Letter to the Editor

Spectrum of heart disease in children under 5 years of age at Liaquat University Hospital, Hyderabad, Pakistan

Nadia Mohammad, Salma Shaikh, Shazia Memon, Heman Das

Objective & methodology: This was a descriptive cross sectional study of one year duration conducted in Pediatric department of Liaquat University Hospital, Hyderabad. The objective was to assess the clinical pattern, age distribution and type of heart diseases in children under 5 years of age. In this study 150 children with suspicion of cardiac problem were enrolled.

Result: Among 150 cardiac patients 55.3% were male and 44.7% were female. Congenital heart diseases (CHD) seen in 89.3% and 10.7% had acquired heart disease. Among CHD 74.6% were Acyanotic lesions while cyanotic lesions were seen in 23.9% and 1.5% were cases of dextrocardia. Ventricular septal defect was the commonest Acyanotic lesion (29.9%) followed by atrial septal defect (25.4%). Among cyanotic heart diseases tetralogy of Fallot was the commonest lesion seen in 11.2% followed by transposition of great arteries and complex heart defect 5.2% and 3% respectively. Among acquired heart disease myocarditis was the commonest disease accounts 94% and pericardial effusion was seen in 6%.

Conclusion: Regarding the type of congenital heart defect acyanotic defect was more common than cyanotic with ventricular septal defect commonest lesion. Tetralogy of Fallot’s was commonest in cyanotic group. Availability of expertise locally will lead to more patients getting surgical treatment at an earlier age thereby reducing morbidity and mortality and improving quality of life for these children.

1. Introduction

Heart diseases constitute an important group of pediatric illness and major cause of childhood mortality and morbidity. Regarding the statistics 86 of 1000 Pakistani children die before the age of 5 years, 44 die before they are a month old, with 11% of neonatal mortality due to cardiac anomalies. Congenital heart disease is the commonest of all congenital lesions and occurs in approximately 8 of every 1000 live births. In Pakistan majority of the childbirths still take place at home and routine neonatal screening is not common, so it is very difficult to...
calculate true birth prevalence of congenital heart disease.\textsuperscript{5} Congenital heart disease by definition is the structural or functional heart disease, present at birth, even if, it is detected later on. Regarding the clinical presentation of CHD, it can be very variable; they may be asymptomatic and discovered only accidentally by a murmur noted during routine checkup,\textsuperscript{6} or may present with symptoms like cyanosis, clubbing of nails to full blown congestive heart failure.\textsuperscript{6}

Late diagnosis of CHD carries a high risk of avoidable mortality, morbidity, and handicap. Acquired heart disease is defined as conditions affecting the heart and its associated blood vessels that develop sometime during childhood and includes diseases such as rheumatic heart disease, myocarditis, cardiomyopathy, bacterial endocarditis and pericarditis. Myocarditis is also common in Pakistan and is an important cause of hospital admission in children.\textsuperscript{7}

Heart diseases in children have not been studied thoroughly in Pakistan as in other western and neighboring countries.

The purpose of this study was to know the burden of heart diseases in children under 5 years of age at Liaquat University Hospital, Hyderabad, which is the biggest tertiary care center in the province, receiving patients not only from Hyderabad but also from interior of Sind province.

There were a few studies conducted in the past, but data regarding the association of clinical presentation with type of lesion is lacking. The results of this study will be useful for health personnel and general practitioner in the community so that early diagnosis can be made and proper management initiated.

2. Material and methods

A descriptive cross sectional study of 1 year duration from 1st March 2007 to 29 February 2008 was conducted at Pediatric department of Liaquat University Hospital, Hyderabad. Our estimated sample was 150 pediatric patients under 5 years (with the probability of 5% prevalence of heart disease) presented with clinical feature suggestive of cardiac diseases.

Children of either sex from birth to 5 years of age who had clinical suspicion of cardiac problem were enrolled by non-probability sampling (convenience) for echocardiography to confirm their diagnosis.

The operational definition for enrollment to our study regarding the type of lesion was measured by echocardiography findings in term of congenital heart disease (ventricular septal defect, atrial septal defect, tetralogy of Fallot and patent ductus arteriosus) and acquired heart disease (rheumatic heart disease, infective endocarditis and myocarditis).

Clinical suspicion was raised by history of recurrent chest infections, presentation with cyanosis or cardiac failure, feeding difficulty and failure to thrive, or detection of murmur in asymptomatic patients.

Our exclusion criteria were arrhythmias, cardiac failure and respiratory distress due to non-cardiac causes like anaemia and volume overload especially in malnourished children.

After enrollment their detailed history and examination were recorded on study proforma, followed by relevant investigations.

Echocardiography (to confirm the diagnosis), chest –X ray and ECG were performed in all cases; other investigations that were advised in selected cases were complete blood count, cardiac enzymes, and serum electrolytes.

Data analysis was done on SPSS version 16.

3. Results

During that one year period 150 patients were enrolled in the study. CHD was seen in 89.3% of patients, while 10.7% had acquired lesion. CHDs were more common in males with male to female ratio 1.2:1, while there was no sex predication for AHD. The mean age of presentation was 15 months (Table 1).

Regarding the type of lesion, 74% were having acyanotic lesion and ventricular septal defect was the commonest lesion (Table 2).

Regarding the clinical presentation, 35% of cases were admitted with symptoms unrelated to CHD and were diagnosed incidentally on physical examination, while 29% had history of repeated chest infection. Other modes of presentation were breathlessness, feeding difficulty, congestive cardiac failure, and failure to thrive (Table 3).

Isolated VSD was found in 29.9% and VSD with ASD was seen in 3.7%. Among the VSD cases 62% children had perimembranous, 35% had muscular and only 4% had supracristal VSD.

Atrial septal defect was the second most common malformation found in 25.4%. Majority being Fossa ovalis (secundum) type (88.2%), and only 11.8% had primum ASD.

Among cyanotic heart disease, tetralogy of Fallot was the commonest lesion found in 11.2%. Commonest presentations were Tet spell (66.7%), breathlessness (93%), feeding difficulty (80%), and severe malnutrition (40%). On general physical examination clubbing was seen in 26.7% (Table 4).

Among AHD 93.8% had myocarditis. Their main clinical presentation was cardiac failure and respiratory distress. Majority of children were found to have a dilated and dysfunctional left ventricle on echocardiography with ejection fraction less than 50%.

Only one case of pericardial effusion was found, presented at age of 1 year with breathlessness and cough. Pericardiocentesis was done and diagnosed as post pneumatic pericarditis.

4. Discussion

The detection of congenital heart diseases early in childhood will lead to better treatment and reduction in the mortality and morbidity, Liaquat University Hospital is the only tertiary referral hospital for Hyderabad and interior of Sind with an "

| Table 1 – Age distribution in congenital heart disease. |
|----------------|-------|-------|
| Age            | # of patients | Percentage |
| New born       | 25    | 17.1% |
| Infant         | 71    | 48.6% |
| Over 1 yr–5 yr | 38    | 26%   |
estimated catchment pediatric population of about 2 millions. This is a one year hospital based study and may not reflect the true incidence or prevalence of heart disease in the community as only those children were enrolled, who were admitted in the pediatric department of Liaquat University Hospital, with clinical features suggestive of heart disease.

Regarding the type of CHD, around 74.6% were acyanotic which correlates well with study done in Kanpur, India. Ventricular septal defect (VSD) is the most common CHD in infants and children, accounts for 25% of CHD, VSD was almost the same as found in studies done in India, Taiwan and Peshawar.

When seen anatomically majority of patients had perimembranous type of VSD followed by muscular VSD 62% and 34% respectively, this correlates with another study of Pakistan (reference) as well as in European study. In our study, size of VSD was small, moderate and large in 62.5%, 16.5% and 21% respectively; similar observation was found in study from Thailand.

The second common acyanotic CHD was atrial septal defect (ASD) seen in 25.4%, similar to Ahmed’s study. In our study majority being of secundum type (88.2%), followed by ostium primum 11.8% this observation was similar to the study done at Lahore. All four cases of ASD primum had features of Down syndrome while overall the features of Down syndrome were seen in 8.2% of patients.

The next common acyanotic lesion was pulmonary stenosis seen in 6.7% followed by patent ductus arteriosus (PDA) in 6%, this was in contrast with study of Sadiq M in which high percentage of PDA was documented, followed by pulmonary stenosis.

Regarding the PDA, majority of patients were in infants with 62% preterm and low birth weight. Females outnumbered male patients and history of gestational diabetes was present in 25% of cases.

Atrioventricular canal defect was found in 3% of patients. There were two cases of complete A/V canal defect, one case of partial A/V canal defect and one case of Partial A/V canal defect with moderate pulmonary stenosis.

Among cyanotic lesions tetralogy of Fallot (TOF) was the commonest lesion found in 11.2% of the patients, this number was higher as compared to international data. However recent study of Agha Khan University, reported an even higher percentage of 25%. In our study, the second common cyanotic lesion was TGA seen in 5.2%, this is in accordance with study at Atlanta but contrast with study of Taiwan in which TGA was twice common than TOF. All of them had Dextro TGA except one case of LTGA. Only one patient of TGA had intact ventricular septum, while remaining were associated with VSD or ASD.

Dextrocardia was seen in 1.5% (2 cases), presented in neonatal period with diarrhea and diagnosed incidentally on auscultation. One case had history of dextrocardia in sibling. Another study done at Liaquat University Hospital, Hyderabad reported dextrocardia in 3.75% of cases.

In our study, most of the patients with CHD presented during infancy. In other reports the diagnosis of CHD is established by one week of age in 40–60% of patients and by one month of age in 50–60%. Unfortunately; this is the scenario in most developing countries because of the lack of skilled personnel, equipment and facilities for diagnosis at primary and secondary health care levels. Patients presented for echocardiography for the first time at a late age.

Regarding the clinical presentation, 80% patients with CHD presented with respiratory distress, cough and recurrent chest infection. This correlates with Nigeria’s study but in contrast to study of Nepal where recurrent respiratory infections were seen in 58.8%. Regarding the family history of cardiac lesion it was present in 14.2% of patients. History of maternal illness during pregnancy was present in 5.2% of patients.

### Table 2 – Type of heart disease.

| Type of heart disease | # of patient | % age |
|-----------------------|--------------|-------|
| Congenital heart disease | 134 | 89.3% |
| Acyanotic heart disease | 100 | 74.6% |
| Cyanotic heart disease | 32 | 23.9% |
| Others | 02 | 1.5% |
| Acquired heart disease | 16 | 10.7% |
| Myocarditis | 15 | 94% |
| Pericardial effusion | 01 | 6% |
| Total # of patients: | 150 | 100% |

### Table 3 – Clinical presentation of heart disease in children with CHD.

| Clinical presentation | # of patients | % age |
|-----------------------|--------------|-------|
| Breathlessness | 107 | 80% |
| Feeding difficulty | 78 | 58% |
| Cough | 71 | 53% |
| Failure to gaining weight | 65 | 48.5% |
| Fever | 55 | 41% |
| Cyanosis | 42 | 31% |
| Repeated chest infection | 31 | 23% |
| Exertional symptoms | 27 | 20% |
| Congestive cardiac failure | 26 | 19.4% |
| Asymptomatic | 19 | 14.2% |
| Tet spell | 12 | 9% |

### Table 4 – Distribution of patients with CHD.

| Type of defect | Percentage | Mean age (month) | Male | Female |
|----------------|------------|------------------|------|--------|
| Ventricular septal defect | 40(29.9%) | 8 | 21(53%) | 19(47%) |
| Atrial septal defect | 34(25.4%) | 15 | 22(65%) | 12(35%) |
| Tetralogy of Fallot | 15(11.2%) | 9.5 | 11(73%) | 4(27%) |
| Pulmonary stenosis | 09(6.7%) | 13 | 5(56%) | 4(44%) |
| Patent ductus arteriosus | 08(6%) | 14 | 1(12%) | 7(88%) |
| Transposition of great arteries | 07(5.2%) | 2.7 | 5(71%) | 2(27%) |
| VSD and ASD | 05(3.7%) | 3 | 4(80%) | 1(20%) |
| TOF and PDA | 05(3.7%) | 3 | 0 | 5(100%) |
| Complex cardiac lesion | 04(3%) | 21 | 2(50%) | 2(50%) |
| Atrioventricular canal defect | 04(3%) | 2 | 5(100%) | 2(50%) |
| Dextrocardia | 02(1.5%) | 1 | 2(100%) | 0 |
| TOF and ASD | 01(0.7%) | 1 | 1(100%) | 0 |

Regarding the family history of cardiac lesion it was present in 14.2% of patients. History of maternal illness during pregnancy was present in 5.2% of patients.
In our study myocarditis was the most common acquired heart disease accounting to 94%. This observation is similar to another study from this hospital and from another province of our country, while differing from Sadiq M study which showed low incidence of myocarditis (64%).

The study gives an overview of the pattern of congenital heart disease in children admitted with suspected cardiac problem. The limitation in our study is lack of availability of pediatric cardiologists and pediatric cardiac surgical center. These deficiencies lead to under reporting the actual numbers of children with heart disease in the wider community. A population based prevalence study is required to determine the full extent of this problem.

5. Conclusion

Heart diseases not only contribute to a significant morbidity and mortality but also cause a tremendous psychological stress and economic burden to the whole family. However, if the problems were recognized at earlier age, the chance of long term complications might be less with better outcome.

In order to avoid complications, reduce mortality and improve quality of life, earlier detection and correction of disease is of utmost importance. Many lesions are amenable to surgery, availability of local expertise and awareness amongst parents and professionals will help do these at the optimal time.

6. Recommendation

- Pediatric echocardiography as diagnostic tool should be made more widely available especially in tertiary institutions to enable early diagnosis and, screening for possible cardiac defects during pregnancy.
- There is an urgent need for the government to establish pediatric cardiac surgical centers with specialized medical cardiology, intensive care, imaging and interventions.
- All newborn babies should be examined thoroughly for any evidence of CHD by pediatrician before hospital discharge and on follow up visits in the early neonatal period.
- There is a need to intensify efforts to educate general practitioner and other health professionals who come across children with heart disease, as they are the ones who can screen, diagnose and refer these babies to cardiac facility and the earlier the diagnosis, the easier it would be to do timely management in appropriate manner.

Ethical approval

This topic is approved by CPSP Karachi.

Contribution

Dr Nadia Mohammad: Contribution for conception and design, analysis and interpretation of data.
Dr Salma Shaikh: Final reversion of draft.

Dr Shazia Memon: Revising it critically for important intellectual content.
Dr Heman Das: Collected and interpreted the data in inpatient department.

Conflicts of interest

All authors have none to declare.

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