# **Original Research Article**

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# An assessment of the pattern of congenital heart disease in children: study in a tertiary care hospital, Rajshahi, Bangladesh

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#### **ABSTRACT**

**Background:** Congenital heart disease is defined as a gross structural abnormality of the heart or intrathoracic great vessels that is actually or potentially of functional significance. The aim of this study was to assess the pattern of congenital heart disease.

**Methods:** It was a hospital based Cross-sectional study carried out prospectively in the department of pediatrics of Rajshahi medical college and hospital from July 2011 to December 2011. The study population was all the children up to 12 years of age admitted in three pediatric units of this hospital during the study period.

**Results:** Among the 147 clinically suspected cases congenital heart disease was confirmed in 110 cases by echocardiography. Thrill was mostly present in 60.5% of VSD cases, in 42.1% of PDA, in 50% of A-V canal defect and 10% of multiple lesions patients. Palpable P2 was present in 27.9% of VSD cases, 15% of TOF, 50% of PS and 30% of multiple lesions patients. Left parasternal heave was found in 25.6% of VSD cases, 15.6% of ASD, 88.2% of TOF, 50% of PS and 40% of multiple lesions patients. Cardiomegaly was present in 5.3% of PDA, 50% of COA, 50% of PS and 20% of multiple lesions cases. Plethoric lung field with cardiomegaly & consolidation was observed in 10% of VSD and 21% of PDA cases. Cardiomegaly with consolidation was observed in 11.6% of VSD & 15.6% of ASD cases. Boot shape heart with oligamic lung was observed in 88.2% of TOF patients. Pulmonary opacity/consolidation was found in 4.7% of VSD cases.

**Conclusions:** It appeared that incidence of CHD is quite significant in RMCH.

**Keywords:** Congenital Heart Disease, Children, Breathlessness, Cough, Palpitation, Undue Fatigability, Bluish Coloration

## INTRODUCTION

Congenital heart disease (CHD) is the commonest of all congenital lesions and is the most common type of heart disease among children.<sup>1</sup> Congenital heart disease is

defined as a gross structural abnormality of the heart or intrathoracic great vessels that is actually or potentially of functional significance.<sup>2</sup> The incidence of congenital heart disease is approximately 8 per 1000 live birth, with a higher rate in stillbirth, spontaneous abortion and

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prematurity.<sup>3,4</sup> World health organization (WHO) reports, among all cardiovascular disease, the incidence of Congenital heart disease in Bangladesh is 6%, in India is 15%, in Burma is 6% and 10% is in Srilanka.<sup>5</sup> The relative frequency of the most common lesions varies with different reports but nine common lesions form 80% of congenital heart disease (Jackson et al).6 These are ventricular septal defect (36%), atrial septal defect (5%), patent arterial duct (9%), atrioventricular septal defect (4%), pulmonary stenosis (9%), aortic stenosis (5%), coarctation of aorta (5%), transposition of great arteries(4%) and tetralogy of fallot (4%). The other 20% of congenital heart disease consists of many rare or complex lesions.<sup>7</sup> As a common congenital anomaly, CHD not only contribute to a significant morbidity and mortality but also causes a tremendous psychological stress and economic burden to the whole family. However, if the problems are recognized at earlier age, the chance of long-term complications are less and the outcome is better. As a result of improved medical and surgical management, more children with CHD are surviving into adolescence and adulthood.<sup>8</sup> Thus there is a need for an increased awareness amongst general physicians and cardiologists of the problem posed by these individuals.9 Except a few scattered observations, the detail clinical pattern of CHD in Bangladeshi children are not well documented. 10 Numerous classifications of congenital heart disease (CHD) has been described, depending on the presence or absence of central cyanosis, type of anatomic malformation and so on. This study was undertaken to find out the pattern of congenital heart disease in children in Rajshahi Medical College Hospital. It may help to detect and treat congenital heart disease at an earlier age and thus give the affected children and their parents hope of a better life.

# **METHODS**

It was a hospital based Cross-sectional study carried out prospectively in the department of pediatrics of Rajshahi medical college & hospital in from July 2011 to December 2011. The study population was all the children up to 12 years of age admitted in three pediatric units of this hospital during the study period. In all cases detail history was obtained from the parents. History included the presenting complaints of the patient's e.g. breathlessness, cough, palpitation, undue fatigability, bluish coloration or lips, tongue and extremities, history suggestive of cyanotic spell, feeding problem, poor weight gain, recurrent chest infection etc. Onset of symptoms and duration were noted. Chest X-ray reports were done by radiologists, ECG reports and echocardiography were done by cardiologists of RMCH. Among the 147 clinically suspected cases congenital heart disease was confirmed in 110 cases by echocardiography. After confirming the diagnosis data was noted in a preformed data sheet.

#### Inclusion criteria

Inclusion criteria were all cases of clinically diagnosed congenital heart disease admitted into all pediatric units of Rajshahi Medical College Hospital, Rajshahi.

#### Exclusion criteria

Exclusion criteria were the patients who are critically ill and age more than 12 years will be excluded from the study.

### **RESULTS**

Total 110 patients with different types of congenital heart disease were included in this study. Figure I show sex distribution of different CHD. Total male patient is 67% and female is 33%. So male:female ratio is 2:1 (Figure 1). It is evident from Table 1 that the commonest lesion was VSD present in 39.1% patients followed by PDA in 17.3%, TOF in 15.5%, ASD in 11.8%, A-V canal defect in 0.9%, PS in 1.8%, COA in 1.8%, TGA in 1.8% and single ventricle with single A-V canal defect in 0.9%. Rest patients had multiple lesions.

Table 1: Types of congenital heart disease in all patients from birth to 12 years of age (n-110).

| Types of lesion       | No. of patient | Percentage |
|-----------------------|----------------|------------|
| VSD                   | 43             | 39.1       |
| ASD                   | 13             | 11.8       |
| TOF                   | 17             | 15.5       |
| PDA                   | 19             | 17.3       |
| A-V canal             | 1              | 0.9        |
| PS                    | 2              | 1.8        |
| TGA                   | 2              | 1.8        |
| COA                   | 2              | 1.8        |
| Multiple lesion       | 10             | 9.1        |
| Single ventricle with |                |            |
| single A-V canal      | 1              | 0.9        |
| defect                |                |            |
| Total                 | 110            | 100.0      |

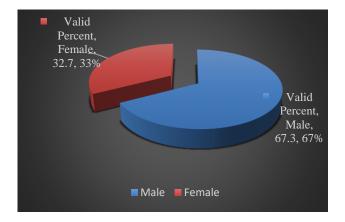


Figure 1: Sex distribution of different congenital heart disease (n=110).

Table 2 shows the cardiac findings in CHD cases. Thrill was mostly present in 60.5% of VSD cases, in 42.1% of PDA, in 50% of A-V canal defect and 10% of multiple

lesions patients. Palpable P2 was present in 27.9% of VSD cases, 15(%) of TOF, 50% of PS and 30% of multiple lesions patients.

Table 2: Important cardiac findings in different CHD (n=110).

| Types of lesion  | Thrill<br>n (%) | Palpable P2<br>n (%) | Parasternal Heave<br>n (%) | Wide & Fixed splitting S2 n (%) | Single S2<br>n (%) |
|------------------|-----------------|----------------------|----------------------------|---------------------------------|--------------------|
| VSD              | 26 (60.5)       | 12 (27.9)            | 11 (25.6)                  | 0 (0)                           | 0 (0)              |
| ASD              | 0 (0)           | 0 (0)                | 2 (15.6)                   | 11 (84.6)                       | 0 (0)              |
| TOF              | 0 (0)           | 15 (88.2)            | 15 (88.2)                  | 0 (0)                           | 15 (88.2)          |
| PDA              | 8 (42.1)        | 0 (0)                | 0 (0)                      | 0 (0)                           | 0 (0)              |
| A-V canal defect | 1 (50)          | 0 (0)                | 0 (0)                      | 0 (0)                           | 0 (0)              |
| PS               | 0 (0)           | 1 (50)               | 1 (50)                     | 0 (0)                           | 2 (100)            |
| TGA              | 0 (0)           | 0 (0)                | 0 (0)                      | 0 (0)                           | 0 (0)              |
| COA              | 0 (0)           | 0 (0)                | 0 (0)                      | 0 (0)                           | 0 (0)              |
| Multiple lesion  | 1 (10)          | 3 (30)               | 4 (40)                     | 1 (10)                          | 3 (30)             |

Parenthesis indicate percentage in respect of total no, of individual defect

Table 3: Important radiological findings (of x-ray chest) in different CHD patients (n=110).

|                    | X-ray ch | est          |                                     |                                 |                                   |  |                  |   |               |              |
|--------------------|----------|--------------|-------------------------------------|---------------------------------|-----------------------------------|--|------------------|---|---------------|--------------|
| Lesion             | Normal   | Cardiomegaly | Cardiomegaly with<br>Plethoric lung | Cardiomegaly with consolidation | Plethoric lung with consolidation | Boot shape heart<br>with oligemic lung | Oligemic<br>lung | Cardiomegaly with<br>consolidation with<br>plethoric lung | Consolidation | Total        |
| VSD                | 1 (2.3)  |              | 20 (46.2)                           | 5 (11.6)                        | 5 (11.6)                          |  |                  | 10 (23)   | 2<br>(4.7)    | 43 (100)     |
| ASD                |          |              | 10 (76.9)                           | 1 (7.7)                         | 2 (15.4)                          |  |                  |   |               | 13 (100)     |
| TOF                |          |              |                                     |                                 |                                   | 15 (88.2)                              | 2<br>(11.8)      |   |               | 17 (100)     |
| PDA                | 2 (10.3) | 1 (5.3)      | 12<br>(63.2)                        |                                 |                                   | •                                      |                  | 4 (21.1)  | •             | 19 (100)     |
| A-V<br>canal       | 1 (50.0) |              | 1(50)                               |                                 |                                   |  |                  |   |               | 2 (100)      |
| PS                 | 1 (50.0) | 1 (50)       |                                     | •                               |                                   | -                                      |                  |   | -             | 2 (100)      |
| TGA                | 1 (50.0) |              | 1(50)                               |                                 |                                   |  |                  |   |               | 2 (100)      |
| COA                | 1 (50.0) | 1 (50)       |                                     |                                 |                                   |  |                  |   |               | 2 (100)      |
| Multiple<br>lesion | 5 (50.0) | 2 (20)       | 1 (10)                              |                                 |                                   |  | 2 (20)           |   |               | 10 (100)     |
| Total              | 12 (14)  | 5<br>(4.5)   | 44 (40)                             | 6 (5.5)                         | 7 (6.4)                           | 15 (13.6)                              | 4<br>(5.5)       | 14 (12.7)   | 2 (1.8)       | 110<br>(100) |

Parenthesis indicate percentage in respect of total no. of individual defect

Left parasternal heave was found in 25.6% of VSD cases, 15.6% of ASD, 88.2(%) of TOF, 50% of PS and 40% of multiple lesions patients. Wide and fixed splitting S2 was present in 84.6% cases of ASD and 10% of multiple lesions. Single S2 was found in all 100% cases of PS, 30% of multiple lesions and 88.2% cases of TOF.

Table III shows important radiological findings (of X-ray chest) in different CHD patients. Cardiomegaly was present in 5.3% of PDA, 50% of COA, 50% of PS and

20% of multiple lesions cases. Plethoric lung field with cardiomegaly & consolidation was observed in 10% of VSD & 21% of PDA cases. Cardiomegaly with consolidation was observed in 11.6% of VSD & 15.6% of ASD cases. Cardiomegaly with plethoric lung field was observed in 46.2% of VSD, 63.2% of PDA, 76.9% of ASD, 50% of AV canal defect & TGA cases. Boot shape heart with oligamic lung was observed in 88.2% of TOF patients. Oligaemic lung was noted in 11.8% of TOF and 20% of multiple lesions cases. Pulmonary opacity/consolidation was found in 4.7% of VSD cases.

Table 4: ECG findings in different CHD patients (n=110).

|                 | Electrocardiogram |              |                  |              |                  |                               |                |  |  |
|-----------------|-------------------|--------------|------------------|--------------|------------------|-------------------------------|----------------|--|--|
| Lesion          | Normal<br>n (%)   | RVH<br>n (%) | RVH+RAD<br>n (%) | LVH<br>n (%) | LVH+LAD<br>n (%) | RVH+LVH+P-<br>Pulmonale n (%) | Total<br>n (%) |  |  |
| VSD             | 16 (37.2)         | 0 (0)        | 2 (4.7)          | 2 (4.7)      | 20(46.5)         | 3 (7)                         | 43(100)        |  |  |
| ASD             | 2 (15.4)          | 0 (0)        | 4 (30.8)         | 1 (7.7)      | 5 (38.8)         | 1 (7.7)                       | 13(100)        |  |  |
| TOF             | 0 (0)             | 2(11.8)      | 14 (82.4)        | 0 (0)        | 1 (5.9)          | 0 (0)                         | 17(100)        |  |  |
| PDA             | 5 (26.3)          | 0 (0)        | 1 (5.3)          | 1(5.3)       | 12(63.9)         | 0 (0)                         | 19(100)        |  |  |
| A-V<br>canal    | 1 (50)            | 0 (0)        | 0 (0)            | 0 (0)        | 0 (0)            | 1 (50)                        | 2(100)         |  |  |
| PS              | 0 (0)             | 0 (0)        | 2 (100)          | 0 (0)        | 0 (0)            | 0 (0)                         | 2(100)         |  |  |
| TGA             | 1 (50)            | 0 (0)        | 0 (0)            | 0 (0)        | 0 (0)            | 1 (50)                        | 2(100)         |  |  |
| COA             | 1 (50)            | 0 (0)        | 0 (0)            | 0 (0)        | 1 (50)           | 0 (0)                         | 2(100)         |  |  |
| Multiple lesion | 5 (50)            | 0 (0)        | 5 (50)           | 0 (0)        | 0 (0%            | 0 (0)                         | 10(100)        |  |  |
| Total           | 31 (28.2)         | 2 (1.)       | 28 (25.5)        | 4 (3.6)      | 37(35.6%)        | 6 (5.5%)                      | 110(100)       |  |  |

Parenthesis indicate percentage in respect of total no. of individual defect

Table 5: Complications of different CHD (n-110).

|                                       | Types of lesion |              |              |              |                    |             |              | Total                    |                |
|---------------------------------------|-----------------|--------------|--------------|--------------|--------------------|-------------|--------------|--------------------------|----------------|
| Complication                          | VSD<br>n (%)    | ASD<br>n (%) | TOF<br>n (%) | PDA<br>n (%) | A-V Canal<br>n (%) | PS<br>n (%) | COA<br>n (%) | Multiple<br>lesion n (%) | Total<br>n (%) |
| Heart failure                         | 6 (40)          | 0 (0)        | 0(0)         | 5 (33.3)     | 0 (0)              | 0(0)        | 0(0)         | 4 (26.7)                 | 15 (100)       |
| Pneumonia                             | 19 (54.3)       | 8 (22.9)     | 0 (0)        | 6 (17.1)     | 0 (0)              | 1 (2.9)     | 0 (0)        | 1 (2.9)                  | 35 (100)       |
| Growth failure                        | 3 (13)          | 5 (21.7)     | 10 (43.5)    | 2 (8.7)      | 1 (4.3)            | 1 (4.3)     | 1 (4.3)      | 0 (0)                    | 23 (100)       |
| Recurrent respiratory tract infection | 8 (57.1)        | 0 (0)        | 0 (0)        | 3 (21.4)     | 1(7.1)             | 0 (0)       | 1 (7.1)      | 1 (7.1)                  | 14 (100)       |
| Cerebral abscess                      | 0 (0)           | 0 (0)        | 4 (100)      | 0 (0)        | 0 (0)              | 0 (0)       | 0 (0)        | 0 (0)                    | 4 (100)        |
| Pneumonia<br>with Heart<br>failure    | 7 (70)          | 0 (0)        | 0 (0)        | 3 (30)       | 0 (0)              | 0 (0)       | 0 (0)        | 0 (0)                    | 10 (100)       |
| Total                                 | 43 (42.6)       | 13 (12.9)    | 14 (13.9)    | 19 (18.8)    | 2(2)               | 2(2)        | 2(2)         | 6 (5.9)                  | 101 (100)      |

Parentesis indicate percentage in respect of total no. of individual defect

Table 4 shows detailed ECG findings in CHD patients. RVH with RAD was noted in 4.7% of VSD cases, in 30.8% of ASD cases, in 82.4% of TOF, in 100% of PS and 50% of other CHD patients. LVH with LAD was found in 46.5% of VSD cases, in 38.8% of ASD, in 63.9% of PDA and in 50% of COA patients. RVH+LVH+ Tall P (P pulmonale) was present in 7% of VSD cases, 7.7% of ASD, 50% of AV canal defect and TGA patients. In this study 37.2% of VSD, 15.4% of ASD, 26.3% of PDA, 50% of PS and 50% of multiple lesion patients had normal ECG tracing.

Table 5 shows complications of different CHD patients. Among 110 patients, 101 presented with different complication. Heart failure was present in total 15 cases, among them, 40% of VSD, 33.3% of PDA and 26.7% of multiple lesions patients presented with heart failure. Growth failure was observed in total 23 cases, among

them, 13% of VSD, 21.7% of ASD, 43.5% of TOF, 8.7% of PDA and 13.1% of other patients presented with growth failure. Pneumonia was noted in 54.3% of VSD, 22.9% of ASD, 17.1% of PDA and 5.7% of other patients. Recurrent chest infection was noted in 70% of VSD and 30% of PDA patients. Pneumonia with heart failure was noted in 54.3% of VSD, 22.9% of ASD, 17.1% of PDA and 5.7% of other patients. Cerebral abscess occurred only in TOF cases.

## **DISCUSSION**

This prospective study was conducted in the department of pediatrics of Rajshahi medical college & hospital from July, 2011 to December, 2011. Babies from birth to children up to 12 years of age were included in this study. The aim of this study was to know the pattern of congenital heart disease in this hospital. In this study the

commonest type of Congenital heart disease was ventricular septal defect. This correlates with many studies. 11-14 But this differs from Rahman et al, Siddique et al and Fatema et al. 15-19 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. 17-19 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 subject 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. 15,16 However all these studies found TOF as the commonest cyanotic congenital heart disease.20-23 This finding is quite similar to the current study. In this study male and female ratio was 2:1, of which males are predominant in ASD, TOF, COA, TGA, multiple lesions, PS, A-V canal defect and single ventricle with single AV canal defect whereas females were more frequently noted in VSD and PDA. This gender distribution correlates partially with the observation of Mollah et al, Hussain et al and Rao et al.<sup>24</sup>-

#### Limitations

This cross-sectional study was conducted in a single community. Limitations of this study were mainly hospital lacks facilities for curative treatment of different congenital heart disease. Also, this study was done in a selected group of patients. So, an extensive study with large sample size and longer period of time should be conducted to get a real picture of the problem; so that cases can be recognized earlier and prompt action can be undertaken.

#### **CONCLUSION**

In this study, most frequent associated disease with CHD was pneumonia present in 35% cases and commonly observed complications were heart failure 15% and growth failure 23%. Fast breathing, chest indrawing, cough, poor weight gain, feeding problems, anemia, cyanosis, clubbing, easy fatigability, recurrent chest infection and murmur detected in routine cardiac examination. Features of heart failure are common mode of presentation of congenital heart disease. Without correction of congenital heart defect outcome of the patients are not satisfactory. Such a study done on a single institute may not reflect the total picture of the community.

#### Recommendations

Heart failure in infancy and childhood should be evaluated cautiously for presence of CHD. Local pediatricians should be trained about specialized cardiac care and specialized cardiac centers should be established locally so that patients can be managed effectively without delay.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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