Cardiology and Angiology: An International Journal

9(4): 78-84, 2020; Article no.CA.63640
ISSN: 2347-520X, NLM ID: 101658392

Pattern of Congenital Heart Disease among Libyan Children: A Single Centre Study

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Authors' contributions

This work was carried out in collaboration among all authors. Author RM designed the study and wrote the protocol. Author MA wrote the first draft of the manuscript, performed the statistical analysis and managed the analyses of the study. Authors NG, AS and MM managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/CA/2020/v9i430152
Editor(s):
(1) Assist. Prof. Jagadeesh Kalavakunta, Michigan State University and Western Michigan University, USA.
Reviewers:
(1) Nikolaos Zavras, Attikon" University General Hospital, Greece.
(2) Halil Ibrahim Tanriverdi, Manisa Celal Bayar University Medical School, Turkey.
Complete Peer review History: http://www.sdiarticle4.com/review-history/63640

Original Research Article

Received 10 October 2020
Accepted 15 December 2020
Published 28 December 2020

ABSTRACT

Objective: To evaluate the pattern of Congenital heart disease (CHD) in Al-Mugref Teaching Hospital in the North Eastern part of Libya.
Patients and Methods: This is a prospective descriptive study involved pediatric patients aged from day 1 until age of 15 years who were referred to the Cardiology department at Almugref Teaching Hospital for suspected CHD. Data were collected over a period of one year and all the recruited patients were subjected to a full cardiovascular system (CVS) examination and 2D Echocardiography (ECHO).
Results and Conclusions: Out of the 719 total referred cases, 332 (46.1%) were confirmed having underlying CHD with predominant a cyanotic type 307 (92.5%). In terms of gender predominance, male to female ratio was 1.1: 1(176 vs. 156). Frequency of CHD in order frequency was as follow: Atrial septal defect (ASD) 134; 40.4%, Ventricular septal defect (VSD) 102; 30.8%, Patent ductus

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arteriosus (PDA) 31; 9.3%, Pulmonary stenosis (PS)15; 4.5%, Atrioventricular (AV) canal defects 12; 3.6%, Aortic stenosis (AS)11; 3.3%, Tetraology of fallot (TOF) 9; 2.7%, Transposition of great arteries (TGA) 4; 1.2%, complex CHD (4; 1.2%), Rhabdomyoma (3;0.9%), total anomalous pulmonary venous drainage (3; 0.9%), Truncus arteriosus (TA) 2; 0.6%, Pulmonary atresia (PA)1; 0.3%, Co-arctation of aorta (COA) 1; 0.3%. In terms of the outcome, majority of the patients in a cyanotic group were advised for scheduled follow-ups (240; 78.18%), and almost a quarter had their heart defects being closed spontaneously in the initial visits (53; 17.26%). Further, eleven patients have undergone a surgical closure (3.58%) and three patients died early (0.9%). In contrast, almost a third of the cyanotic group died shortly after the diagnosis was made (8; 32%), and seven patients were successfully operated (28%); whereas ten cases offered a close monitoring with frequent follow ups (40%).

Keywords: Congenital heart defects; echocardiography; cyanosis; Libya.

1. INTRODUCTION

Congenital Heart Disease (CHD) refers to complex abnormalities that affect either structure and/or function of the heart due to embryonic defects, and is the most common birth defect leading to infant mortality [1]. The incidence of CHD varied globally and ranges from 4 to 50 per 1000 live births [2]. In Libya, the total estimated number of live births with CHD is about 2000 per year, which is being added annually to the already existing pool [3]. The etiology of CHD is thought to be a multi-factorial in origin where a genetic predisposition and environmental factors play a role [4].

Presentation of CHD can vary from asymptomatic incidental findings to severe cardiac decompensation and even early death [3]. An early recognition of cases therefore might have a great implication on both the short and long term prognosis [2]. In terms of a relative frequency of type of lesion it varies in different reports. However, there is a consensus that Ventricular septal defect (VSD), Atrial septal defect (ASD), Patent ductus arteriosus (PDA), Coaractation of Aorta (COA), Tetralogy of fallot (TOF), Transposition of the great arteries (TGA), Pulmonary stenosis (PS) and aortic stenosis (AS) are the most common defects and comprise 90% of all CHD lesions [5]. This study was conducted to evaluate the pattern of CHD in patients who were referred with suspected CHD to Al- Mugref Teaching Hospital in the North Eastern of Libya.

2. PATIENTS AND METHODS

This is a prospective descriptive study involved pediatric Libyan patients (aged from day 1 until age of 15-year-old) who were referred to the Cardiology department at Almugref Teaching Hospital with suspected heart defects. Data were collected over a period of one year (April 2019-April 2020). Almugref Teaching Hospital is a tertiary Hospital located in AJdabiya City and covers a large area of the North Eastern part of Libya. All the referred cases of a total number 719 were undergone a full cardiovascular system (CVS) assessment and 2D Echocardiography (ECHO). The recruitment was based on either presence of positive clinical findings (cyanosis, murmur, and distress) (100; 13.9%), or those with a history of recurrent chest infections (500;69.5%). Children with potential increased the risk (positive family history of CHD, syndromic, and infant of diabetic mother) (119;16.5%) were also included.

3. RESULTS

Out of the 719 total referred cases, 332 (46.1%) were confirmed having underlying CHD with predominant a cyanotic type 307 (92.5%) (Fig. 1). In terms of gender predominance, male to female ratio was 1.1: 1 (176 vs. 156) (Fig. 2).

Frequency of CHD was as follow: ASD (134; 40.4%), VSD (102; 30.8%), PDA (31; 9.3%), Pulmonary Stenosis (15; 4.5%), AV canal defect (12; 3.6%), Aortic Stenosis (11; 3.3%), TOF (9; 2.7%), TGA (4; 1.2%), complex CHD (4; 1.2%), Rhabdomyoma (3;0.9%), total anomalous pulmonary venous drainage (3; 0.9%), Truncus arteriosus (2; 0.6%), Pulmonary atresia (1; 0.3%), COA (1; 0.3%) (Figs. 3 and 4).

In terms of the outcome of our patients, it varied widely between the two groups (a cyanotic and cyanotic type of CHD) Fig 5. Certainly, majority of patients in the first group (a cyanotic category) were advised for scheduled follow-ups with or without anti-failure medications (240; 78.18%)

Table 1. Further, almost a quarter had their heart defects being closed spontaneously during the initial visits (53; 17.26%), whereas eleven patients have undergone a surgical closure (3.58%). Three individuals of this group died early before had their scheduled operations done (0.9%) Table 1. In contrast, almost a third of the cyanotic group died shortly after the diagnosis was made (8; 32%), and seven patients were successfully operated (28%); whereas ten cases offered a close monitoring with frequent follow ups (40%) Table 1.

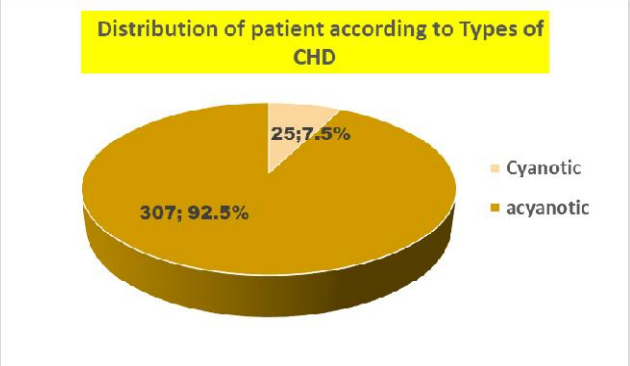

Fig. 1. Distribution of patient according to type of CHD

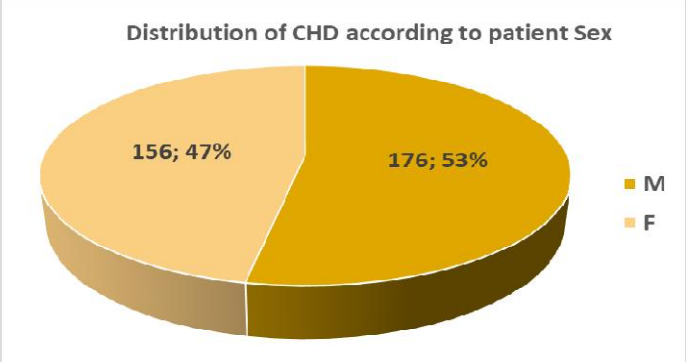

Fig. 2. Distribution of CHD patient according to gender

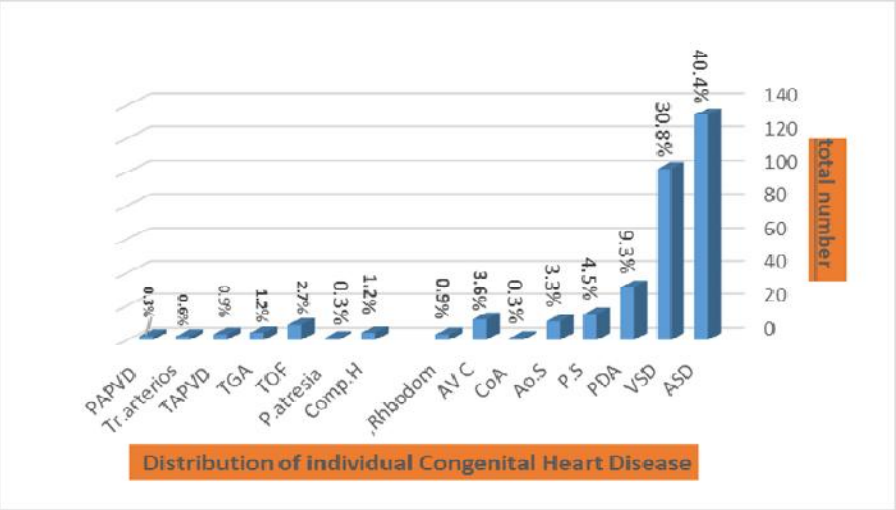

Fig. 3. Distribution of types of congenital heart disease in percentage

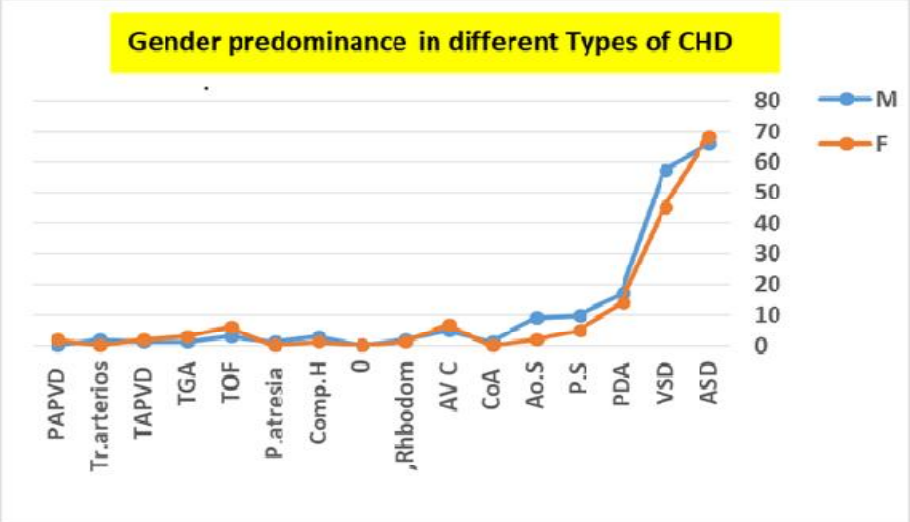

Fig. 4. Relative frequency of congenital heart disease by sex

Table 1. Outcome of patients with different types of CHD

Types of CHD	Fate	No	Percent
P.atresia	Dead	1	100%
TGA	Dead	2	50%
	Operated	1	25%
	follow up	1	25%
TOF	Operated	1	11.10%
	follow up	8	88.90%
TAPVD	Dead	3	75%
	Operated	1	25%
T.arteriosus	Dead	1	50%
	Operated	1	50%
Complex Heart	Dead	1	25%
	Operated	2	50%
	Follow up	1	25%
ASD	Closed	34	25.40%
	Operated	3	2.20%
	Follow up	97	72.40%
VSD	Closed	10	9.80%
	Operated	1	0.90%
	Follow up	91	89.20%
PDA	Closed	10	32.30%
	Operated	3	9.70%
	Follow up	18	58.10%
CO. A	Follow up	1	100%
Aortic Stenosis	Operated	1	9.10%
	Follow up	10	90.90%
AV Canal	Dead	3	25%
	Follow up	9	75%
P. Stenosis	Operated	2	13.33%
	Follow up	13	86.70%
Rhabdomyoma	Follow up	3	100%

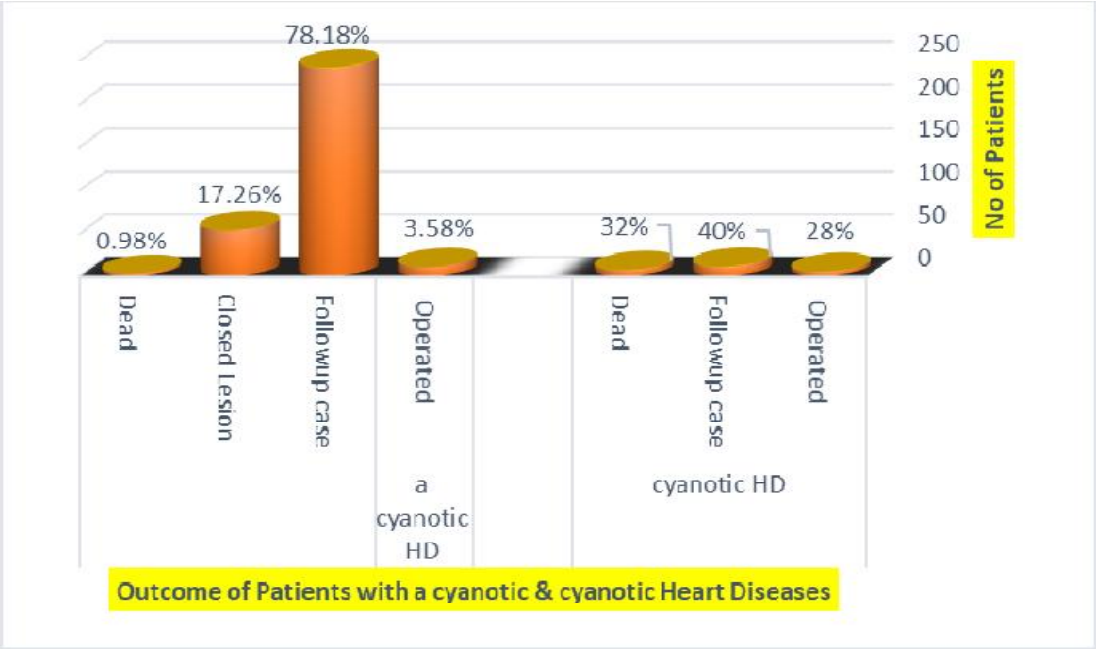

Fig. 5. The outcome of patients with CHD (cyanotic and a cyanotic type)

4. DISCUSSION

The current study showed that almost half of the referred cases with suspected CHD were proved harboring a serious underlying heart defect. Despite the advances in the diagnostic medicine technology, this finding further supports the imperative role of physical examination in an early picking up and guiding the management. The study also revealed that majority of the cases were shown to have a cyanotic type of CHD with a male predominance. These observations are correlating with the findings from other local studies [6], and regional data [5,7] as well as international reports [8]. Further, the study indicated that ASD is the most frequent type of CHD among our participants followed by VSD. Similar findings were also reported from several regional and global studies [9-13]. In contrast, in one local study, VSD was the most prevalent diagnosis among cases with CHD [14].

TOF was the most common heart defect in our patients diagnosed with cyanotic CHD followed by TGA. Interestingly, a similar pattern of frequency has been shown in a number of local and global research studies [14-16]. However, it should be noted that TGA was the commonly reported cyanotic heart defect in a different local study that investigated the pattern of CHD in the South part of Libya [6]. Additionally, the current investigations also revealed that males are being more commonly diagnosed with CHD than females, which is consistent with other research studies' findings [17-18]. Of note, despite the overall male predominance, AV Canal defect, ASD, and TOF were exceptionally found more among our female patients than male participants, as previously shown before [19-21].

It should be noted that the advances in pediatric cardiovascular surgery and cardiac interventional catheterization have shown improved outcomes in patients with underlying heart defects [22-23]. Nevertheless, CHD remains a major cause of morbidity and mortality in pediatric population, and places a heavy financial burden on the community, particularly in developing countries [24]. Certainly, the overall mortality risk is estimated about 18 times higher in children with CHD as compared to the healthy subjects, particularly in those with complex types [25]. Of note, the outcome of our patients showed a variable discrepancy, particularly in the survival rates, which was more pronounced in patients harboring the cyanotic type of CHD. Indeed, the mortality rate in the first group was very negligible since majority of patients had their symptoms controlled by either medical treatments or undergone a successful surgical closure, taking in consideration a considerable number of lesions were closed spontaneously.

The cyanotic group on the other hand showed higher rates of mortality, which is largely owing to the nature and complexity of the underlying heart defects, as previously indicated [24]. Additional factor might be attributed to the lack of sufficient facilities including highly specialized cardiac centers, as the case in the majority of the developing countries, to deal with such complex cases [26].

Limitations of our study included that the data were collected from a single centre which might not accurately reflecting the pattern of CHD in Libyan children. Thus, further studies, including meta-analyses of previous local observations, are warranted in the foreseeable future to precisely finding out the frequency and outcome of CHD among Libyan pediatric population.

5. CONCLUSIONS

CHD appears common among Libyan children referred to the cardiovascular clinic with a predominance for a cyanotic type. The condition also seems more commonly seen in males than females. Further studies are warranted now to validate these preliminary observations.

CONSENT AND ETHICAL APPROVAL

Verbal and written consents were taken from all the participants' guardians. The local Hospital Ethics Committee has approved the study and agreed to publish it. Data were exported from the collected database to Excel spread sheets in preparation for data analyses. Prism 6 statistical software was used for statistical analysis.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sdiarticle4.com/review-history/63640