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Original Research Article

Study on Complicated Pregnancy with Heart Disease and Its Maternal and Foetal Outcome at a Tertiary Care Hospital

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Abstract:

Background: Cardiac disease is an important cause of maternal mortality and morbidity both in antepartum and postpartum period. The overall incidence of heart disease in pregnancy is <1%. Objective of present study was to determine maternal outcome in pregnant women with heart diseases in terms of fetal complication, maternal complication and Mode of delivery. Aim of this study to analyse the type of heart disease complicating pregnancy, to study any associated obstetric or medical complications and their impact on pregnancy and heart disease, and to study the maternal and foetal outcome.

Methods: A retrospective analysis of 127 pregnant women with cardiac disease from January 2023 to December 2023 at Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar was done.

Results: In the present study, incidence of cardiac disease is 1.09%. Rheumatic heart lesions (RHD) constituted 47% and congenital heart disease 41%. Mitral stenosis was the commonest lesion (26%), in RHD cases. While atrial septal defect (ASD) was seen in 12% cases. 69.4% of cases belong to New York Heart Association classification (NYHA) grade 1, 14.8% cases were NYHA grade II, 14.2% cases were NYHA grade III and 1.6% belongs to NYHA grade IV. Out of the total number of cases 7.08% cases were

Complicated by severe anaemia and 8.6% cases had PIH. Fifty three percent cases delivered vaginally & 40% by caesarean section. Ten cases were complicated with congestive cardiac failure; three had atrial fibrillation and two supraventricular tachycardia. 8.6% women developed pregnancy induced hypertension (PIH), 7.87% had intrauterine growth restriction (IUGR), and 12.59% had preterm birth. There were three perinatal deaths and one maternal mortality.

Conclusion: Heart disease in pregnancy is a high risk condition and has major impact on pregnancy. Early diagnosis by proper antenatal care and intervention could be the key to prevention of complications.

Keywords: Cardiac disease; Pregnancy; NYHA grade.

Introduction

Pregnancy contributes to significant haemodynamic changes i.e. 30-50% increase in cardiac output and blood volume which, in turn could lead to clinical decompensation in cardiac patients. The most important causes of heart disease in pregnancy is rheumatic heart disease followed by congenital abnormalities. The number of women with heart diseases who reach childbearing age in a good functional state of heart are increasing as there are advances in diagnosis and treatment improving overall health and prognosis. As a result, pregnancy becomes a realistic option for many of these young women. Haemodynamic changes during normal pregnancy are well tolerated by women with normal cardiac reserve. In patients with pre-existing heart disease, cardiac decompensation often occurs with resultant increase in morbidity and mortality. Heart disease in pregnancy is now one of the leading causes of indirect maternal mortality in India. [1,2] Not just mortality, but cardiovascular diseases in pregnancy also accounts for significant morbidity and is leading cause of obstetrical intensive care admissions. The reported incidence of heart disease in pregnancy is between 0.1-4%. [3,4] Cardiac dis-

ease in pregnancy is still a major problem in developing countries and gets more worsened if obstetric complications develop. Knowledge about the morphological and functional changes in normal pregnancy is important for the timely recognition of cardiac pathology.

Pregnant women with cardiac diseases fall into two categories:

- Those with diagnosed heart disease and under treatment before becoming pregnant
- Those with previously undiagnosed heart disease

Maternal functional status is the most important predictor of outcome and is assessed by New York Heart association (NYHA) functional class. Cardiac lesions and pregnancy both may affect each other adversely. Since foetal life depends upon continuous supply of well-oxygenated maternal blood, these patients contribute to perinatal mortality and morbidity in the form of foetal growth restriction, premature birth or even foetal death. With joint intervention of obstetrician, cardiologist and anaesthetist, we can avoid the complications and reduce the burden of the heart disease and its complications during pregnancy.

Materials and Methods

This cross-sectional study was carried at Department of Obstetrics and Gynaecology of Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar.

In the present study, 127 patients with cardiac disease complicating pregnancy were studied from January 2023 to December2023.Informed consent was taken from all the participants in the study. These included booked cases at our center, booked cases from other hospitals and medical colleges and unbooked/unregistered emergency cases. These women were categorized according to their type of cardiac lesion as- Rheumatic heart disease (RHD), congenital heart disease (CHD) and the miscellaneous group which consists of hypertensive heart disease and cardiomyopathy group. All the groups were divided into treatment received and not received group, which further subdivided as medical or surgical intervention received.

The above groups were studied for demographic variables, maternal and foetal outcome. All patient data in the study were recorded onto a clinical software sheet in a structured format. For the booked patients at our centre, all were sent to cardiologist for initial evaluation and workup. A detailed medical and obstetric history was taken. Functional status of the patient was assessed with every visit for regular booked patients according to the NYHA class. Following initial assessment, NYHA class1 and 2 were managed as outpatients. Class 3 and 4 were hospitalized irrespective of their gestational age. Obstetric examination specifically for growth restriction was looked for. Any form of infection in the body was vigorously treated. Iron and folate supplementations were advised and importance of adequate rest was counselled. For emergency patients reporting at our obstetric casualty in labour or for safe confinement, similar examination and physician opinion were done on their index visit followed by cardiologist consultation and managed accordingly.

Patients with prosthetic metallic valves received heparin in the first trimester and this was converted to warfarin at 13 weeks gestational age and then reconverted to heparin at 36 weeks gestational age. Routine investigations were done in all patients. X –ray chest posterior-anterior view was done if necessary, with abdominal shield. ECG and 2D ECHO was done in all patients.

If antenatal care was uneventful, decisions on mode of delivery and review by anaesthesiologists was taken at 36weeks gestation if obstetric complications were present. Otherwise, patient was for spontaneous labour onset. Vaginal delivery with appropriate labour analgesia was the preferred method. Elective caesarean section was performed only forpatients like severe pulmonary hypertension, severe aortic stenosis and Eisenmerger's syndrome, obstetric indications and emergency caesarean for obstetric emergencies.

All primigravidae underwent clinical pelvimetry by senior obstetrician in labourroom. Antibiotic prophylaxis was provided according to hospital protocol. Some patients in the study had termination of pregnancy in the early trimester. Descriptive analyses were done and all results are presented as frequencies, means and percentages.

Results

A total of 127 pregnant women complicated byheart disease were seen during the study period. There were 11,554 deliveries during the study period so the prevalence of heart disease during pregnancy at our centre was 1.09%. Majority of the women (47%) belonged to age group of 20-26 years. Most of them came from urban (88%) residential back ground(Table1).

Table 1: Demographic characteristics

Age in years	No. of cases	Percentage
<20	8	6%
20-26	59	47%
27-31	35	28%

31-39	22	17%
>40	3	2%
Residential back ground		
Urban	111	88%
Rural	16	12%
Parity		
Primi	46	36.22%
Second gravida	66	51.96%
Multigravida	15	11.81%

Out of the127 patients, 90 patients (71%) were referral cases from Sadar Hospital, private nursing homes and 37 cases (29%) were registered at SKMCH, Muzaffarpur (Table 2).

Table 2: Booking status

Booking status	No. of cases	Percentage
Booked	37	29%
Unbooked	90	71%

According to the WHO criteria of high risk pregnancy prenatal visits, 72% of them did not have adequate overall visits. Maximum (43%) had their index visit at our centre in third trimester, 18% came in labour and 7% postpartum (Table3).

Table 3:Time of index visit

Time of index visit	No. of cases	Percentage
First trimester	17	13%
Second trimester	24	19%
Third trimester	54	43%
In labour	23	18%
Postpartum	9	7%

The principle cardiac lesions in our study were RHD (47%), CHD(41%), cardiomyopathies(8%) and hypertensive heart diseases (4%; Table 4). The ratio of patients with rheumatic heart disease relative to congenital heart disease was 1.14:1.

Table 4: Type of heart disease

Type of heart disease	No. of cases	Percentage
RHD	59	47%
CHD	52	41%
HTNLVH	6	4%
Others	10	8%

Among the women with rheumatic heart disease, mitral stenosis was present in 28 cases (22%) and was the most predominant lesion, whereas in the congenital heart disease(CHD) group, atrial septal defect in 15cases(12%) was found to be the most common lesion. Multiple valvular lesions were present in 33 cases(26%). Among the remainder, three cases had dilated cardiomyopathy, six cases had hypertensive left ventricular pathology and three cases of heart block with and without pacemaker.

Table 5 : Type of dominant valve lesion

Type of heart disease	No. of cases	Percentage
MS	28	22%
MR	21	17%
AS	4	3%
AR	5	4%
TR	5	4%
CHD		
ASD	15	12%
VSD	10	8%
PDA	9	7%
ASD+VSD	5	4%
TOF	6	5%
PS	3	2%
COA	4	3%

Out of the 127 cases in the study, 67 patients were on treatment, among which 24 cases (18.89%) had undergone some form of surgical intervention. During pregnancy, cardiac surgery was performed in five women.

All of them suffered critical mitral stenosis with symptoms not controlled by medical management. Out of the five, four patients underwent trans ventricular closed mitral valvotomy and one patient had mitral valve replacement.

They had tolerated the surgical procedure well with good outcome. Rest of the 19 patients entered pregnancy with prior surgical procedures like mitral valve replacement, mitral valvotomy, patch closure and arterials witch procedures. Most of the women who underwent surgical corrections during pregnancy or after that had good maternal and foetal outcomes with minimal complications. Majority of the women were second gravida 66(52%). Majority of the women (n=67) delivered vaginally, 17 were induced labour with misoprostol oral tablet(PGE_1) for obstetric indications like pregnancy induced hypertension, IUGR or postdatism. Rest of them had spontaneous labour (Table 6). Ten women had instrumental delivery to cut short the second stage of labour. Rest of them(n=50) delivered by LSCS out of which 31 had elective and 26 had emergency LSCS for obstetric indication like previous caesarean, abnormal presentation, dystocia and foetal distress. General anaesthesia was given in most of the cases. Out of remaining ten patients, six had medical termination of pregnancy(MTP) and four had spontaneous abortions.

Table 6:Mode of delivery

Mode of delivery	No. of cases	Percentage
LSCS	**50**	**40%**
Elective	27	21.25%
Emergency	23	18.11%
Vaginal	**67**	**53%**
Induced	17	13.3%
Spontaneous	50	39.37%
Forceps	7	5.51%
Ventouse	3	2.36%
MTPS	6	4%
Spontaneous abortion	4	3%

Out of the 127 cases, 41 cases had complications. Eighteen cases had ICCU admissions for various complications. Out of which, 15 cases had cardiac complications (atrial fibrillation-3, heart failure10, supraventricular tachycardia-2) and 26 caseshadnoncardiac complications (sepsis-9, postpartum hemorrhage-6, wound infection-4, respiratory tract infections -6, heparin induced thrombocytopenia HIT-1) as shown in Table 7. Maximum i.e. six women went in failure during labour and puerperium, three in third trimester and 1 in second trimester.

Table 7: Type of complication cardiac and non-cardiac

Type of complication	No. of cases	Percentage
Cardiac	15	11.8%
Atrial fibrillation	3	2.36%
Heart failure	10	7.87%
SVT	2	1.57%
Non-cardiac	26	20.47%
Sepsis	9	7.08%
PPH	5	3.93%
Wound infection	4	3.14%
Chest infection	6	4.72%
HIT	1	0.78%
ICCU admission	18	14.17%

Out of the 127 cases, 51 cases had obstetric complications. Pregnancy induced hypertension in 11, severe anaemia in 9, gestational diabetes mellitus in 3, postdatism in 2, intrauterine growth restriction in10 and preterm births in 16 (Table8). ICCU admissions were more common in women with heart disease with obstetric complications like pre-eclampsia and anaemia.

Table 8: Obstetric complication

Obstetric complication	No. of cases	Percentage
PIH	11	8.6%
Severe anaemia	9	7.08%
GDM	3	2.36%
Postdatism	2	1.57%
IUGR	10	7.87%
Pre-term birth	16	12.59%

Most of the patients (69.4%) were in NYHA grade I when they reached our hospital, 14.8%were in gr. II. 14.2% in gr. III and 1.6% in gr. IV (Table9). Deterioration in NYHA status was seen in 13 cases, most of whom had cardiac complications.

Table 9 : NYHA grade

NYHA grade	No. of cases	Percentage
I	88	69.4%
II	19	14.8%
III	18	14.2%
IV	2	1.6%

Out of the 40 cases with congenital heart disease, six cases presented with Eisenmerger's syndrome. There were three perinatal deaths; all were low birth weight, one due to IUGR and two due to prematurity. Morbidity was increased due to IUGR, low birth weight and preterm births. One baby was born with congenital heart disease. There were two maternal deaths, one was severe pre-eclampsia induced cardiomyopathy and other died due to congestive cardiac failure in immediate postpartum period. Both were unbooked cases and died within few hours of admission. Maternal and foetal outcome was adverse as the NYHA grade increased as shown in Table10.

Table 10: Maternal and foetal outcome depending on NYHA grade

Obstetric complication	NYHA ≤ II n=107	Percentage	NYHA ≥ III n=20	Percentage
IUGR	2	1.6%	8	6.29%
Preterm	4	3.1%	12	9.4%
Maternal mortality	0	0	2	1.6%
Perinatal mortality	0	0	3	2.3%

Discussion

In the present study, we determined the type of cardiac lesion and assessed the feto-maternal outcome in pregnant women with cardiac disease. Cardiac disease continues to be a risk factor for maternal and neonatal mortality and morbidity. The incidence of cardiac disease at our centre was 1.09%. It is comparable to other Indian studies. [5,6] This study shows that although rheumatic heart disease was more common than congenital heart disease like other studies but the ratio of RHD:CHD was less than other studies. [4,7,8]

The reason for this may be that more number of CHD patients were referred to us during the study period and more number of CHD diagnosed in asymptomatic patients as cardiologists were available at our centre. Mitral stenosis has been found to be the dominant lesion in RHD which is same as other studies. [4,8] Rheumatic heart disease is still dominant cardiac lesion in developing countries inspite of the widespread use of antibiotics against streptococcus. Most of the patients admitted in our hospital were referred cases from periphery and many were diagnosed for the first time in index pregnancy. In our study 88% women belonged to urban area, most of them were referred from nearby private and government hospitals as they were not having ICCU facilities. Majority of the patients (42%) were second gravida and 40% were primigravida. This is in contrast to many studies that had primigravidas in high number. [3,9,10]

There may be many reasons for this, first that owing to improvement in treatment facilities many women attempt second pregnancy other being total lack of the gravity of the situation and social norms force them to have second pregnancy.

Most patients belonged to NHYA class I and II. However, in our study 26% of patients had multiple valvular involvement, but only 15% belonged to NYHA class III and IV. Hence anatomical severity did not correlate with functional class. This was similar to the study by Sethuraman D. [5]Most of the women with heart disease complicating pregnancy had gone into spontaneous labour and

delivered vaginally. Induction of labour was required in 13.3% women.

We had a slight higher rate of LSCS in our study, as compared to other studies. [5,11,12] This may be because our institution is a tertiary referral centre with ICCU facility and women are referred here for LSCS. Maternal mortality in our study was 1.6%. In other Indian studies, the mortality rates ranged from [11-14] 1% to 6%. Studies have reported that pregnancy with NYHA class III and IV was associated with high maternal morbidity and mortality. [12,13]

The incidence of IUGR and preterm foetuses in the present study is more in NYHA class III and IV when compared to NYHA class I and III. Other studies also found adverse foetal outcome in class III and IV. [10,13]Maximum women went in failure in labour or in puerperium with NYHA class III and IV. Surgically corrected cases had good maternal and foetal outcome.

Conclusion

In the present study, the incidence of pregnancy complicated by heart disease was 1.09%. Rheumatic heart disease was the commonest condition, followed by congenital heart disease.Mitral stenosis was the most common lesion among the rheumatic heart disease group and atrial septal defect among the congenital heart disease group. NYHA classes I and II had better prognosis than class III and IV. Maternal mortality was 1.6%. We conclude that pregnancy outcome is good in booked cases with antenatal care by obstetrician and cardiologist, surgically corrected cases and those with NYHA class I and II.

Hence, joint management by obstetrician, cardiologist, anaesthetist and neonatologist will help in ensuring a good prognosis among the patients with heart disease. In the present study, maximum number of women went into failure in labour and puerperium. It has been important to emphasize the time of maximum occurrence of cardiac failure in pregnancy. The above observations show that failure can occur at any time during pregnancy or in the puerperium. Hence, constant vigilance is required throughout antenatal, intrapartum and postpartum period.

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