

# Prevalence of Congenital Heart Disease in Neonate in a Tertiary Level Hospital

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## ABSTRACT

**Background:** Congenital heart disease (CHD) has already been recognized as one of the important cause of neonatal mortality and morbidity. The reported prevalence of CHD in live newborns tends to vary a lot due to various unrecognizable lesions at birth and lack of technical expertise.

**Methods:** A cross sectional study was carried out in the department of Neonatology at Mymensingh Medical College Hospital (MMCH), Bangladesh from January to December 2010 to find prevalence of CHD in neonates.

**Results:** Out of 6560 admitted neonates, 51 were found to have CHD. The prevalence was 7.8/1000 live births. Mean age was 10.2±9.8 days and weight was 2380.5±590.5gms. Respiratory distress was the commonest symptom (71%) followed by cyanosis (26%) and reluctant to feed (24%). Among the CHD Ventricular septal defect (VSD) was the commonest 15/51 and then Atrial septal defect (ASD) 12/51, Patent ductus arteriosus (PDA) 5/51, Transposition of great arteries (TGA) 4/51, Complex heart disease 4/51 and Tetralogy of Fallot (TOF) 3/51 cases. Some associated non-cardiac anomalies like Down's syndrome, polydactyly, syndactyly, cleft lip, cleft palate and cataract were found. Risk factors associated with CHD were diabetes mellitus (10%), hypertension (8%) and maternal infection (4%). Among the drugs, anti-pyretic by 20%, anti-emetic by 18%, anti-epileptic by 4%, vitamin-A and hormone each by 2% of mothers respectively.

**Conclusion:** VSD and ASD were the commonest CHD in this study. Thorough clinical examination and proper investigations immediately after admission is essential, which may help us for proper counseling and early intervention.

**Keywords:** Congenital; heart disease; prevalence

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## Background:

Congenital heart disease (CHD) is defined as a gross structural abnormality of heart or intrathoracic great vessels that is actually or potentially of functional significance.<sup>1</sup> It is the most common cause of major congenital anomalies, representing a major global health problem. Twenty eight

percent of all major congenital anomalies consist of heart defect.<sup>2</sup> Prevalence of congenital heart disease is the rate of new cases of congenital heart disease, usually expressed as the number of babies born with congenital heart disease per 1,000 live births. The prevalence of congenital heart defects in neonates has been studied thoroughly and is

usually reported to be 5-8/1000.<sup>3-5</sup> Asian race is found to be more affected than non Asian race due to high rate of consanguineous marriages.<sup>6</sup> A study done at Aga Khan University hospital by Hassan showed prevalence rate of CHD up to 4/1000 live births in Karachi.<sup>7</sup> Same as that reported in India.<sup>8</sup> Prevalence of congenital heart disease depends upon some factors; like-nature of the study center (whether it is a tertiary level hospital where all critical obstetrical case were admitted), nature of the sample (all live births or all births), source of information (Birth or death certificate), spot examination by a pediatric cardiologist, whether echocardiography is done for all suspected neonates or those who has risk of having CHD ( Baby of diabetic mother, Down's syndrome and other congenital anomaly) etc.<sup>9,10</sup> Prevalence of congenital heart disease is underestimated due to home deliveries and early discharge of mothers along with their neonates from hospitals without proper neonatal examination pertinent to cardiovascular system by a qualified and experienced person.<sup>11</sup> Over time the reported total congenital heart disease with prevalence increased substantially from <1 per 1,000 live births in 1930 to 9 per 1,000 live births in recent years. With a worldwide annual birth rate around 150 million births. The increase in reported total CHD birth prevalence over time may be caused by changes in diagnostic methods and screening modalities rather than representing a true increase.<sup>12</sup> Prevalence of CHD in Bangladesh still is unknown due to insignificant population survey. In the present prospective study we will make specific efforts to detect all possible cases of CHD in neonates by examining all neonates admitted in SCANU of MMCH, Bangladesh. There is no authentic data regarding the prevalence of CHD at national level and it is almost nil in this hospital. As this is a tertiary level hospital, where all high risk pregnancies were admitted for delivery and its catchments area is very large which covers about 30 million populations. This factors increase the load of patient which ultimately increase the prevalence of CHD in infancy in this center.

#### Methods:

This is a cross sectional analytic study carried out for one year (January to December 2010) in the department of neonatology of MMCH, Bangladesh. Six thousand five hundred sixty neonates were admitted during this period. A thorough clinical examination was carried out within first 24 hours of admission. CHD was suspected in the presence of following criteria defined by Mitchell et al.<sup>1</sup> Presence of cardiac murmur, presence of cyanosis or feeding difficulty only, cyanosis associated with feeding difficulty, presence

of congestive heart failure or failure to thrive. Detailed history was collected from parents or attendant regarding family history of congenital heart disease in siblings, parents. Any significant history of ingestion of drugs, hormone, exposure to radiation, any history of fever with rash prior 6 months of conceptions and in 1<sup>st</sup> trimester, maternal age and parity. Babies birth weight, age, sex and gestational age were recorded. All suspected patients were investigated with chest X-ray, electrocardiogram and 2D, M-mode echocardiography with color doppler. Baby of diabetic mothers, all Down's syndrome baby and baby with congenital malformations were screened additionally. Innocent murmur or patients with transient systolic murmur were excluded from the study after confirmation of congenital heart defect by echocardiography.

**Result:** Out of 6560 admitted neonates, 51 were found to have CHD. The prevalence was 7.8/1000 live births. The other findings are given following:

**Table 1 :** General characters of the study population (n=51)

<b>Age (Days. Mean ± SD)</b>	10.2 ± 9.8 ( Range 1-28 days)
<b>Admission weight (gm, mean ± SD)</b>	2380.5 ± 590.5 (1500-3500gm)
<b>Sex distribution:</b>	
Male	28 (55%)
Female	23 (45%)
<b>Gestational age:</b>	
Preterm	21(41%)
Term	30 (59%)

Table 1 shows distribution of CHD by birth weight, gestational period and age. Twenty one patients had gestational ages less than 37 completed weeks and 30 neonates had >37weeks. It also shows that male were more than the female.

**Table 2:** Presentation of congenital heart disease on admission (n = 51)

Presentation	No. of Patient
Respiratory distress	36 (71%)
Cyanosis	13 (26%)
No cyanosis	38 (75%)
Reluctant to feed	12 (24%)
Heart failure	02 (4%)

Table 2 shows respiratory distress was the commonest symptom (71%) followed by cyanosis (26%) and reluctance to feed (24%).

**Table 3:** Types of structural defects of CHD in newborns (n = 51)

Structural Defect	No. of Patient (%)
Ventricular septal defect (VSD)	15 (29)
Atrial septal defect (ASD)	12 (24)
Patent ductus arteriosus (PDA)	05 (10)
Complex congenital heart disease	04 (8)
Transposition of great arteries (TGA)	04 (8)
Tetralogy of Fallot (TOF)	03 (6)
Aortic valve stenosis	01 (2)
Pulmonary atresia with PDA	01 (2)
Pulmonary stenosis	01 (2)
Dextrocardia	01 (2)
A-V canal defect	01 (2)
Mitral valve prolapse with MR	01 (2)
Severe pulmonary hypertension with TR	01 (2)
Persistent truncus arteriosus	01 (2)

Table 3 shows types of structural defect in newborns. VSD was the commonest 29% cases, ASD in 24%, PDA in 10%, TGA in 8%, complex heart disease in 8%, TOF 6% cases.

**Table 4:** Associated non cardiac anomalies (n=51)

Anomaly	No. of Patient (%)
Down's syndrome	03 (6)
Polydactyly with syndactyly	02 (4)
Cleft lip with palate	01 (2)
Cataract	01 (2)
Renal anomaly	01 (2)
Total	08 (16%)

Table 4 shows associated non-cardiac anomalies. Down's syndrome was noticed in 3 (6%) cases, polydactyly and syndactyly were detected in 2 (4%) newborn. Cleft lip with

palate, cataract and renal anomaly were also found in 2% cases respectively.

**Table 5:** History of drugs and Diseases during pregnancy (n=51)

Variable	Type of drug and disease during pregnancy	Total Mothers
History of disease during pregnancy	No disease	40
	Diabetes mellitus	05
	Hypertension	04
	Maternal infection	02
Drug history during pregnancy	No H/O drug ingestion	28
	Anti-pyretics	10
	Anti-emetics	09
	Anti-epileptics	02
	Vitamin-A	01
	Hormone	01

Table 5 shows pattern of risk factors in suspected cases of congenital heart disease. Gestational diabetes mellitus was noticed in 10% cases, Hypertension in 8% cases, drug intake like anti-epileptics, anti-pyretics, anti-emetics, vitamin-A, hormone was found in 44% cases.

**Discussion:**

Congenital heart disease has already been recognized as one of the important cause of neonatal mortality and morbidity. Ferencz et. al., reviewed seven major studies from Europe and North America and concluded that confirmed CHD prevalence had been remarkably constant at 4/1000 live births over 40 years time span from 1940-1980.<sup>11</sup> The prevalence in the present study is 7.8/1000 live births, which is a bit higher than any other study. In this study male and female ratio was 1.2:1. This gender distribution correlates partially with observation of Mollah et. al.<sup>12</sup>

Clinically respiratory distress (71%) was the commonest presenting symptom followed by cyanosis (26%) and reluctant to feed (24%). Similar observation was found by others.<sup>9,16-18</sup> In our study the important CHD in order of frequency were found VSD (29%), ASD (24%), PDA (10%), complex congenital heart disease (8%), TGA (8%), TOF (6%) respectively. The commonest type of congenital heart

disease was ventricular septal defect. This correlates with the study of Mitchell et. al.<sup>1</sup> Mollah et. al.<sup>12</sup> and Hussain et. al.<sup>20</sup> A study conducted on Delhi school children to find out prevalence of congenital heart disease showed lesions in order of frequency were VSD 30%, ASD 23%, PDA 11%, TOF 4%.<sup>20</sup> Findings of that study are almost similar to our study. Report of New England regional infant cardiac program showed VSD as the commonest lesion, which is similar to our study.<sup>22</sup> But our study differs from Rahman et. al.<sup>23</sup>, Siddique et. al.<sup>24</sup> and Fatema et. al.<sup>25</sup> They found ASD was the commonest lesion. This difference in observation might be due to that Rahman et. al. and Siddique et. al. included many adult patients in their study. A significant proportion of VSD close spontaneously before adulthood and some untreated patients with large VSD die in childhood from heart failure. On the other hand ASD patients may remain asymptomatic in childhood and are diagnosed for the first time when they are adult. The study subjects of Fatema et. al. were all newborn and many small sized VSD and most of the child with TOF may not manifest by that time.<sup>25</sup>

In our study associated non-cardiac anomaly and somatic anomaly was noticed in 16% cases. Among those Down's syndrome were noticed in 6% newborn with congenital heart disease. This is almost similar to other studies.<sup>10,26</sup> Maternal disease like diabetes mellitus, maternal infection, hypertension and some drugs might increase occurrence of heart disease in neonates. Regarding the history of diseases during pregnancy, it was found that 40 (78%) mothers of affected neonates had no history of disease during pregnancy period. While 10% mothers were diabetic, 8% hypertensive and 4% mothers gave a positive history of suggestive of infection during their pregnancy period.

History of drug intake during pregnancy revealed that 55% mothers had no history of drug ingestion during pregnancy, while 22 (44%) mothers had a positive history of ingestion of drugs. Among drugs anti-pyretic were taken by 20% mothers, anti-emetic by 18%, anti-epileptic by 4%, vitamin-A and hormone each were taken by 2% of mothers. Similar observation was found by Fatema et. al.<sup>27</sup> This is a single hospital based study to find out the prevalence of CHD.

### Conclusion:

Our observations show, prevalence of CHD was 7.8/1000 live birth. VSD and ASD were the commonest heart diseases. A good number of mothers have got some definite diseases, like diabetes mellitus, hypertension and maternal infection in this study. Early diagnosis of disease and proper

counseling of the parents will help in early intervention and reduce mortality and morbidity of neonates.

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