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Original Research Article

STUDY OF CONGENITAL HEART DISEASE IN NEONATES

P. Thirumurugan[1], S. Kumaran[2], D. Prabakar[3]

[1]Associate Professor, Department Of Cardiology, Institute Of Child Health, Madras Medical College, Tamilnadu, India.
[2]Associate Professor, Department Of Cardiology, Tanjavur Medical College, Tamilnadu, India.
[3]Associate Professor, Department Of Paediatrics, Institute Of Child Health, Madras Medical College, Tamilnadu, India.

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Corresponding Author:
Dr. D. Prabakar
Email: drprabakar73@gmail.com

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Abstract

Background: Congenital heart disease (CHD) has been prevalent in approximately 0.6-0.8% of neonates, whereas an early diagnosis of CHD enables appropriate management and decision-making steps in critical patients. The study aims to identify congenital heart disease's clinical profile and etiology in neonates. **Materials and Methods:** The prospective study was conducted at the Neonatal Intensive Care Unit at a tertiary care hospital for one year among patients with a confirmed clinical diagnosis of CHD, with ethical approval. Patient demographic, clinical profiles, mortality, and extra-cardiac anomalies were assessed. Data collected from the study is represented using SPSS 20.0 and in figures, tables, and charts. **Result:** A total of 50 neonates were enrolled in the study with CHD, out of which 54.0% were males, and 46.0% were females. Hurried respiration was reported in 68.0% of patients, followed by feeding problems (63.0%), cyanosis in 38.0%, and murmur in 78.0% of patients. Anorectal malformation was reported in 5.0% of patients, followed by Hirschsprung disease in one patient and neonatal hepatitis syndrome in 3.0%. Follow-up of patients revealed a failure to thrive in 7 cases, respiratory tract infection in 12 patients, and congestive cardiac failure in 5 patients. Mortality was seen in 25 patients. **Conclusion:** Neonates with CHD have a poor prognosis unless diagnosed early and treated appropriately. The current identifies that neonates with multiple anomalies should be screened for underlying structural or congenital heart disease.

INTRODUCTION

Congenital heart disease (CHD) is the leading cause of significant congenital malformations and is a serious worldwide health issue. The reported birth prevalence of CHD differs greatly amongst research conducted worldwide. The best approximation is widely agreed to be the estimate of 8 per 1,000 live births. Throughout the past century, significant advancements in cardiothoracic surgery and cardiovascular diagnostics have boosted the survival of neonates with CHD.[1] Critical congenital heart disease, defined as a condition that results in mortality or necessitates invasive intervention in the neonatal era, affects one to two newborns out of every 1000, and neonates with this condition benefit most from early identification.[2]

A frequent and deadly form of birth abnormality is congenital heart disease (CHD). Several defects may cause severe morbidity or life-threatening situations if not identified early in life. Nonetheless, most newborns with CHD can gain from successful surgical repair or palliation with early identification.[3] A 4 per 1,000 adult prevalence of CHD is predicted. It is crucial to obtain accurate data on the prevalence of CHD births globally to understand the etiology of CHD. Dedicated care might also be planned and delivered more effectively.[1] According to a definition, congenital heart disease is "a gross anatomical anomaly of the heart or intrathoracic major vessels that is really or potentially of functional relevance." This definition does not include the persisting left superior cava or the combined brachiocephalic and left carotid arterial trunk as functionless anomalies of the major veins or branches of the aortic arch.[4]

The life expectancy of afflicted children has dramatically increased owing to the accessibility of diagnostic technologies like echocardiography and prenatal scanning and improvements in surgical methods and aftercare. As a result, it is now feasible to fully treat a variety of congenital heart illnesses in the neonatal period or the first few years of life, and kids with complex congenital heart problems are now living through the age of childhood.[5] According to the New England Regional Baby

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Cardiac Program research, most CHD-related deaths occur within the first few weeks or months of life. The ability to influence both the mortality of the underlying defect and the subsequent consequences of CHD on the development of other organ systems is provided by primary reparative surgery for various CHDs.[6]

Compared to males, women often have a greater risk of endocarditis, aortic-related outcomes (such as aneurysm or rupture), and situations that require an implanted cardioverter defibrillator. Reoperation, heart failure, and arrhythmia are additional problems that both sexes experience often. Suppose birth prevalence, life expectancy, and the progression of problems linked to congenital heart disease are completely understood. In that case, these factors may serve as the basis for models that forecast the size of the population with congenital heart disease in the future.[7] This study is aimed to assess congenital heart disease in neonates.

MATERIALS AND METHODS

A prospective observational study was conducted at the Neonatal Intensive Care Unit in a tertiary care hospital for one year. Neonatal patients with Congenital Heart Disease were the subjects of this study. Patients who met the inclusion and exclusion criteria were enrolled in the research to assess congenital heart disease in neonates. Fifty neonates were included in this study, and the study was carried out after receiving approval from the institutional ethics committee. A parent's written informed consent was required before a neonate was included.

Inclusion Criteria: The study included all the neonates who were either born at the hospital or were referred to in the neonatal age group, and confirmed clinical diagnosis of congenital heart disease.

Exclusion Criteria: Parents who refused to consent to the study and patients having cyanosis due to causes other than CHD were excluded.

Demographic details of all the patients were recorded. A thorough history of kinship in the parent of the neonate with congenital heart disease was taken. Short-term survival and the occurrence of further congenital abnormalities were reported. Both the age at death and the causes of death were documented. Extra-cardiac anomalies and types of CHD for cyanotic and acyanotic and their age representation were also evaluated in the neonates. The neonate's presented murmur was also noted in the study.

The complaints of the CHD neonates and their follow-up were also recorded. The representation of data was done in the form of tables and figures. All the data were input into SPSS 20.0 and examined for frequencies, percentages, means, and medians after being recorded on Proforma.

RESULTS

Among 50 neonates, 24 (45%) were reported with CHD at week 1. 2 (4%) at week 2, 3 (6%) at week 3, and 21 (40%) at week 4, respectively. The majority of neonates with CHD were recorded at the initial stage. (Table 1) Hurried respiration (68) was the major complaint in neonates, followed by feeding problems (63). Cyanosis and decreased urinary output were also noted. Sweating and murmur were the least complaints to be found in the neonates. [Figure 1].

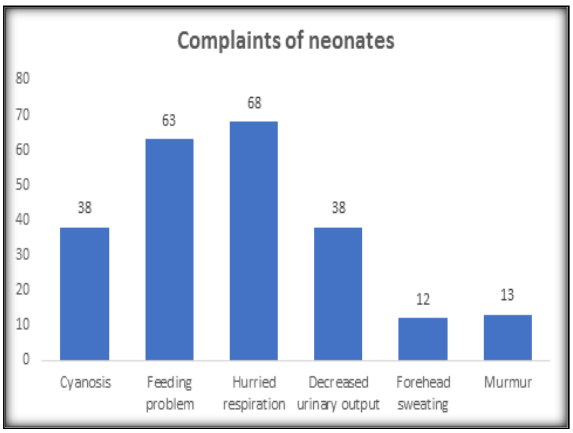

Figure 1: Complaints of neonates

Our study recorded a male predominance of about 28 (54%). Of the 50 neonates, 22 (46%) females were recorded in the study. (Table 1) Figure 2 shows the survived and expired cases in the study. Thirty-five neonates survived, and 25 expired.

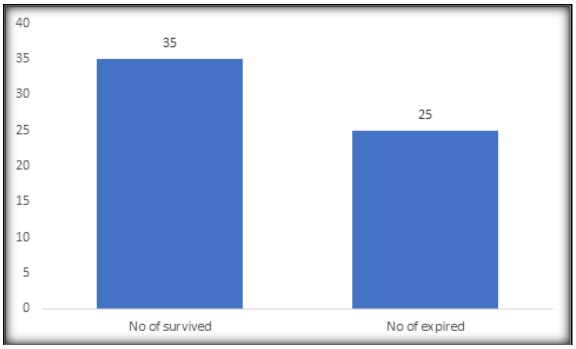

Figure 3: Immediate outcome of the neonates with CHD

22 (42%) patients were reported for CHD due to the history of consanguinity in the parent of the neonate. 28 (58%) neonates were reported for CHD with no history of consanguinity in the neonate's parent. Out of 50 neonates majority of them were recorded for murmur 39 (78%). 11 (22%) were noted when the neonates did not show any murmur [Table 2].

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Table 1: Age at presentation of newborn with CHD

		No. of cases (n)	(%)
Age	Week 1	24	45
	Week 2	2	4
	Week 3	3	6
	Week 4	21	40
Sex	Male	28	54
	Female	22	46

Table 2: Consanguinity history in the parents of neonates with CHD

		No. of cases (n)	Percentage
Born of	Consanguineousmarriage	22	42
	Non-consanguineousmarriage	28	58
Murmur	Present	39	78
	Absent	11	22
Associated anomalies	Anorectal malformations(ARM)	3	5
	Hiruchsprung disease(HPD)	1	2
	Neonatal hepatitissyndrome (NHS)	2	3
	Total present (extra-cardiac anomalies)	6	10
	Absent	44	90

Total extra-cardiac anomalies were found in 6 (10%) neonates, out of which 3 (5%) were anorectal malformations (ARM), 1 (2%) for Hirschsprung disease (HPD), and 2 (3%) for neonatal hepatitis syndrome (NHS) respectively. 44 (90%) cases had no extra-cardiac anomalies [Table 2].

Based on the type of heart disease, cyanotic heart disease was recorded in 22 (37%) patients, whereas 38 (63%) were recorded for Acyanotic heart disease. Among the cyanotic heart disease, TGA was in most of the six patients during the first week. ASD was 4 in the majority of neonates with acyanotic heart disease. By evaluating all four weeks, TOF accounted for 8%, TGA 12%, TAPVR 3%, Single ventricle 2%, HLHS 5%, HRHS 2%, TA 2%, and PS 3% in cyanotic heart disease. Among the acyanotic heart disease, 2% were COA, 3% were PDA, 30% were VSD, 20% were ASD, 2% were CAVCD and 6% for VSD and ASD [Table 3].

Table 3: Various types of congenital heart disease and their age of presentation

Type of heart disease	Age (days)	1st wk	2nd wk	3rd wk	4th wk	Total	%	Total (n)	%
	TOF (Tetralogy of Fallot)	1	1	1	2	5	8		
	TGA (Transposition of great arteries)	6	1	0	0	7	12		
	TAPVR (Total Anomalous of Pulmonary Venous Return)	2	0	0	0	2	3		
Cyanotic	Single Ventricle	1	0	0	0	1	2	22	37
	HLHS (Hypoplastic Left Heart Syndrome)	3	0	0	0	3	5		
	HRHS (Hypoplastic Right Heart Syndrome)	1	0	0	0	1	2		
	TA (Tricuspid Atresia)	1	0	0	0	1	2		
	PS (Pulmonic Stenosis)	2	0	0	0	2	3		
	COA (Coarctation of Aorta)	0	1	0	0	1	2		
	PDA (Patent Ductus Arteriosus)	1	0	0	1	2	3		
Acyanotic	VSD (Ventricular Septal Defect)	2	0	2	14	18	30	38	63
	ASD (Atrial Septal Defect)	4	1	2	5	12	20		
	CAVCD (common atrioventricular canal defect)	1	0	0	0	1	2		
	VSD+ASD	2	0	0	2	4	6		

A follow-up of the CHD neonates was conducted. During the follow-up, 7 (21%) complained of failure to thrive (FTT). Respiratory tract infections (RTI) were the major complaint in neonates 12 (35%). 10 (29%) did not have any complaints and were noted to be normal. Congestive cardiac failure (CCF) was the least complaint seen in neonates [Table 4].

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Table 4: Follow-up of the CHD neonates and their complaints

Complaints	No of cases (n)	(%)
FTT (Failure to thrive)	7	21
RTI (Respiratory tract infections)	12	35
CCF (Congestive cardiac failure)	5	15
Normal	10	29

DISCUSSION

CHD is one of the leading disorders affecting children under 18, affecting 8 out of every 1000 live births. Together with the neural tube defect, it accounts for two-thirds of all severe congenital disabilities and is a significant source of morbidity and death in infants.[5] In research, 1% of the hospitalized patients had CHD, and Male preponderance was discovered.[7] Our study also reported a male predominance of 54%. Another survey revealed a male majority, which is consistent with prior studies.[8] Equal prevalence in both sexes was recorded in research conducted in Hazara.[9] Around 50,000 infants may be born each year with congenital cardiac disease in Pakistan due to the country's exceptionally high birth rate.[5]

Out of the 50 neonates, most CHD was reported at week 1 in 24 (45%) patients. Week 2 reported a lesser number of about 2 (4%). Four (10%) newborns have a family history of congenital cardiac defects. Most congenital cardiac disorders have a 1-3% risk of recurrence if one sibling is afflicted.[5] Most instances (84.4%) were found in infancy, with 29.2% in the first month of life.[7] Another study also reported similar results. [9] The mortality rate in our study was reported to be 25, and 35 patients survived. In a study, 28 infants (63.6%) made it through the newborn phase. Two of the 16 fatalities occurred due to surgical complications, while the other 14 perished from medical conditions. In addition to the cyanotic congenital heart defect, seven of the 16 expiries also had extra-cardiac congenital abnormalities.[5] In contrast to VSD, PDA, and PS, which are more prevalent in females, TGA and left-sided obstructive lesions are more common in boys (about 65%).[10]

The parent's discovery of a murmur and obvious cyanosis was the most frequent reason for a heart exam. Both cyanotic and acyanotic heart disorders have a wide range in the age at which they were first diagnosed.[11] In our study, 39 (78%) neonates presented murmur, whereas it was absent in 11 (22%) neonates. A third of the research participants had extra-cardiac congenital abnormalities that were related.[5] This is consistent with the literature's stated incidence of these abnormalities.[12] In a different research, 58% of the participants had an acyanotic heart abnormality.[7] This acyanotic heart illness's relative frequency is slightly lower than reported nationally and globally.[13] Our study showed 37% of cyanotic heart disease and 63% acyanotic heart disease. The most common acyanotic abnormality was VSD (33.3%), whereas the most common cyanotic anomaly was TOF (17.7%). In one research, six individuals (6.3%) had complex CHD. Seven individuals (7.3%) had dextrocardia; five (71%) had cyanotic heart disease, primarily severe congenital heart disease.[7] In our study, TGA (12%) and TOF (8%) were the most common cyanotic abnormality. VSD (30%) was the most common acyanotic abnormality, followed by ASD (20%). Another study discovered VSD, ASD, ECD, and dextrocardia were all present in acyanotic congenital heart disease in 58.3%, 4.8%, 2.4%, and 3.6% of cases, respectively. TOF in 13.1% of cases with cyanotic congenital heart disease, TAPVC in 3.6%, TGA with VSD in 1.2%, and unidentified heart disease in 13.1%.[8]

The most prevalent symptom of cyanotic and acyanotic heart disease was shortness of breath. In patients of VSD, LRTI and FTT were more often seen. Cyanosis was discovered in 20.2% of instances, and TOF patients were most likely to have it.[8] Due to the parent of the newborn's history of consanguinity, 22 (42%) individuals had CHD. Respiratory Tract infection (RTI) was seen in 35 % of the patients following CHD. 29% of the patients were normal during the follow-up. Particularly during the winter, cardiac patients are more likely to get respiratory infections.[7] The main symptoms of CHD are FTT and developmental delay, which are caused by poor energy expenditure, insufficient food intake, and malnutrition or feeding difficulties.[8]

CONCLUSION

Our study showed male predominance. The majority of the neonates with CHD were recorded in the initial weeks. The majority of the neonates with CHD showed survival. The majority of the neonate did not show any extra-cardiac anomalies. The neonates should also be screened for murmur. For healthy growth and development, CHD requires routine monitoring. Early detection and prompt treatment will significantly lower morbidity and death.

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