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Original Article

Pattern and frequency of pediatric congenital heart disease at the Cardiac Research Institute of Kabul Medical University, Afghanistan

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Abstract

Background Congenital heart disease (CHD) is the most common birth defect, with incidence of 0.7-0.9 live birth; it increases to 2-6% if first degree relative is affected. In Afghanistan majority of births take place at home and routine screening of neonates is not common, so true birth prevalence of CHD cannot be possibly calculated. Therefore, true prevalence of CHD in our population is unknown.

Objective To verify the current pattern and frequency distribution of congenital heart disease (CHD) at the Cardiac Research Institute of Kabul Medical University.

Methods This retrospective study was conducted in children aged 0-14 years, who underwent echocardiography for possible congenital heart disease from January 2015 to December 2016.

Results Of 560 patients who underwent echocardiography, 392(70%) had cardiac lesions. Congenital cardiac lesions were found in 235 (60% of those with lesions) patients, while 157 (40%) patients had rheumatic heart disease. Patients with CHD were further subdivided into acyanotic and cyanotic groups. The majority of acyanotic group had isolated atrial septal defect (55%) while the most common lesion in the cyanotic group was Tetralogy of Fallot (42%).

Conclusion Congenital heart defects are the most common heart disease in the pediatric population presenting at the Cardiac Research Institute of Kabul Medical University. Atrial septal defect (ASD) was the most common acyanotic defect, while Tetralogy of Fallot (ToF) is the most common cyanotic defect. **[Paediatr Indones. 2018;58:106-9; doi: http://dx.doi.org/10.14238/pi58.3.2018.106-9]**.

Keywords: *congenital heart disease; acyanotic; cyanotic CHD; echocardiography*

Congenital heart disease (CHD) is the most common birth defect, with an incidence of 7-9 per one thousand live births.[1] Pediatric CHDs are structural malformations of the cardiovascular system present at birth.[1] Congenital heart disease is a high contributor to the overall burden of pediatric cardiovascular diseases.[2] In developing countries like Afghanistan with very limited health facilities and poor access to the health centers, having a child with cardiovascular defects often results in social and economic problems that affect the entire family.[2] In the Western world, the incidence of CHD was reported to be 8/1,000 live births.[1,2] In Afghanistan, it has been difficult to obtain an accurate figure of the incidence of congenital heart disease. In Pakistan, a study reported a CHD prevalence of up to 6/1,000 live births.[3] In the neighboring country or India, another study reported a similar incidence.[4] In countries like Afghanistan, the true estimate of CHD prevalence is difficult to assess, as the majority of births occur at home and routine childhood

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screening is uncommon, due to financial, cultural, and religious issues. Data on immigrants from the Indian Subcontinent, however, showed a higher incidence of CHDs compared to the Caucasian population.[5]

Congenital heart defects could be isolated lesions or in combination with other cardiac malformations, and may also be associated with certain syndromes.[3] A systematic review mentioned, that in Asia, the highest total birth prevalence of CHD was 8/1,000 live births.[6] Other study has shown that in developing countries, the burden of CHDs continues to rise, due to increases in risk factors and etiological factors for such defects, including infection during pregnancy and older maternal age. The incidence of CHD in Afghanistan is likely much higher than what has been reported in the literature.[7] In developed countries, early diagnosis and suitable treatment has significantly increased the survival rate and has decreased mortality from 85% to 15% in CHD patients. As such, the number of adults with CHD has increased.[8]

In Afghanistan, few studies have been performed at the regional level to estimate the prevalence of CHD. Moreover, unfortunately, data on the prevalence at a general level needed to assess the burden of CHD nationwide is no available. In addition, there is no registry at the national level to approximate the total number of cases. Most past studies considered only the age of patients with CHD who visited the hospital, and the age at which the initial diagnosis was made.[9] Our study was performed at the Cardiac Research Institute of Kabul Medical University with the aim of determining the current frequency and pattern of congenital heart disease distribution.

Methods

A retrospective, cross-sectional study was done at the Cardiac Research Institute of Kabul Medical University from January 2015 to December 2016. Patients aged 0-14 years with echocardiography-confirmed structural heart disease were included in the study. Data were taken from medical records. The diagnosis of CHDs were based on trans-thoracic echocardiography, performed by two experienced echo cardiographer and the patients were reviewed by the consultant pediatric cardiologist, and their clinical presentation were recorded on their medical files.

Congenital heart defects are classified as cyanotic and acyanotic based on the presence and absence of cyanosis and direction of their shunts on echocardiography. We included ventricular septal defect (VSD), atrial septal defect (ASD), pulmonary stenosis (PS), patent ductus arteriosis (PDA), aortic stenosis (AS), and coarctation of the aorta (COA) as acyanotic, because clinically they had no cyanosis, and their shunts were left to right. Those who had right to left shunt we included as cyanotic CHD. In cyanotic group, clinically they had cyanosis which was recorded on their files, and they were included truncus arteriosis, tricuspid atresia, PDA (with right to left), transposition of the great artery (TGA), Tetralogy of Fallot (ToF), total anomalous pulmonary venous connection (TAPVC). Patients with insufficient medical records and those who had no confirmed echocardiography report were excluded. Data analysis was done with *Statistical Package for Social Sciences* (SPSS) software. This study was approved by the Ethics Committee of Pediatric Cardiology Department, Kabul Medical University, Afghanistan.

Results

Of 560 patients who underwent echocardiography, 392 (70%) had cardiac lesions, while 168 (30%) had normal findings. Congenital cardiac lesions were found in 235 (60% of those with lesions) patients, while 157 patients (40%) had rheumatic heart disease (RHD). Patients with CHD were further subdivided into cyanotic and acyanotic groups (**Table 1**).

The majority of the patients in the acyanotic group had isolated atrial septal defect (55%) (**Table 2**). Tetralogy of Fallot was the most common lesion in the cyanotic heart disease group (42.8%) (**Table 3**).

Table 1. The relative frequency and type of lesion in children with CHD

Type of cardiac lesion	N=392
Congenital heart disease, n(%)	235 (60)
Acyanotic CHD, n(%)	188 (80)
Cyanotic CHD, n(%)	47 (20)
Rheumatic heart disease, n(%)	157(40)

Table 2. Distribution of lesion types in patients with acyanotic heart disease (n=188)

Types of lesion, n(%)	Acyanotic CHD (n=188)	Compared to total CHD (n= 235)	Mean age (SD), years
VSD	53 (28.1)	53 (22.5)	2.3 (0.7)
ASD	103 (54.7)	103 (43.8)	4.7 (1.3)
PS	3 (1.5)	3 (1.27)	6.8 (1.2)
PDA	19 (10.1)	19 (8.08)	2.3 (0.7)
VSD+ASD	6 (3.1)	6 (2.5)	1.4 (0.6)
AS	2 (1.06)	2 (0.8)	7.1 (0.9)
COA	2 (1.06)	2 (0.8)	4.2 (1.8)

VSD=ventricular septal defect, ASD=atrial septal defect, PS=pulmonary stenosis, PDA=patent ductus arteriosis, AS=aortic stenosis, COA=coarctation of the aorta

Table 3. Distribution of lesion types in patients with cyanotic heart disease (n= 47)

Types of lesion, n(%)	Cyanotic CHD (n=47)	Compared to total CHD (n=235)	Mean age (SD), year
Truncus arteriosis	4 (8.5)	4 (1.7)	1.2 (0.8)
Tricuspid atresia	14 (29.8)	14 (5.9)	2.5 (0.4)
PDA (Eisenmenger syndrome)	2 (4.3)	2 (0.9)	6.5 (1.5)
TAPVC	4 (8.5)	4 (1.7)	1.3 (0.7)
TGA+VSD	3 (6.4)	3 (1.27)	1.7 (0.3)
ToF	20 (42.6)	20 (8.5)	2.8 (1.2)

TAPVC=total anomalous pulmonary venous connection, TGA=transposition of the great artery, ToF=Tetralogy of Fallot

Discussion

Congenital heart disease (CHD) is the most common birth defects in the pediatric population. This congenital defect is the leading cause of infant mortality and also a major risk factor in developing countries like Afghanistan, both in terms of morbidity and mortality.[1] Most of the children born with CHDs are expected to have normal, productive lives, when treated as early as possible. However, in developing countries, given the high incidence of birth asphyxia and various childhood infections, CHD remains neglected and often overlooked. In such settings, multiple factors including poverty, poor access to health care, lack of available trained staff, spiritual and social beliefs, lack of awareness about CHD and the absence of screening programs result in delayed diagnoses and poor outcome for children with CHD.[9] Early treatment of CHD may prevent a serious risk of avoidable mortality, morbidity, and handicaps.[10] The aim of this study was to verify the pattern and frequency of CHD in pediatric patients at the Cardiac Research Institute of Kabul Medical University.

In Afghanistan most births still take place at home, so it is nearly impossible to screen all the new borns for congenital anomalies. The data presented in this study were confined to hospital records, but there may be a large number of cases without access to a hospital or who died before reaching the hospital due to life threatening lesions. Hence, obtaining exact information on the prevalence and incidence of congenital heart disease in the pediatric population of Afghanistan remains a challenge. We found that among our CHD subjects, 20% had cyanotic heart disease and 80% had acyanotic heart disease, similar to results reported in both local and international studies.[2-12] The ASD and VSD were the most common lesions in our study subjects. Of our CHD subjects, we noted that 103/235 (43.8%) had ASD, which was similar to results from previous studies in neighboring Pakistan, 32.1% at the Punjab Institute of Cardiology (PIC), Lahore, 39.9% at the National Institute of Cardiology Karachi, and 38.16% at the Siddique Sadiq Memorial Trust Hospital, Gujranwala. The second most common congenital heart lesion found in our subject was isolated VSD, with prevalence of 22.5%. Similar prevalence were reported in the in the National Institute of Cardiovascular Disease (NICVD), Karachi, Karachi (18.2%), and Lahore (19.2%).[6] The 3rd most common pediatric cardiac lesion found in our study was PDA (8.08% of total CHD) which was seen 6.1 % of patients at NICVD, Karachi and 7.03% in Lahore. These figures clearly indicate that the pattern of congenital heart defects in three most common acyanotic CHD was similar in a neighboring country. Amongst cyanotic CHD patients, Tetralogy of Fallots was the highest at NICVD Karachi (24.3%) and PIC, Lahore (16.1%). Similarly, the most common cyanotic CHD in our study was also Tetralogy of Fallot.[10]

This study is important in two respects. Rheumatic heart disease was the most common cause of presentation to our hospital (40%). Recent literature involving community and school based studies from Pakistan has also confirmed that rheumatic heart

disease continues to be an important cause of morbidity and mortality in the pediatric population despite drastic drops in the incidence of rheumatic heart disease in the rest of the world.[13-15]

Early detection and surgical intervention in developed countries have provided a significant chance of survival in children with CHD, but unfortunately in developing countries like Afghanistan the facilities for diagnosis and treatment of children with CHD are very limited and very expansive and beyond the reach of poor people. As such, many children die at early age, before diagnosis has been established. To improve the survival of children with CHD, it is necessary to diagnose and treat the condition as early as possible, by provision of diagnostic and surgical facilities at each province of the country.

Our study was performed over a period of two year in a teaching hospital, showing that CHD is still common in our society and constitutes a big health problem. The majority of CHD types in children up to 12 years of age are acyanotic followed by cyanotic heart disease. Ventricular septal defects and atrial septal defects were the major acyanotic CHDs, and Tetralogy of Fallot (ToF) was the major cyanotic CHD. Most of the information about morphology and hemodynamics can be obtained by 2D echo and Doppler examination of all infants and children suspected of having CHD, therefore, it is an essential tool for diagnosis, in addition to proper management to improve the survival of patients with various CHDs by medical or surgical intervention at the earliest possible age.

Conflict of Interest

Non declared.

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