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Congenital heart diseases pattern among children presenting to tertiary care hospital: A cross sectional study

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***Abstract*---**Aim: To determine the pattern of congenital heart diseases among children presenting to tertiary care hospital. Material and Methods: A cross sectional study was carried out at Department of Paediatrics Cardiology, National institute of Cardiovascular Disease Karachi in the duration from November, 2022 to April, 2023. Total 171 patients were presented with CHD. Patients aged between 1 to 12 months of both genders. Pattern of CHD among the patients was determined. Results: Acyanotic CHD was seen in 74.26% patients. Cyanotic CHD was seen in 25.73% patients. Atrial Septal Defect (48.8%) was the most common presentation in acyanotic CHD patients while Tetralogy of Fallot was common presentation (40.9%) in cyanotic CHD patients. Conclusion: From our study we conclude that majority of the patients had acyanotic CHD as compared to cyanotic CHD, Ventricular Septal Defect and Atrial Septal Defect were more

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prevalent in cyanotic CHD while Tetralogy of Fallot was more common in cyanotic CHD.

***Keywords*---**Congenital Heart Disease, Acyanotic CHD, Cyanotic CHD, Pediatrics.

Introduction

A person's quality of life and even their lifespan can be adversely affected by untreated congenital heart abnormalities (CHD), which are defined as anatomical and functional cardiac malformations[1]. Nearly nine million people with congenital cardiac disease reside in regions with limited access to quality care and a high mortality rate[2]. Certain defects that contribute to high infant mortality seem to have a much higher prevalence in certain ethnic groups, and this is especially true with congenital heart defects. Early diagnosis of CHD by screening, parental decision support, and effective interventions are particularly important in reducing racial disparities in healthcare. Long-term effects of ethnic differences need to be investigated in future investigations[3].

A study reported large birth cohort to examine ethnicity variation and discovered that children born to parents from Pakistan are more likely to develop CHDs than children born to parents from other countries [4]. Eight to ten babies out of every thousand are born with some form of heart defect. CHD is much more common among white persons than it is among black or Mexican Americans [5]. After undertaking a thorough analysis, a study found significant geographical differences; the CHD newborns occurrence rate in Asia was 9.3 per 1,000 live births[6].

Studies in China[7] and Atlanta[8] reported similar incidence rates of 8.2 per 1000 live births. Because to rising prevalence of risk factors and etiological variables, the burden of congenital heart abnormalities is rising steadily in low- and middle-income nations[9]. In addition to already high mortality rates, CHD cases often reported late to cardiac facilities, at which point problems have already occurred[10, 11].

The number of adult individuals with CHD is rising since in developed countries the survival rate has increased thanks to early identification and proper treatment, dropping from 80% to 20%[12,13]. According to the most up-to-date information available in this region, 27% of congenital heart disease (CHD) cases are caused by ventricular septal defect (VSD), whereas 10.9% of CHD cases are caused by tetrology of Fallot[14].

Few research examining the incidence and geographic distribution of cardiac disease in Pakistan's tertiary care facilities have been published. Since there is a dearth of information about cardiac disease in the children admitted to The Children's Hospital in Multan over the past five years, we decided to conduct a study based on our own experience. Knowing the extent to which heart disease contributes to morbidity and mortality in our area is an essential first step in developing effective ways to address the problem.

Material and Methods

This cross-sectional study was conducted at Department of Pediatrics Cardiology, National institute of Cardiovascular Disease Karachi in the duration from November, 2022 to April, 2023. Study participants ranged in age from 1 to 12 months and all had echocardiographic evidence of structural heart disease. Transthoracic echocardiography was used to diagnose congenital heart defects; two experienced echo cardiographers performed the tests, and the consultant pediatric cardiologist analyzed the results and the patients' medical records to document the patients' clinical presentation. Cyanosis and the orientation of shunts on echocardiography were used to categorize congenital heart abnormalities as either cyanotic or acyanotic. Patients without a confirmed echocardiography report or with insufficient medical data were not excluded. All the data was stored on a pre-designed pro forma.

Openepi was used to calculate the sample size, we took previous frequency of 20%[15] cyanotic CHD, 6% margin of error and 95% confidence interval, the calculated sample size was 171. Statistical Analysis was performed using SPSS software for categorical and numerical data. Chi Square test was applied between categorical variables keeping significance at $P < 0.05$.

Results

This study was carried on 171 pediatric patients presenting with congenital heart disease. The mean age of the patients was 6.49±3.56 months. The mean maternal age was 24.06±3.73 years. According to gender distribution there were 64.33% male while 35.67% females in our study. About 74.26% patients were presented with acyanotic CHD. Ventricular Septal Defect was found in 31.5% patients, Atrial Septal Defect was found in 48.8% patients, VSD+ASD was found in 8.7% patients while Patent Ductus Arteriosus was found in 11% patients. seen in 13.6%. Cyanotic CHD was seen in 25.73% patients among which Tetralogy of Fallot was found in 40.9% patients, Transposition of great arteries + VSD was found in 15.9% patients, Tricuspid atresia was found in 29.5% patients while Total Anomalous Pulmonary Venous Connection was found in 13.6% patients. We did not find any significant difference between acyanotic and cyanotic CHD with gender.

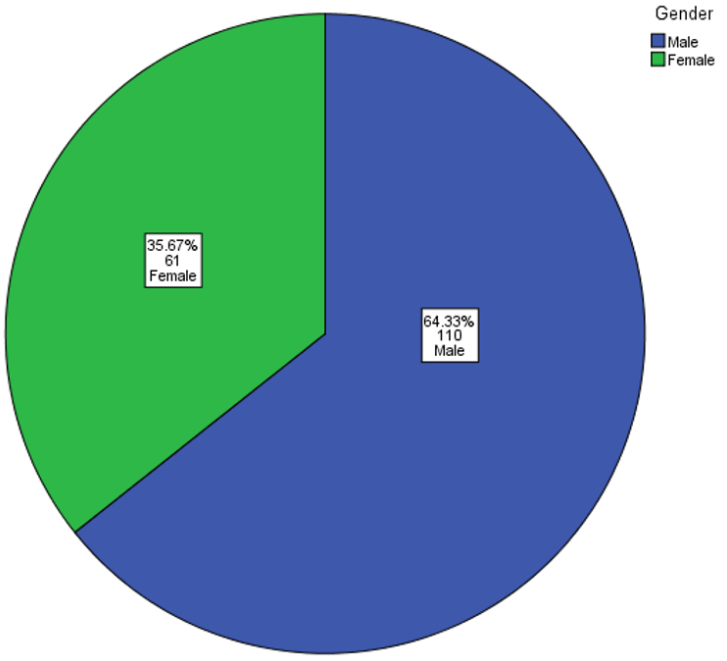

Figure 1. Gender distribution

Table 1 Distribution of Acyanotic CHD

Acyanotic CHD	Frequency	Percent
Ventricular septal defect	40	31.5
Atrial septal defect	62	48.8
VSD+ASD	11	8.7
Patent ductus arteriosus	14	11.0

Table 2 Distribution of Cyanotic CHD

Cyanotic CHD	Frequency	Percent
Valid Tetralogy of Fallott	18	40.9
Transposition of great arteries + VSD	7	15.9
Tricuspid atresia	13	29.5
Total anomalous pulmonary venous connection	6	13.6

Table 3 Association of acyanotic CHD with gender

		Gender		Total	P value
		Male	Female		
Acyanotic CHD	Ventricular septal defect	25	15	40	0.99
		62.5%	37.5%	100.0%	
	Atrial septal defect	39	23	62	
		62.9%	37.1%	100.0%	
	VSD+ASD	7	4	11	
		63.6%	36.4%	100.0%	
	Patent ductus arteriosus	9	5	14	
		64.3%	35.7%	100.0%	
Total		80	47	127	
		63.0%	37.0%	100.0%	

Table 4 Association between cyanotic CHD with gender

		Cyanotic CHD				Total	P value
		Tetralogy of Fallott	Transposition of great arteries+VSD	Tricuspid atresia	Total anomalous pulmonary venous connection		
Gender	Male	12	4	11	3	30	0.40
		40.0%	13.3%	36.7%	10.0%	100.0%	
	Female	6	3	2	3	14	
		42.9%	21.4%	14.3%	21.4%	100.0%	
Total		18	7	13	6	44	
		40.9%	15.9%	29.5%	13.6%	100.0%	

Discussion

Congenital heart diseases (CHD) are still the leading cause of death in children and young adults among all birth abnormalities. Studies done in different countries and reported in scientific journals show that the number of people with CHD ranges from 4 to 50 per 1,000 live births. The CDC says that about 10 out of every 1,000 babies born in the US are born with CHD. A systematic study and meta-analysis showed that 9.3 out of every 1,000 live births in Asia are affected.[16]

Different studies show different CHD rates because they have different rules for who they include. Some studies leave out people with bicuspid aortic valve, tiny ventricular septal defects, and quiet patent ductus arteriosus (PDA). This could have a big impact on the rates that are reported. Even though there isn't strong proof to explain the difference, it could be due to many environmental and genetic factors. CHD prevalence in poor countries might be underestimated due to lack of good healthcare infrastructure with ongoing follow up, scarce screening techniques and limited diagnostic techniques.[17]

CHD are divided into mild, moderate, and severe lesions, or cyanotic vs. acyanotic defects, based on how they develop and what parts of the heart are involved. Most acyanotic lesions are in the weaker CHD group. These include atrial septal defect (ASD), ventricular septal defect (VSD), and atrioventricular canal defect (AVCD).[6] Left ventricular output obstructive lesions, such as aortic stenosis and coarctation of aorta, are also more complicated forms of acyanotic CHD. Cyanotic CHDs include Tetralogy of Fallott, transposition of great arteries, total abnormal pulmonary venous returns, hypoplastic left heart syndrome, truncus arteriosus, and tricuspid atresia.[18]

Even though it has been said that VSD is the most common CHD in the world, the patterns of CHD may change depending on different etiologic factors, such as genetic background, geographic location, seasonal effects, maternal age, and whether or not other family members have CHD.[18]

In countries with few resources, the high death and illness rates are made worse by the time it takes to find CHD. So, the best way to reduce linked illness and death is to find it early and treat it right away. In developed countries, the survival rate has gone up and the death rate has gone down from 80% to 20% because of early detection and proper treatment. This has led to more people living with CHD.[19]

We conducted our study on 171 pediatrics patients presenting with CHD, we observed that most of the patients were males as compared to females. The age ranged from 1 to 12 months. We found that majority of the patients had acyanotic CHD which accounted for 74.26% of the total patients while 25.73% patients had cyanotic CHD. Our results are in comparison with a study which reported almost the same proportions of acyanotic and cyanotic CHD in their pediatric population.[15]

Among acyanotic CHD patients we observed that Ventricular Septal Defect was seen in 31.5% patients, Atrial Septal Defect was seen in 48.8% patients, VSD+ASD was seen in 8.7% patients while Patent Ductus Arteriosus was seen in 11% patients. In patients with cyanotic CHD Tetralogy of Fallot was seen in 40.9% patients, Transposition of great arteries + VSD was seen in 15.9% patients, Tricuspid atresia was seen in 29.5% patients while Total Anomalous Pulmonary Venous Connection was seen in 13.6%. Our results are again in comparison with the aforementioned study which reported Atrial Septal Defect to be the most prevalent in acynotic CHD patients followed by Ventricular Septal Defect, similarly in cyanotic CHD they reported that Tetralogy of Fallot was most prevalent in cyanotic CHD.

Conclusion

From our study we conclude that majority of the patients had acyanotic CHD as compared to cyanotic CHD, Ventricular Septal Defect and Atrial Septal Defect were more prevalent in cyanotic CHD while Tetralogy of Fallot was more common in cyanotic CHD.

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