

# Congenital Heart Diseases among Children in Selected Hospital

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## Abstract

**Background:** Congenital heart disease (CHD) is the most common type of birth defect. As CHD accounts for the most frequent cause of lethal malformation among infants, CHD is also considered a major problem affecting public health worldwide.

**Objective:** To assess pattern of congenital heart diseases and associated risk factors among under-14 children admitted in a selected hospital.

**Methods:** It was cross sectional analytical study conducted among purposively selected 111 children admitted in Children Hospital for treatment. Face to face interview was conducted to collect data. The cases were included in the study when the diagnosis of CHD was established by medical records and echocardiography.

**Results:** About 91% and 9% children came from <1 year and 1-5 year age group. Low birth weight and normal birth weight was 52% and 48%. Pre-term and term distribution was 37% and 63%. About half of the respondents were middle class. About 26%, 25% and 18% mothers consumed vitamin A (>10000 IU/d), anti-pyretics and NSAIDs during pregnancy. About 40% mothers consumed contaminated tap water and 29% mothers were exposed to radiation. Ventricular septal defect (40.5%) and atrial septal defect (36.9%) were prominent. Patent ductus arteriosus and pulmonary stenosis were 8.1% and 5.4%. Statistical significant association was found between ventricular septal defect and birth weight, gestational age and monthly family income. As like VSD, atrial septal defect showed statistical significant association with birth weight, monthly family income, maternal age and rubella infection 6 months prior to conception or 1st trimester.

**Conclusion:** Ventricular septal defect (40.5%) and atrial septal defect (36.9%) were common among children. Maternal nutrition during pregnancy should be emphasized due to prevent low birth weight and pre-term baby.

**Key Words:** congenital heart diseases; children; diagnosis

## Introduction

The incidence of congenital heart disease is approximately 8 per 1000 live birth, with a higher rate in stillbirth, spontaneous abortion and prematurity [1-2]. It is believed that this incidence has remained constant worldwide [3]. From population survey in Bangladesh, the prevalence of congenital heart disease was found 0.18% [4]. World Health Organization (WHO) reports, among all cardiovascular disease, the incidence of congenital heart disease in Bangladesh is 6%, 15% in India, 6% in Burma, 10% in Srilanka [5]. Congenital heart disease as a whole occurs with equal frequency in male and females but some lesions such as aortic stenosis, coarctation of aorta, transposition of great vessels and tetralogy of Fallot are more common in males whereas atrial septal defects are more common in females. The cause of most Congenital heart defects is unknown. Most cases of congenital heart disease are thought to be multi factorial and result from a combination of genetic predisposition and

environmental stimulus [6]. In terms of environmental degradation everybody knows that Bangladesh is on alarming situation. The present study was a piece of attempt to explore this scenario and this study carries important value indeed.

## Methods

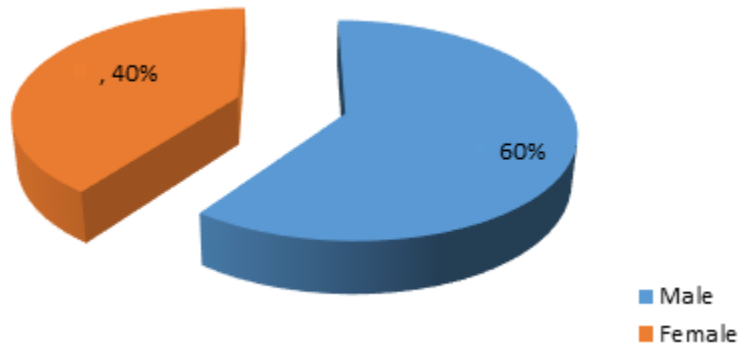
This study was conducted in Children Hospital. It was hospital based cross sectional study. Purposive sampling technique was applied. Face to face interview was conducted to collect data. The cases were included in the study when the diagnosis of CHD was established by medical records and echocardiography. All the data related to socio-demographic condition, diagnosis, clinical presentation and drug history was noted in a preformed datasheet with semi-structured questionnaire. Computer technology (SPSS 20.0) version was used for classification, presentation and analysis of data. Structural defect of heart was determined by medical file and confirmed by echocardiography.

**Results**

Age group (yrs)	Number	Percentage
<1	101	91
1-5	10	9
Total	111	100

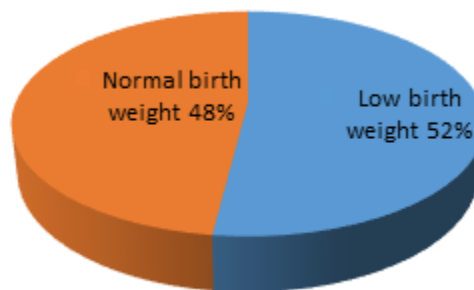
**Table 1:** Distribution of children by age group (n=111)

About 91% and 9% children came from <1 year and 1-5 year age group.



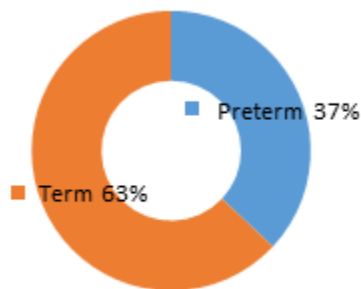
**Figure 1:** Distribution of children by gender (n=111)

Male and female distribution was 60% and 40%.



**Figure 2:** Distribution of children by birth weight (n=111)

Low birth weight and normal birth weight was 52% and 48%.



**Figure 3:** Distribution of children by gestational age (n=111)

Pre-term and term distribution was 37% and 63%.

Maternal health	Number	Percentage
Maternal age		
<30	99	89
≥30	12	11
Parity		

Uniparity	69	62
Multiparity	42	38
Maternal diseases		
Diabetes mellitus	3	3
Hypertension	17	15
Maternal infection		
Maternal infection-6 months prior to conception or 1 <sup>st</sup> trimester	3	3
Febrile illness (influenza) during 1 <sup>st</sup> trimester	9	8
Family history of congenital heart diseases		
Parents	3	3
Antepartum hemorrhage	3	3
Maternal drug history during pregnancy		
Anti-pyretics	28	25
Anti-emetics	16	14
Anti-epileptics	9	8
Vitamin A (>10000 IU/d)	29	26
Hormones	8	7
NSAIDS	20	18
Homeopathy	6	5
Drinking water contamination		
Tap water contamination	44	40
Radiation exposure	32	29

**Table 2:** Maternal health status (n=111)

Most of the mothers (89%) aged from <30 years. About 62% mothers were uniparied. Diabetes and hypertension were 3% and 15% mothers. Maternal infection-6 months prior to conception or 1<sup>st</sup> trimester and febrile illness were 3% and 8% mothers. About 26%, 25% and 18%

mothers consumed vitamin A (>10000 IU/d), anti-pyretics and NSAIDS during pregnancy. About 40% mothers consumed contaminated tap water and 29% mothers were exposed to radiation.

Structural defect	Number	Percentage
Ventricular septal defect (VSD)	45	40.5
Atrial septal defect (ASD)	41	36.9
Patent ductus arteriosus (PDA)	9	8.1
Complex congenital heart disease	2	1.8
Transposition of great arteries (TGA)	2	1.8
Tetralogy of Fallot (TOF)	3	2.7
Pulmonary stenosis	6	5.4
Persistent truncus arteriosus	3	2.7
Total	111	100

**Table 3:** Type of structural defects of CHD in children (n=111)

Ventricular septal defect (40.5%) and atrial septal defect (36.9%) were prominent. Patent ductus arteriosus and pulmonary stenosis were 8.1% and 5.4%. Complex congenital heart disease, transposition of great

arteries, tetralogy of fallot and persistent truncus arteriosus were 1.8%, 1.8%, 2.7% and 2.7%.

Variables	Structural defect (VSD)		Total	χ <sup>2</sup>	p value
	Present	Absent			
	n (%)	n (%)			
Low birth weight	43(38.7)	15(13.5)	58(52.3)	10.857	0.001
Normal birth weight	23(20.7)	30(27)	53(47.7)		
Preterm	31(27.9)	10(9)	41(36.9)	7.035	0.008
Term	35(31.5)	35(31.5)	70(63.1)		
Low income	46(41.4)	28(25.2)	74(66.9)	6.603	0.037
High income	17(15.3)	20(18)	37(33.3)		
Maternal hypertension present	7(6.3)	10(9.0)	17(15.3)	0.003	0.578
Maternal hypertension absent	38(34.2)	56(50.5)	94(84.7)		

Febrile illness (influenza) present during 1 <sup>st</sup> trimester	3(2.7)	6(5.4)	9(8.1)	0.211	0.466
Febrile illness (influenza) absent during 1 <sup>st</sup> trimester	42(37.8)	60(54.1)	102(91.9)		
Drink contaminated tap water	14(12.6)	30(27.0)	44(39.6)	2.301	0.093
Do not drink contaminated water	31(27.9)	36(32.4)	67(60.4)		
	Structural defect (ASD)				
Low birth weight	32(28.8)	26(23.4)	58(52.3)	3.247	0.054
Normal birth weight	15(13.5)	38(34.2)	53(47.7)		
Low income	49(44.1)	25(22.5)	74(66.9)	13.183	0.001
High income	8(7.2)	29(26.1)	37(33.3)		
Maternal age (<30)	58(52.3)	41(36.9)	99(89.2)	7.881	0.005
Maternal age (>30)	0(0)	12(10.8)	12(10.8)		
Maternal hypertension present	3(2.7)	14(12.6)	17(15.3)	3.207	0.061
Maternal hypertension absent	38(34.2)	56(50.5)	94(84.7)		
Rubella infection present 6 months prior to conception or 1st trimester	3(2.7)	0(0)	3(2.7)	5.264	0.048
Rubella infection absent 6 months prior to conception or 1st trimester	38(34.2)	70(63.1)	108(97.3)		

**Table 4:** Association between variable of interest and type of structural defects

Results were expressed as frequency percentage,  $\chi^2$  test was performed and  $p < 0.05$  was level of significance.

Statistical significant association was found between ventricular septal defect and birth weight ( $p=0.001$ ), gestational age ( $p=0.008$ ) and monthly family income ( $p=0.037$ ). No significant association was seen between ventricular septal defect and maternal hypertension, febrile illness (influenza) during 1<sup>st</sup> trimester and drinking contaminated tap water. As like VSD, atrial septal defect showed statistical significant association with birth weight ( $p=0.054$ ), monthly family income ( $p=0.001$ ), maternal age ( $p=0.005$ ) and rubella infection 6 months prior to conception or 1st trimester ( $p=0.048$ ).

## Discussion

Congenital heart disease (CHD) 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 defects [7]. Reported birth prevalence of CHD varies widely among studies worldwide. The estimate of 8 per 1,000 live births is generally accepted as the best approximation [8]. CHD, by definition, is present from birth. The most practical measurement of CHD occurrence is birth prevalence per 1,000 live births [9]. In this study the commonest type of Congenital heart disease was ventricular septal defect. This correlates with many studies [10-13]. But this differs from Rahman et al, Siddique et al and Fatema et al. They found ASD 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 [14-15]. A prospective study conducted in the department of pediatrics of Rajshahi Medical College & Hospital over a period of one year. About 115 children from birth to 12 years of age who had congenital heart disease confirmed by echocardiography were included. All patients were treated conservatively and observed for immediate outcome during the hospital stay. Congenital heart defects are caused by a problem in the heart development during the first weeks of pregnancy. Usually the exact cause of the problem is not known but often it is just a chance event in the complex development of

the baby heart. Sometimes infections and drugs cause a heart defect. For example, German measles (Rubella) and other viruses can the heart as it develops. If a woman takes certain medicines, smokes or drinks too much alcohol early in pregnancy, this can also cause heart and other problems. A baby is generally well protected from outside influences and fright when it is in the womb. Accidents and threatened miscarriages do not cause congenital heart defects. A family history of health problems is only a small risk. It is unusual to have more than one child in a family with congenital heart defects. Statistical significant association was found between ventricular septal defect and birth weight, gestational age and monthly family income. As like VSD, atrial septal defect showed statistical significant association with birth weight, monthly family income and maternal age. The prevalence rate was higher in girls than that of boys in the present study, which may indicate a negligence of caring towards female children in the family. In consistent, children from lower income group had a higher prevalence rate compared to their middle income group counterparts (Low income group vs middle income group: 24.5/1000 vs 13.0/1000). Poor income group had less antenatal checkup which could detect congenital heart disease earlier [16]. They also showed that fifty three children were found to be suffering from definite operable CHD giving a prevalence of 8.98 per thousand, where, again, girls were the main victims (girls vs boys: 12.0/1000 vs 6.4/1000). Atrial septal defect was the commonest lesion 7.6% with a prevalence of 76 per thousand followed by ventricular septal defect (4.7 %) with a prevalence of 47 per thousand. Five (9.4%) cases had a family history of CHD. History of rheumatic fever and/or rheumatic heart disease was found to have a significant prevalence among cases with CHD (11.9%) as compared to children without CHD (0.9%). The multifactorial etiology of CHD involves the chromosomal abnormality, maternal diabetes, smoking, teratogenic drug and maternal infection during early pregnancy [17]. These most likely can explain the difference in reported incidences in different countries. Diabetes and hypertension were 3% and 15% mothers in this study. CCVDs have been associated with maternal pregestational and, less consistently, with gestational diabetes [18]. The associations with gestational diabetes are hypothesized to be due to inclusion of a group of women with previously undetected type 2 diabetes

among women classified as having gestational diabetes [19]. Specific types of cardiovascular malformations associated with maternal pregestational diabetes include laterality and looping defects, transposition of the great vessels, [20] nonchromosomal atrioventricular septal defects, VSDs, hypoplastic left heart syndrome, conotruncal defects outflow tract defects, cardiomyopathy, and PDA. Diabetes appears to induce malformation before the seventh week of gestation [21]. A systematic review and meta-analysis was conducted on the associations between untreated and treated maternal hypertension and the risk of CHDs, evaluating CHDs overall as well as specific CHD subtypes. Maternal hypertension was associated with CHDs [22]. About 40% mothers consumed contaminated tap water and 29% mothers were exposed to radiation in present study. Another study that did evaluate maternal consumption of home tap water during the first trimester of pregnancy found an increased risk of cardiac anomalies [23]. Evaluations of possible associations of heart defects with maternal exposure to ionizing radiation have been limited. The BWIS examined possible associations of heart defects with maternal reports of exposure to ionizing radiation in occupational settings or as part of medical or dental evaluations and found few reports of such exposures and no evidence of any associations [24]. The study place is selected purposively. So the study population in this study may not be the representatives of subjects and the results cannot be generalized.

## Conclusion

It is concluded from the study that ventricular septal defect (40.5%) and atrial septal defect (36.9%) were common among children. Low birth weight, preterm baby and low socioeconomic condition were significantly associated with ventricular septal defect. Atrial septal defect showed statistical significant association with low birth weight, low socioeconomic condition, maternal age < 30 years and rubella infection 6 months prior to conception or 1st trimester ( $p=0.048$ ).

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