Blood Pressure Control among Treated Hypertensives in a Tertiary Health Institution

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Abstract

Background: Goal blood pressure (BP) was defined by the JNC VI and the World Health Organization-International Society of Hypertension (WHO/ISH) as <140 mm Hg systolic and <90 mm Hg diastolic for the general and <130 mm Hg systolic and <85 mm Hg diastolic for special high-risk populations. It is well established that adequate BP control characterizes only a fraction of treated hypertensive patients. The importance of tight BP control has been established in preventing cardiovascular morbidity and mortality.

Methods: We performed cross-sectional studies on the current status of BP control among treated hypertensive in our center. One hundred consecutive patients with essential hypertension who have been attending the outpatient hypertension clinic and have been on treatment for at least 6 months were recruited. The pre treatment BP and BP records in the previous 2 visits were noted. Patients were said to have good BP control if their BPs are < 140/90 mmHg (<130/80 mmHg for high risk patients) at the time of the study and in the last visit.

Results: There were 49 males and 51 female (M: F; 1:1), aged 26 to 85 (mean 52.33 +/- 12.29) years. The duration of hypertension ranged 6 months to 30 (mean 7.37 +/- 7.1) years. The duration of treatment in our centre was 6 months to 10 (mean 3.22 +/- 2.23) years. Blood pressure was controlled in 33 (33%) of the patients. Pre-treatment mean blood pressure was significantly higher than the BP value at the time of the study (155.87 +/- 26.02/97.81 +/- 11.89 mmHg versus 143.40 +/- 24.14/86.53 +/- 12.71 mmHg) (p<0.05). Diuretics were the commonest antihypertensive prescribed either alone or in combination (69%), followed by a calcium antagonist (56%) and centrally acting drugs (38%). Twenty seven were on single antihypertensive, 43 (43%) on 2, 25 (25%) on 3 and 5 (5%) on 4 classes of antihypertensive. Blood pressure control was associated with taking more than one antihypertensive medication and compliance.

Conclusion: Control of BP in patients receiving antihypertensive drugs is still far from optimal in the study population in Nigeria just as in other countries. Many patients had multiple cardiovascular risk factors. Adherence to medication should be encouraged.

Key Words: Blood pressure, Control, Adherence, Hypertension

Introduction

Hypertension is a very important public health problem worldwide and approximately 1 billion people are affected worldwide. It is the most prevalent cardiovascular (CV) risk factor and a gateway to CV risk management.

As the population ages, the prevalence of hypertension will increase even further unless broad and effective preventive measures are implemented. Extrapolations from the non communicable disease survey (NCD) data and from other studies suggest urban prevalence rates of hypertension in Nigeria of around 20% if the current cut-off point of 140/90 mmHg is used. The NCD survey also showed that Kano has the highest age adjusted hypertension prevalence rate of 23.8% in men and 17.7% in women in Nigeria.

Extrapolations from studies in Nigeria and elsewhere indicate that 5% of deaths could be due to hypertension and that the reduction in attributable risk associated with treatment could be 2%, over 10 times higher than in the United States.

The relationship between blood pressure (BP) and risk of CVD events is continuous, consistent, and independent of other risk factors. The higher the BP, the greater is the chance of heart attack, heart failure, stroke, and kidney disease. Hypertensive heart disease was responsible for 47% of all cases referred for echocardiography in our centre. For individuals 4070 years of age, each increment of 20 mmHg in systolic BP (SBP) or 10 mmHg in diastolic BP (DBP) doubles the risk of CVD across the entire BP range from 115/75 to 185/115 mmHg.

In clinical trials, antihypertensive therapy has been associated with reductions in stroke incidence averaging 3540 percent; myocardial infarction, 2025 percent; and heart failure, more than 50 percent.
Goal blood pressure (BP) was defined by the Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC-VI) and the World Health Organization and International Society of Hypertension (WHO/ISH) as <140 mm Hg systolic and <90 mm Hg diastolic for the general and <130 mm Hg systolic and <85 mm Hg diastolic for special high-risk populations. Various epidemiological surveys from different countries have documented the unsatisfactory control of arterial hypertension. As part of a quality assessment for improvement; we evaluated blood pressure (BP) control in treated hypertensive patients in Aminu Kano Teaching Hospital (AKTH), Kano, a tertiary health institution in north western Nigeria.

Patients and Methods
This is a cross-sectional study carried out at hypertension clinic of AKTH, Kano, Nigeria in October 2005, aimed at determining the current status of BP control among treated hypertensive patients.

One hundred consecutive patients with essential hypertension who have been attending the clinic and have been on treatment for at least 6 months were recruited.

The pre treatment BP, current BP and BP records in the previous 2 visits were noted.

Patients were said to have good BP control if their BPs are < 140/90 mmHg (<130/80 mmHg for high risk patients) at the time of the study and in the last visit.

Those with established cause of hypertension were excluded. Eligible patients were consecutively recruited. Demographic data and clinical history were obtained. The patients’ knowledge and practice of lifestyle modification as well as compliance to antihypertensive medication were documented. Other variables obtained included history of cigarette smoking and alcohol consumption as well as the class and number of antihypertensive drug the patient is taking.

Height and weight were measured to get the body mass index (BMI) recorded as weight in kilograms divided by height in meters squared (kg/m²). Peripheral pulses were palpated. BP measurements were taken on the right arm using a standard Sphygmomanometer (ACCOSON) with appropriate adult cuff size. BP recordings were done twice and the mean was taken.

The systolic BP was recorded at phase I Korotkoff sounds while the diastolic blood pressure was recorded at phase V Korotkoff sounds or at phase IV Korotkoff sounds when difference between phase IV and phase V is more than 10mmHg. Evidence of cardiac decompensation was sought.

Blood samples of all the patients were taken for determination of serum urea, electrolytes and creatinine, fasting blood sugar, lipid profile and uric acid. The urine sample was also taken for chemical analysis Statistical analysis was done with the Statistical Package for the Social Sciences (SPSS) version 10. Means with standard deviations of continuous variables were generated. The analysis of continuous variables was carried out using the procedures of descriptive statistics and later, to identify any differences we used Student’s "t"test. Categorical variables were compared using the Chi-square test. Statistical significance was set at the conventional p<0.05.

Results
A total of 320 hypertensive patients were seen in AKTH hypertension clinic in October 2005. One hundred consecutive patients with essential hypertension who satisfy the inclusion criteria were recruited. There were 49 males and 51 females (ratio 1:1); and their ages ranged from 26-85 (mean 52.33 ± 12.29) years. Figure 1 showed the age and sex distribution of the study subject.

That the higher the salt intake, the higher the blood pressure, particularly the diastolic BP, in hypertensive patients. Reduced salt intake might, therefore, be beneficial in black hypertensive patients, in the setting of common presentation at the stage of cardiac decompensation.

Adherence to drug intake is shown to be an important factor for BP control in this study. Control of BP was achieved in 45% of those who were considered to be regular with their drug intake, similar to 43% in patients with high adherence found in Lake City, USA. It was seen in 1% and none of those who were considered to be erratic or those who take their drugs when symptomatic respectively. Patient’s perception and
Table I - Clinical/Laboratory Parameters of the Patients

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>26-85</td>
<td>52.33 ± 12.29</td>
</tr>
<tr>
<td>Duration of BP (years)</td>
<td>0.5 – 30</td>
<td>7.37 ± 7.1</td>
</tr>
<tr>
<td>Duration of treatment (years)</td>
<td>0.5 – 10</td>
<td>3.22 ± 2.23</td>
</tr>
<tr>
<td>BMI (Kg/m²)</td>
<td>19.0 – 42.4</td>
<td>27.74 ± 5.12</td>
</tr>
<tr>
<td>Total Cholesterol (mmol/l)</td>
<td>3.8 – 9.0</td>
<td>5.49 ± 1.17</td>
</tr>
<tr>
<td>LDLc (mmol/l)</td>
<td>2.96 – 6.09</td>
<td>3.59 ± 1.09</td>
</tr>
<tr>
<td>Triglycerides (mmol/l)</td>
<td>0.5 – 3.5</td>
<td>1.28 ± 0.6</td>
</tr>
<tr>
<td>HDLc (mmol/l)</td>
<td>0.7 – 2.4</td>
<td>1.30 ± 0.46</td>
</tr>
<tr>
<td>Uric acid (umol/L)</td>
<td>210 – 729</td>
<td>404.9 ± 146.1</td>
</tr>
<tr>
<td>Heart rate</td>
<td>56 – 104</td>
<td>81.5 ± 17.7</td>
</tr>
<tr>
<td>Current SBP (mmHg)</td>
<td>110-220</td>
<td>143.41 ± 24.14</td>
</tr>
<tr>
<td>Current DBP (mmHg)</td>
<td>66-130</td>
<td>86.53 ± 12.72</td>
</tr>
<tr>
<td>Pre treatment SBP (mmHg)</td>
<td>140-230</td>
<td>155.87 ± 16.02</td>
</tr>
<tr>
<td>Pre treatment DBP (mmHg)</td>
<td>88-130</td>
<td>97.81 ± 11.89</td>
</tr>
</tbody>
</table>

Table II. Blood Pressure control by number of antihypertensive drugs

<table>
<thead>
<tr>
<th>Compliance category</th>
<th>Regular with Drugs</th>
<th>Miss a few doses</th>
<th>Erratic with drugs</th>
<th>Take drugs when symptomatic</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP Controlled</td>
<td>25</td>
<td>7</td>
<td>1</td>
<td>0</td>
<td>33</td>
</tr>
<tr>
<td>BP not controlled</td>
<td>31</td>
<td>8</td>
<td>9</td>
<td>19</td>
<td>67</td>
</tr>
<tr>
<td>Total</td>
<td>56</td>
<td>15</td>
<td>10</td>
<td>19</td>
<td>100</td>
</tr>
</tbody>
</table>

Table III. Blood Pressure control by number of antihypertensive drugs

<table>
<thead>
<tr>
<th>Number of antihypertensive used</th>
<th>One Drug</th>
<th>Two Drugs</th>
<th>Three or More Drugs</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP Controlled</td>
<td>3</td>
<td>12</td>
<td>18</td>
<td>33</td>
</tr>
<tr>
<td>BP not controlled</td>
<td>24</td>
<td>31</td>
<td>12</td>
<td>67</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>43</td>
<td>30</td>
<td>100</td>
</tr>
</tbody>
</table>

Blood pressure was controlled in 33 (33%) of the patients (20F:13M). The duration of hypertension ranged 6 months to 30 years (mean 7.37 +/- 7.1 years). The duration of treatment in our centre was 6 months to 10 years (mean 3.22 +/- 2.23 years). Pre-treatment mean blood pressure was significantly higher than the BP value at the time of the study (155.87 +/- 26.02/97.81 +/- 11.89 mmHg versus 143.40 +/- 24.14/86.53 +/- 12.71 mmHg) (p<0.05). Table 1 showed clinical and laboratory parameters of the study subjects.

There were 9 patients (6F, 3M) with type 2 diabetes mellitus (DM), 4 of whom had good BP control. These are already on treatment for the DM. Thirty seven (37%) of the patients are overweight (BMI 25-29.9 Kg/m2) while 31 (31%) are obese (BMI > 30 Kg/m2). Forty five (45%) had family history of hypertension in first degree relations, 12(12%) had history of cigarette smoking and 7 (7%) had history of alcohol consumption. Knowledge of lifestyle modification was found in 59 (59%) to a varying degree. Forty one (41%) practice dietary modification in terms of reduced salt intake and 13 (13%) perform regular exercise.

Table II showed blood pressure control by adherence to antihypertensive medication. Compliance was defined arbitrarily into 4 categories as shown in the table. Fifty six percent claimed to take their antihypertensive medications regularly, of whom only 25 (45%) are controlled. BP was controlled in none and 1% of those who were considered to be erratic or those who take their drugs when symptomatic respectively.

Diuretics were the commonest antihypertensive prescribed either alone or in combination (69%), followed by a calcium antagonist (56%), centrally acting drugs (38%), ACEI/ARBs (31%), Beta blockers 16% and direct vasodilator (9%).

Twenty seven were on single antihypertensive, 43 (43%) on 2, 25 (25%) on 3 and 5 (5%) on 4 classes of antihypertensive. Table 3 showed blood pressure control by number of antihypertensive medication. The commonest double combination is a diuretic and calcium antagonist, seen in 24/43 (56%) and the commonest triple combination is a diuretic, calcium antagonist and Angiotensin converting enzyme inhibitor (ACEI)/ Angiotensin 2 receptor blocker (ARB) seen in 12/25 (48%).

The laboratory parameters revealed that 36 (36%) had raised low density lipoprotein cholesterol (LDLc) (>3.38mmol/l), 23% had raised total cholesterol (>6.2mmol/l), 15% had high density lipoprotein cholesterol (HDLc) (<1mmol/l). Hyperuricaemia was present in 42% of the patients.

Discussion

Controlling BP in patients with hypertension can reduce complications such as nephropathy, cerebrovascular disease, and cardiovascular disease. Blood pressure control rates vary between and even within countries. This study revealed that only 33% of the patients achieved BP control as at the time of the study. Elsewhere in Nigeria, different workers reported varying rates. A control rate of 25% was found in Osogbo, south western Nigeria, 19% in Ilorin, north central
beliefs on hypertension and benefit of treatment also affects their adherence to medications\(^\text{2}\). Similarly, the asymptomatic nature of hypertension and the unrecognized benefits of treatment contribute to the low adherence to antihypertensive medication.

It has also been shown that competing problems such as poverty and/or more immediately threatening diseases such as diabetes interfere with adherence to hypertension treatment\(^\text{2}\). In a study on misconception of hypertension among Nigerians, it was found that 10\% were anxious about the heavy financial burden imposed by hypertension management, 65\% feel that they will require no more medication once they achieve control of their blood pressure and 21\% are of the opinion that they will achieve a permanent cure only from alternative medical practitioners and will consider using alternative medicine in future\(^\text{3}\).

Diuretics were the commonest antihypertensive prescribed either alone or in combination (69\%), followed by a calcium antagonist (56\%), centrally acting drugs (38\%), ACEI/ARBs (31\%), Beta blockers 16\% and direct vasodilator (9\%). This pattern is similar to that found in other parts of the country with slight variation\(^\text{14, 27, 28}\). Whereas in Nigeria, like in many developing countries, the major determinant of drug prescribed is the cost, the situation is different in the developed world where prescription is based on compelling indications\(^\text{29}\).

Monotherapy was found in 27\% of the patients while 43\%, 25\% and 5\% where on 2, 3 and 4 antihypertensive drugs respectively. The control rate increased with increase in the number of drugs taken. Of the 27\% of the patient who take a single antihypertensive, only 3 (11\%) were controlled. On the contrary, 15 out of the 25 patients (60\%) on 3 drugs were controlled. Control of blood pressure has been shown to be better with a combination therapy compared to monotherapy\(^\text{12, 29}\).

In general, poor BP control among hypertensives is considered to be due to multiple factors. While white coat effect has been shown to play a role, it has not been looked at in this study. In one study, a significant difference (>40 mmHg) was found between clinic blood pressure and day time ambulatory blood pressure in 78\% of the patients\(^\text{30}\). Another factor is to do with the health care providers who are often overloaded with patients and have insufficient time for patient education. In our setting, the bulk of the work of patient education and counseling on adherence to medication is left to the doctor who usually is busy. Studies have shown that involvement of pharmacists in patient counseling on drug compliance and life style modifications has reduced the uncontrolled BP from 92\% to 36.2\% within days after enrollment\(^\text{31}\).

There is also widespread resistance to therapeutic guidelines among clinicians, a phenomenon referred to as clinical inertia by O’Connor and colleagues\(^\text{32}\). Additionally, Steinman reported that clinicians have a lower level of adherence to treatment guideline than they believe they do\(^\text{33}\). Some practitioners tend to underestimate the level of cardiovascular risk of their patients and so do not intensify the therapy of their patients\(^\text{34}\).

Blood pressure control in hypertensives is an objective yet to be achieved in most countries. Updates for clinicians on treatment guideline as well as sensitizing them on the need to give intense therapy will help in improving the control rate. Patient education by doctors and other health care providers such as pharmacists will improve compliance which will in turn improve control rate.

Conclusion
Control of BP in patients receiving antihypertensive drugs is still far from optimal in the study population in Nigeria just as in other countries. Adherence to drug intake is shown to be an important factor for BP control in this study. Control of blood pressure has been shown to be better with a combination therapy compared to monotherapy.

Limitations
This study is limited by the small sample size of 100 and the fact adherence to medication was obtained from the patient history, which might not be reliable. In addition office BP measurements were used and therefore white coat effect could not be ruled out.

References
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