

Spectrum of Different Heart Disease among Children Under 5 Years of Age

HAMAIL AMIN¹, RIFFAT NAEEM², FARAH RAFIQUE³, FARHAT IJAZ⁴, AHMAD TARIQ⁵, AWAIS AHMAD⁶, RANA KHURRAM AFTAB⁷

¹House Officer Shaikh Zayed Hospital, Lahore

²PG Trainee, Ittefaq Hospital, Lahore

³House Officer, Shaikh Zayed Hospital, Lahore

⁴Associate Professor, Department of Physiology, CMH LMC & IOD (NUMS), Lahore

⁵Medical Officer, Punjab Institute of Cardiology, Lahore

⁶Assistant Professor of Physiology, Continental Medical College, Lahore

⁷Additional Medical Superintendent Punjab Institute of Cardiology, Lahore

Corresponding author: Farhat Ijaz Email: farhat_khurram_rana@cmhlahore.edu.pk

ABSTRACT

Background and Aim: It is a well-known finding that cardiac diseases in the pediatric population contribute majorly to morbidity and mortality around the globe and is supported by extensive clinical research. A generalized burden of the disease in Pakistan is as high as above 40,000 congenital cardiac defects being reported among newborn babies. It has been documented those congenital cardiac disorders are among the top three causes of neonatal mortality around the world. This study is focused on studying different types of cardiac problems acknowledged among children who are younger than five years and studying the prevalence and burden of disease and assessing the frequency with which they occur in the Pakistani population.

Methodology: The conducted study was cross sectional with descriptive approach. The time duration of the study was of ten months which started in February 2021 and concluded in November 2021. The study was carried out at pediatrics department of Ittefaq Hospital and Jinnah Hospital, Lahore Pakistan, after taking ethical approval from the respective departments. The sample size of the study was expected to be around 200 participants. All the recruited participants must meet the age limitations who were under 5 years old. The incidence of heart disease was assumed to be 5%. The recruited participants must show signs and symptoms which suggest the incidence of cardiac problems. Participants with pre-existing heart diseases were eliminated from the study. The participants underwent clinical and lab testing before start of the study

Result: The prevalence of 89% (n= 178) of participants was diagnosed with congenital heart disease whereas 11% (n= 22) of participants were detected to have acquired heart diseases. Among diagnosed participants with congenital heart disease, females were found to be 1.2 times more likely to be affected. Among the patients diagnosed with congenital heart diseases, the most common finding was that of ventricular septal defect with a prevalence of 29.5% followed by an atrial septal defect with a prevalence of 26% and in acquired heart disease myocarditis accounted for 91% of the diagnosis.

Conclusion: The present study concluded that the prevalence of cardiac condition among children under 5 years is highly prevalent. Among cardiac condition of pediatric patient congenital heart diseases remain highly incidental with ventricular septal defect being the most common congenital condition. Among acquired cardiac condition, myocarditis was the most frequent finding.

Keywords: Congenital heart disease, Ventricular septal defect, Children

INTRODUCTION

It is a well-known finding that cardiac diseases in the pediatric population contribute majorly to morbidity and mortality around the globe and is supported by extensive clinical research [1]. While studying the trends of causes of early deaths in the pediatric population in Pakistan, almost 86 out of every 1000 children suffer death per Annum who are under 5 years old. When assessing the breakdown, almost half of the population face mortality as early as the first month of post-natal life with the underlying cause being cardiac in nature being up to 11% of the population [2]. A generalized burden of the disease in Pakistan is as high as above 40,000 congenital cardiac defects being reported among newborn babies [3]. Among prevalent cardiology-associated poor quality of life, disorders of congenital nature are most commonly seen. It has been documented those congenital cardiac disorders are among the top three causes of neonatal mortality around the world [4] and congenital heart diseases are among the leading congenital malformation which may cause morbidity and mortality [5]. A study was conducted by Majeed et al. that evaluated the most common type of cardiac problem among neonates in Pakistan. The outcome of this study showed that the most common type of cardiac disorder associated with neonates was the congenital type with a prevalence of 94% and among the diagnosed congenital patients the most prevalent condition was ventricular septal defect [6]. Recent studies suggest the newer trends for postnatal congenital heart disease with the prevalence of 0.3% - 1.2% among the patients who managed to live beyond their natal period of life, however, an overall burden of congenital heart diseases among children is documented to be 2.4% - 5.2% [7]. Data suggest that the frequency of neonates with a congenital heart condition is 4.5 times more likely to be admitted to intensive care units for neonates in comparison to their normal counterparts [8]. As broad as the spectrum of heart conditions among newborn babies the

etiology of these diseases is also wide and multifactorial and has a complex relationship between genetic and environmental components.

As found in the above discussion the incidence of cardiac problems among children and neonates is a significant problem in the Pakistani population and there is a limited focus on different studies in exploring the type and frequency of different heart diseases occurring among the general population specifically children. This study is focused on studying different types of cardiac problems acknowledged among children who are younger than five years and studying the prevalence and burden of disease and assessing the frequency with which they occur in the Pakistani population.

METHODOLOGY

The selected method of this study was cross-sectional with a descriptive approach. The time duration of the study was of ten months which started in February 2021 and concluded in November 2021. The study was carried out at pediatrics department of Ittefaq Hospital and Jinnah Hospital, Lahore Pakistan, after taking ethical approval from the respective department. The sample size of the study was expected to be around 200 participants. All the recruited participants must meet the age limitations who were under 5 years old. The incidence of heart disease was assumed to be 5%. The recruited participants must show signs and symptoms which suggest the incidence of cardiac problems. Participants who were under 5 years old irrespective of their gender were allowed to be part of the study and presented to the cardiology department who were suspected cases of cardiac diseases. The recruitment of participants was carried out by convenience sampling. The participants were waiting on an echocardiogram to confirm their cardiological findings. Consent for the study was taken from the parents of

children and failure to receive consent resulted in its exclusion of the participant from the study. Furthermore, children who were already diagnosed with cardiac arrhythmias, heart failure, and respiratory distress because of etiologies other than that of cardiologic reasons such as patients with poor hemoglobin levels and overload of volume were excluded from the study.

The measures that were taken and considered important before the recruitment of the participants were diagnosis and classification of heart condition assessed by echocardiogram. The diseases which were on the list of possible diagnoses for these children were septal defects in the walls of the atrium and ventricle, tetralogy of Fallot, and persistence of ductus arteriosus among children at a later age. All these diseases were classified as congenital heart diseases. Among the diseases that were classified as acquired were myocarditis, infective endocarditis, and rheumatic heart diseases. The signs and symptoms that were considered to be suggestive of cardiac problem history included repeated infections of the chest, arrival at the hospital with clinical features of heart failure and cyanosis, and children presenting with weight and height below average indicating poor thriving ability and consequent resistance in nutritional intake, other patients who were otherwise healthy presenting with an abnormal heart sound or murmur.

After recruitment of the participants, extensive medical histories of the participants were taken, moreover, participants were subjected to general physical examination, cardiac examination, and examination of the respiratory system. Lab imaging which was employed to make a diagnosis of cardiac disorder included electrocardiogram, radiographic imaging of the chest, and echocardiogram. The participants were also subjected to hematological testing including complete blood picture, serum electrolytes, and cardiac enzymes.

RESULTS

During the time period of conduction of the study, a total number of 200 participants were recruited for the study. These participants were then evaluated for the spectrum of cardiac conditions in children under 5 years old. The gender breakdown of the population showed 132 female participants and 68 male participants making a percentage of 62% and 38% respectively. Figure-1 represent age breakdown of the participants. Among the recruited participants the incidence of congenital heart disease was seen in 89% of the recruited population (n= 178), whereas the incidence of acquired heart diseases was appreciated in 11% of the participants (n= 22). When assessing the predilection of congenital heart disease, the female was found to be 1.2 times more affected in comparison to their male counterparts.

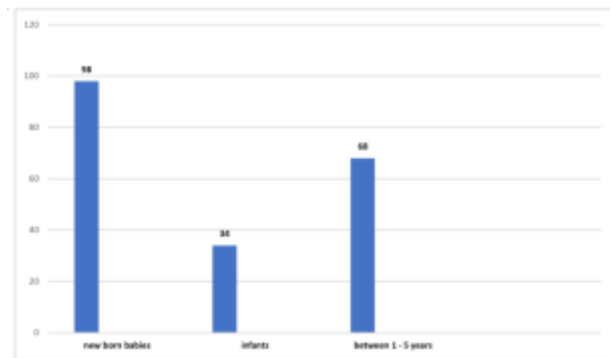


Figure-1: age breakdown of recruited participants

A further assessment of the disease condition showed that 72% of all the observed cases did not include any sign of heart failure or cyanosis. Among the spectrum of diseases defect of the ventricular septal defect was observed to be of the highest

frequency. When assessing the signs and symptoms with which the patients presented to the hospital, a significant number of recruited patients were recommended as incidental findings on general examination (37%), whereas another major symptom among the participants was the repeated occurrence of chest infection. The symptoms and frequency are discussed as follows. Among the most common diseases of acquired nature, 91% of the acquired disease patients had an incidence of myocarditis. The most common signs and symptoms associated with acquired cardiac disease were heart failure and respiratory problems such as difficulty in exertion. An echocardiogram showed dilation of the ventricle on the left and abnormal function of the dilation ventricle.

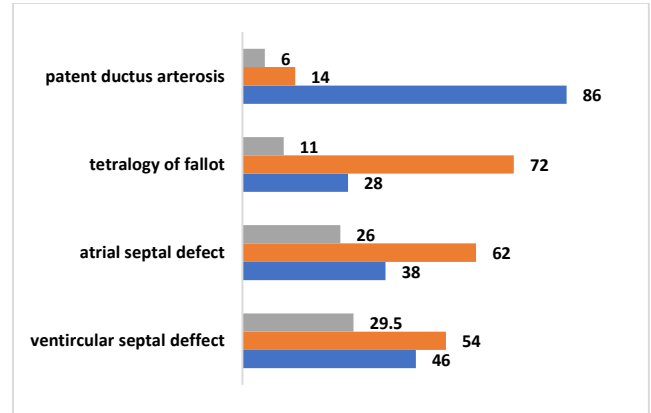


Figure-2: incidence of congenital heart diseases and gender breakdown

Table-1: Prevalence of various signs and symptoms in children

Sign and symptom	Number of participants	Percentage
Incidental finding	74	37%
Recurrent chest infection	62	31%
cyanosis	32	16%
Difficulty in breathing	156	78%
Feeding difficulty	110	55%
Failure to thrive	94	47%
Respiratory distress	36	18%

DISCUSSION

This study was conducted in tertiary care hospital in Pakistan and aimed to assess different heart conditions among children under 5 years. the number of recruited participants was 200 who were recruited after the presentation of signs and symptoms that were suggestive of heart disease. a prevalence of 89% (n= 178) of participants was diagnosed with congenital heart disease whereas 11% (n= 22) of participants were detected to have acquired heart diseases. Among diagnosed participants with congenital heart disease, females were found to be 1.2 times more likely to be affected. Among the patients diagnosed with congenital heart diseases, the most common finding was that of ventricular septal defect with a prevalence of 29.5% followed by an atrial septal defect with a prevalence of 26% and in acquired heart disease myocarditis accounted for 91% of the diagnosis. Most patients who were recruited had no signs of heart failure and were asymptomatic. The findings of this study will be discussed in this section against pre-existing literature.

The outcomes of our study showed that among participants suspected of suspected cardiac disorder, the majority of participants were diagnosed with congenital heart conditions. Other literary evidence also supports this finding. A study conducted by Abou-Taleb et al. conducted a study on sample size was considered as all neonates being admitted to the intensive care unit for neonates. The results showed that among all the neonates, around 10% of admission to the intensive unit

accounted for congenital heart disease [9]. Similar trends were seen in a study conducted by Chapagain et al. who assessed the patterns of neonatal mortality and cardiac diseases in neonates. The sample size of the study included 831 infants. The outcomes of the study showed the incidence of congenital heart disease to be as high as 102 deaths in 1000 children per Annum [10]. The study advocate for the findings of our clinical research as they are in line with outcomes of congenital heart disease being a major contributor to neonatal mortality and showing the prevalence of the disease among the general population being as high as 10%. Other studies that are in accordance with the findings of this study are [11], and [12].

The second key finding of this research was the higher prevalence of ventricular septal defect being the most common reason for congenital heart disease. Similar findings were appreciated in a study conducted by [11]. A study conducted by Constaintine et al. showed that the presence of ventricular septal defect can be appreciated in almost 20% of all congenital cardiac diseases [13]. The findings of these studies are similar to the outcomes of our study as they show a high prevalence of ventricular septal defect to be highest among those diagnosed with congenital heart conditions. Other studies which advocate for these findings are [14] and [15].

This study concluded that the prevalence of cardiac condition among children under 5 years is highly prevalent. Among cardiac condition of pediatric patient congenital heart diseases remain highly incidental with ventricular septal defect being the most common congenital condition. Among acquired cardiac condition, myocarditis was the most frequent finding.

CONCLUSION

The present study concluded that the prevalence of cardiac condition among children under 5 years is highly prevalent. Among cardiac condition of pediatric patient congenital heart diseases remain highly incidental with ventricular septal defect being the most common congenital condition. Among acquired cardiac condition, myocarditis was the most frequent finding.

REFERENCES

1. S. A. S. C. E. M. W. L. O. H. A. H. A. A. B. Z. B. J. C. F. Zimmerman MS, "Global, regional, and national burden of congenital heart disease, 1990–2017: a systematic analysis for the Global Burden of

2. Disease Study 2017," *The Lancet Child & Adolescent Health*, vol. 4, no. 3, pp. 185-200, 2020.
3. H. I. K. N. M. A. J. A. Khan MS, "Morbidity and mortality in children in rural community of district Peshawar," *Gomal Journal of Medical Sciences*, vol. 7, no. 1, 2019.
4. K. T. H. N. S. M. Ahmad I, "Clinical Presentation, Diagnosis and Outcome of Neonates with Suspicion of Congenital Heart Disease in a Tertiary Care Hospital," *PakJ MedRes*, vol. 57, no. 4, 2018.
5. M. G. K. A. K. M. Rizvi SF, "revalence of congenital heart disease in rural communities of Pakistan," *J Ayub Med Coll Abbottabad*, vol. 27, no. 1, pp. 124-7, 2015.
6. J. S. N. N. J. F. W. A. A. F. PatelN, "Frequency and pattern of congenital heart defects in a tertiary care cardiac hospital of Karachi," *PakJ Med Sci*, vol. 32, no. 1, p. 79, 2016.
7. M. u. N. B. A. A. P. J. Majeed M, "Frequency and types of congenital heart disease in neonates: A cross-sectional study from large public sector hospital of Karachi, Pakistan," *Journal of Fatima Jinnah Medical University*, vol. 13, no. 4, pp. 163-5, 2019.
8. S. M. A. M. A. I. Hussain S, "Incidence of congenital heart disease among neonates in a neonatal unit of a tertiary care hospital," *J Pak Med Assoc*, vol. 64, no. 2, 2014.
9. W. K. G. R. Yasmeen S, "Spectrum of neonatal admissions and their outcome in a tertiary care hospital," *PakArmed Forces MedJ*, vol. 67, no. 6, pp. 1044-49, 2017.
10. M. B. M. Abou-Taleb A, "linical profile of cyanotic congenital heart disease in neonatal intensive care unit at Sohag University Hospital," *Upper Egypt. Egyptian Journal of Medical Human Genetics*, vol. 18, no. 1, pp. 47-51, 2017.
11. S. S. RH C, "Spectrum of Congenital Heart Disease in Neonates Admitted in an Intermediate Care Unit of a Tertiary Level Hospital," *Journal of Nepal Paediatric Society*, vol. 37, no. 2, 2017.
12. K. U. S. T. N. S. S. M. Rashid U, "Pattren of pediatric heart diseases in a tertiary care hospital in Pakistan," *Pak Pediatr J*, vol. 40, no. 2, pp. 117-22, 2016.
13. W. T. A. Z. Khushdil AK, "Outcome of neonates ventilated in NICU of a tertiary care hospital and factors associated with poor outcome," *PakArmed Forces MedJ*, vol. 68, no. 2, pp. 300-4, 2018.
14. D. J. A. R. Mavroudis C, "Ventricular septal defect. InAtlas of Adult Congenital Heart Surgery 2020," Springer, pp. 91-115, 2020.
15. H. L. C. S. A. R. B. M. A. V. B. F. C. M. J. J. K. H. S. S. Lopez L, "Classification of ventricular septal defects for the eleventh iteration of the International Classification of Diseases—striving for consensus: a report from the International Society for Nomenclature of Paediatric and Congenital Heart Disease," *The Annals of thoracic surgery*, vol. 106, no. 5, pp. 1578-89, 2018.
16. O. T. Dakkak W, "Ventricular septal defect," *StatPearls*, 2021.