fortune Journals

Research Article

JOURNAL OF SURGERY AND RESEARCH

ISSN: 2640-1002

Prevalence of Congenital Heart Disease in Children with Recurrent Respiratory Tract Infection

Mohammad Ata Ullah[1*], Sumaiya Mamun[2], Heemel Saha[3], AK Al-Miraj[4]

Abstract

Background: Congenital heart disease is when a child is born with a problem with the structure of the heart. Some pediatric congenital heart diseases are simple and do not require treatment. Others are more complicated. A child may require multiple surgeries over several years. Congenital heart disease (CHD) affects the respiratory system and leads to respiratory problems. Recurrent respiratory infection is one such morbidity.

Objective: To assess the prevalence of congenital heart disease in children with recurrent respiratory tract infection.

Methods: This study was conducted at the Department of Cardiac Surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh from June to December 2023. A total of 50 patients with recurrent LRTI were studied (N=50), which included 30 males and 20 females. All the patients were subjected to clinical examination and were made to undergo chest X-ray, electrocardiography, and 2D echocardiography with color Doppler to detect CHD.

Results: Total 50 patients with recurrent LRTI were studied (N=50), which included 30 males and 20 females. All the patients were subjected to clinical examination and were made to undergo chest X-ray, electrocardiography, and 2D echocardiography with color Doppler to detect CHD.

Conclusions: Congenital heart disease (CHD) is a problem that is present at birth and affects the structure and function of the heart. Common examples include holes in the inner wall of the heart and narrowed or leaking heart valves. The results reveal that CHD is a major cause for recurrent LRTI. Considering this, it would be prudent to screen all children presenting with recurrent LRTI for CHD.

Keywords: Congenital heart disease; Pulmonary hypertension; Pneumonia

Introduction

Congenital heart disease is when a child is born with a problem with the structure of the heart. Some pediatric congenital heart diseases are simple and do not require treatment. Others are more complicated. A child may require multiple surgeries over several years. Congenital heart disease (CHD) affects the respiratory system and leads to respiratory problems. Congenital heart disease was the underlying cause of an estimated 261,247 deaths worldwide in 2017, a 34.5% increase from 1990 when the number of deaths was 398,580. In 2017, 69% of all deaths due to congenital heart disease were in infants under 1 year of age.1 Acute respiratory infections pose a major challenge

Affiliation:

[1]Department of Cardiac Surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU) Dhaka, Bangladesh

[2]Institute of nutrition and food science University of Dhaka Bangladesh.

[3]Department of Cardiac Surgery, Thoracic Surgery Unit, Bangabandhu Sheikh Mujib Medical University (BSMMU), Shahbag, Dhaka, Bangladesh

[4]Department of Vascular surgery Bangabandhu Sheikh Mujib Medical University (BSMMU) Dhaka, Bangladesh

***Corresponding author:**
Mohammad Ata Ullah, Department of Cardiac Surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU) Dhaka, Bangladesh

Citation: Mohammad Ata Ullah, Sumaiya Mamun, Heemel Saha, AK Al-Miraj. Prevalence of Congenital Heart Disease in Children with Recurrent Respiratory Tract Infection. Journal of Surgery and Research. 7 (2024): 440-443.

Received: September 12, 2024
Accepted: September 25, 2024
Published: September 30, 2024

Ullah MA, et al., J Surg Res 2024
DOI:10.26502/jsr.10020392

to healthcare systems in developing countries due to their high morbidity and mortality.2 Bangladesh, India, Indonesia and Nepal are estimated to account for 40% of global deaths due to acute respiratory infections. Interestingly, infants who live in crowded conditions and are not optimally breastfed are more likely to develop acute respiratory infections.3,4 People with congenital heart disease are at higher risk of developing respiratory infections. RTIs are infections of the lungs and airways, such as: B. Pneumonia. Symptoms of RTIs include: Coughing, which may be severe with expectoration of mucus and phlegm. Pulmonary edema leads to congestive heart failure and serves as a focus for infection of the lower respiratory tract. Ventricular septal defect (VSD), patent ductus arteriosus (PDA), and atrioventricular septal defect (AVSD) are common childhood acyanotic congenital heart defects that cause bronchopneumonia. Diseases closely related to congenital heart disease include lower respiratory tract infections (e.g. pneumonia), which are the leading cause of death in children worldwide. Infants with hemodynamically significant congenital heart disease are at high risk for acute cardiac events and frequent pneumonia (70% of cases). The severity of acute cardiac events, certain infections, and the association with congenital heart disease require a multidisciplinary approach to prevent serious cardiac and respiratory complications. One such disease is recurrent respiratory infections. Congenital anomalies of the circulatory system often impair the heart's ability to increase systemic and/or pulmonary blood flow. Shunt lesions can reduce arterial oxygen tension and impair tissue oxygenation. Circulatory disorders often also strain the respiratory system itself, causing signs and symptoms similar to those of primary respiratory disease. Recurrent low RTI (LRTI) is defined as two or more hospitalizations in a 6-month period or three hospitalizations for RTI in any period.3 The etiology of RTI is diverse, with infections (viral, bacterial) being the most common. However, underlying congenital heart disease may predispose to recurrent RTI. Although congenital defects of small left-to-right shunts can present with symptoms such as recurrent LRTI and growth restriction in early childhood, it is useful to screen this patient group for congenital heart disease.4Early detection and appropriate treatment of congenital heart disease allows children enough time to catch up in growth, reduces the risk of morbidity and mortality associated with each LRTI episode, significantly reduces the economic burden on families, and prevents long-term morbidity. Early and accurate diagnosis of congenital heart disease in children presenting with recurrent LRTI requires a rapid, effective, and systematic approach, including a detailed medical history and a thorough clinical examination.

Materials and Methods

This study was conducted at the Department of Cardiac Surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU) Dhaka, Bangladesh from June to December 2023. A total of 50 patients with recurrent LRTI were studied (N = 50), which included 30 males and 20 females. All the patients were subjected to clinical examination and were made to undergo chest X-ray, electrocardiography, and 2D echocardiography with color Doppler to detect CHD.

Inclusion criteria

The patients were initially said to have recurrent LRTI based on the following Indian Academy Of Pediatrics '(IAP) criteria.

1. At least 2 episodes of pneumonia occurring in 1 year or 3 episodes of pneumonia occurring over any period of time
2. Between 2 different episodes of recurrent pneumonia the individual recovers completely but without radiologic improvement

Exclusion criteria

1. Those unwilling to undergo chest X-ray, electrocardiography (ECG), and echocardiography (ECHO)
2. Those already operated for CHD
3. Known cases of bronchial asthma

Study procedure: Detailed medical history of all the 50 patients was collected. All patients underwent thorough clinical examination followed by investigative workup. Chest X-ray, ECG, and 2D ECHO with color Doppler were performed by a pediatrician and then the finding were confirmed by a cardiologist. Routine investigations such as hemoglobin (Hb) level, total count (TC), different count (DC), and erythrocyte sedimentation rate (ESR) were also conducted.

Results

A total of 50 patients with recurrent LRTI were studied (N = 50), which included 30 males and 20 females. Of the 50 patients, 22 patients 12 (54.5%) males and 10 (45.5%) females with recurrent LRTI were found to have CHD. Figures 1, 2 & table 1 shows the incidence of different types of CHDs in patients with recurrent LRTI detected with congenital heart defects. Tables 2 shows the age distribution of patients with recurrent LRTI and CHD respectively.

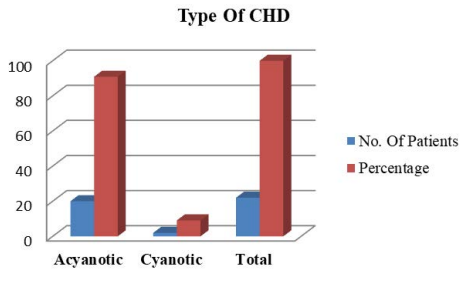

Figure 1: Type of CHD in patients with Recurrent LRTI.

Ullah MA, et al., J Surg Res 2024
DOI:10.26502/jsr.10020392

Table 1: Type of CHD in patients with recurrent LRTI

Type of ACHD	No. of patients	Percentage
Vsd	8	40
Asd	6	30
Pda	3	15
Vsd+Asd	2	10
Mvp	1	5
Total	20	100

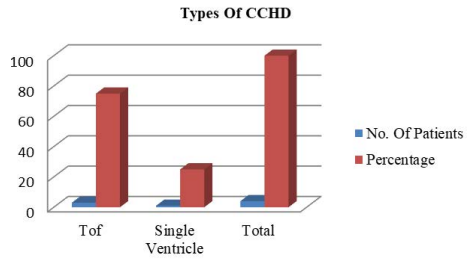

Figure 2: Types of CCHD in patients with recurrent LRTI.

Table 2: Age distribution of patients with recurrent LRTI with CHD (n=50).

Age (Recurrent LRTI)	N (%)	Age (CHD)	N (%)
<1 y	13(26)	<1 y	18(36)
1-5 y	23(46)	1-5 y	20(40)
6-10 y	10(20)	6-10 y	7(14)
>10 y	04(8)	>10 y	5(10)

Discussion

Recurrent respiratory tract infections (RRTIs) are common in children and represent a major challenge for pediatricians. These infections affect a significant proportion of infants and children aged 1–6 years. Colds are the most common form of all respiratory infections and are the leading reason for doctor visits and missed work or school. Most colds are caused by viruses. Studies in adult patients have shown the presence of cardiac events, including: B. Congestive heart failure (CHF) is one of the most common comorbidities increasing the risk of morbidity and mortality [1,3,5]. However, the association in pediatric patients is not well established. Ten percent of children with the highest number of days with respiratory symptoms per year suffered from recurrent respiratory infections. In our study, total 50 patients with recurrent LRTI were studied (N=50), which included 30 males and 20 females. Of the 50 patients, 22 patients 12 (54.5%) males and 10 (45.5%) females with recurrent LRTI were found to have CHD. The diagnostic algorithm for RRI includes investigation of possible causes of chronic cough, such as allergy, asthma, α1-antitrypsin deficiency, primary or secondary ciliary dyskinesia, congenital anomalies, gastroesophageal reflux disease (GER), recurrent pulmonary aspiration, and postnasal drip syndrome. This study also attempted to investigate the characteristics and factors associated with the occurrence of CHF and pneumonia in children less than 5 years of age. The prevalence of congestive heart failure (CCF) was found to be 27.5%. Congenital heart disease (CHD) is one of the causes of recurrent LRTI. With early detection and appropriate treatment, this disease in children can be prevented from irreversible and untreatable diseases such as pulmonary hypertension, Eisenmenger syndrome, thromboembolism, and sudden cardiac death. The study found that the incidence of congenital heart disease in children was 43%, which is significantly higher than the frequency in the general population (6-8%). This means that congenital heart disease is the main cause of recurrent LRTI. It is therefore important to identify children with recurrent LRTI and screen them for underlying congenital heart disease through physical and laboratory examinations. Chandramouli [4] reported that in a study of 2,613 children under 24 months of age with congenital heart disease, the most common reason for hospitalization was bronchiolitis relapsing (LRTI) (54.1%). Gupte et al. [5] reported that congenital heart disease was present in 36% of patients with recurrent LRTI. The majority of children had acyanotic congenital heart disease (ACHD) (20/22). Similar results were reported in studies by Shreshta et al. [6] and Suresh et al. [7] from India. Congenital heart disease was diagnosed in three cases, two of which were tetralogy of Fallot (TOF). A child has a single ventricular infection. Most of the children with recurrent LRTIs were between 1 and 5 years of age, and most of the children with congenital heart disease were also between 1 and 5 years of age. Thus, the incidence of congenital heart disease in this age group is common and statistically significant (P=0.03). Symptoms and signs of pneumonia may be subtle, especially in infants and young children. The combination of fever and cough indicates pneumonia. Other respiratory findings (e.g., tachypnea, increased work of breathing) may precede the cough. Newborns and young children may experience feeding difficulties, restlessness, and agitation rather than coughing or abnormal breathing sounds [8-10].

Conclusion

Congenital heart disease (CHD) is a problem that is present at birth and affects the structure and function of the heart. Common examples include holes in the inner wall of the heart and narrowed or leaking heart valves. In more severe forms of CHD, blood vessels or heart chambers may be missing, poorly formed, and/or in the wrong place. Results indicate that CHD is the leading cause of recurrent LRTI. Given this, clinical practice would require screening for CHD in all children with recurrent LRTI.

Conflict of interest: None.

Source of fund: Nil.

Ullah MA, et al., J Surg Res 2024
DOI:10.26502/jsr.10020392

References

1. Behrman RE, Kliegman RM, Jenson HB, eds. Congenital heart disease. In: Nelson Textbook of Pediatrics. (19th edtn). Harcourt Aisa Pvt Ltd (2000): 1549-1605.
2. Park KM. Pediatric Cardiology for Practitioners. (5th edtn). Elsevier Health Sciences (2007): 119-326.
3. Subramanyam L. Recurrent respiratory tract infection - An approach. Indian J Pract Pediatr 14 (2012): 245-257.
4. Chandramouli B. The neonate with congenital heart disease: Diagnosis and management. Indian J Pediatr 58 (1991): 453-469.
5. Gupta S, Saini G. Congenital heart disease: Clinic echocardiographic profile in children. Asian J Pediatr Pract 8 (2004): 30-34.
6. Shreshta NK, Padmavati S. Congenital heart disease in Delhi school children. Indian J Med Res 72 (1980): 403-407.
7. Suresh V, Rao AS, Yavagal ST. Frequency of various congenital heart diseases: Analysis of 3790 consecutively catheterized patients. Indian Heart J 47 (1995): 125-128.
8. Hajela S. Profile of Congenital Heart Disease inchildhood. Surgery 11 (2014): 12.
9. Cross TJ, Kim CH, Johnson BD, et al. Theinteractions between respiratory and cardiovascular systems in systolic heart failure. J Appl Physiol 128 (2020): 214-224.
10. Gabriela, Krystle, Rahmat BK, et al. Clinical characteristic andoutcome of acute lower respiratory tract infection inchildren with congenital heart disease. Althea Medical Journal 3 (2015): 403-408.