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Blood Pressure Control Amongst Hypertensive Patients in a Tertiary Health Care Facility in Northern Nigeria

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Abstract: This study assessed the pattern of presentation of hypertensive patients in the clinic at Aminu Kano Teaching Hospital (AKTH) Kano, North western Nigeria, determined the level of control of hypertension in these patients and the drugs used for this purpose. A cross sectional retrospective study was conducted using case notes of 200 randomly selected patients who attended the hypertension clinic of the AKTH, Kano. Data extracted included pattern of presentation, drugs prescribed, adherence to treatment and control of blood pressure among the population studied including diabetics in the cohort. The study population had a mean age of 50.7 with over 30% being over 60 years. The 60% were females. Diabetes mellitus was the most common comorbid ailment (13%) in the study population. Over 42 and 29.5% of the population presented with grade 3 and grade 2 hypertension, respectively. Over 80% of the patients were on combination therapy with over 42% of patients on at least 3 antihypertensive drugs. Diuretics were the most commonly prescribed drug group (34%) with the vasodilator, hydrallazine, the least prescribed. About 53% of the patients were reported to have been regular on their drugs. Blood pressure was fully controlled in 34.5% of all patients and in 23.1% of diabetic patients in the study population. Control of blood pressure in the study population including diabetics was low while a high level of non adherence and low socio-economic status was seen in this study population calling for the use of multiple approaches including treatment intensification, scaling up of patient and provider education and creative health system policy changes to address the problem.

Key words: Hypertension, diabetes mellitus, adherence, blood pressure, AKTH, Nigeria

INTRODUCTION

Essential hypertension remains the most common cardiovascular disease in black Africans (Ajayi and Akinwusi, 1993) and a leading public health risk factor on a global scale. Hypertension has a higher age adjusted prevalence in Africa (Seedat, 2000) and its ravage is particularly severe. It is the leading cause of congestive heart failure, chronic renal failure, cerebrovascular disease, cardiovascular mortality and sudden cardiac death (Obasahan and Ajuyah, 1996; Rotimi *et al*., 1998; Adigun *et al*., 2003).

In a study of cardiovascular diseases in multiple centers in Nigeria, hypertension ranked first and its complications constituted 25% of emergency medical admissions in urban hospitals in the country (Ekere *et al*., 2005). A 1997 report by the International Collaborative study of hypertension in blacks put the age adjusted prevalence of hypertension in Nigeria at 14.5% (Cooper *et al*., 1997). However, using the current definition of hypertension from the seventh joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure (JNCVII) guidelines (Anonymous, 2003), 20-25% of Nigerians would be classified as hypertensives (Ogah, 2006). It is the medical illness most frequently diagnosed in the elderly (Bella *et al*., 1993) and is the most common condition associated with dementia in Nigeria. It is also the most common condition in senior executives and army recruits in Nigeria (Okojie *et al*., 2000; Awoyemi *et al*., 2001).

Treatment of hypertension has contributed to decrease in morbidity and mortality from cardiovascular diseases (Gu *et al*., 2006). Individuals of lower socioeconomic status are known to have higher blood pressures and are more prone to cardiovascular disease (Kaplan and Keil, 1993). This in part reflects the higher prevalence of risk factors and the lower access to health care. One study in the United States found a direct correlation between subjects who have not had their blood pressure checked in the previous year and the socio-economic status (Schoenborn, 1998) while access to care may not totally explain the variation in mortality as seen in the various socio-economic classes reported, a 3 fold difference had been reported in coronary mortality

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between the lowest and highest grades of employment with conventional risk factors only accounting for a modest proportion of the difference (Marmot *et al*., 1991). Cardiovascular mortality has also been associated with levels of education income, occupation and unemployment, poverty status and standard of living (Anonymous, 1997).

Uncontrolled hypertension remains a major threat to global health. The optimal target blood pressure is defined by the United States Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure (JNCVII) according to whether the patient also has diabetes or a nephropathy. In uncomplicated hypertension, the target level is 140/90 mmHg. In the case of diabetes or nephropathy, it is 130/80 mmHg. In all cases, diet and exercise changes are also necessary and it is essential that patients understand them in order to comply with them. Epidemiological surveys have revealed that blood pressure control is adequate (i.e., <140/90 mmHg) in only a small percentage of the hypertensive population (Burt *et al*., 1995; Marques-Vidal and Tuomilehto, 1997). In developed countries, only 27% of hypertensives on treatment had adequate blood pressure control (Colhoun *et al*., 1998). The scenario is worse in developing countries (Lopez and Murray, 1996).

Non compliance and poor adherence to therapeutic plans have been recognized as very important factors responsible for poor blood pressure control (Salako *et al*., 2003; WHO and ISH, 1999). Socio-economic factors have been adduced as a responsible factor for non compliance especially in Sub-Saharan Africa. Amidst the changing socio-economic paradigm in the environment, periodic assessment of blood pressure control and its associated factors are necessary.

This study was designed to assess the pattern of presentation of patients with hypertension attending the Hypertension Clinic of the Aminu Kano Teaching Hospital, Kano, North-Western Nigeria; determine the level of adequacy of blood pressure control in those with uncomplicated hypertension as well as those with diabetes; evaluate the drug groups used in these patients as well as their level of adherence. We hope the results of this study will serve as a useful information for possible future health intervention to improve patients treatment outcomes in these diseases.

MATERIALS AND METHODS

This cross sectional retrospective study was conducted between 3rd April and 10th June, 2009. A random sample of 200 case notes of patients with hypertension attending the hypertension (Specialist) clinic of the Aminu Kano Teaching Hospital, a tertiary health care facility located in Kano, North-West Nigeria. Data were extracted from the case notes using pre-piloted data collection forms. The data extracted from the case notes included: age, gender, systolic and diastolic blood pressure readings at first clinic attendance as well as co-morbid ailments. Others included:

- Antihypertensive drugs prescribed
- Patients adherence to prescribed drugs as documented by physicians in case notes
- Number of times prescribed drugs were changed
- Most recent systolic and diastolic blood pressure readings
- Before commencement of the study, ethical clearance for the study was granted by the ethical committee of the Aminu Kano Teaching Hospital, Kano

The classification of hypertension used in this study was based on the United States (U.S) Anonymous (2003) guideline. Data analysis was done with SPSS 16 for descriptive statistics and χ^2-test with $p<0.05$ considered significant.

RESULTS AND DISCUSSION

About 200 randomly selected case notes of hypertensive patients were studied consisting of those belonging to 120 (60%) females and 80 males (40%). The patients had a mean age of 50.7+13.7 with a range of 18-90 years. About 60 (30.5%) of the patients were over 60 years.

Table 1 shows the socio demographic and co morbid conditions associated with hypertension in the population studied. Nearly 50% of the study population were housewives while 20% were engaged in business and 5.5% of them were unemployed. Diabetes mellitus (13%) was the most common co morbid ailment found in the study population while 15 (7.5%), 13 (6.5%), 13 (6.5) and 3.5% patients had hyperlipidaemia, renal disease, obesity and congestive cardiac failure, respectively. All these patients were on appropriate therapy for their co morbid medical diseases.

Over 42% of the study population had grade 3 hypertension, nearly 30% (29.5%) had grade 2 hypertension while 13 (6.5%) of them had isolated systolic hypertension at presentation. In all grades of hypertension, women were more preponderant at presentation (Table 2).

Blood pressure control was achieved in about 69 (34.5%) patients while this was not attained in 70 (35%) of the patients. In about 88 (44%) of patients, the systolic blood pressure alone was controlled while in 110 (55%),

Table 1: Socio-demographic and comorbid ailment distribution of study population

Characteristic	Frequency	Percentage
Gender		
Male	80.0	40.0
Female	120.0	60.0
Age		
Mean	50.7	-
SD	13.7	-
Range	72.0	-
Minimum	18.0	-
Max	90.0	-
Patients ≥60 years	60.0	30.5
Occupation		
Housewife	97.0	48.5
Business	40.0	20.0
Retired civil servants	10.0	5.0
Civil servants	32.0	16.0
Students	5.0	2.5
Farmers	3.0	1.5
Widows	2.0	1.0
Unemployed	11.0	5.5
Co-morbid ailments		
Diabetes mellitus	26.0	13.0
Hyperlipidemia	15.0	7.5
Renal disease	13.0	6.5
Obesity	13.0	6.5
Peptic ulcer disease	8.0	4.0
Strolic	8.0	4.0
Congestive cardiac failure	7.0	3.5
Others	15.0	7.5

Table 2: Blood pressure distribution (According to grades) of study population at presentation

Grades of BP	SBP/DBP	No. of subjects	M	F	%
Grade 1 hypertension	140-159/90-99	43	16	27	21.5
Grade 2 hypertension	160-179/100-109	59	23	36	29.5
Grade 3 hypertension	≥180/≥110	85	33	52	42.5
Isolated systolic hypertension	≥140/<90	13	6	7	6.5

only the diastolic blood pressure was controlled. Statistically significant difference was found in the fully controlled group among males and females as well as among the fully uncontrolled group ($p<0.05$) with more females having uncontrolled blood pressures (Table 3).

Among 26 patients with co-existing diabetes mellitus (n = 26), 6 (23.1%) had their blood pressures fully controlled while 13 (0.5%) had fully uncontrolled blood pressures. In 8 (30.8%) patients among all patients with diabetes mellitus, only the systolic blood pressure was controlled while only the diastolic blood pressure was controlled in 42.3% of the patients in this sub group.

About 66.6% (4) of diabetic patients with full blood pressure control were males while 2 out of 6 (33.3%) diabetic patients with full control of their blood pressure had grade 3 hypertension at baseline with 3 patients (50%) on grade 2 at baseline. About 17 (65.4%) out of the 26 patients with diabetes mellitus in the cohort had grade 3 hypertension at baseline with 6 (23.1%) patients in the grade 2 category at baseline.

Table 3: Pattern of BP control among all subjects in study population and patients with diabetes with goal BP

Treatments	Male (%)	Female (%)	Total (%)
With goal at <140/90 mmHg			
Fully controlled	34 (42.5)	35 (29.2)	69 (34.5)
Fully uncontrolled	23 (28.8)	47 (39.2)	70 (35.0)
Only SBP controlled	41 (51.3)	47 (39.2)	88 (44.0)
Only DBP controlled	52 (65.0)	58 (48.3)	110 (55.0)
At <130/80 mmHg			
Fully controlled	4 (23.5)	2 (22.2)	6 (23.1)
Fully uncontrolled	9 (52.9)	4 (44.4)	13 (50.0)
Only SBP controlled	5 (29.4)	3 (33.3)	8 (30.8)
Only DBP controlled	7 (41.2)	4 (44.4)	11 (42.3)

Table 4: Summary of drug use pattern

Characteristics	Frequency	Percentage
Patients on monotherapy	17	8.5
Patients on fixed dose combination	15	7.5
Patients on 2 drug combination	85	42.5
Patients on 3 drug combination	61	30.5
Patients on 4 drug combination	34	17.0
Patients on 5 drug combination	2	1.0
Patients on 6 drug combination	1	0.5
Patients on antidiabetic drugs	26	13.0
Patients on lipid lowering drugs	19	9.5

Table 4 shows the drug use pattern among the study population. Only 8.5% were on monotherapy and over 42% had at least 3 antihypertensive drugs prescribed with 1 and 0.5% receiving 5 and 6 drugs, respectively.

About 81 (53.0%) out of 153 patients were reported by their doctors to have been regular on their antihypertensives. The clinicians did not report on the adherence status of 47 patients in the study population. Diuretics, mainly thiazides were prescribed in 176 (34%) out of 518 antihypertensive drugs prescribed for all subjects. This was followed by angiotensin converting enzyme inhibitors (23.9%) and calcium channel blockers (22.8%) while centrally acting antihypertensive drugs, mainly alpha methyl dopa was prescribed as 6% of total antihypertensives and angiotensin receptor blockers were prescribed in 4.6% of cases. Fixed dose combination drugs were prescribed in 2.9% of patients while the vasodilator hydrallazine was prescribed for only one patient.

Majority of the study population were in the middle age with a strong female preponderance (60%). This agrees with other reports that hypertension is more common among females in middle age bracket (Hussain *et al*., 1999). Some researchers have opined that it is a reflection of the male populations poor attitude to keeping clinic appointments (Odili *et al*., 2008). Socio demographic distribution of the study population indicates that a large proportion of the study population were unemployed (Either as full time house wives, unemployed singles or married, students or widows) thus placing them in the lower socio economic groups with a

preponderance of hypertension and its complications (Schoenborn, 1998; Marmot *et al*., 1991; Anonymous, 1997).

Diabetes mellitus was seen as the commonest co-morbid ailment in the study population (13%) followed by hyperlipidemia (7.5%). This finding is in agreement with previously conducted studies in Nigeria (Odili *et al*., 2008; Etuk *et al*., 2008; Yusuf and Balogun, 2005). Diabetes mellitus have been recognized as the most common complication of hypertension among black populations (Lopes, 2002). There is thus the need for aggressive treatment (Intensification) to achieve sustained control of blood pressure in these patients.

Over >70% of the study population presented with grade 2 hypertension or higher. This finding agrees with those of other reports (Odili *et al*., 2008; Yusuff and Balogun, 2005). This observation is very worrisome especially against the finding that over 88% of the patients with Diabetes mellitus in this cohort had at least a grade 2 category hypertension on presentation. The patients with these conditions have an obviously higher cardiovascular risk and would therefore require tighter control of their blood pressures possibly with the use of multiple drugs.

The overall rate of blood pressure control in this study was 34.5% while 35% were fully uncontrolled. A statististically significant proportion of males compared to females had fully controlled blood pressures ($p<0.05$). However, the blood pressure levels themselves portrayed women to be more responsive, possibly lending credence to the opinion that women are more likely to adhere to therapeutic plan (Degoulet *et al*., 1983). The control rate of 34.5% is close to findings by Salako and his group at Ibadan who had a rate of 36% (Salako *et al*., 2003) while other workers had reported 30.5% (Odili *et al*., 2008) and 29% (Etuk *et al*., 2008), respectively. These are consistent with global trends in blood pressure control among hypertensives (Marques-Vidal and Tuomilehto, 1997; Burt *et al*., 1995). The negative impact of inadequate blood pressure control on morbidity and mortality is well documented (Obasahan and Ajuyah, 1996; Rotimi *et al*., 1998; Adigun *et al*., 2003). This is more so in this environment where late presentation, low socio economic levels and poor adherence to medication add to the burden of complications (Oyewo *et al*., 1989; Kadiri and Olutade, 1991).

The blood pressure control rate among diabetics in this study was 23.1%. This, though lower than that seen in the general hypertensive population is higher than that reported by workers in Cameroun (Simeon *et al*., 2007) and those in other parts of the world (Teitelbaum *et al*., 2005; Wong *et al*., 2009) where control rates of 10.2, 15.7 and 28%, respectively were reported.

Adequate blood pressure control is of particular concern in patients with diabetes as hypertension increases morbidity and mortality associated with stroke and cardiovascular disease (Johnansen and Birkeland, 2003) as well as microvascular complications such as retinopathy and nephropathy (Haffner, 1998). Evidence suggests that good blood pressure control may be as important if not more important than blood glucose control in reduction of the cardiovascular complications (UK Prospective Diabetes Study Group, 1998).

In this study, over 80% of the patients were on two or more drugs. This is in line with the recommendations of the JNC VII guidelines. In most cases, majority of hypertensive subjects will require more than one drug treatment to achieve optimal blood pressure control (Salako *et al*., 2003). However, inspite of the high rate of use of combination therapy, BP control was still less than satisfactory. In order to improve BP control rates, treatment intensification which has been found independently to improve blood pressure control levels in the setting of clinical trials and routine clinical practice (Okonofua *et al*., 2006) can be adopted. Even in the midst of poor adherence to therapy as seen in this cohort, treatment intensification may be useful in improving control rates. This has been demonstrated by Adam and colleagues (Rose *et al*., 2009) who showed that while treatment intensification was clearly associated with improved BP control over time this effect was similar in size for patients with varying levels of adherence. This argument is most reasonable when we note that many antihypertensive drugs have long half lives and drugs with long half lives may have a degree of forgiveness when some doses are missed (Urquhart, 1998).

Over 53% of the patients on whom adherence was reported were said to have complied to medication instructions. This level of compliance, even in the midst of the disadvantage of self report as a measure of adherence (Yusuf and Balogun, 2005) is not satisfactory and may have contributed to the low control. A better adherence level may have improved the blood pressure control level in this study population. Several studies have identified factors that may be responsible for the inadequate blood pressure control among Nigerian Hypertensives and these include late presentation for treatment, delayed diagnosis and commencement of treatment inadequacy of pharmacological treatment, non adherence to prescribed regimen, low socio economic/ under privileged class and subsequent inability to afford cost of drugs prescribed and exposure to stress (Kadiri *et al*., 2000; Oyewo *et al*., 1989; Kadiri and Olutade, 1991).

Diuretics (34%) either alone or in combination were the most commonly prescribed drug groups. This finding agrees with that of some researchers (Adigun *et al*., 2003) while other reports had other drug groups as the most frequently prescribed (Odili *et al*., 2008; Yusuff and Balogun, 2005; Chou *et al*., 2004). The high usage rate of diuretics is consistent with the recommendations of the JNC 7 guidelines and the working group of the International Society on Hypertension in Blacks. In addition to cost advantage, the volume dependency of hypertension in blacks and the ALLHAT study recommendation made strong cases for the use of diuretics as first line drugs. The seminal research of Wassertheil-Smoller and others also found that monotherapy with diuretics was equal or superior to others in preventing cardiovascular disease complications of high BP in women (Wassertheil-Smoller *et al*., 2004). Most of the diuretics prescribed were of the thiazide family, particularly bendrofluazide. Nevertheless, it must be pointed out that evidence from reviews and clinical trial data have found an increased incidence of new onset diabetes among patients receiving thiazide diuretics through mechanisms that are not fully understood but may be related to the association of thiazide induced hypokalemia with increased blood glucose which may be reversed by treating the hypokalemia (Zillich *et al*., 2006), The use of ACE inhibitors and calcium channel blockers were also most appreciable.

There was a ready recourse to the use of multitherapy in this study. Over 80% of patients were on combination therapy. This is in agreement with the JNC VII guidelines which states that small doses of different classes of antihypertensive drugs is more beneficial than a high dose of one. This advice probably accounts for 60% of antihypertensive drug visits in the United States getting polytherapy of three or more classes of drugs (Ma *et al*., 2006). The use of fixed dose combination therapy is rather low at 2.9%. Fixed dose combinations have been known to improve adherence and consequently improve BP control rates.

In this study, life style modifications were not documented. Dietary indiscretion, especially liberal use of salt has been reported to have affected BP control (Salako *et al*., 2003). On the whole, improvement in control rates in this environment would entail the use of multiple strategies including treatment intensification, close adherence to clinical guidelines, development of a hypertension registry and disseminating best practices from high performing centers to other groups. This practice has been reported by a group in San Francisco, California to have increased control rates from 44% in 2001-80% by 2009 (Greenland *et al*., 2010). In an environment such as ours, the creative use of a hypertension registry and the use of non physician based clinic visits to measure and treat hypertension may contribute significantly to turn the tide against this disease.

CONCLUSION

The percentage of hypertensive patients with optimal blood pressure control in this study is low. Control of BP in patients with Diabetes as a comorbid ailment is also low, though higher than those reported by some other workers. Non compliance and low socio economic status and late presentation existed in this study population and may have contributed to the poor BP control observed. Multiple approaches including patient and provider education, treatment intensification, use of hypertension registry and other public health approaches and possible health system policy changes are needed to address these issues.

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