

## PREGNANCY COMPLICATED BY MATERNAL HEART DISEASE: A CLINICAL STUDY AT A TERTIARY REFERRAL CENTRE

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### Abstract

**Background:** Heart disease remains a leading cause of indirect maternal deaths during pregnancy accounting for 20% of all cases. Many significant circulatory changes accompany pregnancy in women with preexisting cardiovascular disease; these alterations in haemodynamics can be dangerous. Therefore, patients should be evaluated for underlying cardiac disease to select appropriate management. **Aims:** The aim of this study is to evaluate the influence of biological factors in Maternal and Perinatal Outcome in Heart Disease Complicating Pregnancy. **Materials and Methods:** Department of Obstetrics and Gynecology, Sri Krishna Medical College & Hospital (SKMCH), Muzaffarpur, Bihar from Sep 2020 to Aug 2022 on 50 pregnant women with heart disease. **Result:** Based on age among the pregnant women with heart disease, about 38% were in the age group of 21 to 25 years. Gestational age of the pregnant women at the time of admission to the hospital was studied: 66% of the patients belong to term gestation. Preterm labour accounted to 32% & 1 women with heart disease was referred to our hospital as post-dated. Majority of the cases with heart disease were referred with antenatal check-up elsewhere i.e., outside government hospital 84% and 62% of the patients had cardiac disease diagnosed prior to present pregnancy. The cardiac functional status of the pregnant women with heart disease at the time of admission to the hospital was studied: Most of the patients have stable cardiac status and they fall under class I - i.e., 66%. 18% of the pregnant women belong to NYHA class II, 10% belong to NYHA class III and 6% of the cases belong to NYHA class IV at the time of admission. **Conclusion:** Heart disease is the most common non-obstetric cause of maternal morbidity and mortality. It also has a major impact on neonatal outcome. Favourable outcome is noted in women with NYHA class I and II, avoidance of factors precipitating heart failure like anemia, infections, arrhythmias, regular cardiac follow up, strict adherence to cardiac medications.

## INTRODUCTION

In the presence of maternal heart disease, the circulatory changes of pregnancy may result in decompensation or death of the mother or fetus.<sup>[1-3]</sup> Heart disease complicates 0.2–4% of all pregnancies in the western world.<sup>[4]</sup> Incidence of cardiac disease complicating 1 to 4% of pregnancies in India.<sup>[5]</sup> Major hemodynamic alterations occur during pregnancy, labor, and delivery and the postpartum period. These changes begin to take place during the first 5 to 8 weeks of pregnancy and reach their peak late in the second trimester. In patients with preexisting cardiac disease, cardiac decompensation often coincides with this peak. Heart disease constitutes the major non-obstetric cause of maternal deaths.<sup>[5]</sup>

Cardiac diseases in pregnancy are broadly classified into congenital and acquired. The acquired group includes rheumatic heart disease, cardiomyopathies, ischemic heart disease. Among acquired group, rheumatic heart disease is commonest in developing countries including India. Ischemic heart diseases and cardiomyopathies are common in the developed countries.<sup>[6]</sup>

In the presence of maternal heart disease, the circulatory changes of pregnancy may result in adverse consequences, including death of the mother or fetus. Pregnancy is a challenge to women with heart disease because of the 50% increase in plasma volume and six-fold increase in the risk of thrombosis. In developing countries, quite a large number of women become pregnant without seeking therapeutic intervention for cardiac lesions and many

of them are only diagnosed with heart disease during pregnancy.<sup>[7]</sup>

The keys to successful diagnosis and management of incipient disease are: a high index of suspicion, particularly in women with known risk factors for cardiovascular disease; a low threshold for radiological investigations; early cardiology input; and invasive monitoring during labour and delivery.<sup>[7]</sup> Management of pregnant women with pre-existing cardiac problems should be undertaken by multidisciplinary teams in tertiary centers.<sup>[7]</sup> In women with pre-existing cardiac disease wishing to proceed to term, cardiac status must be optimized preoperatively and preferably a planned elective delivery should be scheduled.<sup>[7]</sup>

The present study was undertaken to study the current maternal and fetal outcome in patients with heart disease.

#### **Aim & Objectives**

1. To know maternal and perinatal outcome,
2. To plan outcome of pregnancy (normal delivery or lower segment cesarean section)
3. To determine rate of maternal mortality, perinatal mortality and heart disease in baby.

## **MATERIALS AND METHODS**

This Prospective Observational Study done under indoor patients of Department of Obstetrics and Gynecology, Sri Krishna Medical College & Hospital (SKMCH), Muzaffarpur, Bihar from Sep 2020 to Aug 2022 on 50 pregnant women with heart disease.

#### **Selection of patients**

All pregnant women with congenital or acquired cardiac lesions or those with cardiac arrhythmias were studied. A proforma was pre designed to gather the minimum but essential information regarding heart disease in pregnancy. Keeping in mind the limitations of resources the proforma was made simple and brief. Baseline data was recorded at the first visit which include age, parity, gestational age, NYHA class, co-morbidity, prior cardiac events (if any than either intervention done or not), cyanosis, medications etc.

#### **Inclusion Criteria**

All patients with heart disease complicating pregnancy irrespective of gestational age – without any other medical illness & Pregnant women diagnosed to have cardiac disease during hospital stay.

#### **Exclusion Criteria**

Pregnant patients with associated medical illness like anemia, PIH, chronic kidney disease, GDM are excluded from the study and those who did not give consent for the study.

Pregnant women with cardiac disease in NYHA class I and II are admitted at 36 weeks of gestation. NYHA class III and IV are admitted to hospital at once the diagnosis is made. Cardiac symptoms if arise at any period of gestation admitted immediately and intensive care is given to such patients. Conditions precipitating heart failure like anemia, infections,

preeclampsia should be treated promptly. Drugs taken by cardiac patients should be revised and cardiology opinion to be obtained. Penicillin prophylaxis is given in RHD. Infective endocarditis prophylaxis-Inj. Ampicillin (50mg/kg) and Inj. Gentamycin (3mg/kg). Caesarean delivery is done for obstetric indications few cardiac indications for LSCS are pulmonary hypertension, Eisenmenger syndrome, Coarctation of aorta. During labour patient is kept in bed in propped up position, nasal oxygen administered. IE prophylaxis if needed is administered. Strict monitoring of vital signs, restriction of IV fluids, cardiac drugs to be continued in intrapartum period when needed. Second stage of labour is curtailed by applying outlet forceps with liberal episiotomy. Episiotomy wound is sutured in layers. In the post-partum period patient is monitored for PPH, pulmonary edema, LRI and special precautions are taken to prevent these complications. Cardiologist review should also be obtained in postpartum period. Breast feeding was started as early as possible. Babies were examined by pediatrician. All newborn babies are immunized as per national schedule.

#### **Obstetric Outcome**

Obstetric complications observed in mother are missed abortion, incomplete abortion, preterm labour, one maternal death due to atrial fibrillation with embolic manifestation. Otherwise, women are delivered by natural labour, LSCS or by assisted vaginal delivery.

#### **Cardiac Outcome**

Cardiac complications observed were pulmonary edema, intra op fall in saturation, sudden worsening of NYHA grade or sudden cardiac arrest and cardiac death.

#### **Neonatal Outcome**

Neonatal outcomes observed were low birth weight, preterm birth, small for gestation, IUGR, large for gestation, baby with single umbilical artery, respiratory distress syndrome. These babies require admission to NICU.

Postnatal women who delivered are counselled for adapting any of the available forms of contraception and also the risks involved in future pregnancies should be explained to the patient and her partner, which is most important. Birth spacing for a minimum of three years should be advised for primigravida mothers. Puerperal sterilization is advised for the women who have completed their families. In women in whom PS could not be done, vasectomy is advised to their spouse. In the women who have not completed their family or in whom sterilization procedures could not be carried out IUCDs are inserted under strict aseptic precautions with infective endocarditis prophylaxis.

#### **Statistical Analysis**

Statistical analysis was carried out, taking into account the major causes of maternal morbidity, obstetrics events, outcomes of the neonate and the mother, interventions needed, and were compared, using IBM, SPSS statistics software 27.0 Version. To

describe the data, descriptive statistics frequency analysis, unpaired t-test and percentage analysis were used for categorical variables and the mean and SD was used for continuous variables.

## RESULTS

This study was conducted under Department of Obstetrics and Gynaecology, of SKMCH, Muzaffarpur, Bihar, for a period of approx. twenty-four months on 50 pregnant women with heart disease.

Based on age among the pregnant women with heart disease, about 38% were in the age group of 21 to 25 years, 32% were in 26 to 30 Years and 10% were above 30 years. Teenage pregnancy was seen in 20% of the cases [Table 1].

Among the entire patient studied, about 42% were second gravid, 28% were Primigravida [Table 2].

Gestational age of the pregnant women at the time of admission to the hospital was studied: 66% of the patients belong to term gestation. Preterm labour accounted to 32% & 1 women with heart disease was referred to our hospital as post-dated (table 3). Majority of the cases with heart disease were referred with antenatal check-up elsewhere i.e., outside government hospital 84% [Table 4] and 62% of the patients had cardiac disease diagnosed prior to present pregnancy [Table 5].

Based on presenting symptoms, most patients presented with dyspnoea as their chief complaint i.e., 29 (58%) followed by fatigue i.e., 23 (46%). 30 percent patient shows no symptoms also [Table 6].

The cardiac functional status of the pregnant women with heart disease at the time of admission to the hospital was studied: Most of the patients have stable cardiac status and they fall under class I- i.e., 66%. 18% of the pregnant women belong to NYHA class II, 10% belong to NYHA class III and 6% of the cases belong to NYHA class IV at the time of admission [Table 7].

ASD: Atrial septal defect, MVP: Mitral valve prolapse, PDA: Patent ductus arteriosus, PPCM: Peripartum cardiomyopathy, RHD: Rheumatic heart disease, VSD: Ventricular septal defect

Echocardiography helps in diagnosing heart disease in pregnant women. About 50% of the women had Rheumatic heart disease, 30% had congenital heart disease, 10% had Peripartum cardiomyopathy and Mitral valve prolapse is seen in 08% of the cases and is mostly an incidental finding during ECHO study [Table 8].

Among 50 cases 4 cases are from preterm were admitted for further evaluation and observation.

Echocardiography, ultrasound done and patients were followed further. But one case referred to higher center. Among the remaining 46 cases LSCS was done in 24 and vaginal Delivery done in 22 cases. Among 22 vaginal delivered patients, second stage of labour was cut short by application of vacuum [Table 11] and out of 24 caesarean sections, majorities i.e., 19 were done on emergency basis and the rest were elective [Table 12].

In emergency caesarean section performed the most common indication is fetal distress followed by previous caesarean section. There were 3 cases of cephalopelvic disproportion and severe oligohydramnios was seen in 2 cases and breech in 1 case for which LSCS was done [Table 13].

Pregnant women with heart disease delivered should be monitored vigorously in the immediate postnatal period. Strict vitals monitoring, maintaining intake output chart, administering antibiotics, nasal oxygen was given. Cardiologist review should be obtained postnatally and if the patient was on cardiac drugs, it should be continued. In the immediate postoperative period, one woman having MS with atrial fibrillation developed cardio-embolic stroke and died of sudden cardiorespiratory arrest. One patient died of MODS with sepsis. Mostly 3 cases show post-op complications were found to be LRTI [Table 14].

Cardiac patients with NYHA grade 3 or 4, Severe MS with atrial fibrillation, require intensive care. Women in the postnatal period also require intensive care since they can develop cardiac failure. Mostly about 56% i.e., 28 cases were observed for 24 to 48 hours in ICU [Table 15].

Only about 22% of cases required ventilatory support during the hospital stay [Table 16].

Two maternal deaths occurred in post-natal period. One due to cardio- embolic stroke and the other due to sepsis with MODS [Table 17] and out of 46 cases, majority of them (86.96%) had good perinatal outcome. There were 5 intrauterine fetal demise and 1 early neonatal death due to prematurity [Table 18]. Among the total babies born, majority were term gestational babies i.e., 71.73% [Table 19]. Neonatal outcome in terms of birth weight of the babies were studied. Most of the babies born were with birth weight between 2.5 to 3kg. 63.05% of the babies come under this group. 36.95% of the babies have birth weight of less than 2.5 kg [Table 20]. Neonate born to pregnant mothers complicated by heart disease requiring NICU care was studied in detail. Out of the 46 babies born, 09 required admissions to the NICU. All the babies were screened for heart disease by performing ECHO. In our study, the screening for the heart disease is negative for these babies [Table 21].

**Table 1: Age range of selected pregnant women with heart disease**

Age in years	Frequency	Percentage
Up to 20	10	20%
21-25	19	38%
26-30	16	32%
>30	05	10%

Total	50	100%
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**Table 2: Distribution according to parity**

Parity	Number	Percentage
Primigravida	14	28%
Gravid-2	21	42%
Gravid-3	08	16%
Gravid-4 & more	07	14%

**Table 3: Gestational age**

Gestational age	Frequency	Percentage
Preterm	16	32%
Term	33	66%
Post-dated	01	02%
Total	50	100%

**Table 4: Distribution According to Antenatal Check-up**

Registered & Booked At	No Of Patients	Percentage
Government hospital	08	16%
Outside	42	84%
Total	50	100%

**Table 5: Distribution According to Time of Diagnosis**

Time Of Diagnosis	No. of patients	Percentage
Previously	31	62%
Current Pregnancy	19	38%

**Table 6: Distribution according to presenting complaints**

Presenting Complaints	Frequency	Percentage
Asymptomatic	15	30%
Dyspnoea	29	58%
Palpitation	06	12%
Fatigue	23	46%
Edema	06	12%

**Table 7: NYHA Grading**

NYHA grading	Frequency	Percentage
I	33	66%
II	09	18%
III	05	10%
IV	03	06%
Total	50	100%

**Table 8: Type of heart disease in selected patients**

Type of heart disease	Frequency	Percentage
ASD	07	14%
Atrial Myxoma	01	02%
Ebstein's Anomaly	01	02%
MVP	04	08%
Patent Foramen Ovale	01	02%
PDA	03	06%
PPCM	05	10%
RHD	25	50%
VSD	03	06%

ASD: Atrial septal defect, MVP: Mitral valve prolapse, PDA: Patent ductus arteriosus, PPCM: Peripartum cardiomyopathy, RHD: Rheumatic heart disease, VSD: Ventricular septal defect

**Table 9: RHD Type in selected patients**

Lesion	Number	Percentage
Isolated MS	08	32%
Isolated MR	05	20%
MS/MR	04	16%
MS/PHT	03	12%
MS/Atrial Fibrillation	02	08%
Other combined lesions	03	12%
Total	25	100%

MS: Mitral stenosis, MR: Mitral regurgitation, PHT: Pulmonary hypertension

**Table 10: Distribution according to Penidura prophylaxis**

Penidura Prophylaxis	No. Of Patients	Percentage
YES	12	48%
NO	13	52%

**Table 11: Mode of Delivery in Selected Patients**

Mode Of Delivery	Frequency	Percentage
LSCS	24	52.17%
Vaginal	22	47.83%
Total	46	100%

**Table 12: LSCS in selected patients**

Type	Number	Percentage
Elective	05	20.83%
Emergency	19	79.17%
Total	24	100%

**Table 13: Indication for emergency LSCS**

Type	No. of women	Percentage
Fetal distress	08	42.10
CPD	03	15.73
Severe oligohydramnios	02	10.52
Failure to progress	01	05.26
Breech	01	05.26
Previous LSCS	04	21.05
Total	19	100%

**Table 14: Postoperative Complications**

Complications	Number of Patients
LRTI	03
Pulmonary edema	01
MODS with sepsis	01
Cardioembolic stroke	01
Total	06

**Table 15: Duration of Stay In ICU**

Duration of Stay in ICU	Frequency	Percentage
< 24 hrs	10	20%
24 - 48 hrs	28	56%
48 - 72 hrs	04	08%
> 72 hrs	08	16%
Total	50	100%

**Table 16: Need for Ventilatory Support**

Need For Ventilatory Support	Frequency	Percentage
Yes	11	22%
No	39	78%
Total	50	100%

**Table 17: Maternal outcome in studied patients**

Maternal Outcome	Frequency	Percentage
Live and well	44	88%
Follow Up	03	06%
Referral	01	02%
Death	02	04%
Total	50	100%

**Table 18: Distribution According to Fetal Outcome**

Fetal Outcome	No Of Patients	Percentage
Live and well	40	86.96%
Intrauterine death	05	10.87%
Early neonatal death	01	02.17%
Total	46	100%

**Table 19: Distribution according to fetal outcome on the basis of gestational age**

Gestational age	No of Patients	Percentage
Pre-Term	12	26.09%
Term	33	71.73%

Post-datism	01	2.17%
Total	46	100%

**Table 20: Birth Weight**

Birth Weight	Frequency	Percentage
< 2.5 Kg	17	36.95%
2.5 - 3 Kg	29	63.05%
> 3 Kgs	00	00.00%
Total	46	100%

**Table 21: NICU Admission**

NICU Admission	Frequency	Percentage
Yes	09	19.56%
No	37	80.44%
Total	46	100%

**Table 22:**

Studies	NYHA classes			
	I	II	III	IV
Koregol M et al. <sup>[7]</sup> (2009)	78 (70.90%)	16 (14.55%)	11 (10.00%)	04 (03.64%)
Konar H et al. <sup>[8]</sup> (2012)	234 (83.27%)		43 (15.30%)	04 (0.14%)
Joshi G et al. <sup>[11]</sup> (2015)	26 (61.90%)		10 (33.80%)	06 (14.3%)
Pujitha KS et al. <sup>[9]</sup> (2017)	06 (18.75%)	22 (68.75%)	03 (09.40%)	01 (03.12%)
Present study	33 (66.00%)	09 (18.00%)	05 (10.00%)	03 (06.00%)

**Table 23:**

Studies	Incidence of low-birth-weight babies
Koregol M et al. <sup>[7]</sup> (2009) study	< 2kg were 17 i.e. 15.45%
Joshi G et al. <sup>[11]</sup> (2015) study	<= 2kg were 16 i.e. 42.10%.
Present study	< 2.5kg were 17 i.e. 36.95%.

## DISCUSSION

Cardiac disease contributes to be a major risk factor for maternal and neonatal morbidity and mortality. Although the incidence of cardiac disease in pregnancy more or less remains unchanged but various factors leading to cardiac disease during pregnancy widely varies with different study population and study period.

**Etiology:** Out of 50 cases 26 cases i.e., 30% had congenital heart Different Types of Lesions in RHD: Most of the cases were found to be RHD i.e., 25 (50%), similar study by Konar H et al.<sup>[8]</sup> (2012) 69.39%, Pujitha KS et al.<sup>[9]</sup> (2017) 62.60%, Koregol M et al (2009).<sup>[7]</sup>

KS et al.<sup>[9]</sup> (2017) most of the patients had NYHA class II (68.75%) and Joshi G et al.<sup>[11]</sup> (2015) most patients were in NYHA classes I and II (61.9%), while 38.1% of the patients were in NYHA classes III and IV.

Incidence of low-birth-weight babies: Neonatal outcome in terms of birth weight of the babies were studied. Most of the babies born were with birth weight between 2.5 to 3kg. 63.05% of the babies come under this group. 36.95% of the babies have birth weight of less than 2.5kg. Similarly, Koregol M et al.<sup>[7]</sup> (2009) shows < 2kg were 17 i.e., 15.45%, 2-2.5 kg 31 i.e., 28.18%, 2.5-3 kg 40 i.e., 36.36%, < 3 kg was 15 i.e., 13.63% and Joshi G et al.<sup>[11]</sup> (2015) shows low birth weight babies <= 2 kg were 16 i.e., 42.1%.

## CONCLUSION

Heart disease is the most common non-obstetric cause of maternal morbidity and mortality. It also has a major impact on neonatal outcome. Favorable outcome is noted in women with NYHA class I and II, avoidance of factors precipitating heart failure like anemia, infections, arrhythmias, regular cardiac follow up, strict adherence to cardiac medications. Pregnancy should be avoided in women with severe type of heart disease and in such cases; surgical procedures should be performed in the pre pregnancy period itself. Pregnant women with heart disease are advised to have regular and frequent antenatal visits. During pregnancy, corrective procedures if required should be done in the second trimester but it carries significant fetal risk. Cardiac drugs taken prior to pregnancy should be reviewed by the cardiologist. Delivery should preferably conduct in a tertiary care centre with multi-disciplinary approach. Fetal ECHO performed around 20 weeks of gestation to find out inherited heart diseases in newborn. Universal access to obstetric and cardiac care and use of standard treatment protocol will definitely improve the outcome in women with cardiac disease.

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