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A study on foetal echocardiography in high risk antenatal mothers in a tertiary care centre

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Abstract
Introduction: Foetal echocardiography is the ultrasonic evaluation of the human foetal cardiovascular system. A variety of maternal or foetal disorders may result in abnormality of the foetal cardiovascular system to a degree which demands evaluation at a level above and beyond what is attainable with standard antepartum obstetrical ultrasound. Congenital heart disease is the most common congenital anomaly found in humans.
Materials and Methods: A total of 50 cases of antenatal mothers, who are having risk factors like diabetes mellitus, family history, are included in the study group. The foetal echocardiography was done for the pregnant mothers between the age group of 20 to 40 years at different gestational age after 20 weeks of pregnancy in AJ Institute of Medical Sciences and Research Centre, Mangalore between 2017 to 2018.
Results: Out of the 50 cases who underwent foetal echo most antenatal mothers were in their second pregnancy, mostly belonging to 26-30 years of age, presenting between 20-24 weeks of gestation. The study revealed 29 out of 50 cases of normal echo finding. 7 had a non-pathologic abnormal echogenic focus, and 14 had pathologic structural defects.
Conclusion: Foetal echocardiography is a reliable method of diagnosing congenital heart disease, especially in high-risk women

Keywords: Echocardiography, high risk pregnancy, congenital heart disease

Introduction

The incidence of congenital heart disease has been estimated at 6 to 12 per 1000 births. According to the WHO, cardiac defects account for 42% of infant deaths and have become the leading cause of infant mortality.

Congenital heart disease in new born is causing significant morbidity and mortality. Sometimes the severe CHD can lead to intrauterine foetal death. The incidence of CHD at birth varies depending on the maternal risk factors and genetic inheritance. Antenatal diagnosis of congenital malformations of heart is a challenging aspect for treating physicians. Non-invasive imaging modalities like USG and foetal echocardiography have a significant role in the antenatal diagnosis of CHD. The disadvantage of echocardiography is the sparsity of experts for diagnosis in semi-urban centres. Echocardiography is one of the best imaging modalities to diagnose CHD in suspected and high-risk patients.

Foetal echocardiography is the ultrasonic evaluation of the human foetal cardiovascular system. A variety of maternal or foetal disorders may result in abnormality of the foetal cardiovascular system to a degree which demands evaluation at a level above and beyond that attainable with standard antepartum obstetrical ultrasound. Congenital heart disease is the most common congenital anomaly found in humans.

The foetal echocardiography marks the primary tool for evaluation of foetal cardiovascular pathology from the late first trimester to term. Prenatal detection of CHD may improve pregnancy outcomes of foetuses with specific cardiac lesions. Accurate prenatal diagnosis offers potential clinical benefit with regard to infant outcome.

Women at a higher risk of foetal cardiac anomalies are those with

1. A family or an obstetric history of CHD
2. Foetus having an abnormal basic cardiac examination during first trimester scan
3. The presence of indirect markers for foetal CHD such as increased nuchal translucency, abnormal flow in ductus venosus, or tricuspid regurgitation
4. Foetuses with chromosomal anomalies
5. Foetuses with any other associated structural defect
6. Monochorionic twin pregnancies

7. Pregnancies from assisted reproductive technologies

Early identification of specific cardiac anomalies like aortic stenosis, might allow intrauterine treatment to improve perinatal outcome. Complete cardiac examination might be considered as part of routine foetal anatomy scan at 11 to 13.6 weeks of gestation.

Materials and Methods

The present observational study was conducted in the tertiary level Medical college teaching hospital, between 2017-2018. Ethical clearance was obtained from the Institutional Ethical Clearance Committee. A total of 50 pregnant mothers, who have undergone foetal echocardiography evaluation between 18 to 32 weeks of pregnancy were enrolled into the study. All the pregnant mothers who were enrolled, were having one or two risk factors for congenital heart diseases for foetus. Most common was diabetes mellitus in pregnancy, and elderly pregnancy. After explaining in detail about the benefits of foetal echocardiography and its non-invasive nature, certainty in diagnosis of foetal cardiac malformation were made to undergo foetal echocardiography at various gestational age as per the identification of risk factors and maternal compliance for the test.

The age group of pregnant women who were having risk factors for CHD were between ages of 20 to 40 years. Even though the higher age was an independent risk factor for CHD, we decided to include all age groups, to find age related distribution of CHD. In addition to that, all the enrolled cases were singleton pregnancies, with one or two definitive risk factors for foetal CHD. After obtaining consent, patient underwent foetal echocardiography, either as an outpatient or inpatient, depending on their obstetric status at time of study.

During the procedure, complete four-chamber evaluation of foetal heart is done. Depending on the presence or absence of malformations, detailed report is handed over to the patient. In presence of cardiac malformation, patients were counselled in detail regarding outcome of pregnancy and future course of treatment after discussing with paediatric cardiologist, who is available in-house. In cases of normal echocardiography result, the mothers were reassured about the status of the foetal heart, with minimal false negativity, which has to be confirmed after delivery by repeating the echocardiography on the neonate.

Results

Of the 50 antenatal mothers, who have undergone foetal echocardiography, for having one or two risk factors for CHD, were analysed according to age distribution. As per that, it has been found that maximum number of patients belonged to ages 26-30, whereas least number of patients presented between ages 36-40. As per the current information, elderly age could be an additive factor for the occurrence of congenital heart disease in the foetus in addition to other risk factors.

Table 1: Maternal age at time of foetal echocardiography

Maternal Age	Number of patients
20-25	13 (26%)
26-30	23 (46%)
31-35	13 (26%)
36-40	2 (4%)

In general, most of the foetal echocardiographies are done following foetal anomaly scan, usually at about 20-22 weeks of pregnancy, following suspicious findings on ultrasound. According to L. Caserta *et al*, the echocardiographic study of the foetal heart is optimally performed between 18 and 22 weeks of gestational age, a time window which enables the evaluation of most details of foetal cardiac anatomy [6]. But in our study, foetal echocardiography was done at various gestational ages for various indications, including late references by primary or secondary health care centres for further evaluation. As per that in this study majority of echocardiographies were done between 20 to 24 weeks of gestation, followed by 24 to 28 weeks of gestation. The least number of patients presented between 32 to 36 weeks of gestation.

Table 2: The gestational age at time of foetal echocardiography

Gestational Age	Weeks
18-20	9
20-24	16
24-28	11
28-32	7
32-36	8

Even though parity has no direct or indirect influence on the congenital heart disease or its occurrence, in our analysis, majority of patients who had undergone foetal echocardiography were in their second pregnancy. Least number of women presented in their 4th pregnancy.

Table 3: Parity score in present pregnancy

Parity Index	Number
Gravida 1	16
Gravida 2	21
Gravida 3	9
Gravida 4	5

Recent studies suggested improved physiological state after birth and improved surgical outcome for infants who have had prenatal diagnosis via foetal echocardiography [5]. In our study, out of 50 patients, 29 patients had normal foetal echo findings, which had a substantial effect on mother on relieving anxiety and stress related to existence of foetal cardiac anomalies. Twenty-one patients were diagnosed with abnormal echocardiography at varying severity. Out of the 21 patients, 7 had isolated echogenic focus in the left ventricle, and 14 patients had structural cardiac defects.

Table 4: foetal echocardiography results

Echo findings		
Normal	29 (58%)	
Abnormal	21 (42%)	
	Structural defects	Isolated echogenic focus
	14 (28%)	7 (14%)

Detailed analysis of abnormal foetal echocardiography was done. The most common abnormality was the presence of an echogenic focus in the left ventricle followed by dilated right atrium and right ventricle. Dextroposition of cardia was reported in 2 cases. Majority of cases featured a combination of multiple defects.

Table 5: detailed findings of abnormal foetal echocardiography

Dilated RA/RV	3
Dilated RA	1
Dextroposition + mildly dilated RA/RV	1
Small echogenic focus in LV	7
Dilated LA/LV	1
Outflow tracts not well visualized	1
Dextroposition + hypertrophied IVS	1
Tricuspid atresia + hypoplastic RV + Large muscular VSD with L to R shunt + dilated LA/LV	1
Moderate perimembraneous VSD with L to R shunt	1
Hypoplastic LV + small aortic arch with dilated RA/RV	1
2D drop out seen in IVS, no colour flow across	1
Corrected TGV, intact IVS, small echogenic focus in RV	1
Smallish LV, small sized ascending aorta, dilated RA/RV	1

Discussion

Congenital heart diseases are the most common foetal structural anomalies, either isolated or in association with other anatomical defects. CHD are strongly associated with chromosomal anomalies and genetic syndromes and can significantly modify the clinical outcome of affected foetuses. The prevalence of major cardiac defects varies from 3 to 12 per 1000 pregnancies in relation to the type of defect and study population, and to minor geographic variations included across different studies [11].

In our study, the most common age group of pregnant women who had undergone foetal echocardiography for defined risk factor were between the ages of 26-30 years. Similar mean age group was noted in a study by S Garg *et al*. [8]

As per this observational study, the mean gestational age at which the antenatal mother has undergone foetal echocardiography was between 20-24 weeks. Similar age group was noted in a study by S Sharma *et al*, where the mean age group at diagnosis was 22-23 years [10]. Similarities can be noted in study conducted by Meyer Wittkoff *et al*. where the median gestational age at which foetal echocardiography done on 1037 foetuses was 21weeks [2]. Another study by Carvalho *et al*. showed majority of patients being evaluated between mean gestational age of 20-24 weeks by foetal echocardiography for having one or more risk factors [4]. Study conducted in1996 by Ingrid Stumpflen *et al*. showed mean time for diagnosis of congenital heart disease was 26.9 weeks of gestation for the total study population [1].

Study by Garne *et al*, who did evaluation of prenatal diagnosis of congenital heart diseases by ultrasound, in 2000 reported that gestational age at detection of isolated cardiac defects was around 24 weeks which is similar to reports in our studies [3].

In our study, out of 50 patients, 21 foetal echocardiographies showed abnormal findings. However, 7 of the cases only had isolated small echogenic focus in left ventricle as the abnormal finding. According to S. Ozkutlu *et al*. in 2001, isolated echogenic focus is considered as a normal finding in the developing heart and hence is not considered as a pathologic symptom. In their study they detected 17 cases of isolated echogenic focus in 1370 cases, and none of them had any CHD or Down's syndrome [7]. Study conducted by K. Nayak *et al*. in 2016, reported that the CHD rate in low-risk women were around 20.3 per 1000 live-births. Out of 180 high risk cases, 2 antenatal mothers were detected to have a congenital heart disease by foetal echocardiography, which is significantly less than the incidence reported in our study [9].

In our study the most common structural defect noted was dilated RA/RV (3 out of 14 cases). Study by K. Nayak *et al*. stated that endocardial cushion defect was the most common structural defect [9].

Conclusion

Foetal echocardiography is a reliable method of diagnosing congenital heart disease, especially in high risk women. The availability of foetal echocardiography expertise is the determining factor in most of the health care centres in the diagnosis of CHD. Antenatal diagnosis or exclusion of CHD makes a positive impact on maternal well-being and to chart out the treatment plan after delivery. So at the end, our study strongly recommends foetal echocardiography to all mothers who have a risk factor for congenital heart disease like diabetes in pregnancy, maternal congenital heart disease, etc.

References

1. Stümpflen I, Stümpflen A, Wimmer M. Effect of detailed fetal echocardiography as part of routine prenatal ultrasonographic screening on detection of congenital heart disease. Lancet. 1996; 348:854-7.
2. Meyer-Wittkopf M, Cooper S, Sholler G. Correlation between fetal cardiac diagnosis by obstetric and pediatric cardiologist sonographers and comparison with postnatal findings. Ultrasound Obstet Gynecol. 2001; 17:392-7.
3. Garne E, Stoll C, Clement M, Euroscan Group. Evaluation of prenatal diagnosis of congenital heart diseases by ultrasound: experience from 20 European registries. Ultrasound Obstet Gynecol. 2001; 17(5):386-91.
4. Carvalho JS, Mavrides E, Shinebourne EA, Campbell S, Thilaganathan B. Improving the effectiveness of routine prenatal screening for major congenital heart defects. Heart. 2002; 88(4):387-91.
5. Rychik J, Ayres N, Cuneo B. American Society of Echocardiography guidelines and standards for performance of the fetal echocardiogram. J Am Soc Echocardiogr. 2004; 17:803-10.
6. Caserta L, Ruggeri Z, D'Emidio L. Two-dimnesional fetal echocardiography: where we are. Journal of Prenatal Medicine. 2008; 2(3):31-35
7. Ozkutlu S, Akca T, Kafali G, Beksac S. The results of fetal echocardiography in a tertiary center and comparison of low-and high-risk pregnancies for fetal congenital heart defects. Anatol J Cardiol. 2010; 10(3):262-69.
8. Garg S, Sharma P. use of fetal echocardiography for characterization of fetal cardiac structure in women with normal pregnancies and gestational diabetes mellitus. J Ultrasound Med. 2014; 33:1365-1369.
9. Nayak K, Chandra GSN, Shetty R, Narayan PK. Evaluation

of fetal echocardiography as a routine antenatal screening tool for detection of congenital heart disease. Cardiovascular Diagnosis and Therapy. 2016; 6(1):44-49.
10. Sharma S, Kaur N. Role of echocardiography in prenatal screening of congenital heart diseases and its correlation with postnatal outcome. Journal of Clinical and Diagnostic Research. 2017; 11(4):TC12-TC14.
11. Hernandez-Andrade E, Patwardhan M, Cruz-Lemini M, Luewan S. early evaluation of the fetal heart. Fetal Diagn Ther. 2017; 42:161-173.