

## **A Study of Cardiac Diseases in Pregnancy in a Tertiary Care Hospital in Bangalore, Karnataka, India**

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### **ABSTRACT**

**Background:** Cardiac disease complicates 1-4% of pregnancies. It is one the most important cause of morbidity and mortality. Cardiologists and obstetricians are facing a higher number of patients with cardiac disease because of multiple reasons—higher incidence of obesity, chronic hypertension and large number of children with congenital heart disease undergoing corrective surgeries and attaining pregnancy.

**Methods:** A retrospective study was conducted for 5 years from January 2016 to December 2020 at the department of Obstetrics and Gynaecology in ESIC Medical College and Postgraduate Institute of Medical Science and Research, Bangalore, Karnataka, India. Among 8709 pregnant patients attending the clinic, 120 patients with cardiac disease was identified and included in the study and the type of disease along with the outcome was determined.

**Results:** Cardiac disease among pregnant patients in our study was found to be 1.37% (120 cases out of 8709 patients). Of this 53 patients were primigravida, and 67 patients were multigravida. Among this congenital heart disease was the most common, accounting for 47 cases (39.16%), followed by Rheumatic heart disease in 33 cases (27.5%).

**Conclusion:** Cardiac disease can complicate anytime during pregnancy. So early detection and proper follow up with ECG and Echocardiography as and when required is necessary. A multidisciplinary approach with obstetrician, physician, cardiologist and anaesthetist is necessary to prevent the mortality and morbidity.

**Keywords:** Cardiac disease, Pregnancy, RHD, Congenital heart disease, Peri Partum Cardio Myopathy

### **INTRODUCTION**

Cardiac disease complicates 1-4% of pregnancies [1]. It is one the most important cause of morbidity and mortality. The ratio of rheumatic heart disease to congenital heart disease is decreasing due to improved paediatric care and improved surgical interventions in early childhood.

Also more patients with cardiac diseases are now attempting pregnancy because of

the improved availability of life saving modern therapy [2].

In pregnancy there is a 3 to 4 fold increase in risk of myocardial infarction compared with age matched non pregnant women of comparable age [3].

Due to the changing trend of advanced age at pregnancy, there is a rise in the associated risk factors like atherosclerosis and obesity.

However, in developing countries, many women do not have pre pregnancy evaluation, and are diagnosed with cardiac diseases during antenatal period or during labor. Many of the clinical features of cardiac diseases like breathlessness, pedal oedema, and murmur can also occur in normal pregnancy, therefore requiring a careful approach.

Physiological changes occur in the cardiovascular system in pregnancy due to elevated levels of estrogen and progesterone which leads to increase in the maternal intra and extra vascular fluid volumes, atrial and ventricular size, adrenergic responsiveness.<sup>4</sup> Cardiac output increases by 30-50% during pregnancy, peaking at the end of second trimester and reaching a plateau until delivery. Acute hemodynamic changes occur during Labor and postpartum period that may result in maternal decompensation. Heart rate, blood pressure and cardiac output all increase with uterine contractions and the magnitude of the change increases as labor advances [5].

Patients with cardiac diseases are more prone to develop complications like pre eclampsia, pre term labor, which increases the overall maternal and fetal morbidity and mortality. Hence it is important to identify these patients, evaluate them and provide proper care during the antenatal,

intra partum and post partum period for a better outcome.

#### **AIMS AND OBJECTIVES**

- 1) To study the incidence of cardiac disease in pregnancy.
- 2) To study the distribution of different types of cardiac lesions.
- 3) To study the maternal and perinatal outcome.

#### **MATERIALS AND METHODS**

A retrospective study was conducted for 5 years from January 2016 to December 2020 at the department of Obstetrics and Gynecology in ESIC Medical College and Postgraduate Institute of Medical Science and Research, Bangalore, Karnataka, India. All antenatal patients having cardiac disease, diagnosed before pregnancy or during antenatal, intrapartum or post partum period were included in the study. Among 8709 pregnant patients attending the clinic, 120 patients with cardiac disease were identified and included in the study and the type of disease along with the outcome was determined.

#### **RESULTS**

The total number of patients with cardiac diseases was found to be 120 out of 8709 patients accounting for 1.37% of cases. Of this 47 cases were congenital heart disease and 33 RHD. Among the congenital heart disease, ASD was the most common, accounting for 23 cases.

**Table 1: Distribution of Cardiac Conditions**

Type of Cardiac Disease	Number of Cases	Percentage
Congenital Heart Disease	47	39.1
RHD	33	27.5
Mitral Valve Prolapse	16	13.3
Arrhythmias	10	8.33
Other valvular heart disease	5	4.16
PPCM	3	2.5
Pericardial Effusion	2	1.66
Ischemic Heart Disease	2	1.66
Viral myocarditis	1	0.83
Cor pulmonale	1	0.83

**Table 2: Distribution of Congenital Heart Disease**

Type of Congenital Heart Disease	Number of Cases	Percentage
ASD	23	48.93
VSD	11	23.4
Bicuspid aortic valve	3	6.38
Dextrocardia	2	4.25
Corrected PDA	2	4.25
Severe AS	2	4.25
Persistent Foramen Ovale	1	2.12
Corrected Tetralogy of Fallot	1	2.12
TGA	1	2.12
Pulmonary Stenosis	1	2.12

53 patients in the study were primigravida, while 67 patients were multigravida.

**Table 3: Parity**

Parity	Number of cases	Percentage
Primi	53	44.16
Multi	67	55.83

Majority of the cases in our study belonged to 20 – 30 years of age.

**Table 4: Age Distribution**

Age	Number of Cases	Percentage
≤ 20 years	11	9.16
21 – 25 years	41	34.16
26 – 30 years	48	40
31 – 35 years	16	13.33
36 – 40 years	4	3.33

108 cases were terminated at term  $\geq$  37 weeks of gestation). 12 preterm deliveries occurred of which 2 cases of intra uterine fetal demise occurred. These 2 patients had developed associated pre eclampsia and severe IUGR with Oligohydramnios.

**Table 5: Period of Gestation at Termination**

Period of gestation	Number of Cases	Percentage
< 37 weeks	12	10
$\geq$ 37 weeks	108	90

In our study, 66 patients delivered by LSCS. 40 patients delivered by Full term vaginal delivery.

**Table 6: Mode of Delivery**

Mode of Delivery	Number of Cases	Percentage
LSCS	66	55
FTVD	40	33.3
VAVD	7	5.8
FAVD	2	1.6
PTVD	3	2.5
IUD	2	1.66

There were 2 twin gestations in our study. 96 babies weighed  $\geq$  2.5 kg while 26 babies weighed < 2.5 kg.

**Table 7: Birth Weight**

Birth Weight	Number of Cases	Percentage
< 2.5 kg	26	21.31
≥ 2.5 kg	96	78.68

In our study, 20 patients had associated hypothyroidism.

**Table 8: Comorbidities**

Condition	Number of Cases	Percentage
Bronchial asthma	1	0.83
Hypothyroidism	20	16.66
Overt Diabetes	2	1.66
Chronic hypertension	1	0.83
Pulmonary tuberculosis	1	0.83

13 patients during our study developed pre eclampsia, 7 had anemia, gestational diabetes mellitus was seen in 4 cases.

**Table 9: Obstetric and Fetal Complications**

Complication	Number of Cases	Percentage
Twins	2	1.66
Preeclampsia	13	10.83
Gestational Diabetes mellitus	4	3.33
Anemia	7	5.83
IUGR	5	4.16
Oligohydramnios	6	5
Abruption	1	0.83
MCA infarct and hemiparesis	1	0.83

## DISCUSSION

In the present study, we determined the type of cardiac lesion and the fetomaternal outcome. In our study cardiac disease was found in 1.37% cases. In the study by Sheela *et al*, the incidence of cardiac disease in pregnancy was found to be 1% [6]. In the study by Pandey *et al* it was found to be 0.8% [7]. Similar incidence of 1.72% was found in the study by Priya *et al* [8].

In our study 47(39.1%) cases were congenital heart disease, with rheumatic heart disease accounting for 33(27.5%), Mitral valve prolapse in 16, arrhythmias in 10 cases, PPCM in 3 cases. In the study by Priya *et al*, the proportion of RHD was 39.7% [8]. Earlier studies of Indian population showed a prevalence of RHD ranging from 68-88%. There has been a steady decrease in the cases of RHD due to

improved awareness and access to healthcare. Also a shift in the trend towards more cases of congenital heart disease is seen due to improved corrective surgeries, and more advanced life saving therapy, thus more of such patients becoming pregnant. Congenital heart disease was seen in 29.7% cases in the study by Kamat *et al* [9].

In our study ASD was the most common congenital heart disease accounting for 48.9% cases. Similar result was obtained in the study by Pandey *et al* and Kamat *et al* with ASD being the most common among the congenital heart disease [7,9].

In our study 44% patients were primigravida and 55.8% patients were multiparous. Similar result of 45.9% primigravida was obtained in the study by

Kamat *et al* [9]. Study by Salam *et al* showed primigravida to be 60% [10].

40% of patients were aged 26–30 years, and 34.16% patients were aged between 21 – 25 years in our study. Study by Bhatla *et al* showed the mean age to be  $25.66 \pm 3.9\%$  [11]. This is in agreement with the study by Salam *et al* where 37.8% were between 20-25 years and 36.7% were aged 26–30 years [10]. The higher numbers of cases with advancing age are due to increase in obesity, atherosclerosis as the age progresses accounting for some of the acquired causes.

90% of the cases were terminated after term gestation ( $\geq 37$  weeks). 10% cases were terminated  $< 37$  weeks of gestation. This is in agreement with the study by Pandey *et al* where 87.2% cases were term [7]. The study by Bhatla *et al* showed that 75% of cases were  $\geq 37$  weeks period of gestation [11].

In our study 55% cases underwent LSCS, 33.3 % cases by FTVD, 5.8% by Vacuum assisted vaginal delivery and there were 2 Intra uterine fetal demise. These 2 patients had developed associated pre eclampsia and severe IUGR with Oligohydramnios. In the study by Priya *et al* LSCS was done in 30% cases and vaginal delivery occurred in 52% [8]. In the study by Kamat *et al* LSCS was done in 35% cases and vaginal delivery in 51.3% [9]. The high proportion of LSCS in our study was due to high number of patients with previous LSCS (50.74%) followed by fetal distress in 13.4% and Cephalopelvic disproportion in 13.4% cases.

In our study 78.68% babies weighed  $\geq 2.5$  kg. Similar result was obtained in the study by Bhatla *et al* where 71.04% babies weighed  $\geq 2.5$  kg [11]. Study by Kamat *et al* showed similar result with 81.8% babies weighing  $\geq 2.5$  kg [9]. Medical comorbidities like hypothyroidism existed in 16.6% cases in our study. In the study

by Pandey *et al* hypothyroidism was seen in 5.1% cases [7].

In our study 10.8% patients developed pre eclampsia, 3.33% had Gestational diabetes mellitus, 5.83% had anemia, IUGR in 4.16% and Oligohydramnios in 5% cases. This is in agreement with the study done by Kamat *et al* where pre eclampsia was seen in 8.5% cases [9]. In the study by Pandey *et al* pre eclampsia occurred in 20% cases and IUGR in 5.12% cases [7].

In our study, 2 patients had intra uterine fetal demise due to development of severe pre eclampsia with severe oligohydramnios. Peripartum cardiomyopathy is a rare syndrome that presents late in pregnancy or post partum. The diagnostic criteria for peripartum cardiomyopathy is [5].

- 1) Heart failure within the last month of pregnancy or within 5 months post partum
- 2) Absence of prior heart disease
- 3) No determinable cause
- 4) Echocardiographic indication of left ventricle dysfunction
  - Ejection fraction of  $< 45\%$  or fractional shortening of  $< 30\%$ .
  - Left ventricle end diastolic dimension of  $> 2.7\text{cm}/\text{m}^2$

These patients usually present with dyspnoea, cough, orthopnoea, tachycardia. Women with a diagnosis of PPCM in a previous pregnancy are at a higher risk for heart failure in subsequent pregnancies.

The NYHA (New York Heart Association) grades functional capacity of heart into 4 grades.

**Grade 1:** No limitation. Ordinary physical activity doesn't cause undue fatigue, dyspnea or palpitations.

**Grade 2:** Slight limitation of physical activity. Ordinary physical activity results in fatigue, palpitation, dyspnoea or angina pectoris.

**Grade 3:** Marked limitation of physical activity. Less than ordinary physical activity leads to symptoms.

**Grade 4:** Unable to carry on physical activity without discomfort. Symptoms present even at rest.

The modified WHO classification of maternal cardiovascular risk grades into 4 classes.

**Class 1:** In this class, conditions include uncomplicated, small or mild pulmonary stenosis, patent ductus arteriosus, mitral valve prolapse; successfully repaired simple lesions (atrial or ventricular septal defect, patent ductus arteriosus, anomalous pulmonary venous drainage); atrial or ventricular ectopic beats, isolated. Here there is no detectable increased risk of maternal mortality and no or mild increase in morbidity.

**Class 2:** In this class, conditions include unoperated atrial or ventricular septal defect, repaired Tetralogy of Fallot and most arrhythmias. If otherwise well and uncomplicated, there is small increased risk of maternal mortality or moderate increase in morbidity.

**Class 2 or 3:** In this class, conditions include mild left ventricular impairment, hypertrophic cardiomyopathy, native or tissue valvular heart disease not considered WHO 1 or 4, Marfan syndrome without aortic dilatation, aorta < 45 mm in aortic disease associated with bicuspid aortic valve, repaired coarctation. Depending on the individual risk is as indicated in class 2 or class 3.

**Class 3:** In this class, conditions include mechanical valve, systemic right ventricle, Fontan circulation, cyanotic heart disease (unrepaired), other complex congenital heart disease, Aortic dilatation 40-45 mm in Marfan syndrome, aortic dilatation 45-50 mm in aortic disease associated with bicuspid aortic valve. Here there is significantly increased risk of maternal

mortality or severe morbidity. Expert counselling required. If pregnancy is decided upon, intensive specialist cardiac and obstetric monitoring needed throughout pregnancy, childbirth and the puerperium.

**Class 4** – in this class, conditions include pulmonary artery hypertension of any cause, severe systemic ventricular dysfunction (LVEF<30%, NYHA 3-4), previous peripartum cardiomyopathy with any residual impairment of left ventricular function, severe symptomatic mitral or aortic stenosis, Marfan syndrome with aorta dilated > 45mm, aortic dilatation > 50 mm in aortic disease associated with bicuspid aortic valve, native severe coarctation. Pregnancy is contraindicated in this category. There is extremely high risk of maternal mortality or severe morbidity. If pregnancy occurs, termination should be discussed. If pregnancy continues, care as for class 3.

In our study all patients belonged to NYHA grade 1 or 2. By early diagnosis and appropriate combined approach with the help of cardiologist and anesthetist we were able to manage most of the cases without any serious morbidity.

Most of the patients in our study were diagnosed antenatally, and managed appropriately with a multidisciplinary approach with the help of cardiologist and intensivist. Appropriate precautions were taken when they go into labor, and LSCS was conducted only when indicated.

One patient, who was a known case of severe MR, went into spontaneous labor suddenly, and developed pulmonary edema due to the increased cardiac output during labor. This complication was immediately identified, patient was managed appropriately with diuretics, with the help of intensivist and cardiologist, and patient responded to treatment well and recovered.

## CONCLUSION

All patients with cardiac disease should be managed in a tertiary care centre. Patient with certain cardiac disease like severe pulmonary hypertension, Eisenmenger syndrome, Coarctation of Aorta and history of peripartum cardiomyopathy are better advised to not to conceive, to prevent maternal mortality and morbidity.

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