

An Echocardiographic Study of Congenital Heart Disease in a Paediatric Population in South South Nigeria

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ABSTRACT

Congenital cardiac anomalies still remain the commonest type of birth defect seen in the general population worldwide and are a significant cause of morbidity and mortality especially in infancy and early childhood. Recent epidemiological data suggest a gradual increase in the prevalence of these anomalies. With echocardiography being the bedrock of diagnosis, it was the aim of this study to determine the echocardiographic pattern of Congenital Heart defects in children seen in University of Uyo Teaching Hospital. The study was a retrospective analysis of the echocardiography reports of children being investigated for cardiac disease over a five year period (January, 2008 to July, 2013) in the hospital. A total of 20,479 children were seen in the department over the study period. Seventy three of these patients were found to have cardiac anomalies with an almost equal M:F ratio of 1.02:1. Congenital cardiac anomalies accounted for 58(79.43%) of the subjects giving a prevalence rate of 3/1000 with Ventricular Septal defect (VSD) being the commonest congenital anomaly occurring in 32.9% of congenital heart diseases seen. With the attendant morbidity and mortality attributable to this disease condition, we recommend that a cardiac intervention program be put in place to help reduce the burden of disease in the paediatric population in our environment.

Key words: Congenital, Cardiac Defects, Echocardiography.

INTRODUCTION

Congenital heart disease has been defined by Mitchell et al as “a gross structural abnormality of the heart or intrathoracic great vessels that is actually or potentially of functional significance”¹. Congenital heart defects are the most common type of birth defects seen with an incidence in the general population of 7/1000 live births with 2-3 out of 1000 new born infants being symptomatic with heart disease in the first year of life². Congenital cardiac anomalies can be classified into acyanotic and cyanotic heart lesions. Amongst the acyanotic cardiac lesions, various studies have shown that ventricular septal defects are the commonest lesions seen while tetralogy of Fallot, transposition of the great arteries are the commonest cyanotic lesions seen depending on the population studied^{3,4}. Racial and ethnic predilections have also been noted with certain lesions like atrial septal defects, and peripheral pulmonic stenosis being commoner in the black population as opposed to the caucasians while transposition of the great arteries, truncus arteriosus, aortic stenosis and coarctation of the

aorta were commoner in whites⁶. Echocardiography is the bedrock of diagnosis of congenital cardiac defects with gradual evolution of two dimensional echo to three and four dimensional echo studies and has been found to be an accurate tool for the preoperative diagnosis of most major congenital heart defects in children⁷. In Nigeria, an early study done by Antia and Gupta in Ibadan showed the incidence of congenital cardiac defects to be 3.5/1000 live births⁸. Over the years, other studies done internationally, have demonstrated a gradual increase in the birth prevalence of congenital cardiac abnormalities⁹. More recently, most studies done locally have been prevalence studies which also show a rise in the number of cases of congenital heart diseases being seen^{3,4,5}. In our center, the lack of availability of diagnostic equipment in the past made diagnosing these patients an uphill task. However, the recent acquisition of an ultrasound machine with 2 Dimensional echocardiographic capability by the hospital has made it possible to assess the prevalence, types and the gender predisposition if any of the various congenital cardiac anomalies in children seen in the University of Uyo Teaching hospital where previously, no such study had been carried out in this environment.

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MATERIALS AND METHODS

This study is a retrospective analysis of data collected from the 2D echocardiographic

reports of paediatric patients seen in the various units of the Department of Paediatrics of the University of Uyo Teaching Hospital i.e. Children's Emergency Room, Children's Outpatient and Inpatient wards with a diagnosis of congenital heart disease from January 2008-July 2013. The University of Uyo Teaching Hospital is a 500 bed hospital complex and is the only tertiary healthcare institution in Akwa Ibom state. It caters for a population of approximately 4 million people¹⁰ and also patients from adjoining states such as Abia, Ebonyi and Cross river states.

The study population were children aged 1 month to 13 years seen in the department of Paediatrics. Data was extracted from the register of the echocardiography laboratory which included the age, sex, initial clinical diagnoses and echocardiographic diagnoses. Echocardiographic modalities used were M-mode, Two dimensional (2D) and Doppler studies with a 5-MHZ sector transducer according to the recommendations of the American Society of Echocardiography¹¹. Data was analyzed using the SPSS version 17 statistical software to elicit prevalence and types/pattern of heart diseases

RESULTS

Over the 5 year study period, the total number of children aged between 1 month and 13 years seen in the department overall was 20,479. Seventy three (0.35%) had an echocardiographic diagnosis of cardiac disease. Of these, 58 of them had congenital heart disease, giving a prevalence rate of 3/1000.

Table 1 shows the frequencies of the cardiac diagnoses made at echocardiography. There were 37 (50.7%) females and 36 (49.3%) males (F:M=1.02:1). Congenital cardiac anomalies accounted for 58 out of 73(79.43%) of the subjects with ventricular septal defect (VSD) being the commonest congenital anomaly occurring in 32.9% of congenital heart diseases seen. The female to male ratio of the VSD cases was 1.5:1. The other cardiac anomalies did not have sufficient numbers to allow for a good comparison. The rest (15 out of 73 {20.5%}) were acquired heart diseases of which Rheumatic heart disease was the commonest. Only one case of Endomyocardial fibrosis (EMF) complicated by pericardial effusion was seen in the study subjects.

Table 1: Frequency Table of Echocardiographic Diagnoses

Echocardiographic Diagnosis	Frequency (%)
Ventricular Septal Defect	15(20.54)
Ventricular Septal Defect + *Others	9(12.32)
Patent Ductus Arteriosus	9(12.32)
Patent Ductus Arteriosus + *Others	8(10.96)
Atrial Septal Defect	4(5.48)
Atrial Septal Defect + *Others	8(10.96)
Tetralogy of Fallot	4(5.48)
Tetralogy of F allot + *Others	1(1.37)
Rheumatic Heart Disease	3(4.11)
Rheumatic Heart Disease + *Others	3(4.11)
Cardiomyopathies	3(4.11)
Pericardial Disease	6(8.22)
TOTAL	73(100)

*Others=Pulmonary Stenosis, Pulmonary Regurgitation, Tricuspid Regurgitation, Aortic Regurgitation, Mitral Valve Prolapse.

Figure 1 shows the age distribution of the participants by gender. There was no significant age difference between both genders ($p=0.93$).

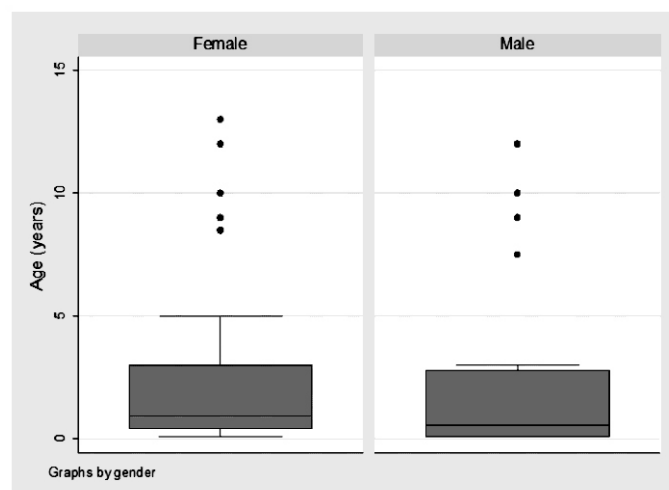


Figure 1: Box Plot Showing the Age Distribution by Gender

DISCUSSION

The prevalence of congenital heart disease in our study population was 3/1000 in hospital attendees which is in keeping with figures obtained locally and internationally^{3-5,9}. Temporal variations in the birth prevalence of congenital cardiac anomalies have been noted with an apparent increase in prevalence over the

years especially in Asia, Europe and North America.⁹ In the same study by Van der Linde *et al.*, the reported prevalence was found to be lowest in Africa with a value of 1.9/1000 live births⁹. They also found a corroboration between socioeconomic indices and prevalence of congenital heart disease with those in low income countries having lower prevalence. Thus, the reported value for Africa may be a reflection of this factor at play.

In Nigeria, some of the early studies done by Gupta and Antia gave an incidence rate of about 3.5/1000 and till date remains the only study on incidence of congenital heart disease done in Nigeria⁸. More recent prevalence studies done in Nigeria demonstrate a rising trend in the number of cases of congenital heart disease being seen³⁻⁵. The factors that may account for this apparent increase have not yet been clearly elucidated. Better case ascertainment/reporting and improved diagnostic facilities may be implicated as probable explanations for this observation as is the case in our study where prior to the year 2008, there was no available echocardiography laboratory in the hospital. The overall sex distribution of the cases was approximately equal whereas other studies show as light male preponderance^{3,4}. Necropsy studies by Akang *et al.*¹² and more recently by Thomas *et al.*¹³ also corroborate this slight male preponderance.

Congenital cardiac defects made up approximately 80% of the bulk of cardiac cases seen with acquired heart diseases making up the remaining 20%. This trend has also been noted by other authors.¹⁴ Ventricular septal defects were the commonest congenital cardiac lesions and this finding has been corroborated by various authors^{3,4,5,14}. There was a slight female preponderance in patients with ventricular septal defects in our study which is similar to the findings by Okoromah and Ekure¹⁴. Rheumatic heart disease still remains the commonest acquired heart condition seen in our environment as was the case in this study^{15,16}. Only one case of endomyocardial fibrosis (EMF) was found in our study which lends credence to the observation by other recent researchers that EMF may be a disappearing disease entity in Nigerian children¹⁴⁻¹⁶ when compared to findings by Antia¹⁷ and Jaiyesimi¹⁸. This change in disease pattern may be explained by the apparent improvement in socioeconomic and environmental conditions and

by extension, improvement in general nutrition as nutritional factors and parasitic infestations have been implicated in the aetiology of EMF¹⁹. Study limitations included inability to follow up the cases as required in determining outcome and true birth prevalence.

CONCLUSION

The prevalence of congenital heart disease appears to be increasing in our environment. This apparent increase may be attributed to improved methods of case finding and availability of diagnostic facilities. This highlights the necessity for a cardiac intervention program to help ameliorate the consequences of this disease condition.

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