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Original Research Paper

Pediatrics

A STUDY ON CLINICAL SPECTRUM OF CONGENITAL HEART DISEASE IN CHILDREN IN TERTIARY CARE CENTRE OF EASTERN INDIA

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ABSTRACT

Introduction: Reliable data on congenital heart disease (CHD) from diverse settings is important both for planning healthcare infrastructure and to elucidate possible aetiologies of CHD in different settings. The aim of this study was to describe the clinical spectrum and prevalence of CHD in a tertiary care hospital of Eastern India.

Methods: This was a prospective, descriptive, cross-sectional study of all children from 1 month to 12 years who had had an echocardiogram performed as an in-patient at a tertiary care super speciality hospital between February 2018 and July 2019.

Results: Of 110 enrolees, majority presented at <1 year of age. Male predominance (52.73%) was seen in the presentation. The most common symptoms were cough and breathlessness (93.63%); tachypnoea was the most common sign (93.63%), followed by tachycardia (89.09%). In this study, ASD was the most common acyanotic heart disease (38.04%); TOF was the most common cyanotic heart disease (55.55%). Central cyanosis was present in 20 cases, SpO_2 was <80%, 18 cases of them were cyanotic heart disease. The other 2 cases were acyanotic heart disease with severe pneumonia. The most common complications were congestive cardiac failure (CCF), Lower respiratory tract infections (LRTI), pulmonary hypertension and failure to thrive (FTT). Mortality was comparatively more in cyanotic heart disease.

Conclusion: CHD is a common cardiovascular problem in our setting. With increasing availability of echocardiographic facilities and screening in all cases of recurrent LRTI and FTT, more cases are likely to be identified early.

KEYWORDS : Congenital heart disease (CHD), congestive cardiac failure (CCF), Echocardiography

INTRODUCTION

Congenital heart disease occurs in approximately 0.8% of live births. The incidence is higher in stillborn (3-4%), spontaneous abortuses (10-25%), and premature infants (approximately 2% excluding patent ductus arteriosus [PDA]). This overall incidence does not include mitral valve prolapse, PDA of preterm infants, and bicuspid aortic valves (present in 1-2% of adults).

Congenital cardiac defects have a wide spectrum of severity in infants: approximately 2-3 in 1,000 new-born infants will be symptomatic with heart disease in the 1st year of life. The diagnosis is established by 1st week of life in 40-50% of patients with congenital heart disease and by 1st month of life in 50-60% of patients[1]. Congenital heart disease (CHD) is the commonest of all birth defects and is the most common type of heart disease among children.

CHD is defined as a gross structural abnormality of the heart or intrathoracic great vessels that is actually or potentially of functional significance. The prevalence of CHD in India ranges between 3.9 – 26.4 per 1000 live births, in hospital based studies. This heavy burden emphasizes the importance of this group of heart diseases. Amongst CHD majority are acyanotic CHDs which account for about two third of CHD burden. With improvement of paediatric cardiac care, their survival to adulthood has increased leading to increasing number of surviving adult patients with uncorrected congenital heart diseases. Majority of acyanotic CHD are simple and potentially correctable[2].

Aims and objective of the study:

The present work is being undertaken to evaluate:

1. To study the clinical features of congenital heart disease in children.
2. To evaluate the complication of congenital heart disease.
3. Short term follow up

MATERIALS AND METHODS

A hospital based, prospective, observational study was conducted between February 2018 and July 2019 at the OPD and In-patient Department of Paediatric Medicine, of our tertiary care, superspeciality Hospital. All patients who attended the Paediatric Medicine OPD and who were admitted in the IPD of Paediatric Medicine at I.P.G.M.E. & R., during the study period, fulfilling the inclusion and exclusion criteria, were included in the study. Keeping the time constraints, 110 patients with CHD were included.

INCLUSION CRITERIA:

1) Age – 1month - 12 yrs.
2) Children with respiratory and cardio-vascular problems were included

EXCLUSION CRITERIA:

1) Neonatal CHD.
2) Operated case of CHD
3) Acquired heart disease
4) Children having multiple congenital malformations

After obtaining ethical clearance from the Institutional Ethics Committee, the study was conducted among the study

population after taking written informed consent from the guardian/parents/ patients(>7 years age). During the initial 15 months of the study period, all children (1month-12 years) diagnosed as CHD were enrolled, but only those satisfying the inclusion/exclusion criteria were included for the study. Based on the age of first presentation, age of first onset symptom, and physical examination, cyanosis and oxygen saturation, study population were grouped as acyanotic heart disease or cyanotic heart disease. The study population was investigated and transthoracic [2D] guided, M mode and Doppler echocardiography was done to detect evidence of various types of congenital heart disease. They were further classified into VSD, ASD, VSD with ASD, PDA, TOF, TAPVC, TGA with VSD or ASD, pulmonary stenosis, single ventricle, dextrocardia etc. The data collected through the study was analysed to find out distribution of CHD according to age and gender. The incidence of various types cyanotic or acyanotic heart disease and their complications were noted.

Statistical analysis was done by using SPSS 24.0. and Graph Pad Prism version 5. Data had been summarized as mean and standard deviation for numerical variables and count and percentages for categorical variables. Frequencies of various signs expressed as percentage of total cases. Unpaired proportions were compared by Chi-square test or Fischer's exact test, as appropriate. Each of these statistics can be used to carry out either a one-tailed test or a two-tailed test. The Mann–Whitney U test was used to determine whether two independent samples were selected from populations having the same distribution; If the calculated p-value was below the threshold chosen for statistical significance (usually the 0.05, or 0.01 level), then the null hypothesis was rejected in favour of the alternative hypothesis. p-value ≤ 0.05 was considered as statistically significant.

A logistic regression analysis was done using Statistical version 6 [Tulsa, Oklahoma: StatSoft Inc., 2001] and MedCalc version 15.8 [Mariakerke, Belgium: MedCalc Software 2015], among the statistically significant predictor variables.

RESULTS

It represents the frequency distribution of study subjects by age group of the child. Among the 110 subjects, 90 patients (81.82%) constitute age interval between 1 month and 1 year. 18 patients (16.36%) constitute age interval between 1 year and 5 years. 2 patients (1.82%) are between 5 years and 12 years of age.

Male patients predominated over females. 52.73% were males and 47.27% were females.

Distribution of cyanotic and acyanotic heart disease: 92 patients (83.64%) were suffering from Acyanotic CHD, in which 47 (51.09%) were males, 45 (48.91%) were females and 18 patients (16.36%) were suffering from Cyanotic CHD, in which 11 (61.11%) were males and 7 (38.89%) were females. Among the acyanotic heart disease, ASD is found to be the commonest variant in this study (38.04%), and TOF is the commonest variant among the cyanotic heart diseases.(**Fig 1&2**)

Age and gender wise distribution: ASD, the most common CHD among the acyanotic heart diseases and the most common CHD overall, is found to be most common in between 1 month and 1 year of age. It was also most common among the females (18) over the males. The second most common CHD, VSD, is also most common in infancy, with slight male predominance (male= 16 cases, female= 13 cases).

Tetralogy of Fallot, the commonest CHD among the cyanotic heart disease is most common in between 1 month and 1 year of age. It is also slightly commoner among the males (6 cases) over females (4 cases).

Clinical findings: In the present study, most common symptoms were cough / breathlessness in 97 cases (88.20%), followed by fever in 63 cases (57.27%), prolonged suck rest suck (SRS) cycle seen in 62 patients (56.36%). And most common signs on general examination were tachypnea in 103 cases (93.63%), tachycardia in 98 cases (89.09%), followed by crepitations in 73 cases (66.36%),murmur in 65 cases (59.09%) and cyanosis in 20 cases (18.18%) of cases.

Presence of murmurs: Murmur was audible in 65 cases (59.1%), 45 cases (40.9%) did not have any murmur.

Chest X-ray findings: 85 cases (77.27%) presented with pneumonia and 25 cases (22.73%) presented without pneumonia. And 82 cases (74.27%) were presented with cardiomegaly and 28 cases (25.45%) were without cardiomegaly.

SpO_2 wise distribution: In this study, in 20cases central cyanosis was found and also SPO2 value was <80%, among which 18 cases were cyanotic heart disease. Two cases (2.17%) were acyanotic heart disease. This may be due to presence of severe pneumonia in these two cases of acyanotic heart disease who have normal SPO2 >92% after treatment and proved to be acyanotic heart disease. And all the 18 cases (16.36%) of cyanotic heart disease was found SPO2 value <80%. Among total 92 (83.64%) acyanotic heart disease, 71 cases (77.17%) were presented with SPO2 value 80 -90% and 19 cases (20.65%) had SPO2 value >90%. Chi- square test P-value =<0.001, which was significant, that means clinically early predicted between acyanotic and cyanotic heart disease by spo2 value.

Cardiomegaly in echocardiography: Out of 18 cases of cyanotic CHD, 5 (27.78%) cases presented with cardiomegaly and 13 (72.22%) cases not presented with cardiomegaly. And out of 92 cases of acyanotic CHD, 77 (83.70%) cases presented with cardiomegaly and 15 (16.30%) cases not presented with cardiomegaly.

Hypertrophy of cardiac chambers: out of all cases, 52 (47.27%) cases presented with RVH and 40 (36.36%) presented with LVH and 18 (16.36%) presented with both (RVH + LVH).9 (Fig-2)

Outcome: 58.20% patients were discharged, in which 92.19% were acyanotic and 7.81% cyanotic and 41.80% patients expired, in which 71.74% were acyanotic and 28.26% cyanotic. Fishers exact test 2 tailed P value = 0.005.

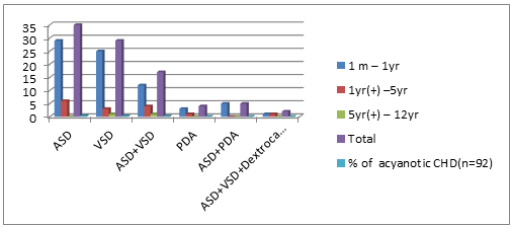

Fig 1- Age and gender wise distribution of common acyanotic heart disease

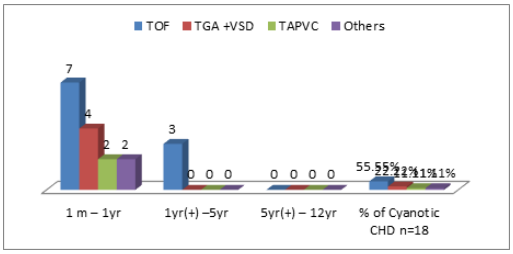

Fig 2- Age and gender wise distribution of common cyanotic heart disease

DISCUSSION:

Congenital heart disease by definition is the structural abnormalities of heart or intra-thoracic great vessels present since birth that is actually or potentially of functional significance regardless of the age of detection (Mitchell et all, IJP, April 2013)[3]. The reported prevalence of congenital heart diseases (CHD) ranges from 1.01 to 17.5 per 1000 live births according to various studies over the world[4-6]. In India, the prevalence of CHD is 2.25-5.2 per 1000 children[7]. In India, the incidence of CHD is 3.9/1000 live births, as reported by a Khalil et al in a hospital based study[8]. In community based studies from India, the prevalence of CHD ranges from 0.8-5.2/1000 children[8]. In India10% of the present infant mortality may be accounted for by Congenital Heart Disease as reported by Saxena et al[9]. Nearly 1/3rd of the congenital heart diseases (CHD) are critical requiring interventions in the first year of life, 6.7% of the neonatal deaths are due to congenital malformations, 25% of which are cardiovascular[10].

Because timely recognition of cyanotic congenital heart disease (CCHD) could improve outcomes, it is important to identify and evaluate strategies to enhance early detection[11].

The present study shows, most of the patients were below 1 year which constitutes 81.82% followed by those in 1 to 5 yrs age group, which constitutes 16.36%. In the study done by Kumar Deeva et al[12], the majority of patients belonged to <1year age group i.e about 36% followed by age group of 8 – 12 years with 32%. There were less number of patients suffering from congenital heart disease between 1 – 4 years age group. Mahapatra et al[13] showed that CHD cases were diagnosed more commonly between 1 month to 1 year (40.25%). In the study done by Gabriela K et al[14], the majority of children (80%) were under 1 year of age and in Shah G. S et al[15] study showed, CHD presented more frequently during infancy (46 %). Begum R et al 54 also described that majority of cases (71.95%) were between 1—12 month , 18.30% between 1-5 years and 9.75% between 5-12years.

The present study shows, male patients predominated over females. 52.73% were males and 47.27% were females. In a similar study done by Kumar Deeva et al[12] male patients predominated over females, in their study, 64% were males and 36% were females. Mahapatra et al[13] showed that out of 231 cases, males (54.5%) predominated and male to female ratio was 1.2:1. Shah G. S. et al[15] showed that Out of 84 CHD cases, 51cases were males and 33 females and male to female ratio was 1.5:1. And Begum R. et al also described that out of 82 cases, 55 cases (67.07%) male and 27 cases (32.92%) female, and male to female ratio was 2.03:1

In the present study, out of 92 cases (83.64%) of acyanotic CHD , 35 cases (38.04%) were ASD, 29 cases (31.52%) were VSD , 17 cases (18.48%) were ASD +VSD , 4 cases (4.35%) were PDA , 5 cases (5.43%) were diagnosed as ASD +PDA , and 2 cases (2.17%) had dextrocardia.

Out of 18 cases (16.36%) of cyanotic CHD, 10 cases (55.55%) were TOF ,4 cases (22.22%) were diagnosed as TGA +VSD , and 2 cases (11.11%) were found to have TAPVC and other 2 cases were(11.11%) pulmonary atresia and single ventricle.

Comparative study done by Hazela S. et al[16] in 2014, found 58% VSD, 26% ASD, and 56% TOF, 18% TGA with VSD. And Kumar B Deeva et al in their study in 2015, found 32% VSD, 16% ASD ,18% TOF and 6% TGA with VSD.

Kumar Deeva et al[12] who showed that most of the patients (76%) were suffering from also acyanotic heart diseases and the rest (24%) were suffering from cyanotic heart diseases. Out of 24% patients of cyanotic type of heart disease which was tetrology of fallot (18%) and it was the most common and followed by TGA with 6%. And 76% constituted acyanotic group of which ventricular septal defect was the most common followed by atrial septal defect which was 16% and then PDA (10%).

Mahapatra et al[13] showed that the commonest type of acyanotic CHD in their study was ventricular septal defect (36.3%) and cyanotic CHD is tetralogy of Fallot (11.25%). And Shah G. S. et al[15] also showed that acyanotic heart disease was detected in 58 (69 %) cases while cyanotic heart disease was detected in 26 (31%) cases. Among acyanotic heart disease, ventricular septal defect was found in 49 (58.3%), atrial septal defect in 4 patients (4.8%), endocardial cushion defect in 2 patients (2.4%) and dextrocardia was found in 3 patients (3.6%). Among cyanotic heart disease, Tetralogy of Fallot (TOF) accounted for 13.1%, total anomalous pulmonary venous connection (TAPVC) 3.6%, transposition of great arteries (TGA) with VSD 1.2% and unspecified cases of heart disease was found in 13.1%. VSD and TOF were the most common lesions while other CHD like ASD, dextrocardia, TAPVC, ECD, TGA with VSD were encountered less frequently. Begum R. et al[17] also described that out of 82 cases 51 cases (62.20%), acyanotic and 31 cases (37.80%) cyanotic , among of the 62.20% acyanotic, 33 cases (40.20%) VSD, 10cases (12.20%) ASD, 3 cases (3.60%) PDA, .and among of the 37.80% cyanotic, 16 cases (19.50%) TOF, 3 cases (3.60%) TGA, 1case (2 %) TAPVC and 2 cases (2.40%) complex lesions.

In the present study, most common symptoms were cough with breathlessness in 97 cases (88.20%), followed by fever in 63 cases (57.27%), and prolonged SRS cycle seen in 62 patients (56.36%).

And most common signs on general examination were tachypnea in 103 cases (93.63%), tachycardia in 98 cases (89.09%), crepitations in 73 cases(66.36%) , cardiac murmur in 65 cases (59.09%) and congestive heart failure in 56 cases (50.90%), central cyanosis 20 cases (18.18%), pedal edema 15 cases (13.63%), and clubbing in 8 cases (7.28%), Kumar Deeva et al[12] showed that about 74% of them were present with murmurs while 26% did not show any type of murmur. And also study done by Mahapatra et al[13] showed that the major clinical finding was a detection of a murmur (84.8%) followed by tachycardia (41.5%) and tachypnea (36.3%). And Gabriela K. Kuswiyanto R. B. et al[14] described the clinical symptoms mostly found were difficulty of breathing (98%), fever (85.2%), cough (75.2%), Bronchopneumonia (86.6%) was the common type of acute lower respiratory tract infection (ALRTI).

Shah G. S. et al[15] also described that the most common clinical presentations were breathlessness (69%), lower respiratory tract infection (LRTI) (52%), congestive cardiac failure (CCF) (46%), cyanosis (20.2%). And Begum R. et al[17] also described that from history and clinical examination the disease was suspected in patient having cardiac murmur, presence of cyanosis, feeding difficulties, cyanosis associated with feeding difficulties, clubbing, features of congestive cardiac failure.

In the present study chest Xrays were done in all 110 cases, out of which 85 cases (77.27%) presented with pneumonia and 25 cases (22.73%) without pneumonia. 82 cases (74.27%) had cardiomegaly and 28 cases (25.45%) did not have cardiomegaly.

In this study, in 20 cases central cyanosis was found at presentation and also SPO2 value was <80%, among which 18 cases were cyanotic heart disease. Two cases were acyanotic heart disease. This may be due to presence of severe pneumonia in these two cases of acyanotic heart disease they later had normal SPO2 >92% after treatment and proved to be acyanotic heart disease. And all the 18 cases

(16.36%) of cyanotic heart disease had SPO2<80% inspite of oxygen therapy. Among all the 92 cases (83.64%) were acyanotic heart disease, of which 71 cases (77.17%) were presented with SPO2 value between 80 - 90% and 19 cases (20.65%) had SPO2 value >90%. Chi- square test P-value =<0.001, which was significant. It means early clinically prediction of cyanotic and acyanotic heart disease by SPO2.

In our study, 58.20% cases were discharged, in which 92.19% cases were acyanotic heart disease and 7.81% were cyanotic. And 41.80% cases died, in which 71.74 % were acyanotic heart disease and 28.26% cases were cyanotic heart disease.

But Shah G.S. et al[15] described that the mortality rate was 20 %. The mortality usually occurred in those patients complicated with congestive cardiac failure, lower respiratory tract infection.

CONCLUSION.

This study is an attempt to increase the effectiveness of screening of CHD by combining clinical examination and pulse oximetry. A highly index of suspicion, detailed history, physical, cardiovascular and other systemic examinations, chest x-ray, and echocardiography help us to diagnose most of the cases of CHD. A cardiac evaluation with echocardiography is also necessary in all cases of LRTI and failure to thrive (FTT). CHD needs regular monitoring for early diagnosis and will reduce the morbidity and mortality to a large extent and for better outcome.

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