Original Article

Pattern of Congenital Heart Disease in Children — A Cross-sectional Study in 250 Bed District Hospital in Northern Region of Bangladesh

DOI: dx.doi.org

Sazzad Haider Shahin[1*], Shirin Akhter[2], Sheikh Masud[3]

Received: 05 July 2024
Accepted: 15 August 2024
Published: 25 August 2024

Published by:
Sheikh Sayera Khatun Medical College (SSKMC), Gopalganj, Bangladesh

*Corresponding Author

ABSTRACT

Introduction: *Congenital heart disease (CHD) is a major problem of heart's structure and function which is present at birth. Congenital heart disease is commonly genetic defect and diverse abnormalities occurs due to this type of birth defect. A study reported the incidence of CHD ranged between 1.0- 150 per 1000 live births worldwide.* ***Methods & Materials:*** *This study was a retrospective cross-sectional study which was conducted at the department of Pediatrics, in 250 Bedded District Hospital, Thakurgaon, in northern region of Bangladesh. The study was conducted during the period of March 2019- February 2022. The total sample size for this study was 135.* ***Results:*** *Most of the patients 87(64.4%) were diagnosed during the age of day 29 – 12 month, 34(25.2 %) of patients were diagnosed during neonatal period and only 14(10.4%) were diagnosed during 1-12 years. Male were found clearly the most predominant in this study. 120(89%) had acyanotic CHD and only 15(11%) had cyanotic CHD. ASD, VSD and PDA was the most common pattern of CHD among the study children. Other pattern of CHD like Valvular HD, Ebstein Anomaly, Tetralogy of Fallot, TGA, AVSD, PA- VSD, Truncus Arteriosus, DORV, HPLHS, Single Ventricle and TAPVR was not very common among the study patients.* ***Conclusion:*** *With the development of diagnostic capacity and neonatal care, timely detection of CHD is probable by 2D and caler echocardiography which can help to ensure timely treatment and contribute to better treatment outcome.*

Keywords: *Congenital Heart disease (CHD), Ventricular Septal Defect (VSD), Atrial Septal Defect (ASD)*

(The Insight 2023; 6(2): 183-189)

1. *Junior consultant, Department of Pediatrics, 250 Bedded general hospital, Thakurgaon, Bangladesh*
2. *Medical officer, Department of Disease Control, Civil surgeon Office, Thakurgaon, Bangladesh*
3. *Senior Consultant, Department of ENT, 250 Bedded General Hospital, Thakurgaon, Bangladesh*

INTRODUCTION

Congenital heart disease (CHD) is a major problem of heart's structure and function which is present at birth. Congenital heart disease is commonly genetic defect and diverse abnormalities occurs due to this type of birth defect. A study reported the incidence of CHD ranged between 1.0-150 per 1000 live births worldwide[1]. CHD is generally categorized into two groups, named cyanotic heart disease like tetralogy of Fallot (TOF), truncus arteriosus (TA), transposition of the great arteries (TGA); and acynotic heart disease which especially includes ventricular septal defect (VSD), atrioventricular septal defect (AVSD), patent ductus arteriosus (PDA), atrial septal defect (ASD), pulmonary stenosis (PS), and coarctation of the aorta[1,2]. Although Congenital heart disease is categorized based on multifactorial defects but irresistible mainstream of congenital heart defects do not isolate in Mendelian ratios and shows similar accumulation, which advocates that genetic factors may play a role in CHD expansion[3]. Congenital heart disease can be caused due to sporadic genetic variations, point mutations, deletion or duplication[4]. Moreover, 5-8% cases of CHD are associated with a large spectrum of chromosomal abnormalities including Trisomies 21, 13, and 18[5,6] Nearly 30% of major cardiac defects are related with supplementary developmental abnormalities and caused due to a known chromosomal abnormality syndrome or as a genetic syndrome part[7,8] However, most of the studies reported that CHD is associated with genetic defects and PS was the most recurrent[9] Whereas other studies claimed that the incidence and pattern of genetic disorders is associated with CHD may differ within region to region[10,11] Early diagnosis of CHD and appropriate treatment is very important for the management of CHD in these children[12,13]. In developed countries, generative exposure of CHD is now thought to be a standard of care which helps in improving the treatment outcome. But in most developing and underdeveloped countries, these treatment facilities are low and inaccessible to most of the people. Besides, the patients present late at the hospital which results in poor outcome and much complications may be also seen[14]. Hence, the aim of this present study was to find the incidence and investigate the pattern of CHD related with genetic defects in pediatric patients.

MATERIAL AND METHODS

This study was a retrospective cross-sectional study which was conducted at the department of Pediatrics, in 250 Bedded District Hospital, Thakurgaon, in northern region of Bangladesh. The study was conducted during the period of March 2019- February 2022. The total sample size for this study was 135.

Inclusion criteria

- Children who are aged between 1 day-12 years.
- Patient who were diagnosed for CHD for the first time and admitted in pediatric department.

Exclusion criteria

- Patients with acquired heart disease.
- Who died prior to the confirmation of diagnosis.
- Old cases who were previously assessed by echocardiography and came up for further follow up.

The study patients were selected by reviewing the hospital's congenital heart disease (CHD) nominal register. All the information in the hospital course and

treatment given were recorded properly. The data required for the purpose of this study are age and gender of patient and pattern of CHD. Children who were diagnosed with cyanotic heart disease after discharge from the birth clinic was considered as having a delayed presentation. The ethical approval was given by the hospital authority. The statistical analysis was done using the statistical tool "Statistical Package for Social Sciences (SPSS) version 21.

RESULTS

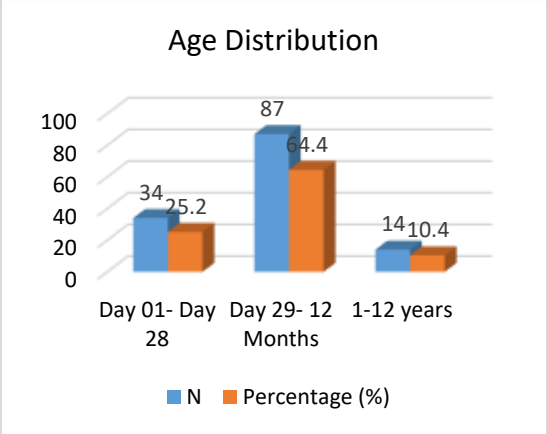

Figure 1: Age distribution of the study patients

Figure 1 shows the distribution of the study patients. Most of the patients 87(64.4%) were diagnosed during the age of day 29 – 12 month, 34(25.2 %) of patients were diagnosed during neonatal period and only 14(10.4%) were diagnosed during 1-12 years.

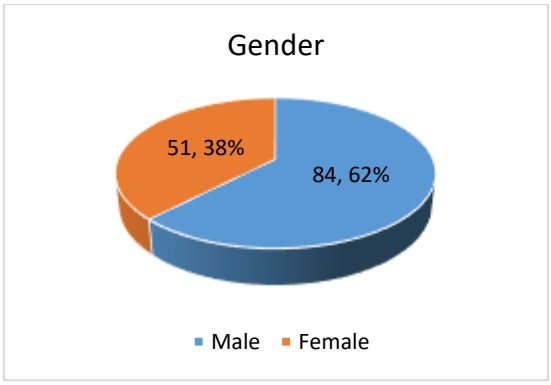

Figure 2: Gender distribution of the study patients

Figure 2 shows the gender distribution of the study patients. Most participants 84(62%) were male and 51(38%) were female. Male were found clearly the most predominant in this study.

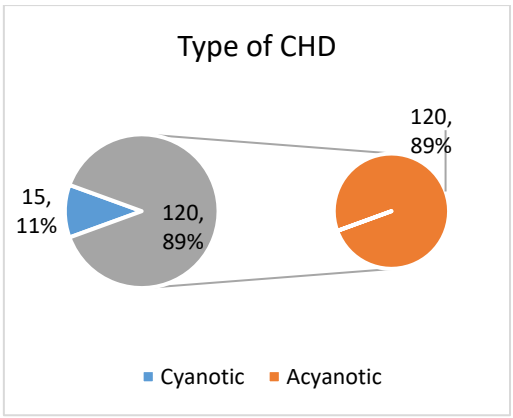

Figure 3: Type of CHD

Figure 3 shows the type of CHD where most of the study patients 120(89%) had acyanotic CHD and only 15(11%) had cyanotic CHD.

Table I: Association of age and pattern of CHD among children

Pattern of CHD	Day 1 to Day 28		Day 29- 12 Months		1-12 years	
	Male	Female	Male	Female	Male	Female
ASD	3	4	12	9	2	5
VSD	5	2	24	8	4	4
PDA	8	5	3	3	1	2
Valvular HD	1	0	3	1	2	3
Dextrocardia	0	0	0	0	0	0
Ebstein Anomaly	1	0	0	0	0	0
Tetralogy of Fallot	1	1	0	1	2	0
TGA	1	0	1	0	0	1
AVSD	2	0	0	1	0	0
PA- VSD	0	0	1	1	0	0
Truncus Arteriosus	0	0	0	0	0	0
DORV	0	1	1	0	0	0
HPLHS	1	1	0	0	0	0
Single Ventricle	1	0	1	1	0	0
TAPVR	0	0	0	0	0	0

Table I shows the association of age and pattern of CHD among children. ASD, VSD and PDA was the most common pattern of CHD among the study children. Other pattern of CHD like Valvular HD, Ebstein Anomaly, Tetralogy of Fallot, TGA, AVSD, PA- VSD, Truncus Arteriosus, DORV, HPLHS, Single Ventricle and TAPVR was not very common among the study patients.

DISCUSION

The present study directs that CHD is a vital cardiac problem among the pediatric patients. In this study, Most of the patients 64.4% were diagnosed during the age of day 29 – 12 month, 25.2% of patients were diagnosed during neonatal period and only 10.4% were diagnosed during 1-12 years. Hussain et al. in their study also reported majority of CHD during infancy whereas only 8.3% CHD was found at neonatal period[15]. *Similarly Rahim et al* in Pakistan found also only 8% CHD during neonatal period[16]. There were (135) cases among them 62% were male and 38% were female. Male were found clearly the most predominant in this study. The male: female ratio was 1.6:1 in this study. This ratio is quite similar by comparing other studies in this field[17]. But in contrast, Islam MN et al. in their study found male and female ratio was 1.2:1[18]. In this present study, commonest type of CHD was acyanotic CHD which accounted for 88.9 % cases. Result found by *Rahman et al, Begum et al, Hussain, Sharmin et al, Rahim et al.* also showed similarity with the present study[15,16,18-21]. In this study, ASD, VSD and PDA was the most common pattern of CHD among the study children. Other pattern of CHD like Valvular HD, Ebstein Anomaly, Tetralogy of Fallot, TGA, AVSD, PA- VSD, Truncus Arteriosus, DORV, HPLHS, Single Ventricle and TAPVR was not very

common among the study patients. This comparatively higher prevalence of CHD denotes that all the study patients were evaluated and labeled as CHD during the 1st month of life. The study of Rahman et al and Fatema et al. also reported ASD as the commonest lesion of CHD[19,22]. Also, Fatema et al. found ASD was the commonest lesion especially among the neonates[22]. As PDA, VSD and ASD showed majority of prevalence and had a possibility of a spontaneous cessation without initiating any major effect on health and without demanding any medical intervention, the prevalence of CHD could have been lessen if all patients had been reassessed during early childhood or adolescence[23]. In a prospective study conducted at a local Saudi district reported that ASD was the most commonly diagnosed lesion of CHD, though complex CHD was found in around 20% cases[24]. As in this present study 25.2% study patients were neonate and 64.4% were infant, hence, this may cause increased ASD number. However, *Hussain et al.*, *Sharmin et al.* and *Rahim et al*. in their study reported VSD as the commonest CHD[15,16,21]. In our study, VSD was found in 47 cases. Also, *Suryakant et al*. and *Mishra* found 25% patients with VSD which was also consistent with this presents study[25,26].

Conclusion:

Most of the admitted patients who were suspected of having congenital heart disease were definitively diagnosed by Co/ov$_2$ Echocardiography. Majority of cases were <1 year. Male patients were predominance over female in the diagnosis of congenital heart disease. Acyanotic heart anomalies was the commonest cardiac anomalies and numerous factors such as poverty, illiteracy, insufficient health care facilities, improperly trained health professionals at primary care level, deficiency of antenatal and immediate postnatal screening program, inappropriate referral system, and social and financial issues are the main causes of late presentation and late diagnosis of CHD specially in a developing country like Bangladesh which may increase the risk of complex lesions. With the development of diagnostic capacity and neonatal care, timely detection of CHD is probable by 2D and color Doppler echocardiography which can help to ensure timely treatment and contribute to better treatment outcome.

Acknowledgements:

We would like to express our deepest appreciation to the staff of the Department of Pediatrics, 250 Bedded District Hospital, Thakurgaon, for their assistance in data collection. We also thank the patients and their families for their participation in this study. Their cooperation was vital for the completion of this research.

Author Contributions:

- Conception and design: Dr. Md. Sazzad Haider Shahin, Dr.Shirin Akhter, Dr. Sheikh Masud
- Acquisition, analysis, and interpretation of data: Dr. Md. Sazzad Haider Shahin
- Manuscript drafting and revising it critically: Dr. Md. Sazzad Haider Shahin, Dr.Shirin Akhter, Dr. Sheikh Masud
- Approval of the final version of the manuscript: Dr. Md. Sazzad Haider Shahin, Dr.Shirin Akhter, Dr. Sheikh Masud

- Guarantor accuracy and integrity of the work: Dr. Md. Sazzad Haider Shahin

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Conflict Of Interest: The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

List Of Acronyms:

CHD: Congenital Heart Disease
ASD: Atrial Septal Defect
VSD: Ventricular Septal Defect
PDA: Patent Ductus Arteriosus
SPSS: Statistical Package for the Social Sciences
WHO: World Health Organization
DS: Down Syndrome
CVS: Cardiovascular System
DM: Diabetes Mellitus
RHD: Rheumatic Heart Disease
CVS: Cardiovascular System

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