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The Prevalence and Risk Factor of Congenital Heart Defects in Bangladesh

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Abstract **Original Research Article**

Background: Congenital heart disease is defined as a gross structural abnormalities of the heart or intra-thoracic great vessels that is either functionally significant or has the potential to be so. ***Objective:*** In this study main goal is to evaluate the prevalence and risk factor of congenital heart defects in Bangladesh. ***Method:*** This cross sectional study was carried out tertiary medical hospital from January 2021 to January 2022. A total of 100 children up to 12 years of age admitted in three pediatric units of this hospital during the study period. All normal patients were discharged and congenital heart disease cases had given follow up at 01months to 06 months interval. ***Results:*** During the study, majority were belong to 7-12 years age group, 54% and 60% were female. 20% had prematurity, followed by 10% had genetic syndrome, 3% had congenital neurological anomaly, 2% had congenital gastrointestinal anomaly. Majority had low birth weight, 40%. Followed by 35% cases mother had <37 week of gestational age, 62% cases had prenatal infection, 45% cases were Prenatal contact with toxic substances, 55% cases had gestational hypertension and diabetes, 40% cases prenatal anemia. In addition, 25% had Atrial septal defect, 22% had Ventricular septal defect, 20% had Patent foramen ovale, 11% had Patent ductus arteriosus, 10% had Pulmonary stenosis, 4% had Tetralogy of Fallot. ***Conclusion:*** In conclusion we can say prevalence of CHD is increasing where both a trial septal defect and Ventricular septal defect are quite common. In addition, lower birth weight, gestational hypertension and diabetes are reported as risk factor developing CHD in neonates.

Keywords: Congenital heart defects (CHD), birth defects, gestational diabetes.

INTRODUCTION

Congenital heart defects (CHD) are among the most common birth disorders, occurring in up to 9.3 per 1,000 live births with substantial regional variation [1, 2].

According to a large number of publications, the prevalence of CHD has grown in both developed and developing nations. Recently released research reveals that CHD is associated with social deprivation and poor socio- economic strata [3].

Bangladesh is well renowned for being one of the least developed countries, with one of the lowest per capita GDPs in the world (USD 370). Another crucial and essential aspect is that CHD is the major cause of mortality among diabetics. The evidence on CHD and its connection with known risk factors in diabetic populations is limited, and the effect of known diabetes duration was not shown to be a substantial contributor to the cardiovascular risk factors [4-6].

In this study main goal is to evaluate the prevalence and risk factor of congenital heart defects in Bangladesh.

OBJECTIVE

- To evaluate the prevalence and risk factor of congenital heart defects in Bangladesh.

METHODOLOGY

This cross sectional study was carried out tertiary medical hospital from January 2021 to January 2022. A total of 100 children up to 12 years of age admitted in three pediatric units of this hospital during the study period. All normal patients were discharged and congenital heart disease cases had given follow up at 01 months to 06 months interval. All chromosomal

anomalies and syndromes were diagnosed and recorded. Management plan were designed for all cases. Some of the cases were postoperative or post interventional case and were kept in follow up.

The data was entered in MS excel and analyzed using SPSS-23. The continuous variables were represented using Mean and Standard deviation and categorical data was represented in the form of frequencies and proportions and chi square test will be used to check for association between quantitative data. P value less than 0.05 is considered to be statistically significant.

RESULTS

In table-1 shows age distribution of the study group where majority were belong to 7-12 years age group, 54% followed by 25% belong to 0-3 years and 21% belong to 4-6 years. The following table is given below in detail:

Table-1: Age distribution of the study group

Age distribution	%
0-3 years	25%
4-6 years	21%
7-12 years	54%

In figure-1 shows gender distribution where 60% were female and 40% were male. The following figure is given below in detail:

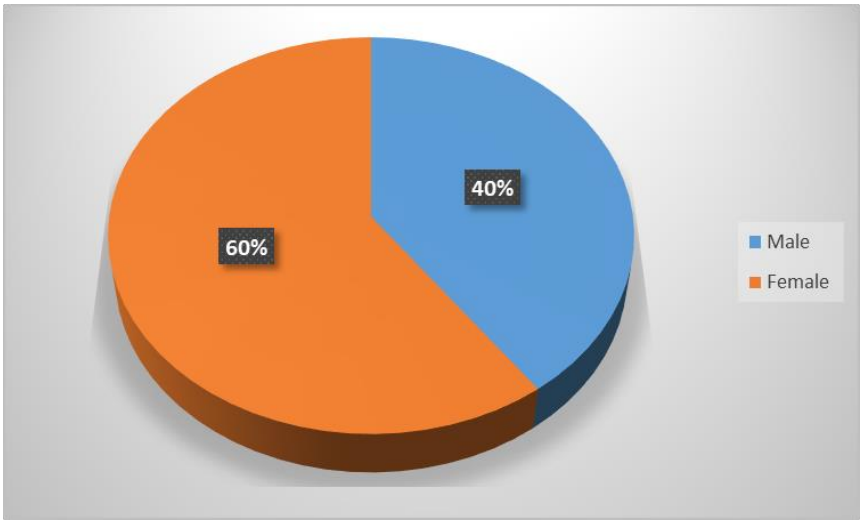

Figure-1: Gender Distribution of the study group

In figure-2 shows distribution of the study group according to comorbidity where 20% had prematurity, followed by 10% had genetic syndrome, 3% had congenital neurological anomaly, 2% had congenital gastrointestinal anomaly. The following figure is given below in detail:

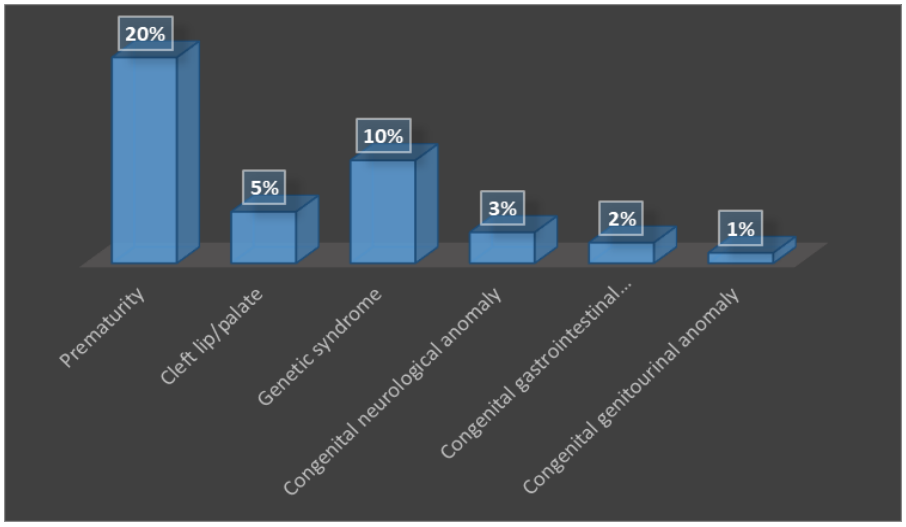

Figure-2: Distribution of the study group according to comorbidity

In table-2 shows parents characteristics of study group where majority had low birth weight, 40%. Followed by 35% cases mother had <37 week of gestational age,62% cases had prenatal infection, 45% cases were Prenatal contact with toxic substances, 55% cases had gestational hypertension and diabetes, 40% cases prenatal anemia, 70% cases did smoke. The following table is given below in detail:

Table-2: Parents characteristics of study group

Variable	%	P value
Birth weight (g)		
<2,500	40%	
2500-<3000	25%	<0.001
3000-<3500	14%	
3500-<4000	10%	
>4000	11%	
Gestational age (weeks)		<0.001
<37	35%	
37-38	28%	
38	14%	
39-40	13%	
>40	11%	
Prenatal infection		0.001
Yes	62%	
No	38%	
Prenatal contact with toxic substances		0.001
Yes	45%	
No	55%	
Prenatal medication use		
Yes	60%	0.001
No	40%	
Gestational hypertension		<0.001
Yes	55%	
No	45%	
Gestational diabetes		<0.001
Yes	55%	
No	45%	
Prenatal anemia		<0.001
Yes	40%	
No	60%	
Smoking		<0.001
Yes	70%	
No	30%	

In table-3 shows family history of CHD where in 40% cases patient's mother had CHD history whereas in father cases it was 35%. The following table is given below in detail:

Table-3: Family history of CHD

Family History	%
History of mother with CHD	
Yes	40%
No	60%
History of father with CHD	
Yes	35%
No	65%

In table-4 shows prevalence of CHD type in patients where 25% had a trial septal defect, 22% had Ventricular septal defect, 20% had Patent foramen ovale, 11% had Patent ductus arteriosus, 10% had pulmonary stenosis, 4% had Tetralogy of Fallot. The following table is given below in detail:

Table-4: Prevalence of CHD type

Prevalence of CHD type	%
Atrial septal defect	25%
Ventricular septal defect	22%
Patent foramen ovale	20%
Patent ductus arteriosus	11%
Pulmonary stenosis	10%
Tetralogy of Fallot	4%
Atrioventricular septal defect	2%
Aortic stenosis	2%
Single ventricle	2%
Ebstein's anomaly	1%
Compound type	1%

DISCUSSION

Previous studies have identified similar rates of CHD prevalence in Asian children ranging from 0 to 18 years of age (10, 11) [7-10].

Which was supported by our study where majority were belong to 7-18 years age group, 54% followed by 25% belong to 0-3 years and 21% belong to 4-6 years.

Analyzing the risk factors, we found a high association between diabetes and CHD (OR 16.36 CI: 4.54–58.35); this risk in our study is consistent with other studies that compare the anomaly rate in diabetic mothers [10–13].

In our study 62% cases had prenatal infection, 45% cases were Prenatal contact with toxic substances, 55% cases had gestational hypertension and diabetes, 40% cases prenatal anemia, 70% cases did smoke. Whereas other study reported that, 70% cases had prenatal infection, 35% cases were Prenatal contact with toxic substances, 60% cases had gestational hypertension and diabetes, 55% cases prenatal anemia, 80% cases did smoke.[14] In our study where majority had low birth weight 40% followed by 35% cases mother had <37 week of gestational age. Another study reported that, risk factors as weight less than 2,500g, or a gestational age of less than 36 weeks, have an association with CHD; others' studies show the same results [15-18].

The potential for the existence of cardiac abnormalities among the offspring of mothers with diabetes mellitus has been recognized for more than 50 years [19]. Our study finds a high correlation between pre-gestational diabetes mellitus and CHD. Although perinatal mortality has declined dramatically in diabetic

pregnancies over the past years, most studies continue to show a higher mortality in these patients than in control populations [20, 21].

A recent metanalysis in China33 showed that mothers with advanced age (OR 2, 6), cold or fever (OR 4, 5), passive smoking (OR 2,7), noise exposure (OR 3) and radiation exposure (OR 2,9) were prone to have children with cardiac defects [22].

Which was quite similar to our study where 70% cases had smoking status and 45% cases exposed to toxic substances.

In our study 25% had atrial septal defect, 22% had Ventricular septal defect, 20% had Patent foramen ovale, 11% had Patent ductus arteriosus, 10% had pulmonary stenosis, 4% had Tetralogy of Fallot. Whereas other study reported that 21% had a trial septal defect, 18% had Ventricular septal defect, 10% had Patent foramen ovale, 8% had Patent ductus arteriosus, 9% had pulmonary stenosis, 4% had Tetralogy of Fallot [23].

CONCLUSION

In conclusion we can say prevalence of CHD is increasing where both a trial septal defect and Ventricular septal defect are quite common. In addition, lower birth weight, gestational hypertension and diabetes are reported as risk factor developing CHD in neonates.

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