

# Profile of Fetal Echocardiography in a Tertiary Cardiac Centre of Nepal

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Received: 2-Jan-2018; Accepted: 15-Jan-2018

**Aims:** To analyze the fetal echocardiographic diagnosis.

**Methods:** A descriptive study of fetal echocardiographic diagnosis at Shahid Gangalal National Heart Centre between October 2016 to September 2017.

**Results:** Total of 615 fetal echocardiography was performed in 607 pregnancies. Intrauterine heart disease noted in 79 cases. Echogenic intracardiac foci was the most common abnormality (6%) followed by VSD (1.3%), fetal arrhythmia (1.1%), pericardial effusion (1.6%), cardiomyopathy (0.3%), hypoplastic left ventricle (0.6%), DORV (0.3%) and tricuspid atresia (0.4%). Similarly, the most common referral for fetal echocardiography was for maternal disorder mostly diabetes mellitus.

**Conclusions:** Fetal echocardiography is an important tool for the antenatal diagnosis of congenital heart defects. Appropriate timing and judicious use increases the sensitivity and improves the perinatal outcome of newborns with congenital heart disease

**Keywords:** congenital heart disease; fetal echocardiography; Nepal

<http://dx.doi.org/10.3126/njog.v13i1.21610>

## INTRODUCTION

Heart defects are the most common congenital malformation in a fetus.<sup>1</sup> The incidence of CHD is 8 per 1000 live births.<sup>2-4</sup> Improvements in the antenatal diagnosis of cardiac anomalies have resulted in a significant reduction in neonatal morbidity and mortality.<sup>5,6</sup> Moreover, early diagnosis provides an appropriate pre and post natal planning, allowing appropriate prenatal counselling and improving parental psychological state. Emergent treatments and procedures, such as initiation of prostaglandin to maintain patency of the ductus arteriosus and balloon atrial septostomy, can be planned ahead of time, thereby avoiding hemodynamic compromise.<sup>7-9</sup> Ultrasound imaging of the fetal heart has been an established modality for detection of cardiac diseases in prenatal period. Fetal echocardiography is an advanced imaging tool requiring sophisticated ultrasound system and highly skilled manpower. Currently available ultrasound technology permits definition of complex fetal cardiac pathology in the hands of experienced clinicians and sonographers

much as is done after birth.<sup>10</sup> Its use is not readily available specially in resource limited countries like Nepal. Fetal echocardiography services began in 2007 in Shahid Gangalal National Heart Centre and continues to be one of the few centres in Nepal with ongoing services. Here, we present the one year result of fetal echocardiography performed in the only referral centre of Nepal.

## METHODS

All cases who underwent fetal echocardiography from October 2016 to September 2017 were included in the study after taking informed consent from the participants. Demographic profile, gestational age, reason for referral, maternal history and family history was recorded. Fetal echocardiography was performed by two dimensional, pulsed wave and color doppler echocardiatic methods using a Philips Affiniti 70G echo machine with a convex array probe with frequencies between 1MHz to 5MHz. The major scanning views obtained were four chamber view, outflow tract view, three vessel view and ductal and arch view. The cardiac situs, ventriculoarterial connections, venous inflow, atrial and ventricular

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chambers, atrioventricular and semilunar valves and cardiac rhythm were assessed.

## RESULTS

Total of 615 fetal echocardiography was performed in 607 pregnancies. Among them 536 fetal echocardiography were found to be normal and intrauterine heart disease noted in 79 cases. The most common referral for fetal echocardiography was for maternal disorder mostly diabetes mellitus, screening purpose and significant family history [Table-1].

**Table 1: Indication for referral for Fetal Echocardiography**

Indication	No.	%
Maternal Disorders	244	40.1
Screening	141	23.2
Family History	139	22.8
Abnormal USG	57	9.3
Fetal abnormality	26	4.2

The most common cardiac finding was echogenic foci followed by structural defects [Table-2].

**Table-2: Findings in Fetal echocardiography**

Echocardiographic findings	Number (percentage)
Echogenic Foci	37 (6%)
Pericardial effusion	10 (1.6%)
Isolated VSD	8 (1.3%)
Fetal arrhythmia	7 (1.1%)
Hypoplastic left ventricle	4 (0.6%)
Tricuspid atresia	3 (0.4%)
Cardiomyopathy	2 (0.3%)
DORV	2 (0.3%)

One each of TAPVC, TGA, Intra cardiac mass, AVSD, Ebsteins Anomaly, Dextrocardia with common inlet double outlet single ventricle

Note: VSD: Ventricular Septal Defect, TAPVC: Total Anomalus Pulmonary Venous Return, AVSD: Atrioventricular Septal Defect, DORV: Double Outlet Right Ventricle

## DISCUSSION

Routine screening with obstetrical ultrasound may not detect subtle cardiac abnormalities which are the most common congenital malformation in a fetus. Moreover cardiac disease is known to occur more frequently in apparently low risk pregnancies.<sup>11</sup> However, according to the American Society of Echocardiography, the primary indications for fetal echocardiography are fetal heart abnormalities or fetal arrhythmia detected by routine prenatal sonography along with family history of congenital heart disease, maternal diabetes or systemic lupus erythematosus, fetal exposure to

a teratogen, fetal karyotype abnormality, and other fetal system abnormalities.<sup>12</sup>

Our study shows a five-fold increase in the volume of fetal echocardiography over a period of two years in the same centre.<sup>13</sup> In our study, most common referral indication for fetal echocardiography was maternal condition, mostly diabetes mellitus, followed by abnormal prenatal sonographic findings and family history. Similar referral patterns are found in various literatures<sup>14,15</sup> Whereas in some studies abnormal cardiac findings in prenatal sonography was major referral indication.<sup>16,17</sup> Postnatal echocardiograms or pathology and autopsy reports, and patient medical records.

## RESULTS

Of 6,002 pregnant women who had undergone prenatal sonographic examination during the study period, 275 (4.6%) With the incidence of congenital heart disease of 8-10 per 1000 live births, the incidence of fetal echocardiography is estimated to be ten times more.<sup>18</sup> This increased incidence of heart disease in the fetus depends on the systematic screening and definite protocols for fetal cardiac screening within a country. In our study the frequency of intrauterine heart disease is 12.8 % which is concordance with the literatures.<sup>19-21</sup> The most common finding was echogenic focus in the left ventricle which was 6% in our study which is similar to the study done by Shipp et.al.<sup>22</sup> Echogenic foci in the heart has been known to be present in 1.5-4.0% of pregnancies which can reach to up to 10-30% in Asian populations.<sup>22,23</sup> Pericardial effusion which is defined as an accumulation of pericardial fluid in utero of thickness of than 2 mm was found in 2% of low risk pregnancy by Dizon-Townson et al which is similar to our observation.<sup>24</sup> Fetal arrhythmia may be defined as an irregularity of the cardiac rhythm, as an abnormally slow (<100 bpm) or fast (>180 bpm) heart rate, or as a combination of irregular rhythm and abnormal heart rate. Fetal arrhythmias are detected in at least 2% of unselected pregnancies during routine obstetrical scans and are a common reason for referral to the fetal cardiologist.<sup>25</sup> In present study, 7 out of 615 (1.1%) fetuses had arrhythmia, 5 of which were sinus bradycardia without associated structural heart disease and 2 of them were complete heart block.

**Limitations:** Major limitation of our study was the lack of follow up of the newborns screened and the absence of autopsy report of aborted fetuses.

## CONCLUSIONS

The increasing number for fetal echocardiography performed in the centre suggests increasing referral for early detection of cardiac abnormalities.

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