

## Original Article

# *Frequency and Pattern of Congenital Heart Diseases Among Children in a Tertiary Hospital in Mogadishu, Somali, 2019: A Hospital-Based Study*

Mohamed Farah Yusuf Mohamud<sup>1\*</sup>, MS; Yahya Kemal Icen<sup>2</sup>, PhD;  
Said Abdirahman Ahmed<sup>2</sup>, MS; Abdirahman Abdikadir Osman<sup>3</sup>, MS;  
Abdinafic Mohamud Hussein<sup>4</sup>, MS

### ABSTRACT

**Background:** Congenital heart diseases (CHDs) constitute the most common congenital malformations in pediatrics and comprise up to 25% of all congenital anomalies. They contribute significantly to morbidity and mortality in children.

**Methods:** This retrospective hospital-based study was conducted on children undergoing echocardiography for suspected CHDs between January 2019 and December 2019 in a tertiary teaching hospital.

**Results:** Out of 460 patients examined, 160 (35%) patients were diagnosed with CHDs, and 33 (7%) children had acquired heart diseases. Male gender was predominant (82/160; 51%), while female patients comprised 49% (78/160) of the study population. The majority of the patients (130/160; 81%) had acyanotic CHDs, whereas 30 (19%) patients had cyanotic CHDs. The most frequent type of acyanotic CHD was ventricular septal defect (59/160; 37%), followed by pulmonary stenosis (22/160; 14%) and patent ductus arteriosus (21/160; 13%). Tetralogy of Fallot was the most common cyanotic CHD in that it was diagnosed in 8 (5%) patients.

**Conclusions:** Ventricular septal defect was the most common acyanotic CHD in this study, while tetralogy of Fallot was the most frequent cyanotic CHD. To our knowledge, there are no previous data on CHD in our country. We hope that the results of this study will provide a database for future investigations on the incidence and prevalence of CHDs in tertiary hospitals in Somalia and raise awareness about the significance of their early detection and surgical interventions. (*Iranian Heart Journal 2021; 22(1): 10-15*)

**KEYWORDS:** Congenital heart defect, Acyanotic CHD, Cyanotic CHD, Frequency and pattern of CHD

<sup>1</sup> Emergency Medicine Department, Mogadishu Somali-Turkish Training and Research Hospital, Mogadishu, Somalia.

<sup>2</sup> Cardiology Department, Mogadishu Somali-Turkish Training and Research Hospital, Mogadishu, Somalia.

<sup>3</sup> Internal Medicine Department, Mogadishu Somali-Turkish Training and Research Hospital, Mogadishu, Somalia.

<sup>4</sup> Cardiovascular Surgery Department, Mogadishu Somali-Turkish Training and Research Hospital, Mogadishu, Somalia.

\*Corresponding Author: Mohamed Farah Yusuf Mohamud, MS, Emergency Medicine Department, Mogadishu Somali-Turkish Training and Research Hospital, Mogadishu, Somalia.

Email: m.qadar59@gmail.com

Tel: +252615591689

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Congenital heart diseases (CHDs) constitute the most common congenital malformations in pediatrics and comprise up to 25% of all congenital anomalies. They contribute significantly to morbidity and mortality in children.<sup>1</sup> It is difficult to establish the incidence of CHDs. A systemic review showed that approximately 1.35 billion infants were born with CHDs each year worldwide. Numerous studies have shown that the incidence of CHDs ranges from 4 to 85.9 per 1000 live births.<sup>2, 3</sup> Nonetheless, there could be geographical variations. The prevalence of CHDs is not uniform. According to a study by Vander Linde et al,<sup>4</sup> Asia has the highest prevalence of CHDs at 9.3 per 1000 live births, whereas Africa has the lowest prevalence of CHDs at 1.9 per 1000 live births. In addition, Europe has the second-highest prevalence of total CHDs at 8.2 per 1000 live births. No previous study from Somalia has ever examined the pattern and incidence of CHDs in the country. We, therefore, sought to identify the frequency and pattern of CHDs in a tertiary hospital in Mogadishu, Somalia.

## METHODS

Data on pediatric patients (age between 0 and 18 years) who were diagnosed for the first time with CHDs in the cardiology department of our tertiary teaching hospital between January 2019 and January 2020 were retrospectively collected. The data were obtained from medical records, and the diagnosis was confirmed via transthoracic echocardiography.

SPSS software, version 23, was used for data analysis, and the results were expressed in terms of frequencies, percentages, and means. The study protocol was approved by the institutional research ethics committee (reference number: MSTH/1398).

The exclusion criteria were acquired heart diseases, previous diagnosis with CHDs,

referrals for follow-up visits, and non-confirmed by echocardiography.

CHDs were classified as cyanotic CHDs, consisting of tetralogy of Fallot (ToF), transposition of the great arteries (TGA), tricuspid atresia, total anomalous pulmonary venous return, univentricular heart, Eisenmenger syndrome, and complex anomalies (ToF + ventricular septal defect [VSD], TGA+ ToF, and TGA+VSD), and acyanotic CHDs, namely VSD, atrial septal defect [ASD], patent ductus arteriosus [PDA], atrioventricular septal defect, coarctation of the aorta, and complex anomalies (VSD+ASD).

## RESULTS

A total of 460 pediatric patients underwent echocardiography during the study period (January 2019 to December 2019). Of this total, 193 (42%) patients had cardiac lesions, while 267 (58%) had normal cardiac findings. Of the patients with cardiac lesions, 160 (35%) children had CHDs, while 33 patients (7%) had acquired heart diseases.

Male and female patients accounted for 82 (51%) (n = 82) and 49% (n = 78) of the study population, respectively.

Apropos age, most of the patients with CHDs (60/160; 37.5%) were diagnosed aged between 0 and 1 year (Table 1). The mean age of the patients was  $5.3 \pm 5.0$  y (median age: 3 y; maximum: 18 y vs minimum: 1 y). Of the 160 patients diagnosed with CHDs, 130 (81.3%) children had acyanotic CHDs, while 30 (18.8%) had cyanotic CHDs (Table 2). The most common acyanotic CHD was VSD, followed by pulmonary stenosis and PDA, whereas ToF was the most frequent cyanotic CHD.

The most frequent type of CHD was VSD, detected in 59 (37%) patients, followed by pulmonary stenosis (13.75%), PDA (13.1%), ASD (6.8%), and ToF (5%). Complex CHDs were diagnosed in 14 (8.8%) patients.

The frequencies and various patterns of the other CHDs by gender distribution are shown in Table 3. Defects such as VSD, pulmonary stenosis, and ToF were more frequent in the male patients, while coarctation of the aorta and PDA were more common among the female patients.

### DISCUSSION

We performed the present study to determine the frequency and pattern of CHDs in a tertiary teaching hospital in Mogadishu, Somalia.

CHDs constitute the most common congenital malformations in the pediatric

population and comprise up to 25% of all congenital anomalies. They contribute significantly to morbidity and mortality in children.<sup>1</sup> It is difficult to establish the incidence of CHDs. Numerous studies have reported that the incidence of CHDs ranges from 4 to 85.9 per 1000 live births,<sup>2, 3</sup> although there could be geographical variations. For instance, a hospital-based study in India reported that the incidence of CHDs was 24.4 per 1000 live births in 2016, whereas a study in China reported the rate of 11.1 per 1000 livebirths.<sup>5, 6</sup>

**Table 1:** Gender distributions of various patterns of CHDs

Sex	VSD	PS	PDA	ASD	ToF	TGA	AVSD	MS	TA	AS	CoA	Univen tricular Heart	Eisenm enger	Complex CHDs	Total
Male	28	13	10	5	6	4	2	1	2	2	0	1	0	8	82(51%)
Female	31	9	11	6	2	2	2	1	1	2	3	1	1	6	78(49%)
Total	59	22	21	11	8	6	4	2	3	4	3	2	2	24	160(100%)

CHD, Congenital heart disease; VSD, Ventricular septal defect; PS, Pulmonary stenosis; PDA, Patent ductus arteriosus; ASD, Atrial septal defect; ToF, Tetralogy of Fallot; TGA, Transposition of the great arteries; AVSD, Atrioventricular septal defect; MS, Mitral stenosis; TA, Tricuspid atresia; AS, Aortic stenosis; CoA, Coarctation of the aorta

**Table 2:** Relative frequency and pattern of lesions in the children with CHDs

Type of CHD	N=160
Acyanotic	130(81%)
Cyanotic	30(19%)
Total	160(100%)

CHD, Congenital heart disease

**Table 3:** Age and gender distribution of acyanotic and cyanotic CHDs

Age Group		Cyanotic CHD	Acyanotic CHD	Total
≤1 y	Male	12	25	37(23%)
	Female	2	21	23(14%)
2-6 y	Male	2	15	17(11%)
	Female	4	20	24(15%)
7-12 y	Male	5	14	19(12%)
	Female	1	18	19(12%)
13-18 y	Male	1	8	9(6%)
	Female	3	9	12(7%)
Total	Male	66	16	160(100%)
	Female	48	30	

CHD, Congenital heart disease

In the current study, the most common type of CHD was acyanotic CHD (81%), which is in line with studies Awori et al<sup>7</sup> and Talargia et al.<sup>8</sup>

In their investigation, Kula et al<sup>9</sup> and Sen et al<sup>10</sup> found that VSD was the most frequent CHD. In our investigation, VSD was found in 37% of the entire study population, which is similar when compared with the abovementioned studies on CHDs. Nevertheless, a previous study showed that ASD was the most common CHD, while another investigation demonstrated that ToF was the most frequent CHD.<sup>11,12</sup> About 35% of our study patients were toddlers and preschoolers. In addition, ASD was the fourth most common CHD. In contrast, in the study by Sen et al,<sup>10</sup> 25% of the study patients were neonates and 50% were infants.

In our study, the most common cyanotic CHD was ToF (5%). Vyas et al<sup>13</sup> and Sheikh et al<sup>14</sup> similarly found ToF as the most frequent cyanotic CHD.

In our country, the exact frequency of CHDs is unknown due to the lack of any data registry at the national level. For the reduction of the frequency and the prevention of CHDs, the suggested strategies may include regular antenatal care, non-use of medicines without prescriptions, non-use of herbals, smoking cessation, drinking cessation, control of chronic medical conditions (eg, diabetes and hypertension), and vaccination against communicable diseases like rubella.<sup>15</sup> In our study, the frequency of CHDs was high, implying the significance of the aforementioned prevention strategies. Understanding and documenting the distribution of CHDs in any population is of vital importance so as to anticipate health needs and provide effective and appropriately targeted services for the prevention, diagnosis, and management of these conditions.

### Limitations

The main limitation to the present study is its retrospective design insofar as it may have led to errors in the documentation of the screened results and records. Also, this study was limited to a single tertiary hospital, and many patients were not, therefore, screened. Another salient weakness is our inability to assess the outcome of the children who were referred for surgery to our cardiac center. Additionally, the small sample size and short study duration precluded us from determining the true frequency of CHDs in our hospital. Further population-based studies are required to address these shortcomings. Despite the limitations, however, we believe that our study will provide a reliable estimation of the frequency and pattern of CHDs in Mogadishu, Somalia.

### CONCLUSIONS

The present study is the first to report the frequency and pattern of CHDs in Mogadishu, Somalia. The frequency of CHDs in our tertiary hospital was 160 (35%) patients. The most common acyanotic CHD was VSD (37%), while ToF (5%) was the most common cyanotic CHD. The majority of our patients were male (51%). We recommend the government, national and international NGOs, and other health-care providers to assist and support the implementation of new health policies for diagnostic and therapeutic cardiac surgery centers.

### Availability of Data and Materials:

Our study was retrospective, and the data were obtained from medical records. The diagnosis of CHDs was via transthoracic echocardiography. There was no need to obtain consent from the patients.

The data that support the findings of this study are available from Mogadishu Somali-Turkish Training and Research Hospital. Data are, however, available from the authors upon reasonable request and with the permission of Mogadishu Somali Turkish Training and Research Hospital.

**Conflict of Interest:** None declared.

**Funding:** None declared.

#### Authors' Contributions

MFY is responsible for the study idea, study design, and data collection. AMH and YKI analyzed the data, revised the manuscript, and wrote the final draft of the manuscript. SAA and AAO contributed to the conception and design of the work, interpreted the data, and approved the submitted version. All the authors have read and approved the submission of the manuscript.

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