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Original Research Article

A study of prevalence and pattern of congenital heart disease and rheumatic heart disease among school children

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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. Early detection among school children is a novel approach which is time saving and cost effective. The objective was to study prevalence and pattern of congenital heart disease and rheumatic heart disease among school children.
Methods: An institution based cross sectional study was conducted from July2008 to March 2009 among school children of all schools having 1st Standard to 10th Standard in Latur district. After obtaining necessary permissions and consent, students were screened for congenital heart disease by the health team.
Results: The prevalence of congenital and rheumatic heart disease was found to be 4.6 per 10,000 school children. The most common type of congenital heart disease found was VSD and ASD in 25.2% of cases each. They both together constituted more than 50% of the congenital heart disease among school children. The next most common type was PDA in 14.1% of cases followed by TOF in 11.7%. Rheumatic heart disease in the form of MS was seen in 12.3% of cases among the school children. PS constituted in 4.9%, TA in 4.3% followed by AS in 1.2% of cases. Ebstein anomaly and Bicuspid aortic valve was seen in one case each. In the present study, females were found affected more than males. In case of PS and TA, males outnumbered females. Ebstein anomaly and bicuspid aortic valve was present only in females.
Conclusions: Prevalence of congenital and rheumatic heart disease was 4.6 per 10,000. VSD and ASD were the most common types of congenital heart disease.

Keywords: Congenital heart disease, Prevalence, Pattern, School children

INTRODUCTION

Congenital heart diseases (CHD) refer to structural or functional heart diseases, which are present at birth. Some of these may be discovered later. These are primarily seen in neonates, infants and children; although in our country it is not uncommon to see adults with uncorrected CHD.

The burden of congenital heart disease in India is likely to be enormous, due to a very high birth rate. This heavy burden emphasizes the importance of this group of heart diseases.[1] Congenital heart diseases (CHD) are relatively common with a prevalence ranging from 3.7 to 17.5 per 1000 live births. According to a status report on CHD in India, 10% of the present infant mortality may be accounted for by CHD.

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.[2]

CHDs are one of the major causes of infant mortality. In 90% of the CHD cases, there is no identifiable cause that can be attributed as multifactorial defects, and the most cases are asymptomatic and discovered during routine neonatal check-ups.[3]

Early detection of congenital heart disease is of paramount importance to improve the quality of life of children and prevent morbidity and mortality. Early detection among school children is a novel approach which is time saving and cost effective.

Hence present study was planned to detect early and manage the cases of congenital heart disease among school children.

METHODS

It was institution based cross sectional study. Study period was from July 2008 to March 2009. Study place was all schools of Latur district. Study population were school children from 1st standard to 10th standard.

Institutional ethics committee permission was taken before the start of the study and after submitting the protocol to the ethics committee. Permission from the district education officer was taken to carry out the study in all school of the Latur district. Permission was also taken from each school principal to carry out the study in their respective schools. This was also regarded as the consent of study participants as they were minors.

An institution based cross sectional study was conducted from January 2013 to July 2014 among school children of all schools having 1st Standard to 10th standard in Latur district. After obtaining necessary permissions and consent, students were screened for congenital heart disease by the health team. The team consisted of a trained doctor, staff nurse and a pharmacist who were assigned to visit all the schools in the district, prepare health cards of the students, treat minor ailments and screen the children for possibilities of major diseases.

Any patient having the signs and symptoms like shortness of breath, difficulty in feeding, excessive sweating, bluish discoloration of lips and tongue, failure to thrive, clubbing, palpitation, feeling of discrepancy in pulse, cyanosis, heart murmur, abnormal chest X-ray, or strong family history, recurrent chest infections swelling of abdomen and feet, chest and abdomen pain, and loss of consciousness, etc. were identified for further evaluation. They were then re-examined by the cardiologist on site. Those with suspected cardiac lesions were undergone echo-cardiographic examination for confirmation of the diagnosis.

Prevalence, age and sex specific frequency of all kinds of CHDs observed were computed. The different types of CHDs considered for the present investigation are: VSD, atrial septal defect, TOF, patent ductus arteriosus (PDA), pulmonary stenosis, aortic stenosis, transposition of great arteries, double outlet right ventricle, tricuspid artesia, hypoplastic left heart syndrome, single ventricle, Ebstein anomaly, and complex. Echocardiography was performed by senior cardiologists.

RESULTS

Table 1: Sex wise distribution of school children.

Standard	Male	Female	Total
1st	19425	19072	38497
2nd	19237	18998	38235
3rd	18545	19056	37601
4th	17764	18591	36355
5th	18400	18015	36415
6th	18084	18343	36427
7th	17305	17679	34984
8th	16355	16823	33178
9th	15776	15543	31319
10th	15821	14929	30750
Total	**176712 (49.9%)**	**177049 (50.1%)**	**353761 (100%)**

A total of 3, 53, 761 school children from 1st Standard to 10th Standard were screened for congenital heart disease. Out of that 1, 76, 712 (49.9%) were males and 50.1% were females. Thus females were equally studying along with males (Table 1).

Table 2: Prevalence of congenital heart disease.

Congenital heart disease	Number	Proportion per 1000
Present	163	4.6 per 10,000
Absent	353598	9995.4 per 10,000
Total	**353761**	**100%**

Table 3: Prevalence of congenital heart disease according to the type.

Type of congenital heart disease	Number	Percentage
Ventricular septal defect (VSD)	41	25.2
Atrial septal defect (ASD)	41	25.2
Patent ductus arteriosus (PDA)	23	14.1
Tetralogy of Fallot (TOF)	19	11.7
Mitral stenosis (MS)	20	12.3
Pulmonary stenosis (PS)	08	04.9
Tricuspid atresia (TA)	07	04.3
Aortic stenosis (AS)	02	01.2
Ebstein Anamoly	01	00.6
Bicuspid aortic valve	01	00.6
Total	**163**	**100**

In the present study we found a prevalence of 4.6 per 10,000 school children (Table 2).

The most common type of congenital heart disease found was VSD and ASD in 25.2% of cases each. They both together constituted more than 50% of the congenital heart disease among school children. The next most common type was PDA in 14.1% of cases followed by TOF in 11.7%. Rheumatic heart disease in the form of MS was seen in 12.3% of cases among the school children. PS constituted in 4.9%, TA in 4.3% followed by AS in 1.2% of cases. Ebstein anomaly and Bicuspid aortic valve was seen in one case each (Table 3).

In the present study, females were found affected more than males. In case of PS and TA, males outnumbered females. Ebstein anomaly and bicuspid aortic valve was present only in females (Table 4).

Table 4: Distribution of types of heart diseases among children as per their age and sex.

Type of congenital heart disease	5-12 years		> 12 years		Total	
	Male	Female	Male	Female	Male	Female
VSD	11	17	09	04	20	21
ASD	19	17	00	05	19	22
PDA	09	08	01	05	10	13
TOF	09	06	01	03	10	09
MS	03	08	03	06	06	14
PS	04	01	01	02	05	03
TA	04	02	01	00	05	02
AS	01	01	00	00	01	01
Ebstein anomaly	00	00	00	01	00	01
Bicuspid aortic valve	00	01	00	00	00	01
Total	**60**	**61**	**16**	**26**	**76**	**87**

DISCUSSION

A total of 3, 53, 761 school children from 1st Standard to 10th Standard were screened for congenital heart disease. Out of that 1, 76, 712 (49.9%) were males and 50.1% were females. Thus females were equally studying along with males.

In the present study we found a prevalence of 4.6 per 10,000 school children. Kapoor R et al found a prevalence of 26.4 per 1000 patients which is higher than found in the present study.[2] This may be due to the fact that present study was community based and the said author study was hospital record based study. Wanni KA et al found a prevalence of 1.12 per 1000 patients.[3] This was also a hospital record based study and that may be the reason for their higher prevalence.

The most common type of congenital heart disease found was VSD and ASD in 25.2% of cases each. They both together constituted more than 50% of the congenital heart disease among school children. Similar findings were reported by Kapoor R et al and Wanni KA et al.[2,3]

The next most common type was PDA in 14.1% of cases followed by TOF in 11.7%. Rheumatic heart disease in the form of MS was seen in 12.3% of cases among the school children. PS constituted in 4.9%, TA in 4.3% followed by AS in 1.2% of cases. Ebstein anomaly and Bicuspid aortic valve was seen in one case each.

In the present study, females were found affected more than males. In case of PS and TA, males outnumbered females. Ebstein anomaly and bicuspid aortic valve was present only in females.

van der Linde D et al in their systematic review and meta-analysis reported that Asia reported the highest CHD birth prevalence, with 9.3 per 1,000 live births (95% CI: 8.9 to 9.7), with relatively more pulmonary outflow obstructions and fewer left ventricular outflow tract obstructions.[4] Reported total CHD birth prevalence in Europe was significantly higher than in North America (8.2 per 1,000 live births [95% CI: 8.1 to 8.3] vs. 6.9 per 1,000 live births [95% CI: 6.7 to 7.1]; $p < 0.001$).

Sipek A et al studied incidence of congenital heart defects. They found incidence rate of 197.83 per 10,000 live birth.[5]

Ishikawa T et al found that there were 104 cases of CHD in the 2067 live births.[6] Ventricular septal defect and patent ductus arteriosus were the most frequent cardiac abnormalities. The prevalence of new-borns with CHD who had signs or symptoms of CHD and/or required invasive intervention was 21.3 per 1000 live births.

Misra M et al reported that out of 118,212 children examined, 142 were found to have CHD.[7] The prevalence was 1.3 per 1000 children and the commonest lesions were ventricular and atrial septal defects, aortic stenosis with or without regurgitation, and pulmonary stenosis.

Sawant SP et al found that overall prevalence of CHD was 13.28 per 1,000 live births.[8] Ventricular septal defect (VSD) was the commonest CHD (42.86%) followed by Atrial septal defect (ASD) (25.71%) giving the prevalence of 5.69 and 3.41 per 1,000 live births respectively. Tetrology of Fallot's (TOF) was the main cyanotic CHD (8.57%) with the prevalence of 1.13 per 1,000 live births. VSD and TOF were prevalent in males. ASD was prevalent in females. Associated structural anomalies were detected in 22.86 % cases.

Bhat NK et al in their study, observed a prevalence of 8.54 per 1000 children attending hospital.[9] Only one fifth cases were diagnosed in neonatal period and the diagnosis was delayed beyond infancy in more than half of the cases. Ventricular septal defect (30.45%), atrial septal defect (17.63%), patent ductus arteriosus (9.62%), pulmonary stenosis (6.41%), tetralogy of Fallot (5.45%) and transposition of great arteries (5.13%) were the commonest defects observed. Only 9.29% of children with CHD underwent definitive treatment.

Mohammad N et al found that among 150 cardiac patients 55.3% were male and 44.7% were female.[10] Congenital heart diseases (CHD) seen in 89.3% and 10.7% had acquired heart disease. Among CHD 74.6% were Acyanotic lesions while cyanotic lesions were seen in 23.9% and 1.5% were cases of dextrocardia. Ventricular septal defect was the commonest Acyanotic lesion (29.9%) followed by atrial septal defect (25.4%). Among cyanotic heart diseases tetralogy of Fallot was the commonest lesion seen in 11.2% followed by transposition of great arteries and complex heart defect 5.2% and 3% respectively. Among acquired heart disease myocarditis was the commonest disease accounts 94% and pericardial effusion was seen in 6%.

Bhardwaj R et al reported that prevalence of CHD in general population was 6.3/1000.[11] ASD was the commonest lesion. CHD was more common in female.

Ashraf M et al observed a prevalence of 4.1/1000.[12] Ventricular septal defect (VSD) was the most frequent lesion seen in 69 (31.2%), followed by patent ductus arteriosus (PDA) in 36 (16.3%) children. Tetralogy of Fallot (TOF) was the most frequent cyanotic heart disease seen in 17 (7.8%) patients.

Glen S et al concluded that in 22% of patients with congenital VSD there were significant associated cardiac abnormalities.[13] Some of these abnormalities, such as aortic prolapse and regurgitation or infundibula pulmonary stenosis, may develop or progress subsequently and therefore should be sought during the initial assessment and monitored during follow up. Follow up to the age of 30 years allows the detection of most cases of aortic regurgitation. The prognosis from VSD is excellent and the risk of endocarditis in a population informed of the need for antibiotic prophylaxis is small.

Smitha R et al studied prevalence of CHDs for five years in Mysore hospitals ranges from 6.6 to 13.06 per 1000 live births.[14] The most frequent type of CHD was found to be VSD (40.47%) followed by ASD (19.06%), TOF (13.38%) and PDA (9.53%). It is clear that the maximum CHDs were detected in the first year of life when compared to the later years of life. The prevalence of CHDs in Mysore is increasing from 2000 to 2004 which might be due to the improvement of diagnosis, attention or awareness among the medical authorities on the disease.

CONCLUSION

Prevalence of congenital heart disease was 4.6 per 10,000 school children belonging to 1st standard to 10th standard in Latur district. This prevalence is lower compared to other studies which were mostly hospital based or they used the live births as denominator. So we can conclude that we found the prevalence of congenital heart disease among children who survived of fatal congenital heart disease.

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Ethical approval: The study was approved by the institutional ethics committee

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