

## ABSTRACT

**Background:** Congenital cardiac defects have a wide spectrum of severity in infants. About 30-40% of patients with congenital cardiac defects will be symptomatic in the 1<sup>st</sup> year of life, while the diagnosis was established in 60% of patients by the 1<sup>st</sup> month of age.

**Objectives:** To identify the occurrence of specific types of CHD among hospitalized patients and to evaluate of growth of patients by different congenital heart lesions.

**Methods:** A retrospective study, done on ninety-six patients (51 male and 45 female) with congenital heart disease (CHD) admitted to central teaching hospital of pediatrics, Baghdad from 1<sup>st</sup> September 2009 to 30<sup>th</sup> of August 2010.

**Results:** The most common congenital heart diseases (CHD) were ventricular septal defect (VSD), tetralogy of Fallot (TOF), patent ductus arteriosus (PDA), transposition of great arteries (TGA), pulmonary Stenosis( PS), and Atrial septal defect (ASD).The most common modes of presentation were respiratory infection and heart failure in acyanotic patients and cyanosis in cyanotic groups. The study showed that only patent ductus arteriosus and atrial septal defects were more common in

female while all other lesions were equal male to female ratio or slightly more common in male. The effect of acyanotic congenital heart disease on growth (Wt) is more common than cyanotic congenital heart disease.

**Conclusions:** VSD is the most common type of congenital heart disease and the most common cause of morbidity, while ASD is the least common cause of morbidity in patients with congenital heart disease. The most common modes of presentation of patients with CHD are respiratory infection and heart failure in acyanotic CHD while cyanosis is the most common presentation in cyanotic group.

**Key words:** Congenital heart disease, ventricular septal defect, tetralogy of fallot.

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## INTRODUCTION

Congenital heart diseases (CHD) occur in 0.5-0.8% of livebirths. The incidence is higher in stillborns (3-4%), abortuses (10-25%), and premature infants (2%) excluding patent ductus arteriosus. Congenital cardiac defects have a wide spectrum of severity in infants. About 30% - 40% of patients with congenital cardiac defects will be symptomatic in the 1<sup>st</sup> year of life, while the diagnosis was established in 60% of patients by the 1<sup>st</sup> month of age<sup>(1-3)</sup>.

There are eight common congenital heart lesions (ventricular septal defect, atrial septal defect, patent ductus arteriosus, coarctation of aorta, tetralogy of fallot, transposition of great arteries, pulmonary stenosis and aortic stenosis), which together make up to 90% of all cases. The remaining 10% consists of more complex anomalies<sup>(4)</sup>. Although the advance in the diagnostic techniques (especially the colour Doppler echocardiography), VSD still considered as the commonest lesion

and constitute about 25%-30% of all CHD while ASD, PDA and coarctation are considered the next most common congenital heart diseases and each lesion forms about 8%-10% of all congenital heart diseases (CHD)<sup>(5,6)</sup>. Tetralogy of fallot, which is the most common cyanotic congenital heart disease accounts for 6% - 8% of the whole CHD and the TGA for 5%-6% of these diseases<sup>(7)</sup>.

The most common lesions in acyanotic congenital heart disease that cause left to right shunting and volume overload are: ventricular septal defect,atrial septal defect and PDA<sup>(1)</sup>. The direction and magnitude of the shunt across such a communication depends on the size of the defect. If the hole is small the shunt may be trivial, but if it is large the blood flows through the pulmonary artery may be several times greater than that through the aorta and this results in signs and symptoms of heart failure and failure to thrive begins to appear<sup>(1-4)</sup>.

Atrial septal defect is of three types: secundum, primum, or sinus venosus, depending on which embryonic septal structure has failed to develop normally<sup>(1,2)</sup>. It is usually asymptomatic with Fixed split S<sub>2</sub> and Soft systolic murmur at upper left sternal edge. In ASD secundum, the defect is in the region of the fossa ovalis, which is the most common type of ASD and it associated with structurally normal atrioventricular valves<sup>(8)</sup>. In ASD primum, the defect is in lower atrial septum involving the left atrioventricular valve which has clefted and tends to leak<sup>(9-11)</sup>. In sinus venosus ASD, the defect is at the upper end of atrial septum such that superior vena cava overrides the atrial septum and the right pulmonary veins are usually anomalous and drain directly into the superior vena cava or right atrium<sup>(10,11)</sup>.

The natural history of patent ductus arteriosus is related to the size of ductus and to the changes that occur in the pulmonary circulation after birth. If the ductus does not close during the first three months of life in the full-term infants, spontaneous closure thereafter is rare. Patent ductus arteriosus is associated with maternal rubella infection during early pregnancy, It is common problem in premature infants; female to male 2:1 ratio<sup>(1-3)</sup>. Small defect not have any symptom while large defect will result in heart failure and failure to thrive similar to large VSD<sup>(7)</sup>.

Ventricular septal defect is the most common cardiac malformation and accounts for 25% of congenital heart disease. Defects may occur in any portion of ventricular septum, but most are of the membranous type<sup>(12)</sup>. Small VSD with normal pulmonary arterial pressure is usually asymptomatic while large VSD with pulmonary hypertension presented with dyspnea, difficulties in feeding, failure to thrive and recurrent chest infection<sup>(13,14)</sup>.

Cyanotic congenital heart disease can be subdivided into two types. In the first type, the lungs are underperfused as blood shunts from right to left bypassing the lungs and tetralogy of Fallot (TOF) is the commonest example<sup>(15)</sup>. In the second type, the lungs are normally filled or even overperfused with blood, but cyanosis

results because there is mixing of the systemic and pulmonary circulations, transposition of the great arteries is the commonest example<sup>(6)</sup>.

The newborn with TOF with mild degree of obstruction usually pink and cyanosis develops and increases over the next few weeks or months while if the obstruction is severe, the cyanosis may be present during the neonatal period. Hypercyanotic spells may be particular problem during the first 2 years. Heart failure is extremely rare in TOF<sup>(15)</sup>.

In patients with transposition of great arteries, which is the most common cause of cyanosis during the neonatal period, progressive cyanosis within the first few hours or days of life and the affected baby becomes increasingly blue and without treatment, this disease has lethal course and few patients survive the first year of life<sup>(1, 2)</sup>.

The aim of the study was to study the sex and age distribution of CHD and the most common pattern of presentation, to identify the occurrence of specific types of CHD among hospitalized patients and to evaluate of growth of patients by different congenital heart lesions.

## **METHODS**

It is a retrospective study done on ninety-six patients (51 male and 45 female) with congenital heart disease (CHD) admitted to central teaching hospital of pediatrics, Bagdad from 1st September 2009 to 30th of August 2010.

For each patient, the following data were collected: age, sex, cause of admission, and the growth parameter (weight, height & head circumference).

The diagnosis of CHD was done by electrocardiography, chest X-ray and two dimensional and Doppler echocardiographic examination.

## **RESULTS**

The studied group included ninety-six patients with congenital heart disease. Fifty-one patients were male (53.1%) and forty-five patients were female (46.9%) with a male: female ratio of 1.13:1. There were 48 patients had VSD (50%) and 18 patients were diagnosed as tetralogy of

Fallot (18.75%) and 14 patients showed to have patent duct arteriosus (14.58%). Nine patients were diagnosis as transposition of great arteries (9.37%), while 4 patients had pulmonary stenosis (4.16%) and 3 patients had ASD (3.12%), so the most common congenital heart disease was VSD & the least common congenital heart disease was ASD. TOF, VSD & TGA were more common in male, PS equal in male and female, while patent ductus arteriosus and atrial septal defect more common in female. Acyanotic CHD (VSD, ASD, PDA, PS) had more deleterious effect on the growth (weight) of the patients (65,21%) weight (<3<sup>rd</sup> centile) than cyanotic heart disease (TOF, TGA) (37.04%).

In general, the most common age of presentation for congenital heart diseases was the first six months of age

(64.6%), followed by the second six months of age (30.2%) and the least age was after one year (5.2%). While tetralogy of Fallot mostly appear in second 6 month of life (72.22%) & ASD mostly appears after age of 1 year (66.6%).

The most common presenting clinical features of CHD in this study was chest infection in 54 patients (56.25%) while the cyanosis is the presenting feature in 26 patients (27%) and heart failure was the least clinical presentation in 16 patients (16.66%).

Chest infection was the most common presenting clinical feature in acyanotic CHD (72.4%) while cyanosis was the least presenting clinical feature in acyanotic CHD (4.3%). Cyanosis was the most common presentation in cyanotic CHD (85.1%) while heart failure was the least presentation (0%) in cyanotic CHD.

**Table 1: Various types & percent of CHD**

Diagnosis	No.	%
VSD	48	50
TOF	18	18.75
PDA	14	14.58
TGA	9	9.37
PS	4	4.16
ASD	3	3.12
Total	96	100

**Table 2: Sex distribution of Various types of CHD**

Diagnosis	Male	Female	M:F	Total
VSD	28	20	1.4:1	48
TOF	11	7	1.5:1	18
PDA	4	10	0.4:1	14
TGA	5	4	1.2:1	9
PS	2	2	1:1	4
ASD	1	2	0.5:1	3
Total	51	45		96

**Table-3- the effects of CHD on growth pattern**

In Acyanotic CHD	Wt <3 <sup>rd</sup> centile	%	Wt >3 <sup>rd</sup> centile	%	Total
VSD	33	68.75	15	31.25	48
ASD	2	66.6	1	33.33	3
PDA	8	57.14	6	42.85	14
PS	2	50	2	50	4
TOF	4	22.22	14	77.78	18
TGA	6	66.66	3	33.33	9
Total	55	57.3	41	42.7	96

**Table 4: Age distribution at diagnosis in different types of CHD**

Diagnosis	0-6 M	%	7-12 M	%	> 12 M	%	Total
VSD	33	68.75	12	25	3	6.25	48
TOF	5	27.7	13	72.22	-	-	18
PDA	12	85.71	2	14.28	-	-	14
TGA	9	100	-	-	-	-	9
PS	3	75	1	25	-	-	4
ASD	-	-	1	33.3	2	66.6	3
Total	62	64.6	29	30.2	5	5.2	96

**Table 5: Common presentation of various types of CHD**

Diagnosis	Chest infection	%	Cyanosis	%	HF	%	Total
VSD	35	72.9	1	2	12	25	48
PDA	10	71.4	-	-	4	28.5	14
PS	2	50	2	50	-	-	4
ASD	3	100	-	-	-	-	3
TOF	4	22.22	14	77.78	-	-	18
TGA	-	-	9	100	-	-	9
Total	54	56.25	26	27	16	16.66	96

## DISCUSSION

The occurrence of congenital heart disease cannot be determined in this study because it is a hospital based rather than community based study.

The relative occurrence of the various abnormalities found in this study is compared with other studies

This study proved that VSD is the commonest congenital heart disease in hospital based studies and it is nearly comparable with Ammar study<sup>(16)</sup>, but the result is higher than that recorded by Khurshid<sup>(17)</sup> and Tantchou<sup>(18)</sup>.

Tetralogy of Fallot (TOF) was the second most congenital lesions (18.75%) in this study and this relatively agreed with Tantchou study<sup>(18)</sup> but higher its incidence in other studies.

Patent ductus arteriosus showed to be the third most common congenital lesions and the second most common acyanotic lesions, and this is compatible with Ammar and Tantchou<sup>(16,18)</sup> studies but less than that recorded in Khurshid study<sup>(17)</sup>. There is higher incidence of TGA than in other studies.

This study revealed that there was lower incidence of ASD in comparison with Ammar, Khurshid and Sawant studies<sup>(16,17,19)</sup>, but it is nearly comparable with Tantchou<sup>(18)</sup>.

The distribution of occurrence of CHD between male and females confirm the old concept that the male patients with PDA and ASD less than females (0.4:1 & 0.5:1 respectively) while in all other lesions, there is slight male predominance.

The evaluation of growth of patients in this study revealed that the majority of patients (65.21%) with left to right shunt (acyanotic CHD) had poor growth state and these results compatible with George

W Land study<sup>(9)</sup>, and (37%) of patients with cyanotic congenital heart disease (TOF, TGA) had poor weight gain and this compatible with Thomas PG study<sup>(10)</sup>.

Regarding the age at which the diagnosis had been done, this study indicate that the patients with left to right shunt (VSD & PDA) mostly presented during Ist6 months of life (68%, 85% respectively), All patients with diagnostic TGA presented within the first few months of life and this compatible with the natural history of this disease.

In this study, the main cause of presentation of patients with left to right shunt lesions (VSD, PDA & ASD) were chest infection (72.2%) and heart failure (23.1%) and this explained by excessive pulmonary blood flow which results in heart failure and recurrent pulmonary infection while 3 patients (4.3%) presented with cyanosis result from high pulmonary vascular resistance with bidirectional or right to left shunt and this caused by long-standing left to right shunt or in some infants with large VSD or PDA pulmonary arteriolar medial thickness never decrease. Cyanosis was the most common presentation in patients with right to left shunt cyanotic CHD (85.1%) and this explained on the pathophysiological mechanism of right to left shunt & caused by hypercyanotic spells which is the most common complications of patients with TOF.

## CONCLUSION

VSD is the most common type of congenital heart disease and the most common cause of morbidity, while ASD is the least common cause of morbidity in patients with congenital heart disease. The most common mode of presentation of

patients with CHD are respiratory infection and heart failure in acyanotic CHD while cyanosis is the most common presentation in cyanotic group while heart failure is rare in this group. PDA and ASD are more common in females while all other lesions a slight male predominance is present.

### Recommendation

Create new units in pediatrics hospitals for early diagnosis and managements of congenital heart diseases.

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