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Blood pressure control among hypertensives managed in a specialised health care setting in Nigeria

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Summary

In spite of the plethora of anti-hypertensives, hypertension remains an important cause of morbidity and mortality among Nigerian hypertensive population. To determine blood pressure control rate, defined as the proportion of treated hypertensive population with systolic and diastolic blood pressures less than 140 mmHg and 90mmHg respectively. One hundred and ten (110) treated adult Nigerian hypertensives aged 28-80 (mean 46.02 ± 15.20) years with male: female ratio of 1:1.4 who have been commenced on treatment for at least 6 months were selected by simple random sampling for determination of blood pressure control rate and its determinant factors using clinic blood pressures. Blood pressure control rate was 42.70%. Pre-treatment mean blood pressure was significantly higher than the value at least 6 months post commencement of treatment: ($170.09 \pm 15.20/108.98 \pm 15.85$ mmHg versus $146.10 \pm 24.50/93.8 \pm 21.90$ mmHg) ($t=8.73$; $p<0.05$). In the group with uncontrolled blood ± 17.91 mmHg in 42 (66.6%), rose by 10.50 ± 1.0 mmHg in 8 (12.70%) and was unchanged in 13 (20.66%) patients. Diastolic blood pressure fell by 22.22 ± 14.58 mmHg in 32 (50.8%), rose by 7.88 ± 6.66 mmHg in 16 (25.40%) and was unchanged in 15 (23.80%) patients. Clinic compliance and family history of hypertension were associated with satisfactory blood pressure control. Blood pressure control rate among the study population was low. Compliance and family re-enforcement should be encouraged.

Keywords: *hypertension, blood pressure control.*

Résumé

Malgré un repectoire des médicaments contre l'hypertension, cette maladie reste une cause importante de souffrance et de mortalité parmi la population des hypertendus Nigérienne. L'objectif de cette étude était de déterminer le taux controle de la tension artérielle défini en proportion des hypertendus traités en systole et diastole moins de 140mmHg et 90 mmHg respectivement. Cent

dix (110) adulte Nigérien hypertendu agès de 28-80 ans (moyenne 46 ± 15.20 ans) avec un taux de gendre (M :F 1 :1.4) entreprit un traitement pour 6 mois et le taux de tension artérielle a etè determinè et autres facteurs déterminants dans leur echantillon de sang. le taux de tension artérielle controle etait de 42.70%.La valeur de la tension artérielle a l'admission était plus elevée et signifiante que la valeur obtenue 6 mois après le taritement ($-170 \pm 15.55/108 \pm 15.85$ mmHg contre $146 \pm 24.5/93.8 \pm 21.9$ mmHg)($t+8.73$, $P<0.05$). Dans le groupe de patients non contrôllés , la tension artérielle en systole reduisait a 25.13 ± 17 mmHg chez 46(66%) et augmentait de 10.50 ± 1 mmHg chez 8(12.7%) et restait sans changement chez 13 (20%). Cependant en diastole la réaction etait de 22.22 ± 14.58 mmHg chez 32(50.8%) et augmentait de 7.88 ± 6.66 mmHg chez 16 (25,40%) et restait sans aucun changement chez 15 patients. Bien que le controle de la tension artérielle dans cette etude etait bas . l'histoire de la famille en rapport avec le contrôle de la tension artérielle était satisfaisant et doit etre encouragé.

Introduction

In spite of the plethora of anti-hypertensive drugs and their established benefits in reducing the risk of stroke, heart failure, coronary artery disease and progression to renal failure [1-3], hypertension-related morbidities and mortality remain unacceptably high among Nigerian treated hypertensive population. In a recent report of heart failure attributable to arterial hypertension (HBP) among sub-Saharan African, for example, 50% of the patients were previously diagnosed hypertensives who have been commenced on treatment prior to onset of heart failure [4]. Poor blood pressure (BP) control is a major factor contributing to the high cardiovascular and renal mortality and morbidity among hypertensives. Blood pressure control rate ranged from 20 to 30% and 40 to 50% in the general population and specialised health care clinics respectively among Caucasians [5-8]. About 30% of Nigerian hypertensive populations are estimated to achieve satisfactory blood pressure control [9].

Factors contributing to poor blood pressure control among Caucasians include non-adherence to treatment, non-use of combination anti-hypertensive therapy, failure to set BP goals, lack of systemic approach to achieving

and maintaining control BP levels [10,11]. Lack of organized health education programmes [12] and lack of objective monitoring of drug compliance [13] are also reported factors accounting for poor blood pressure control.

Data on blood pressure control and its determinant factors among Nigerian hypertensives are scanty. This information is required periodically as an audit of management of HBP. It also form a baseline for intervention programmes, particularly, modification of factors detrimental to satisfactory blood pressure control when these could be identified.

This study aims at determining the BP control rate and its determinant factors among Nigerian hypertensive population being managed in a specialised health care clinic in Nigeria.

Methodology

Patients

The study was carried out at the cardiology clinic of Usmanu Danfodiyo University Teaching Hospital, Sokoto, Northwestern Nigeria. Hypertensives are, as a practice, given 1-month appointment for follow-up in this clinic. One hundred and ten (110) patients aged 28 to 80 years (mean 46.02 ± 15.20) years with male: female ratio of 1:1.4 was recruited over 2 months by simple random sampling using a table of random numbers. All the patients have been commenced on treatment at least 6 months prior to recruitment and represented 40% of the study population. The study period covered August 1999 to February 2000.

Clinical and demographic data

Information on occupation and maximum educational status attained was obtained and utilised in determining the socioeconomic status of patients. Where a patient is a full time housewife, the occupation of the husband was used in determining her socioeconomic status. A hypertensive that has attained, at least, a post primary education was considered literate. Though information on Arabic literacy was obtained, it was neither used in determining literacy nor socioeconomic status. This is because Arabic literacy, in this part of the world, is limited to Koranic recitation and does not necessarily confer gainful employment.

Coexisting risk factors for cardiovascular disease were determined. These included diabetes mellitus defined as plasma glucose greater than 7.8mmol/L or current anti-diabetic therapy, consumption of at least 20 units of ethanol per week, smoking of 10 or more sticks of cigarette daily and a family history of hypertension.

Height and weight were measured with patients lightly clothed and without shoes on. Obesity was defined as body mass index greater than 30Kg/m² for males and 29Kg/m² for females. Blood pressure was measured with standard

mercury sphygmomanometer after 5 minutes of rest using standard procedures [14] Three measurements were done and the average of the last two readings were taken as the BP. Korotkoff sound phases I and V were taken as systolic and diastolic blood pressures respectively. The same team of physicians throughout the study did blood pressure measurement.

A hypertensive with systolic and diastolic blood pressures below 140mmHg and 90mmHg respectively [15] during the last two or more clinic visits at 4 or more weeks interval was considered to have achieved satisfactory blood pressure control. Blood pressure control rate was defined as the proportion of hypertensives that achieve satisfactory blood pressure control.

Clinic compliance

Follow-up was done at 4 weekly intervals. Clinic compliance with 4 weekly appointments over a period of 16 weeks (4 appointments) preceding determination of BP control was determined and scored. Compliance with each appointment carries 25 marks. A score of 75% and above (kept at least 3 appointments) was required for a patient to be considered to be clinic compliant. A score less than 75% constituted non-compliance.

Drug treatment

The types and number of drugs taken by each patient was recorded. Treatment with a single drug or a preparation with fixed drug combination was considered as monotherapy. Treatment with 2 or more drugs constituted multiple therapy.

In order to determine the cost of treatment, a survey of cost of drugs in the hospitals in Sokoto metropolis was done. A price list was made. The drugs were graded A, B and C categories according to cost. Grade A anti-hypertensives were the most expensive.

Statistical analysis

Data are presented as means \pm standard deviation. Comparison of two means was by student's t-test. Chi-square test was used to compare proportions. A p-value < 0.05 was considered statistically significant.

Results

Clinical and demographic characteristics

The baseline and personal data of patients are shown in Table 1. Mean age was 46.02 ± 15.20 years (range 28-80 years). Male: female ratio was 1:1.4. Seventy-nine (71.8%), 29 (26.4%) and 2 (1.8%) patients belonged to lower, middle and upper socioeconomic classes respectively. The rates of literacy, coexisting type 2 diabetes mellitus, family history of HBP and previous stroke or heart failure were 34.55%, 11.82%, 27.27% and 13.60% respectively.

Table 1: Baseline personal/clinical data of patients.

Characteristics		N=110
		N(%)
Gender	Male	45 (40.91)
Literacy status	Literate	65 (59.09)
	Illiterate	38 (34.55)
Socioeconomic status	Upper	2 (1.80)
	Middle	29 (26.40)
	Lower	79 (71.80)
Employment status	Government employed	25 (22.73)
	Self employed	25 (22.73)
	Housewives	52 (47.27)
	Unemployed	8 (7.27)
Positive family history of HBP		30 (27.27)
Concomitant diabetes mellitus		13 (11.82)
Past history of stroke or Heart failure		15 (13.60)
		Means(SD)
Age (years)		46.02 ± 15.26
Systolic BP at diagnosis (mmHg)		170.09 ± 15.27
Diastolic BP at diagnosis (mmHg)		108.98 ± 15.85
Duration of treatment (years)		2.92 ± 3.52

BP: Blood pressure

HBP: High blood pressure.

Drug treatment

Treatment has been commenced for a period of 2.98 ± 3.52 years (range 0.67–22years). The anti-hypertensive medications used are shown in Table 2. Diuretics and calcium channel blockers were the 2 leading prescribed drugs, the proportions of patients on these medications being 57.3% and 39.09% respectively. Fifty (45.50%) patients were on monotherapy while 60 (55.50%) were on multiple anti-hypertensive therapy. Of those on multiple drug therapy, 51 (85%) were on 2 drugs and 9 (15%) were on 3 or more drugs. Thirty-two (29.09%) patients were on formulation with fixed drug combination either as a single drug or in combination with other drugs.

Table 2: Anti-hypertensive drugs used by patients.

Drugs	No of patients	Percentage (%)
Diuretics	63	57.30
Calcium channel blockers	43	39.09
Alpha methyl dopa	33	30.00
Angiotensin converting enzyme inhibitors	15	13.64
Beta blockers	9	8.18
Fixes drug combination formulations	29	26.36
Others	1	0.91

Multiple anti-hypertensive therapy were recorded in some patients.

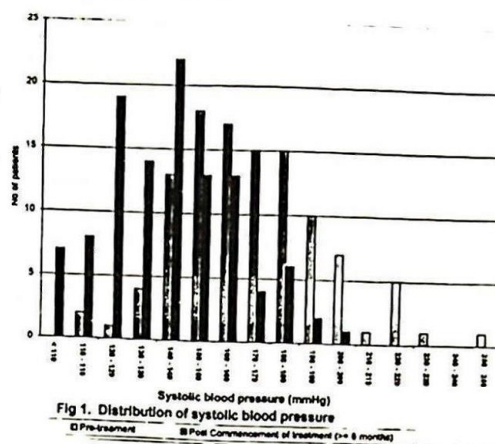


Fig. 1: Distribution of systolic blood pressure.

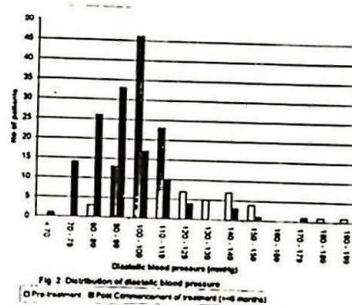


Fig. 2: Distribution of diastolic blood pressure.

Blood pressure control

The mean BP at diagnosis was 170.09 ± 15.20/109.98 ± 15.85mmHg. The systolic BP ranged between 130 and 270mmHg while the diastolic ranged between 80 and 170mmHg. Of the 110 hypertensives studied, BP control was achieved in 47 (42.70%) patients. Of the 63 hypertensives with uncontrolled blood pressure, systolic blood pressure fell by 25.13 ± 17.91 in 42 (66.6%) patients, rose by 10.50 ± 1.00mmHg in 8 (12.70%) patients and was unchanged in 13 (20.63%) patients. Diastolic BP fell by 22.22 ± 14.58mmHg in 32 (50.80%) patients, rose by 7.88 ± 6.66mmHg in 16 (25.40%) patients and was unchanged in 15 (23.80%) patients. The distribution of pre-treatment BP is shown in Figure 1 while blood pressure distribution after at least 6 months since treatment was commenced is shown in Figure 2. The pre-treatment mean BP was significantly higher than that after at least 6 months since commencement of treatment (170.09 ± 15.20/108.98 ± 15.85mmHg versus 146.10 ± 24.50/93.80 ± 21.90mmHg) (p < 0.05)

Table 3: Comparison of hypertensives with controlled and uncontrolled blood pressure (BP)

Parameters	BP controlled	BP uncontrolled
	N=47	N=63
Male: female ratio	1:1.76	1:1.25
Upper/middle socio-economic classes (%)	34.40	23.81
Literacy rate (%)	40.43	30.16
Positive family history of HBP (%)*	38.30	19.01
Presence of coexisting diabetes mellitus (%)	10.64	12.70
Clinic compliance rate (%)*	81.25	47.50
Anti-hypertensive monotherapy (%)*	57.50	36.50
	Mean	Mean
Age (years)	44.77 ± 13.01	46.65 ± 11.16
Body mass index (Kg/m ²)	27.21 ± 5.40	27.84 ± 5.38
Duration of treatment (years)*	2.01 ± 3.30	3.30 ± 3.44
Cost of treatment N (US\$)*	684.67 ± 440.41 (7.21 ± 4.64)	926.39 ± 579.51 (9.23 ± 6.10)

**P* < 0.05

HBP: High blood pressure

Hypertensives with controlled and those with uncontrolled BP are compared in Table 3. The proportions of patients with controlled BP was significantly higher among clinic compliant than clinic non-compliant patients (50% versus 30%; $\chi^2=4.17$, $P<0.05$), among those with a family history of hypertension than those without (60% versus 36.25%; $\chi^2=5.03$, $P<0.05$) and among those on monotherapy than those on multiple drug therapy (54% versus 33.30%; $\chi^2=4.77$, $P<0.05$). The proportion of patients with controlled blood pressure was significantly higher among patients with history of previous stroke or heart failure than those without (66.66% versus 33.33%; $\chi^2=4.07$, $P<0.05$).

The mean cost of drug treatment per month among hypertensives with controlled BP (N684.67 ± 440.41 or US\$7.21 ± 4.64) was significantly higher than those with uncontrolled BP (N926.39 ± 579.51 or US\$9.23 ± 6.10) ($t=2.36$, $P<0.05$). It was also significantly higher among patients on multiple anti-hypertensive therapy than those on monotherapy (N1023.39 ± 560.89 or US\$10.77 ± 5.90) versus (N506.30 ± 314.01 or US\$5.33 ± 3.31) ($t=5.80$, $P<0.05$).

Though the proportions of patients with controlled BP was numerically higher among literates than illiterates, and among patients in the middle than lower

socioeconomic status, the differences did not reach statistically significant levels. Gender, age, coexisting diabetes mellitus and body mass index did not influence blood pressure control.

Hypertensives who smoke significant amount of cigarette (8) or consume alcohol (7) were too small in number for meaningful statistical analysis.

Discussion

The management of arterial hypertension presents, in principle, an ideal model for the definition of optimum treatment. This is because blood pressure (BP) can be easily measured. Furthermore, the benefits of treatment of HBP are established [1-3] and could be utilized in assessing the efficiency of HBP control. The ideal target blood pressure has not been clearly defined. It is however generally believed that BP should be lowered below 140mmHg systolic and 90mmHg diastolic [15].

The traditional rule of halves states that only half of the hypertensive populations are diagnosed. Of those diagnosed, only half are on treatment. Of those on treatment, only half achieve blood pressure control. Our results show that the BP control rate among hypertensives on treatment in the specialised hospital setting studied was 42.70%. This is similar to 41% obtained among Americans [8], but below a value of 50.3% among Italians [7] managed in similar settings and using the same criterion for blood pressure control (BP<140/90mmHg). The blood pressure control rate among our hypertensives is higher than the rates reported among hypertensives in the general population: 30% among Nigerians [9] and Europeans [6]; 20% among Japanese [16] and 10% among Chinese [17]. It thus appears that the rule of halves is applicable to hypertensives receiving care in specialised hospital clinics while the rule of one third, which inter alia, states that only a third of hypertensive population on treatment achieve blood pressure control is applicable to the hypertensives in the general population.

Though BP control was not achieved in 57% of our hypertensives, the recorded fall in BP by 25.13 ± 17.91/22.22 ± 14.58mmHg in this group may be significant. This is because a net reduction in diastolic BP by 5-6mmHg has been shown to be associated with a reduction in the risk of stroke [18]. Lack of adherence to treatment appears to be the most common immediate factor contributing to poor blood pressure control. [13,19]. Our results showed that clinic compliant hypertensives had a significantly higher proportion of patients with controlled BP than the clinic non-compliant ones. This suggests a relationship between clinic compliance and drug compliance.

There has been a recent interest in the roles of multiple anti-hypertensive therapy on BP control. Low dose anti-hypertensive combination has been advocated as first line

treatment of hypertension to ensure tight blood pressure control, particularly among Black Americans [20,21]. The pharmacoconomics of this policy has however not been determined [22]. The influence of combination anti-hypertensive therapy might be population dependent. Our results appear to indicate that in a population made predominantly of lower and middle socioeconomic classes, combination anti-hypertensive treatment is likely to result in a high and unaffordable cost of drugs, poor drug compliance and poor blood pressure control. Combination anti-hypertensive therapy may however be unavoidable in patients with poorly responsive HBP.

Family history of chronic non-communicable disease has been suggested as a means of providing an opportunity for early intervention and improved control of HBP, obesity and diabetes mellitus [23]. Another report also demonstrated a significantly higher hypertension awareness score among hypertensives with a family history of HBP than those without [24]. The current study shows that the presence of a family history of HBP was associated with a significantly higher blood pressure control rate. This may be not unrelated to the strong extended family system in Nigeria. An affected member of the family may facilitate health education on HBP.

Arterial hypertension is a chronic non-curable disease requiring a long-life anti-hypertensive therapy. The initial enthusiasm and compliance with treatment tend to wane with increased duration of treatment [25]. Consequently, as observed in this study, the proportion of patients with controlled BP tends to reduce as the duration since commencement of treatment increases.

In a recent report of Italian hypertensives attending a specialised clinic, hypertensives with poor blood pressure control were more frequently women, older and had a higher prevalence of diabetes mellitus [7]. Male dominance was, on the other hand, demonstrated among Chinese with poor blood pressure control [17]. These findings contrast ours where age, gender and coexisting diabetes mellitus did not affect blood pressure control. Varying prevalence of renal complications of diabetes mellitus and socio-cultural differences among different populations may explain the discrepancies in these studies.

Though literacy rate and the proportions of hypertensives in the upper/middle socioeconomic classes were numerically higher among patients with controlled than uncontrolled BP, the differences were not statistically significant. This apparent absence of influence of literacy and socioeconomic factors on BP control could have arisen from confounding factors such as compliance with treatment. Furthermore, only a negligible proportion of our hypertensives (2%) belong to the upper socioeconomic class.

We were constrained in this study by lack of facilities for 24-hour BP monitor to determine the possible influence of 'white coat phenomenon' on our patients' clinic blood pressure. A previous report however showed that clinic blood pressure measurement did not underestimate the prevalence of hypertensives with controlled blood pressure [7]. The small proportion of alcohol users in this study may not be unrelated to the overwhelming dominance of Islamic religion in the study population. The influence of life-style modification on blood pressure control was not investigated in this study.

In conclusion, BP control rate among the hypertensive population studied is low. However, it does not differ from the values reported among Caucasians in similar centres. Factors contributing to controlled blood pressure including clinic compliance, family reinforcement, literacy and economic empowerment should be encouraged.

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