International Journal of Contemporary Pediatrics
Selvakumar R et al. Int J Contemp Pediatr. 2019 Sep;6(5):2016-2021
http://www.ijpediatrics.com
pISSN 2349-3283 | eISSN 2349-3291

DOI: http://dx.doi.org/10.18203/2349-3291.ijcp20193716

Original Research Article

Study on spectrum of heart diseases in children aged 1 month to 12 years in a rural medical college in Southern India

Selvakumar R., Vasanthamalar C.*, Sreeman N.

Department of Paediatrics, Government Theni Medical College and Hospital, Theni, Tamilnadu, India

Received: 24 April 2019
Revised: 29 May 2019
Accepted: 12 June 2019

***Correspondence:**
Dr. C. Vasanthamalar,
E-mail: drvmalar@gmail.com

ABSTRACT

Background: To study the pattern of heart diseases in children aged 1 month to 12 years of age and to assess the pattern, age and gender specific distribution of congenital heart diseases and acquired heart diseases in various age groups like infants, toddler, preschool and school children to prevent morbidity and mortality. To study the various complications associated with various types of heart diseases.
Methods: This is a descriptive study of one-year duration in which children with suspicion of heart disease were subjected to ECG, Chest X ray and Echocardiogram. Patients with confirmed heart disease were included and the infants less than 1 month, CCF due to anaemia or without any structural abnormality were excluded.
Results: The prevalence of heart disease was 0.9% in author study. VSD is the commonest acyanotic lesion in all age group observed and TOF is the commonest cyanotic lesion. Most of the cyanotic lesions were observed in less than one year. Most of the acyanotic lesions fall within 5 to 12 years. RHD and rheumatic carditis forms the major acquired lesion followed by dilated cardiomyopathy. VSD, ASD, PDA, TOF, Pulmonary stenosis, Rheumatic carditis and MR were predominant in females whereas Aortic stenosis (Bicuspid aortic valve), AV canal defect, TGA, TAPVC were predominant in males. Among the nutritional status 64.2% of patients from acyanotic group and 100% patients from cyanotic group were malnourished. 35% of acyanotic and 100% of cyanotic group were stunted.
Conclusions: Acyanotic lesion is the commonest, among which VSD is most common. TOF is the common cyanotic CHD. More than half of the patients were asymptomatic in acyanotic group and presented in the 5- 12 years age group and diagnosed on the basis of clinical suspicion on routine health visits or for some other reason.

Keywords: Echocardiogram, Heart diseases, Rheumatic heart diseases, Tetrology of fallot, Ventricular septal defect

INTRODUCTION

Heart diseases constitute an important group of pediatric illness and major cause of childhood morbidity and mortality. They may be symptomatic or asymptomatic. Late diagnosis of heart disease in children carries a high risk of mortality and morbidity. To avoid this mortality and morbidity early diagnosis is important. Heart diseases in children may be congenital or acquired. Congenital heart disease is the one present since birth. Some cases of congenital heart diseases are asymptomatic and are diagnosed on routine health visits.[1]

Acquired heart diseases in children are less frequent than adult. Acquired Cardiac diseases represents a diverse group of heart diseases which occurs after birth. Acquired heart diseases, though known to have global distribution, their relative burden and pattern of its distribution vary

between regions across the world even within the particular geographical area.[2]

It is important to mind that children with congenital heart diseases are at increased risk of poor growth. The factors which play a role in the poor growth may be feeding difficulties, excessive caloric requirement and the cardiac lesions on growth and development with chronic acquired heart diseases also at increased risk of poor growth.[3]

In India the incidence and prevalence of CHD is quite likely to be on the higher side due to high birth rate. Some hospital based and some community-based studies reveals that incidence of various lesions has varied.

The incidence of moderate and severe forms of heart diseases is about 6 per 1000 live births. But when all the lesions are included like the trivial lesions ie tiny muscular VSDs, the incidence increases to 75 per 1000 population. In an Indian study it is reported that the incidence of congenital heart disease is more in girls than in boys.

The prevalence of rheumatic fever and rheumatic heart diseases also have been estimated in surveys mainly in school aged children which shows there is a wide variation in between the countries ranging from 0.2 per 1000 to 77.8 per 1000.

The prevalence of rheumatic fever and rheumatic heart diseases and the mortality rates are also varied from country to country, even in the population groups within the same country. Some data shows that rheumatic heart diseases accounts for 12-65 % of hospital admissions related to cardiovascular diseases.[4]

The aim of the study is to study the types of heart disease in children aged 1 month to 12 years, to assess the pattern, age and gender specific distribution of congenital and acquired heart diseases, to study the complications associated with various types of heart diseases.

METHODS

Present study design Descriptive Study, Study period On July 2016 to June 2017. The place of study is Paediatric department of Theni Medical College Hospital.

Study population

Children of either sex from 1 month to 12 years of age having clinical suspicion of heart disease are enrolled for echocardiogram to confirm the diagnosis. Clinical suspicion is based on history of recurrent respiratory tract infections, presence of cyanosis, clubbing, cardiac failure, failure to thrive and in asymptomatic patients, by the presence of murmur. The total number of children enrolled in the study were 226. Congenital heart disease is diagnosed by any gross structural abnormality of the heart or intrathoracic blood vessels that is of functional significance excluding the systemic great arteries and veins. Acquired heart disease is diagnosed using parameters like mitral valve area, thickening of leaflets, left atrial diameter, aortic root diameter, IVSd, IVSs, (Ventricular internal diameter in diastole and systole), EF and fractional shortening. Complete blood count, ECG and X Ray chest are performed in all patients.

Inclusion criteria

Children aged 1 month to 12 years with confirmed heart disease by echocardiography.

Exclusion criteria

Cardiac failure due to anaemia Cardiac failure in PEM Arrhythmias with no structural heart disease.

Statistical analysis

Data collected will be entered in excel sheet and analyzed using SPSS program.

RESULTS

During the study period, a total of 24,980 patients sought medical care in the Paediatric OPD in Theni Medical College Hospital among whom 226 children in the age group of 1 month to 12 years were diagnosed with heart disease. The prevalence of heart disease was 0.9% in this study (Table 1).

This value cannot be extrapolated to the normal population, as the study was carried out only in a proportion of the population which sought medical care in a tertiary hospital, and neonates with heart disease were not included in the study.

Table 1: Prevalence of heart disease among children in the age group of 1month to 12 years.

Sex of child	No. of children with heart disease	Total no. of children attended OPD	Prevalence (%)	Prevalence 95% CI
Male	93	13324	0.7	0.6 to 0.9
Female	133	11656	1.1	1.0 to 1.3
Total	226	24980	0.9	0.8 to 1.0

A total of 226 patients in the age group of 1 month to 12 years with a confirmed diagnosis of heart disease were included in the study, of which 93 patients were male (41%) and 133 were female(59%), with a male- female ratio of 0.7:1 (Table 2).

Table 2: Sex distribution of heart disease.

Sex	No.of patients	Percentage	CI
Male	93	41.1	34.9 to 47.7
Female	133	58.8	52.3 to 65.1

Among the 195 cases of CHD, 79 were male and 116 were female, and the male female ratio is 0.7:1. Among the 31 acquired heart disease patients, 14(45%) were male and 17 (55%) were female, and the male female ratio is 0.8:1. The sex distribution of various heart diseases has been summarised in Table 3.

VSD, ASD, PDA are common in females than in males as summarized in Table 3. Maximum number of cases presented during school age, i.e., 5-12 years (118), followed by the infantile period, i.e less than 1 year (66) (Table 4). Acyanotic heart disease comprises the majority of lesions in all the age groups.

Cyanotic heart disease commonly presented in the infantile period. There is a striking rise in acquired heart disease during the preschool and school age. Acquired heart diseases are the second most common lesions in the age group of 3-5 years and 5-12 years (Table 5).

Table 3: Sex distribution of various heart diseases.

Type of heart disease	Male	Female
VSD	29	32
ASD-OS	15	29
PDA	6	19
Pulmonary stenosis	4	10
BAV	6	3
MVP	3	7
Complex lesions	3	7
Situs inversus	0	1
Septal hypertrophy	1	0
AV canal defect	2	0
HOCM	1	0
PAPVC	1	0
TOF	3	8
TGV	2	0
TAPVC	2	0
DORV	1	0
Tricuspid atresia	1	0
DCM	0	0
Post viral DCM	4	2
Myocarditis	1	0
Pericardial effusion	1	2
Rheumatic carditis	2	6
RHD/MR	2	7
RHD/MS	3	0

Table 4: Age distribution of heart disease.

Age group	No of patients with heart disease	Percentage	95% Confidence interval
< 1 year	66	29.2%	23.6 to 35.4
1 to 3 years	26	11.5%	7.8 to 16.2
3 to 5 years	16	7.1%	4.2 to 11
5 to 12 years	118	52.2%	45.7 to 58.7

Table 5: Distribution of heart disease in different age groups.

Age group	Congenital heart disease		Acquired heart Disease
	Acyanotic	Cyanotic	
< 1 year	54(81%)	10(15%)	2(4%)
1 to3 years	25(96%)	1(4%)	0
3 to 5 years	10(62%)	1(6%)	5(32%)
5 to 12 years	89(75%)	6(5%)	23(20%)

Of the total number of cases, 86% had congenital heart disease and 14% were diagnosed with acquired lesions.

Of the 196 cases of CHD, 178(91%) had acyanotic and 18 (9%) had cyanotic heart disease. Summarised in Tables 6-8.

Among Acyanotic CHD VSD (34%) is more common the pattern of various heart diseases has been followed by ASD (24%) & PDA (14%) as summarized in Table 6.

Among Cyanotic CHD TOF (61%) is more common followed by TAPVC (11%) and TGV (11%) as summarized in Table 7.

Table 6: Pattern of acyanotic CHD.

VSD	34%
ASD	24%
PDA	14%
Pulmonary stenosis	8%
Bicuspid aortic valve	6%
MVP	6%
AV canal defect	1%
HOCM	1%
Complex defect	4%

Table 7: Pattern of cyanotic CHD.

TOF	61%
TAPVC	11%
TGV	11%
Tricuspid atresia	5%
Truncus arteriosus	6%
DORV	6%

Among acquired heart disease, Rheumatic carditis (27%), RHD [MR] (30%), DCM (POST VIRAL) (22%) followed by pericardial effusion and RHD/MR/MS (11%) and Myocarditis (1%) as summarized in Table 8.

Among the children with acquired heart disease, the commonest lesion was mitral regurgitation due to rheumatic heart disease (30%), followed by rheumatic carditis (27%) and dilated cardiomyopathy (22%). Pericardial effusion and Rheumatic mitral stenosis constituted 10% each of the total acquired heart diseases. Out of the 195 cases with congenital heart disease, 32(16%) presented with complications.

Table 8: Pattern of acquired heart disease.

Rheumatic carditis	27%
RHD(MR)	30%
DCM (Post viral)	22%
Pericardial effusion	10%
RHD/MR/MS	10%
Myocarditis	1%

The most frequent complications observed were pulmonary hypertension, cardiac failure and infective endocarditis. Pulmonary hypertension was frequently observed in cases of VSD of the sub aortic type and ASD. Among cyanotic heart diseases, TAPVC and Truncus arteriosus presented with pulmonary hypertension, and no case of isolated TOF presented with PHT.

Among the acquired heart diseases, 45% of cases presented with complications. Rheumatic MS was frequently associated with PHT. A case of rheumatic MR presented with infective endocarditis, resulting in cardiac failure.

Out of the total 226 cases, 30 (13%) presented with signs of failure (Table 9). 33% of these cases were isolated VSDs, mainly of the subaortic type with pulmonary hypertension, and one case of VSD went for failure due to infective endocarditis.

Table 9: Complications of various Groups of heart disease.

Type of heart disease	Complications	Frequency	Percentage	95% CI
Congenital Acyanotic heart disease (no:178)	Failure	13	7.3	4.1 to 11.9
	PHT	30	16.9	11.9 to 22.9
	IEC	1	0.6	0.02 to 2.7
Congenital Cyanotic heart disease (no:18)	Failure	3	0	0 to 15.3
	PHT	2	11.1	1.9 to 32.1
	IEC	0	0	0 to 15.3
Acquired heart disease (no:30)	Failure	14	46.7	29.5 to 64.4
	PHT	4	13.3	4.4 to 29.1
	IEC	1	3.3	0.2 to 15.4

The other common lesions presenting with failure were rheumatic carditis (20%) and post viral dilated cardiomyopathy (16.7%) (Table 10). Isolated PDA and ASD did not present with failure signs, whereas a case of mixed heart disease with ASD-OS and subaortic VSD presented with failure.

In these study 34.07% of patients with heart disease presented with moderate to severe wasting. 28.7% of

patients presents with mild wasting. 37.23% of patients had normal weight for height or BMI. Among the acyanotic group, 4.5% had severe wasting;19.2% had moderate wasting; 30.5% had mild wasting and 35.8% of them had normal BMI. Most of the children with cyanotic heart disease had moderate (50%) to severe wasting (44.5%). Among children with acquired heart disease, most of them presented with mild (32.2%) to moderate wasting (35.5%)17.6% of patients with heart disease presented with moderate to severe stunting and 25.22% patients presents with mild stunting of growth. 57.18 % of patients had normal height for age. Among the acyanotic group, most of the children had normal height for age (65%). 27% had mild stunting. Among the cyanotic group, most of the children presented with severe stunting (89%). Among the children with acquired heart disease, 57% of the children had normal height for age; 25% of them had mild stunting.

Table 10: Cases presenting with cardiac failure.

Type of heart disease	No of cases	Percentage
VSD	10	33.3
Rheumatic carditis	6	20
DCM	5	16.7
MR	2	6.7
TAPVC	2	6.7
AV canal defect	2	6.7
Truncus arteriosus	1	3.3
Myocarditis	1	3.3
Complex heart disease	1	3.3
Total	30	100

DISCUSSION

In these study the prevalence of heart disease in children aged 1month to 12 years was 9 per 1000 population. The prevalence of CHD was 8 per 1000. Rajendra Kumar Jatav et al reported a CHD prevalence of 8.55 per 1000 which is very similar to our results.[5] Kurshid Ahmed et al reported a prevalence of 1.12% in a study conducted in children in a tertiary care hospital in Srinagar.[6] Najaf Masood et al reported a prevalence of 1% in a hospital based study in Rawalpindi, Pakistan.[7] All these studies show greater prevalence of CHD compared to our study.

The prevalence of acquired heart disease in our study was 1 per 1000. Rheumatic heart disease constituted 64% of acquired heart disease. The prevalence of RHD in our study was 0.8 per 1000. Dipanker Prajapathi et al, reported an RHD prevalence of 0.9 per 1000. [8] A more recent hospital based survey in India shows a prevalence of 5-26%, which is high number when compared to the results of our study.

In another study, the male female ratio of children with heart disease was 0.7:1.[9] The male female ratio in the congenital heart disease subgroup was 0.7:1. This is in accordance with a study from Christian Medical College , Vellore, by Anushula Tandon et al, that evaluated the risk factors for CHD, but this study included adult population as well.[10] A study conducted at Srinagar Govt. Medical College Hospital showed a male female ratio of 1.2:1, In our study population, the male-female ratio of acquired heart disease was 0.8:1, Dipanker et al reported a male female ratio of 0.9:1 in children with RHD.[8]

In these study 52% of children with heart disease presented in the school age (5 to 12 years), followed by the infantile period (1 month to 1 year). Smitha Mundada et al, also reported greater relative prevalence of CHD is in the age group of 5 - 12 years followed by 1-3 years of age, in a study conducted at a tertiary care hospital in Aurangabad.[11] Najma Patel et al, reported maximum number of cases in the infantile age group((75%).[12] In a study conducted at Peshawar tertiary care hospital, most of the cases of CHD presented in the age group of 1-5 years (46%), followed by the age group of 5 to 12 years (29%).[13] These differences observed may be due to the routine screening and referral of children under the school health programme.

In another study, majority of patients presented with acyanotic CHD, this is similar to other studies from India and worldwide. Among the acyanotic heart disease, VSD is the most common lesion, comprising 31% of total heart disease, followed by ASD (22%) and PDA (13%). This is similar to the results of a study conducted in a tertiary care hospital in Uttarkhand by Navneet Kumar et al, that showed greater prevalence of VSD in the acyanotic group, comprising 31% of heart disease.

Sandeep V Harshangi et al, reported a greater prevalence of VSD in the study population (30%), followed by ASD and PDA.[14] Bharadwaj et al reported a greater prevalence of VSD (33%), followed by ASD (19%) in the paediatric OPD in a tertiary referral center in central India.[15]

These results are similar to that of our study. In the cyanotic group of children, TOF is the commonest lesion in ourstudy, followed by TGV and TAPVC. Sandeep V. Harshangi et al, reported TOF as the commonest cyanotic heart disease, followed by TGV in a study conducted in a tertiary care hospital in Nepal.[14]

Anushula Tandon et al, also reported TOF as the commonest cyanotic heart disease in a study done at CMC, Vellore.[10] Among the acquired heart diseases, Rheumatic carditis and Rheumatic mitral valve disease were the commonest lesions in our study, followed by Dilated cardiomyopathy of post viral etiology.

UM Sani et al at Sokoto, Nigeria reported RHD as commonest, followed by Dilated cardiomyopathy and Pericardial effusion. Of the 226 patients,13% presented with signs of failure. Sandeep V Harshangi et al, reported 56% of patients with cardiac failure in his study.[14] This number is considerably high than our study.

ACKNOWLEDGEMENTS

Authors would like to thank all our cardiologists for providing immense support throughout the study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Kuehl KS, Loffredo CA Ferencze. Failure to diagnose congenital heart disease in infancy. Pediatrics. 1999;103(4):743-7.
2. Zuhlke L, Mirabel M, Marijon E. Congenital heart disease and Rheumatic heart disease in Africa: Recent advances and current priorities. Heart. 2013; 99(21):1554-61.
3. Bode-Thomas f, Ige OO, Yilwan C. Childhood acquired heart disease in Jos, North Central Nigeria, Nigeria medical journal. 2013;54(1):51-8.
4. WHO Study Group on Rheumatic Fever and Rheumatic Heart Disease (2001: Geneva, Switzerland) & World Health organization. 2004. Rheumatic fever and rheumatic heart disease: report of a WHO expert consultation, Geneva, 20 October-1 November 2001. World Health Organization. Available at: http://www.who.int/iris/handle/10665/42898.
5. Jatav RK, Kumbhare MB, Srinivas M, Rao DR, Kumar PG, Reddy PR. Prevalence and pattern of congenital heart diseases in Karimnagar, Andhra Pradesh, India: diagnosed clinically and by trans-thoracic-two-dimensional echocardiography. Int J Res Med Sci. 2014;2(1):186-92.
6. Misra M, Mittal M, Verma AM, Rai R, Chandra G, Singh DP, et al. Prevalence and pattern of congenital heart disease in school children of eastern Uttar Pradesh. Indian heart J. 2009;61(1):58-60.
7. Masood N, Sharif M, Asghar RM, Qamar M, Hussain I. Frequency of Congenital Heart Diseases at Benazir Bhutto Hospital Rawalpindi. Ann Pak Inst Med Sci. 2010;6(2):120-3.
8. Prajapati D, Sharma D, Regmi PR, Khanal H, Baidya SG, Rajbhandari S, et al. Epidemiological survey of Rheumatic fever; Rheumatic heart disease and Congenital heart disease among school children in Kathmandu valley of Nepal. Nepalese Heart J. 2013;10(1):1-5.
9. Saxena A. Epidemiology of Rheumatic Heart disease in India. J Preventive Cardiol. 2012;2(2):1075-82.
10. Tandon A, Sengupta S. Risk factors for Congenital Heart Disease in Vellore, India. Current Res J of Biol Sciences. 2010;2(4):253-8.
11. Smitha Mundada, Jagdish Kathwate. Clinical Profile of patients with Acyanotic Congenital Heart Disease in Pediatric Age Group in Rural India: IOSR-JDMS. 2014;13(12):06-12.
12. Pate N, Jawed S, Nigar N, Junaid F, Wadood AA, Abdullah F. Frequency and Pattern of Congenital Heart Defects in a tertiary care cardiac hospital of Karachi. Pak J Med Sci. 2016; 32(1):79-84.
13. Rahim F, Younas M, Gandapur AJ, Talat A. Pattern of Congenital Heart Diseases in children at tertiary care centre in Peshawar. Pak J Med Sci. 2003;19(1):19-22.
14. Harshangi SV, Itagi LN, Patil V, Vijayanath V. Clinical Study of Congenital Heart Disease in Infants in tertiary care hospital; JPSI. 2013;2(1):15-8.
15. Bhardwaj R, Rai SK. Epidemiology of Congenital Heart Disease in India. Congenit Heart Dis. 2015;10(5):437-561.

Cite this article as: Selvakumar R, Vasanthamalar C, Sreeman N. Study on spectrum of heart diseases in children aged 1 month to 12 years in a rural medical college in Southern India. Int J Contemp Pediatr 2019;6:2016-21.