

ORIGINAL ARTICLE

CONDITION LEADING TO PEDIATRIC CARDIOLOGY CONSULTATION IN TERTIARY CARE HOSPITAL PESHAWAR

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Objectives: This study was conducted to determine the basis for cardiology consultation and the rationale for different clinical conditions in the pediatric population.

Methodology: This descriptive study was conducted in Pediatric Cardiology department, Peshawar institute of Cardiology from June 2021 to December 2021. A data of 817 patients was collected from monthly log of patients maintained by the consultation services, files of admitted patients, echocardiographic and laboratory reports. Patients enlisted through consecutive sampling irrespective of patients age, gender. Data collected was analyzed on IBM SPSS version 20. For numerical variables, mean/standard deviations were determined. For categorical variables, frequency and percentages were determined, and a p-value of 0.05 was deemed a significant difference.

Results: Age at the time of consultation was 3.2 ± 11.7 years (range 1 day to 47 years). The most common basis for consultation were intercurrent illness in underlying congenital heart disease 288 (35.25%). A total of 551(67%) had Single consultation and 266(32.92%) had multiple consultation ranging from 2 to 4.

Conclusion: Systematic approach should be followed to assess these patients in tertiary care hospital and all consultants must follow the curricula to get the required knowledge and gain expertise in these diseases to diagnose properly. None the less these data confirm the impression of increasing demands of the pediatric cardiologist, and thus may be useful in planning consultant services within the specialty.

Keywords: congenital heart disease, murmur, cyanosis, chest pain, arrhythmia, infective endocarditis

Citation: Gul H, Hussain I, Dil H, Ullah I, Rehman Y, Hisamuddin E, Khan MS, Moeed A, Gohar F, Ali F. Condition Leading to Pediatric Cardiology Consultation in Tertiary Care Hospital Peshawar. Pak Heart J. 2022;55(04):385-390. DOI: <https://doi.org/10.47144/phj.v55i4.2323>

INTRODUCTION

Congenital heart diseases are structural and functional heart diseases, which are diagnosed at the time of birth or later in life. They are clinically variable, and may be asymptomatic or detected accidentally on routine examination by murmurs. Some patients also present with congestive heart failure, cyanosis or clubbing. Congenital heart diseases (CHDs) are one of the most prevalent fetal abnormalities, with a prevalence of up to 13 per 1000 live births.¹ Congenital heart diseases are divided into cyanotic and acyanotic congenital heart diseases according to the presence or absence of cyanosis.²

Congenital heart diseases are one of the most common congenital abnormalities in the pediatric age group. In a study conducted in CMH Rawalpindi, the incidence of congenital heart diseases was reported as 15/1000 births.³ Clinical conditions which affect the heart and

blood vessels after birth are known as Acquired heart diseases and are presented during childhood including rheumatic heart diseases, myocarditis, cardiomyopathy, bacterial endocarditis, and pericarditis. An important reason for hospital admission in childrens are myocarditis.⁴ Most of the cardiac conditions affecting the pediatric population are diagnosed at early neonatal life, however, some congenital while most of the acquired heart diseases are presented clinically beyond this time period. The frequency and volume of these pediatric cardiac conditions are expected to increase in the near future as the advancement and routine clinical examination of the pediatric population will be of great importance owing to which increased cases will be diagnosed at early stages and the numbers reported will also be higher. Because of increased referral from general pediatricians, there is an increased workload in pediatric cardiology. Timely diagnosis can reduce the mortality and morbidity in these neonates and

children, and help in the better outcomes of these patients.⁵ Majority of children are also referred by pediatric physicians to the department of pediatric cardiology in case of any suspicion raised during their cardiac examination, which also increases the number of pediatric cardiology consultations.⁶

Aim of this study is to determine the basis for pediatric cardiology consultation and to determine the rationale for different clinical conditions presented in the pediatric population.

METHODOLOGY

This Descriptive study was carried out from June 2021 to December 2021 in pediatric Cardiology Department, Peshawar Institute of Cardiology. Ethical approval was obtained from Ethical Committee, Peshawar Institute of Cardiology. Informed consent was taken from all parents/guardians of included patients. Records of all those patients were included in the study who received cardiac consultation services (including first outpatient visit and routine follow-ups). Those patients who required clearance for non-cardiac surgical procedure and were not evaluated as cardiac consultation services were excluded from the study. Data was collected from emergency department, inpatient services and outpatient service, from the diagnosis confirmed by the records of subjective and physical examination along with investigation findings (chest X-ray, Electrocardiogram and Echocardiogram). Data was analyzed using SPSS version 20. For numerical variables, mean and standard deviations were determined while for categorical variables, frequency and percentages were determined, and a p-value of less than 0.05 was deemed a significant difference.

RESULTS

Total 817 patients were examined. Age 3.2 years old \pm 11.7 years (range 1 day to 47 years). According to the records examined, there were 551 (67%) single consultations and 266 (32.92%) multiple consultations ranging from 2 to 4. The number of patients who were diagnosed with congenital heart disease and presented with Inter-current illness (ICI) were 288 (35.25%) which included repeated chest infections most of which were viral. Dehydration, cyanotic spells and brain abscess were the most common presentations of the patients diagnosed with cyanotic congenital heart disease, rest data explained in Table 1. Total of 168 (20%) patients were evaluated for murmur. Patients age range from 1 day to 16.5 years (median age 6 months). The most common diagnosis among these

patients were ventricular septal defect (VSD) 45 (26.78%), rest of the data are mentioned in Table 2. Those patients who were referred from nursery with suspicion of murmur had patent ductus arteriosus (PDA) as the commonest diagnosis. Total of 18 (10.71%) patient with underlying mitral regurgitation, 11 (61.11%) were diagnosed with rheumatic heart disease (RHD) and 7 (38.88%) had congenital mitral valve abnormalities. Total of 182 (22%) patients presented with complaints of cyanosis, 77 (42.30%) were diagnosed with underlying cyanotic congenital heart disease in which 48 (62.33%) had decreased pulmonary blood flow and 29 (37.66%) presented with unprotected pulmonary blood flow.

Table 1: Reason for pediatric cardiology consultation

	ED (known)	ED (new)	Nursery	OPD	Total
Murmur	26	32	31	79	168 (20%)
Functions	7	3	5	3	18 (2.2%)
Cyanosis	38	24	58	62	182 (22%)
Arrhythmia	3	23	3	3	32 (3.9%)
ICI in CHD	198			90	288 (35.25%)
Chest pain	13	6		5	24 (2.93%)
Syndromes	12	8		4	24 (2.93%)
IE	7	12		7	26 (3.19%)
Recent surgeries	5	7		34	46 (5.63%)
Foetal echo				2	2 (0.24%)
Syncopy/Dizzinies			3	4	7 (0.85%)

ICI: intercurrent illness, CHD: congenital heart disease, IE: infective endocarditis, ED: emergency department, OPD: outpatient department

Total of 48 (26.37%) patients were referred from nursery with cyanosis but on detail assessment there workup turns out to be normal and labelled as acrocyanosis. Total of 27 (14.83%) patients had primary pulmonary hypertension. cyanosis secondary to lower respiratory tract infection were found in 24 (13.18%) and 6 (3.29%) patient with seizure presented with cyanosis.

Total of 24 (2.93%) patients who presented with chest pain with mean age of 12 ± 8.5 years, were evaluated further for establishing a diagnosis. Total of 7

(29.16%) patient had chest pain secondary to cardiac cause. Total of 10 (41.66%) had musculoskeletal problem, 3 (12.5%) patients had GERD and pulmonary disease leading to chest pain. one patient with herpes zoster infection presented with chest pain.

Table 2: Consultation for evaluation of murmur

	ED (known)	ED (new)	Nursery	OPD	Total
PDA	0	0	20	14	34 (20%)
ASD	8	0	0	21	29 (17.26%)
AS	1	2	5	1	9 (5.35%)
VSD	2	25	1	17	45 (26.78%)
AV canal	6	0	0	9	15 (8.92%)
MS	1	1	0	3	5 (3.03%)
MR	6	4	2	6	18 (10.71%)
PS	2	0	3	7	12 (7.14%)
Truncus Arteriosus	0	0		1	1 (0.59%)

PDA: patent ductus arteriosus, ASD: atrial septal defect, AS: aortic stenosis, VSD: ventricular septal defect, AV: atrioventricular, MS: mitral stenosis, MR: mitral regurgitation, PS: pulmonary stenosis, ED: emergency department, OPD: outpatient department

By analyzing the patient records, arrhythmias were identified as the basis for consultation in 32 (3.9%) patients with mean age of 5 ± 3.8 years. Supraventricular Tachycardia were more common in infants and neonates with no underlying congenital heart disease (CHD) Table 3.

Table 3: Consultation for evaluation of arrhythmias

	ED (known)	ED (new)	Nursery	OPD	Total
Atrial arrhythmias					
Atrial flutter	1	0	0	1	20 (62.5%)
Atrial fibrillation	1	2	0	0	
Ectopic Atrial Tachycardia	0	1	0	0	
Supraventricular Tachycardia	0	11	3	0	
Ventricular arrhythmias					
Ventricular Tachycardia	0	3	0	1	5 (15.62%)
Ventricular Premature beats	1	0	0	0	
Heart block					
1stdegree	0	0	0	1	4 (12.5%)
2nddegree	0	0	0		

Complete Heart Block	0	3	0	0	
Pacemaker					
Permanent Pace Maker	0	2	0	0	3 (9.37%)
Temporary Pace Maker	0	1	0	0	

ED: emergency department, OPD: outpatient department

In the records of patients, the evaluation for suspected clinical and subclinical infective endocarditis was done for 26 (3.19%) patients. Rest data explained in Table 4.

Total of 18 (2.2%) patient was referred by other departments for evaluation of cardiac functions and the most common cause were underlying renal diseases, among neonates and infant, the cause for dysfunction was mostly viral myocarditis followed by underlying structural heart lesion including aortic stenosis and aortic arch abnormalities.

Total of 24 patients were referred with suspected syndrome by the pediatrician for cardiac assessment, among them the most common syndromes encountered were trisomy 21 followed by infant of diabetic mother 2 (0.24%).

Table 4: Consultation to R/O infective endocarditis

	ED (known)	ED (new)	OPD	Total
Vegetations	0	5	3	8 (30.73%)
Positive blood C/S	1	4	2	7 (26.92%)
Fever	6	2	2	10 (38.46%)
Embolic Event	0	1	0	1 (3.84%)

C/S: culture, ED: emergency department, OPD: outpatient department

DISCUSSION

Most of the pediatric population with cardiac conditions are diagnosed by early neonatal age, however, some congenital and most acquired heart disease presents beyond this time frame. Congenital heart disease (CHD) affects about 40,000 US birth population.⁷ Approximately, In each 100 babies born 1 have CHD while critical CHD occurs in ¼ patients.⁸ In Pakistan more than 60,000 babies are born with congenital heart diseases (CHD) each year, there are over thirty five congenital heart diseases with a wide range of abnormalities.⁵ Total 817 patients were evaluated at Peshawar Institute of Cardiology. Age at the time of consultation was 3.2±11.7 years (range 1

day to 47 years). The prevalence of CHD in the general population was 6.3/1000 in a population-based study conducted in four villages of Himachal Pradesh. Atrial septal defect was the commonest lesion among them.⁹ In Pakistani population the epidemiological data which would reflect the true incidence of heart disease is not available. Available studies have limitations of biasness in study design as the data is inadequate and confined to the selected communities. The hospital-based study conducted at Karachi Institute of cardiology documented the prevalence of congenital heart disease in the rural population in which the overall prevalence was reported as 3.4/1000.¹⁰ In contrast to this study, the results of another study conducted in CMH Rawalpindi showed the incidence of 15/1000.³ Thus showing a wide variation in the prevalence of congenital heart disease in different population.

Many CHD's especially with clinically insignificant defects are diagnosed incidentally on general evaluation of patients in routine checkups. Time of diagnosis of heart diseases is very important for timely management of the disease, in a study half of all cases of CHD are detect by 1 month of age, three fourth at 3 months and approximately all by 3–4 years of age.¹¹ In our study, distribution of age for consultation were 3.2 years old \pm 11.7 years old with mean age of 6-month. Risk factors for CHD are different in different parts of the world. Consanguinity is general in developing countries compared with the developed countries, Fung et al. detected them in 21.8% and 3.5% respectively, and 9% prevalence of CHD in first-degree relatives. Majority of the mothers are housewives and, have no risk of alcohol consumption or smoking¹² and hence therefore CHD are becoming an increasing risk for pediatric mortality, especially in developing countries. For better identification of the etiology of cardiac dysmorphogenesis, a scrupulous epidemiological data on CHD is the basis so that every opportunity can be utilized to prevent the diseases prenatally.^{13,14} As in a resource-limited society we can mainly focus on the sign and symptoms and clinical condition with which most of the children presented.

In this study the most common basis for consultation were intercurrent illnesses, 288 (35.25%) that mainly included repeated chest infections (viral mostly) and congestive heart failure in acyanotic CHD and among cyanotic congenital heart disease most common illness with which these patients presented were dehydration, cyanotic spells, complications of polycythemia, neurological defect i.e. infarct, hemorrhages and brain abscess. A total of 168 (20%) patients were evaluated for murmur with the median age of 6 months and most of them were referred by

Pediatrician The most common diagnosis among these patients were ventricular septal defect 45 (26.78%), followed by Patent ductus arteriosus 34 (20%), Atrial septal defect 29 (17.2%) and mitral regurgitation in 18 (10.71%) patients. Patients referred from nursery with suspicion of murmur had patent ductus arteriosus as the commonest diagnosis. A total of 18 (10.71%) patient with underlying mitral regurgitation 11 (61.11%) were diagnosed with rheumatic heart disease and 7 (38.88%) had congenital mitral valve abnormalities This study correlate well with the retrospective study conducted on Egyptian children in which isolated ventricular septal defect accounted for 19.8% of acyanotic congenital heart disease.¹² In our study 182 (22%) patients presented with complaints of cyanosis, 77 (42.30%) were diagnosed with underlying cyanotic congenital heart disease in which 48 (62.33%) had underlying decreased pulmonary blood flow and 29 (37.66%) with unprotected pulmonary blood flow. Uncorrected congenital heart diseased patient had worsened cyanosis if they have any history of prolong dehydration or fever. A total of 48 (26.37%) had acrocyanosis, 27 (14.83%) had PPHN and 24 (13.18%) had underlying lung disease. Contrary to our study data from NICVD Karachi which showed TOF as the commonest CHD constituting 24.4% cases followed by VSD 21.5%.¹⁵ Regarding chest pain the most common diagnosis among them were musculoskeletal/ costochondritis in 10 (41.66%), followed by chest pain in underlying cardiac disease in 7 (29.16%), 3 (12.5%) diagnosed with GERD, 3 (12.5%) with underlying pulmonary artery disease and 1 (4.1%) had underlying herpes zoster skin infection. Although most of the chest pain In pediatric age group is usually benign ,but one should always rule out critical cardiac and lung pathology prior of labeling someone with benign chest pain.¹⁶ Most of patient presented with chest pain in pediatric age group are benign in nature only few have cardiac cause.¹⁷

The most common arrhythmias acquiring consultation were atrial arrhythmias 20 (62.5%) Ventricular tachyarrhythmia was observed in 5 (15.62%). SVT were more common in infants and neonates with structurally normal heart. The results of the study were comparable with study conducted in Uganda where arrhythmias were found in 27.3% of children, with 22.7% having first degree AV block¹⁸ which is contrary to our study, only 12.5% patients have 1st degree heart block.

In our study clinical and subclinical infective endocarditis were diagnosed in 26 (3.19%) patients. Fever was the most common presenting complaint 10 (38.46%) followed by echocardiographic evidence of

vegetation 8 (30.73%) and positive blood culture in 7 (26.92%). Similar results were also reported in a study in which fever were the most common symptom (89.3%), leukocytosis (80.8%), splenomegaly (70.2%), and a new heart murmur or change in character of pre-existing murmur (68%).¹⁹ A total of 18 (2.2%) patients were referred by other departments for evaluation of cardiac functions and the most common cause were underlying renal diseases, among neonates and infant the cause for dysfunction were mostly viral myocarditis followed by underlying structural heart lesion including aortic stenosis and aortic arch abnormalities.

In syndromic child along with other specific phenotypic feature Approximately 30% have congenital heart disease.²⁰ In our study 24 patients referred with suspected syndrome by pediatrician for cardiac assessment among them the most common syndromes encountered were trisomy 21 followed by infant of diabetic mother 2 (0.24%) .

Limitation of our study were improper referrals from periphery, no proper documentation of the past events, and socioeconomic status also played important role in patient delayed referral to the tertiary care unit, which has direct impact on clinical outcome of disease. As most of the patients with CHD or acquired heart diseases presented late to the specialized center, therefore they have developed complications already, leading to increased mortality of pediatric patients. In developed countries timely diagnosis and timely treatment has increased the survival rate and has decreased mortality from 80% to 20% causing an increase in the number of adults with CHD.²¹

This study included patients visiting Peshawar institute of cardiology where not only Pakistani but patients from across the border (Afghanistan) were also treated so it does not give the true incidence and prevalence of CHD in our total population which is the limitation of the study.

Although the actual burden of congenital heart disease and its referral to our unit in minimized by COVID restriction in the time frame in which data were collected. Incidence of CHD in developing country like ours, would be much higher despite of the fact that most of the cases in our setup are missed due to lack of proper referral, insufficient facilities and diagnostic techniques.¹⁶

This study has given an overview of the burden of congenital and acquired heart diseases and pattern of congenital heart disease with which patients are commonly presented in pediatric cardiology unit. This

data can be used in the future for meta- analysis and also as reference for making a guideline for proper referral to a tertiary care unit, that will help in prioritizing patient on the basis of seriousness of underlying heart problem which will improve patient care and will lower down burden on pediatric cardiology consultation services.

CONCLUSION

Pediatric cardiology consultations saw a wide range of clinical problems. Few patients, however, returned more regularly. In tertiary care hospitals, a systematic method should be used to examine these patients, and all consultants must follow the curricula to get the necessary knowledge and skill in these illnesses in order to identify them correctly. Nonetheless, these findings support the perception of rising demands on pediatric cardiologists and may be relevant in the development of consultant services in the field.

AUTHORS' CONTRIBUTION

HG and FA: Concept and design, data acquisition, interpretation, drafting, final approval, and agree to be accountable for all aspects of the work. IH, HD, IU, YR, EH, MSK, AM, and FG: Data acquisition, interpretation, drafting, final approval and agree to be accountable for all aspects of the work.

Conflict of interest: Authors declared no conflict of interest.

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