

Frequency of Congenital Heart Disease in Children with Heart Murmur at Tertiary Care Hospital

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ABSTRACT

Purpose: To determine the frequency of congenital heart disease in children of age 2 months to 5 years with heart murmur.

Methods: This Descriptive Cross Sectional was conducted in Pediatrics Unit, MTI-Hayatabad Medical Complex, Peshawar from February-August 2019. After ethical approval detailed clinical examination was performed with the help of a stethoscope. Auscultation was also performed by a Pediatrician. For confirmation of congenital heart disease echocardiography, color doppler ultrasound and echocardiography were performed.

Results: A number of congenital heart diseases were recorded in patients presented with heart murmur. Mean age of patients was 4.1±1.3 years, weight was 14.2±2.5 kg and for duration 1.2±0.6 years. 130(49.42%) patients were recorded in 2 months to 3 years age group whereas 133(50.57%) patients were recorded in 4 to 5 years age group. 196(74.52%) patients were male while 67(25.5%) patients were female. 29(11.02%) were diagnosed with PDA, 21(7.9%) patients were recorded with VSD, 18(6.84%) patients were recorded with ASD, 21(7.9%) patients were diagnosed for PFO while 33(12.5%) patients were having TGA. P-value of congenital heart disease with the duration of symptoms were calculated using chi-square test were PDA (p=0.716), VSD (p=0.816), ASD (p=0.762), PFO (p=0.603), TGA (p=0.557).

Practical Implication: The practical implication of our study is to recommend proper evaluation, early management of children with heart murmur for CHDs in our local population.

Conclusion: Children with CHD are more likely to have heart murmur as we recorded high prevalence of congenital heart diseases in children presented with heart murmur

Keywords: Congenital Heart Disease, Congestive Heart Failure, Patent Ductus Arteriosus

INTRODUCTION

Congenital heart disease is a structural and functional abnormality with the heart that exists from birth¹. Congenital heart defects are the most common group of Congenital malformation and is one of the most common causes of prolonged morbidity and mortality^{2,3}. In pediatrics population heart murmurs are common and most children will have a detectable heart murmur. Early detection of the disease may improve the outcome by timely management and preventing complications². A heart murmur is a strange "whooshing" sound produced by blood flow through a heart valve, a restricted chamber, or an odd connection between the chambers, as seen in congenital heart disease⁴. The location, timing, and duration of each type of murmur, as well as the intensity and quality of the sound it produces, are all characteristics of the murmur⁴. Heart murmurs are also common in healthy infant and children⁵. Murmur can be organic (pathologic) and inorganic (innocent). It may be a sign of serious heart defect⁶. Inorganic (innocent) heart murmur is the one which does not represent any heart disease while organic murmur shows a heart defect. Of the innocent murmur the most common murmur in children is still's murmur and is considered to be flow related⁷. A study has been conducted on "Prevalence and etiology of heart murmurs" by Bagheri and Torabi in Kerman University of Medical Sciences Iran. In this study murmur were heard in 145 patients including 71 girls and 74 boys in which 51% of patients showed congenital heart disease⁸.

In another study done in cononel hospital Bihac Bosnia on "The importance of heart murmur in neonatal period" by Kardasevic M and Kardasevic A reported that among 32 children with heart murmur, 14 (43.75%) patients had a structural abnormality of the heart⁶. Congenital heart diseases are the leading cause of morbidity and mortality in our local population. The purpose of this study is to determine the frequency of congenital heart disease in children with heart murmur. After carefully reviewing the literature in the area of problem, it was identified that although much was going on regarding congenital heart disease, but very few studies regarding congenital heart disease in children with heart murmur have been done in Asia. This study will be the first step toward local research work, as

limited data is available in studies regarding this problem. The results of the study will provide us with further update us on the local magnitude of the problem and thus will help in early detection, timely referral and proper management of treatable congenital heart disease in our local population of Khyber Pakhtunkhwa. The results can then be compared with other internationally published data and based upon these comparisons more research work may be suggested / advised for further line of action in order to update existing protocols and a set of guidelines for dealing with such patients. To determine the frequency of congenital heart disease in children of age 2 months to 5 years with heart murmur.

MATERIALS AND METHODS

This Descriptive cross sectional study was done in Pediatrics Unit at Hayatabad Medical Complex, Peshawar from February-August, 2019 with sampling technique-Non Probability Consecutive Sampling. Inclusion criteria were; Age 2 Months to 5 Years, Children having a heart murmur on Auscultation and both Gender. While Age < 2 Months and > 5 Years and Syndrome children with already diagnosed congenital heart defect were excluded from the study. Total 263 children as per sample size coming as outdoor patients or admitted in Department of Pediatrics at Hayatabad Medical Complex, Peshawar fulfilling the inclusion criteria was included in the study. The purpose and benefits of the study were explained to the parents/guardians of the patients. A written informed consent was taken from the parents. Patient's bio data like age, gender and address was noted on a prescribed proforma. A detailed clinical examination was performed with the help of a stethoscope. For confirmation of congenital heart disease echocardiography and color Doppler ultrasound were performed. All the above information including age, gender and duration of disease, residence, economic status, weight and congenital heart disease was recorded on a pre-designed proforma. Sample Size was 263 keeping 43.5%⁶ proportion of congenital heart disease with confidence interval 95%, level of significance 6%, margin of error 5% on WHO Sample Size Calculator. Chi-square test was used to calculate p-value.

RESULTS

The research was carried out in the Department of Pediatric Medicine, Hayatabad Medical Complex Peshawar. Results were calculated using SPSS version 22.0, as per descriptive statistics, mean and SDs for age was 4.1+1.3 years, for weight was 14.2+2.5 and for duration 1.2+0.6. 130 (49.4%) patients were recorded in 2 months to 3 years age group whereas 133 (50.57%) patients were recorded in 4 to 5 years age group. 196 (74.5%) patients were male while 67 (25.47%) patients were female. 180 (68.4%) patients were from urban areas while 83 (31.55%) patients were from rural areas. 149 (56.6%) patients were from low background, 56 (21.2%) patients belonged to middle class families whereas 58 (22.05%) patients were from high socio economic class. As for patients with heart murmur, a number of congenital heart diseases were recorded in them, 29 (11.0%) patients were diagnosed for PDA, 21 (7.9%) patients were recorded with VSD, 18 (6.8%) patients were recorded with ASD and 21 (7.9%) patients were diagnosed for PFO while 33 (12.54%) patients were having TGA (Table no-2). Stratification of congenital heart diseases with respect to age and duration of symptoms is recorded at Table No 3 and 4.

Table 1: Show the gender wise distribution

Gender Groups	Frequencies	Percentages
Male	196	74.52%
Female	67	25.47%
Total	263	100%

Table 2: Show the frequency and types of congenital heart disease

Congenital Heart Diseases	Frequencies	Percentages
Patent Ductus Arteriosus (PDA)	29	11.02%
Ventricular Septal Defect (VSD)	21	7.98%
Atrial Septal Defect (ASD)	18	6.84%
Patent Foramen Oval (PFO)	21	7.98%
Transposition Of Great Arteries (TGA)	33	12.54%
Total	122	46.38%

Table 3: Congenital Heart Diseases With Age

Congenital Heart Diseases		Age Groups		P Value
		2 to 3 Years	4 to 5 Years	
PDA	Yes	17	12	0.293
	No	113	121	
VSD	Yes	09	12	0.529
	No	121	121	
ASD	Yes	06	12	0.157
	No	124	121	
PFO	Yes	10	07	0.423
	No	120	126	
TGA	Yes	16	17	0.907
	No	114	116	

Table 4: Congenital Heart Diseases With Duration Of Symptoms

Congenital Heart Diseases		Duration		P Value
		< 1 Year	> 1 Year	
PDA	Yes	11	18	0.716
	No	97	137	
VSD	Yes	09	12	0.816
	No	99	143	
ASD	Yes	08	10	0.762
	No	100	145	
PFO	Yes	08	09	0.603
	No	100	146	
TGA	Yes	12	21	0.557
	No	96	134	

DISCUSSION

Innocent heart murmurs are rather prevalent in clinical practice, with 50–90% of children and 15–44% of young people having them on at least one examination. Congenital cardiac disease, on the other hand, has a prevalence of 0.5–0.8 percent, with the majority of cases appearing in childhood and only 1 or 2 previously unknown instances presenting in school-aged children. When

there are no other indications or symptoms of heart disease, it can be difficult for the primary health care practitioner to determine which patients with murmurs need to be sent to a specialist. Innocent murmurs come in a variety of types. Even now, there's a harmless hum (systolic ejection murmur heard best over the right upper sterna border), Supraclavicular arterial bruit innocent murmur, Physiological systolic ejection innocent murmur (best heard at left upper sterna boundary) (louder on the right above the clavicle), innocent sound of neonatal peripheral pulmonary valve stenosis (PPS) (best heard at the base of the heart, flanks, back), innocent sound of jugular vein apex (continuous above the upper right edge of the breast when sitting) Innocent breast soufflé's (noticed) if the mother is breastfeeding due to increased blood flow to the breast.

Congenital heart disease is a structural and functional abnormality with the heart that occur since birth¹. The most prevalent type of congenital malformation is congenital cardiac abnormalities, which are one of the primary causes of long-term morbidity and mortality^{2,3}. In pediatrics population heart murmurs are common and most children will have a detectable heart murmur. Early detection of the disease may improve the outcome by timely management and preventing complications². Heart murmur is an unusual "whooshing" heart Blood flow via a heart valve, a narrow chamber, or an odd link between the chambers, as seen in congenital heart disease, produces a sound⁴. Heart murmurs are also common in healthy infant and children⁵. Murmur can be organic (pathologic) and inorganic (innocent). It may be a sign of serious heart defect⁶. Inorganic (innocent) heart murmur is the one which does not represent any heart disease while organic murmur shows a heart defect. Of the innocent murmur still^s murmur is the most common in children and is considered to be flow related⁷. Each type of murmur is characterized by its location, timing, duration as well as the intensity and quality of sound it makes⁴.

In this study, as per descriptive statistics, mean and SDs for age was 4.1+1.34. Mean and SDs for weight was 14.2+2.5 and Mean and SDs for duration 1.2+0.63. 130 (49.42%) patients were recorded in 2 months to 3 years age group whereas 133 (50.57%) patients were recorded in 4 to 5 years age group. 196 (74.52%) patients were male while 67 (25.47%) patients were female. 180 (68.44%) patients were from urban areas while 83 (31.55%) patients were from rural areas. 149 (56.65%) patients were from low background, 56 (21.2%) patients belonged to middle class families whereas 58 (22.05%) patients were from high socio economic class. As for patients with heart murmur, a number of congenital heart diseases were recorded in them, 29 (11.02%) patients were diagnosed for PDA, 21 (7.98%) patients were recorded with VSD, 18 (6.84%) patients were recorded with ASD and 21 (7.98%) patients were diagnosed for PFO while 33 (12.54%) patients were having TGA.

A study has been conducted on "Prevalence and etiology of heart murmurs" by Bagheri and Torabi in Kerman University of Medical Sciences Iran. In this study murmur were heard in 145 patients including 71 girls and 74 boys in which 51% of patients showed congenital heart disease⁸ which as compared to this study, a number of congenital heart diseases were recorded in them, 29 (11.02%) patients were diagnosed for PDA, 21 (7.98%) patients were recorded with VSD, 18 (6.84%) patients were recorded with ASD, 21 (7.98%) patients were diagnosed for PFO while 33 (12.54%) patients were having TGA.

In another study done in contonel hospital Bihac Bosnia on "The importance of heart murmur in neonatal period" by Kardasevic M and Kardasevic A reported that among 32 children with heart murmur, 14 (43.75%) patients had a structural abnormality of the heart⁶ which as compared to this study, a number of congenital heart diseases were recorded in them, 29 (11.02%) patients were diagnosed for PDA, 21 (7.98%) patients were recorded with VSD, 18 (6.84%) patients were recorded with ASD, 21 (7.98%) patients were diagnosed for PFO while 33 (12.54%) patients were having TGA. (Table No. 1).

A heart murmur heard for the first time at 6 months carries a 1:7 chance of structural heart disease, but one heard for the first time at 12 months carries just a 1:50 risk. The reported prevalence of innocent heart murmurs after infancy ranges between 17 and 66%, with most authors reporting between 40 and 60%. Most children with newly referred murmurs have no significant heart disease, according to reviews from cardiology referral centers.

Only 20–30% of patients with heart murmurs referred by primary care physicians for echocardiography or cardiologist evaluation have pathology, according to studies of patients referred by primary care physicians for echocardiography or cardiologist evaluation. Echocardiography is indicated for the evaluation of any potentially pathologic murmur and for the evaluation of neonatal cardiac murmurs since these are more likely to represent symptoms of structural heart disease, according to studies of patients referred by primary care physicians. It's a non-invasive procedure that's now offered in nearly all pediatric facilities.

In a study conducted in Pakistan, between the ages of 3 months and 5 years, congenital cardiac abnormalities were identified more frequently than in other age groups. The greater incidence in the age bracket of 3 months to 5 years could be due to the fact that CHD becomes symptomatic at that age. Ventricular septal defect was the most prevalent congenital cardiac abnormality with a single lesion in our analysis, followed by atrial septal defect, Tetralogy of Fallot, and Patent ductus arteriosus⁹.

In another study conducted by Tiny Mazhani et al¹⁰, 140 (40%) of the 377 participants had normal echocardiograms, 170 (45%) had CHD, and 57 (15%) had an acquired lesion. The most common diseases were ventricular septal defect (VSD) (29 percent), patent ductus arteriosus (18 percent), atrio-ventricular septal defect (AVSD) (10 percent), and tetralogy of Fallot (TOF) (6 percent). The most prevalent acyanotic lesion was VSD, while the most common cyanotic lesion was TOF. A comparison was done between provisional clinical diagnosis and echocardiographic examination, in which provisional and echocardiographic diagnosis was concordant in 52.3% of patient and discordant in 47.7%. This difference was of high statistical significance ($p < 0.001$). The author recommended echocardiography for precise evaluation of heart murmurs but the role of comprehensive history taking and meticulous physical examination must not be neglected.¹⁶ which as compared to this study, a number of congenital heart diseases were recorded in them, 29 (11.02%) patients were diagnosed for PDA, 21 (7.98%) patients were recorded with VSD, 18 (6.84%) patients were recorded with ASD and 21 (7.98%) patients were diagnosed for PFO while 33 (12.54%) patients were having TGA. (Table No. 1).

This finding was in agreement with another study conducted in Pakistan, simple heart problems accounted for 153 (56.04%), while complicated or numerous congenital cardiac malformations accounted for 120 (43.9%). 25.3% of the 273 patients were cyanotic, while 74.7% had Acyanotic heart disease. Ventricular septal defect was the most prevalent lesion found (29.6%), followed by Tetralogy of Fallot (20.8%)¹¹.

Another study¹¹ consistently reported that 194 patients had heart murmurs and after Doppler echocardiography recorded that 95 patients had innocent murmurs (49%), and 99 patients' pathological murmurs (51%).¹⁹ which as compared to this study, a number of congenital heart diseases were recorded in them, 29 (11.02%) patients were diagnosed for PDA, 21 (7.98%) patients were recorded with VSD, 18 (6.84%) patients were recorded with ASD and 21 (7.98%) patients were diagnosed for PFO while 33 (12.54%) patients were having TGA. (Table No. 1).

One another study¹², consistently reported that 719 patients had heart murmurs and recorded 447 with innocent murmurs (62%) and 272 with pathological murmurs (38%).²⁰ which as compared to this study, a number of congenital heart diseases were recorded in them, 29 (11.02%) patients were diagnosed for PDA, 21 (7.98%) patients were recorded with VSD, 18 (6.84%) patients were recorded with ASD, 21 (7.98%) patients were

diagnosed for PFO while 33 (12.54%) patients were having TGA. (Table No. 1).

Our findings, on the other hand, contradict those of Uner et al., who found 243 patients with heart murmurs after ECHO recorded 209 innocent sounds (86%) and just 34 pathological murmurs. As a result, we believe the discrepancy between our findings and those of a prior study is due to variances in the number of patients involved in the study, as well as patient ages ranging from 6 to 15 years¹².

In this regard, our findings are consistent with those of a recent study, which found that the most frequent structural heart condition that causes pathological murmur is Ventricular septal defect. Rheumatic heart disease is caused by pulmonary stenosis, aortic stenosis, and an atrial septal defect. Also, according to Reza et al., the most frequent structural heart diseases that cause pathological murmur are Ventricular septal defect, tetralogy of Fallot and atrial septal defect. Finally, aortic stenosis leads to pulmonary stenosis.¹²

In a study conducted in Malaysia reported that congenital cardiac disease was found to be present in 6.7 out of 1000 live births. There were 38 percent severe lesions, 15% moderate lesions, and 47 percent mild lesions. As a result, the rates of mild, moderate, and severe CHD at delivery were 3.2, 0.9, and 2.6 per 1000 live birth, respectively¹³.

A similar study conducted in Jinjiang City Hospital, a total of 65 cases of Congenital Heart Disease were detected, with a 7.82 percent overall incidence and the most frequent kind being a ventricular septal defect¹⁴. In an Indian study, 68% of newborns had acyanotic heart disease, while 32% had cyanotic heart disease¹⁵. In a study that was published in Pakistan In our study, 58 percent of individuals had congenital heart disease with a heart murmur¹⁸. Atrial (20.3%) and ventricular septal defect (10.5%) were the most prevalent cardiac anomalies, respectively, according to a study published in Iran¹⁹. The most frequent acyanotic lesion in a study conducted on Jordanian infants was patent ductus arteriosus, which was followed by ventricular and atrial septal defects (44%) (25%). Of total CHD, cyanotic CHD accounted for 6%²⁰.

CONCLUSION

Children with CHD are more likely to have heart murmur, as we found a high frequency of CHDs in children with heart murmur. As a result, we propose that children with heart murmur be properly evaluated for CHDs in our local population.

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