Original Research Article

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A study of prevalence and pattern of congenital heart disease at Sopore, Kashmir, North India

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ABSTRACT

Background: Early detection of congenital heart disease is of paramount importance to improve the quality of life of children and prevent morbidity and mortality. 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. Present aim was to study the prevalence, age and sex wise distribution, and clinical spectrum of congenital heart disease (CHD) at Sopore, Kashmir, North India.

Methods: Around 39829 children in the age group 0 months to 18 years were screened for Defects at birth, Diseases in children, Deficiency conditions and Developmental Delays including Disabilities over the period of 18 months under RBSK. Clinical examination, echocardiography and color Doppler were used as diagnostic tools.

Results: A prevalence of 5.3 per 1000 population was observed. VSD (ventricular septal defect) was the commonest lesion (30.1%), followed by PDA (patent ductus arteriosus) in 21.6 % and ASD (atrial septal defect) in 20.2%. Tetralogy of Fallot was the commonest cyanotic heart disease (8.0%). Maximum numbers of children with heart disease were diagnosed in the age group 6 weeks to 6 years.

Conclusions: For better estimation of prevalence of congenital heart diseases, more elaborate community-based studies are needed. Such community based studies can be easily done by collecting and analyzing data collected from screening programs like RBSK. Such community based screening programs helps in detecting silent cardiac ailments, their prevalence and pattern, and early therapeutic intervention. A few prevalence studies have been carried out piecemeal in different locations of India; and more such studies can be easily done by collecting and analyzing data collected under RBSK screening program.

Keywords: Congenital heart disease, PDA, Prevalence, VSD

INTRODUCTION

Congenital heart disease (CHD) is defined as a gross structural abnormality of the heart or intrathoracic great vessels that is actually or potentially of functional significance.¹ Congenital heart disease (CHD) is the most frequently occurring congenital disorder, responsible for 28% of all congenital birth defects.² The birth prevalence of CHD is reported to be 8-12/1000 live births.^{3,4} According to a status report on CHD in India, 10% of the present infant mortality may be accounted for by CHD.⁵ According to a large hospital based study from India, the incidence of congenital heart disease is 3.9/ 1000 live

births. In community based studies from India the prevalence of CHD ranges from 0.8-5.2/1000 patients.⁶ Cardiac defects are grossly divided into acyanotic and cyanotic heart diseases, former being more common. Ventricular septal defect (VSD) (30-35%) and tetralogy of Fallot (TOF) (5-7%) are most common among acyanotic and cyanotic CHDs respectively.⁷ Congenital heart diseases (CHDs) are the leading cause of mortality in the first year of life.⁸⁻¹⁰ Large majority of these structural abnormalities of heart occur as an isolated anomaly, but around 33% have associated anomalies.¹¹

There are few population-based studies in India about the prevalence of CHD and none in Kashmir, hence the purpose of the study.

METHODS

This was a community-based retrospective community based study, carried out in villages of Sopore Baramulah North Kashmir.

The study has been carried in Sopore Baramulah, Jammu and Kashmir, North India a Himalayan region of state of Jammu and Kashmir, which is renowned for apple production and is also known as apple town. The Sopore town lies with geographical coordinates of $34^{0}30'N$ and $74^{0}47'E$. The total area of the study area is approximately estimated to 320 square kms. The sub district is home to about 2.2 lakh people, among them about 52% are males and about 48% are females. 100% of the whole population is from general caste, 0% are from schedule caste and 0% are schedule tribes. Child (aged under 6 years) population of Sopore Tehsil is 15%, among them 53% are boys and 47% are girls. There are about 34 thousand households in the sub district and an average 7 persons live in every family.

This cross sectional survey was done along with the Rashtriya Bal Swasthya Karyakram (RBSK) mobile health team to identify birth defects, deficiencies, diseases and developmental delays including disabilities in children. Authors screened and record the children for 18 months from 15 March 2016 to 15 August 2018.

The Operational Guidelines of RBSK was followed with them to reach all the target groups of children for health screening. According to this, block micro-plan for school and community visits monthly outreach plan were made based on the mapping of educational institutions and Aanganwadies, and enrolment in them.

The schedule of visits of Mobile Health Teams were communicated to the school, Aanganwadi Centers, ASHAs, relevant authorities, students, parents and Local Government well in advance so that required preparations can be made. Aanganwadi Centers and school authorities were made arrangements for prior communication with parents and motivate them to participate in the process.

For new born

Facility based newborn screening at SDH Sopore. Further ASHAs will mobilize caregivers of children to attend the local Aanganwadi Centers for screening by the dedicated Mobile Health Team.

For children 6 weeks to 6 years

Aanganwadi Center based screening by the dedicated Mobile Health Teams.

For children 6 years to 18 years

Government and Government aided school based screening by dedicated Mobile health teams.

A dedicated team of RBSK was screening the children for defects, deformities, deficiencies and diseases. During screening any suspected cardiac patient was advised to pediatric department at SDH Sopore. All the persons were asked about history of (H/O) palpitation/increased precordial activity in child, any H/O recurrent chest infection, or bluish discoloration of tongue/lips. Then the detailed cardiovascular examination was done. The children suspected of CHD, were evaluated further and those suspected of cardiac disease were subjected for chest X-ray, electrocardiogram (ECG), followed by echocardiography. The echocardiography was done in District hospital Baramulah or GB pants children Hospital.

Statistical analysis

The data obtained was accessed in SPSS software for necessary descriptive statistical analysis.

RESULTS

Table 1 shows age and sex distribution of total population screened. In present study authors have screened 20407 male and 19422 female children (total 39829) in the age group 0 to 18 years of age.

Table 1: Age and sex wise distribution of screenedchildren.

Total population screened	Male	Female	Total
0-6 week	1122	1090	2212
6 weeks to 6 year	4055	3882	7937
6year to 18 years	15230	14450	29680
Total	20407	19422	39829

Table 2 shows that a total of 212 children had CHD, with acyanotic heart disease 188 (88.6%) and cyanotic heart disease 24 (11.3%). This amounts a prevalence of 5.3/1000 population, details of which are shown in Table 2.

Table 2: Age and sex distribution of congenital heart
diseases.

Total population	Male	Female	
screened N=39829	20407	19422	
Congenital heart disease found n=212			5.3/1000
Acyanotic congenital heart disease ACCHD* 188 (88.7%)	108 (51%)	80 (37.7%)	88.6%
Cyanotic congenital heart disease CCHD# 24 (11.3%)	10 (4.7%)	14 (6.6%)	11.3%

*ACCHD=Acyanotic congenital heart disease; #CCHD=Cyanotic congenital heart disease.

Table 3 shows that the most common lesion among the acyanotic heart diseases (n=188) was isolated VSD 64 patients representing 34%, seconded by PDA in 46 (24.4%) and ASD in 44 (23.4).

Table 3: Pattern of ACHD (n=212).

ACCHD ^a	n=188	n=212
VSD ^b	64 (34.0%)	30.1%
ASD ^c	44 (23.4%)	20.7%
PDA ^d	46 (24.4%)	21.6%
Complex anomalies	5 (2.65%)	2.3%
AV septal defects	7 (3.72%)	3.3%
ASD+PDA	3 (1.5%)	1.4%
PS ^e	12 (6.3%)	5.6%
AS^{f}	2 (1.0%)	0.94%
Bicuspid aortic valve	2 (1.0%)	0.94%
MVP ^g	2 (1.0%)	0.94%
Dextrocardia	0 (0.0%)	0.0%
COA ^h	1 (0.5%)	0.47%

a=Acyanotic congenital heart disease; b =Ventricular septal defect; c=Atrial septal defect; d=Patent ductus arteriosus; e=Pulmonary stenosis; f=Aortic stenosis; g=Mitral valve prolapsed; h=Coarctation of aorta.

Table 4 shows that among the cyanotic heart diseases (n=24), TOF was seen in 17 patients (70.8%), seconded by the transposition of the great vessels in 4 (16.6%).

Table 4: Pattern of CCHD.

CCHD*	n=24	Total
TOF#	17 (70.8%)	8.0%
TGV\$	4 (16.6%)	1.9%
Single ventricle	1 (4.1%)	0.5%
TAPVC%	1 (4.1%)	0.5%
Tricuspid atresia	0 (0.0%)	0.0%
DORV^	1 (4.1%)	0.5%
Truncus ateriosus	0(0.0%)	0.0%

*Cyanotic Congenital heart disease; #Tetrology of Fallot; \$Transposition of Great Vessels; ^ Double outlet right ventricle.

Table 5 shows the ages at diagnosis and most CHD were detected in age group 6 weeks to 6 years. The majority of

acyanotic heart diseases (77) were diagnosed in age group 6 weeks to 6 years of life and majority of cyanotic heart diseases were diagnosed in first 6 weeks of life.

Table 5: Spectrum of age wise detection of congenital heart diseases.

Age group	0 to 6 weeks	6 weeks to 6 year	6 year to 18 year		Total
VCD	M/F	M/F	M/F	M/F	64
VSD	14/11	17/15	4/3	35/29	64
	3/4 7/6	12/10	1/0	24/20	44
Complex anomalies	3/2	0/0	0/0	3/2	5
AV septal defects	3/2	1/1	0/0	4/3	7
ASD+PDA	1/1	1/0	0/0	2/1	3
PS	3/1	4/0	3/1	10/2	12
AS	0/0	1/0	1/0	2/0	2
Bicuspid aortic valve	0/0	0/0	2/0	2/0	2
MVP	0/0	0/0	0/2	0/2	2
Dextrocardia	0/0	0/0	0 0	0/0	0
COA	0/0	0/0	1/0	1/0	1
Total	36/27 (63)	44/33 (77)	28/20 (48)	108/80	188
CCHD [*] Cyan	otic cong	genital he	eart dise	ases n=24	ļ
TOF [#]	4/3	2/3	2/3	8/9	17
TGV ^{\$}	1/3	0/0	0/0	1/3	4
Single ventricle	1/0	0/0	0/0	1/0	1
TAPVC [%]	0/1	0/0	0/0	0/1	1
Tricuspid atresia	0/0	0/0	0/0	0/0	0
DORV	0/1	0/0	0/0	0/1	1
Truncus arteriosus	0/0	0/0	0/0	0/0	0
Total	6/8 (14)	2/3 (5)	2/3 (5)	10/14	24

DISCUSSION

The majority of prevalence studies in India were either school-based or hospital-based. School-based studies exclude a large portion of CHD patients below the age of admission to school, and a significant proportion of CHD lesions had not been considered because many patients with severe CHDs drop out of school because of their low socioeconomic status. These types of studies reported a prevalence of 1-5/1000 individuals, which cannot be considered a true picture of the prevalence rate.12-¹⁶Although community-based studies included all strata of society, there was only 1 such study in India, which gave a prevalence of 4.2/1000 individuals.17 In present study authors found a prevalence of 5.3 per 10, 00. The prevalence is consistent with study done by Chadha et al, 2001 which is also a community based study.¹⁷ In present study authors found that the most common type of congenital heart disease found was VSD (34%), PDA (24.4%), and ASD (23.4%) among acyanotic congenital heart diseases and TOF (70.8%) among cyanotic congenital heart disease. These findings are in consistent with studies done by Wanni KA et and Bhat et al.^{18,19} Misra et al have found the prevalence was 1.3 per 1000 children and the commonest lesions were ventricular and atrial septal defects.²⁰ Their study was a school based and included school children in the age group 4 to 18 years and therefore explains low prevalence of CHD as compared to present study. Sawant et al have found prevalence of 13.28 per 1000 and these results higher than found in the present study.²¹ This may be due to the fact that present study was community based and the above-mentioned studies were hospital record based study.

Smitha et al reported that VSD had 31.82% (in the year 2000), 38.19% (2001), 38.06% (2002), 22.88% (2003) and 26.37% (2004) of prevalence among the all of CHDs in Mysore hospitals.²² Jatav et al had reported isolated ventricular septal defect (28.44%), isolated atrial septal defect (18.10%), patent ductus arteriosus (10.34%), isolated congenital pulmonary stenosis (6.03%) and tetralogy of Fallot's (6.03%).²³ The reported range of VSD in many studies varies from 21.3-42.8%. According to a meta-analysis of the prevalence of CHDs worldwide, ventricular septal defects are the most predominant type, followed by Atrial Septal defects and Patent Ductus Arteriosus, and Tetrology of Fallot is most prevalent among cyanotic heart defects.²⁴

In this study, TOF 8% of total CHD defects and 70.8% among cyanotic congenital heart diseases. The reported range of TOF prevalence is 4.6-18.3% of total defects (mean=6.99, 95% CI 4.725-9.246). It is also the most frequent cyanotic CHD in Western countries, though it accounts for a relatively low proportion of total CHDs. A study in Atlanta, USA (1998-2005), reported a prevalence of $0.47/1000.^{25}$ The EUROCAT study reported 0.2/1000, while a study in Iceland estimated a maximum of 0.5/1000 CHDs, and the prevalence in Taiwan was 0.63/ 1000 births.²⁶⁻²⁸ present study found a population prevalence of 0.4 /1000, which is the consistent reported thus far.

In present study more males (108) than females (104) were affected by acyanotic congenital heart diseases and more females (14) than males (10) were affected by cyanotic congenital heart diseases. But difference was statistically insignificant. In present study majority of CHD cases were detected in the age group 6 weeks to 6 years of age group at community level by RBSK screening program, which might have been otherwise missed for pretty long time.

CONCLUSION

Advancements in diagnostic technology and progress in therapeutic management might have improved the life expectancy of CHD patients in Western countries; however, the situation in developing countries like India is quite different. For better estimation of prevalence of congenital heart diseases, more elaborate communitybased studies are needed. Such community based studies can be easily done by collecting and analyzing data collected from screening programs like RBSK. Such community based screening programs helps in detecting silent cardiac ailments, their prevalence and pattern, and early therapeutic intervention. A few prevalence studies have been carried out piecemeal in different locations of India; and more such studies can be easily done by collecting and analyzing data collected under RBSK screening program.

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