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ORIGINAL ARTICLE

Analysis of children with congenital heart defects hospitalized with lower respiratory tract infections.

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ABSTRACT… Objective: To analyze children of congenital heart defect hospitalized with lower respiratory tract infections (LRTIs). **Study Design:** Cohort study. **Setting:** Department of Pediatrics, Rai Medical College Teaching Hospital, Sargodha Pakistan. **Period:** July 2021 to June 2022. **Material & Methods:** Echocardiography confirmed known CHD cases of both genders aged 1 month to 10 years and hospitalized with LRTI were included. Demographic and clinical data were noted while relevant radiological examination and bacterial culture / respiratory virus panel from nasopharayngeal swabs examined. Types of CHD (acyanotic or cyanotic), types of bacterial causative agents and outcomes in terms of duration of hospitalization (days) and mortality or discharged were noted. **Results:** In a total of 63 children, 34 (54.0%) were male. The mean age was 1.56±1.42 years while 46 (73.0%) children were aged below 1 year. Assessment of causative agents revealed that 9 (14.3%) had viral involvement, 8 (12.7%) bacterial agents. Majority of the children, 44 (69.8%) had acyanotic CHD while remaining 19 (30.2%) had cyanotic CHD. Need for pediatric intensive care unit (PICU) admission was noted in 22 (34.9%). Although, need for PICU stay was more among children with acyanotic CHD when compared to cyanotic CHD, but the difference did not reach statistical significance (40.9% vs. 21.1%, p=0.1292). Likewise, duration of hospitalization was relatively more among children with acyanotic CHD when compared to children with cyanotic CHD but the difference did not reach statistical significance (17.65±8.21 vs. 14.3±6.84, p=0.1243). **Conclusion:** Majority of the children with CHD hospitalized with LRTI were below 1 year of age. Acyanotic CHD was the most common CHD type. Mortality was relatively low and most of the children with CHD hospitalized with LRTI were treated and discharged successfully.

Key words: Acyanotic, Cyanotic, Congenital Heart Defect, Lower Respiratory Tract Infection, Mortality.

INTRODUCTION

Global incidence of congenital heart defects (CHD) is estimated around 1% while its incidence ranges between 3-10 per 1,000 among live-births.[1,2] Pediatric age groups with CHD are prone to increased rates of complications involving various body organs. In Pakistan, around 40,000 cases of CHD are born every year.[3] Incidence of CHD is increasing especially in developing countries while many cases of CHD are identified late when the complications have been developed.[4]

Around 95% of children below 2 years of age are estimated to have been infected with respiratory syncytial virus (RSV).[5] Other pathogens like human metapneumonovirus, coronaviruses and bocaviruses are also common causes of respiratory tract infections (RTIs) among children.[6,7] Among children, lower respiratory tract infection (LRTIs) is considered to be an important cause of morbidity and mortality. The LRTI is described as "infections that affect airways below the epiglottis".[8] Epidemiological factors and burden of LRTIs are different in between developing and developed countries.[9] Researchers in the past have shown CHD with pulmonary congestion as a significant risk factor for hospitalization among children.

Some researchers have evaluate children with pneumonia for the prevalence of CHD

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but not many studies have been conducted to find out the socio-demographic and clinical characteristics of children having CHD admitted with LRTIs. Findings of this study were thought to help pediatricians better anticipate CHD patients hospitalized with LRTIs which will further improve overall treatment strategies. The objective of this study was to analyze children of CHD hospitalized with LRTIs.

MATERIAL & METHODS

This cohort study was conducted at the Department of Pediatrics, Rai Medical College Teaching Hospital, Sargodha Pakistan from July 2021 to June 2022. Approval from "Institutional Ethical Committee" was obtained (certificate number: ERC/2020/095). Informed and written consents were sought from parents/guardians of all children enrolled in this study. During the study period, echocardiography confirmed known CHD cases of both genders aged 1 month to 10 years and hospitalized with LRTI were included. Exclusion criteria were children having acquired heard defects or those whose parents or guardians shared refusal for their children to be part of this study.

At the time of enrollment, demographic and clinical data were noted among all studied cases. Relevant radiological examination and bacterial culture / respiratory virus panel from nasopharayngeal swabs were examined. Types of CHD (acyanotic or cyanotic), types of bacterial causative agents and outcomes in terms of duration of hospitalization (days) and mortality or discharged were noted. All the patients were treated as per institutional protocols following standard guidelines. A special proforma was designed to record all study data.

Data analysis was performed employing SPSS version 26.00 software. Qualitative data was expressed in terms of frequency and percentages whereas numeric data were shown in the form of mean and standard deviation (SD). Chi-square test (for qualitative variables) and independent sample t-test (for quantitative data) were performed taking $p<0.05$ as statistically significant.

RESULTS

In a total of 63 children as per inclusion/exclusion criteria, 34 (54.0%) were male. The mean age was 1.56±1.42 years while 46 (73.0%) children were aged below 1 year. Residential status of 38 (60.3%) children was rural. Assessment of causative agents revealed that 9 (14.3%) had viral involvement, 8 (12.7%) bacterial agents while no causative agents were found in 46 (73.0%) children with CHD having LRTI. Majority of the children, 44 (69.8%) had acyanotic CHD while remaining 19 (30.2%) had cyanotic CHD. Need for pediatric intensive care unit (PICU) admission was noted in 22 (34.9%) as per institutional protocols. Table-I is showing details of characteristics of children with CHD hospitalized having LRTI.

Characteristics		Frequency (%)
Gender	Male	34 (54.0%)
	Female	29 (46.0%)
Age Groups	<1 year	46 (73.0%)
	≥1 year	17 (27.0%)
Residential Status	Urban	25 (39.7%)
	Rural	38 (60.3%)
Causative Agent	Viral	9 (14.3%)
	Bacterial	8 (12.7%)
	None	46 (73.0%)
Types of CHD	Acyanotic	44 (69.8%)
	Cyanotic	19 (30.2%)
Need for Pediatric ICU Stay		22 (34.9%)

Table-I. Characteristics of children with CHD hospitalized having LRTI (n=63)

Although, need for PICU stay was more among children with acyanotic CHD when compared to cyanotic CHD, but the difference did not reach statistical significance (40.9% vs. 21.1%, p=0.1292). Likewise, duration of hospitalization was relatively more among children with acyanotic CHD when compared to children with cyanotic CHD but the difference did not reach statistical significance (17.65±8.21 vs. 14.3±6.84, p=0.1243). Comparison of the children characteristics with respect to types of CHD is shown in Table-II.

Characteristics		Types of CHD		P-Value
		Cyanotic (n=19)	Acyanotic (n=44)	
Gender	Male	10 (52.6%)	24 (54.5%)	0.8887
	Female	9 (47.4%)	20 (45.5%)	
Age Groups	<1 year	12 (63.2%)	34 (77.3%)	0.2467
	≥1 year	7 (36.8%)	10 (22.7%)	
Residential Status	Urban	8 (42.1%)	17 (38.6%)	0.7962
	Rural	11 (57.9%)	27 (61.4%)	
Causative Agent	Viral	3 (15.8%)	6 (13.6%)	0.8494
	Bacterial	3 (15.8%)	5 (11.4%)	
	None	13 (68.4%)	33 (75.0%)	
Need for Pediatric ICU Stay		4 (21.1%)	18 (40.9%)	0.1292
Duration of Hospitalization (days)		14.3±6.84	17.65±8.21	0.1243
Mortality		1 (5.3%)	3 (6.8%)	0.8163

Table-II. Comparison of children characteristics with respect to types of CHD (n=63)

DISCUSSION

Some of the important predisposing factors for LRTI in children are described as prematurity, age <5 years, exposure to environmental smoke, aspiration syndrome, chronic lung disorders, CHD and immune compromised health status.[10-13]

In this study, we found that majority of the children with CHD hospitalized having LRTI were male (54.0%). Our findings are consistent with other researchers where male predominance has been revealed among children with CHD.[14-16] Majority of the children (73.0%) were aged below 1 year. Data from other countries show that due to optimal pre-delivery and neonatal screening, majority of the CHD cases are diagnosed well within or before the neonatal age group.[17-19] In Pakistan, as there are no national neonatal screening programs, many of the CHD cases are diagnosed late but still, contemporary local and regional data have shown that most of CHD cases are diagnosed within 1st year of life.[14,20]

We noted that majority of the children with CHD having LRTI were having acyanotic CHD (69.8%). Sahan YO et al evaluating 50 children with CHD and LRTI found that 52.6% children were having acyanotic CHD types.[21] Pejaver R and colleagues expressed that CHD is a major risk factor for recurrent LRTI. Moreover, the same study also revealed that vast majority (92.7%) of CHD cases had acyanotic CHD.[22] Another study by Gupte S et al found that 36% of children with recurrent LRTI were having CHD. Authors also concluded that patients coming with recurrent LRTI must be screened for the presence of CHD.[23]

This is the first study from Pakistan analyzing characteristics of children with known CHD hospitalized with LRTI. Relatively small sample size and collecting data from a single center study were some of the limitations of this study. We were unable to correlate risk factors associated with LRTI among children with CHD. Further prospective studies monitoring CHD cases for recurrence of LRTI needs to be conducted to add what little is known about the impact of LRTI among children with CHD.

CONCLUSION

Majority of the children with CHD hospitalized with LRTI were below 1 year of age. Acyanotic CHD was the most common CHD type. Mortality was relatively low and most of the children with CHD hospitalized with LRTI were treated and discharged successfully.

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2	Farhan Zahoor	Introduction, Proof readiang.	
3	Hussain Bux Korejo	Literature review, Methodology.	
4	Sadaf Liaqat	Data collection, Proof reading.	
5	Sohaib Riaz	Literature review, Methodology.	
6	Numan Khan	Literature Review, References.	
7	Fazal ur Rehman	Drafting, References.