IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

THE PATTERN AND PREVALENCE OF CONGENITAL HEART DISEASE IN CHILDREN SEEN IN IRRUA SPECIALIST TEACHING HOSPITAL

Angela Ifeoma Odike[1], Nwamaka Odinakachi Ejidike[1], Augusta Adesua Orji-Okhueleigbe [1],

Njideka Constance Uchefuna[2], Sheila Ojor Ileli[1]

1. Paediatric cardiology unit, Department of Paediatrics, Irrua Specialist Teaching Hospital, Edo, Nigeria
2. Paediatric cardiology unit, Department of Paediatric, Nnamdi Azikiwe University Teaching Hospital, Anambra, Nigeria

Abstract

Congenital heart disease (CHD) is one of the commonest congenital anomaly in children in Nigeria and it contributes significantly to childhood morbidity and mortality. The paediatric cardiology unit of Irrua Specialist Teaching Hospital (ISTH), a rural tertiary hospital in South-South (S/S) Nigeria was established in November 2010 to manage children with CHD. The goal of our study is to document the prevalence and pattern of CHD seen in the Paediatric unit of ISTH.

The study was a retrospective observational study of the records of 188 children seen in the Paediatric Cardiology unit from August 2023 to October 2024. The biodata and echocardiogram diagnosis were obtained from the records. Data was analyzed using Excel spreadsheet.

The records of 188 children with structural heart diseases were reviewed, 177 (94.1%) had congenital heart disease and 11 (5.9%) had acquired heart disease. The age range of the children with congenital heart disease was from 2 days to 204 months (17 years) with a mean age of 36.4 months. There was a male preponderance of 66.7%. The prevalence of CHD was 12.3/1000. Atrial septal defect (ASD) was the commonest acyanotic CHD (43.5%), followed by ASD+ ventricular septal defect (VSD) at15.8% and isolated VSD (13.6%). Tetralogy of Fallot was the commonest cyanotic CHD (2.8%).

In conclusion, CHD is the main cause of heart disease in children seen in ISTH, with ASD as the commonest acyanotic CHD, followed by ASD+VSD and VSD, contrary to existing literature. Tetralogy of Fallot was the commonest cyanotic CHD.

Index Terms: Atrial septal defect, Pattern, Nigeria, Cor triatriatum dexter, Infants

INTRODUCTION

Congenital heart disease (CHD) is a structural abnormality of the heart and (or) of the great vessels that is present at birth.[1] The estimated prevalence of CHD globally is 8-10 per 1,000 live births. [1, 2] Some studies in Nigeria have documented an estimated prevalence of 7.2-18.1 per 1000 children. [3, 4, 5] Congenital heart disease contributes significantly to childhood morbidity and mortality in developing countries, especially in sub-Saharan Africa. [3]

Congenital heart disease can be classified into acyanotic and cyanotic defects.[6] The spectrum of CHD varies among study population and location.[7,8] The commonest acyanotic defect documented in many studies globally is ventricular septal defect (VSD) , followed by ASD.[8,9,10,11] They can occur as single defects or in association with other defects.[5] Tetralogy of Fallot is recorded as the commonest cyanotic CHD.[8-12]

In a study in primary school children in S/S Nigeria, the prevalence of CHD was 18.1 per 1,000 pupils.[3] The commonest acyanotic cardiac defects seen were atrial septal defects (83.9%) followed by ventricular septal defects (9.7%). [3]They also documented that CHD occurred with higher frequency among females (64.5%) and in children in the 5-9 years (61.3%) age group.[3]Many hospital-based studies, however, have shown more male preponderance. [5, 9-13] and a higher frequency of occurrence in children less than 12 months.[5,9-11]

A systematic review by Abdulkadir et al demonstrated apparent regional differences in major congenital heart diseases in Nigeria.[8] Several authors have also demonstrated racial, ethnic and environmental differences in the incidence and spectrum of CHD in other climes.[3, 7, 8, 11, 14]

The Paediatric cardiology unit of ISTH which is a rural tertiary health institution in S/S Nigeria was established in November 2010. We perform at least 12 echocardiography studies on new CHD patients monthly (unpublished local database). However, the prevalence and spectrum of CHD in ISTH has not been documented. This study aims to fill this knowledge gap.

SUBJECTS AND METHODS

This was a retrospective observational study of the records of children seen in the Paediatric Cardiology unit of ISTH Irrua from 1st August 2023 to 31st October 2024. The data retrieved from each record were, age, gender and echocardiogram report. The echocardiogram in all the

The children were categorized into 5 groups of 0< 1month, 1<12 months, 12<60 months, 60< 144 months, 144< 216 months.

The information obtained was recorded in Excel. The data were analyzed with Excel spread sheet and presented as frequencies and percentages.

RESULTS

A total of 14,448 children were seen in the paediatric unit of ISTH from 1st august 2023 to 31st October 2024. One hundred and eighty-eight of them had structural heart disease. Of this number, 177 (94.1%) had congenital heart disease and 11 (5.9%) had acquired heart disease. The prevalence of CHD was 12.3/ 1000 children. The age range of the children with CHD was from 2 days to 204 months (17 years) with a mean age of 36.4 months. There were 118 (66.7%) males and 59(33.3%) females with an M: F of 2:1.

Table 1 shows the age distribution of the children with CHD. Children in the age group 1<12 months were the most affected (36.7%), followed by those in the 12<60 months age group (28.8%). In both groups the males were affected more than the females (24.3/12.4% and 22.6/6.2% respectively).

Table1. Age and gender distribution of children with congenital heart disease

AGE IN MONTHS	NUMBER OF DEFECTS (%)	AFFECTED MALES (%)	AFFECTED FEMALES (%)
0<1	19 (10.7)	11 (6.2)	8 (4.5)
1<12	65(36.7)	43(24.3)	22(12.4)
12 <60	51(28.8)	40(22.6)	11 (6.2)
60<144	26 (14.7)	13(7.3)	13(7.3)
144<216	16 (9.1)	11(6.2)	5(2.9)
TOTAL	**177 (100)**	**118(66.7)**	**59(33.3)**

Fig 1 shows the distribution of children with CHD based on the presence or absence of cyanosis. Acyanotic CHD was more prevalent (94.4%) in the study.

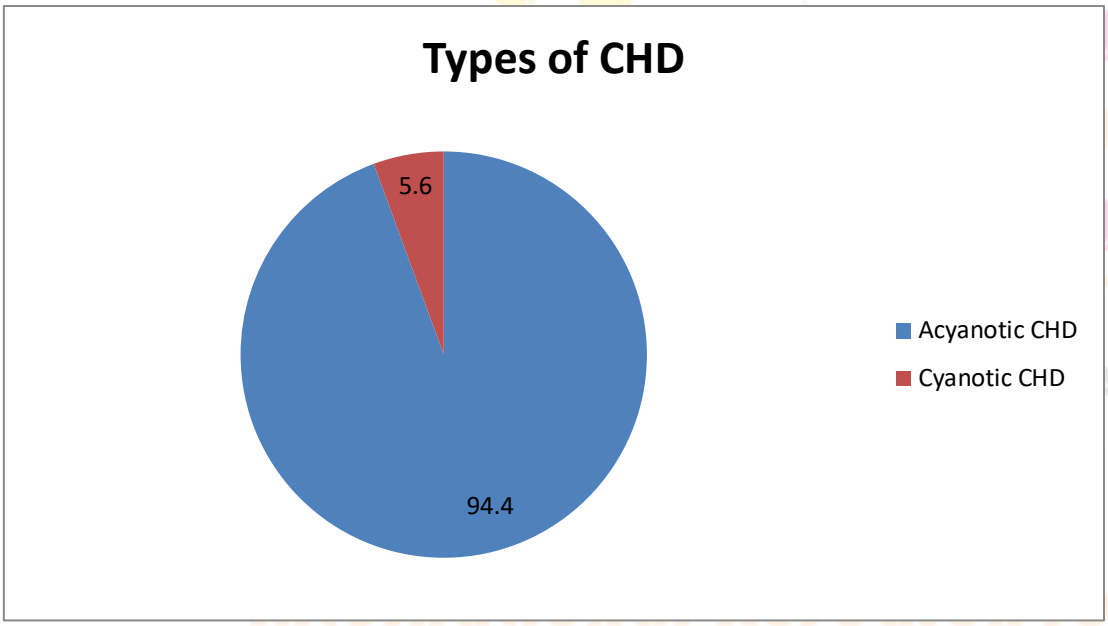

Fig 1. Types of CHD based on the presence or absence of cyanosis

Table 2 shows the distribution of acyanotic CHD according to the number of defects in each child. One hundred and twenty-one (68.4%) children with acyanotic CHD have single defects and 46 (26%) had more than one defect.

Table 2: Distribution of acyanotic CHD according to number of defects

Types of CHD	Number	Percentage
Acyanotic CHD		
Atrial septal defect (ASD)	77	43.5
Ventricular septal defect (VSD)	24	13.6
Atrioventricular septal defect (AVSD)	6	3.4
Patent ductus arteriosus (PDA)	4	2.3
Pulmonary stenosis(PS)	3	1.7
Cor triatriatum dexter (CTD)	2	1.1
Partial anomalous pulmonary venous connections (PAPVC)	2	1.1
Single atrium	2	1.1

Ebstein anomaly	1	0.6
Total	**121**	**68.4**
ASD+VSD	28	15.8
ASD+PDA	5	2.8
ASD+VSD+PDA	3	1.7
ASD+CTD	2	1.1
ASD+PS	2	1.1
VSD+PS	2	1.1
VSD+AP SHUNT	1	0.6
ASD+PDA+ critical PS	1	0.6
ASD+ Aortopulmonary (AP) shunt	1	0.6
VSD+PDA	1	0.6
Total	**46**	**26**
Grand total	**167**	**94.4**

Table 3 shows the pattern of CHD in the children reviewed. Atrial septal defect (ASD) was the commonest acyanotic CHD (77 (43.5%) in the patients, with 59(45.5%) occurring in children less than 12 months. Atrial septal defect + ventricular septal defect (VSD) was the second commonest acyanotic defect (15.8%) and ventricular septal defect alone was the third at 13.6%. Tetralogy of Fallot (TOF) was the commonest cyanotic disease (2.8%) recorded

Table 3: Pattern of congenital heart disease in the children

Types of CHD	**Number**	**Percentage**
Acyanotic CHD		
Atrial septal defect (ASD)	77	43.5
ASD+VSD	28	15.8
Ventricular septal defect (VSD)	24	13.6
Atrioventricular septal defect (AVSD)	6	3.4
ASD+PDA	5	2.8
Patent ductus arteriosus (PDA)	4	2.3
Pulmonary stenosis(PS)	3	1.7
ASD+VSD+PDA	3	1.7
Cor triatriatum dexter (CTD)	2	1.1
ASD+CTD	2	1.1
Partial anomalous pulmonary venous connections (PAPVC)	2	1.1
Single atrium	2	1.1
ASD+PS	2	1.1
VSD+PS	2	1.1
VSD+AP SHUNT	1	0.6
Ebstein anomaly	1	0.6
ASD+PDA+ critical PS	1	0.6
ASD+ Aortopulmonary (AP) shunt	1	0.6
VSD+PDA	1	0.6
Cyanotic CHD		
Tetralogy of Fallot (TOF)	5	2.8
Univentricular heart	2	1.1
Tricuspid atresia	1	0.6

TOF+ASD+PDA	1	0.6
ASD+PDA+TR+MR+complex anatomy	1	0.6
TOTAL	**177**	**100**

MR-mitral regurgitation, TR- tricuspid regurgitation

Echocardiogram was the only investigation used in the study of the cardiac structure in the children whose records were reviewed. Only one (3.2%) child with PAPVC had surgical repair in Anambra state, sponsored by a Non-Governmental Organization (NGO). Five (16.1%) patients died over the period under review.

DISCUSSION

The study shows the pattern and prevalence of CHD in children seen in ISTH. Congenital heart disease accounted for 94.1% of the structural heart defects in the children seen over the study period. This is higher than the 83.6% reported by Chinawa et al[10] in their study in Southern Nigeria and 71.7% in the study in North central Nigeria by Abah et al.[9]

The prevalence of CHD in this study was 12.3/1000. This is similar to the 14.4/1000 reported by Otaigbe et al in their study in S/S Nigeria.[5]This similarity maybe due to the location of both studies in tertiary institutions in S/S Nigeria.

Infants (1<12 months) and preschool age (12<60 months) children accounted for most of the cases of CHD (36.7% vs 28.8%), similar to the study in Enugu, [10] (41.7% vs 29.2%) and Port Harcourt, [5] (62% vs 24.4%). There was a male preponderance in the study (66.7%) which was also reported by other authors[5,9-12] Expectedly, most of the children (94.4%) in this study had acyanotic congenital heart diseases. This is the usual trend reported in literature.[5, 9, 11, 12] Among the children with acyanotic heart disease, 121(68.4%) had single defects similar to the report by Otaigbe et al (63.5%).[5]

Atrial septal defect was documented as the commonest acyanotic CHD at 43.5%. Another study in S/S Nigeria also reported ASD (83.9%) as the commonest CHD but the study was in primary school children. [3] The finding in this study is contrary to several other studies that show VSD as the commonest acyanotic CHD.[8-10, 14, 15] It has however been documented that the prevalence of ASD has been increasing with the years.[16]Of note is the fact that most of the ASDs recorded in this study were in infants (35/77 (45.5%). The reason for this is not known.

The other CHD recorded in this study were ASD + VSD (15.8%) and isolated VSD (13.6%). Otaigbe et al [5] and Garne [17] also reported cases of ASD + VSD in their studies with a prevalence of 2.2% and 0.03% respectively. In this study VSD was the 3rd commonest acyanotic CHD, contrary to report by other authors.[8-14]

The commonest cyanotic CHD was TOF. This was reported in 5 (2.8%) patients. This is in concordance with the study by Okwundika et al[12] in Asaba and several other authors.[5, 9, 10, 14]

In conclusion, CHD is the main cause of heart disease in children seen in ISTH, with ASD as the commonest acyanotic CHD, followed by ASD+VSD and VSD, contrary to existing literature. Tetralogy of Fallot was the commonest cyanotic CHD.

REFERENCES

1. Wu W, He J, Shao X. Incidence and mortality trend of congenital heart disease at the global, regional, and national level, 1990-2017. Medicine (Baltimore). 2020 Jun 5;99(23):e20593. doi: 10.1097/MD.0000000000020593. PMID: 32502030; PMCID: PMC7306355.
2. Nwafor, I.A. and Eze, J.C. (2019) Status of Congenital Heart Defects in Nigeria: The Role of Cardiac Surgery. World Journal of Cardiovascular Surgery, 9, 63-72. doi: 10.4236/wjcs.2019.97008
3. Susan UA, Nnena TP, Edewele OB. Prevalence of congenital heart diseases among primary school children in the Niger Delta Region of Nigeria, West Africa. J Cardiol Cardiovasc Med. 2019; 4: 144-149.DOI: 10.29328/journal.jccm.1001056 ORCID ID: 0000-0002-5222-48

4. Yilgwan CS, Ige OO, Bode-Thomas F. Clinical screening for heart disease in apparently healthy Nigerian school children. Nig J Cardiol. 2014; 11: 74-79.
5. Otaigbe BE, Tabansi PN. Congenital heart disease in the Niger Delta region of Nigeria: a four-year prospective echocardiographic analysis. Cardiovasc J Afr. 2014 Nov-Dec; 25(6):265-8. Doi: 10.5830/CVJA-2014-055. Epub 2014 Nov 10. PMID: 25388927; PMCID: PMC4327180.
6. https://my.clevelandclinic.org/health/diseases/22441-cyanotic-heart-disease
7. Khasawneh W, Hakim F, Abu Ras O, Hejazi Y, Abu-Aqoulah A. Incidence and Patterns of Congenital Heart Disease Among Jordanian Infants, a Cohort Study From a University Tertiary Center. Front Pediatr. 2020 May 5; 8:219. Doi: 10.3389/fped.2020.00219. PMID: 32432065; PMCID: PMC7214919.
8. Abdulkadir M, Abdulkadir Z. A systematic review of trends and patterns of congenital heart disease in children in Nigeria from 1964-2015. Afr Health Sci. 2016 Jun; 16(2):367-77. Doi: 10.4314/ahs.v16i2.5. PMID: 27605952; PMCID: PMC499
9. Abah RO, Ochoga MO, Audu OP, Idoko A, Eseigbe EE, Dabit JO .Pattern of cardiac diseases among children in a tertiary hospital in North Central, Nigeria: A three and half years retrospective cohort echocardiographic study Niger J Paediatr 2018; 45 (1): 6- 9. DOI: http://dx.doi.org/10.4314/njp.v45i1.2)
10. Chinawa, A. T., & Chinawa, J. M. (2021). Compendium of cardiac diseases among children presenting in tertiary institutions in southern Nigeria: a rising trend. Libyan Journal of Medicine, 16(1). https://doi.org/10.1080/19932820.2021.1966217
11. Singh R, Rajaram Tawker N. The Spectrum of Congenital Heart Disease in Children in the Andaman and Nicobar Islands: A Five-Year Retrospective Study. Cureus. 2022 Sep 13; 14(9):e29109. Doi: 10.7759/cureus.29109. PMID: 36258979; PMCID: PMC9559556.
12. Okwundika, I. O., Ajaegbu, O. C., Ighbosewe, P. A., Ezeonwu, B. U., Mbagwu, N. E., & Sadoh, W. E. (2024). The spectrum of congenital heart defects among children at federal medical centre, Asaba, Nigeria. International Journal of Community Medicine And Public Health, 11(11), 4218–4221. https://doi.org/10.18203/2394-6040.ijcmph20243277
13. Nawar Ali Al-Wather, A-Nasser Munibari. Pattern of congenital heart disease in the cardiac center of Al-thawra General Teaching Hospital J Saudi Heart Assoc 2013;25:113–172
14. Majani NG, Koster JR, Kalezi ZE, Letara N, Nkya D, Mongela S, Kubhoja S, Sharau G, Mlawi V, Grobbee DE, Slieker MG, Chillo P, Janabi M, Kisenge P. Spectrum of Heart Diseases in Children in a National Cardiac Referral Center Tanzania, Eastern Africa: A Six-Year Overview. Global Heart. 2024; 19(1): 61. DOI: https://doi. org/10.5334/gh.1342
15. Nawar Ali Al-Wather , A-Nasser Munibari Pattern of congenital heart disease in the cardiac center of al-thawra general teaching hospital J Saudi Heart Assoc 2013;25:113–172, Abdulkadir M, Abdulkadir Z. A systematic review of trends and patterns of congenital heart disease in children in Nigeria from 1964-2015. Afri Health Sci 2016; 16(2): 367-377. http://dx.doi.org/10.4314/ahs.v16i2.5
16. Liu Y, Chen S, Zühlke L, Black GC, Choy MK, Li N, Keavney BD. Global birth prevalence of congenital heart defects 1970-2017: updated systematic review and meta-analysis of 260 studies. Int J Epidemiol. 2019 Apr 1; 48(2):455-463. Doi: 10.1093/ije/dyz009. PMID: 30783674; PMCID: PMC6469300.)
17. Garne, E. (2006). Atrial and ventricular septal defects – epidemiology and spontaneous closure. The Journal of Maternal-Fetal & Neonatal Medicine, 19(5), 271–276. https://doi.org/10.1080/14767050500433817)