

Prevalence of Congenital Heart Disease in Fallujah General Hospital, Western of Iraq (2007-2011)

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Abstract :

Background: Congenital heart diseases (CHD) comprise the most common group of congenital malformations. Despite recent developments in interventional and surgical techniques, heart disease in children continues to be an important cause of morbidity & mortality.⁽¹⁾

Aim of study : Our aims were to assess the prevalence, age-wise distribution, & clinical spectrum of congenital heart disease, among children in the Fallujah district region in Iraq, during the years 2007, 2008, 2009, 2010 & 2011, referred to FGH.

Methods: This is a hospital based descriptive study based on retrospective & prospective collecting all cases referred to Fallujah General Hospital (FGH) to identify all patient with CHD, born between the 1st of January 2007 & December 31, 2011, in FGH. 2nd of big referral hospital in Anbar Governorate, Iraq. Ethical approval was granted by the scientific committee in Fallujah hospital & Anbar medical college.

Live newborns delivered in this hospital are 2414, 4753, 5551, 7011 & 7320 in 2007, 2008, 2009, 2010, & 2011 respectively (total 27049) excluding live newborns that occur outside the FGH. During the study period, new born & children was done examined & screened for CHD & follow – up for this 5 years.

Clinical examination, 2D echocardiography and color Doppler and sometime cardiac catheterization either in Baghdad or later on in FGH were considered as definitive tools for diagnosis of CHD.

Result : Out of the 533 cases of CHD there were 281 males (52.72 %) & 252 females (47.27 %) (Fig.1). Out of the 533 cases of CHD there were 59 (11.06 %) cases in 2007, 44 (8.25%) cases in 2008, 49 (9.19 %) cases in 2009, 167 (31.33%) cases in 2010 & 214 (40.15%) cases in 2011 (Fig .2).

The overall prevalence of CHD live births during this 5-year period was 19.7 / 1000 live births. CHD was found to be slightly more common in male than female births (10.38 versus 9.31 per 1000).

ASD was the commonest lesion 193, followed by, VSD 164, other (various types of CHDs existing together including rare type of CHDs.) 52, PDA 34, VSD +ASD 31, PFO 28, TOF 18 and PS 13. Fig.(3).

The rate of CHD was 24.44 per 1000 live birth in 2007, 9.25 per 1000 live birth in 2008, 8.82 per 1000 live birth in 2009, 23.81 live birth in 2010 & 29.23 per 1000 live birth in 2011. Figures 4,5,6,7,& 8. In 2007 & 2008 VSD was the commonest CHD, & PS lowest rate in 2008. Fig (4,5). While ASD was the commonest CHD in 2010 & 2011 Fig (6,7,& 8)

Depend on geographical distribution, the highest rate of CHD was in center of the city 223 (41.83 %) cases, followed by other (villages at the city boundaries) 125 (23.45 %), then eastern region (Karma) 97 (18.19%), Amria 57 (10.69%) & lowest rate was in western region Saqlawya 31 (5.81%). Fig. (9)

167 (31.33 %) of the affected newborns had a positive family history of abortion, & 88 (16.51 %) had a maternal history of drugs & X-ray radiation. Fig. (11).

Conclusion : 1. The present study shows, for the first time, the prevalence and pattern of CHD in Fallujah region in western Iraq.

2. These findings will help establish a database for future studies, which will focus on etiology and ethnic disparity of CHD in the region.

3. The findings can help to establish valuable changes in health policies for the improvement of diagnostic and therapeutic facilities.

4. The present high prevalence rate of CHD in Fallujah need advance research & registration system to apply in Al-Anbar & Iraqi medical offices.

5. The catastrophic successive wars imposed on Iraq undoubtedly have played some role in this problem.

6. The overall pattern of CHD is similar to the finding in other countries.

Key words : Congenital heart disease, Fallujah, FGH, Prevalence, Iraq.

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Introduction :

Congenital heart diseases (CHD) were defined as a structural abnormality of the heart or intrathoracic great vessels that is actually or potentially of functional significance⁽¹⁾.

Congenital heart diseases (CHD) comprise the most common group of congenital malformations. Despite recent developments in interventional and surgical techniques, heart disease in children continues to be an important cause of morbidity & mortality⁽¹⁾.

Etiology of CHD is multifactorial and a large collection of environmental and genetic causes have a role in its pathogenesis.⁽³⁾

It is estimated that approximately 10-15% of congenital structural anomalies are the result of the adverse effect of environmental factors on prenatal development⁽⁴⁾.

Teratogen is defined as any environmental factor that can produce a permanent abnormality in structure or function, restriction of growth, or death of the embryo or fetus.⁽⁵⁾

Definition of prevalence mean proportion of individuals in a population having a disease or characteristic, prevalence is a statistical concept referring to the number of cases of a disease that are present in a particular population at a given time, whereas incidence refers to the number of new cases that develop in a given period of time usually

expressed as the number of babies born with congenital heart disease per 1,000 live births.⁽⁶⁾

CHDs are relatively common with a prevalence ranging from 3.7 to 17.5 per 1000 live births^(7,8)

Several previous reports suggest a changing pattern and incidence of congenital heart disease in various geographic locations^(9,10) according to racial and ethnic factors⁽¹¹⁾

Recent reports have drawn attention to increase in congenital birth anomalies in Fallujah blamed on teratogenic, genetics & genomic stress that result from environmental damage by the contamination following the battles in the city in 2005^(12,13,14 & 15).

There is no information about the prevalence rate of congenital heart diseases in Fallujah. Therefore, this is the first study of prevalence of CHD in AL-Fallujah City or in Iraq, after U.S.A army invasion at 2003 as congenital malformation & infant mortality were been studied & showed increasing incidence⁽¹²⁾, the objective of this study was to estimate the pattern and the prevalence rate of congenital heart diseases in a referral hospital in Fallujah City, which is the big city of Anbar Governorate, Iraq, during the years 2007, 2008, 2009, 2010 & 2011.

Regardless of whether this increase in incidence in Fallujah is real or artificial the reported cases do not represent the real situation because of primitive congenital birth defect registration system.

Materials & Methods:

This is a descriptive hospital based retrospective & prospective collecting all cases referred to FGH to identify all patient with CHD, born between the 1st of January 2007 &

December 31st, 2011, in Fallujah General Hospital (FGH), one of big referral hospital in Anbar Governorate, Iraq, & ethical approval was granted

by the scientific committee in Fallujah hospital & Anbar medical college .

Fallujah region is located in the east of AL-Anbar governorate , in 2011 the population of Fallujah was estimated at about 600000 based on 2009 census with an adjusted growth rate of 3 % , population were distributed in 3 sub districts (Amerya , Karma , & Saqlawea sub districts) in addition to the center of the city & cover an area of about 38 Kilometer square⁽²⁾ with patients coming from more than 100 km around the city . Patients are usually from different socioeconomic class families

Live newborns delivered in this hospital are 2414 , 4753 , 5551 , 7011 & 7320 respectively in 2007,2008,2009,2010,& 2011.(total 27049) excluding live newborns that occur outside the FGH . During the investigation were examined & screened for CHD & follow –up for this 5 years.

Different types of CHDs considered for the present study including : Ventricular Septal Defect (VSD), Atrial Septal Defect (ASD), Tetralogy of Fallot (TOF), Patent Ductus

Arteriosus (PDA), Pulmonary Stenosis (PS), Transposition of Great Arteries (TGA), and others Complex CHDs Total Anomalous Pulmonary Venous Connection (TAPVC), Partial Anomalous Pulmonary Venous Connection (PAPVC), Pulmonary Artesia (PA), Single Ventricle (SV), Ebstein Anomaly (EA) & other various types of CHDs existing together including rare type of CHDs.

Clinical examination, 2D echocardiography and color Doppler and sometime cardiac catheterization either in Baghdad or later on in FGH were considered as definitive tools for diagnosis of CHD. Variables recorded included the date of birth , sex , type of malformation , age of mother , age of father , history of CHD in family , maternal history drug , fever & X-ray radiation during pregnancy . The ethical committee has approved the study by the scientific committee in FGH & Anbar medical college .

Descriptive data are presented as percentages. Descriptive statistics was calculated for CHD prevalence per 1,000 live births.

Results :

Out of the 533 cases of CHD there were 281 males (52.72 %) & 252 females (47.27 %) (Fig. 1).

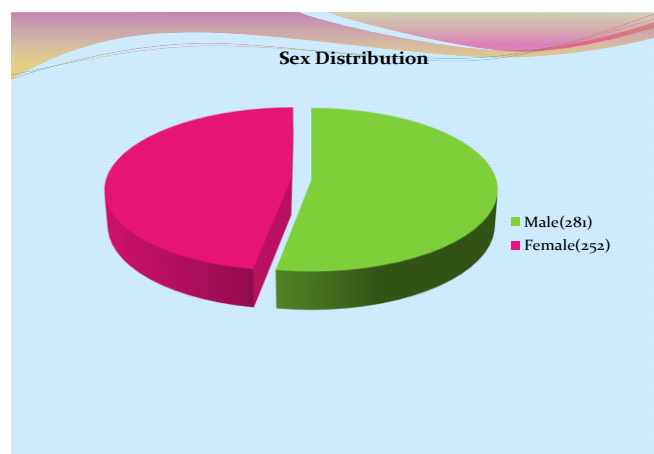


Figure (1) Distribution of cases according to gender .

Out of the 533 cases of CHD there were 59 (11.06%) cases in 2007 ,44 (8.25%) cases in 2008 , 49 (9.19 %) cases in 2009 ,167 (31.33%) cases in 2010 & 214 (40.15%) cases in 2011 (Fig .2).

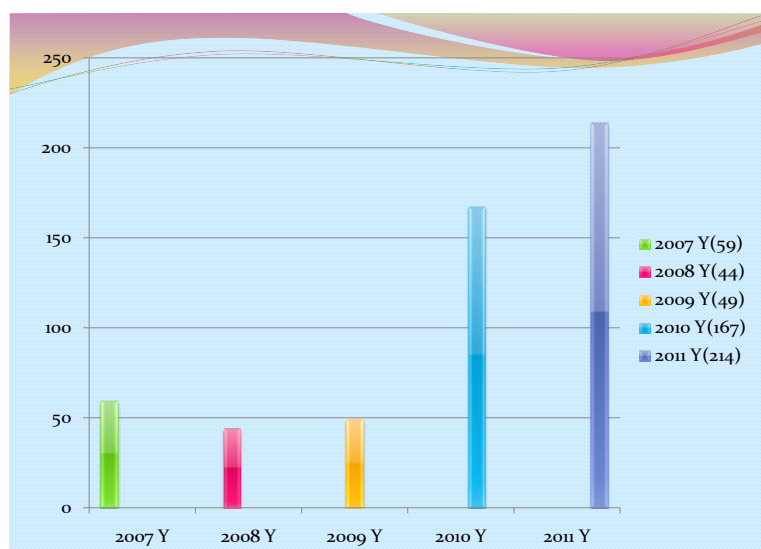


Figure (2) Distribution of cases according to years .

The overall prevalence of CHD live births during this 5-year period was 19.7 / 1000 live births. CHD was found to be more common in male than female births (10.38 versus 9.31 per 1000).

ASD was the commonest lesion 193 , followed by , VSD 164 , other (various types of CHDs existing together including rare type of CHDs.) 52 , PDA 34 , VSD +ASD 31 , PFO 28 , TOF 18 and PS 13 . Fig.(3) .

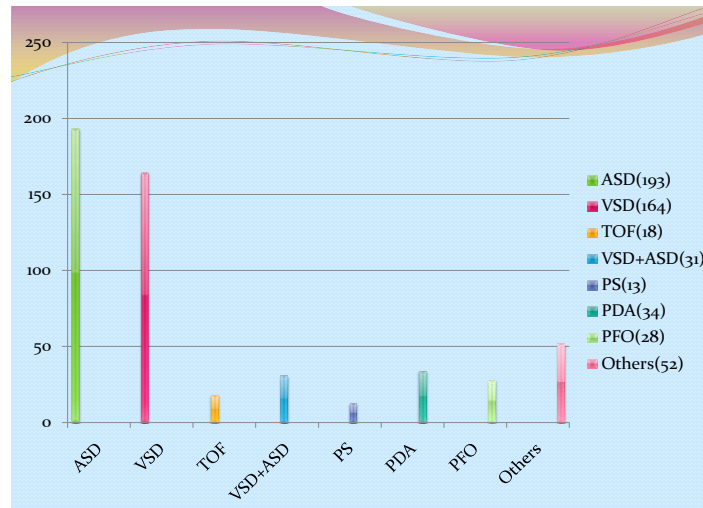


Figure (3) Distribution of cases according to pattern of CHD .

The rate of CHD was 24.44 per 1000 in 2007 , 9.25 per 1000 in 2008, 8.82 per 1000 in 2009 , 23.81 in 2010 & 29.23 per 1000 in 2011. Fig.(4,5,6,7,& 8.)

In 2007 & 2008 VSD was the commonest CHD , & PS lowest rate in 2008. Fig (4,5).While ASD was the commonest CHD in 2010 & 2011 Fig (6,7,& 8)

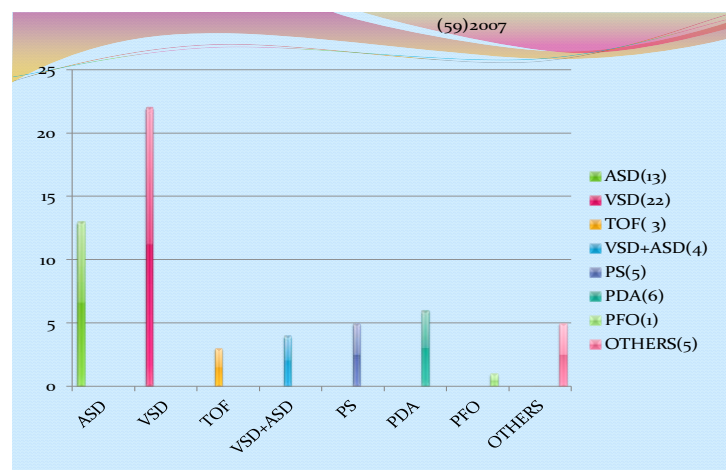


Figure (4) Distribution of cases according to pattern of CHD in 2007 year.

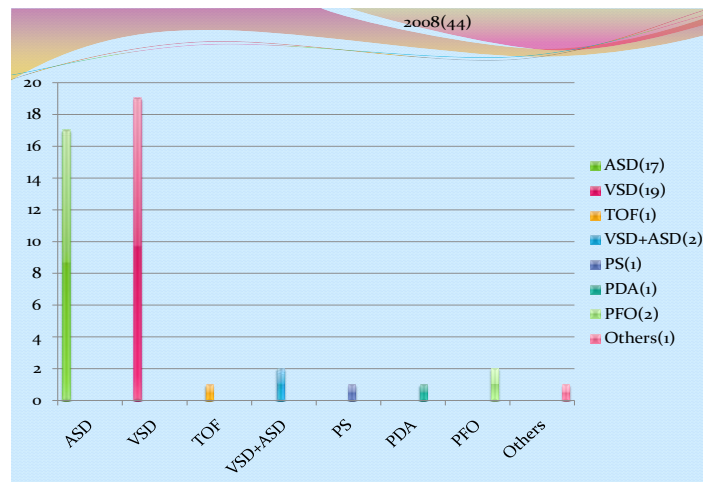


Figure (5) Distribution of cases according to pattern of CHD in 2008 year.

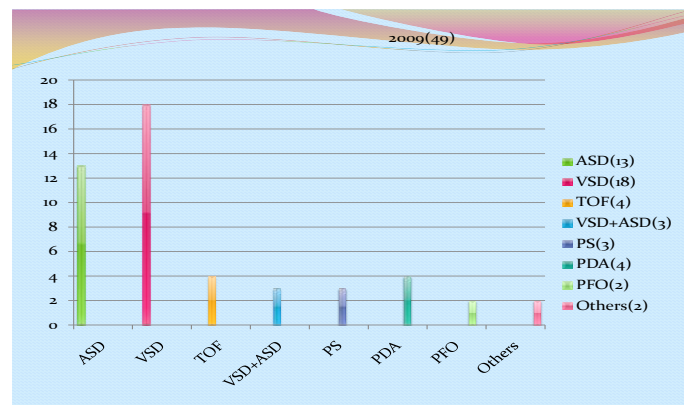


Figure (6) Distribution of cases according to pattern of CHD in 2009 year

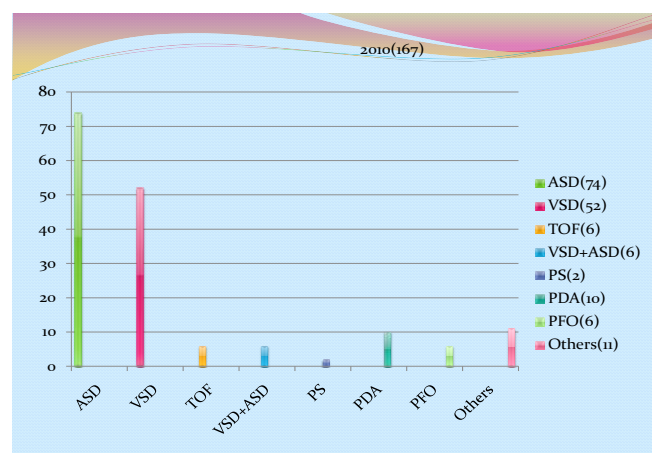


Figure (7) Distribution of cases according to pattern of CHD in 2010 year.

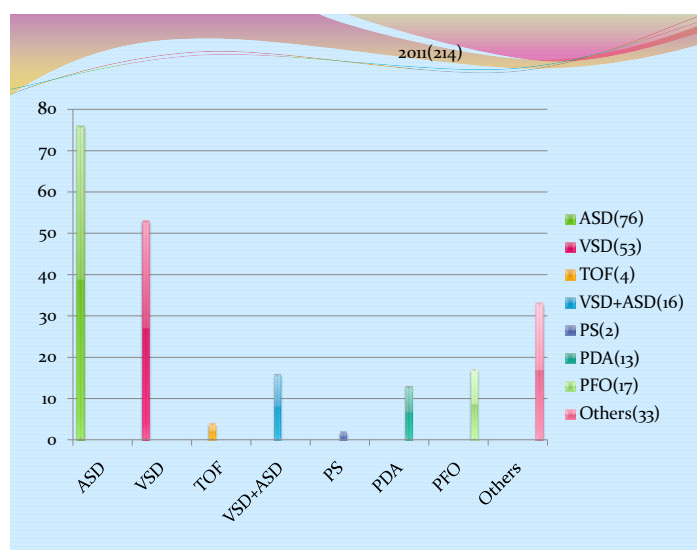


Figure (8) Distribution of cases according to pattern of CHD in 2011 year.

Depend on geographical distribution ,the highest rate of CHD was in center of the city 223 cases ,followed by other(around the city) 125, then eastern region (Karma) 97 , Amria 57 & lowest rate was in western region Saqlawya 31. As see in Fig. (9)

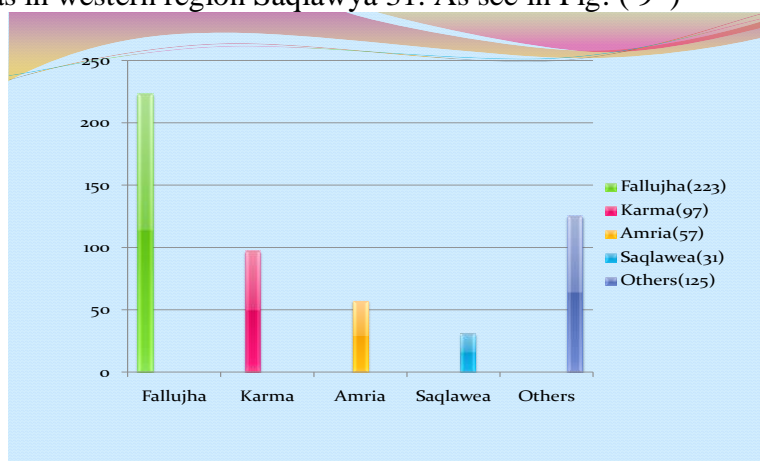


Figure (9) Distribution of registered CHD cases according locality .

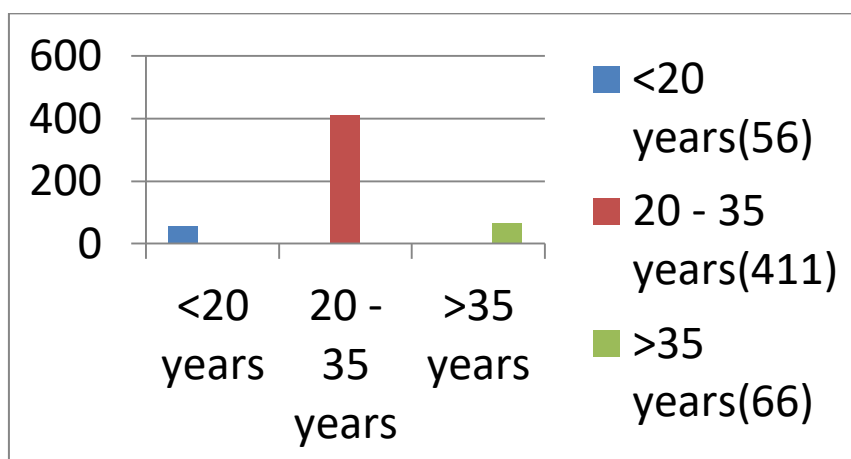


Figure (10) Frequency of cases with CHD related to age of mother .

167 of the affected newborns had a positive family history of abortion Fig.(11) , & 88 had a maternal history of drug use & X-ray irradiation during pregnancy Fig. (12).

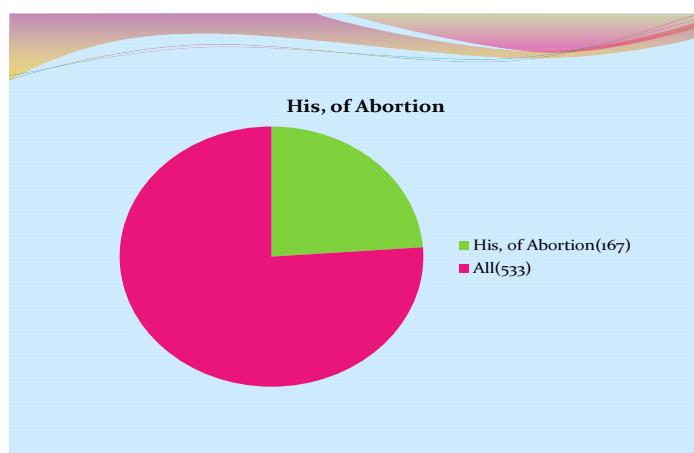


Figure (11) Frequency of cases with CHD related to history of mother with abortion

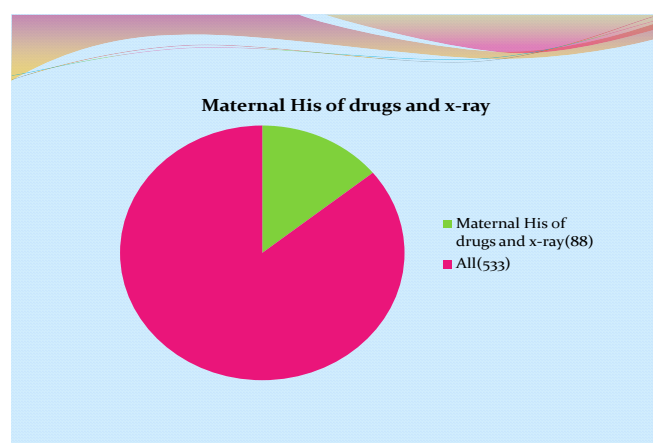


Figure (12) Frequency of cases with CHD related to maternal history of drug use & X-ray irradiation during pregnancy .

Discussion :

This study was conducted to explore the pattern and the prevalence rate of CHD in Fallujah . The overall prevalence of CHD during this 5-year period was 19.7 /1000 live births.

This is the first study concerning prevalence of CHD in Fallujah region ,although this study is deal with a small number of cases ,we believe it sheds some light on the pattern of CHD in this region .There is no study done in Iraq that gives the prevalence of CHD per 1000 live births.

Incidence of CHD was higher in Fallujah center 223 (41.83 %) cases than its subdistricts (fig.9) this is probably due to exposure of Fallujah center to more military operations & Battles than the sub districts (1st & 2nd Fallujah battles ,siege & invasions by USA Army at 2004 ,2005) or due to better medical service in center of city , we believe there is need for more advanced research .

In our study the overall prevalence rate of CHD (19.7/1000) in 5 years which is higher than that found in Bagher in

Gorgan Northern Iran (8.6 / 1000 live births) , (16) Fixler in Dallas, USA (6.75 / 1000 live births) (7) ,England (5.7 / 1000 live births) (17), Oman (6.8 / 1000

live births) (18) , & in Qatari(12.23 / 1000 live births).(19)

Prevalence of congenital heart diseases at global level as cited in the available literature and our study Table 1 (20)

Table 1 Prevalence of congenital heart diseases at global level as cited in the available literature and our study.

Country / city	Frequency per 1000 live births	References
Lebanon	11.5	Bitar et al (1999)
Oman	7.1	Subramanyan et al (1999)
Saudi Arabia	10.7	Alabdulgader et al (2001)
Bosnia –Herzegovina	6.12	Begic et al (2003)
Iran	12.3	F.Rahim et al (2008)
Our study	19.7	2012(2007-2011)

The reported prevalence in Indian population tends to be higher than in other populations (26.4 per 1000 was observed)⁽²¹⁾ .

The prevalence and pattern of individual congenital heart diseases in

Fallujah ,Iraq and different parts of the world recorded during the same period in 2007-2008 is depicted in Table(2).⁽¹⁶⁾

Table 2 : The prevalence of individual congenital heart diseases in per/1000 recorded during 2007-2008 in Fallujah Iraq and different parts of the world.

Author	ASD	PDA	VSD	PS	TOF	VSD+ASD	Country
Present study	3.62	0.69	5.3	0.27	1.11	0.83	Fallujah Iraq
Bagher Nikyar ⁽¹⁴⁾	2.64	1.28	0.85	0.34	0.17	1.28	North Iran
Subramanyan et al ⁽¹⁶⁾	1.44	1.03	2.49	0.88	0.96	-----	Oman
Fixler et al ⁽⁵⁾	0.7	0.53	4.28	0.89	0.35	-----	Dalls (USA)

The differences among these results in different parts of the world could be related to the study population, type of classification, and various selection criteria such as live births and still births in the study or methods of diagnosis and racial/ethnic differences. In addition to the security situation after 2003 ,as well as the transport of FGH from old place cross the river to center of city after 2009 & the travel some of the researchers to Japan during period of study & primitive CHD registration system .

The most frequent type of CHD was found to be ASD which is in accordance with another Study in Iran(22) while in other studies (23,24) the most frequent type of CHD was VSD. This variation may be related to death of many newborns as a result of severe defects before accessing the medical facilities. This might also be due to racial and genetic factors in different populations.

The prevalence of CHD in Fallujah Iraq had an upward trend during the period of study from 2007 - 2011 which might be due to the

improvement of diagnosis, attention or awareness among the medical authorities or reflect changes in population. . Further study is needed to explore the exact ethological factors.

We found that CHD was slightly more common in male births Fig (1). This finding is not similar to that reported in Saudi Arabia⁽²⁵⁾ , where the frequency was the same for males and females while in Nigeria⁽²⁶⁾ CHD was found to be more common in female births.

Also, researchers have pointed out the effect of race/ethnicity on CHD prevalence⁽²⁷⁾, Racial/ ethnical differences in the prevalence of cardiac malformations in utero and at live birth may have environmental components, e.g., nutritional status and teratogen exposure, in addition to genetic factors⁽²⁸⁾.

Several studies showed the advanced maternal age is a risk factor for the development of CHD^(29,30 & 31) this was different in the current study occurred in mothers in the highly reproductive age. (20-35years) Fig.(10).

This study had certain limitations. Firstly, primitive CHD registration system . Secondly we cannot state the number of severely ill children who died during initial steps of resuscitation (before the echocardiography could be performed). Thirdly, we could not

The possible explanation for this result is , may be due to environmental pollutions resulted from the successive wars occurred in our country in the last 2 decades . High rate of CHD in such situation is presumably due to exposure of pregnant women to radiation , as many refer that some weapons used by American army in Iraq since 1991 contained depleted Uranium⁽³²⁾ & such condition occurred in Basrah after the 2nd Gulf war⁽³³⁾ .

However most other studies showed increased risk only above 35 years old, ^(34,35,36,&37) probable explanation is that chromosomal defects are increased above maternal age of 35 years while non-chromosomal defects are increased in both extreme age (maternal age above 35 years & below 20 years)⁽³⁸⁾

In our study, associated abortions were seen in 167 (31.33 %) Fig.(11) of cases; & 88 (16.51 %) Fig.(12) of cases with maternal history of drugs & X- ray radiation during pregnancy , Further study is needed to explore the exact ethological factor .

assess the fate of very small acyanotic lesions like tiny VSD.

Fourthly, the study was done by personal efforts, Data collection based on hospitals record ,private clinics , that make CHD cases under estimated as some cases may not reach medical facilities.

Conclusion :

- 1.The present study shows, for the first time, the prevalence and pattern of CHD in Fallujah region in western Iraq.
- 2.These findings will help establishing a database for future studies, which will focus on etiology and ethnic disparity of CHD in the region.
- 3.The findings can help to establish valuable changes in health policies for the improvement of diagnostic and therapeutic facilities.
4. The present high prevalence rate of CHD in Fallujah need advance research & registration system to

- apply in Al-Anbar & Iraqi medical office .
5. The catastrophic successive wars imposed on Iraq undoubtedly have played some role in this problem .
 6. The overall pattern of CHD is similar to that in other countries .

Recommendations:

- 1-Activation of national congenital malformation control program involving (registration, diagnosis ,treatment and follow up) to the level of small hospitals to reach the real number of congenital malformation cases in Iraq and to build up a data base for the future retrospective studies.
- 2-Activation of screening programs for early detection of common congenital malformation to decrease morbidity and mortality of malformation .
- 3-Broad environmental and medical study about the preventable causes of congenital malformation in Fallujah and Iraq like (consanguineous marriage avoidance , sources of radiation ,contaminated water ,food and soil –etc).& part of this can be

done by specific TV programs ,teaching symposia ,& posters , stickers in the hospital & health care centers.

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