Investigating outcomes in the management of hypertension by specialists in a University Hospital

*DS Ogaji, PY Naa-ere, E. Okumoko, C. Ekejiuba, MM Mezie-Okoye

Department of Preventive and Social Medicine, University of Port Harcourt, PMB 5323, Choba, Nigeria

*Corresponding Author: E-mail- daprim.ogaji@uniport.edu.ng; +2348177092225

ABSTRACT

Background: *Hypertension is an acknowledged risk factor for other cardiovascular diseases and this risk is heightened with the co-existence of other risk factors and long-term co-morbidities. This study reviewed clinical outcomes in the management of hypertension at the medical outpatient clinic of the University of Port Harcourt Teaching Hospital, Nigeria.*

Method: *Cross-sectional survey and review of records of 182 randomly selected regular patients at the medical out-patients' clinic. Outcomes measured were patients' adherence to treatment, persisting risk factors, co-morbidities, trend in patients' blood pressure over last three consecutive visits. Descriptive and analytic statistics were conducted using (SPSS) version 20.0.*

Results: *A majority of the patients were females (62.6%) and about half (45.0%) reported adherence to the treatment protocol. Common persisting risk factors were overweight (73.1%) and high low density lipoprotein cholesterol (81.0%) while co-morbidity was diabetes (26.9%). Proportion of clients with uncontrolled BP progressively declined over the last 3 consecutive visits (63.7 → 60.4 → 54.4%). The progressive declines were statistically significant with p-value of 0.039 and 0.001 respectively. Poor adherence (p = 0.01), older ages (p = 0.047), and shorter duration of illness (p = 0.023) were significantly associated with uncontrolled hypertension.*

Conclusion: *Adherence to treatment protocol and regular follow-up of hypertensive patients were modifiable predictors of adequate BP control. Most of the persisting risk factors are related to behavioural and dietary practices among hypertensive subjects. Findings have implications for periodic clinical audit as a strategy for clinical governance and quality improvement.*

Keywords: *clinical audit, outcome, hypertension management, specialist clinic, UPTH, Nigeria.*

The Nigerian Health Journal

INTRODUCTION

Hypertension is acknowledged one of the greatest risk factors for other cardiovascular diseases.[1] It is defined by the 7th Joint National Committee (JNC) as systolic blood pressure of ≥140mmHg and diastolic blood pressure of ≥ 90mmHg.[2] The classification of the various levels of blood pressure by the British Hypertension Society is consistent with those defined by the European Society of Hypertension and the World health organization-International Society of Hypertension (WHO/ISH)[2]. However, pragmatists would consider the threshold for initiation of management for hypertension as the level of blood pressure at which the benefits of treatment outweighs its costs and hazards.

The cardiovascular risks associated with high blood pressure is increased with the existence of other risk factors in an individual, such as age, gender, weight, physical activity, smoking, family history, serum cholesterol, diabetes mellitus, and pre-existing vascular disease. Even in more than 95% of cases, a specific underlying cause of hypertension are not easily determined making its pathogenesis still poorly understood.[1, 2] There is an estimated 1 billion people worldwide and approximately 7.1 million annual deaths per year that can be attributable to hypertension and this is disproportionately distributed across racial groups.[3, 4]

Although the goal of treatment is to lower blood pressure to normotensive state and protect important organs like the brain, heart and kidneys from damage; reducing the risk of occurrence through life style modifications such as eating a healthier diet, quitting smoking, getting more exercise, losing weight if obese or overweight have also been advocated.[1, 5-7]

Prevention of hypertension and reversal of known risk factors are thus important goals in overall efforts to control blood pressure and reduce the incidence of hypertension-related cardiovascular and renal complications. Regrettably, while some of these risk factors such as age, gender, genetic factors, and race are non-modifiable and often not within the remit of preventative services, others like overweight, high salt intakes, alcohol, tobacco consumption and reduced physical activity are largely modifiable and captured in current recommendations and guidelines for preventing hypertension.[8]

The Nigerian Health Journal

Some challenges of managing hypertension include making a diagnosis of hypertension due to variability in blood pressure measurements encountered by clinicians, setting therapeutic goals in its management and keeping patients motivated to adhere to their treatment protocol.[9, 10]

Audit is a methodological examination and review aimed at improving quality and while medical audit is "a specialized part of quality assurance in which practitioners review care they provide, usually with an emphasis on its technical rather than interpersonal aspects, Clinical audit seeks to improve patient care and outcome through systematic review of care against explicit criteria and the implementation for change.[11, 12] Classically, audits adopt a cyclical step-wise process that include up to six steps such as: definition of criteria and standard; collection of data on structure, process and/or outcomes; collation and analysis of data; comparing performance with standard; recording gaps and deficiencies, and making recommendations[13]. Clinical audit as a specialized form of quality assessment may involve the structure-process-outcome triad of the health service delivery system.[14] There is not much known on the real outcomes during the management of hypertension by specialists in this setting. This study which was designed to bridge this gap, used explicit criteria and a cohort of regular visitors at the medical outpatient clinic for the management of hypertension to systematically review outcomes in terms of patients' blood pressure status, identify persisting risk factors, explore trend in the attainment of beneficial outcome and explore predictors of key outcomes in the management of hypertension at the medical outpatient clinic of the University of Port Harcourt Teaching Hospital, Nigeria. It is envisaged that findings from this research would provide additional impetus for the establishment of a clinical governance system that would enhance quality, safety and patient experiences with the delivery of health care in the hospital.

The Nigerian Health Journal

METHODS

Study area

Study was conducted at the medical out-patient department (MOPD) in the University of Port Harcourt Teaching Hospital (UPTH). The hospital which is located in Alakahia town serves as a tertiary referral centre for Rivers and neighboring States. Although it is a tertiary health care facility, the hospital also provides a range of primary and secondary care to patients. Thus patients' accessing services are first seen at the general out-patient clinic or the accident and emergency departments depending on the severity of their illness and then referred to the various specialists for continuing care. For those with long-term morbidities like hypertension, subsequent routine encounter with the hospital are with the specialist who run the medical outpatient clinic.

Study design

Descriptive cross-sectional study and review of patients' records

Study population

The study population included adult patients who have previously been diagnosed with hypertension and are seeking care at the medical out-patient clinic in UPTH on regular basis. We included a retrospective cohort of participants who were ambulatory, adults aged over 18 years, receiving regular care at the facility, kept the last 2 previous consecutive appointments to the hospital and may or may not have other long-term co-morbidities. New patients, those who were very sick and those who declined participation were excluded from participating.

Study sample

Consecutive patients seen at the medical outpatient clinic were recruited into the study if they met the eligibility criteria and gave their consent to participate in the study. The study protocol required the screening of all patients attending the medical outpatient clinic and a review of their medical records to identify those who met the inclusion criteria and gave their consent to participate in the study during the period of data collection.

The Nigerian Health Journal

The study was designed to detect a difference of 5% in the proportion of patients with controlled BP following visit to the specialist. The sample size of 168 for the study was determined by the formula for a paired study[15];

$$n = \frac{(Z_{\alpha/2})^2 * \rho(1-\rho)}{(e)^2}$$

Where n= sample size; $Z_{\alpha/2}$ =1.96, e = 5% error, corresponding to 95% confidence limit, q =1 – p; P = prevalence. The prevalence rate of 10% was obtained from the range of 10 – 25% prevalence of hypertension in similar populations.[16, 17]

Data collection

The data for this study was collected between September 2014 and January 2015 by final year medical students who had received training on research methods and data collection. A structured, interviewer administered questionnaire was used to collect information from the patients relating to their socio-demographic, behavioural, adherence with treatment, persisting risk factors, co-morbidities and the existence of patient-physician mutual therapeutic threshold for the BP. A pro forma was used to obtained clinical information from the patients' records. The clinical information included current and previous records of their blood pressure for the last two visits, current weight, height, duration of hypertensive illness, drug regimen as well as alterations (if any) made on their treatment in the index visit. The research team took the weights and heights of the patients with the usual scale in the clinic while other clinical records including the serial blood pressure were extracted from the patients' record jointly by two members of the research team. This clinical audit was conducted based on explicit criteria and standards. The explicit criteria were the proportion of patients in current normotensive state as previously defined in the concept note [2], absence/remission of modifiable risk factors, laboratory findings within the normal reference range and adherence to management protocol. The target standard was the attainment of 100% favourable outcomes on each criterion which typifies success in the management of hypertension within this practice. The reference range on the laboratory report form was used in the assessment of low density lipoprotein (LDL) cholesterol.

The Nigerian Health Journal

The head of the department of medicine reviewed and gave permission for this research. Adequate information was given to participants prior to obtaining their consents and only those who consented participated in the study. The data from the survey and record review were collected under strict confidentiality. Personal identifiable data on the patients like their names, address, phone numbers and emails were not collected.

Data analysis

Excel spread sheet was used to enter data and statistical package for social sciences (SPSS) version 20.0 was used for the analysis[18]. All missing data were handled using listwise deletion while p-value of 0.05 or less was considered statistically significant.

The primary aim of the analysis was to determine the prevalence of various risk factors for hypertension among the patient cohort and explore predictors of the current BP status. Firstly, we examined the distribution of all variables in the study and presented these in tables as frequencies, percentages or mean, standard deviations and ranges. Next we explored the trend in the BP of this cohort following consecutive repeated visits (current and last two visits). The analysis of this trend was used to determine the odds of having uncorrected blood pressure with follow-up visits and if this odd was significant. The McNemar test was then used to test for significance in this paired design involving dichotomous data.

The third objective of the analysis was to uncover predictors of uncorrected blood pressure from the dataset. The measured outcome was the index blood pressure status of the patient while the explanatory variables were gender, smoking status, alcohol intake, exercise habits, BMI, cholesterol level, drug adherence, age and duration of hypertensive illness. The independent variables were either categorical or continuous and to identify predictors of uncontrolled blood pressure among the study population, an initial exploration of the relationship between the independent variables and the outcome was done using Chi-square test or Pearson's correlation for categorical and continuous independent variables respectively. This was followed by a series of univariate logistic regression analysis involving each independent variable and then a multivariate logistic regression analyses which accommodated all the independent variables in the dataset.

The Nigerian Health Journal

For categorical independent variable, dummy variables were generated during the analyses to represent the various subgroups within the variables and then one subgroup served as the baseline or referent group. While the 'univariate' analyses, examined each independent variable separately, the multivariate analysis controlled for inter-relationships that could exist between the independent variables. The logistic regression approach was used as the outcome variable (blood pressure status) was binary (e.g. normal/abnormal) in natured.

RESULTS

Consecutive one hundred and eighty two patients being managed for hypertension at the specialist clinic were recruited in this study. The mean age of these subjects was 54.4 years with a range of 23 to 93 years while the mean number of years they had lived with a diagnosis of hypertension was 5.7 years. Most of the participants were females (62.6%), married (76.4%) and had more than secondary level of education (38.6%) (Table1).

Table 1. Socio-demographic and clinical characteristics of study participants

Characteristics	**Distribution**
Age (mean, SD, Min - Max)	54.4 years, 12.8, 23 – 93 years
Illness duration (mean, SD, Min - Max)	5.7 years, 5.0, 0 – 32 years
Gender – Frequency(Percent)	Male – 68(37.4), Female – 114(62.6)
Level of schooling – Frequency (percent)	Primary – 35(19.2), Secondary – 70(38.5), Tertiary – 72(38.6)
Marital status – Frequency (percent)	Currently single – 43(23.6), currently married – 139(76.4)
Occupation – Frequency (percent)	Currently unemployed – 51(28.3), currently employed – 129 (71.7)

Table 2 shows the prevalence of persisting risk factors among the cohort. The prevalence of current smoking was lower (2.2%) than excessive use of alcohol (13.7%) in the study

The Nigerian Health Journal

population. Less than half of these patients engaged in regular exercise while 16% admitted having a habit of adding extra table salt to their meal. Prevalence of overweight and high LDL cholesterol was high, 73.1% and 81.0% respectively.

Table 2. Prevalence of persisting risk factors among study participants

Risk factor (Number)	Frequency	Percentage
Smoke (n=181)		
Yes	4	2.2
No	177	97.3
Alcohol (n=181)		
Yes	25	13.7
No	156	85.7
Regular exercise (n=181)		
Yes	81	44.5
No	100	54.9
Extra table salt in food (n=175)		
Yes	28	16.0
No	147	84.0
Body Mass Index(n=182)		
Normal	49	26.9
High	133	73.1
Cholesterol(n=116)		
Normal	22	19.0
High	94	81.0

There was serial reduction in proportion of respondents having uncontrolled blood pressure with repeated visits over the last three consecutive visits to the facility. The odds ratio for having uncontrolled high blood pressure between the previous and the current visit (OR = 1.38, 95%CI: 1.01, 1.89) fell from what was observed between the second previous and the previous visit (OR = 1.67, 95%CI: 1.22, 2.30). These reductions in the proportion of patients with poor control of their blood pressure were statistically significant with p-values of 0.039 and 0.001 respectively (Table 3).

The Nigerian Health Journal

Table 3. Trend in BP status over the last three consecutive visits to facility

BP Status	Freq (%)	[a]Comparison
Current visit BP		
Normal	83(45.6)	
High	99(54.4)	$\chi^2_{df=1}$ = 4.26, p = 0.039
Previous visit BP		OR = 1.38, 95%CI: 1.01, 1.89
Normal	72(39.6)	
High	110(60.4)	
Second previous visit BP		$\chi^2_{df=1}$ = 11.0, p = 0.001
Normal	66(36.3)	OR = 1.67, 95%CI: 1.22, 2.30
High	116(63.7)	

a - McNemar's test

From Table 4, about half (n = 83, 45.6%) of these patients have other long-term co-morbidity. Among those that had long-term co-morbidity, 50 (27.4%) had diabetes mellitus, (1.1%) had diabetes mellitus and heart failure, (1.1%) had diabetes mellitus and stroke (Table 4). Most of the patients admitted that there is shared therapeutic goal with their physician on the desirable blood pressure threshold (97.8%) but only 34.6% of them felt they are achieving that goal. The commonest drug categories in the management cocktail were calcium channel blockers (61%), diuretics (57.1%) and angiotensin receptor blockers (43.3%). In a majority of cases during the current visit, the management protocol was unchanged. The decision following a majority of current visits was to continue the same line if management (n = 120, 65.9%). The decision to alter or change the line of treatment was significantly associated with the current blood pressure status of the patient ($\chi^2_{df=1}$ = 10.41, p = 0.001). The reasons adduced for poor adherence with medications included forgetfulness (n = 81, 45.1%) and feeling well and so do not need further medications (28%).

Table 5 presents finding on patients' socio-demographic, behavioural and clinical predictors of poor blood pressure control. After controlling for the interrelationships among the various variables in the multivariate logistic model, those who were adherent to their treatment regime were significantly less likely to have poor blood pressure control (B = -1.24, standardised OR = 0.3, 95%CI of OR: 0.1 – 0.8, p = 0.01). While older patients are significantly more likely to present with poor control in blood pressure (B = 0.05, OR = 1.1, 95%CI: 1.0 - 1.1, p = 0.047), those with longer duration of hypertensive illness showed a contrast (B = -0.12, OR = 0.9,

The Nigerian Health Journal

95%CI: 0.8 – 1.0), p-value = 0.023. Overall, the model that included patients' characteristics was barely efficient in containing relevant factors needed to predict patient current blood pressure status ($\chi^2_{df=17}$ = 27.1, p = 0.057), but highlighted some salient predictors of blood pressure control.

Table 4. Long-term co-morbidities, management and adherence among hypertensive patients

Characteristic	Frequency	Percentage
Long-term comorbidity		
Hypertension + DM	50	27.5
Hypertension + HF	12	6.6
Hypertension + DM + HF	2	1.1
Hypertension + DM + Stroke	**2**	1.1
Physician-patient mutual therapeutic goal		
Yes	178	97.8
No	4	2.2
Patients' opinion on shared goal		
Achieved	63	34.6
Not yet achieved	119	65.4
***Class of drug**		
Angiotensin receptor blockers	79	43.3
Angiotensin converting enzyme inhibitors	48	26.4
Beta blockers	36	19.8
Calcium channel blockers	111	61.0
Diuretics	104	57.1
Central alpha adrenergic agonist	36	19.8
Central vasodilators	7	3.8
***Management decision**		
Continue same treatment	120	65.9
Change treatment plan	62	34.1
***Reasons for poor adherence to drug treatment**		
Forgot drugs	81	45.1
Felt better	50	28.0
Felt worse	16	9.9
Fear of side effect	38	21.4
Ineffective	13	8.8
Avoiding addiction	15	8.2
Cost of drugs	19	10.4
Traditional/religious belief	16	8.8

Note: *Some cases had multiple responses

The Nigerian Health Journal

Table 5. Exploring the predictors of uncontrolled BP

Independent variable – referent group	Univariate analysis			Multivariate analysis		
	[a]B	OR (95% CI)	p-value	[a]B	OR (95%CI)	p-value
Constant				-22.37	-	0.000
Gender - Female	0.10	1.1(0.6, 2.0)	0.756	0.10	1.1(0.4, 3.1)	0.847
Smoking - Yes	1.30	3.7(0.4, 36.0)	0.264	22.45	$5.5*10^9$(0, ∞)	0.999
Excess alcohol intake – Yes	-0.27	0.8(0.3, 1.8)	0.545	-1.09	0.3(0.1, 1.9)	0.210
Extra salt in diet - Yes	0.43	1.5(0.3, 8.2)	0.613	0.76	2.1(0.2, 19.2)	
Regular exercise – Yes	0.28	0.4(0.7, 2.4)	0.360	0.17	1.2(0.5, 2.9)	0.699
BMI – High	-0.15	0.9(0.4, 1.7)	0.652	0.15	1.2(0.4, 3.5)	0.799
Cholesterol - High	0.62	1.9(0.7, 4.8)	0.194	-0.26	0.8(0.2, 2.5)	0.669
Adherence – No	0.89	2.4(1.3, 4.5)	0.004	-1.24	0.3(0.1, 0.8)	0.010
Employment - Yes	0.11	1.1(0.6, 2.1)	0.752	-0.88	0.4(0.1, 1.3)	0.128
Education – Tertiary	-	-	-	-	-	-
Primary or less	1.16	3.2(0.3, 30.1)	0.309	0.15	1.2(0.3, 4.0)	0.814
Secondary	-0.17	0.9(0.4, 1.9)	0.688	-0.55	0.6(0.2, 1.7)	0.307
Marital Status – Married	0.08	1.1(0.5, 2.2)	0.831	0.44	1.6(0.4, 5.5)	0.499
[b]**Age of patient (in years)**	0.01	1.0(1.0, 1.1)	0.939	0.05	1.1(1.0, 1.1)	0.047
[b]**Duration of illness (years)**	-0.04	1.0(0.9, 1.0)	0.163	-0.12	0.9(0.8, 1.0)	0.023

a –the unstandardised coefficient shows the relationship between subgroups within the independent variable and its referent for categorical predictors. The standardised coefficient β was used to describe the change in the outcome for every unit increase in the predictor for continuous predictors (b). Model summary for multivariate analysis $\chi^2_{df=17}$ = 27.1, p = 0.057

DISCUSION

Summary of the study

Study reports the outcomes in the management of hypertension at the specialist clinic in a tertiary hospital setting. Finding shows overweight and hypercholesterolemia as the most frequent persisting risk factors while diabetes mellitus was the most common long-term co-morbidity among these patients. The commonest reasons for poor adherence to antihypertensive medications were forgetfulness and patients who felt they are well and so don't require further drug treatment. Study showed progressive and significant reduction in the proportion of cases in this cohort with poor control of their blood pressure following repeated follow-up visits. Other identified predictors of adequate blood pressure control were adherence

The Nigerian Health Journal

to treatment protocol, younger age of patient and longer duration of illness among these subjects.

Comparison with other reports

This study found that the odds of having uncontrolled blood pressure was higher among males than female which was not statistically significant. Although this study was not designed to estimate gender distribution of the prevalence of uncontrolled hypertension, previous studies had reported a male preponderance in the prevalence of hypertension.[19, 20] A possible explanation for a significant male preponderance of hypertension is the higher prevalence of notable risk factors for hypertension such as alcohol abuse and smoking in men than women in many population.[20]

About a third of the sample population had tertiary level of education and though level of education was not predictive of prevalence of hypertension, direct relationship have been reported in previous studies conducted among sub Saharan populations.[17, 21] Even in situations with comparable prevalence of hypertension in both literally and non-literally skilled populations, other factors such as lower physical activity, increase consumption of unhealthy foods and higher psychosocial stress commonly found among more educated people may heightened the difference in risk between these groups. Furthermore, there are compelling evidence that more educated persons have better health seeking behavior and access to health services than uneducated people. As such, they are more likely to go for routine medical check-ups, have earlier diagnosis of hypertension, commence appropriate management and have an overall long-term outcome than less educated persons.[17]

Our findings show that about half of the study subjects do not engage in regular exercise as a life style. An earlier study in Zambia had shown sedentary lifestyle as a predictor of hypertension.[21] Another previous report attributed not engaging in regular and effective exercise with the incident of hypertension among women.[22] The implications from these evidences provide the imperative for sustained efforts at providing health education and behavioural interventions to promote healthier lifestyles.

Another pertinent observation from this study was that about a fifth of hypertensive patients were still of the habit of adding extra table salt to their meals. This is even more worrisome with

The Nigerian Health Journal

a higher proportion of 40.7% reported from a study conducted in a contiguous State to the present study site. There are indications that both cultural and ecological factors have influence on this practice as the predominant marine inhabitants that live along the salt water estuaries in the contiguous State have a predilection for salty diets that may increase their risk of having hypertension.[23, 24]

This study reports a low prevalence of current tobacco use among the study cohort. It is not however, unlikely that a socio-desirability bias may have resulted in the few number of hypertensive patients that admitted current habit of smoking. In this regard, most subjects who still smoke may have some aversion disclosing their smoking habit to the public. Secondly, strong religious prohibition of smoking in Nigeria generally and specifically in Port Harcourt makes smoking socially undesirable and could also make it difficult for patient to admit that they are still smoking. Thirdly, smoking is frowned upon by the prevailing traditional systems and beliefs. Fourthly, the vast majority of people today are aware of the health risks associated with smoking following effective public education through the mass media. Beside tobacco smoking, there are other potentially harmful cultural practice involving the use of grounded dry tobacco dust already mixed with grounded potash stone and sniffed by mostly the elderly in this region.[25] There is need to investigate if this practice predisposes people to having hypertension.

Our finding shows that 13.7% of hypertensive still consumes alcohol in significant quantity. Evidence from a previous report showed a direct relationship between alcohol and raised BP given that above 30g of alcohol intake per day, every increment of 10g of alcohol per day may on the average increase the systolic blood pressure by 1-2mmHg and diastolic blood pressure by 1mmHg.[26] Another study among French population showed direct relationship between alcohol intake and both systolic and diastolic blood pressure for men and women.[7] The latter association was highly significant even in the multivariate model with age and body mass index. Besides being predictive of the occurrence of hypertension, alcohol intake also has a strong relationship with poor blood pressure control.[7] These findings stress the importance for the control of alcohol consumption as an established risk factor for hypertension, poor control of high blood pressure and non-compliance with antihypertensive treatment.[7]

Finding that more than one half of hypertensive patients are overweight with a BMI greater than 25 is similar to findings from previous studies.[19, 27] Like alcohol and tobacco use, high BMI

The Nigerian Health Journal

was not significant associated with poor BP control in this study, but existing evidence support a consistent relationship between BMI and hypertension within various age groups and gender in the population.[19, 28]

Our finding that a higher proportion of patients with uncorrected BP still had high cholesterol could also be attributed to certain lifestyles of subjects such as consumption of red meat, saturated fat, high calorie diets and eating junk foods which could predispose them to having high blood cholesterol. However, there was no relationship between the current high cholesterol and uncontrolled high blood pressure in this study.

Poor adherence to treatment regime seen as a significant predictor for poor control of blood pressure was corroborated by a previous finding.[29] This brings to bear more potential of educational intervention on improving the quality of care and patients' outcome. The reasons adduced for poor compliance can form relevant basis for designing educational intervention aimed at improving patients' attitude to taking their medications.

This finding shows significant reduction in the proportion of respondents among the cohort with uncontrolled blood pressure following repeated visits for check-up. This appears critical and in a way supports the need for hypertensive patients to have periodic appointments with health providers and also participate actively in the management of their long-term condition. Education and lifestyle modification that would enhance compliance to treatment regime and alert health personnel of any abnormal symptom(s) should be supported. Active patient orientation could affect outcome in management of hypertension as patients afforded high degree of active patient orientation (APO) are significantly more likely to have their blood pressure under control and to exhibit more positive cognitive and behavioral response to illness management.[30]

Implications of the study

The study had uncovered useful information for improving the quality of care for patient with hypertension and other long-term co-morbidities in this practice area. Majority of the persisting risk factors in this study are related to the lifestyle and diet of the patients. There is need for concerted efforts to be made by internists to implement lifestyle and dietary intervention within their practice or avail patients of these services in other preventative units or centres. The

The Nigerian Health Journal

expected outcomes from these interventions would be increased physical activity, dietary modifications and reduction in adverse behavioural tendencies like smoking and excess consumption of alcohol.

Further research aimed at investigating the suitability of the current system of care and attendant hassles faced by hypertensive patients need to be conducted in the light of the existence of other long-term co-morbidities, cost and access to care.

The involvement of a broader range of health professionals may prove useful in improving outcomes in the management of hypertension. Additionally, proper patients' education and involvement in the management process by consulting physicians, dieticians, and nurses should be enhanced in order to encourage compliance to treatment modalities and assure better outcomes in the management of hypertension in Nigeria.

Non-modifiable risk factors for poor blood pressure control such as age of the patient and duration of hypertensive illness can still form a focus for quality improvement. Evidence from this study suggest that patients with long duration of hypertension were more likely to have controlled blood pressure. This may have been influenced by positive behavioural changes over the years or possible influence of patient support groups where such exist.

Study limitation

One major weakness of this study was that pertinent information on some of the patients such as previous blood lipid profile were missing due to poor management of patients' records. This is an important limitation in the conduct of clinical audit premised on the use of patient records as the validity of the process is predicated on the accuracy and completeness of these records.

There are indications that the reference ranges for normal in the laboratory form like LDL cholesterol had not been reviewed over a period of time. This could result in a high proportion of false positives if too restrictive.

Analysis was not done to explore the influence of patients' medications on the blood pressure status of the patients. While this is desirable, it was clearly outside the scope of this study.

The Nigerian Health Journal

CONCLUSION

This clinical audit on the management of hypertension revealed the prevalence of risk factors and predictors of poor BP control among hypertensive patients seen in the medical outpatient of the University of Teaching Hospital. While overweight and hypercholesterolemia were frequently reported among hypertensive patients, adherence to treatment, younger ages and longer duration of hypertensive illness were predictors of good blood pressure control. Periodic visit and review at a specialist clinic can improve the chance of controlling high blood pressure but stronger research designs would be required to confirm or refute this hypothesis. We recommend regular clinical audits as part of an overall clinical governance strategy of improving the quality of specialist care provided in Nigerian hospitals.

Conflict of interest

The authors declare that there is no conflict of interest in undertaking this project.

REFERENCES

1. Miura K. Strategies for prevention and management of hypertension throughout life. Journal of Epidemiology. 2004; 14(4):112-7.
2. Moser M. World Health Organization-International Society of Hypertension Guidelines for the Management of Hypertension-Do These Differ From the US Recommendations? Which Guidelines Should the Practicing Physician Follow?. Journal of clinical hypertension (Greenwich, Conn.). 1999 Jul;1(1):48-54.
3. Burt VL, Cutler JA, Higgins M, Horan MJ, Labarthe D, Whelton P, et al. Trends in the prevalence, awareness, treatment, and control of hypertension in the adult US population data from the health examination surveys, 1960 to 1991. Hypertension 1995; 26(1):60-9.
4. Lackland DT, Keil JE, editors. Epidemiology of hypertension in African Americans. Seminars in Nephrology; 1996; 16(2):63 - 70.
5. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo Jr JL, Jones DW, Materson BJ, Oparil S, Wright Jr JT, Roccella EJ. The seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure: the JNC 7 report. JAMA. 2003 May 21;289(19):2560-71.
6. Williams B, Poulter NR, Brown MJ, Davis M, McInnes GT, Potter JF, et al. British Hypertension Society guidelines for hypertension management 2004 (BHS-IV): summary. BMJ 2004; 328(7440):634 - 640.
7. Lang T, Degoulet P, Aime F, Devries C, Jacquinet-Salord M-C, Fouriaud C. Relationship between alcohol consumption and hypertension prevalence and control in a French population. Journal of Chronic Diseases 1987; 40(7):713-20.
8. Slama M, Susic D, Frohlich ED. Prevention of hypertension. Current Opinion in Cardiology 2002; 17(5):531-6.

The Nigerian Health Journal

9. Rothwell PM, Howard SC, Dolan E, O'Brien E, Dobson JE, Dahlöf B, et al. Prognostic significance of visit-to-visit variability, maximum systolic blood pressure, and episodic hypertension. The Lancet 2010; 375(9718):895-905.
10. Ogedegbe GO, Boutin-Foster C, Wells MT, Allegrante JP, Isen AM, Jobe JB, et al. A randomized controlled trial of positive-affect intervention and medication adherence in hypertensive African Americans. Archives of Internal Medicine 2012; 172(4):322-6.
11. National Institute for Clinical Excellence. Principles for best practice in clinical audit. Oxon, Radcliffe Publishing; 2002:1 - 6.
12. Hughes J, Humphrey C. Medical audit in general practice: a practical guide to the literature. London. Kings's Fund Centre; 1990.
13. Linnarsson R. Medical audit based on computer-stored patient records exemplified with an audit of hypertension care. Scandinavian Journal of Primary Health Care 1993; 11(1):74-80.
14. Donabedian A. The quality of care: How can it be assessed? JAMA 1988; 260(12):1743-8.
15. Kirkwood BR. Essentials of medical statistics. 2nd Edition. Oxford. Blackwell Scientific Publications; 1988.
16. Isezuo A, Njoku C. Blood pressure control among hypertensives managed in a specialised health care setting in Nigeria. African Journal of Medicine and Medical Sciences 2003; 32(1):65-70.
17. Hendriks ME, Wit F, Roos M, Brewster LM, Akande TM, de Beer IH, et al. Hypertension in sub-Saharan Africa: cross-sectional surveys in four rural and urban communities. PloS one 2012; 7(3):e32638.
18. SPSS I. IBM SPSS statistics base 20. Chicago, IL: SPSS Inc. 2011.
19. Humayun A, Shah AS, Sultana R. Relation of hypertension with body mass index and age in male and female population of Peshawar, Pakistan. J Ayub Med Coll Abbottabad 2009; 21(3):63-5.
20. Takashima Y, Miwa Y, Mori T, Hashimoto M, Uchino A, Yuzuriha T, et al. Sex differences in the risk profile and male predominance in silent brain infarction in community-dwelling elderly subjects: the Sefuri brain MRI study. Hypertension Research 2010; 33(7):748-52.
21. Tedesco M, Di Salvo G, Caputo S, Natale F, Ratti G, Iarussi D, et al. Educational level and hypertension: how socioeconomic differences condition health care. Journal of Human Hypertension 2001; 15(10):727-31.
22. Forman JP, Stampfer MJ, Curhan GC. Diet and lifestyle risk factors associated with incident hypertension in women. JAMA 2009; 302(4):401-11.
23. Muller MD, Ryan EJ, Bellar DM, Kim C-H, Williamson ME, Glickman EL, et al. Effect of acute salt ingestion upon core temperature in healthy men. Hypertension Research 2011; 34(6):753-7.
24. Michikawa T, Nishiwaki Y, Okamura T, Asakura K, Nakano M, Takebayashi T. The taste of salt measured by a simple test and blood pressure in Japanese women and men. Hypertension Research 2009; 32(5):399-403.
25. Shapo L, Pomerleau J, McKee M. Epidemiology of hypertension and associated cardiovascular risk factors in a country in transition: a population based survey in Tirana City, Albania. Journal of Epidemiology and Community Health 2003; 57(9):734-9.
26. Ariff F, Suthahar A, Ramli M. Coping styles and lifestyle factors among hypertensive and non-hypertensive subjects. Singapore Medical Journal 2011; 52(1):29-34.
27. Brown CD, Higgins M, Donato KA, Rohde FC, Garrison R, Obarzanek E, et al. Body mass index and the prevalence of hypertension and dyslipidemia. Obesity Research 2000; 8(9):605-19.

The Nigerian Health Journal

28. Reisin E, Graves JW, Yamal J-M, Barzilay JI, Pressel SL, Einhorn PT, et al. Blood pressure control and cardiovascular outcomes in normal-weight, overweight, and obese hypertensive patients treated with three different antihypertensives in ALLHAT. Journal of Hypertension 2014; 32(7):1503-13.
29. Van Wijk BL, Klungel OH, Heerdink ER, de Boer A. The association between compliance with antihypertensive drugs and modification of antihypertensive drug regimen. Journal of Hypertension 2004; 22(9):1831-7.
30. Schulman BA. Active patient orientation and outcomes in hypertensive treatment: application of a socio-organizational perspective. Medical Care 1979; 17(3):267-80.

The Nigerian Health Journal