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Original Research Article

A RETROSPECTIVE STUDY ON INCIDENCE AND PATTERNS OF CONGENITAL HEART DISEASE AMONG NEONATES AND CHILDREN UPTO THE AGE OF 5 YEARS IN A TERTIARY CARE CENTRE

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Abstract

Introduction: Congenital heart disease (CHD) is one of the major causes of mortality and morbidity in the pediatric population of both the developing and developed countries. Variability in incidence and prevalence of CHD from various countries of Indian subcontinent and rest of the world could be because of genetic, cultural, and environmental factors.

Materials and Methods: This is a Retrospective Observational Study which will be done at the Department of Pediatrics, Gulbarga Institute of medical Sciences, Kalaburagi, Karnataka. A retrospective analysis of cases, data of 767,921 patients (0-18 years) over 3 years and 10 months period was conducted to ascertain the prevalence and spectrum of CHDs.

Results: A total of 877 patients out of 767,921, were found having CHDs measuring a prevalence of 1.12/1000. About 777 (88.5%) were the acyanotics, and 100 (11.5%) were cyanotic heart patients. Among the acyanotic heart diseases ventricular septal defect was the most frequent lesion seen in 241 (31.2%), followed by patent ductus arteriosus in 184 (24.3%) children. Among the cyanotic heart diseases tetralogy of Fallot was the most frequent cyanotic heart disease seen in 48 (48.0%) patients.

Conclusion: Prevalence of 1.12/1000 among the hospital attending patients could be an underestimation of the actual disease burden in our community, and heightened awareness among the treating physicians about the cardiac diseases could actually reduce the mortality and morbidity associated with these ailments.

Key words: Children, congenital-heart, echocardiography, prevalence

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Introduction

Among all congenital defects, congenital heart diseases (CHD) continue to be the major cause of mortality in peadiatric age groups. The incidence of CHD varies between populations according to the published studies conducted in different countries with an incidence ranging from 4 to 50 per 1,000 live births.[1-3] CHD prevalence in developing countries might be underestimated due to lack of proper healthcare systems and follow up, unavailable detection modalities and limited diagnostic techniques.[4]CHD are categorized into trivial, moderate and severe lesions or acyanotic vs. cyanotic defects according to the pathophysiology and affected heart structure.[1] The acyanotic lesions are mostly included in the milder CHD group and this includes septal cardiac defects like atrial septal defect (ASD), ventricular septal defect (VSD), and atrioventricular canal defects. In addition, left ventricular outflow obstructive lesions like aortic stenosis and coarctation of aorta are other examples of acyanotic CHD with more complexity. Cyanotic CHD include Tetralogy of Fallot, transposition of great arteries, total anomalous pulmonary venous returns, hypoplastic left heart syndrome, truncus arteriosus, and tricuspid atresia.[1,2] Although VSD has been frequently reported to be the most common CHD across the world, the patterns of CHD might vary according to different etiologic factors including genetic background, geographic location, seasonal influence, maternal age, and the presence of CHD among other family members. The clinical spectrum of CHD is versatile and changes according to the age of presentation. Asymptomatic presentation is common and discovered accidentally on routine check up visits, whereas other presentations can range from poor suckling, cyanosis, and shortness of breath up to frank heart failure.[5] Most of these defects follow the multifactorial pattern of inheritance as a result of interlinking genetic and environmental factors with a smaller percentage being linked to chromosomal aberrations.[6] The pattern of risk factors for CHD is different among different parts of the world. In developing countries, consanguinity is relatively prevalent; most mothers are housewives, non smokers, and non-alcohol consumers. Unfortunately, only a few studies had evaluated the perinatal risk factors among those populations.[7,8] In countries with limited resources, the delay in diagnosing CHD adds to the already existing high mortality and morbidity rates. Therefore, early identification and timely intervention is key in reducing related morbidity and mortality. In developed countries, early detection and proper treatment have increased the survival rate and decreased mortality from 80 to 20% resulting in an increase in the number of adults surviving with CHD. Our study will be conducted to review the current prevalence of CHD and to assess the patterns and distribution among neonates and children upto the age of 5 years who were admitted and referred for cardiac evaluation at our Tertiary care hospital. We also will be assessing the medical management of certain CHD and the need for referral to a higher centre for the surgical management.

Materials& Methods

This is a Retrospective Observational Study which will be done at the Department of Paediatrics, Gulbarga Institute of medical Sciences, Kalaburagi, Karnataka.

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Inclusion criteria

All inborn and out born neonates admitted to SNCU and postnatal ward, infants and children upto the age of 5years admitted to PICU and general ward with clinical suspicion of CHD will be included.

Exclusion criteria

Acquired heart diseases.
Cardiomyopathies.
Congenital heart blocks.
Children with age group of >5years.

- Study includes both inborn and out born neonates admitted to SNCU and postnatal ward, infants and children upto the age of 5years admitted to PICU and general ward.
- The data will be collected from the medical records obtained from medical records department. Some missing data will be completed by telephone calls when a valid number is available.

-Diagnosis of the type of CHDs will be confirmed by echocardiography and documented in the files. Data collected included full demographic and clinical data.

-A thorough study of the perinatal (antenatal, natal, and postnatal), as well as the family history, will be done to detect possible underlying risk factors for CHDs.

-Demographic data included age at diagnosis, gender, sex, consanguinity, parental education, and occupation.

-For each studied case, the presenting complaint, reason for referral, examination findings, type of CHD, presence of dysmorphic features, associated syndromes, or other congenital anomalies will all be collected.

- Treatment details and reason for referral to higher centre will all be reviewed.

-Complete risk factor assessment will be done for each reviewed file.

-Antenatal history included maternal age at conception, full obstetric history, repeated abortions or stillbirths, type of conception (normal or assisted), medical diseases with pregnancy (i.e., diabetes mellitus, hypertension, systemic lupus, and bronchial asthma), teratogen exposure (radiation, chemicals and smoking), maternal infection (i.e., urinary tract infection, congenital TORCH infections, and premature rupture of membranes), maternal medications during pregnancy (i.e., hypoglycemic, antihypertensive, antiepileptic, antibiotics).
-Natal and postnatal history included the gestational age (GA), early neonatal illnesses, and NICU admissions.

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-Family history included the presence of CHDs, other congenital or chromosomal abnormalities, and sibling deaths.

Results

A total of 767,921 patients (aged 0-18 years) were attended in our hospital during the 3 years and 10 months between March 2009 and December 2012. These patients were subjected to a detailed history and thorough clinical examination, investigations such as X-ray chest, ECG all leads, and subsequently echocardiography A total of 866 patients had CHD, with males 455 (52.4%), and females 412 (47.5%). This amounts a prevalence of 1.12/1000 population, details of which are shown in Table 1. Maximum patients were seen among the age group of 1-12 months, that is, 407 measuring 46.9%. Most common lesion among the acyanotic heart diseases (n = 767) was isolated VSD, that is, 241 patients representing 31.9% seconded by PDA in 184 (24%). Among the cyanotic heart diseases (n = 100), TOF was seen in 48 patients (48%), seconded by the transposition of the great vessels (27%). The ages at diagnosis were also different, out of total 867 patients diagnosed as CHD; 251 (28.9%) patients were neonates, 407 (46.9) were infants between 2 and 5 years were 153 (17.6%), 6-12 years school children were 4.8% and above 12 years were 13 (1.5%).

Table 1: Spectrum of congenital heart diseases as per ages of presentation and sex

CHD: Congenital heart disease, TOF: Tetralogy of fallot, TAPVC: Total anomalous pulmonary venous connection, DORV: Double outlet right ventricle, ASD: Atrial septal defect, VSD: Ventricular septal defect, PDA: Patent ductus arteriosus, PFO: Patent foramen ovale, AV: Atrioventricular, PS: Pulmonary stenosis, MVP: Mitral valve prolapse, MR: Mitral regurigitation, TGV: Transposition of great vessels

Cyanotic													
TOF	10	2	13	10	4	5	2	1			30	18	48 (48)
TGV	10	1	5	7		2	1		1		17	10	27 (27)
Single ventricle	2		4	1							6	1	7 (7)
TAPVC	1		2	1	2						5	1	6 (6)
Tricuspid atresia	1	1									1	1	2 (2)
DORV	2	2	2	1		1	1				5	4	9 (9)
Truncus arteriosus									1		1		1 (1)
Total cyanotic CHD	26	6	26	20	6	8	4	1	2		65 (7.5)	35 (4.0)	100 (100.0)
Acyanotic													
ASD	31	29	37	40	17	16		2	1	3	86	90	176 (22.9)
VSD	20	25	64	66	29	19	7	7	1	3	121	120	241 (31.4)
VSD+(PDA/ASD/		2	16	4			1				17	6	23 (2.9)

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PFO)													
PDA	47	39	30	34	1	1	1	6		1	92	92	184
					4	2							(23.9)
AV canal defect	4	5	7	12	1	2	1				13	19	32 (4.1)
PS	7	3	15	13	7	6	3	1	1		33	23	56 (7.3)
Bicuspid aortic valve	1		1			1		1			2	2	4 (0.5)
Dextrocardia	2		2		1						5		5 (0.6)
Cardiomyopathy	1		7	9	4	7	1	2			13	18	31 (4.0)
Aortic stenosis	1		1		1			3			3	3	6 (0.7)
MVP MR	2			3	1	1	1				4	4	8 (1.0)
Coartation of aorta									1		1		1 (0.1)
Total	116	10	18	181	7	6	15	22	4	7	390	377	767
		3	0		5	4					(45.0)	(43.5)	(88.6)
Grand total	142	10	20	201	8	7	19	23	6	7	455	412	867
		9	6		1	2					(52.4)	(47.5)	

Discussion

To know about the estimated index of CHDs in various population groups, several studies were carried out in past 40 years and during this period a notable improvement in diagnosis of CHD was made by the introduction of echocardiography. Our study comprised all children up to 18 years, with CHD born in our hospital, referred from other hospitals, and those attended to our hospital for a variety of reasons. Our analysis gives a prevalence of 1.12/1000 patients which are similar to other studies.[9,10] However, it is contradicting to the high prevalence of CHDs reported from the other states of India.[11-13] Acyanotic group formed the major chunk (88%), of the total CHD patients which is in congruent with the other studies.[14,15] The most frequent type of CHD was VSD, and maximum number of cases of CHD was of the age group 1-12 months (46.7%), and including neonates it comprised about 76% of the total CHDs' which is in accordance with other studies from rest of India,[15] earlier study from the same region,[16] and rest of the world.[17-19] The frequency of the complex and rare types of CHDs was less when compared to the western data but similar to other Indian studies.[20,21] This could be due to the severity of the defects which might have led to the death of the patients before accessing the medical facilities and racial and genetic factors between us and them. Current prevalence of CHDs' is lesser than the earlier study from the same region[16] that could be because better peripheral health services. Various cases of CHD would have escaped diagnosis like neonates, especially born at home, who die without medical attention and those who are asymptomatic with mild to moderate degree of CHD, or those diagnosed at peripheral/private centers, this may increase our falsely low prevalence. The diagnosis of CHD may pass unnoticed in 30% of infants during the 1st weeks of life.[22] The magnitude of the CHD problem is considerable and is largely unrecognized, understated, and underestimated. However, encouraging results of treatment for most of the

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CHD from developed countries should prompt more clinicians to take up the challenge of managing these complex problems. Congenital malformations and in particular CHDs are likely to become important contributors to infant mortality in the near future. Hence, it is important to determine the exact prevalence and case burden of CHD so that appropriate changes in health policiescan be recommended.[23]

Conclusion

Prevalence of 1.12/1000 among the hospital attending patients could be an underestimation of the actual disease burden in our community, and heightened awareness among the treating physicians about the cardiac diseases could actually reduce the mortality and morbidity associated with these ailments.

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