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A Study Of Echocardiography In Congenital Heart Disease And To Establish The Importance Of Echocardiography In Early And Accurate Diagnosis Of Congenital Heart Disease.

Dr. Lakhindrahansda[1], Dr.(prof) Anil kumarchaudhary[2], Dr. Rajeev ranjan[3]
[1](junior resident, Department of Pediatrics, Rajendra Institute of Medical Sciences,Jharkhand)
[2](professor Department of pediatrics, Rajendra Institute of Medical Sciences,Jharkhand)
[3](Senior resident, Department of pediatrics, Rajendra Institute of Medical Sciences, Jharkhand)

Abstract: *congenital heart disease is a significant cause of mortality and morbidity in our NICU and pediatric department. Many newborns and childrens are presenting with features of congestive heart failure and pulmonary arterial hypertension. So the study has been done to establish the importance of echocardiography in early and accurate diagnosis of congenital heart disease.*

Keywords: *Congenital heart disease, Echocardiography, Acyanotic, Cyanotic, Pulmonary arterial hypertension*

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I. Introduction

Congenital heart defect is defined as the structural, functional or positional defect of the heart in isolation or in combination, present since birth with manifestation at any time after birth. Congenital heart disease is the most common single group of congenital abnormalities accounting for about 30% of the total. The incidence of congenital heart disease varies from 10-12 per 1000 live birth. This is much more in preterm babies, spontaneous abortion and still birth to the tune of 10% of all. The following common lesions account for approx. 85% of all causes, which are ventricular septal defect, atrial septal defect, Patent ductus arteriosus, pulmonary valve stenosis, aortic valve stenosis, coaraction of aorta, tetralogy of fallots and transposition of great vessels. The remaining 15% account for the rare and complex lesion. Congenital heart disease as a whole, occurs with an equal frequency in males and females but some lesion in which male has a preponderance are aortic stenosis, coaractation of aorta, hypoplastic left heart and TGA and female has preponderance in patent ductus arteriosus and atrial septal defect and Ebstein anomely. Races has got no prelidiction or affinity towards congenital heart disease but some differences in the type of the lesion do occur. Extracardiac anomalies occur in about 25% of infant with significant cardiac defect. Despite a large number of cardiac defect exist, the clinical presentation are limited. The usual manifestation of congenital heart diseases is prominent anterior chest wall and recurrent chest infection along with tachypnoea in acynotic heart disease and in cyanotic heart disease apart from Tachypnea and tachycardia cyanosis is the usual menifestation with oligemic lung field. But in the cyanotic heart disease with plethoric lung field evidences of congestive heart failure is usual manifestation. Failure to thrive, stridor, hypercyanotic spell, chest pain and precordial pulsation also suggest probability of congenital heart disease. The diagnostic criteria suggested by Nadas for defining the heart disease is as following: systolic murmur Grade III or more especially with thrill, diastolic murmur, cyanosis and congestive cardiac failure. Besides these systolic murmur less than grade III in intensity, abnormal second heart sound, abnormal ECG, abnormal chest X-ray, abnormal blood pressure (as minor criteria). Radiography of chest is very important and useful tool to suppliment the clinical finding. Interpretation of chest radiograph involves evaluation of cardiac size and classical cardiac contours, lung vasculature, aortic arch helps in diagnosis in many cases. Like radiography electrocardiogram also complements clinical findings. The electrocardiogram gives valuable information about hemodynamic status of the defect and severity of the defect of certain lesions. Some times however septal defect like small ventricular septal defect, atrial septal defect and mild valvular abnormalities can be missed in imaging cardiography. Thus in doubtful cases Doppler Echocardiographic study can be used to detect abnormal flow patterns associated with left to right shunt and valve regurgitation or stenosis. Sometimes clinical finding along with chest X-ray picture pose difficulties in diagnosing the case as a congenital cyanotic heart disease with absence of murmur with plethoric lung field. In such type of cases Echocardiography is very essential. The echocardiography evaluates cardiac contractile function (both systolic and diastolic), gradient across the stenotic valves, the

direction of flow across the shunt, the patency of coronary arteries, presence of vegetations due to

endocarditis, the presence of pericardial fluid, cardiac tumor, aortic root dimension and effects of cardiotonic and cardiotoxic drugs. It has almost replaced invasive cardiac catheterization. Therefore present study was undertaken to evaluate various congenital heart diseases for their incidence and clinical presentation, the echocardiographic profile of congenital heart disease and to correlate it with clinical features in patients admitted in Rajendra institute of medical science, Ranchi Jharkhand.

II. Aims and Objectives

Aims and objectives of present study are to study¬-

1. To evaluate the clinical features of congenital heart disease.
2. Determine the incidence of congenital heart disease in pediatric age group in Rajendra instituteof medical sciences , Ranchi Jharkhand.
3. To establish the importance of echocardiography in early and accurate diagnosis of congenital heart disease.

III. Material And Method

The present study "Clinical and Echocardiographic Profile of Congenital Heart Disease in Pediatric Age Group in RIMS, Ranchi, Jharkhand" was carried out in Rajendra Institute of Medical Sciences. Ranchi. All the 7200 patients admitted in pediatrics department. Rajendra Institute of Medical Sciences, Ranchi, during a span of one year from 1st Jan. 2019 to 31 Dec 2019 was taken as cohort. All the suspected cases of congenital heart disease that attended in our outpatients department were admitted thus they automatically became part of the cohort.

SELECTION OF CASES: The assessment of a child or infant admitted for the presence or absence of heart disease was done with the help of some guidelines suggested by Nadas known as Nadas criteria which includes systolic murmur grade III or more in intensity especially with thrill, diastolic murmur, cyanosis & congestive cardiac failure as major criteria and systolic murmur less than grade ill in intensity, abnormal second heart sound, abnormal ECG, abnormal X-ray chest and abnormal blood pressure as minor criteria. Presence of one major or two minor criteria was essential for indicating the presence of heart disease. Besides this, recurrent chest infections, stridor, chest pain, shock hypercyanotic spells and failure to thrive, precordial pulsation and presence of extracardiac malformations were also taken into consideration. Care was taken to ensure that a case once enrolled in the study was not repeated when they came for followup.

PLAN OF STUDY: A total of 90 cases short listed from 7200 were subjected to detailed scheme of history taking, clinical examination and appropriate laboratory, radiological, electrocardiographic and echocardiographic examination. Clinical photographs wherever and whenever found to be of interest have been taken. The following scheme of history taking, clinical examination and investigations was followed:

1. Serial No.	2. Registration No.
3. Name.	4. Age/Maturity Term/Preterm/Post-Term.
5. Sex.	6. Religion.
7. Address.	8. Presenting Compliant.

9. History of Presenting Complaint.

a) Previous similar complaint.
b) Duration.
c) Aggravating or relieving factors.

10. Past History.
11. Antenatal History: Maternal infection, radiation, drugs exposure during pregnancy.
12. Developmental History: Developmental milestones and differences between the development of index child as compared to other siblings.

PHYSICAI EXAMINATION:

General Examination:

a) Appearance	b) Pulse	c) Respiration
d) Pallor	e) Icterus	f) Cyanosis
g) Clubbing	h) An apparent extracardiac anomaly	
i) Oedema	j) Temperature	k) Weight
1) Height		

SYSTEMIC EXAMINATION:

1. Chest/Respiratory system — Type of breathing, Dyspnea, chest expansion, vocal resonance, breath sound, crepitation, wheeze.
2. Cardiovascular system.

GENERAL PHYSICAL EXAMINATION; Pulse (rate, volume, rhythm, character, vessel wall, other peripheral pulses including volume and timing of femorals, sleeping pulse rate, blood pressure in both upper and lower limbs.

INSPECTION: Precordial bulge (costal or intercostals), pulsations over the precordium (normal, hyperdynamic or quiet), neck vessels, suprasternal area and epigastrium, collateral arteries and dilated veins, apex beat.

PALPATION:

Site and character (normal, tapping, heaving) of apex beat, point of maximal impulse of cardiac contraction, palpable heartsounds, left parasternal heave and thrills (site and timing in relation to cardiac cycle).

PERCUSSION: Outline of cardiac borders.

AUSCULTATION: Heart sounds, intensity, single or split, variable or fixed splitting of S2, third heart sound, gallop rhythm, fourth heart sound, opening snap and ejection clicks. CARDIAC MURMURS: Site of maximum intensity, grade, timing (systolic, diastolic or continuous), character (ejection, pansystolic, crescendo or decrescendo) and conduction.

3. ABDOMEN/ GASTROINTESTINAL TRACT: Distension, engorged veins, feel, tenderness, oedema of abdominal wall, flow of blood in engorged veins. Any enlargement of liver, spleen, kidney.

4. CENTRAL NERVOUS SYSTEM: Consciousness, skull size, Maceven sign, developmental screening, motor and sensory function. Autonomic dysfunction.

INVESTIGATIONS:

1. TLC & DLC of WBC, Hb%, ESR were done.
2. X-ray chest - PA view was taken as in AP view normal heart may mimic cardiomegaly.
3. ELECTROCARDIOGRAPHY: Tracing of all leads including limb leads and chest leads - was taken and variation of the norm at each age group was taken into consideration during evaluation.
4. ECHOCARDIOGRAPHY: Echocardiography uses ultrasound to image the heart and great vessels. A transducer containing a piezo electric crystal which interconverts electrical and mechanical i.e. (sound) energy functions both as the transmitter of sound as the receiver of reflected waves. Three types of studies were performed.

1. M-MODE ECHOCARDIOGRAPHY: A single transducer emitting 1000-2000/sec. along a single line provides an ice-pick view of the heart with excellent resolution. The direction of beam can be changes.
2. TWO DIMENSIONAL RFAL TIME IMAGING: It produces an image in two dimensions by steering the sound wave through upto 90° about 30 times/sec. It provides excellent spatial resolution permitting analysis of structural movement in real time from multiple transducer positions on the chest and upper abdomen.
3. DOPPLER ECHOCARDIOGRAPHY: It identifies blood flow rather than morphology, and displays flow in cardiac chambers and vascular channels based on the change in frequency imparted to a sound wave by the movement of RBCs. In pulsed Doppler and continuous wave Doppler, the speed and direction of blood flow in the line of echobeam change the transducer's reference frequency. This frequency change is used to determine systemic and pulmonary blood flow and to estimate the gradient across the valves. Color Doppler permits a more accurate assessment of the presence and direction of intracardiac shunts. Standardized colors depict flow towards (red) or away (blue) from the transducer.

For obtaining best result echocardiographic study was done keeping in mind the clinical findings. M-Mode, 2 dimensional real time imaging or Doppler study was done according to necessity. For sedation child was given either trichlofos (30 mg/kg) orally or injection diazepam (0.3 mg/kg) intravenous. Following points were emphasised while doing echocardiography.

1. Situs solitus or inversus.
2. AV & VA concordance.
3. Pulmonary and systemic venous drainage.
4. Great arterial relationship.
5. Intactness of atrial and ventricular septum.
6. Size of right atrium, right ventricle, left atrium and left ventricle and their muscular hypertrophy/atrophy.
7. Valvular status of tricuspid, mitral, pulmonary and aortic valves regarding stenosis/regurgitation.
8. Any vegetation or clot.
9. Pericardium.

IV. Observation

Incidence of congenital heart disease per 1000 cases.

Total number of cases surveyed	7200
Cases of CHD as diagnosed by echocardiography	74
Incidence per 1000 cases	10.28

Table -1 shows that incidence of congenital heart disease was 10.28 per 1000 children admitted.

Table -II

Incidence of types of congenital heart disease.

Types of CHD	Number of Patients	Percentage
Acyanotic	52	70.27
Cyanotic	22	29.73

Table -II shows that the incidence of Acyanotic congenital heart disease was 70.27% while that of cyanotic congenital heart disease was 29.73%

Table -III

Incidence of CHD among Tribal and non-tribal child.

	Number of Patients	Percentage
Tribals	20	27.03
Non Tribals	54	72.97

Table -III Indicates the incidence of congenital heart disease among tribal child was low (27.03%).

Table -IV

Sex distribution in Acyanotic CHD and Cyanotic CHD.

Sex	Acyanotic CHD (52)	Cyanotic CHD (22)
Male (52)	36 (69.23%)	16 (72.72%)
Female (22)	16 (34.05%)	6 (27.27%)

Table -IV shows sex distribution of CHD in indicates male predominance (72.72%) over female (27.27%) and types of CHD both Acyanotic and Cyanotic were more common is male as compared to female.

Table -V

Age of Presentation of congenital heart disease.

Age group	Number of Patients	Percentage
New born - 1 months	14	18.92%
1 months - 1 years	26	35.14%
1 years - 5 years	19	25.67%
5 years -10 years	03	4.04%
10 years - onwards	12	16.22%

Table - V shows that commonest age of presentation of congenital heart disease was 1 month - 1 year (35.14%).

Table - VI

Incidence of different Clinical Presentation in CHD.

s. No.	Clinical Presentation	Acyanotic CHD	Cyanotic CHD
1.	Dyspnea	36 (69%)	12 (55%)
2.	Recurrent chest infection	27 (52%)	-
3.	Cyanotic spell	-	12(55%)
4.	Failure to gain weight	25 (48%)	14 (64%)
5.	Cyanosis	-	19 (86%)
6.	Congestive cardiac failure	16 (31%)	04 (18%)
7.	Easy Fatiguability	14 (27%)	-
8.	Anemia	12 (27%)	-

Table -VI shows that the most common clinical presentation of Acyanotic CHD was Dyspnea (69%) and Cyanotic CHD was cyanosis (86%).

Table -VII

Observation of Role of ECG and X-ray chest in diagnosis of congenital heart disease.

Inv.	Abnormal	Normal	Sensitivity
ECG	50	24	67.57%
X-ray chest	46	28	62.16%

Table - VII shows that sensitivity of ECG as a tool of investigation was (67.57%) and X-ray chest has a sensitivity of (62.16%) in diagnosis of congenital heart disease.

Table - VIII

Incidence of individual lesions of congenital heart disease.

S. No.	Lesion	No. of cases	Percentage
1.	Ventricular septal defect	27	36.49%
2.	Tetralogy of Fallot	08	10.81%
3.	Patent ductus arteriosus	07	9.46%
4.	Atrial septal defect	15	20.27%
5.	Endocardial cushion defect	04	5.41%
6.	Pulmonary stenosis	01	1.35%
7.	Tricuspid Atresia	01	1.35%
8.	Complex cardiac anomalies	11	14.86%

Table - VIII shows ventricular septal defect was commonest lesion.Tetralogy of Fallot was the commonest lesion in cyanotic group. Complex cardiac anomalies accounted for 14.86% of all lesion.

Table - IX

Incidence of Complex Cardiac anomalies.

Anomalies	No. of cases	Percentage
PDA + AR +AS	5	45.46%
PDA +ASD	3	27.28%
VSD + ASD	3	27.2%

Table -X

Incidence of Congenital heart disease in different Age group.

S. No.	Lesion	0-1 months	1 month-1 years	1 year - 5 years	5 years - 10 years	10 years Onwards.
1.	Ventricular septal defect	-	17	08	01	01
2.	Tetralogy of fallot	01	03	02	-	02
3.	Patent ductus arteriosus	07	-	-	-	-
4.	Atrial septal defect	02	02	04	01	06
5.	Endocardial cushion defect	-	01	01	01	01
6.	Tricuspid atresia	-	-	01	-	-
7.	Pulmonary stenosis	-	-	-	-	01
8.	Complex cardiac anomalies	04	03	03	-	01
	Total	14	26	19	03	12

Table X shows ventricular septal defect was the commonest lesion in 1 month - 1 year period (35.14%). Patient ductus arteriosus was commonest lesion in neonatal period.

Table - XI

Incidence of different lesions in chromosomal abnormality (Down syndrome)

Lesion	Number	Percentage
Ventricular septal defect	5	71.43%
Endocardial cushion defect	2	28.57%

Table XI shows that ventricular septal defect was commonest CHD (71.43%) followed by Endocardial cushion defect (28.57%) in Down syndrome.

Table -XII

Incidence of type of ventricular septal defect as diagnosed by Echocardiography.

Type	No. of cases	Percentage
Small defect size (<4 mm)	10	37.04%
Moderate defect size (4-10mm)	13	48.15%
Large defect size (10-20 mm)	04	14.81%

Table XII shows that moderate size defect was the commonest type of VSD 48.15%) and large size defect was least common variety (14.81%).

Table - XIII

Incidence of type of ASD as diagnosed by Echocardiography

Types of ASD	No. of cases	Percentage
Ostium secondum	15	100%

Table XIII shows that Ostium Secondum type of ASD was commonest variety.

Table -XIV

Distribution of pulmonary arterial hypertension in CHD (n=19)

Lesion	No. of cases with PAH	Total no. of cases	Percentage
Ventricular septal defect	7	27	25.93%
Atrial septal defect	8	15	53.33%
Endocardial cushion defect	4	4	100%

Table XIV indicates relative incidence of Pulmonary arterial hypertension was maximum in Endocardial cushion defect (100%) followed by in Atrial septal defect (53.33%) and ventricular septal defect (25.93%).

Table -XV

Views of 2 D - Echocardiography taken in different lesion.

Lesion	Parasternal	Apical 4 chamber view	Subcostal	Suprasternal
V.S.D.	4	21	2	-
T.O.F.	08	-	-	-
P.D.A.	-	-	-	07
A.S.D.	-	-	15	-
E.C.D.	-	4	-	-
Pulmonary stenosis	01	-	-	-
Tricuspid Atresia	-	1	-	-
Complex cardiac	-	7	2	2
Total	13	33	19	09

Table XV shows the view showing best morphology in individual cardiac lesions. Parasternal view was best view for TOF, Pulmonary atresia and pulmonary stenosis while Apical 4 - chamber view was best for most of the cases of VSD and endocardial cushion defect and tricuspid atresia similarly subcostal view was best for atrial septal defect and suprasternal notch view was best for patent ductus arteriosus.

Table -XVI

Advantage of Echocardiography in suspected CHD (n=90)

Particulars	No. of cases
False positive cases identified	16
Cases without diagnosis by clinical profile diagnosed	4
Cases with wrong diagnosis correctly diagnosed	4
Cases with corrected diagnosis by Echocardiography	24
Percentage	27%

Table XVI shows importance of Echocardiography in diagnosis of congenital heart disease. In 27% of all cases correct diagnosis was established by echocardiography when other modes had failed.

V. Discussion

The present study "Clinical and Echocardiographic profile of congenital heart disease in pediatric age group in RIMS, Ranchi" was undertaken to evaluate various congenital heart diseases for their incidence and clinical presentation, the Echocardiographic profile of congenital heart disease & to correlate it with clinical features admitted in Rajendra Institute of Medical Sciences. Ranchi. Table I shows the incidence of congenital heart disease population wise. Out of 7200 cases admitted in Rajendra Institute of Medical Sciences, Ranchi. Only 74 cases were diagnosed to be the case of congenital heart disease, which constitute 10.28 per thousand live birth. Burton et al (1994) also showed the incidence to be 8 per thousand live birth. William Hay (1999) (CPDT) also quote the incidence of congenital heart disease in 0.8%. WHO (2000) reported the incidence to be 6-8 per thousand. Hegic H et al (2003) reported the incidence to be 6.12 per 1000 live birth. Nelson 2003 also reported the incidence of congenital heart disease to be 0.5 - 0.8% and further quote that the incidence may be high in still birth (3- 4%). The finding in present series of work is consistent with the finding of above workers. Table II indicate the incidence of Acyanotic heart disease was 70.27% and of cyanotic heart disease was 29.73%. Chadda SL (2006) reported the incidence of Acyanotic heart disease is 68% and of cyanotic heart

disease to be 32%. Fazlur Rahim et al (2007) reported the incidence of Acyanotic and cyanotic heart disease to be 66.6% and 33.8% respectively. Similar is the finding quoted in Braunwald (2007) Text book of heart disease.

Dickenson et al (1981) also reported incidence of Acyanotic and cyanotic heart disease is 71% & 21% respectively. Thus it seems that the incidence of acyanotic heart disease ranges from 60 - 70% and to that of cyanotic heart disease is approx. 30%. The finding in the present series of work is almost consistent with the finding of above workers. Table III indicate that the incidence of congenital heart disease among tribal child was low (27.03%). This may because even in the present modem era, they believe in their own traditional way of treatment (Jadu tona etc) leading to low incidence of attending the Hospital. This may be the reason why the lower incidence of congenital heart disease in tribal population. Table IV indicate the male: female ratio, and it was observed that the percentage of cases was more in male than female and type of congenital heart disease both acyanotic and cyanotic were more common in male. Begic H et al (2003) reported the incidence of male and female to be 4.6 and 3.7 per thousand live birth with the male: female ratio is 1.8: 1. Fazlur Rahim et al (2007) reported that the male: female ratio of congenital heart disease to be 2: 1. The finding in present series of work is consistent with the finding of above worker. Table V shows (1 month - 1 year) of age was the commonest age of presentation (35.14%) followed by (1 year - 5 year) age group 25.67%, neonatal period (18.91%) and (5 years to 10 years) age group 4.04% and 10 years onward (16.22%). Nearly similar result were obtained in most of the above workers.

Fazlur Rahim et al (2007) reported that the most common age of presentation of congenital heart disease was 1 years - 5 years (46.44%) followed by 5 years — 10 years (29.33%) then 1 Mo - 1 yrs (14%). Gupte et al (1998) reported that the most common age of presentation of CUD was 1 Mo - 1 Yrs (51.86%) followed by 1 yrs - 5 yrs (23.33%) during the period of 1 month -1 year the hemodynamic changes due to structural defect becomes established resulting in symptoms. Probably due to this reason this period is commonest age of presentation. Table VI indicate the incidence of clinical presentation in congenital heart disease that Dyspnea was the commonest (69%) in acyanotic heart disease followed by recurrent chest infection (52%) failure to gain weight (48%). features of CCF (31%) and easy fatiguability in 27%. Among associated findings Anemia was found in 27% cases. Bhave et al (1999) also reported that dyspnoea as a commonest symptoms in 86.79% followed by lower respiratory tract infection in 34.80% and failure to gain weight in 43.39%. Nelson (2012) report the tachypnea, chest retraction and nasal flaring was the commonest symptoms in Acyanotic congenital heart disease. In the present series of work on cyanotic heart disease. Cyanosis was the commonest presentation (86%) followed by dyspnoea (55%) and failure to gain weight (64%), cyanotic spell (55%), congestive cardiac failure (18%). Gupte et al (2004) reported that cyanosis as the commonest presentation (21.66%) and cyanotic spell in 5% their observation was made on all the cases including acyanotic heart disease as well.

Gingell RI et al (2003) and Saizer HR et al (2003) reported that impaired growth are common feature of many cyanotic and to a lesser extent acyanotic heart disease. The finding in the present series of work is consistent with the finding of above worker, that the dyspnoea and recurrent chest infection is most common presentation in Acyanotic heart disease and cyanosis is the commonest presentation in cyanotic heart disease. Table VII indicate the incidence of ECG abnormality was found in 67.57% and chest X-ray finding were abnormal in 62.16% of diagnosed cases of congenital heart disease. The abnormality in ECG and X-ray chest appear after some time of birth depending upon the severity of lesion. In mild form of congenital heart diseases they can be normal. This is one of the major drawback of these diagnostic modalities. Moreover the finding are vague in most of the complex lesions and at times are difficult to interpetate. Thus, with the advent of hi-tech investigation modalities like echocardiography its relevance is becoming lessened. X-ray chest shows cardiomegaly in many conditions other than congenital heart disease like anemia, pericardial effusion & metabolic disorder. However, they remain an important diagnostic tool in supplementing the clinical finding of congenital heart diseases. Table VIII indicate that ventricular septal defect was the commonest lesion (36.49%) in all congenital heart disease and Tetralogy of fallots was the commonest cyanotic heart disease (10.81%). This was followed by ASD (20.27%), Complex cardiac anomalies 14.86%, PDA 9.46% , ECD 5.41%, PS 1.35% and TA 1.35%. Dickenson et al (2006) reported that VSD was most common congenital heart disease (32%) and Tetralogy of fallots was most common congenital heart disease (6%) in cyanotic heart disease. Fazlur et al (2007) reported that VSD was most common congenital heart disease in acyanotic heart disease (46%) while TOF (25.3%) was most common in cyanotic heart disease. Chadha et al (2008) reported that VSD was commonest 46% & TOF (10%) in cyanotic heart disease. Braunwald Text Book of Cardiology (2001) indicates that most common congenital heart disease in acyanotic group was VSD (30.5%) and TOF (5.8%) in Acyanotic group. Miyagne NI et al (2012) reported that VSD was most common congenital heart disease in acyanotic Heart disease and TOF in cyanotic heart disease. The finding in the present series of work indicate that VSD was the commonest lesion in all case of congenital heart disease & TOF was commonest in cyanotic heart disease. This finding is almost consistent with the finding of above worker. Table IX indicate the total incidence of complex cardiac lesion was 14.86% all of which was acyanotic heart disease. Ferencz et al (1985) reported

that the incidence of complex cardiac lesion as 14% of all cases. Fyler et al reported in incidence of complex cardiac lesion besides TOF as 12% of all cases. The finding of the present series of work is nearly consistent with that of various studies done previously. Table X shows the incidence of different congenital heart disease in different age group. Patent ductus arteriosus present most commonly in neonatal period. Similarly VSD was the commonest lesion in 1 Mo - 1 Year age group (62.96%) Tetralogy of fallot was commonest in 1 mo-1 year age group (37.5%) and 25% among 1 year to 5 year. Atrial septal defect was common in 1 year to 10 years age group. Most of the study have reported almost similar incidence about the lesion at different age group. The reason behind early presentation of PDA may be because of its higher incidence in premature babies which is self limiting in most of the cases and hypoxia which causes ductus remains open. During the period of 1 Mo – l year hemodynamic rearrangements due to lesion start occurring in most of the congenital heart disease. The pulmonary vascular resistance which is higher in the foetal period start falling post natally when Pa 02 cone., increases and the right ventricular muscle mass involutes. The systemic pressure increase while pulmonary artery pressure falls due to lowering of the pulmonary vascular resistance. As a result, flow of blood through the ductus arteriosus reverses. Instead of blood flowing from pulmonary artery to aorta, as in the fetus, the blood flows from aorta to pulmonary artery. The duetus arteriosus constrict and closes off. The pulmonary and systemic circulation thus separate from each other soon after birth. At this time, however, the pulmonary pressure and resistance is equal or only slightly lower than the systemic pressure. Therefore even if communication between the two side like ASD or VSD or PDA there is very little flow from left to right side. The pulmonary vascular resistance fall rapidly to reach normal adult level by 2 to 3 weeks in normal babies. In presence of Acyanotic or cyanotic heart disease however the fall in pulmonary vascular resistance and pressure is slower and reaches adult value around 6-10 weeks.

Since there is very little flow across the abnormal communication like VSD or PDA they do not manifest in first few days of life. The murmur of these lesion tend to appear by the end of first week of life, it gradually increases in intensity as the pressure and resistance in the pulmonary circuit fall. Only by 6-10 weeks or more when resistance may have reached its lowest value, the maximum shunt would become apparent. That is why the clinical presentation and identification of congenital heart disease delayed. The symptoms of TOF is due to pulmonary infundibular stenosis and VSD. Pulmonary stenosis evolves slowly and thus TOF generally manifest after 1-2 years of age. Thus it is the commonest cyanotic heart lesion in the age group of 1 - 5 years and 5-10 years. Table XI indicates the incidence of congenital heart disease is chromosomal abnormality (Down syndrome). Out of 7 eases of Down syndrome in present series of work 71.43% were found to be ventricular septal defect and 28.57% had Endocardial cushion defect. Normand J et al (2001) reported that endocardial cushion defect 42.7% and VSD in 33.33% in trisomy 21. The result of the study are almost similar to that of Khalil et al who found that the commonest lesion in Down syndrome was VSD (31.7%) followed by endocardial cushion defect. Table XII indicate the incidence of types of VSD as diagnosed by Echocardiography. Moderate size lesion was found to be the commonest (48.15%) followed by small size lesion (14.81%) and large size lesion (37.04%). Large size lesion are associated with severe morbidity and mortality if the surgical correction is not done early Also the chances of their self healing are very remote as compared to small VSD which may often close on its own. Table XIII indicate the incidence of type of ASD as diagnosed by echocardiography. In present series of work it was only Ostium Secondum (100%) type. Kulkami ML (2003) paediatric cardiology reported that Ostium secondum type of ASD was commonest (80%). Braunwald (2001) also reported that ostium secondum type ASD was commonest type. Khalil et al (2001) also reported that ostium secondum was commonest ASD (50 - 70%). Table XIV shows the incidence of pulmonary arterial hypertension in congenital heart disease. Out of these 19 cases 7 were of VSD, 8 case of ASD and 4 case of endocardial cushion defect. The relative incidence of pulmonary arterial hypertension was maximum in endocardial cushion defect (100%). Normand J et al (2001) reported that pulmonary arterial hypertension was present in 69 out of 72 cases of endocardial cushion defect in their study i.e. 95.83%. The finding in the present series of work is almost consistent with the finding of above workers. Table XVI indicate the views of 2 D Echocardiography taken in different lesion and the views which showed the best morphology was observed. Parasternal long and short axis views ware taken in most of the cases. TOF. pulmonary atresia and pulmonary stenosis. Apical 4- chamber view was taken in, 77.78% of cases of VSD and Endocardial cushion defect. Similarly subcostal view was found to be best for lesion like ASD and suprasternal notch view was best for PDA.

Similar observation were made by Park, who also found parasternal view to be the best for TOF. apical 4 chamber view for VSD, subcostal view for atrial septal defect and suprasternal notch view for PDA. Table XVI shows importance of Echocardiography in diagnosis of congenital heart disease. In 27% of all cases correct diagnosis was established by echocardiography when other modes of diagnosis had failed. Cheitlein et al (1997) reported that Echocardiography has become the definitive diagnostic method and recognition and assessment of congenital heart disease. Joshi NC et al (2010) - Doppler Echocardiography can evaluate hemodynamic data regarding pressure difference across the aortic and pulmonaiy valve and detection of shunt flow. It has almost replaced invasive cardiac catheterization Fazlur Rahim et al (2007) reported in his study on pattern of congenital

heart disease in children, the final diagnosis of congenital heart disease was confirmed by Echocardiography. Link KM et al (2010) reported that Echocardiography is the primary diagnostic modality in study of congenital heart disease. Fazlur Rahim et al (2007) reported that 2D Echo with Doppler examination forms the gold standard for diagnostic of congenital heart disease. Two dimensional echocardiography provides essential structural information in all forms of cardiac and great vessel disease in pediatric patient. Doppler echocardiography provides important physiological information that, when combined with anatomic data, helps guide therapeutic management in some diagnostic categories. Reevaluation examination allow tracking of hemodynamic changes such as those occurring during the transition phase from fetal to newborn and infancy period (Musewe NN et al. 1987). Echocardiography provides clinical information to guide medical or surgical intervention and provide prognostic information. It is also valuable to track evolutionary changes in the cardio vascular system and to determine management subsequent to medical or surgical intervention. Perinatal physiological changes often mask or obscure the presence of hemodynamically important cardiovascular lesions. Echocardiography allows early recognition of lesion in the neonate with presumed sepsis or pulmonary disease in which either the pulmonary or the systemic circulation depends on the patency of the ductus arteriosus (Leung et al, 1988) (Huhta et al, 1984). Definite diagnosis in these lesions before ductal closure may prevent severe morbidity or death. Table XVII indicates the false positive and predictive value of clinical profile of congenital heart disease. The apparent physical finding in all the cases suggestive to be congenital heart disease was 90. But on echocardiography it was found to be 74 only leads to false positive cases of 16 with a percentage of false positive cases to be 22% and predictive value of 82%. This may be because of functional murmur which may present as pulmonary ejection click, vibratory murmur and venous hum.

VI. Summary And Conclusion

The present series of work is to evaluate the correlation of clinical and echocardiographic finding of congenital heart disease. It was observed that.

- The incidence of congenital heart disease was 10.28 per 1000 of admitted cases. Acyanotic & cyanotic heart disease constitute 70.27% & 29.73% respectively.
- Incidence of congenital heart disease among tribal child was low (27.03%).
- The commonest age of presentation of congenital heart disease was 1 month - 1 year (35.14%) followed by 1 year - 5 year (25.68%) and least common was 10 years onward (16.21%).
- Both acyanotic and cyanotic heart disease were more common in male as compared to females. Relatively cyanotic heart disease was more common I in females.
- Dyspnoea was the commonest (69%), clinical presentation in acyanotic heart disease followed by recurrent chest infection (52%), failure to gain weight (48%), congestive cardiac failure (31%) and easy fatiguability (27%) and anemia (27%).
- Most common clinical presentation of cyanotic congenital heart disease was cyanosis (86%) followed by dyspnoea (55%), failure to gain weight (64%) and cyanotic spell (55%).
- Patent ductus arteriosus was the commonest lesion diagnosed in neonatal period followed by ventricular septal defect and ventricular septal defect was the commonest lesion diagnosed in 1 month - 1 year age group (35.14%) and VSD was commonest overall individual lesion which constitutes 62.96%.
- Atrial septal defect was commonly diagnosed after 1 year of age. Ostium secondum type was the commonest type of atrial septal defect (100%).
- Tetralogy of fallot was the commonest cyanotic congenital heart disease identified (10.81%) and its clinical presentation was common in 1-5 years and 5-10 years age group.
- Complex cardiac anomaly constituted 14.86% of all lesion. Among the complex lesion all were acyanotic heart lesion.
- The sensitivity of ECG in diagnosing congenital heart disease was 67.57% and that of X-ray chest was 62.16%.
- In chromosomal abnormality (Down's syndrome) the commonest lesion was ventricular septal defect constitutes (71.43%) followed by Endocardial cushion defect (28.57%).
- Moderate type (shunt size 4-10 mm) was the commonest (48.15%) variety of ventricular septal defect followed by small type (size of shunt < 4 mm) (37.04%). Least common was large type (size of shunt 10-20 mm) (14.81%).
- The relative incidence of pulmonary arterial hypertension was maximum in Endocardial cushion defect (100%) followed by atrial septal defect (53.33%). Although maximum number of cases of pulmonary arterial hypertension were found in ventricular septal defect. Its relative incidence was 25.93%.
- Parasternal view was the best for diagnosing tetralogy of fallot, pulmonary stenosis and pulmonary atresia. Apical 4-chamber view was best view to diagnose ventricular septal defect and tricuspid atresia. Subcostal view of 2 D echocardiography was best to diagnose atrial septal defect and suprasternal view was best view to diagnose patent ductus arteriosus.

- Echocardiography was the best tool in diagnosing complex cardiac malformation and complicated cases.

Conclusion

Thus it appears that if the clinical findings are correlated and confirmed by the echocardiographic findings the sensitivity and predictive value raises 82% to 100% approximately. Therefore echocardiography should be done in each and every cases of congenital heart disease to confirm the diagnosis and evidences of pulmonary arterial hypertension so that early management can be done to save the child and to allow them to grow in normal parameters (physical and mental).

References: Park's Pediatric cardiology(6th Edition)

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