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Original Research Article

Pattern of Congenital Heart Diseases among Less than 5 Years Old Children of Bangladesh-An Observational Study from a Pediatric Cardiac Center

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Abstract: ***Introduction*:** Congenital Heart Disease (CHD) is the most common congenital problems. CHD is about 25% of all congenital malformations and is the most common type of heart disease among children. It may present in different ages from birth to adolescence. Worldwide, CHD is relatively common with a prevalence ranging from 1.0-6.6 per 1000 live births. ***Aim of the Study*:** The aim of this study was to find out the pattern of congenital heart diseases among less than 5 years old Children of a pediatric cardiac center. ***Methods*:** This was a retrospective observational study and conducted in the Department of pediatric cardiology of Combined Military Hospital Dhaka, Bangladesh during the period from July, 2018 to July, 2020. A total of 1000 patients from outdoor and indoor patient registry who were diagnosed and treated as a case of congenital heart disease within the mentioned period were included in the study. ***Result*:** Majority of our patients was male (58%) compared to female (42%). Among all patients, 29.80% had VSD, followed by 20.4% & 14.9% had ASD & TOF respectively and 72% & 28% of our patients had Acyanotic & cyanotic CHD respectively.VSD & TOF was the most common in patients with acyanotic & cyanotic CHD respectively. Recurrent RTI, pneumonia, heart failure, infective endocarditis, and Cyanotic spell are common complications of congenital heart disease. Down syndrome and congenital rubella syndrome are the main syndromic association in congenital heart diseases. The majority (97%) of our patients improved, and 3% died. ***Conclusion*:** Our study focuses on the congenital heart diseases of children of Bangladesh. Among the acyanotic congenital heart disease, VSD is the maximum & among the cyanotic congenital heart disease TOF is the highest in number. With early diagnosis, treatment and regular follow up, mortality rate is very low and the prognosis is excellent.

Keywords: Congenital Heart Disease, Less than five years old Children, Acyanotic, Cyanotic.

INTRODUCTION

Congenital Heart Disease (CHD) is the most common congenital problems. CHD is about 25% of all congenital malformations and is the most common type of heart disease among children [1]. It may present in different ages from birth to

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adolescence [2]. Most cases are asymptomatic and discovered during routine neonatal check-ups [3]. Worldwide, CHD is relatively common with a prevalence ranging from 1.0-6.6 per 1000 live births. The prevalence was 1.0 per 1000 in Egyptian children, 6.6 per 1000 in Americans, 5.0 per 1000 in Chinese [4-6]. The prevalence and pattern of specific congenital heart lesions in different ethnic groups are well documented [7, 8.] There are, however, few studies assessing the prevalence and pattern of congenital heart defects in different ethnic groups living in the same geographical area. The population of Indians, Pakistanis, Bangladeshis, and other individuals from the Indian subcontinent in the United Kingdom has increased over the past three decades (1 -8 million in the census 1991) and Asians form 5-8% of the total population of the West Midlands region [9, 10]. The percentage (9%) is even higher for children aged 0-4 years. The pattern of congenital heart defects in Asian infants requiring hospital admission over a period of three years was compared with that of mainly white infants [11]. It has a negative psychological impact on the families afflicted as well as being the most prevalent serious birth defect. In order to handle CHD properly, it is necessary to identify the pattern of CHD in children. In the western countries pattern of CHD is well documented, but has not been studied nationwide in Bangladesh as in other western and neighboring countries [12]. Rahman *et al.,* found ASD (39.9%) as commonest CHD followed by VSD (28.4%) TOF (28.6%) and PDA (5.2%) [13, 14]. Begum NNF *et al.,* found ASD as the commonest CHD in neonate. Hussain *et al.,* found VSD (52.8%) ASD (11.1%) TOF (22.2%) and PDA (8.3%) as the common CHD [15-17]. Sharmin *et al.,* found VSD in 42.6%, TOF 18.3% and ASD14.8% [18]. So different pattern of CHD is seen in Bangladesh in different studies. The most crucial factors for a better long-term result and quality of life are early discovery, prompt referral to the appropriate center, and competent management. However, the absence of diagnostic tools and awareness in Bangladesh makes CHD detection challenging. The purpose of this study was to find out pattern of CHD in children attending pediatric care.

OBJECTIVE OF THE STUDY

The main objective of the study was to find out the pattern of congenital heart diseases among less than 5 years old Children of a pediatric cardiac center.

METHODOLOGY & MATERIALS

This was a retrospective observational study and conducted in the Department of pediatric Cardiology of Combined Military Hospital Dhaka, Bangladesh during the period from July, 2018 to July, 2020. A total of 1000 patients from outdoor and indoor patient registry who were diagnosed as a case of congenital heart disease within the mentioned period were included in the study.

These are the following criteria to be eligible for the enrollment as our study participants: a) Patients aged less than 5 years old; b) Patients diagnosed with congenital heart disease; c) Patients who were confirmed by Color doppler echocardiography; d) Patients who were given consent to participate were included in the study And a) Patients of CHD more than five years old and b) who didn't give consent were excluded from our study.

Statistical Analysis

All data were recorded systematically in preformed data collection form and analyzed. Statistical analysis was performed by using SPSS 21(Statistical Package for Social Sciences) for windows version 10. Probability value <0.05 was considered as level of significance. The study was approved by Ethical Review Committee of Combined Military Hospital Dhaka, Bangladesh.

RESULT

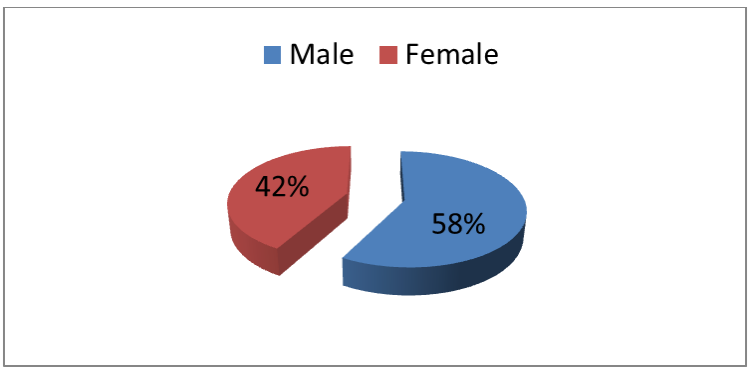

Figure 1: Gender Distribution of the patient (N=1000)

Figure 1 shows that most of our patients were male (58%) compared to female (42%).

Table 1: Number of Different Types of Congenital Heart diseases (N=1000)

Type of lesion	Number of patient	Percentage
VSD	298	29.80%
ASD	204	20.4%
PDA	140	14%
COA	10	1%
PS	8	0.8%
AS	4	0.4%
Dextrocardia	7	0.7%
A-V Cannel Defect	30	3%
TOF	149	14.9%
TGA	62	6.2%
Pulmonary atresia	21	2.1%
DORV	17	1.7%
Tricuspid atresia	11	1.1%
TAPVC	9	0.9%
Single Ventricle	7	0.7%
Multiple lesions	23	2.3%
VSD	298	29.80%
ASD	204	20.4%

AR = Aortic regurgitation; AS= Aortic Stenosis; VSD = Ventricular septal defect; ASD = Atrial septal defect; TOF = Tetralogy of fallot; PDA= Patent ductus arteriosus; PS = Pulmonary stenosis; TGA= Transposition of great arteries; COA= Coarctation of Aorta; DORV= Double outlet right ventricle; TAPVC= Total anomalous pulmonary venous circulation

Table 1 shows the number of different types of congenital heart diseases. Among all patients, the majority (29.80%) had VSD, followed by 20.4% & 14.9% had ASD & TOF respectively. The least prevalence was less than 1 % which was found in patients with PS, AS, dextrocardia, TAPVC & single ventricle. Multiple lesions which include ASD, VSD, PDA, PS and anomalous pulmonary vein in different combination were found in 2.3% of all patients.

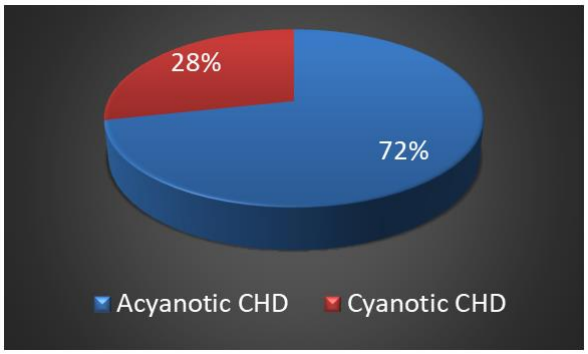

Figure 2: Types of Congenital heart Disease (N=1000)

Figure 2 shows that majority (72%) of our patients had Acyanotic CHD and 28% had cyanotic CHD.

Table 2: Types of Acyanotic CHD (N=716)

Type of lesion	Number of patients	Percentage
VSD	298	41.62
ASD	204	28.49
PDA	140	19.55
A-V Cannel Defect	30	4.18
COA	10	1.39
AS	4	0.55
PS	8	1.11
Dextrocardia	7	0.98
Multiple lesions	15	2.09

In table 2 we found among all patients with acyanotic CHD 41.62% of them VSD, followed by 28.49%, 19.55%, 4.18% had ASD, PDA & A-V Cannel Defect respectively. Only 4(0.55%), 7(0.98%) & 8(1.11%) patients had AS, PS, & dextrocardia respectively.

Table 3: Types of Cyanotic CHD (N=284)

Type of lesion	Number of patients	Percentage
TOF	149	52.46
TGA	62	21.83
Pulmonary atresia	21	7.39
DORV	17	5.98
Tricuspid atresia	11	3.87
TAPVC	9	3.16
Single Ventricle	7	2.46
Multiple lesion	8	2.81

Table 3 shows that among all patients with cyanotic CHD, 52.46% had TOF, followed by 21.83% had TGA, 7.39% & 5.98% had pulmonary atresia & DORV respectively. Only 2.81% had multiple lesions.

Table 4: Distribution of our study patients by complications of CHD

Complications	Number	Percentage
Recurrent RTI	421	42.10
Pneumonia	231	23.10
Heart Failure	193	19.30
Tet Spell	93	9.30
Pulmonary hypertension	129	12.90
Infective Endocarditis	6	0.60
Cerebral Abscess	3	0.30
Septicaemia	69	6.90
Failure to thrive	97	9.70

Table 4 shows the complications of our patients. The majority (42.10%) had recurrent RTI, followed by 23.10%, 19.30%, 12.90%, 9.70% & 9.30% had pneumonia, heart failure, pulmonary hypertension, failure to thrive, & tet spell respectively. Cerebral abscess & infective endocarditis was less than 1%.

Table 5: Distribution of our study patients by syndromic associations of CHD

Syndrome	Number	Percentage
Down Syndrome	36	3.6
Congenital Rubella syndrome	33	3.3
Turner syndrome	6	0.60
Noonan syndrome	3	0.3
Patau syndrome	7	0.7
Edward Syndrome	9	0.9

Table 5 shows among all patients, only 3.6%, & 3.3% had Down syndrome & congenital rubella syndrome respectively. Turner, Noonan, Patau & Edward syndrome were less than 1%.

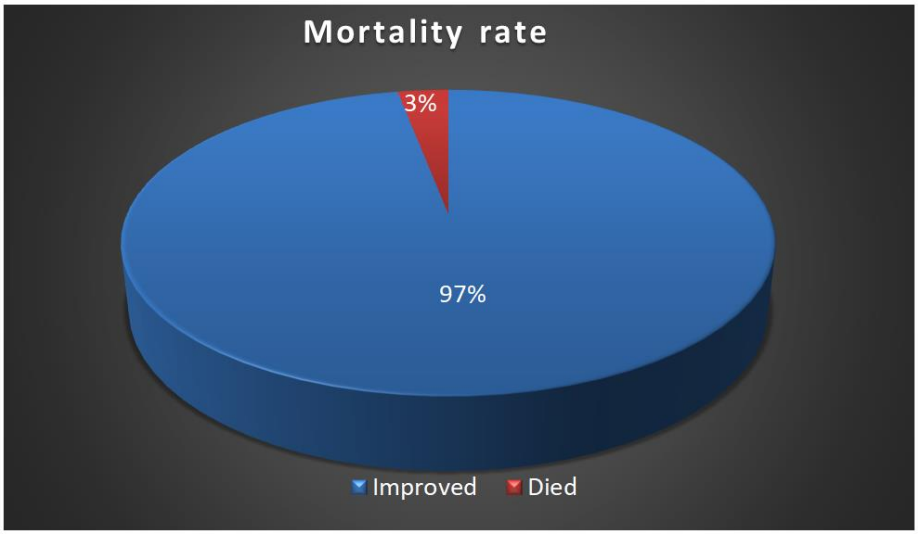

Figure 3: Distribution of our study patients by mortality rate in CHD

Figure 3 shows the mortality rate of our study patients. The majority (97%) of our patients improved, and 3% died in our study.

DISCUSSION

The length and rigor of case finding, the sensitivity of the diagnostic technique employed, as well as the admission procedures of the relevant hospitals, all affect the prevalence and rates of incidence of CHD in various studies. The use of color doppler echocardiography has improved early detection rates and made it easier to diagnose even the smallest problems. It is generally acknowledged that a rise in the reported prevalence of CHD has been caused by an improvement in diagnosis, attention, or awareness among general pediatricians, and early referral to pediatric cardiologists [19, 20]. In our study, most of our patients were male (58%) compared to female (42%). Islam MN found male and female ratio was 1.2:1 which is similar to our study [21]. Hussain *et al.,* during early nineties found only 8.3% CHD at neonatal period [17]. Similar result was found by Rahim *et al.,* in Pakistan who detected only 8% CHD during neonatal period [12]. In our study, all of our cases were diagnosed under 5 years. Hussain *et al.,* also found majority of CHD during infancy which support our study [17]. In our study, commonest CHD is acyanotic CHD (72 %). Similar result was found by Rahman *et al.,* Begum NNF *et al.,* Hussain, Sharmin *et al.,* Rahim *et al.,* [12, 14-18]. In our study the commonest type of congenital heart disease was ventricular septal defect (VSD) (29.80%). Rahman *et al.,* and Fatema *et al.,* found ASD as the commonest lesion. Fatema *et al.,* found ASD as the commonest lesion in neonates [14, 16]. Hussain *et al.,* Sharmin *et al.,* and Rahim *et al.,* in their study found commonest CHD was VSD [14, 17, 18]. A study by Sen *et al.,* found VSD in 27.5% of cases [22]. Suryakant *et al.,* Mishra found 25% of cases as VSD in Latur district, India, which is consistent with our study [23, 24]. In this study, commonest cyanotic heart disease was TOF (52.46%). Rahman *et al.,* Hussain *et al.,* Sharmin *et al.,* Suryakant *et al.,* Mishra *et al.,* Hussain *et al.,* found TOF as commonest cyanotic CHD which is similar to our study [14, 17, 18, 23-25]. On the contrary, Begum *et al.,* found TOF and TGA in equal numbers in neonates [15]. Worldwide, VSD is the most common acyanotic CHD accounting for 25-30% of all CHD [26]. VSD was the commonest CHD both in past and present (32.7% and 26.9%). [25] Siddique *et al.,* also found ASD as the commonest CHD about 20 years back [27]. Among the complications of CHD pulmonary complications are more common which are pulmonary edema, pulmonary infection, atelectasis, pulmonary hypertension, pulmary hemorrhage and emobolism. [28]Acute global ischaemia, focal ischaemia, brain abscess, mycotic aneurism, poor cognitive outcome, poor motor and language skill are the neurological association of CHD [29]. In a study from china it is revealed that more preschoolers with CHD were below the 50th percentile in height and weight than non-CHD preschoolers [30]. In a population based study it was found that Down syndrome was associated with 95% of all syndromic CHD followed by Edward, Killian –Pallister, noonan, Holt- Oram and VECTER syndrome [31]. In our study Down syndrome and Congenital Rubella syndrome are more common syndromic association of CHD. A large population based study in America showed that mortality rate ratio of children with CHD is greatly reduced to 0.33 [32]. A large population based study in England showed that case fatality rate of CHD in children greatly reduced from 2.10% to 0.83% between 1997/1998 and 2003/2004 [33]. A study of Norway published that the one year cumulative mortality of non-severe CHD was 3% [34]. In our study in this

center the mortality rate is also 3% which indicate that with early diagnosis and effective treatment mortality is very low.

Limitations of the Study

Our study was a single center study. Our short study period was a major limitation. There are more patterns of CHD that needs to be determined & evaluated. After evaluating those patients, we did not follow up with them for a long term and have not known other possible interference that may happen in the long term with these patients.

CONCLUSION AND RECOMMENDATIONS

Our study focuses on the congenital heart diseases of children of Bangladesh. Among the acyanotic congenital heart disease VSD is the maximum & among the cyanotic congenital heart disease TOF is the highest in number. Recurrent RTI, pneumonia, Heart failure, infective endocarditis, and Cyanotic spell are common complications of congenital heart disease. Down syndrome and congenital rubella syndrome are the main syndromic association in congenital heart diseases. With early diagnosis, treatment and regular follow up, mortality rate is very low and the prognosis is excellent. So further study with a prospective and longitudinal study design needs to be done to identify more patterns of CHD to prevent mortality.

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