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IMPORTANCE OF 2D ECHO AS A ROUTINE SCREENING FOR CONGENITAL HEART DISEASES IN ALL NEWBORN

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ABSTRACT

INTRODUCTION

Significant risks of death, illness, and disability arise from a delayed identification of congenital cardiac disease (CHD). Echocardiographic investigations in infants may be useful in detecting CHD earlier and with higher sensitivity than when using other screening approaches because echocardiography is frequently used to diagnose the condition. The aim of present study is to determine the importance of 2D Echo as a routine screening for congenital heart diseases in all newborn.

MATERIAL AND METHODS

The present observational study was conducted at department of pediatrics among 500 newborns who visited for postnatal follow ups during the study period of one year. The newborns underwent echocardiographic screening within as a part of routine screening during their postnatal follow up. The statistical analysis was done by SPSS version 25.0 using t-test and chi square test. A p-value less than 0.05 was considered as significant.

RESULTS

Out of 500 newborns examined only 10 cases of congenital heart disease during postnatal clinical examination were found showing the prevalence of CHD as 2%. Among 10 cases 3 were of atrial septal defect, 4 were ventricular septal defect, 2 were of pulmonary stenosis and 1 were of aortic regurgitation. According to Ewer classification they were diagnosed as critical CHD (1); serious CHD (2), significant CHD (2) and non significant CHD (5).

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CONCLUSION

The detection rate of congenital heart disease (CHD) in infants without a prenatal diagnosis or clinical indications of the condition can be increased by including echocardiography screening as part of normal postnatal follow-up care.

KEYWORDS

Congenital Heart Disease, Echocardiography, Newborn, Postnatal Outcome, Screening.

INTRODUCTION

With an incidence of about eight per 1000 live births, heart problems are the most frequent congenital malformations.[1–2] In contrast, one or two newborns per 1000 have critical congenital heart disease (CCHD). Generally speaking, critical congenital heart disease (CCHD) is defined as CHD that results in death or necessitates catheterization or surgery within the first 28 days of life.[3] Postponing the diagnosis of congenital heart disease (CHD) can worsen the consequences of intervention and raise the risk of abrupt myocardial collapse and death.[2,4] As early discharge following delivery is increasingly preferred, newborns with congenital heart disease (CHD) are more likely to experience symptoms at home as opposed to in the newborn nursery.

Numerous risk factors that might be either maternal or foetal are linked to congenital heart defects (CHDs). Infections, a sibling's history of a heart abnormality, higher nuchal fold thickness or conspicuous nuchal translucency, structural defects in other systems, and intrauterine growth retardation (IUGR) in the mid-trimester are the fetal risk factors. Maternal risk factors include diabetes, autoimmune diseases such as Sjogren's syndrome or systemic lupus erythematosus, medication use (e.g., antipsychotics like lithium or antiepileptics), and the mother's coronary heart disease.[5] Among the several ECAs seen in association with CHDs are agenesis of the corpus callosum, spina bifida, oesophageal atresia, duodenal atresia, anal atresia, diaphragmatic hernia, omphalocele, cleft lip/palate, polydactyly, syndactyly, club foot, renal dysplasias, and pulmonary hypoplasia..[6]

Prenatal foetal echocardiography is the only means of detecting such defects in previous days but now post natal clinical examination with routine screening through 2D echocardiography of new born is the new way to rule out congenital heart diseases. Since echocardiography is frequently used to diagnose congenital heart disease (CHD), particularly when carried out by paediatric cardiologists, it may be useful in identifying the condition in neonates earlier and with a better degree of sensitivity than when using other screening techniques.[7]

However, few studies have assessed the effectiveness of hospital-wide echocardiography screening for CHD in newborns.[8-10] The aim of present study was to determine the importance of 2D Echo as a routine screening for congenital heart diseases in all newborn.

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MATERIAL AND METHODS

The present observational study was conducted at department of pediatrics among newborns who visited for postnatal follow ups during the study period of one year. The permission for conducting the study was taken from institutional ethical committee before commencement of study. The guardians were asked to sign an informed consent form after explaining them about the complete procedure. Consecutive sampling was done and total of 500 newborns were examined during their postnatal follow up visits at the department. Patients were selected on the basis of following eligibility criteria.

Inclusion Criteria

1. Newborns delivered at ≥36 weeks of gestation.
2. Newborn having a birth-weight of ≥2300 g.

Exclusion Criteria

1. Newborns admitted to the neonatal intensive care unit (NICU).
2. Newborns prenatally diagnosed with CHD.
3. Newborn with clinical signs or symptoms indicative of CHD before discharge.

During their postnatal follow-up, the babies had regular screenings, including echocardiography. Every echocardiography test was documented and examined. An intra-atrial connection measuring more than 5 mm in diameter combined with an enlarged right atrium and right ventricle was identified as an atrial septal defect. A fossa ovalis intra-atrial defect ≤4 mm in size was thought to be a patent foramen ovale. Echocardiographic follow-up for CHD patients was deemed complete for the purposes of this study when all cardiac lesions resolved on their own, when they underwent surgery, had a catheter inserted, or when they passed away. On the basis of the CHD severity classification proposed by Ewer and colleagues,[3] four CHD outcome categories were defined in this study: (i) critical CHD (which was defined in infants who had ventricular septal defect, coarctation of the aorta (CoA), aortic valve stenosis, pulmonary valve stenosis, Tetralogy of Fallot (TOF), pulmonary atresia (PA) with intact ventricular septum, simple transposition of the great arteries, or interruption of the aortic arch (IAA), as well as in infants who died or needed surgery within the first 28 days of life for any of these conditions.), (ii) serious CHD (this was identified in newborns needing intervention within the first year of life because to non-critical cardiac lesions) , (iii) significant CHD (It was defined as any cardiac lesion that did not meet the criteria for severe or critical care and persisted for more than six months of life.) , and (iv) non-significant CHD (described as any abnormalities that do not remain beyond six months of life and are not clinically noticeable). The outcomes were examined following the recording of all the clinical and demographic data. Mean±SD was used to express the data. The t-test and chi square test were used in SPSS version 25.0's statistical analysis. A significant p-value was defined as one that was less than 0.05.

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RESULTS

Out of 500 newborns examined only 10 cases of congenital heart disease during postnatal clinical examination were found showing the prevalence of CHD as 2% as shown in figure 1.

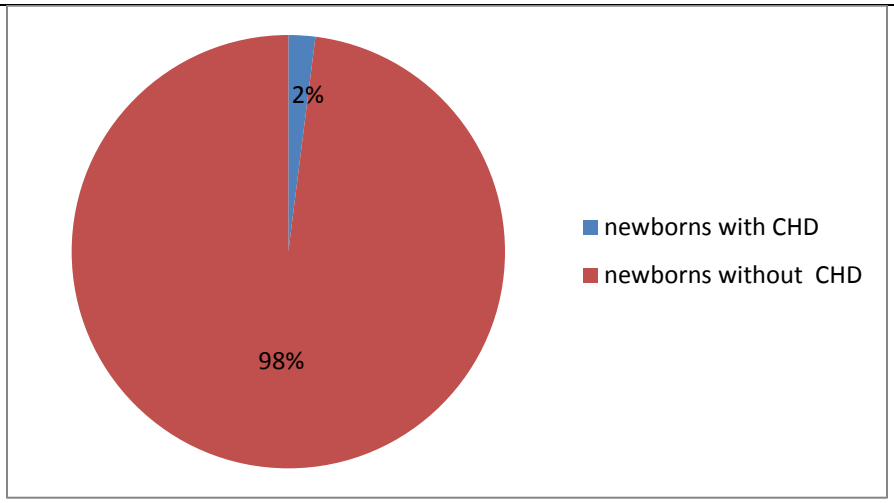

Figure 1: Prevalence of CHD among newborns

Among 10 case of CHD detected 3 were of atrial septal defect, 4 were ventricular septal defect, 2 were of pulmonary stenosis and 1 were of aortic regurgitationa as shown in table 1.

Type of CHD	Frequency
Atrial septal defect	3
Ventricular septal defect	4
Pulmonary stenosis	2
Aortic regurgitation	1
Total	10

Table 1: Distribution of patients according to type of congenital heart diseases

Patients with CHD showed that out of 10 cases 1 was of critical CHD, 2 cases were of serious CHD and significant CHD respectively and 5 cases were of non significant CHD as shown in table 2.

Type of Severity	Frequency
Critical CHD	1
Serious CHD	2
Significant CHD	2
Non significant CHD	5
Total	10

Table 2: Distribution of patients according to CHD severity classification

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DISCUSSION

The fetal heart is a challenging organ to evaluate because of the nature of the cardiac structure and the wide range of abnormalities. Furthermore, the purpose of routine prenatal ultrasounds is not to check for congenital heart defects (CHDs). Therefore, the majority of CHDs remain undiagnosed during the fetal stage. Consequently, most CHDs remain undiagnosed during the fetal stage. This is why the emphasis on introducing echocardiography as a part of routine screening during postal natal visit is taken into consideration.[11]

One of the most prevalent types of congenital abnormalities in humans is congenital cardiac disease. For the purpose of treating these instances, echocardiography's early diagnosis of CHDs is crucial. A family's decision on management and treatment options is aided by an early diagnosis. When CHDs are diagnosed early, the right medical care may be given right away, which eases the transition from prenatal to postnatal stages and reduces mortality and morbidity.[12,13]

The present study was done among 500 newborns who visited to department of pediatrics during their post natal follow up visit. According to this study, postnatal follow-up visits with neonates can detect CHD at a higher rate by routine echocardiographic screening. Additionally, early echocardiographic screening identified cases of typical congenital heart disease(CHD), facilitating prompt monitoring and treatment to lower the death rate.

In our study, the incidence of CHD was 10 per 500. A greater incidence of CHD was found by echocardiography (14.9 per 1,000 pregnancies) in a research by Stümpflen et al.[14] This might be the result of CHD instances going undiagnosed in the broader public. A much higher incidence of CHDs identified by echocardiography (20.3 per 1,000 births) was also reported by Nayak K et al..[15]

The gold standard for identifying congenital heart disease (CHD) is postnatal echocardiography. While it has significant drawbacks as a screening tool, it can be an effective means of reducing the condition in newborns. The use of echocardiographic screening is now viable in large-volume institutions, as it would result in an acceptable increase in disease detection in neonates. It can be implemented reasonably quickly in all hospitals. The death rate will also decline if skilled pediatric cardiologists are hired to follow up on all tests and perform screening echocardiogram on all babies. Screening costs can be easily covered by using government assistance and techniques.[16]

Important strength of the present study is that echocardiographic screening was conducted by experienced pediatric cardiologists so the results established are authentic and can be taken as a reference for future studies. The main limitation of our study is the small number of sample size and a single centre study. To generalize the results more research is needed on this topic at various centres.

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CONCLUSION

Echocardiographic screening help improve the detection rate of CHD in newborns who visited for postnatal follow up. In light of these findings, we can say that implementing this as a screening tool will help in reducing mortality rate among newborns.

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