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CLINICAL PRESENTATION OF CONGENITAL HEART DISEASE IN INFANTS AT TERTIARY CARE HOSPITAL

Pediatrics

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ABSTRACT

BACKGROUND: Congenital heart diseases (CHDs) account for 6-10 % of all the infant deaths, and 20 - 40 % of all infant deaths from malformations. About 25% of CHDs are life threatening and manifest before the first routine clinical examination. The aim of the study is to identify clinical signs/symptoms that best predicts CHD in newborns/infants.

MATERIAL & METHODS: This was a Cross-sectional observational study included children age between 0 to 1 year with suspected heart disease came to outdoor and indoor services of Department of Pediatrics, DMCH, Laheriasarai, Bihar from July 2020 to June 2021. The data was reported as frequency and percentages for categorical variables and mean ± SD for continuous variable

RESULTS: In our study there were 102 participants in total. Out of them 57 participants were ≤1 month of age i.e. 57(55.90 % of total, 29(28.4%) between 2-6 months,16 (15.7%) between 7-12 months. There were 55 males and 47 females. In the present study, tachycardia was present in 55(53.9%) out of 102 study participants, Failure to thrive in 17 (16.7%) ,Recurrent chest infection 18(17.6%),Suck rest suck cycle 32(31.4%), Forehead sweating 33(32.4%), Failure to maintain oxygen saturation84(82.4%) Increased precordial pulsations 26(25.5%)Murmur 76 (74.5%), Tachycardia 55(53.9%) and Cyanosis 28(27.5%).

CONCLUSION: Forehead sweating, suck rest suck cycle, tachycardia, murmur, cyanosis, increased precordial pulsations, recurrent chest infections and spo2 can be considered as an significant parameters in screening of CHD in children age less than one year living at high altitude.

KEYWORDS

Clinical Presentation, Congenital Heart Disease, Neonates, High Altitude.

INTRODUCTION

Congenital heart disease may be defined as an anatomic malformation of the heart or great vessels which occurs during intrauterine development, irrespective of the age at presentation. Congenital heart diseases (CHDs) account for 6-10 % of all the infant deaths, and 20 – 40 % of all infant deaths from malformations[1]. About 25% of CHDs are life threatening and manifest before the first routine clinical examination [1,2].

The worldwide incidence is around 2-8 per 1000 live births but the burden in India is huge due to very high birth rate[3]. Approximately 10% of present infant mortality in India may be accounted for by congenital heart disease[4].

About 25% of CHDs are life-threatening and may manifest before the first routine clinical examination[6,7]. Failure to identify these clinical symptoms immediately after birth leads to a delay in referral and increased mortality and morbidity.[8]

The present study, conducted in a tertiary care center, attempted to identify clinical symptoms that best predicts CHD in newborns/ infants.

AIMS AND OBJECTIVES

The aim of the study is to identify clinical signs/symptoms that best predicts CHD in newborns/infants.

MATERIAL AND METHODS

This was a Cross-sectional observational study included children age between 0 to 1 year with suspected heart disease came to outdoor and indoor services of Department of Pediatrics, DMCH, Laheriasarai, Bihar from July 2020 to June 2021.

Data collection: After taking pre informed consent for this study from parents or guardians, the data related to age, gender, altitude of residence was collected .

Confirmation of CHD: Presence of CHD was confirmed based on echo-cardiographic evidence of CHD. All children suspected to have CHD based on initial symptoms underwent echocardiography examination using echo machine. Pediatric and neonatal probe by consultant cardiologist. The 2D echo images were obtained and reviewed real time from sub costal, apical 4 chambers, parasternal long and short axis and suprasternal views supplemented with color flow imaging. Pulse and continuous wave Doppler interrogation as appropriate. The presence of CHD on echocardiography was taken as the CHD present.

Operational Definitions

Recurrent Pneumonia: ≥ 2 episodes in a single year with radiographic clearing between occurrences.

Tachycardia : The cutoff values taken for labeling tachycardia was different for different age groups and the values taken are as follows.

- ≤3 months ranging 110-160/minute.
- 3-6 months ranging 100-150/minute.
- 6-12 months ranging 90-130/minute.

Tachypnea : Any value exceeding this range was considered as tachypnea

- ≤3 months ranging 30-60/minute.
- 3-6 months ranging 30-45/minute.
- 6-12 months ranging 25-40/minute.

Failure to Thrive: weight consistently below the 3rd percentile for age and sex, progressive decrease in weight to below the 3rd to 5th percentile, or a decrease in the percentile rank of 2 major growth parameters in a short period.

DATA ANALYSIS

The data was reported as frequency and percentages for categorical variables and Mean ± SD for continuous variable with normal distribution. The diagnostic performance of the initial screening tools was tested by calculating sensitivity, specificity, positive and negative predictive value using two by two tables. Two sited p value of <0.05 was taken as the statistically significant.

The data was analyzed using Microsoft Excel version12 software.

RESULTS

In our study there were 102 participants in total. Out of them 57 participants were ≤1 month of age i.e. 57(55.90%) of total, 29(28.4%) between 2-6 months,16(15.7%) between 7-12 months. There were 55 males and 47 females. Most of the participants i.e. 41(40.2%) were residents of altitude ranging between 2000-3000 meters. Out of 102

study participants, 4 had history of GDM and only 3 participants had underlying congenital heart disease. None of our study participants had history of antenatal fever & heart disease in family.

In the present study, tachycardia was present in 55(53.9%) out of 102 study participants, Failure to thrive in 17 (16.7%), Recurrent chest infection 18(17.6%), Suck rest suck cycle 32(31.4%), Forehead sweating 33(32.4%), Failure to maintain oxygen saturation 84(82.4%) Increased precordial pulsations 26(25.5%), Murmur 76 (74.5%), Tachycardia 55(53.9%) and Cyanosis 28(27.5%). (Table-1).(Figure-1).

Table 1 : Socio-Demographic, Risk Factors and Clinical Characteristics of the Study Participants

Characteristics	Category	Male (%)	Female(%)	Total(%)
Age (%)	• ≤1 month	29(28.4%)	28(27.4%)	57(55.9%)
	• 2-6 months	16(15.6%)	13(12.7%)	29(28.4%)
	• 7-12 months	10(9.8%)	6(5.8%)	16(15.7%)
Mean age	2.86±3.53 months			
Altitude (m)	• ≤1000	14(13.7%)	10(9.8%)	24(23.5%)
	• 1000-2000	22(21.5%)	19(18.6%)	41(40.2%)
	• >2000	19(18.6%)	18(17.6%)	37(36.3%)
Risk factor for CHD	• H/O GDM	2(1.9%)	2(1.9%)	4(4.0%)
	• Fever with rash during pregnancy	0	0	00
	• Family H/O CHD	0	0	
Reasons for suspecting CHD	• Failure to thrive	13(12.7%)	4(3.9%)	17(16.7%)
	• Recurrent chest infection	14(13.7%)	4(3.9%)	18(17.6%)
	• Suck rest suck cycle	22(21.5%)	10(9.8%)	32(31.4%)
	• Forehead sweating	22(21.5%)	11(10.7%)	33(32.4%)
	• Failure to maintain oxygen saturation	49(48.03%)	35(34.3%)	84(82.4%)
	• Increased precordial pulsation	16(15.6%)	10(9.8%)	26(25.5%)
	• Murmur	45(44.1%)	31(30.3%)	76(74.5%)
	• Tachycardia	34(23.5%)	21(20.5%)	55(53.9%)
	• Cyanosis	19(18.6%)	9(8.8%)	28(27.5%)

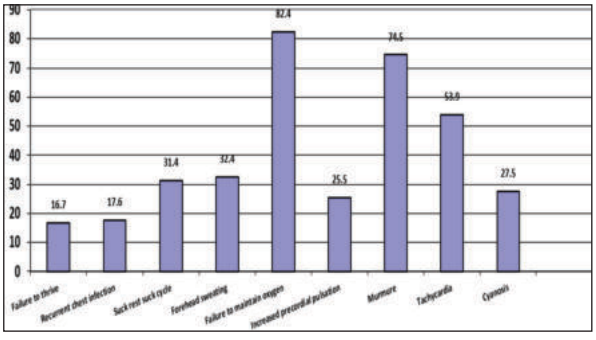

Figure-1: Clinical Characteristics of the Study Participants

In the present study, tachycardia was present in 55(53.9%) out of 102 study participants and out of these 55 patients, 48 were diagnosed with underlying CHD. Odds ratio was 2.7 with CI (1.2-5.94), with P value of 0.019, which is significant. Failure to thrive was seen in 16 patients among all 79 diagnosed patients with CHD. Odd ratio was 0.22 with CI (0.03-1.57), with P value of 0.14, which is not significant. 66(74.5%) patients had murmur on examination.

Odd ratio was 3.8 with CI (1.89-7.6) with a P value of 0.000 which is highly significant.

In the present study, 31(39.2%) patients had history of forehead sweating. Odd ratio was5.01 with CI (1.25-20.16) with a P value of 0.005 which is highly significant. In 30(38%) patients, there was history of suck rest suck cycle while feeding. Odd ratio was4.8 with CI (1.9-19.5) with a P value of 0.010, which is significant.

18 had history of recurrent chest infections and all of them were diagnosed with underlying congenital heart disease.

P value was 0.010 which was significant. 27(34.2%) had history of cyanosis with a P value of 0.003 which is significant.26(32.9%) had increased precordial pulsations with a P value of 0.001 which is highly significant. 69(87.3%) had persistence of oxygen requirement. Odd ratio was 2.4 with CI (1.24-4.96) with a P value of 0.026 which is highly significant.

Table 2 : Diagnostic Performance of Various Clinical Symptoms

		CHD		Total N(%)	Odds ratio (95%CI)	p-value
		Absent N(%)	Present N(%)			
Tachycardia	• Yes	7(30.4%)	48(60.8%)	55(53.9%)	2.7	0.019
	• No	16(69.6%)	31(39.2%)	47(46.1%)	(1.2-5.94)	
Failure to thrive	• Yes	1(4.3%)	16(20.3%)	17(16.7%)	0.22	0.14
	• No	22(95.7%)	63(79.7%)	85(83.3%)	(0.03-1.57)	
Murmur	• Yes	10(43.5%)	66(83.5%)	76(74.5%)	3.8	0.000
	• No	13(56.5%)	13(16.5%)	26(25.5%)	(1.89-7.6)	
Forehead Sweating	• Yes	2(8.7%)	31(39.2%)	33(32.4%)	5.01	0.005
	• No	2(91.3%)	48(60.8%)	69(67.6%)	(1.25-20.16)	
Suck rest cycle	• Yes	2(8.7%)	30(38.0%)	32(31.4%)	4.8	0.010
	• No	2(91.3%)	49(62.0%)	70(68.6%)	(1.9-19.5)	
Cyanosis	• Yes	1(4.3%)	27(34.2%)	28(27.5%)	8.3	0.003
	• No	22(95.7%)	52(65.8%)	74(72.5%)	(1.17-58.87)	
Recurrent chest infection	• Yes	0	18(22.8%)	18(17.6%)	NA	0.010
	• No	23(100%)	61(77.2%)	84(82.4%)		
Increased precordial pulsation	• Yes	0	26(32.9%)	26(25.5%)	NA	0.001
	• No	23(100%)	53(67.1%)	76(74.5%)		
Persistent oxygen requirement at room air	• Yes	15(65.2%)	69(87.3%)	84(82.4%)	2.4	0.026
	• No	8(34.8%)	10(12.7%)	18(17.6%)	(1.24-4.96)	

DISCUSSION

The present hospital based cross-sectional observational study was conducted among patients aged 0-1 year for a period of one year from July 2020 to June 2021. The primary aim of the study was to identify clinical signs/symptoms that best predicts CHD in newborns/infants. In the current study, 102 patients coming to pediatric OPD or indoor were included on the basis of criteria of suspicion and clinical parameters to detect CHD.

In the present study, 79(77.5%) patients (46 male and 33 female) were detected to have underlying congenital heart disease out of total 102 patients.

Maximum 57(55.9%) patients were of ≤1 month of age group and among them 44 (77.19%) had underlying congenital heart disease. So therefore, it is essential to recognize congenital heart disease in the early stages as the deterioration is sudden and, most of the children with complex heart disease die at presentation or before any surgical intervention is made9. Between 2-6 months, 29 (28.4%) patients were suspected of CHD, out of which 21(72.41%) had underlying CHD.

Between 7-12 months age group, 16(15.7%) patients were suspected of CHD out of which, 14(87.5%) had underlying CHD.

Vaidyanathan et al., in their study[2] screened 5487 newborns and CHD was detected in 425 neonates (7.75%). The low detection of CHD in their study was due to the fact that, they included all newborns born between February 2006-2009 prospectively, on the basis of many baseline characteristics of study population i.e. Gestational age, Family history of CHD, Consanguinity , Maternal diabetes mellitus, Pregnancy induced hypertension, Infections during pregnancy, Exposure to teratogenic drugs, Parental smoking and then pulse oximetry done in all of them at 48 hours of life. In another study done by Mohsin et al.,[10] 25 (1.5%) newborns were detected to have congenital heart disease out of total 1,650 screened cases. Study conducted by Mathur et al.,[11], detected 72 (7.57%) cases with congenital heart disease out of 950 screened cases. Our study has included participants between 0-1 year of age group, while most of the studies done on CHD screening included only neonates. Also in the present study, we used various clinical symptoms and parameters as a criteria for suspicion of CHD, which lead to higher detection rate of CHD.

In our study, out of 102 study participants, 4 had history of GDM and among them 3 participants had underlying congenital heart disease. Odd ratio was found to be 1.11 with 95% CI (0.19-6.32) with a P value 1.000,which is not statistically significant. Similar to our study results, in another study done by John Skim et al.,[12], Gestational diabetes was present in 6(3.7%) out of 258 included patients with a p value of 0.272. So in both of these studies there was no significant correlation between GDM and CHD.

Among 79 study participants having underlying congenital heart disease, 31(39.2%) had history of forehead sweating, with a P value of 0.005 which is highly statistically significant and 30(31.4%) had history of suck rest suck cycle while feeding, with a P value of 0.010,which is also statistically significant. It means that both forehead sweating and suck rest suck cycle are significant predictors of underlying CHD.

In the present study, out of 79 study participants having underlying CHD, 18 (22.78%) had history of recurrent chest infections and all of them were diagnosed with underlying congenital heart disease with P value was 0.010 which was statistically significant.

So, recurrent chest infection is a significant predictor of CHD as per our study.

In the current study, out of 79 study participants having underlying congenital heart disease, 27(34.2%) had history of cyanosis with a P value of 0.003 which was statistically significant. Similar to our study, Mathur et al.,[11] and Vaidyanathan et al.,[2] also concluded that the Central cyanosis was highly significant in diagnosing underlying CHD. It signified that cyanosis is significant predictors of underlying CHD.

In our study, out of 79 study participants having underlying congenital heart disease, 26(32.9%) had increased precordial pulsations with a P value of 0.001 which was statistically highly significant. Similar trends were seen in a study done by Vaidyanathan et al., [2], which also shown that abnormal precordial pulsation was significant to detect underlying CHD having p value of 0.005. So, both these studies add up to that increased precordial pulsation is a significant predictor in detecting CHD.

In the present study, out of 79 study participants having underlying congenital heart disease, only 16 participants were diagnosed with failure to thrive. There was no statistically significant relation between failure to thrive and CHD in our study as most of participants were ≤ 1 month of age.

Among 79 study participants having underlying congenital heart disease, 48(60.8%) were those having tachycardia and 31(39.2%) had normal heart rate. Odd ratio was 2.7 with 95% CI (1.2-5.94), with a statistically significant P value of 0.019.

CONCLUSION

It is essential to recognize congenital heart disease in the early stages as the deterioration is sudden and, most of the children with complex heart disease die at presentation or before any surgical intervention is made. We recommend that forehead sweating, suck rest suck cycle , tachycardia, murmur, cyanosis, increased precordial pulsations, recurrent chest infections and spo2 can be considered as an significant parameters in screening of CHD in children age less than one year living at high altitude

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