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

Bernice Mesmer NSITOU ¹, Méo Stéphane IKAMA ², Bousso Drame³, Berthollet Bwira KABORU⁴*  

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 ± 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 lifestyle changes, including urbanization, adoption of new nutritional regimes etc., low-income countries are now reporting high incidences of cardiovascular diseases. Notably, the sub-Saharan African region is experiencing a significant increase in the burden of cardiovascular diseases. 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. 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. 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
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. Absence of compliance to treatment is among the main causes of poor blood pressure control. Clinical studies suggest that poor adherence to treatment would be responsible for two-thirds of uncontrolled hypertension. 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.

According to the literature, the degree of adherence to antihypertensive treatment is variable depending on the profiles of hypertensive populations. Recent studies from Africa indicate variable prevalence rates ranging between 19 and 38% depending on countries and contexts. In Brazzaville, the prevalence of hypertension was found to be high at 32.5%. 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 6th of December 2010 to the 10th 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, that is 686,000 persons. Based on prevalence data available in the literature from other countries and Congo, 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 pills. For this study, we used a test developed and validated by Girerd and colleagues. 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 ≥ 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≤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 ± 10.6 years (range 34 – 81). There were 122 women (57.5%) with a mean age of 58.9 ± 10.8 years and 90 men (42.5%), mean age 57.5 ± 10.4 years. The age difference between the sexes was not significant (p = 0.3). Table I 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%) 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**

<table>
<thead>
<tr>
<th>Age-groups</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 40</td>
<td>14</td>
<td>6.6</td>
</tr>
<tr>
<td>40-49</td>
<td>28</td>
<td>13.2</td>
</tr>
<tr>
<td>50-59</td>
<td>67</td>
<td>31.6</td>
</tr>
<tr>
<td>60-69</td>
<td>69</td>
<td>32.5</td>
</tr>
<tr>
<td>70-79</td>
<td>32</td>
<td>15.1</td>
</tr>
<tr>
<td>≥80</td>
<td>2</td>
<td>0.9</td>
</tr>
<tr>
<td>Total</td>
<td>212</td>
<td>100</td>
</tr>
</tbody>
</table>

With regard to employment status, a significant proportion of the patients were unemployed (30%), followed by civil servants (28%), see Figure 1.
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

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

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

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>OR (95% CI)</th>
<th>Coefficient</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of the treatment</td>
<td>0.36 (0.25-0.83)</td>
<td>-1.023</td>
<td>0.017</td>
</tr>
<tr>
<td>Knowledge of high BP-related complications</td>
<td>0.77 (0.32-1.83)</td>
<td>-0.264</td>
<td>0.5514</td>
</tr>
<tr>
<td>The patient buys the drugs himself</td>
<td>1.02 (0.43-2.35)</td>
<td>0.017</td>
<td>0.968</td>
</tr>
<tr>
<td>Knowledge of the severity of hypertension</td>
<td>0.34 (0.13-0.94)</td>
<td>-1.065</td>
<td>0.0373</td>
</tr>
<tr>
<td>High cost of treatment</td>
<td>1.84 (0.93-3.64)</td>
<td>0.610</td>
<td>0.0791</td>
</tr>
<tr>
<td>Own tensiometer for self BP control</td>
<td>0.54 (0.21-1.40)</td>
<td>-0.607</td>
<td>0.2082</td>
</tr>
<tr>
<td>Existence of a family member reminding the patient about taking medication</td>
<td>1.59 (0.75-3.37)</td>
<td>0.465</td>
<td>0.2226</td>
</tr>
</tbody>
</table>

**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. The 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. One Nigerian study found that 49% of patients were noncompliant. Overall, it has been shown that this proportion ranges between 12 and 38%. Studies from Greece, Brazil, France and USA respectively reported rates of 15%24, between 20-40%2, 8%28 and 14%23. 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. 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 population. Such adherence problems among the elderly may be related to cognitive impairments which are common at that stage of life. The level of compliance had no relationship with gender in our study. The same observation was made elsewhere. In effect, certain authors have found poorer adherence among male patients.

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. 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
found that lack of health insurance was a risk factor
for poor compliance31. In Adoubi and colleagues’
study, 49.4% of the patients had health insurance,
as compared to 7.5% in this study31. 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 compliant32.

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 process32. 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 life33; 34. 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
lifestyle35. In this perspective, innovative and
context specific communication strategies have
been called for36.

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
prescribed37. Girerd et al. (2003) had similar findings
in France32. 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 unnecessarily36; 38.

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 close-
ended questions30. 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
compliant30. 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.

REFERENCES
21. Yiannakopoulou E, Papadopulos JS, Cokkinos DV and Mountokalakis TD. Adherence to antihypertensive treatment: a critical factor for blood pressure control. European journal of


38. McHorney CA and Gadkari AS. Individual patients hold different beliefs to prescription medications to which they persist vs nonpersist and persist vs nonfulfill. Patient preference and adherence. 2010; 4: 187-95.