Dominance of Hypertensive Heart Disease in a Tertiary Hospital in Southern Nigeria: An Echocardiographic Study

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Background: Echocardiography is a noninvasive technique for the investigation of cardiac disease with reliable levels of accuracy. Echocardiographic services commenced in the cardiac unit of the University of Port-Harcourt teaching hospital in southern Nigeria in April 2000. This study aims to report our experience with the procedure over a 12 month period as well as the spectrum of clinical cases diagnosed at our center.

Methods: This is a cross-sectional study carried out at the cardiology unit of the department of internal medicine of the University of Port-Harcourt teaching hospital in southern Nigeria between May 2009 and April 2010. This was performed with the ALOKA- 400R machine using two dimensional, M-mode, color flow and tissue Doppler protocols.

Results: Two hundred and thirty-four consecutive patients, 119 males and 115 females, were examined during the study period. Their ages ranged from 10 to 96 years with a mean of 49.69 ± 16.5 years. One hundred and twenty-four patients (53%) had hypertensive heart disease, 20 (9%) had rheumatic heart disease while 13 (6%) had dilated cardiomyopathy. Hypertrophic cardiomyopathy, pericardial effusion, intracardiac tumors, cor pulmonale, arrhythmogenic right ventricular dysplasia, infective endocarditis, prosthetic heart valve, aortic arch aneurysm were present in less than 5% of the participants. The echocardiography was inconclusive in 3 (1%) while 49 (21%) had a normal study.

Conclusion: Hypertensive heart disease was the largest echocardiographic diagnosis at our center and is one of the most important noncommunicable diseases responsible for increased morbidity and mortality among our patients in Nigeria. More work needs to be done to increase awareness about, and treatement for, hypertension in order to prevent its complications. (*Ethn Dis*. 2012;22(2):136–139)

Key Words: Echocardiography, Hypertensive Heart Disease, Nigerians

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Background

During the 20th century, we witnessed unparalleled increases in life expectancy and a major shift in the causes of illness and death throughout the world. During this transition, cardiovascular disease became the most common cause of death worldwide.[1] A century ago, cardiovascular disease accounted for less than 10% of all deaths. Today, it accounts for approximately 30% worldwide including nearly 40% in high-income countries and about 28% in low- and middle-income countries.[2] Echocardiography came into minimal use in Nigeria in the mid-1970s, mostly concentrated in the urban areas.[3,4] It is a noninvasive technique for the investigation of cardiac disease with reliable levels of accuracy. It provides morphological and hemodynamic information that often guides the management of patients.

Echocardiography services commenced in the cardiac unit of the University of Port-Harcourt teaching hospital, Port Harcourt, Nigeria in April 2000. Previously, only chest X-rays and electrocardiographs alone were available for evaluating cardiac patients and their limitations were apparent as they were unable to give us structural information regarding our patients' hearts. Echocardiography has been invaluable in the evaluation of valvular heart diseases, which are quite common in our environment. Cardiac centers, where valve repair and replacement are done, are becoming increasingly available in the country and this procedure has been very useful in their pre-operative evaluation. The availability of echocardiography at our center has also helped in the management of patients with acute coronary syndromes, which has a high mortality associated with coronary artery diseases and its complications: papillary muscle rupture, ventricular septal defects and ventricular aneurysms – all difficult to diagnose with chest X-rays and electrocardiographs. Procedures such as pericardiocentesis, which used to be done blind, can now be done under echocardiographic guidance.

A study on the pattern of cardiac diseases seen in the center based on echocardiographic assessment between April 2000 and March 2003 has already been reported.[5] In 2008, the University of Port-Harcourt Teaching Hospital moved to its permanent site and acquired a 2-D echocardiographic machine with Doppler and color flow facilities. Our previous echocardiograph machine lacked Doppler and color flow function, thus making it difficult to conduct a detailed and complete echocardiographic study on our patients. We therefore decided to evaluate how our new facility has improved the diagnosis of cardiovascular disease in our center. This study aims to report our experience with the procedure during a 12-month period as well as the spectrum of clinical cases diagnosed at our center.

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Table 1. Clinical indications for echocardiography

Clinical Indication	Total *n* Requests	%
Hypertensive heart disease	119	51
Ischemic heart disease	22	9
Chest pains	19	8
Congestive heart failure	16	7
Dilated cardiomyopathy	14	6
Rheumatic heart disease	9	4
Palpitations	8	3
Pericardial disease	5	2
Hypertrophic cardiomyopathy	4	2
Arrhythmia	3	1
Syncopal attacks	2	1
Chronic kidney disease	2	1
Cardiomegaly on CXR	5	2
Mitral valve prolapse	1	<1
Prosthetic heart valve	1	<1
Pulmonary embolism	1	<1
Refractory pedal swelling	1	<1
Chemotherapy	1	<1
Marfan's syndrome	1	<1
Total	234	100

METHOD

This prospective study was carried out at the cardiology unit of the Department of Internal Medicine of the University of Port-Harcourt Teaching Hospital between May 2009 and April 2010. Our center is a 400-bed hospital located in the southern region of Nigeria. It serves as a referral center for four southern states (Rivers, Abia, Imo, and Bayelsa states). Echocardiography is performed at our center routinely three times/week. Emergency cases are also given priority. Ethical approval was obtained from our institution's ethical review board for this study.

Clinical Evaluation

Demographic data such as age, sex and indication for echocardiography were obtained from the participants. A detailed history, physical examination and routine investigations such as chest X-ray and ECG had previously been carried out on these patients by the referring teams.

Echocardiography

This was performed with the ALOKA-400R machine using two dimensional, M-mode, color flow and tissue Doppler protocols. Echocardiography was performed on each patient in the left lateral decubitus position. All measurements were made according to the American Society of Echocardiography leading edge to leading edge convention protocol.[6] Echocardiography examination was performed in the parasternal long axis, short axis, apical 4 chamber and occasionally subcostal views. Left ventricular measurements were obtained at end-diastole and end-systole in the parasternal long axis view. Three experienced cardiologists performed all the echocardiographic interpretations. All echocardiographic diagnoses were based on standard criteria.

Table 2. Diagnosis at echocardiography

Diagnosis	Total *n* Patients	%
Hypertensive heart disease	127	54
Rheumatic heart disease	20	9
Dilated cardiomyopathy	13	6
Ischemic heart disease	8	3
Hypertrophic cardiomyopathy	4	2
Pericardial disease	3	1
Cor pulmonale	2	<1
Intra cardiac tumor	2	<1
Thyrotoxic heart disease	2	<1
Arrhythmogenic right ventricular dysplasia	1	<1
Infective endocarditis	1	<1
Prosthetic heart valve	1	<1
Aortic arch aneurysm	1	<1
Normal	49	21
Total	234	100

RESULTS

Two hundred and thirty-four consecutive patients were evaluated during the study period: 119 males and 115 females, with a male to female ratio of 1.04:1. Their ages ranged from 10 to 96 years with a mean of 49.6 ± 16.5 years. Ten (4%) patients were aged 10–20 years, 110 (47%) were aged 21–50 while 109 (47%) were aged 51–80. Only five (2%) were older than 80 years. Fifty percent of the patients were traders while the other half were civil servants, teachers, farmers, and students, unemployed and retirees. Most of them were middle class earners. Sixty-four (30%) of the patients above the age of 20 were obese with BMI > 30 kg/m^2 while 76 (44%) were overweight. Of the total patients evaluated, 65% had hypertension while 77% of those being treated for hypertension had high blood pressure. The clinical indications for referral of the studied patients are shown in Table 1. The most common clinical indications for echocardiography among patients studied were: hypertensive heart disease: 119 (51%); ischemic heart disease: 22 (9%); chest pains of unknown etiology: 19 (8%); congestive cardiac failure: 16 (7%); cardiomyopathies: 18 (8%); and rheumatic heart disease: 9 (4%).

Table 3. Confirmation rate of clinical diagnosis at echocardiography

Clinical Diagnosis	Total Request for each Clinical Indication	Number Confirmed by Echo	%
Hypertensive heart disease	119	92	77
Ischemic heart disease	22	1	5
Rheumatic heart disease	9	7	78
Pericardial disease	5	1	20
Dilated cardiomyopathy	13	9	69
Hypertrophic cardiomyopathy	4	2	50
Chest pain	17	11	65
Palpitation	8	5	63

The diagnoses made at echocardiography are shown in Table 2. The most prevalent diagnoses were hypertensive heart disease (54%; 127 patients), rheumatic heart disease (9%; 20 patients) and dilated cardiomyopathy (6%, 13 patients). The echocardiography was inconclusive in 3 (1%) while 49 (21%) had a normal study. Hypertensive heart disease was more prevalent among patients aged 51–80 years (59%, 74 patients) vs those aged 21–50 years (39%, 49 patients). Also, four patients, aged 51–80 years, had evidence of ischemic heart disease, double the rate found in those aged 21–50 years. Rheumatic heart disease was also found to be more prevalent as patients aged, with only two patients aged <21 years to nine patients >50 years. Five patients aged >80 years had echocardiography done on account of congestive cardiac failure; of these 4 (80%) were found to have dilated cardiomyopathy.

Hypertensive heart disease was found in 65 (57%) of the women compared with 61 (51%) of the men who participated in the study. Of the patients with rheumatic heart disease, 10 (59%) were males while 7 (41) were females. Thirteen (81%) males had dilated cardiomyopathy compared with only 3 (19%) females. All 6 patients found to have ischemic heart disease were males.

Analysis of the data for diagnostic yield showed that of the 119 patients who came for evaluation for hypertensive heart disease, 92 were confirmed with a yield of 77% while the others had a normal study. Rheumatic heart disease was confirmed in 7 of 9 patients with a yield of 78%, dilated cardiomyopathy in 9 (69%) of 13 subjects and hypertrophic obstructive cardiomyopathy in 2 of 4 patients with a yield of 50%. Only one participant was sent for evaluation for congenital heart disease, which was confirmed on echocardiography. Of the 17 patients with chest pain, 11 (65%) had abnormal echocardiograms while 5 (63%) of the 8 patients with palpitations had abnormal echocardiograms (Table 3).

The results of this study show that hypertension ranked as the most common indication for echocardiographic request while hypertensive heart disease was the most common echocardiographic diagnosis.

DISCUSSION

The results of this study show that hypertension ranked as the most common indication for echocardiographic request while hypertensive heart disease was the most common echocardiographic diagnosis. Rheumatic heart disease (9%) was next to hypertensive heart disease, closely followed by cardiomyopathies (7%). These findings are similar to reports from related studies from centers across Nigeria as well as a previous study at our own center 4 years ago.[4–8] Agomuoh et al, in a review of 141 patients examined over 3 years, showed hypertensive heart disease as the commonest echocardiographic diagnosis followed by cardiomyopathies before rheumatic heart disease.[5] Our study followed the same pattern though rheumatic heart disease was more common than cardiomyopathies and more of our participants (52%) had hypertensive heart disease compared with 34% in Agomuoh's study. This may be explained by the rising prevalence of hypertension in our society and the increase in the number of hypertensive patients being referred for echocardiography. Another explanation for the high prevalence of hypertensive heart disease may be because of the poor control of hypertension that has resulted in structural changes of left ventricular hypertrophy. For instance, 79% of patients found to have hypertensive cardiomyopathy had uncontrolled hypertension. We also found that poor patient education about hypertension and its complications accounted for high degree of noncompliance to prescribed medication as hypertension is relatively without symptoms. A further review of these patients after adequate counseling, especially with emphasis on the fact that they are at risk of dying prematurely from complications of hypertension, revealed an improvement in control of blood pressures subsequently. Hypertensive heart disease in this study was very common in both males and females though slightly more in females, which clearly shows the rising prevalence of hypertension among females in Nigeria. Rheumatic heart diseases and dilated cardiomyopathies were more common among males. All the patients found to have ischemic heart disease were male patients suggesting that male sex is a risk factor for ischemic heart disease. Kolo et al, in a 3 year audit of echocardiography at University of Ilorin teaching hospital, evaluated 913 patients and found hypertension and hypertensive heart disease to be the most common clinical indication and echocardiographic diagnosis respectively.[7]

This also mirrored findings in our study and furthermore, rheumatic heart disease and cardiomyopathies were among the top four echocardiographic diagnoses. Ogah et al in Abeokuta also had similar results in a study of 1441 patients with hypertensive heart disease (57%) being the most common echo diagnosis followed by rheumatic heart disease (4%) and dilated cardiomyopathy (3%).[8] Contrary to our study, Ike et al, in a review of 2527 patients over a 10 year period in Enugu, southeast Nigeria, found valvular heart disease as the most common indication for echo as well as echocardiographic diagnosis ahead of hypertensive heart disease.[9] This may be explained by the center being the major referral center for cardiac surgery in Nigeria at the time thereby attracting several patients with structural heart diseases. Congenital heart disease was also very common in the latter study contrary to our findings as well as those from other studies across Nigeria; this is because children formed a large number of the participants evaluated. Our study had only one patient aged 10 years who, incidentally, had a congenital heart disease. In our study, ischemic heart disease was found in 3% which, despite being relatively low, is higher than reported prevalence by Kolo et al (<1%)[7], Balogun et al (2%),[4] Ukoh and Omuemu (3%)[10] and Ike et al (<1%).[9] This may be connected to the industrialized nature of Port Harcourt city with its influx of several multinationals. This may also be explained by the fact that the incidence of coronary heart disease is increasing in developing countries despite the relatively low prevalence.[11] Echocardiographic confirmation of clinical diagnosis was highest in patients with hypertensive heart disease and rheumatic heart disease but low in patients with ischemic heart disease and cardiomyopathies. There was no correlation between occupation or social class and the diagnosis obtained at echocardiography.

This study also tried to highlight the knowledge of doctors regarding the usefulness of echocardiography in managing their patients as shown by the indications provided for the procedure. For instance, chest pain, which is a nonspecific symptom and was the indication in 18 patients while palpitations, which would have been diagnosed more appropriately with electrocardiography or halter monitor, was provided as the indication for echocardiography in 9 patients. Further evaluation of these patients however revealed that most of them had hypertensive heart disease, which would have been identified if the referring doctor had assessed their patients properly. This, however, is not surprising as a number of our patients are referred for echocardiography from peripheral clinics where the resident doctors are not very familiar with the indications for echocardiography.

CONCLUSION

Echocardiography is a useful tool in the evaluation and diagnosis of cardiac disorders and as revealed in this study, hypertension and hypertensive heart disease constitute the largest clinical indication and echocardiographic diagnosis at our center. The high frequency of hypertensive heart disease underscores the need for more aggressive control of hypertension among our patients with more emphasis on patient education to improve compliance to medication. The increased use of echocardiography in cardiovascular disease in our laboratory may reflect increased physician awareness of the need for complete evaluation of cardiovascular patients so as to guide treatment using best practices. There is also a need for rational use of this tool by establishment of specific indications for referral to avoid unnecessary tests and waste of patient's resources.

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