ORIGINAL RESEARCH

Prevalence and clinical spectrum of hypertensive retinopathy among hypertension clinic patients at Queen Elizabeth Central Hospital in Malawi

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Date Received: 01-Feb-2017
Revisions Received: 02-Feb-2018
Date Accepted: 13-Feb-2018

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https://dx.doi.org/10.4314/mmj.v30i3.9

Abstract

Background
Prevalence and spectrum of hypertensive retinopathy in the population reflects the status of hypertension control and the associated risks for cardiovascular events. We investigated the prevalence and clinical spectrum of hypertensive retinopathy among patients attending hypertension clinic at a tertiary hospital in Malawi.

Methods
This was a cross-sectional study of systematically selected patients attending hypertension clinic at Queen Elizabeth Central Hospital. Patient interviews using a structured questionnaire and review of patients' medical records (health passports) were done to obtain the following information: demographics, duration since the diagnosis of hypertension, history of stroke and blood pressure measurements. The presence and severity of hypertensive retinopathy was determined by dilated fundoscopy through slit lamp biomicroscopy.

Results
We recruited 104 patients. Women outnumbered men by 3:1. Women tended to be younger compared to men (mean ages 54 and 61 years respectively). Of the surveyed patients, 80% had sub-optimal blood pressure control and 75% had evidence of hypertensive retinopathy. History of stroke was associated with hypertensive retinopathy.

Conclusions
Hypertensive retinopathy is very common in patients attending the hypertension clinic at Queen Elizabeth Central Hospital in Blantyre, Malawi. This may be a reflection of sub-optimal blood pressure control in this patient population. There is a need to identify the actual reasons, rectify them and intensify intervention in control of hypertension in this patient population.

Key words: hypertension, hypertensive retinopathy, sub-Saharan Africa, cardiovascular, stroke

Introduction

The World Health Organization (WHO) has warned that developing countries are sitting on a time bomb of non-communicable diseases (NCDs), and hypertension is one of them[1]. Data on the prevalence and control of hypertension is sparse in sub-Saharan Africa (SSA). Where data has been obtained, hypertension seems to be very common. A STEPS nationwide survey of hypertension in Malawi commissioned by the WHO found high hypertension prevalence (33%) among adults together with a large number of risk factors for NCDs[2]. Data from similar surveys elsewhere shows similar high prevalence of hypertension in African communities[3,4].

Awareness, detection and treatment and control of hypertension in SSA are all low[4]. As a result, many patients present for the first time to health care providers with evidence of end organ damage. Among those that are in care, drug stock outs and other health structural barriers may make the control of hypertension difficult. Therefore, there are high rates of cardiovascular morbidity and mortality associated with hypertension in the region[5].

Hypertensive retinopathy is a spectrum of retinal signs related pathologically to retinal microvascular damage from elevated blood pressure[6]. It is well documented that hypertensive retinopathy is associated with cardiovascular morbidity and mortality[7-9].Therefore, prevalence and spectrum of hypertensive retinopathy in the population reflects the status of hypertension control and the associated risks for cardiovascular events. In clinical management of hypertensive patients, hypertensive retinopathy can be used in cardiovascular risk assessment[9] and can be an indication for initiating anti-hypertensive therapy, even in persons with pre-hypertension or stage one hypertension[10,11].

We conducted a hospital based cross-sectional study in Blantyre-Malawi in order to determine the prevalence and pattern of hypertensive retinopathy among patients attending a hypertension clinic at a tertiary hospital.

Methodology

Setting

This cross-sectional study was conducted at Queen Elizabeth Central Hospital (QECH) in Blantyre, Malawi, between July and August 2014. QECH is the largest tertiary and teaching hospital in Malawi for nurses, clinical officers,

primary, secondary and tertiary. QECH serves at all these levels. It has a large secondary level but small tertiary level service and there is no dedicated government district hospital in Blantyre. `

Hypertension clinics are conducted on Tuesday and Friday mornings. Approximately 80 patients attend each clinic. The drug supply is erratic at best and the commonest anti-hypertensive medications include propranolol, hydrochlorothiazide and alpha-methyldopa. Angiotensin converting enzyme (ACE) inhibitors and calcium channel inhibitors are at times available. Patients are seen once every 3 months but drug supply is usually provided for only 1 month because of rationing.

Sampling

Our minimum sample size (97) was based on the reported prevalence of 60%, with a margin of 5% and this gives the study power of above 80%. We used the following sample size formula:

$N = Z_{\alpha/2}^2 * p*(1-p) / MOE^2$, where $Z_{\alpha/2}$ is the critical value of the Normal distribution at $\alpha/2$, MOE is the margin of error, p is the sample proportion, and N is the population size. A systematic sampling method was adopted where every fourth patient on the queue at hypertension clinics at QECH was invited to participate in the study. The following was the exclusion criteria: history of diabetes mellitus, retinal condition other than hypertensive retinopathy, inaccessible fundus and participant's decline to participate in the study.

Data collection

A structured interview and review of patients' medical records was done by a research assistant (a final year medical student) by use of questionnaire in order to obtain the following information: age, sex, occupation, place of residence, duration of hypertension and blood pressure measurements as recorded in patients' health passports by clinic nurses. Blood pressure is routinely measured and recorded in patients' health passports by nursing staff on all patients during each clinic visit. The current or most recent blood pressure measurements were recorded.

Fundoscopy was done in both eyes by an ophthalmologist through slit lamp biomicroscopy with hand held Volk 90 Diopter lens in order to determine the presence and severity of hypertensive retinopathy. Pupillary dilatation with Tropicamide eye drops was done before slit lamp examination. Grading of any retinopathy was done according to Mitchell-Wong simplified classification of hypertensive retinopathy[12].

Data analysis

The data was entered and cleaned using Epidata version 3.1 and exported to the Statistical Package for Social Sciences (SPSS, version 16.0). Exploratory analysis was based on findings from the eye with more severe retinopathy using graphical techniques and frequency distributions. Categorical variables are reported as proportions while continuous variables are reported as means and standard deviation for normally distributed variables and, where appropriate, as median (IQR) for variables with a skewed distribution. Descriptive statistics were run on all baseline covariates and inferential statistics are based on the 5% significance level and 95% confidence interval.

Ethical clearance

The study protocol was approved by the College of Medicine Research Ethics Committee (P.08/13/1441). Permission to conduct the study was sought from Queen Elizabeth Central hospital and informed written consent was obtained from all participating patients.

Results

We invited 108participants to participate in the study out of whom 104 were enrolled. One person declined and three persons were excluded (two patients had inaccessible fundus due to dense cataracts and one patient had Uveitis).

There were 28 men (26.9%) and 76 women (93.1%). The demographic and clinical characteristics of the study participants are shown in Table 1.

Table 1: Demographic and clinical characteristics of the study participants

	Males	Female	All	p value
Mean age in years (SD)	61.3(12.2)	53.9 (12.5)	55.9 (12.8)	0.008
Median (IQR) time since diagnosis in years	4 (2 - 8)	3(2 - 9)	3 (2 - 9)	-
Time from diagnosis of hypertension				
< 3 years	8 (28.6%)	24 (32.4%)	32 (31.4%)	
3 – 4 years	7 (25.0%)	17 (23.0%)	24 (23.5%)	
≥ 5 years	13 (46.4%)	33 (44.6%)	46 (45.1%)	0.929
BP classification % (n)				
Controlled (<140/90 mm Hg)	6 (21.4%)	12 (16.2%)	18 (17.6%)	
Grade 1 (mild)	8 (28.6%)	19 (25.7%)	27 (26.5%)	
Grade 2 (moderate)	5 (17.9%)	20 (27.0%)	25 (24.5%)	
Grade 3 (severe)	9 (32.1)	23 (31.1%)	32 (31.4 %)	0.782
On treatment of hypertension	28 (100.0%)	12 (96.0%)	100 (97.1%)	0.283
History of stroke	8 (28.6%)	7 (9.3%)	15 (14.6%)	0.014

Women were significantly younger (p=0.008) and were less likely to have had history of stroke than men (p=0.014). Almost all the study participants 100 (97.1%) were on anti-hypertensive medications at the time of the study. The prevalence of hypertensive retinopathy is shown in Table 2.

Table 2: Prevalence of hypertensive retinopathy

Grade*	Number	Percentage	95% CI
Any retinopathy	78	75.0%	66.7 – 83.3%
Mild retinopathy	73	70.2%	61.4 – 79.0%
Moderate retinopathy	5	4.8%	0.7 – 8.9%

***None of the participants had severe retinopathy**

The prevalence of retinopathy was high (75.0%, 95% CI 66.7 – 83.3%) in our setting. Mild hypertensive retinopathy was the most prevalent grade. There were no patients with malignant hypertensive retinopathy.

We also studied the association between the prevalence of retinopathy and factors such as sex, old age, history of stroke, severity and known duration of hypertension. We found that only history of stroke was significantly associated with the prevalence of hypertensive retinopathy on univariate analysis (Table 3).

Table 3: Factors associated with prevalence of hypertensive retinopathy

		Retinopathy			
Risk factor (unit of measurement)		Present	Absent	N	P-Value
Sex: n (%)	Male	19 (73.08)	7 (26.92)	26	1.00
	Female	57 (73.08)	21 (26.92)	78	
Age years	Mean (SD)	56.0 (10.7)	57.8 (14.2)	103	0.48
Time since diagnosis in years	Median (IQR)	4 (2, 8.5)	3 (2,10)	102	0.94
BP classification: n (%)	Controlled (<140/90 mm Hg)	13 (72.2)	5 (27.8)	18	0.68
	Grade 1 (mild)	21 (77.8)	6 (22.2)	21	
	Grade 2 (moderate)	17 (68.0)	8 (32.0)	25	
	Grade 3 (severe)	26 (81.4)	6 (16.6)	32	
Treatment of hypertension: n(%)	Yes	76 (76.0)	24 (24.0)	100	0.16
	No	1 (33.3)	2 (67.7)	3	
History of stroke: n(%)	Yes	15 (100)	0	15	0.019
	No	63 (71.6)	25 (26.4)	88	

Discussion

In this study, we found a high prevalence of uncontrolled systemic hypertension and a high prevalence of both hypertensive retinopathy (75.0%) and stroke (14.6%). The prevalence of stroke was higher in men than women and this difference was statistically significant. We also found that prevalent stroke was associated with hypertensive retinopathy. Only a few of our study participants had controlled hypertension (17.6%) at the time of the study. This is not surprising as previous studies in Malawi have described similar findings[13,14]. The previous studies in Malawi also found that hypertension control is a result of many factors including lack of medication and essential equipment, inadequate knowledge and skills of health workers and low clinic patient attendance rates[13,14]. We found a very high prevalence of mild hypertensive retinopathy (70.2%) among our study participants. This is similar to a study done in Ghana among civil servants where the prevalence of mild grades of retinopathy among hypertensive persons was as high as 69.4%[15]. The high prevalence of mild hypertensive retinopathy among our study participants is not surprising because there was high prevalence of uncontrolled hypertension. We did not find severe hypertensive retinopathy. We think this was mainly because hypertensive patients with end organ damage such as renal failure and hypertensive heart diseases are seen in renal and chest clinics respectively.

Large population based studies done outside Africa have demonstrated that hypertensive retinopathy is associated with cardiovascular morbidities such as coronary cardiac disease and left ventricular hypertrophy and stroke[10,16]. We found in our study participants that hypertensive retinopathy was associated with history of stroke. Previous studies have demonstrated hypertensive retinopathy as an independent risk factor for incident or subclinical stroke even in patients with controlled hypertension[10,16]. Future studies are needed to identify the relationship between prevalent stroke and hypertensive retinopathy in Africa in persons with controlled hypertension. It would have been interesting to study the association between hypertensive retinopathy and other cardiovascular morbidities such as coronary cardiac disease, left ventricular hypertrophy and renal dysfunction. However, this was not possible within the confines of our current study. Our study had some limitations. Some diseases such as diabetic retinopathy can present with similar features as in hypertensive retinopathy. We excluded patients with history of diabetes mellitus. However, we did not carry out laboratory tests such as fasting blood glucose to rule out the possibility of diabetic retinopathy especially in patients with moderate hypertensive retinopathy, and this may potentially have led to overestimation of prevalence of moderate hypertensive retinopathy. Secondly, we did not measure blood pressure during the study. We recorded blood pressure that was measured routinely by the hospital clinic nurses during the clinic visit. This could have potentially led to misclassification of the severity of hypertension as the blood pressure measurements may not have been adequately standardized due to busy nature of the clinic.Nevertheless, our study had some strength. Many of the previous studies on hypertensive retinopathy used Keith, Wagener, and Barker classification or its modification in grading of hypertensive retinopathy. This classification system is associated with difficulty in distinguishing the lower grades of retinopathy[1] in clinical practice. We used a new grading system called Mitchell-Wong Simplified classification which is reliable in classifying lower grades of hypertensive retinopathy[9,16]. In addition, we examined both eyes of the study participants and analyzed the eye with worse hypertensive retinopathy, thereby minimizing chances of missing any retinopathy.

Conclusion

Our study has shown high prevalence of uncontrolled hypertension, high prevalence of hypertensive retinopathy, and that hypertensive retinopathy is associated with history of stroke. Interventions aimed at control of hypertension among clinic patient population must be intensified. Further studies are needed to identify the association of hypertensive

https://dx.doi.org/10.4314/mmj.v30i3.9

retinopathy with other cardiovascular morbidities and also to identify the association of hypertensive retinopathy with stroke in patients with controlled hypertension.

Acknowledgements

We are very grateful to Dr. Boston Zimba and Ms. Catheline Lunduka for taking part in the participants' recruitment process and data entry respectively.

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