

Echocardiographic pattern of acquired heart diseases in Nigeria

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ABSTRACT

Background: Acquired heart diseases (AHDs) are present from childhood to old age, and the frequency of pathology differs according to age and the geographical region of the patients. The aim of this study was to document the echocardiographic patterns of AHDs in our setting. **Materials and Methods:** Retrospective analysis of echocardiographic diagnosis of AHD was done for age, sex, and echocardiographic pattern. **Results:** There were 190 diagnoses in the 163 patients with 27 patients having a double diagnosis, consisting of 88 (54%) males and 75 (46%) females. The mean age was 50.4 years (age range 9-85 years). Ten types of acquired heart pathologies were identified and they included hypertensive heart disease in 49.47%, rheumatic heart disease in 26.32%, cardiomyopathy in 11.05%, endomyocardial fibrosis in 4.74%, and pericarditis in 3.68%. Others were cor pulmonale, pulmonary hypertension, intracardiac thrombi, left atrial myxoma and degenerative heart disease which accounted for the remaining 4.74%. **Conclusion:** This study identifies 10 types of AHDs among the study population. The huge impact of hypertensive heart disease and rheumatic heart disease is a big indicator pointing to the existence of a sub-optimal level of healthcare in the country.

Key words: Acquired heart diseases, echocardiographic pattern, Nigeria

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INTRODUCTION

Acquired heart diseases (AHDs) are diseases of the heart that appear in an individual after birth. They are a heterogeneous group of disorders that arise from damage to the heart and adjacent blood vessels by a variety of processes including ischemic, hypoxic, metabolic, nutritional, inflammatory, and infectious processes.¹ AHDs are present globally.² A previous study in Nigeria showed that AHD contributed between 28.8% and 68% of all cardiac conditions, with infective pericarditis, endomyocardial fibrosis and dilated cardiomyopathy contributing 35.8%, 26.7%, 21.7%, and 11.2%, respectively.³⁻⁵ AHD are present from childhood to old age, and the frequency of pathology differs according to age and the geographical region of the patients.^{2,6}

Echocardiography is a veritable tool for the diagnosis and characterization of AHD.^{5,7-9} Echocardiographic machine

is currently available in all tertiary and some secondary health institutions in Nigeria. With the echocardiographic confirmation of AHD, prognostication and management plan can confidently be made. Apart from diagnosing AHD for possible treatment, identification of heart diseases by echocardiography generally helps in patient's management because studies have shown that echocardiography as an imaging modality has a role in interventions on both congenital and acquired structural heart diseases.¹⁰ It also helps in prognostication of patients needing noncardiac operations since perioperative morbidity and mortality are higher in those with structural heart disease than those without.¹¹ Lastly, echocardiographic identification of structural heart diseases followed by successful correction of such diseases has the potential of preventing sudden cardiac deaths caused by polymorphic ventricular tachycardia which substrate is structural heart disease.¹²

This study, therefore, aimed to document the pattern of AHDs in our patient population.

MATERIALS AND METHODS

A retrospective review of the echocardiographic reports of patients done for varying indications in our hospital over a 1-year period was carried out. Those with an

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echocardiographic diagnosis of AHD were analyzed for age, sex, and echocardiographic pattern. Transthoracic M-Mode, two-dimensional echo Doppler, and color flow Doppler echocardiography was done by a trained echocardiographer in conjunction with cardiologists using Hp Sonos 4500 and Sonos 5500 ultrasound machines, and the results recorded on a video tape that was reviewed by a team of cardiologists.

Data were summarized in Excel spreadsheet and analyzed with Stata version 10 (Stata is a general-purpose statistical software package created in 1985 by StataCorp). Relationships between continuous and categorical variables were assessed using Student's *t*-test and Chi-square test consecutively, except where otherwise indicated. Statistical significance is $P < 0.05$.

RESULTS

There were 163 patients with an echocardiographic diagnosis of AHD during the study period, consisting of 88 (54%) males and 75 (46%) females. The mean age was 50.4 years (age range 9-85 years). The modal age group was 50-59 years where up to 20% of patients belong although the incidence was fairly evenly distributed from age 40 to 85 years with more than 74 % of the patients [Table 1].

There were 190 diagnoses in the 163 patients with 27 patients having a double diagnosis. Ten types of acquired heart pathologies were identified. These included hypertensive heart disease in 49.47%, rheumatic heart disease in 26.32%, cardiomyopathy in 11.05%, endomyocardial fibrosis in 4.74%, and pericarditis in 3.68%. Others were cor pulmonale, pulmonary hypertension, intracardiac thrombi, left atrial myxoma, and degenerative heart disease which accounted for the remaining 4.74% [Table 2 and Figure 1].

Hypertensive heart disease

This was the commonest diagnosis made in about 49% of all cases [Table 3]. The mean age of patients with hypertensive heart disease was 56.9 years. There was no patient below

the age of 20 years with a diagnosis of hypertensive heart disease, thereby regarded by this study as a disease of adulthood. Echocardiographic features of hypertensive heart disease included left ventricular hypertrophy and interventricular septal hypertrophy.

Rheumatic heart disease

This was the second commonest diagnosis of AHDs made in this series. It constituted about 26.32% of the

Table 1: Age/sex distribution of patients with acquired heart diseases made by echocardiography

Variable	Male (n = 88)	Female (n = 75)	Total (n = 163)	Statistical indices
Age				
<20	4 (6.7)	5 (6.7)	9 (5.5)	df=6, $\chi^2=6.6657$, $P=0.722$
20-29	9 (10.2)	8 (10.7)	17 (10.4)	
30-39	8 (9.1)	8 (10.7)	16 (9.8)	
40-49	17 (19.3)	12 (16.0)	29 (17.8)	
50-59	14 (15.9)	19 (25.3)	33 (20.3)	
60-69	18 (20.5)	11 (14.7)	29 (17.8)	
>70	18 (20.5)	12 (16.0)	30 (18.4)	
Mean (SD)	51.5 (18.0)	49 (17.8)	50.4 (17.9)	df=161, t -test=-0.6965, $P=0.3713$

SD – Standard deviation

Table 2: Sex distribution of diagnoses made by echocardiography

Diseases	Male	Female	Total	Statistical indices
Hypertensive heart disease	49 (52.1)	45 (47.9)	94	df=5, $\chi^2=2.6122$, $P=0.779$
Rheumatic heart disease	26 (52.0)	24 (48.0)	50	
Cardiomyopathy	13 (61.9)	8 (38.1)	21	
Endomyocardial fibrosis	3 (33.3)	6 (66.7)	9	
Pericarditis	4 (57.1)	3 (52.9)	7	
Others	6 (66.7)	3 (33.3)	9	

Table 3: Age and sex distribution of patients with hypertensive heart disease made by echocardiography

Variable	Male (n = 49)	Female (n = 45)	Total (n = 94)	Statistical indices
Age				
<20	0 (0.0)	0 (0.0)	0 (0.0)	df=5, $\chi^2=3.2063$, $P=0.693$
21-29	2 (4.1)	1 (2.2)	3 (3.2)	
30-39	4 (8.2)	2 (4.4)	6 (6.4)	
40-49	9 (18.4)	8 (17.8)	17 (18.1)	
50-59	10 (20.4)	16 (35.6)	26 (27.7)	
60-69	11 (22.5)	9 (20.0)	20 (21.3)	
>70	13 (26.5)	9 (20.0)	22 (23.4)	
Mean (SD)	57 (14.4)	56.6 (12.1)	56.9 (13.3)	df=92, t -test=-0.1380, $P=0.8913$

SD – Standard deviation

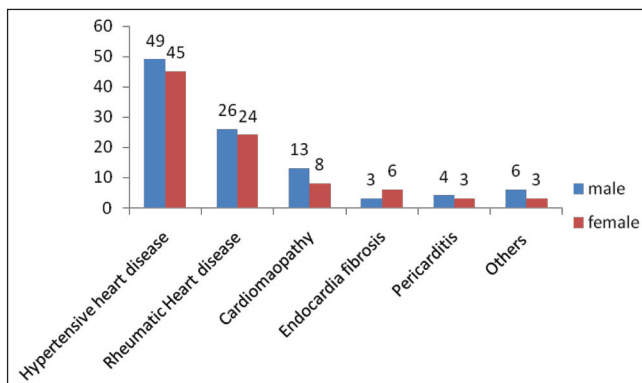


Figure 1: Sex distribution of acquired heart diseases

diagnoses. The incidence of this disease spread from childhood to adulthood [Table 4]. The mean age of patients with rheumatic heart disease was 45.1 ± 18.6 years. Echocardiographic diagnostic features of rheumatic heart disease included.

Cardiomyopathy

This was diagnosed in 11.05% of the times. Cardiomyopathy was found from childhood to adulthood also. The youngest patient with cardiomyopathy was 13-year-old while the oldest was 75-year-old. Entities encountered included dilated cardiomyopathy, nonobstructive cardiomyopathy, and hypertrophic obstructive cardiomyopathy.

Endomyocardial fibrosis

Endomyocardial fibrosis was diagnosed in 4.74% of the cases. Among children, the disease was found in only one 9-year-old child who had bi-ventricular endomyocardial fibrosis while the remaining patients were adults. The disease was equally found to affect one or both ventricles.

Pericarditis

Pericarditis contributed 3.68% of the echocardiographic diagnoses of AHDs in this report. Patients were both pediatrics and adults. The diagnosis was commonly effusive pericarditis.

Others

These included cor pulmonale and degenerative heart disease each in two elderly patients, bi-ventricular thrombi in a patient with rheumatic heart disease, left atrial myxoma and pulmonary hypertension in 1 patient each.

DISCUSSION

This study has shown the same epidemiologic characteristic of AHDs as it is in other developing economies.^{1-3,6,13} The spectrum of AHD in our series also resembles those of related studies.^{1-5,13} The disease has been shown to occur

from childhood to elderly life with no sex predilection.^{2,14} This was defined in this study which shows the occurrence of AHD from pediatric age group to elderly age group (9-85 years). However expectedly, since these are acquired pathology, there were more adult patients than pediatric patients (17:1 [Table 1]). Various related studies have also documented nonstatistically significant gender difference in the incidence of AHD,^{1,2,14,15} just as this study shows slight male preponderance (male:female = 1.17:1). A previous study in the same center had shown AHD to constitute about 5.32% of all cardiothoracic surgery cases.¹⁵

Echocardiography has been used as a veritable noninvasive tool for the diagnostic evaluation of both pediatric and adult cardiac patients, in that it is able to depict and delineate the pericardial, myocardial, and intracardiac gross morbid anatomy.^{1-9,13-16} This tool was used in the present study, and it was able to aid the identification of the 10 types of AHD in the patients' population. The predominance of hypertensive heart disease (49%) in this study is not surprising as it is a reflection of the prevalence of systemic hypertension in Nigeria which at the moment is put at 22.7%.¹⁷ Again since hypertension is regarded as "a silent killer" in that it may remain asymptomatic till late, it therefore means that in environment like Nigeria where regular medical checks are not done by the generality of the citizens, many hypertensive patients may not be diagnosed until they are compelled to present to hospital with symptoms of complications such as heart failure, renal failure, and cerebrovascular accident. Additional reason adduce to the high rate of hypertensive heart disease in this study is the fact that many patients with systemic hypertension even when diagnosed early may not be able to afford the cost of regular/lifelong anti-hypertensive medications thereby resulting in poor compliance with therapy and accelerated development of multi-system complications including hypertensive heart disease. The recognizable echocardiographic features of hypertensive heart disease which were found in our patients are left ventricular hypertrophy, thickening of the interventricular septum, and diastolic dysfunction.¹⁸ The treatment here depends on the specific entity and may include control of hypertension and cardiac muscle remodeling therapy.¹⁹

Rheumatic heart disease contributing to 26% of the diagnoses of AHD in this Nigerian series reflects the fact that rheumatic fever is still of public health importance. Two previous studies in Nigeria have shown significant place of rheumatic heart disease at 17.4% and 35.8% of all AHD in children, respectively.^{1,3} When only valvular heart diseases are considered, rheumatic heart disease is known to contribute up to 22% in Europe.² However, when all AHD are considered in that environment, the contribution of rheumatic heart disease is expected to be much less. The simple improvement in environmental sanitation, personal hygiene, and primary healthcare has a great potential to

Table 4: Age and sex distribution of patients with rheumatic heart disease made by echocardiography

Variable	Male (n = 26)	Female (n = 24)	Total (n = 50)	Statistical indices
Age				
<20	3 (11.5)	2 (8.3)	5 (10.0)	df=6, $\chi^2=6.2634$, P=0.416
20-29	4 (15.4)	2 (8.3)	6 (12.0)	
30-39	2 (7.7)	3 (12.5)	5 (10.0)	
40-49	5 (19.2)	7 (29.2)	12 (24.0)	
50-59	3 (11.5)	7 (29.2)	10 (20.0)	
60-69	5 (19.2)	1 (4.2)	6 (12.0)	
>70	4 (15.4)	2 (8.3)	6 (12.0)	
Mean (SD)	46.1 (21.2)	44 (15.6)	45.1 (18.6)	df=48, t-test=-0.3838, P=0.7028

SD – Standard deviation

significantly reduce the incidence of rheumatic fever and the sequel of rheumatic heart disease. This preventive approach is more viable than treatment of the sequels of rheumatic heart disease, which include heart valve repair and replacement which are major and expensive endeavor not regularly available service in Nigeria at the moment. Population study is also expected to yield lower prevalence.¹⁶

Cardiomyopathy which is a heterogeneous group of AHD accounted for about 11% of cases in this series similar to an earlier Nigerian study.³ Entities such as dilated cardiomyopathy, nonobstructive cardiomyopathy, and hypertrophic obstructive cardiomyopathy were met. Although echocardiography is unable to determine the pathogenetic mechanism of cardiomyopathy, further investigations done for patients with cardiomyopathy in other series have been able to disclose the causes of cardiomyopathy to include chronic chagas disease and Takotsubo syndrome.^{20,21}

The cases of endomyocardial fibrosis encountered in this series were of both univentricular and bi-ventricular involvement and lower than a related study (4% vs. 21.7%).³ Although, the disease is known to be commoner in children and young adults,²² age analysis of the patients with endomyocardial fibrosis showed only one child, five young adults, and three elderly adults. The causes of endomyocardial fibrosis are not specifically known, cases still do occur and should be appropriately managed to avoid thromboembolic complication which has been reported to result in autoamputation of the leg.²²

All the cases of pericarditis encountered in this series were of effusive type. Less than half of them possessed additional features of pericardial tamponade, which indicated immediate intervention with therapeutic pericardiocentesis. A previous study done in the Nigerian National Cardiothoracic Center of Excellence proved the accuracy of transthoracic echocardiography as a pericardial diseases diagnostic tool.⁹ Two other Nigerian studies found pericarditis to constitute about 25% and 26% of AHDs.^{1,3}

The rare cases of AHD were cor pulmonale and degenerative heart disease each in two elderly patients, bi-ventricular thrombi in a patient with rheumatic heart disease, left atrial myxoma, and pulmonary hypertension in one patient each. There were no cases of infective endocarditis or Kawasaki disease even though these have been reported as capable of being diagnosed with echocardiography.^{14,23-25} The only case of left atrial myxoma was referred for open-heart surgery,²⁶ in another hospital.

CONCLUSION

This study identifies 10 types of AHDs among the study population. The huge impact of hypertensive heart disease

and rheumatic heart disease is a big indicator pointing to the existence of a sub-optimal level of healthcare in the country. We, therefore, advocate the establishment of advance cardiovascular medicine and surgery facilities at all regions of the country for prevention and treatment of AHDs.

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