Al Mukhtar Journal of Sciences
Vol (31), No. (02), Year (2016) 115-122
Omar Al Mukhtar University, Al Bayda, Libya.
National Library No.: 280/2013/Benghazi

Prevalence of congenital heart disease among children in Aljabal Alkhdhar region, Libya: An Echocardiographic study

Mohamed Thabet Ali[1*], Salah Moftah Hamad[2]

[1]*Department of Pediatrics, Omar Almukhtar University, Albaida – Libya.*
[2]*Department of Radiology, Omar Almukhtar University, Albaida – Libya.*
[*]*Email: Alkwafi65@yahoo.com*

DOI: https://doi.org/10.54172/mjsc.v31i2.222

Abstract

Congenital heart diseases (CHD) are one of the most frequent malformations at birth. The aims of this study were to assess the prevalence of congenital heart disease, their different types, and their detection rate among children in Aljabal Alakhdar, Eastern part of Libya.
The study was conducted during three-year period (September 2009- October 2012). The prevalence of CHD in Althawra Hospital Albaida was studied. The diagnosis of structural defects was based on echocardiographic study. Age groups from neonates till adolescent were included. In the study period, 342 children were found to have CHD; 299 patients were neonates and infants. Total prevalence of CHD over the study period was 8.9 per 1,000 live-born. The prevalence increased from 8.6 to 9.2 per 1,000 live births between 2009 and 2012. Isolated ventricular septal defect (34 %) was the most frequent non cyanotic anomaly, and Tetralogy of Fallot (3.5 %) was the most frequent cyanotic anomaly. The Prevalence rate of CHD in this region compare to the international standard is almost similar. Increasing incidence of CHD might be attributed to easier diagnosis with more regular and fixed dates of pediatrics cardiac clinic in the hospital in last few years or it may indicate a real increase in the defects, which might need further studies to know the possible causes.

***Keywords*:** Congenital heart disease, echocardiography, prevalence.

Introduction

Congenital heart disease (CHD) is one of the most common congenital malformations. Despite recent developments in interventional and surgical techniques, heart disease in children continues to be an important cause of morbidity and mortality. The current study was undertaken to evaluate the spread of CHD in

Received, April 24, 2016; accepted, November 07, 2016

Aljabal Alakhdar region- Libya. This region is with total population of around 200,000 and birth rate of around 8.2% deliveries in 2010 according to Albaida city civil affair registry. This study aimed at establishing the frequency and prevalence of CHD in children referred to pediatric cardiology clinic-althawra hospital.

Patients and Methods

Congenital heart diseases were defined as a structural abnormality of the heart or intra-thoracic great vessels that is actually or potentially of functional significance following nomenclature of the European Pediatric Cardiac Code (Franklin et al., 2002). The following conditions were excluded: cardiac arrhythmias, patent ductus arteriosus in premature newborns and before 2 weeks of age in newborns, bicuspid aortic valve, mitral valve prolaps, patent foramen ovale, acquired heart disease, cardiac thrombus, and cardiomyopathy of infants of diabetic mothers.

All cases of CHD that were diagnosed by echocardiography in Althawra Teaching Hospital during the period September 2009- October 2012 were included. Children with cardiac problem followed by other cardiac units and private clinics at study area were not included. During the study period, 342 patients with different problems were seen at pediatric cardiology unit. All known cases of CHD were entered retrospectively from lists of patients seen at the Unit, with their pediatric echocardiogram findings. Referring causes were different including cyanosis, cardiac murmur, cardiomegaly, recurrent chest infections or arrhythmia. Pre-examination measures include routine chest x-ray and electrocardiogram. Echocardiography examination was conducted using two-dimensional, M-mode and color, pulse and continuous wave Doppler echocardiogram.Two-dimensional echocardiographic pictures were recorded in standard parasternal long-axis, short-axis, apical four chamber, subcostal and suprasternal views. Data regarding estimated population, live births rate were obtained from Albaida city civil affair registry (2010) which is the official regional bureau. SPSS 14 for Windows was used for analysis. The two-tailed chi-square test ($\chi 2$) was used for detecting differences among the yearly prevalence rates. A p value of <0.05 was considered significant.

Results

A total of 976 children (aged 1 day to 15 years) attended the Pediatric Cardiology clinic during the three-year study period. A total 342 children were found to have CHD. There were 175 (51%) boys and 167 (49%) girls, with a male/female ratio of 1: 1 .The average

age at diagnosis were 2.4± 3.7 years (1 day to 15 years, median 4 months). Out of total patients with CHD 299 patients were neonates and infants the most frequent diagnosis made was isolated ventricular septal defect (114 patients) representing 34% of the total cardiac anomalies. There were 58 males and 56 females (M/F, 1:1). The next most frequent diseases were patent ductus arteriosus in 49 patients (15%), isolated atrial septal defect in 44 (13%), isolated pulmonary stenosis in 28 (8%), and tetralogy of Fallot in 12 (3,5%). The relative frequency and sex difference of the defects are shown in Table (1). Simple CHD and ventricular septal defects in 38 children were associated with atrial septal defect in 26 patients, patent ductus arteriosus in 21 patients, pulmonary stenosis in 11 cases.

Table 1. Relative Frequency of Some of the Congenital Heart Diseases and Sex Difference

Heart disease M/F	n	%	boys	girls
Isolated ventricular septal defect 1:1	114	33.3	58	56
Patent ductus arteriosus 1.4:1	49	15	29	20
Isolated atrial septal defect 1:1.3	44	13	19	25
Simple CHD* and ventricular septal defect 1.1:1	38	11	20	18
Isolated pulmonary valve stenosis 1:1.1	28	8	13	15
Tetralogy of Fallot 2:1	12	3.5	8	4
Coarctation of the aorta 2.1	6	1.7	4	2
Atrioventricular septal defect 1.1:1	19	5.5	10	9
Isolated aortic valve stenosis 1:1	4	1.2	2	2
Transposition of the great arteries 1:1.3	7	2	3	4
Complex heart disease 1:1.3	21	6	9	12

Simple CHD*: Ventricular septal defect ± atrial septal defect ± pulmonary stenosis ± aortic stenosis ± patent ductus arteriosus ± coarctation of the aorta.

The ages at diagnosis were different, with 103/342 (30%) studied in the neonatal period (Group 1), 196 (57.3%) in infant and toddler period (Group 2), 21 (6.1%) in preschool age (Group 3), 15 (4.4%) in school-aged children (Group 4), and 7 (2%) in adolescents (Group 5).Distribution of the various cardiac anomalies and age at diagnosis are given in Table (2) and Figure (1)

Table 2. Congenital Heart Diseases and Age at Dagnosis

	Group 1	Group 2	Group 3	Group 4	Group 5	Total
Patient Number (%)	103(30)	196(57.3)	21(6.1)	15 (4.4)	7(2)	342
Male/Female	55/48	96/100	12/9	9/6	3/4	175/167
Ratio	(1.1:1)	(1:1)	(1.3:1)	(1.5:1)	(1:1.3)	(1:1)
Isolated VSD (%)	35(30)	67(58)	7(6.1)	3(2.6)	2(1.7)	114
Isolated ASD (%)	11 (25)	22(50)	6(13.6)	4(9)	1(2.3)	44
Isolated PDA (%)	21(42.8)	21(42.8)	3(6.1)	3(6.1)	1(2)	49
Isolated pulmonary stenosis (%)	10(35.7)	15(53.6)	1(3.6)	1(3.6)	1(3.6)	28
Tetrology of fallot (%)	5(41.7)	6(50)	1(8.3)	0	0	12
Coarcetation of the aorta (%)	1(16.7)	3(50)	1(16.7)	0	1(16.7)	6
Simple CHD* and VSD (%)	8(21)	26(68.4)	2(5.3)	2(5.3)	0	38
TGA (%)	4(57.1)	3(42.8)	0	0	0	7
Atrioventricular septal defect (%)	2(10.5)	16(84.2)	0	1(5.30)	0	19
Isolated aortic valve stenosis (%)	0	2(50)	0	1(25)	1(25)	4
Complex heart disease (%)	6(28.6)	15(71.4)	0	0	0	21

Group 1: newborns, 2: infant and toddlers, 3: preschool children, 4: school children, 5: adolescents. Complex CHD*: tricuspid atresia, truncus arterious, pulmonary atresia ,common atrium, hypoplastic left-heart syndromes, single ventricle and/or double inlet ventricle, corrected transposition of the great arteries, Ebstein anomaly.

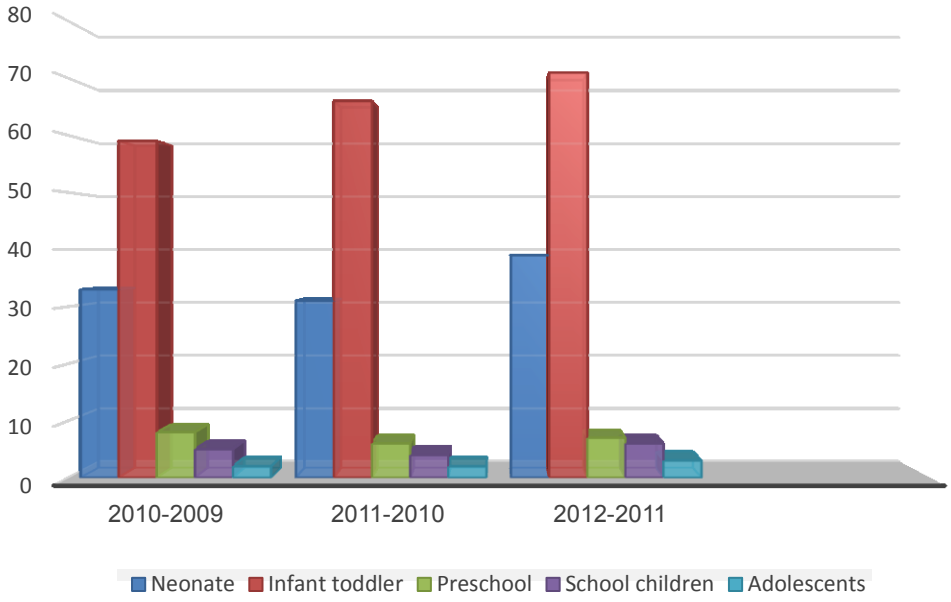

Figure 1. Congenital heart disease and application age by the time

Table 3. Prevalence of Congenital Heart Disease in Live-Born Children

Year	Live birth*	n**	n/1000	x2	p
2009-2010	14603	92	6.3		
2010-2011	14696	97	6.6		
2011-2012	14285	110	7.7		
Total	43584	299	6.86	2.33	0.12

* Live-born children as accounted for by city population and birth rate, ** n: Neonates, infants and toddlers with CHD in these years.

Discussion

Epidemiological studies have shown varied frequency and prevalence of CHD. The incidence of CHD has varied between 4 and12 /1,000 (Bassili *et al*., 2000; Subramanyan *et al*., 2000) and (Hoffman, 1995). In Libya, The total estimated number of live births with CHD is about 2000 per year, which is added every year to the already existing pool (Aburawi, 2006) .Our survey reveals an incidence of 6.86/1,000 live births, which falls in the range of the reported studies. Distribution of cardiac defects in our children was not very different from the reported series (Venugopalan *et al*., 2002; Baspinar *et al*., 2006; Sani *et al*., 2007; Mark *et al*., 2008). Ventricular septal defect, pulmonary stenosis and atrial septal defect were reported as the most frequent CHDs (Robida *et al*., 1997; Begic *et al*,. 2003). The results of our study indicate that ventricular septal defect was the most frequent type of CHD in Aljabal Alakhdar area, followed by patent ductus arteriosus and atrial septal defect. Sex predominance for the more frequent heart defects was also not different from the literature. Increased Occurrence of some CHDs over time was observed in our study.

Conclusion

Ventricular septal defect was the most frequent anomaly and it is commonly associated with a variety of other defects: atrial septal defect, patent ductus arteriosus, etc. The prevalence of CHD seems to be is increasing. Whereas most findings likely result from improved case reporting, others might reflect changes in the distribution of risk factors in the population, for example changing in incidence of maternal diabetes mellitus in recent years or increasing incidence of children with trisomy 21 which might be related to older maternal age pregnancies. The declining age at diagnosis may be attributed to improvements in medical circumstances over the period under study. These include better medical training. We suggest that cardiac evaluation should be performed at birth in immunization centers, in order to facilitate early detection and treatment of CHD. Potential sources of error in this study include its retrospective nature and many cases with CHD from Aljabal Alakhdar diagnosed in other cardiac clinic in nearby regions not included in this study, In addition, this study only included live births because autopsy data on still-births is not routinely collected in this region; therefore, the complex CHD rate may be higher than observed in the study.

References

Albaida city civil affair registry. (2010).

Bassili, A., S. A. Mokhtar, N. I. Dabous, S. R. Zaher, M. M. Mokhtar, A. Zaki. (2000). Congenital heart disease among school children in Alexandria, Egypt: an overview on prevalence and relative frequencies. Journal of Tropical Pediatrics, 46: 357-362.

Begic, H., H. Tahirovic, S. Mesihovic, V. Ferkovic, N. Atic, A. Latifagic. (2003). Epidemiological and clinical aspects of congenital heart disease in children in Tuzla Canton, Bosnia-Herzegovina. European Journal of Pediatrics, 162: 191-193.

Aburawi, E. (2006). The burden of congenital heart disease in Libya. Libyan Journal of Medicine, 1: 120-122

Hoffman, J. I. E. (1995). Incidence of congenital heart disease: I Postnatal incidence. Pediatric Cardiology, 16: 103-113.

Franklin , R. C., R. H. Anderson, O. Daniels. (2002). Report of the Coding Committee of the Association for European Paediatric Cardiology. Cardiology in the Young, 12: 611-618.

Mark, D., M. J. Strickland, T. Riehle, W. Mahle, A. Correa. (2008). Prevalence of Congenital Heart Defects in Metropolitan Atlanta, 1998–2005. The Journal of Pediatrics, 153: 807–813.

Başpinar, O., S. Karaasalan, B. Oran, T. Baysal, A. M. Elmaci, A. Yorulmz. (2006). Prevalence and distribution of Children with congenital heart diseases in the central Anatolian region. The Turkish Journal of Pediatrics, 48: 237-243.

Robida, A., G. M. Folger, H. A. Hajar. (1997). Incidence of CHD in Qatari children. International Journal of Cardiology, 60: 19-22.

Sani, M., M. Mukhtar, K. M. Karaye. (2007). Spectrum of Congenital Heart Disease in Tropical Environment, Nigeria. Journal of the National Medical Association, 99: 665-668.

Subramanyan, R., P. Venugopalan, A. Sapru, S. M. al Khusaiby. (2000). Incidence and Spectrum of congenital heart disease in Oman. Annals of Tropical Paediatrics, 20: 337-341.

Venugopalan, P., A. K. Agarwal, W. J. Johnston, E. Riveria. (2002). Spread of heart disease in An open-access paediatric echocardiography clinic. International Journal of Cardiology, 84: 211-216.

معدل انتشار أمراض القلب الخلقية بين الأطفال بمنطقة الجبل الأخضر في ليبيا من خلال دراسة فحص صدى القلب

الملخص

تعتبر التشوهات القلبية من أكثر لتشوهات الولادة عند الأطفال. أغراض البحث هي تقييم انتشار الأمراض القلبية الولادية وأنواعها المختلفة ومعدل اكتشافها بين الأطفال في الجبل الأخضر في الجزء الشرقي من ليبيا.

اجري البحث خلال فترة 3 سنوات (في الفترة من سبتمبر 2009 إلى أكتوبر 2012) في مستشفى الثورة في البيضاء لدراسة انتشار الأمراض القلبية الولادية باستخدام فحص صدى القلب (الايكو) متضمنا الفئات العمرية من حديثي الولادة و حتى سن المراهقة. تم تشخيص 342 حالة تشوهات قلبية ولادية خلال فترة البحث،299 لحديثي ولادة ورضع مع معدل انتشار عام 8.9 لكل 1000 مولود حي مع تزايد في الانتشار من 8.6 إلى 9.2 لكل 1000 مولود حي في الفترة من 2009 إلى 2012 ، ثقوب جدار البطين المنفردة(34%) كانت أكثر التشوهات الغير مصحوبة بنقص الأكسجين في الدم وكانت رباعية فالوت (3.5%) أكثر التشوهات المصحوبة بنقص أكسجين الدم. معدل انتشار التشوهات القلبية بين الأطفال في المنطقة لا يختلف عن المعدل العالمي والتزايد في حدوث التشوهات خلال سنوات البحث يعزى ربما إلى أن التشخيص أصبح أسهل نظرا لوجود مواعيد ثابتة و منتظمة في وحدة أمراض قلب الأطفال بالمستشفى في السنوات الأخيرة أو قد تكون زيادة حقيقة في الحالات مما قد يتطلب دراسات أخرى لمعرفة الأسباب المحتملة.

مفتاح الكلمات: أمراض القلب الخلقية، صدى القلب، معدل الانتشار.