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Congenital heart diseases: Pattern of clinical presentations in children less than 2-years of age in a pediatric practice in south-south Nigeria

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Abstract

The increase in the prevalence of congenital heart disease remains a major contributing factor to childhood morbidity and mortality in Africa. The study describes the clinical features of children with CHD that presented to a general pediatric hospital, to improve on early recognition and management of the diseases. The prevalence of CHD from the study was 2 per 100 (30 per 1577 or 1 in 52) i.e. (2/100 or 20/1000). A higher incidence in females (53.3%) with M: F = 1:1.14, the majority presented with difficulty / fast breathing (70%), cough(40%), other presenting symptoms are poor weight gain (26.7%), delayed milestones(13.3%). On examination, 60% had dyspnea, 56.7% had murmur. Packed cell volume for acyanotic heart disease ranged 28-30%, and 50-61% for cyanotic heart disease. The majority had comorbid bronchopneumonia (46.6%), and heart failure (23.3%). Echocardiographic findings revealed VSD in 26.7%, 20.0% had PDA and tetralogy of Fallot in 6.7%, Transposition of Great Arteries in 3.3%, and Dextrocardia in 3.3%. The outcome showed that 30% had no symptoms on follow-up, 23.3% were referred for surgery, 10% dropped from follow-up and 3.3% died. These findings which are comparable to the findings of other researchers showed that congenital heart disease has a place in childhood morbidity and mortality, therefore appropriate attention should be directed to improve on early recognition and management of the diseases.

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Cardiopathies congénitales: modèle de présentations cliniques chez les enfants de moins de 2 ans dans une pratique pédiatrique du sud-sud du Nigéria

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Résumé

Objectif de l'étude : L'augmentation de la prévalence des cardiopathies congénitales demeure un facteur majeur contribuant à la morbidité et à la mortalité infantiles en Afrique.

Méthode de l'étude : L'étude décrit les caractéristiques cliniques des enfants atteints de coronaropathie qui se sont présentés à un hôpital pédiatrique général, afin d'améliorer la reconnaissance précoce et la prise en charge des maladies.

Résultat de l'étude: La prévalence des coronaropathies de l'étude était de 2 pour 100 (30 pour 1577 ou 1 sur 52) c'est-à-dire (2/100 ou 20/1000). Une incidence plus élevée chez les femmes (53,3 %) avec M : F = 1:1,14, la majorité présentait des difficultés/respiration rapide (70 %), de la toux (40 %), d'autres symptômes présentés sont une faible prise de poids (26,7 %), un retard jalon (13,3 %). A l'examen, 60% avaient une dyspnée, 56,7% un souffle. L'hématocrite pour les cardiopathies acyanotiques variait de 28 à 30 % et de 50 à 61 % pour les cardiopathies cyanotiques. La majorité avait une bronchopneumonie comorbide (46,6 %) et une insuffisance cardiaque (23,3 %). Les résultats écho cardiographiques ont révélé un VSD chez 26,7 %, 20,0 % avaient un PDA et une tétralogie de Fallot chez 6,7 %, une transposition des grandes artères chez 3,3 % et une dextrocardie chez 3,3 %. Le résultat a montré que 30% n'avaient aucun symptôme lors du suivi, 23,3% ont été référés pour une intervention chirurgicale, 10% ont abandonné le suivi et 3,3% sont décédés.

Conclusion : Ces résultats, comparables à ceux d'autres chercheurs, ont montré que les cardiopathies congénitales ont une place dans la morbidité et la mortalité infantiles ; par conséquent, une attention appropriée doit être accordée à l'amélioration de la détection précoce et de la prise en charge des maladies.

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INTRODUCTION

Congenital Heart Diseases are problems of heart structure and function resulting from developmental anomalies of the heart. It has an overall prevalence of 10 per 1000 live births [1]. Congenital heart diseases (CHD) are major contributors to childhood morbidity and mortality in Africa because of late presentations and the shortage of skills and equipment for appropriate interventions [2]. The causes of CHD are largely unknown for certain; however, many cases are multifactorial and result from combinations of genetic predisposition and as-yet-to-be-determined environmental stimulus. Thus, some of the heart lesions are related to known chromosomal abnormalities, in particular, trisomy 21, 13, and 18 and Turner syndrome. In this regard, heart disease is found in more than 90% of patients with trisomy 18, 50% of patients with trisomy 21, and 40% of those with Turner syndrome [1,3]. Nonetheless, other etiological factors that are associated with CHD include maternal Rubella in the first trimester of pregnancy, and maternal ingestion of drugs such as anticonvulsants, steroids, anti-hypertensive and anti-neoplastic agents. [4] In addition, certain medical conditions in the mother are associated with a high incidence of Congenital Heart Defects including Diabetes Mellitus, Phenylketonuria, and Systemic Lupus Erythematosus [4,5].

Congenital Heart Diseases are divided into two groups, based on the presence or absence of cyanosis. Examples of Cyanotic Congenital HD include Tetralogy of Fallot, Truncus Arteriosus, and Transposition of Great Arteries. In contrast, illustrations of Acyanotic Heart Diseases include Ventricular Septal Defect, Atrioventricular Septal Defect, Patent Ductus Arteriosus, Arterial Septal Defect, Pulmonary Stenosis and Coarctation of the aorta [6].

CHD shows a wide spectrum of clinical severity in infants; hence, approximately 2 – 3 per 1000 newborn infants are symptomatic in the first year of life. Thus, it is possible to establish the diagnosis by 1 week of age in 40-50% of patients with CHD and by 1 month in 50 – 60% of patients [3]. However, this early recognition of infants with CHD is often not possible in our own setting because of either a heavy workload or lack of due diligence in the application of standard clinical methods in the assessment of infants and children generally. As a result, the diagnosis is often delayed or missed completely by attending practitioners in Primary Health Care Centers and general hospitals as well as Specialist and Private Hospitals. Consequently, these children only come to notice complications such as heart failure, recurrent pneumonia, and failure to thrive.

This study, therefore, describes the clinical features of children with CHD that presented to a general pediatric hospital, to improve on early recognition and management of the diseases. Confirmed by chest x-ray and echocardiography, radiological and echocardiographic findings and outcome of CHD in children presented to a General Pediatric Hospital to improve early recognition and management of the diseases.

MATERIALS AND METHODS

Study location.

This study was carried out in Modic Medical Centre situated within Benin City in Oredo Local Government Area of Edo State, Nigeria. The Centre is a private Pediatric hospital receiving children with various diseases from Benin City and its environs.

Study design, duration, and inclusion criteria

The study was descriptive, cross–sectional and was carried out between January 1, 2015 and December 31, 2017. It involved children aged ≤2 years that presented consecutively to the Out-patient Clinics or were admitted to the Wards and Newborn unit and diagnosed with CHD based on Echocardiographic evidence of congenital heart lesion. Children < 2 years with CHD not confirmed by echocardiography and Children > 2yrs of age with either congenital or acquired heart diseases were excluded from the study.

Consent: The purpose and nature of the study were explained to each parent and consent was obtained from them before the enrolment of the children.

Clinical assessment: The children that fulfilled the inclusion criteria were assessed on the presentation by standard clinical methods, including a detailed history and thorough physical examination with particular attention to cardiovascular and respiratory systems.

Investigations: Full Blood Count, Chest X-Ray, and Echocardiogram were ordered for each child with suggestive features of CHD including abnormal facies, cyanosis, cardiac murmur, respiratory/cardiovascular symptoms, and poor growth.

Diagnosis: A diagnosis of CHD was based on the presence of abnormal echocardiogram results provided by the Pediatric cardiologist.

Treatment and follow up: The children with heart failure, pneumonia, sepsis or other comorbidities were hospitalized and treated with oxygen, diuretics, antibiotics and other appropriate measures as indicated. The children were either followed up in the Clinic on a 2 to 4 – weekly basis or referred to Pediatric cardiology or Cardiothoracic Units in teaching hospitals. Laboratory, Radiological and Echocardiology tests were done periodically to ascertain the progress of the lesions.

Data Collection and Analysis

The details for each child were recorded in a Pro-forma include bio - data, presenting complaints and antenatal history, findings at clinical examination, laboratory data, **radiological** and echocardiogram findings and outcome. The data were analyzed by descriptive statistical methods.

RESULTS

Pattern of Congenital Heart Disease presentation at Modic Children's Hospital, Benin city from May 2015 to December 2017 (30 months)

Prevalence: A total of 5196 children aged ≤5 years were seen during the period of the study and 1577 (30.4 %) were aged ≤2 years and 30 (1.9%) were diagnosed with CHD based on the study criteria, giving a prevalence of 2 per 100 (30 per 1577 or 1 in 52) i.e. (2/100 or 20/1000).

Yearly Distribution: Nine (9), 12 and 9 children were diagnosed with CHD in 2015, 2016 and 2017 as shown in Figure 1.

Gender and age distribution: The 30 cases of congenital heart disease comprise 14 (46.7%) boys and 16 (53.3%) girls (M: F = 1:1.14) and 21 (70%) were aged ≤6 months and 9 (30%) aged 7 to 24 months. The mean age of the children was 4.74 ± months (range: 0.1-23 months). The distribution of the children according to age and gender is shown in Table 1, CHD Type match with Age is shown in Table 2

Presenting Complaints and History: The presenting complaints and frequencies were Fever 7(23.3%), Cough 12(40%); difficult/fast breathing 21(70%); noisy breathing 5(16.7%); easy fatigability 6(20.0%); poor weight gain/ failure to thrive 8(26.7%); delayed milestones 4(13.3%).

Clinical examination findings: The mean weight of the 30 children was 3.9kg ± 6.1 (Range: 1.30 – 10) and for 21 ≤6months was 3.2Kg ± 2 (Range: 1.3 – 5.3) and 9 ≥7 months was 7.02Kg ± 3 (Range: 4.6 – 10). The mean weight for 27 children aged < 12 months was 1.78kg ± (range: 1.3 – 7.2) and for 3 children aged 13 – 24 months 9.63 Kg ±0.37 (range: 8.9 – 10).

The physical findings as shown in table 3 include Pallor 3(10.0), Pyrexia 7(23.3), Cyanosis 5(16.7), Finger/toe clubbing 1(3.3), Oedema (1), Tachycardia (8), Tachypnoea (10), Dyspnoea (18), Murmur (17), Crepitations (2) active precordium (5), dysmorphic features (7), Cataract (1), hepatomegaly/ hepatosplenomegaly (11)

Laboratory data: Hematocrit (PCV): Mean PCV for the 30 children was 29.1% (Range: 28 - 61); mean PCV for 25 children with acyanosis was 36% and mean for 5 with cyanosis was 56%. The distribution of PCV is shown in table 4**.**

Radiological findings: The radiological findings (Table 6) include narrow cardiac pedicle with pulmonary oligaemia and boot shaped normal heart 1; bilateral pulmonary plethora with perihilar infiltrates and enlarged cardiac silhouette (3); bilateral pulmonary infiltrates with features of bronchopneumonia (2); pulmonary changes of intra - cardiac shunt (1); pulmonary plethora with suspected intracardiac shunt (1); normal findings (2); bronchopneumonia with cardiomegaly (1); heart failure with cardiomegaly and intracardiac shunt (1); bilateral pulmonary consolidation with lobar involvement (1); cardiac failure with Left- Right shunt and bronchopneumonia (1); bronchopneumonia and boot shaped heart (1); dextrocardia with Right to Left shunt and bronchopneumonia (1); bronchopneumonia (1)

Echocardiographic findings: The echocardiographic findings were Ventricular Septal Defect 6(26.7), Patent Ductus Arteriosus 6(20.0), Tetralogy of Fallot 2(6.7), Transposition of Great Arteries 1(3.3), Dextrocardia 1(3.3). The types and frequencies of echocardiographic findings are shown in table 7.

DISCUSSION

This study shows that the number of cases of Congenital Heart Disease presenting to

Modic clinic has revealed a similar trend over the past 3 years. Thus one can say, 2 out of every 100 children ≤2 years presenting to the Clinic had Congenital Heart Disease. The disease affected girls slightly more than boys in consonance with the findings of reports by Freeman et al [7], and Pinto and colleague [8] but contrary to the results of others Amel-Shahbaz et al [9] and Begic et al [10]. The reason for the gender disparity is not clear but may be due to genetic rather than environmental factors.

Additionally, it was found that most of the cases of CHD were seen in children aged ≤1-year, though the majority of the affected children presented within the first 6-months of life in concurrence with the congenital nature of the condition. Moreover, this early presentation of the children may be a reflection of the severity of the condition; thus leading to early manifestation of features of CHD. Thus the most frequent clinical features were cough, breathlessness and noisy breathing. The most frequent manifestations were difficult/fast/noisy breathing (70%); dyspnoea (60%); murmur (56.7%) These findings were often associated with fever and pulmonary rales. However, these findings were not surprising because they reflected the underlying cardiac lesions leading to shunting of blood from the left to the right sides of the heart. Consequently, the shunting of blood leads to lung congestion that predisposes to the development of pneumonia and heart failure [11].

The presentation of finger clubbing was noted in the children with Cyanotic CHD because it is associated with chronic hypoxia. Majority of the children had low weight for age and the finding was not surprising because growth failure is a manifestation of chronic hypoxia and chest infections [12].

It was also noteworthy that 23% of the children had dysmorphic features including microcephaly and cataract that perhaps indicate possibility of intrauterine infection such as rubella as cause of the CHD.

We also found that Acyanotic CHD was commoner than cyanotic CHD accounting for 23/30 and 7/30 respectively. This finding concurs with results by other workers [1,2,5,6,8]

Significant findings include;

1. Prevalence 30 (1.9%) out of 1577 or 1 in 52 or 2 per 100 or 20 / 1000
2. Children < 5 years - 5196 and 1577 (30.4%) were < 2 years
3. Yearly distribution 9, 12, 9
4. Fewer boys than girls 14/16; 1:1.14
5. Most affected children ≤6 months (70%) than children ≥7 months (30%)
6. Mean age of children 4.74months
7. Most frequent presenting complaint – difficult/fast/noisy breathing – 21/30 (70%); dyspnea 18/30 (60%); murmur 17/30 (56.7%)
8. Dysmorphic features 7/30 or 23.3%;
9. Mean PCV – acyanotic CHD - 36%; cyanotic CHD 56%
10. VSD, PDA and TOF were most frequently reported echocardiographic findings accounting for 8 (26.7%) 6 (20%), 2 (6.7%), 2 (6.7%) respectively.
11. Symptoms disappeared in 15 (50%); 7 (23.3%) referred for surgery and 1(3.3%) death

CONCLUSION

The African region has been quagmired with limitations in diagnosing and managing congenital heart disease, despite the increase in prevalence and risk factors of the disease. These findings, therefore, call for improvement in diagnosis and management in order to ameliorate the burden of childhood morbidity and mortality.

Conflict of interest: The authors declare no conflict of interest.

Acknowledgement: Nil

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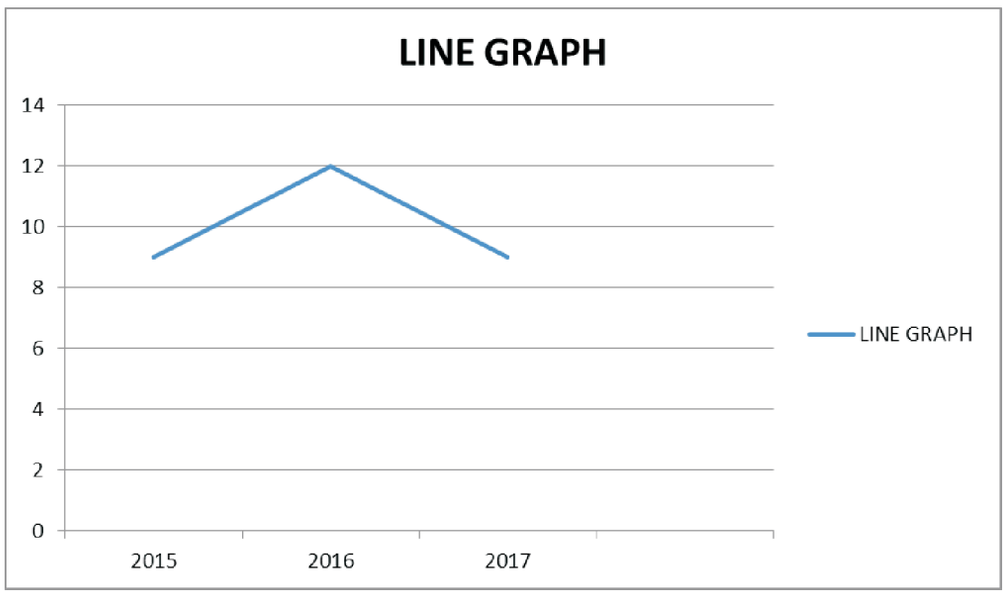

Figure 1: Yearly Distribution of 30 Children with Congenital Heart Disease (2015 - 2017)

Table I. Age and sex distribution of 30 children with Congenital Heart Disease

Age Months)	Males (%)	Females (%)	Total (%)
< 1	4 (28.6)	2 (12.5)	6 (20)
1 - <6	5 (35.7)	10 (62.5)	15 (50)
6 - <12	4 (28.6)	2 (12.5)	6 (20)
12 – <18	1 (7.1)	1(6.25)	2 (6.7)
18-24	-	1 (6.25)	1 (3.3)
Total	14 (100)	16 (100)	30 (100)

Table 2: CHD Type match with Age

S/N	Age	Cyanotic (%)	Acyanotic (%)
1	0 – 1 mth	1(3.3)	9(30.0)
2	2 – 6 mths	2(6.7)	9(30.0)
3	7 – 12 mths	2(6.7)	4(13.3)
4	13 – 24 mths	1(3.3)	2(6.7)
	Total	6(20.0)	24(80.0)

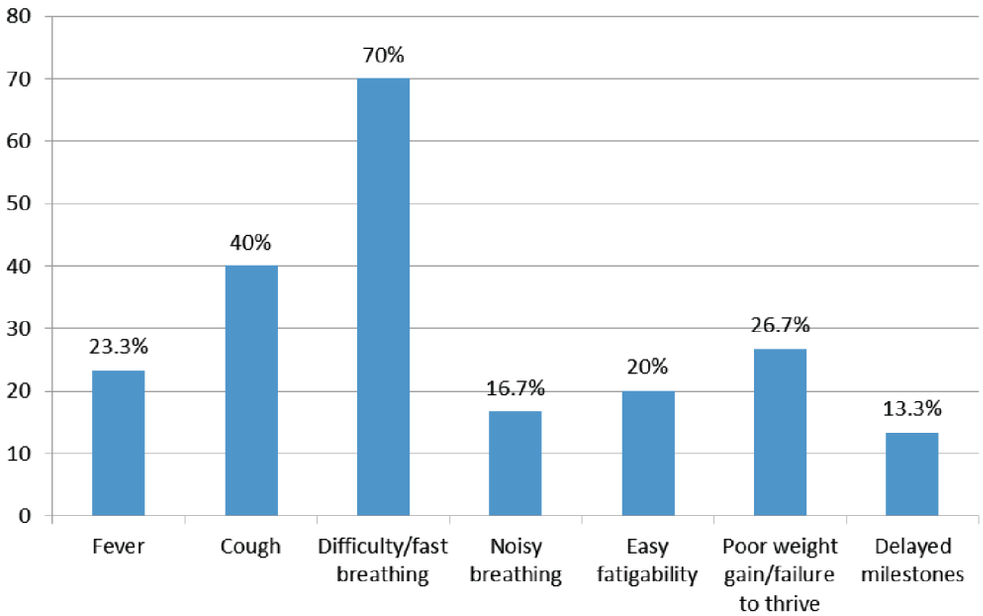

Figure 2: Presenting complaints and history findings of patients

Table 3: Physical findings

S/N	Findings	Frequency (%)
1	Pallor	3 (10.0)
2	Pyrexia	7 (23.3)
3	Cyanosis	5 (16.7)
4	Finger/toe clubbing	1 (3.3)
5	Oedema	1 (3.3)
6	Tachycardia	8 (26.7)
7	Tachypnoea	10 (33.3)
8	Dyspnoea	18 (60.0)
9	murmur	17 (56.7)
10	Crepitations	2 (6.7)
11	Active praecordium	5 (16.7)
12	Dysmorphic features	7 (23.3)
13	Cataract	1 (3.3)
14	Hepatomegaly/ hepatosplenomegaly	11 (36.7)

Table 4: Packed Cell Vol. (PCV) in 30 - children with Congenital Heart Disease

S/N	PCV	Acyanotic (%)	Cyanotic (%)	Total (%)
1	≤30	4 (13.3)	0 (0.0)	4 (13.3)
2	31 – 35	4 (13.3)	0 (0.0)	4 (13.3)
3	36 – 40	3 (10.0)	0 (0.0)	3 (10.0)
4	41 – 45	0(0.0)	0 (0.0)	0 (0.0)
5	46 – 50	2 (6.7)	0(0.0)	2 (6.7)
6	> 50	0 (0.0)	5(16.7)	5(16.7)

Table 5: Associated complications

S/N	Complications	Frequency (%)
1	Bronchopneumonia	14 (46.6)
2	Heart Failure	7 (23.3)
3	Birth Asphyxia	3 (9.9)
4	Prematurity	3 (9.9)
5	Feeding difficulty	2 (6.6)

Table 6: Chest X- ray findings

S/N		Frequency (%)
1	Broncho Pneumonic changes	7 (23.3)
2	Cardiomegaly	4 (13.2)
3	Normal Heart size	3 (9.9)
4	Dextrocadia	1 (3.3)
5	Not reported	10 (36.6)

Table 7: Echocardiographic Diagnosis of CHD (27pts)

S/N	Types	Frequency (%)
1	Ventricular Septal defect, VSD	6 (26.7)
2	Patent Ductus Arteriosus, PDA	6 (20.0)
3	Tetralogy of Fallot, TOF	2 (6.7)
4	Atrial Septal Defect, ASD	2 (6.7)
5	Transposition of Great Arteries, TGA	1 (3.3)
6	Tricuspid Atresia, TA	1 (3.3)
7	Patent foramen ovale, PFO	1 (3.3)
8	Atrioventricular Septal defect, AVSD	1 (3.3)
9	Dextrocardia (VSD + PDA + Atrial situs solitus)	1 (3.3)
10	Secundum type ASD + VSD	1 (3.3)
11	Secundum type ASD + PDA	1 (3.3)
12	Perimembranous VSO + Bifid Aorta	1 (3.3)
13	Subaortic VSD + PFO	1 (3.3)
14	PDA + PFO	1 (3.3)
15	PDA + VSD + ASD	1 (3.3)
16	TA + ASD + VSD	1 (3.3)

Table 8: Patient outcomes

S/N	Category	Frequency (%)
1	No Symptoms on follow up	15 (30.0)
2	Referred for Surgery	7 (23.3)
3	Dropped off from follow up	3 (10.0)
4	Died	1 (3.3)