

## Echocardiography at the University of Ilorin Teaching Hospital, Nigeria: A Three Years Audit

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**Abstract:** Echocardiography is a major non-invasive cardiac examination that provides morphologic and hemodynamic information which often guide the management and monitoring of patients with cardiovascular diseases. We present an audit of echocardiographic services over a three year period to define the pattern of cardiac diseases in the center. Echocardiograms of 913 patients who were referred between May 2004 and April 2007 were reviewed. Studies were performed with Esaote Megas CVX machine which has 2-D, M-mode and Doppler facilities. The data obtained were analyzed for mean age, sex, clinical indications and echocardiographic diagnoses in the study subjects. Nine hundred and thirteen patients were examined, comprising of 523 males (57.3%) and 390 females (42.7%). The commonest indication for echocardiography was systemic hypertension (61.4%) followed by congenital heart disease (7.23%), chest pain (5.9%), congestive cardiac failure (5.2%), rheumatic valvular heart disease (3.1%) and stroke (3.06%) respectively. Five hundred and thirty-seven (58.8%) subjects had echocardiographic diagnoses of hypertensive heart disease, 67 (7.3%) had congenital heart diseases, 64 (7.0%) had rheumatic valvular heart diseases, 63 (6.9%) had various forms of cardiomyopathies and Pericardial diseases accounted for 19 (2.1%). Ischemic heart disease was diagnosed in 9 (0.99%) patients and 105 (11.5%) subjects had normal study. Hypertensive heart disease and related complications were found to be the commonest cardiovascular disease in the center followed by congenital and rheumatic heart disease respectively. There were few cases of coronary artery disease.

**Key words:** Audit, echocardiography, cardiovascular diseases, spectrum, Nigeria

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### INTRODUCTION

Echocardiography is an important non-invasive investigative tool in the evaluation of cardiovascular diseases. It provides morphological and hemodynamic information which often guide the management of patients (Balogun *et al.*, 1993). This mode of cardiac assessment is relatively cheaper when compared with competing technologies and has high degree of sensitivity and specificity if performed by trained operator. The development of echocardiography has witnessed a tremendous growth from the use of M-mode in 50s to 3-D, Doppler and trans-esophageal echocardiogram in current usage (Edler and Lindstrom, 2004). Echocardiography is second only to Electrocardiography (ECG) as the most frequently utilized cardiac assessment facility (Cheitlin *et al.*, 2003). Findings from echocardiographic modalities correlate well with those of cardiac catheterization and radio-nuclide studies

(Appleton *et al.*, 1988; Rakowski *et al.*, 1996). In Nigeria, accessibility to echocardiography is increasing especially in many tertiary health care facilities but still low due to high cost and concentration of facilities in the urban centers (Ogah *et al.*, 2006).

Lack of echocardiographic services in many centers hampers adequate classification of cardiovascular diseases and effective planning. Indeed, many patients with heart diseases are often diagnosed late, especially after complications such as heart failure and pulmonary hypertension have developed making surgical intervention risky. Despite a gradual increase in the utilization of this facility in the assessment of cardiovascular disorders in Nigeria, there are few reports on experience with 2-D and doppler echocardiography especially in the North central zone.

We therefore, present an audit of echocardiographic services over a 3 years period to define the pattern of cardiac diseases in the center.

**MATERIALS AND METHODS**

Echocardiograms of 913 patients, who were referred to the Cardiology Unit of the University of Ilorin Teaching Hospital (UITH), Ilorin, for cardiac evaluation over a 3 years period (between May 2004 and April 2007) were retrospectively studied. Echocardiographic examinations were performed with Esaote Megas CVX machine (2003 model). Referrals were received for various cardiac complaints from within Kwara and neighboring states including Niger, Kogi, Oyo and Osun. All the patients were examined echocardiographically with M-mode, 2-dimensional, color, pulsed and continuous wave doppler in standard positions (Schiller and Crawford, 1989; Quinones *et al.*, 2002). Detail information about each patient was obtained from the records kept at the echo laboratory. The data obtained were analyzed for age, sex, clinical indication for echocardiography and final echocardiographic diagnoses.

**RESULTS**

Nine hundred and thirteen patients were examined, comprising of 523 (57.3%) males and 390 (42.7%) females with male to female ratio of 1.3:1. The ages of the subjects ranged between 2 weeks and 98 years with a mean of 47.5 years. Most of the referrals came from departments of medicine, family medicine, surgery and pediatrics.

The clinical indications for echocardiography are shown in Table 1. The commonest indications for echocardiography in the subjects studied were hypertensive heart diseases 561 (61.4), congenital heart diseases 66 (7.23%), chest pain 54 (5.9%), congestive cardiac failure 48 (5.2%) and rheumatic heart disease 29 (3.1%). Cerebro-vascular diseases accounted for 28 (3.06%), dilated cardiomyopathies 25 (2.7%), routine medical check 16 (1.75%), unspecified indications 15 (1.6%), ischemic heart diseases 14 (1.5%), pulmonary diseases 13 (1.4%), thyroid diseases 8 (0.88%), pericardial diseases 7 (0.77%) and others 29 (3.1%).

Table 2 shows the echocardiographic findings of the studied subjects. Five hundred and thirty-seven (58.8%) subjects had echocardiographic diagnosis of hypertensive heart disease. Of these, 137 (25.5%) were in hypertensive heart failure. Sixty-seven (7.3%) subjects had congenital heart diseases, 64 (7.0) had rheumatic valvular heart diseases, 63 (6.9%) had cardiomyopathies and 19 (2.1%) had pericardial diseases. Pulmonary diseases were diagnosed in 16 (1.75%) subjects, ischemic heart diseases in 9 (0.99%), thyrotoxic heart disease in

Table 1: Clinical indications for echocardiography

Clinical indications	Total number of requests	
	for each clinical indications	Percentage
Hypertensive heart disease	561	61.40
Congenital heart diseases	66	7.23
Chest pain	54	5.90
Congestive cardiac failure	48	5.20
Rheumatic heart disease	29	3.10
TIAs and stroke	28	3.06
Dilated cardiomyopathy	25	2.70
Routine	16	1.75
Unspecified	15	1.60
Ischemic heart disease	14	1.50
Pulmonary disorders	13	1.40
Endocrine (thyroid) diseases	8	0.88
Pericardial diseases	7	0.77
Infective endocarditis	5	0.55
Hypertrophic cardiomyopathy	4	0.44
Renal diseases	3	0.33
Palpitations	3	0.33
Arrhythmias	2	0.22
Cardiomegaly on chest X-ray	2	0.22
Mitral valve prolapsed	2	0.22
Sickle cell disease	2	0.22
Syncope	2	0.22
Endomyocardial fibrosis	2	0.22
Aortic aneurism	1	0.11
Cytotoxic therapy	1	0.11
Total	913	100.00

Table 2: Echocardiographic diagnoses

Diagnoses	Total number of patients	Percentage
Hypertensive heart disease	537 (HHF=137)	58.80 (25.5)
Congenital heart diseases	67	7.30
Rheumatic heart disease	64	7.00
Cardiomyopathies	63	6.90
Pericardial diseases	19	2.10
Pulmonary disorders	16	1.75
Ischemic heart disease	9	0.99
Thyrotoxic heart disease	8	0.88
Cardiac masses	5	0.55
Dextrocardia	5	0.55
Intra-cardiac thrombi	3	0.33
Infective endocarditis	2	0.22
Mitral valve prolapsed	2	0.22
Cardiotoxicity (doxorubicin)	1	0.11
Inconclusive	7	0.77
Normal study	105	11.50
Total	913	100.00

8 (0.88%), Cardiac masses in 5 (0.55%), Dextrocardia in 5 (0.55%) and intra-cardiac thrombi in 3 (0.33%). Others included infective endocarditis in 2 (0.22%) patients, mitral valve prolapse in 2 (0.22%) and cardiac cytotoxicity in 1 (0.11%). However, the echocardiography was inconclusive in 7 (0.77%) subjects and 105 (11.7%) had normal study.

Analysis of the data showed that of the 561 patients sent for the evaluation of hypertensive heart diseases, 483 (86%) had echocardiographic confirmation of their clinical diagnoses, the remaining 14% had normal examination as shown in Table 3. Congenital heart

Table 3: Echocardiographic confirmation rate of clinical diagnoses

Clinical diagnoses	Total request for each clinical indication	Number confirmed by Echo	Percentage
Hypertensive heart disease	561	483	86.0
Congenital heart diseases	66	42	63.3
Chest pain	54	25	46.3
Congestive heart failure	48	39	81.3
Rheumatic heart diseases	29	17	58.6
Cardiac source of emboli in stroke	28	10	36.0
Dilated cardiomyopathy	25	17	68.0
Ischemic heart disease	14	9	64.0
Pulmonary disorders	13	10	76.9
Endocrine (thyroid) diseases	8	8	100.0
Pericardial diseases	7	5	71.4
Infective endocarditis	5	2	40.0
Mitral valve prolapsed	2	2	100.0
Total	861	669	-

diseases were confirmed in 44 (63.6%) subjects of the 66 indications and 25 (46.3%) of the 54 subjects, who had chest pain as indication, had abnormal echocardiogram. The rest had normal tests. Heart failure was diagnosed in 39 (81.3%) of 48 subjects who had clinical diagnoses of congestive cardiac failure, rheumatic valvular heart disease in 17 (58.6%) out of 29 indications, cardiac source of embolus was confirmed in 10 (36%) out of 28, dilated cardiomyopathy in 17 (68%) out of 25, ischemic heart diseases in 9 (64%) out of 14 and pulmonary diseases in 10 (76.9%) out of 13 subjects. All patients with thyrotoxicosis who were sent for evaluation of the heart function had echocardiographic diagnosis of thyrotoxic heart disease, 5 (71.4) out of 7 had pericardial diseases and 2 (40%) had vegetation out of 5 patients who were examined for infective endocarditis.

### DISCUSSION

The results of this study show that systemic hypertension and hypertensive heart disease are the commonest clinical indication and echocardiographic diagnosis, respectively in the center. Congenital heart diseases rank second as indication (7.23%), as well as echocardiographic diagnosis (7.3%). These findings are similar to reports from related studies in many centers in Nigeria (Ukoh and Omuemu, 2005; Balogun *et al.*, 1999; Agomuoh *et al.*, 2006) but in contrast to the study at Enugu (Ike, 2008). Ukoh and Omuemu (2005), in a review of echocardiogram of 820 subjects examined over 9 years, revealed systemic hypertension to be the most frequent indication and hypertensive heart disease being the commonest diagnosis. These are further supported by findings of Balogun *et al.* (1999) and Agomuoh *et al.* (2006). However, a review of 2527 subjects studied over

10 years at Enugu by Ike (2008), put valvular heart diseases as the commonest indications as well as echocardiographic diagnosis ahead of hypertensive heart disease. This may not be unconnected with the active cardiac surgical unit at Enugu, thereby attracting more referrals for patients with structural heart diseases. Similarly, the prevalence of congenital heart diseases in the study was higher than other studies (Ukoh and Omuemu, 2005; Balogun *et al.*, 1999; Agomuoh *et al.*, 2006) but lower than that of Ike (2008). This is because unlike the study and that of Ike (2008), only adults were included in other studies (Ukoh and Omuemu, 2005; Balogun *et al.*, 1999; Agomuoh *et al.*, 2006). Ischemic heart disease was diagnosed in 0.99% of the subjects.

The incidence of coronary artery disease appears to be rising in developing economies including Nigeria but the prevalence is still low (Akinboboye *et al.*, 2003; Sani *et al.*, 2006). Balogun *et al.* (1999) reported prevalence of coronary artery disease to be 2%, Ukoh and Omuemu (2005) 2.7% and Ike (2008) 0.8% in their series. A significant proportion of the patients had normal echocardiogram. Recently the American College of Cardiologist Foundation in association with other bodies issued the appropriateness criteria for transthoracic and transesophageal echocardiography (Douglas *et al.*, 2007). This is to ensure rational use of this imaging facility and to prevent over use or misuse in patients who may not obtain a benefit. Echocardiographic evaluation of hypertensive heart disease, rheumatic valvular heart diseases, congenital heart diseases and coronary heart diseases among other indications are highly advocated by this guideline. Echocardiographic confirmation of clinical assessment was high in the patients with hypertensive heart disease. This often influences the choice of anti-hypertensive medication by the physicians especially those that suppress renin-angiotensin-aldosterone axis and re-enforces drug compliance in the patients. The sensitivity of clinical assessment proved to be low compared with echocardiography in patients with congenital heart diseases (63.6%) and rheumatic valvular heart diseases (58.6%).

This is not surprising because referrals were received from diverse population of doctors, who might not have formal postgraduate clinical training in cardiology. Equally significant from the study is high number of patients with chest pain as indication for echocardiography. However, only 46.3% of them had abnormal echocardiogram. The rest had normal tests. A careful evaluation of this group of patients by the referring doctors is suggested in order to minimize unnecessary echocardiographic examination.

Possible cardiac sources of emboli were found in 36% of patients with transient ischemic attack or stroke. In a related study in Switzerland, Wolber *et al.* (2007) found cardiac sources of emboli in 18% of their patients with ischemic stroke. It is however, important to note that trans-thoracic echocardiography is less sensitive than trans-esophageal echocardiography in detecting intra-cardiac thrombi and vegetations.

### CONCLUSION

This study has described the spectrum of cardiovascular diseases in the center as diagnosed by echocardiography and evaluation of hypertensive heart disease is the commonest clinical indication as well as echocardiographic diagnosis. The prevalence of ischemic heart disease is low even though the incidence seems to be rising from various reports in Nigeria (Akinboboye *et al.*, 2003; Sani *et al.*, 2006). Concerted effort needs to be put together by the government and health care providers for prevention, early detection and treatment of systemic hypertension in order to prevent its complications. Achievement of target blood pressure control early in the course of therapy should be the goal of treatment of these patients. There is also the need for the government to make cardiac surgery accessible and affordable to patients with structural heart diseases in order to alleviate their suffering.

Although, echocardiography is relatively cheap, safe and provides information that may influence the course of management of patients rapidly, a rational use by establishment of clinical diagnosis as definite indication for echocardiography is advocated. This will avoid unnecessary test and waste of patients' scarce resources.

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