patterns of congenital heart diseases in children under five years in Karbala city,Iraq

أنماط أمراض القلب الخلقية لدى الأطفال دون سن الخامسة في مدينة كربلاء بالعراق

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Abstract:

Background: Congenital heart diseases (CHD) are one of the most common congenital problems in children. Presentation can be vary from asymptomatic discovered accidentally to severe complain and death. Early diagnosis and treatment has great effects on prognosis.

Aim of study: To assess the frequency of various forms of CHD, patterns of distribution according to age and gender, pattern of presentation and to estimate the effects on growth among affected children under 5 years age in Karbala city, Iraq.

Methods: This is a prospective descriptive study on sample of patients with a confirmed diagnosis of CHD referred for echocardiography over a period of one year from October 2011 to October 2012. Patients from day one of life till five years were included. Study was conducted in the Pediatric echo-cardiac clinic in Karbala Pediatric Teaching Hospital.Statistical analysis was done using SPSS version 10.

Results: A total of (110) children were included. There were (42) males (38.2%) and 68 females (61.8%) with a ratio of 1:1.6. Most of the patients in the study have acyanotic CHD and least common with cyanotic CHD; 86(78.2%) and 24 (21.8%) respectively.

Ventricular septal defect (VSD) followed by atrial septal defect(ASD), patent ductus arteriosus (PDA), and pulmonary valve stenosis(PS) were the most common acyanotic congenital heart lesions. While Tetralogy of Fallot (TOF) followed by transposition of the great arteries(TGA) were the commonest cyanotic congenital heart lesions. There was a female gender dominance in VSD, ASD, PDA & PS(58.5, 70.3, 62.5 and 69.2 percent respectively. While more male gender had complex CHD.

Conclusion:.

Majority of patients have non-cyanotic CHD. The commonest non cyanotic CHD is VSD & the commonest cyanotic lesion is TOF , Predominance of female gender in VSD,ASD&PS,while the male gender more dominant in complex CHD.,

.**Keyword:** Congenital heart diseases, Echo-cardiac clinic, Karbala ,Iraq.

الخلاصة:

ان أمراض تشوهات القلب الولادية هي واحدة من اكثر المشاكل الخلقية شيوعا في الأطفال وتختلف أعراض هذه الأمراض من بسيطة بدون أعراض مرضية واضحة -وتكتشف عن طريق الصدفة إلى أعراض شديدة قد تؤدي الى الموت.ان للتعرف المبكر على هده الأمراض وعلاجها أثار كبيرة على مصير المريض المستقبلي.

الهدف من هذه الدراسة هو تقييم نمط الأشكال المختلفة من أمراض القلب الخلقية عند الأطفال حسب العمر والجنس،نمط التشخيص وتاثيرها على النموفي الاطفال ذوات الاعمارالاقل من الخمس سنوات في مدينة كربلاء في العراق.

نوع الدراسة استطلاعية وصفية على عينة من المرضى الدين لديهم التشخيص المؤكد للمرض الخلقي في القلب والدين أحيلوا إلى وحدة سونار القلب خلال فترة سنة واحدة من تاريخ تشرين الأول 2011 إلى تشرين الأول 2012زتمت الدراسة في وحدة سونار القلب (الايكو) في مستشفى كربلاء التعليمي للأطفال. وقد شملت أعمار المرضى من يوم واحد حتى خمس سنوات من العمر.تم تحليل النتائج بواسطه برنامج الحزم الاحصائيه للعلوم الاجتماعيه النسخه العاشرة.

شملت الدراسة ما مجموعه 110 طفل،42 من الذكور بنسبة 38.2 % بالمائة و 68 من الإناث بنسبة 61.8 بالمائة مع نسبة

الذكور إلى الإناث 1.6/1 .معظم المرضى يعانون من التشوهات اللاازرقاقية 86(78,2%)بينما شملت الازرقاقيه 24(21,8%). وكان عيب الحاجز ألبطين يليه عيب الحاجز الاديني والقناة الشريانية بين الشريان الابهر والشريان الرئوي وتضيق الصمام الرئوي.
. بينما كانت رباعية فالوت يليها تغيير وضعية الشرايين الكبيرة هي الأكثر شيوعا في تشوهات القلب الخلقية الازرقاقية. كان عددالإناث في عيب الحاجزين ألبطيني والاديني والقناة الشريانية بين الشريان الابهر والشريان الرئوي وتضيق الشريان الرئوي بنسبة 58,5و70,3، 62,5 و 69,2 بالمائة على التوالي)، بينما كان عدد الذكور هو الاكثر في تشوهات القلب الخلقية المعقدة.
نستنتج من هذه الدراسة ان معظم المرضى مصابين بتشوهات القلب اللا ازرقاقيه،حيث اكثرها شيوعا عيب الحاجز البطيني بينما كانت رباعية فالوت اكثر تشوهات القلب الازرقاقية شيوعا،كثرة عيب الحاجزين ألبطيني والاديني والقناة الشريانية بين الشريان الابهر والشريان الرئوي وتضيق الشريان الرئوي في جنس الاناث بينما تكثرتشوهات القلب الازرقاقية المعقده في جنس الذكور.

الكلمات المفتاحية:
امراض القلب الولاديه،عيادة سونار القلب(الايكو)،كربلاء،العراق.

Introduction:

congenital heart diseases (CHDs) are the malformation of the heart or the large blood vessels elated to the heart.[1]

Early months of pregnancy are a critical time of affection by CHDs because the heart and the vascular system are almost fully formed in midgestation.[2]

The range of defects is broad, ranging from major complex defects that result in sever disability and early death to minor defects that are discovered accidently in asymptomatic adults.[3] The exact cause of CHD is unknown in most cases,but there are known related factors including genetic defects , chromosomal abnormalities, intrauterine infections such as rubella, certain drugs taken in early pregnancy and consanguineous marriages.[4]

Only about 15% of CHDs has a known cause. Approximately 5–10% is corelated with a chromosome abnormality, 3–5% can be linked to defects in single genes, and around 2% are associated with a known environmental factors though many cases shows multifactorial aetiology.[1,2]

Many studies demonstrate that attribution of underlying genetic background with external phenotype seems to be an important step in early diagnosis and prevention.[5]

Nearly one third of infants born with CHD develop life-threatening event within the first few days of life with a mortality rate about 90%. Congestive heart failure is the presenting symptom in about 80% of infants with critical disease. [6]

Four-chambers transvaginal echocardiography provides detailed imaging of the heart anatomy in the fetus and can detect major defects, but reliance on only this view would have resulted in overlooking in about 23% of the defects. More detailed fetal echocardiography with outflow-tract views can be especially helpful in detecting anomalies of the great arteries and it is indicated in risky pregnancies. [7]

Proper evaluation requires cardiac imaging, magnetic resonance imaging that's provides excellent anatomic evaluation and often even give more informations than angiography. [8]

The progress in surgical techniques and improvements in diagnostic techniques have led to significant improvements in the treatment of CHD hence the number of children reach adulthood and assimilation in the social environment has significantly increased.[9]

Aggressive feeding strategies must be employed early with these children in order to prevent permanent growth disturbances which cause increased morbidity and mortality in children with CHD. [10]

The pediatric cardiac programs in many developing countries are not well established, and epidemiological data on CHD-related morbidity and mortality are deficient.[11]

Many studies of recurrence of CHD within the same families suggested either polygenic or multifactorial inheritance. The recurrence risk for first-degree relatives was found to be 2-5% and recurrence risk was significantly higher if the affected member was the mother ,these results has

been shown in large studies that look at the pattern of recurrenence and the degree of concordance for different heart lesions within families.[12,13]

Objectives of the study: To identify the patterns of CHD in Karbala and compare it with other studies, to study the gender and age distribution of CHD , the most common pattern of presentation and to estimate the effects of different CHD on growth of patients under 5 years age.

Materials and methods:

This is a prospective study conducted in Pediatric echo-cardiac clinic in Karbala Pediatric Teaching Hospital, which is the main pediatric hospital in Karbala city, Iraq.

The study was conducted from October 2011 to October 2012. Clinical examination, 2D echocardiography and color doppler were considered as definitive tools for diagnosis of CHD. A two-dimensional and Doppler echocardiogram was done using the instrument [SONOACED eutschland GmbH Elbestrasse10, D-45768 Marl, Deutschland, MODELE: SONOACE X8]

All children with the confirmed CHD were included.

The relative frequencies of specific forms of CHD in the group were determined.

Age ranged from 1 day- 5 years. The patients were divided to three age groups, 0-6 months, 7-12 months and >12 months. Clinical data were reviewed. Consideration was given to age groups, consanguinity, cyanosis, family history, congenital abnormalties, gender distribution and type of CHD.

The data were analyzed using SPSS version 10 . The average values differences of the parameters were evaluated by two-tailed Student's t-test. While 0the significant differences probability between the different groups were calculated using the t-test for independent samples. The associations between parameters were evaluated by Pearson's correlation coefficient.The statistical significance was assessed in all calculations. A P value of <0.05 was considered to be statistically significant.

The results assessment were by

1-Descriptive data analysis(tables of frequencies, percentages and cumulative percentages, contingency coefficients for the association tables and graphical presentation by using Pie charts.

2-Inferential data analysis thats used to accept or reject the statistical hypotheses and it includes the Chi-Square statistic (χ^2– test) ,One-Sample Kolmogorov-Smirnov (K-S) test,Binomial test,Contingency Coefficients test,Odds Ratio coefficient,Cohort Criteria and Related Rates.

Results:

Table(1) shows the demographic data of the patient involved ,the study sample consist of total 110 CHD patients, there were 68(61.8 %)females and 42(38.2%) males, with female to male ratio 1.6/1, there were 52(47.3%) for (\ – 6) months, 22(20%) for (7 – 12) months and 36(32.7%) for > 12 months.

Regarding the parental consanguinity, 70 patients (63.6%) were diagnosed with positive consanguinity and 40(36.4%) patients with negative consanguinity.

Most of cases has non-cyanotic CHD and less commonly has cyanotic CHD; 86(78.2%) versus 24 (21.8%) respectively.

86(78.2%) patient were delivered vaginaly (VD) and 24(21.8%) by cesearian section (C/S) .

Regarding the family history of CHD, there were 80(72.7%) has negative family history,while 30(27.3%) has positive family history of CHD. Also there were 99(90%) patients with no associated anomalies and 11(10%) patients with other congenital anomalies (9 Down's syndrome and another 2 cases with multiple congenital defects).

Among the 110 patients, 41(37.3%) of them had ventricular septal defect(VSD) and 37(33.6%) patients were diagnosed as atrial septal defect (ASD) and 16(14.5%) patients showed to have patent ductus arteriosus (PDA) , tetralogy of Fallot (TOF) in 16 (14.5%) and 13(11.8%) patients were diagnosis as pulmonary stenosis (PS).

Complex CHD present in 5(4.5%) patients and 4(3.6%) patients had Endocardial cushion defect(ECD) and 2(1.8%) for each of the patients with the diagnosis of PFO, Double outlet right ventricle

(DORV) & transposition of great vessels (TGA) and in 1(0.9%) patient were diagnosed as mitral valve prolapse(MVP) as shown in **table (2).**

In VSD, ASD, PDA, PS, PFO, TGA and MVP, the females have more incidences with (1.247, 1.745, 1.034, 1.765, 1.031, 1.031and 1.015 times) respectively than males.While in complex CHD males are 2.538 times more than females,While the incidence is equal between males and females in TOF, ECD and DORV as shown in **Table (3).**

The complex CHD, VSD, ASD, PDA, PS,TOF and ECD were common in age group below 6 month,while the distribution in TGA and DORV is more below 1 year, and the distribution in PFO was equal among age group below 6 months and above 1 year a*/nd finally in MVP was more in patients aged 7-12 months as shown in **Table (4**).

Table (5) shows the distribution of different types of CHD (Echo Diagnosed) according to weight centiles scores (below 5^{th} & at $\geq 5^{th}$centile) with comparison significant.

In VSD 15 patients were below 5^{th}centile and 26 patients above 5^{th}centile, in ASD 18 patients were below 5^{th}centile and 19 patients above 5^{th}centile, in PDA 4 patients were below 5^{th}centile and 12 patients above 5^{th}centile, in TOF patients 12 were below 5^{th}centile and 4 patients above 5^{th}centile, in PS 8 patients were below 5^{th}centile and 5 patients above 5^{th}centile, in complex CHD 3 patients were below 5^{th}centile and 2 patients were above 5^{th}centile, in ECD patients 2 were above and 2 below 5^{th}centile, in PFO 2 patients both were above 5^{th}centile, in TGA and DORV patient one were above and one below 5^{th}centile, finally one patient with MVP and he was above 5^{th}centile.

In **Table(6)** we have two groups of patients, the 1^{st} group who were below 5^{th}centile including 34(69.4%) patients with single CHD and 15(30.6) patients with double or more CHD, while in the 2^{nd} group there were 48(78.7%) patients with single CHD and 13(21.3%) patients with double CHD above 5^{th}centile.Totally for the 110 patients involved in the study; 49 (44.55%) patients were below 5^{th}centile and 61(55.45) patients above 5^{th}centile.

Table (7) shows comparison of our study with other studies. [14,15,16,17]

Figure (1) shows the Pie charts of the Percentages for the different levels of some direct related parameters and **Figure (2)** shows the Pie Charts for the Percentages according to different gender and age group**s.**

Table (1) : Distribution of Frequencies, Percentages and Cumulative Percents of the studied Parameter's Groups with Comparison Significant.

Variables	Groups	Freq.	Percent	C.S. P-value
Age Groups	0 - 6 m.	52	47.3	χ^2 - test P=0.002 HS
	7 - 12 m.	22	20	
	> 12 m.	36	32.7	
Gender	Female	68	61.8	Binomial test P=0.017 S
	Male	42	38.2	
Consanguinity	+ve	70	63.6	Binomial test P=0.006 HS
	-ve	40	36.4	
Cyanosis	A cyanotic	86	78.2	Binomial test P=0.000 HS
	Cyanotic	24	21.8	
Mode of delivery	Normal vaginal delivery	86	78.2	Binomial test P=0.000 HS
	Cesearian section	24	21.8	
Family History	Negative	80	72.7	(K-S) – test P=0.000 HS
	Postive	30	27.3	
Other Congenital Anomalies	Absent	99	90	Binomial test P=0.000 HS
	Present	11	10	

Table (2) : Distribution of the observed frequencies and percentages of the Echocardiography Diagnosed status with Comparison Significant

Echo Diagnosis	Status	Frequency	Percent	C.S. P-value Binomial test
VSD	Absent	69	62.7	P=0.010
	Present	41	37.3	S
ASD	Absent	73	66.4	P=0.001
	Present	37	33.6	HS
PDA	Absent	94	85.5	P=0.000
	Present	16	14.5	HS
TOF	Absent	94	85.5	P=0.000
	Present	16	14.5	HS
PS	Absent	97	88.2	P=0.000
	Present	13	11.8	HS
Complex CHD	Absent	105	95.5	P=0.000
	Present	5	4.5	HS
ECD	Absent	106	96.4	P=0.000
	Present	4	3.6	HS
PFO	Absent	108	98.2	P=0.000
	Present	2	1.8	HS
TGA	Absent	108	98.2	P=0.000
	Present	2	1.8	HS
DORV	Absent	108	98.2	P=0.000
	Present	2	1.8	HS
MVP	Absent	109	99.1	P=0.000
	Present	1	0.9	HS
COA	Absent	110	100	Non applicable
	Present	0	0	

Table (3) : Distribution of the Echocardiography Diagnosed status according to Gender with Correlation Coefficients and Comparison Significant

Echo Diagnosis	Status	Freq.'s & Percents	Gender		Total	C.S. P-value Odds Ratio /or Cohort
			Female	Male		
Complex CHD	Absent	Freq.	66	39	105	C.C.=0.098 P=0.304 NS 1 : 2.538
		% Complex CHD	62.9%	37.1%	100%	
	Present	Freq.	2	3	5	
		% Complex CHD	40%	60%	100%	
VSD	Absent	Freq.	44	25	69	C.C.=0.052 P=0.585 NS 1 : 1.247
		% USD	63.8%	36.2%	100%	
	Present	Freq.	24	17	41	
		% USD	58.5%	41.5%	100%	
ASD	Absent	Freq.	42	31	73	C.C.=0.123 P=0.194 NS 1 : 0.573
		% ASD	57.5%	42.5%	100%	
	Present	Freq.	26	11	37	
		% ASD	70.3%	29.7%	100%	
PDA	Absent	Freq.	58	36	94	C.C.=0.006 P=952 NS 1 : 0.967
		% PDA	61.7%	38.3%	100%	
	Present	Freq.	10	6	16	
		% PDA	62.5%	37.5%	100%	
PS	Absent	Freq.	59	38	97	C.C.=0.056 P=558 NS 1 : 0.690
		% PS	60.8%	39.2%	100%	
	Present	Freq.	9	4	13	
		% PS	69.2%	30.8%	100%	
TOF	Absent	Freq.	60	34	94	C.C.=0.100 P=0.293 NS 1 : 1.765
		% TOF	63.8%	36.2%	100%	
	Present	Freq.	8	8	16	
		% TOF	50%	50%	100%	
MVR	Absent	Freq.	68	42	110	Non applicable 0.00 : 0.00
		% MUR	61.8%	38.2%	100%	
	Present	Freq.	0	0	0	
		% MUR	0.0%	0.0%	0%	
PFO	Absent	Freq.	66	42	108	C.C.=0.106 P=0.262 NS 1 : 0.971
		% PFO	61.1%	38.9%	100%	
	Present	Freq.	2	0	2	
		% PFO	100%	0.0%	100%	
ECD	Absent	Freq.	66	40	106	C.C.=0.047 P=0.620 NS 1 : 1.650
		% ECD	62.30%	37.70%	100.00%	
	Present	Freq.	2	2	4	
		% ECD	50%	50%	100%	
TGA	Absent	Freq.	66	42	108	C.C.=0.106 P=0.26 NS 1 : 0.971
		% TGA	61.1%	38.9%	100%	
	Present	Freq.	2	0	2	
		% TGA	100%	0.0%	100%	
DORV	Absent	Freq.	67	41	108	C.C.=0.033 P=0.728 NS 1 : 1.34
		% DORU	62%	38%	100%	
	Present	Freq.	1	1	2	
		% DORU	50%	50%	100%	
MVP	Absent	Freq.	67	42	109	C.C.=0.075 P=0.430 NS 1 : 0.985
		% MUP	61.5%	38.5%	100%	
	Present	Freq.	1	0	1	
		% MUP	100%	0.0%	100%	
COA	Absent	Freq.	68	42	110	Non applicable 0.00 : 0.00
		% COA	61.8%	38.2%	100%	
	Present	Freq.	0	0	0	
		% COA	0.0%	0.0%	0%	

Table (4) : Distribution of the Echocardiography Diagnosed status according to Age Groups with Correlation Coefficients and Comparison Significant

Echo Diagnosis	Status	Freq.'s & Percents	Age Groups			Total	C.S. P-value
			0 - 6 m.	7 – 12 m.	> 12 m.		
Complex CHD	Absent	Freq.	49	22	34	105	C.C.=0.109 P=0.519 NS
		% Complex CHD	46.7%	21%	32.4%	100%	
	Present	Freq.	3	0	2	5	
		% Complex CHD	60%	0.0%	40%	100%	
VSD	Absent	Freq.	34	13	22	69	C.C.=0.054 P=0.851 NS
		% USD	49.3%	18.8%	31.9%	100%	
	Present	Freq.	18	9	14	41	
		% USD	43.9%	22.0%	34.1%	100%	
ASD	Absent	Freq.	31	16	26	73	C.C.=0.134 P=0.365 NS
		% ASD	42.5%	21.9%	35.6%	100%	
	Present	Freq.	21	6	10	37	
		% ASD	56.8%	16.2%	27%	100%	
PDA	Absent	Freq.	45	18	31	94	C.C.=0.052 P=0.863 NS
		% PDA	47.9%	19.1%	33%	100%	
	Present	Freq.	7	4	5	16	
		% PDA	43.80%	25.00%	31.30%	100%	
PS	Absent	Freq.	46	17	34	97	C.C.=0.184 P=0.144 NS
		% PS	47.4%	17.5%	35.1%	100%	
	Present	Freq.	6	5	2	13	
		% PS	46.2%	38.5%	15.4%	100%	
TOF	Absent	Freq.	44	20	30	94	C.C.=0.079 P=0.710 NS
		% TOF	46.8%	21.3%	31.9%	100%	
	Present	Freq.	8	2	6	16	
		% TOF	50.0%	12.5%	37.5%	100%	
MVR	Absent	Freq.	52	22	36	110	Non applicable
		% MUR	47.3%	20.0%	32.7%	100%	
	Present	Freq.	0	0	0	0	
		% MUR	0.0%	0.0%	0.0%	0%	
PFO	Absent	Freq.	51	22	35	108	C.C.=0.073 P=0.742 NS
		% PFO	47.2%	20.4%	32.4%	100%	
	Present	Freq.	1	0	1	2	
		% PFO	50%	0.0%	50%	100%	
ECD	Absent	Freq.	50	21	35	106	C.C.=0.035 P=0.935 NS
		% ECD	47.2%	19.8%	33.0%	100.00%	
	Present	Freq.	2	1	1	4	
		% ECD	50.0%	25.0%	25.0%	100%	
TGA	Absent	Freq.	51	21	36	108	C.C.=0.119 P=0.452 NS
		% TGA	47.2%	19.4%	33.3%	100%	
	Present	Freq.	1	1	0	2	
		% TGA	50.0%	50.0%	0.0%	100%	
DORV	Absent	Freq.	51	21	36	108	C.C.=0.119 P=0.452 NS
		% DORU	47.2%	19.4%	33.3%	100%	
	Present	Freq.	1	1	0	2	
		% DORU	50.00%	50.00%	0.0%	100%	
MVP	Absent	Freq.	52	21	36	109	C.C.=0.188 P=0.133 NS
		% MUP	47.7%	19.3%	33.0%	100%	
	Present	Freq.	0	1	0	1	
		% MUP	0.0%	100.00%	0.0%	100%	
COA	Absent	Freq.	52	22	36	110	Non applicable
		% COA	47.3%	20.0%	32.7%	100%	
	Present	Freq.	0	0	0	0	
		% COA	0.0%	0.0%	0.0%	0%	

Table (5) : Distribution of the Echocardiography diagnosed status according to weight centiles scores (below 5^{th} and at $\geq 5^{th}$centile) with Comparison Significant

Echo Diagnosis	Status	Freq.'s & Percents	Weight (centile)%		Total	C.S. P-value Odds Ratio /or Cohort
			$< 5^{th}$	$\geq 5^{th}$		
Complex CHD	Absent	Freq.	46	59	105	C.C.=0.068
		% Complex CHD	43.80%	56.20%	100%	P=0.477
	Present	Freq.	3	2	5	NS
		% Complex CHD	60%	40%	100%	1 : 1.924
VSD	Absent	Freq.	34	35	69	C.C.=0.123
		% USD	49.30%	50.70%	100%	P=0.195
	Present	Freq.	15	26	41	NS
		% USD	36.60%	63.40%	100%	1 : 0.594
ASD	Absent	Freq.	31	42	73	C.C.=0.059
		% ASD	42.50%	57.50%	100%	P=0.538
	Present	Freq.	18	19	37	NS
		% ASD	48.60%	51.40%	100%	1 : 1.284
PDA	Absent	Freq.	45	49	94	C.C.=0.160
		% PDA	47.90%	52.10%	100%	P=089
	Present	Freq.	4	12	16	NS
		% PDA	25%	75%	100%	1 : 0.363
PS	Absent	Freq.	41	56	97	C.C.=0.124
		% PS	42.30%	57.70%	100%	P=0.189
	Present	Freq.	8	5	13	NS
		% PS	61.50%	38.50%	100%	1 : 2.185
TOF	Absent	Freq.	37	57	94	C.C.=0.245
		% TOF	39.40%	60.60%	100%	P=0.008
	Present	Freq.	12	4	16	HS
		% TOF	75%	25%	100%	1 : 4.622
MVR	Absent	Freq.	49	61	110	
		% MUR	44.50%	55.50%	100%	Non applicable
	Present	Freq.	0	0	0	0.00 : 0.00
		% MUR	0.00%	0.00%	0%	
PFO	Absent	Freq.	49	59	108	C.C.=0.121
		% PFO	45.40%	54.60%	100%	P=0.201
	Present	Freq.	0	2	2	NS
		% PFO	0.00%	100%	100%	1 : 0.966
ECD	Absent	Freq.	47	59	106	C.C.=0.021
		% ECD	44.30%	55.70%	100%	P=0.823
	Present	Freq.	2	2	4	NS
		% ECD	50%	50%	100%	1 : 1.255
TGA	Absent	Freq.	48	60	108	C.C.=0.015
		% TGA	44.40%	55.60%	100%	P=0.876
	Present	Freq.	1	1	2	NS
		% TGA	50%	50%	100%	1 : 1.250
DORV	Absent	Freq.	48	60	108	C.C.=0.033
		% DORU	44.40%	55.60%	100%	P=0.728
	Present	Freq.	1	1	2	NS
		% DORU	50%	50%	100%	1 : 1.250
MVP	Absent	Freq.	49	60	109	C.C.=0.086
		% MUP	45%	55%	100%	P=0.368
	Present	Freq.	0	1	1	NS
		% MUP	0.00%	100%	100%	1 : 0.983
COA	Absent	Freq.	49	61	110	
		% COA	44.5%	55.5%	100%	Non applicable
	Present	Freq.	0	0	0	0.00 : 0.00
		% COA	0.0%	0.0%	0%	

Table (6) : Association number of Echocardiography diagnosed status according to weight(wt) centiles scores (below 5^{th} and at $\geq 5^{th}$ centile)

weight %	Freq.'s & Percent	Echo Diagnosis		Total	Related Rates (< 5 : ≥ 5) Wt
		Single	Double or more		
Wt < 5 centile	Freq.	34	15	49	Single 1 : 0.882
	% weight	69.4%	30.6%	100%	
Wt ≥ 5 centile	Freq.	48	13	61	
	% weight	78.7%	21.3%	100%	Double 1 : 1.436
Total	Freq.	82	28	110	
	% weight	74.5%	25.5%	100%	

Table 7: Comparision of various types of CHD between our study and other studies.[14,15,16,17]

CHD	This study	Peshawar, Pakistan(14)	Khaled Amro*Jordan(15)*	Turkey(16)	Pokhara, Nepal(17)
PATTERNS	%	%	%	%	%
VSD	37.3	29	43.4	22.2	38
ASD	33.6	10.5	13.6	11.1	7.3
PDA	14.5	14.9	8.3	9.2	7.5
TOF	14.5	12.3	9.5	10	9.1
PS	11.5	7.1	6.2	4.4	3.6
Complex CHD	4.5	6.1	2.25	---	7.5
ECD	3.6	4.4	3.6	3.9	1.8
PFO	1.8	---	---	---	---
TGA	1.8	7	5.5	---	1.8
DORV	1.8	---	---	---	---
MVP	0.9	---	---	---	---

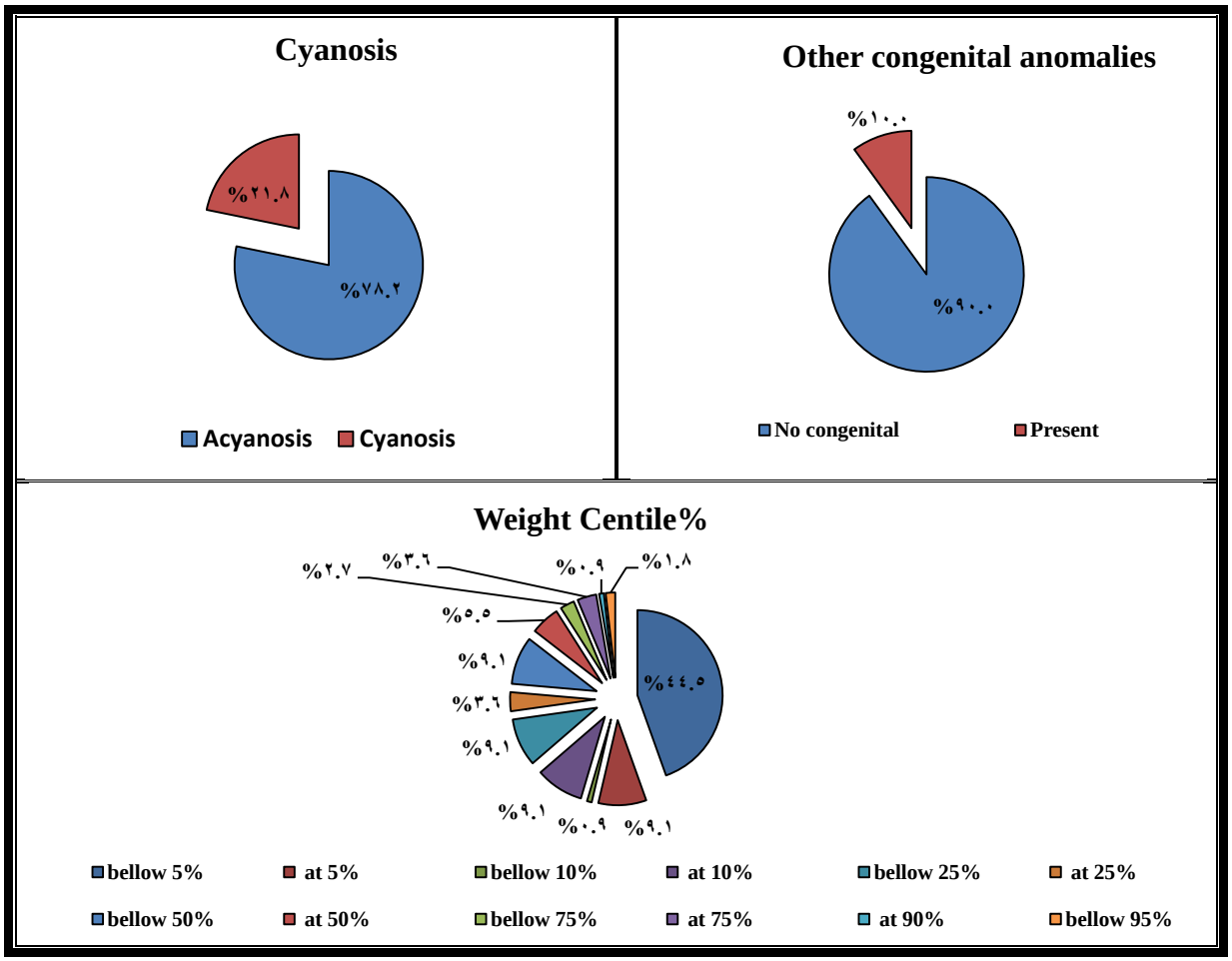
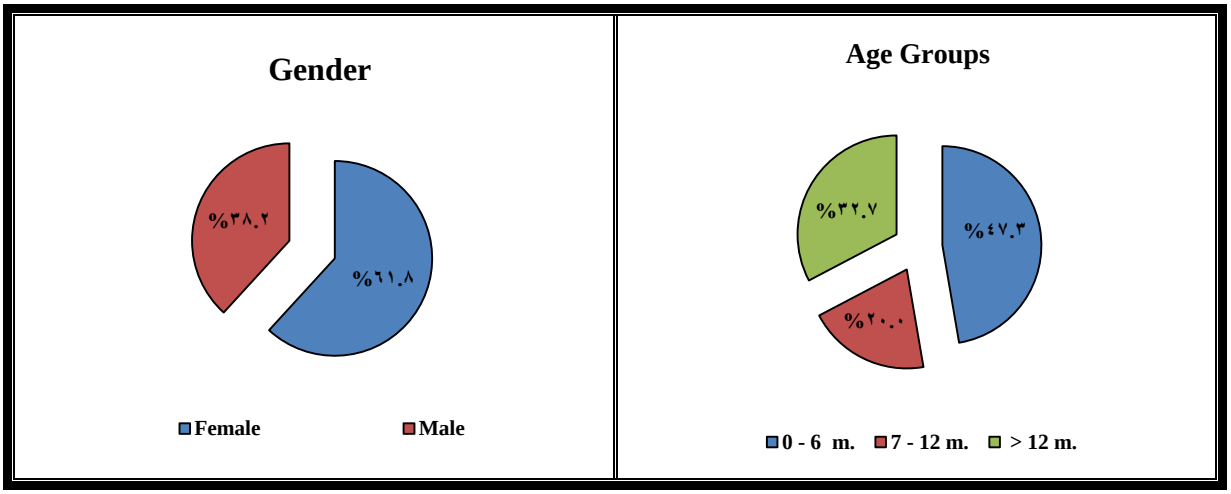


Figure (1) : Pie charts of the Percentages for the different levels of some direct related parameters.



Figure(2):Pie Charts for the Percentages according to different gender and age groups.

Discussion:

This study shows the pattern of CHD in Karbala city and compares the results with some parts of the world. It is generally accepted that the improvement of diagnosis, attention or awareness among general pediatrician and early referral to pediatric cardiologists has resulted in an increase of reported prevalence of CHD. To the best of our knowledge there are no other local studies and reports about cases of CHD at Karbala governorate at our study time.

One hundred ten patients were included, 42 male(38.2 %) and 68 (61.8%) females, Male to female ratio is 1:1.6. This result is similar to another studies[14,15]and different than that shown by others done in Jordan and turkey that's show male propordance.[16,17,18]This difference may be due to geographical, racial and social factors.

Regarding the age groups we found that 52(47.3%) patients of 1 day-6month age, 22(20%) patients of 7-12 month age and 36(32.7%) patients above 1 year as shown in table 4. Explination of the higher incidence of CHD thats diagnosed in the 1st 6 months of life was the early presentation of manifestations of most of the CHD and progressive deterioration.

This result is higher than another study done in Nigeria[18] and It is consistent with other studies done by Masood et al [19] and by Subramanyan et al [20].

It is apperant that there were a significant differences (P<0.05) between the two gender, and a highly significant different (P<0.01) was reported for different age groups as shown in table1.

In our study groups the number of acyanotic CHD was 86(78.2%) which is higher than the cyanotic 24(21.8%). This result was agree with another study done in Pakistan 73.9% [14] and statistically there is a highly significant different (P<0.01) between the obvious two dichotomous category levels as that shown in table 1.

It is without doubt that many cases would have escaped detection and referral which mainly includes neonates born at home or who die without medical intervention.

In the current study 80(72.7%) patients were without family history of CHD and 30(27.3%) patients with family history of CHD. This different from that reported from another study (2-5%) [12],in this study statistical comparison reported a highly significant different (P<0.01) between different family history groups. Epidemiologic studies and reports of familial disease suggest that inherited traits contribute to the development of CHD[5].

In our study 70(63.6%) cases the consanguinity (1st and 2nd degree relatives) was positive and 40(36.4%) patients with negative consanguinity.This is consistent with the results reported by other study[22].Statistically there is a highly significant different (P<0.01) between the obvious of dichotomous category groups.

In this study group 99(90%) patients have no dysmorphic features associated with CHD and 11(10%) patients have. Nine patients of the later had Down's syndrome and the other two patient with multiple dysmorphic features. This result was less than that in other study[23].The statistical comparison reported a highly significant different at P<0.01 between the two different dichotomous category. The multifactorial etiology of CHD involves the chromosomal abnormality, maternal diabetes, smoking, teratogenic drug and maternal infection during early pregnancy.[24,25]

The most likely explanation is the difference in reported incidences in different countries.

Congenital heart diseases have a multifactorial nature of inheritance[24].This emphasizes the importance of genetic counseling to patients with family history of CHD[26].

Also in this study groups, VSD is found to be the most common non cyanotic CHD(37.3%) and This is higher than what is reported in other study and lowers than in others as shown in Table 7, and this result is expected being worldwide, VSD is the most common acyanotic CHD accounting for 25-30% of all CHD[[27]. The difference when present may be explained by the difference in genetic makeup and ethnicity.

A study from Iceland reported VSD (45.7%) as the most diagnosed heart defect, followed by ASD (12.2%) and AS (1.5%), among 338 patients [28]. Similar findings from Saudi Arabia reported VSD in 32.5% of patients, PDA in 15.8%, and ASD 10.4%[17].

In this study ASD ranked second in frequency accounting for 33.6%. Other studies have shown comparable results Table 7. The PDA was seen in 14.5% of cases,this is higher than that reported in

Jordan and Nepal[15,17]. The difference can be explained by there's no exclusion of premature babies in our study.

Among the cyanotic lesions TOF was the commonest cyanotic congenital heart disease followed by TGA being 14.5% and 1. 8% respectively. This is incomparable to worldwide where the incidences CHD in TOF and TGA (10% and 5%) respectively [30]. This is higher than what is reported in other studies[14,15,16,17] as shown in Table(7).

There was a female predominance in ASD, PDA, and TGA in 33.6%, 14.5% and 1.8% respectively in our study. This is consistent with that reported by another study [24].

Male predominance was seen in complex CHD. This is similar to that found in Jordan study[15]

Table (2) shows the distribution of different types of (Echo Diagnosed), there were 41(37.3%) of present (VSD), 37(33.6%) of present (ASD), 16(14.5%) of present (PDA), 16(14.5%) of present (TOF), 13(11.8%) of present (PS), 5(4.5%) of present (Complex CHD), 4(3.6%) of present (ECD), 2(1.8%) of present (PFO), 2(1.8%) of present (TGA), 2(1.8%) of present (DORV), 1(0.9%) of present (MVP), AND 0(0.0%) of (COA) and statistically there are a highly significant different ($P<0.01$) between that obvious dichotomous of the two category diagnosed at each echo diagnosed technique.

The results shows that there were no association between gender and the two dichotomous present and absent echo morbid diagnosed since a non significant differences were obtained ($P>0.05$) . In addition to that, an odds ratio and cohort indicators were represented a meaningful differences at each types of echo diagnosed, by applying odds ratio, females had been attacked (1.247) times than males with (VSD), females had been attacked (1.745) times than males with (ASD), females had been attacked (1.034) times than males with (PDA), males and females had been attacked equally with (TOF), females had been attacked (1.449) times than males with (PS), males had been attacked (2.538) times than females with (complex CHD) ,male and females had been attacked equally with (ECD), cohort criteria shows that females had been attacked (1.031) times than males with (PFO), with odds ratio, shows that females had been attacked (1.031) times than males with (TGA), with odds ratio, male and females had been attacked equally with (DORV), cohort criteria shows that females had been attacked (1.015) times than males with (MVP), cohort criteria no registered of (MVR) defects cases at both gender, and finally no registered of (COA) defects cases at both gender.This study show different results when compare with another studies as shown in table 7.

The results shows that there were no association between different of age groups and the two dichotomous present and absent echo morbid diagnosed since a non significant differences were obtained at $P>0.05$ as shown in table 4.

The most common times of presentation or echo diagnosed of CHD among patients was from (1 day to 6 months) of live, like in VSD, ASD, PDA, TOF, PS, complex CHD and ECD (43.9%, 56.8%, 43.8%, 50%, 46.2%, 60%, and 50% respectively). However, our finding that sixty to seventy five percent of the patients presented to the hospital before the age of one year, was higher to finding elsewhere. [19,21]

Regarding the distribution of different types of (Echo Diagnosed) according to weight centiles scores (below 5^{th} and at $\geq 5^{th}$centile) with comparison significant.

The results shows that there were no association between gender and the two dichotomous present and absent echo morbid diagnosed since a non significant differences were obtained at $P>0.05$ except at (TOF) type which was reported a highly significant association with respect of increasing defected ceases at those of $< 5^{th}$centile at $P<0.01$. In addition to that, an odds ratio and cohort indicators were represented a meaningful differences at each types of echo diagnosed, by applying odds ratio, $<5^{th}$centile had been attacked (1.924) times than $\geq 5^{th}$centile with (complex CHD), $\geq 5^{th}$centile had been attacked (1.684) times than $< 5^{th}$centile with (VSD), $< 5^{th}$centile had been attacked (1.284) times than $\geq 5^{th}$centile with (ASD), $\geq 5^{th}$centile had been attacked (2.755) times than $<5^{th}$centile with (PDA), $<5^{th}$centile had been attacked (2.185) times than $\geq 5^{th}$centile with (PS), $< 5^{th}$centile had been attacked (4.622) times than $>5^{th}$centile with (TOF), no registered of (MVR) defects cases at both centile, cohort criteria shows that $\geq 5^{th}$ centile had been attacked

(1.035) times more than <5th with (PFO), with odds ratio, <5th centile had been attacked (1.255) times than ≥5th centile with (ECD), with odds ratio shows that <5th had been attacked (1.250) times than ≥5th with (TGA), with odds ratio, ≥5th had been attacked (1.250) times than ≥5th with (DORV), cohort criteria shows that ≥5th had been attacked (1.017) times than <5th with (MVP), and finally no registered of (COA) defects cases at both centile.

The mechanisms of growth deficiency in CHD are multifactorial and include associated chromosomal genetic syndromes, inadequate nutritional intake and poor absorption of nutrients in chronic congestive heart failure (CHF). Also, increased the required calories to sustain the increased myocardial, respiratory and neuro-humoral functions in CHD-related heart failure. Chronic CHF and chronic hypoxaemia in CHD impair cellular metabolism and cell growth, while repeated chest infections are associated with increased metabolic demands. Other mechanisms of growth deficiency in CHD have been reported [11].

While the cause of abnormal growth and development is multifactorial,reduced energy consumption and increased energy expenditure, or both, may be the most important players[10].

Table (6) shows the distribution of numbers of echocardiography diagnoses according to weight centiles scores (below 5th and at ≥ 5thcentile) with cohort criteria. In this study 49 patients below 5thcentile and 61 patients above 5thcentile and this differed from another study [33]. Finally the total CHD with single heart defect were diagnosed by 2D echocardiogram was 82 (74.5%) patients were 48 from were above 5thcentile and 34 were below 5thcentile, and the total CHD with double or more heart defects was 28 (25.5%) patients, 13 patients from were above 5thcentile, and 15 patients were below 5thcentile.

Conclusions

1-Majority of patients with congenital heart disease have non-cyanotic CHD.

2-The commonest non cyanotic CHD is VSD and the commonest cyanotic lesion is TOF.

3-Predominance of female gender in VSD,ASD and PS, while the male gender more dominant in complex CHD**.**

Recommendations:

Early diagnosis of congenital heart diseases and proper management In order to avoid complications and early surgical interference in patients with TOF and complex congenital heart diseases to overcome the detrimental effects on patient with a cyanotic congenital heart diseases on growth pattern .

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