal compliance problems, and non-compliant. The instrument allows to estimate with a good probability the level of compliance to medication and identify more than 80% of poor compliant<sup>10</sup>. A major weakness of this instrument is that being based on patients' self-reporting, it might overestimate actual adherence.

## CONCLUSION

This study shows that compliance to hypertensive treatment in Congo Brazzaville is low as in similar African countries. Poor knowledge of treatment and ignorance of the severity of hypertension were the main predictors of poor adherence. Thus, in order to improve adherence among these patients, it is important to consider and test a set of tools to support awareness and enhance empowerment among patients with hypertension. Appropriate, context- and patient-specific therapeutic education programs are called for as they may help reduce the incidence of complications and costs associated with the managing complications of hypertension.

### Policy implications

1. Guidelines for therapeutic education programs by clinical staff should be developed and systematically implemented to improve patient compliance with treatment. This requires well-trained clinical staff and time allocated to this activity.

2. The government should accelerate the process for the establishment of a universal health insurance, and a policy to help the poor with chronic diseases to meet the costs of medication.

3. Beyond the above-mentioned clinical responses, a prevention policy to address risk factors for cardiovascular diseases is imperative.

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