



Maternal and Fetal Outcome in Pregnancies with Heart Disease

Authors

Dr Rahul Nilkanth Patil¹, Dr Sangeeta Ramteke²

¹Resident, ²Associate Professor

Dept of Obstetrics and Gynecology, Government Medical College Nagpur

Corresponding Author

Dr Rahul Nilkanth Patil

Resident, Department of Obstetrics and Gynecology

Government Medical College Nagpur

Abstract

Aims and objectives

1. To assess the maternal outcome of pregnancies complicated by heart disease.
2. To assess the foetal outcome of pregnancies complicated by heart disease.

Study Design: It was a prospective, observational study conducted at department of obstetrics and gynaecology in a tertiary care hospital over a period of two years.

Materials and methods: The study was approved by the Institutional ethical committee. All patients who have cardiac disease in pregnancies admitted in obstetrics and gynaecology department of our institute and were willing to participate in the study were enrolled. Those patients who were admitted in our institute in postpartum period and those who were not willing to participate in this study were excluded from the study. Women enrolled in this study were examined during antenatal or peripartum period (depending upon when they first visit our institute) and classified on the basis of New York heart association (NYHA) functional classification. In admitted patients indication of admission, complications associated with heart disease and shift of NYHA class, if any, were noted. Routine tests and special tests like ECG and 2DECHO were done. Fetal well being was also assessed. Mode of delivery and neonatal outcome was recorded according to the proforma. During postnatal period all patients were followed up to discharge from hospital for any obstetrical, cardiac and neonatal complications. Details of maternal and neonatal morbidity and mortality were noted.

Results: in this study the incidence of heart disease was found to be 0.69%. Mean age at presentation was found to be 24 +/- 3.4 years. Maximum patients belonged to age group 21-25 years. Majority of the patients (77%) were primigravida. Most of the patients (31.46%) were admitted in hospital during 34-37 weeks of gestation. The most common complaints for which the patients were admitted was breathlessness (58.87%) and labour pains (22.58%). A NYHA based classification revealed that most of the patients (70.96%) were NYHA grade I while grade II, III and IV were 13.7%, 11.31% and 4.03% respectively. Most common etiology of heart disease in studied subject was found to be rheumatic (66.94%) in origin followed by congenital (24.19%) and peripartum cardiomyopathy (5.66%). In patients having rheumatic valvular heart disease most common isolated valvular involvement was seen in the form of mitral stenosis (14.5%) followed by mitral regurgitation (6.45%) and tricuspid regurgitation (5.64%). Rest of the patients had multiple valvular lesions involving mitral, tricuspid and aortic valves. In patients who had congenital heart disease most common

lesion was Atrial septal defect followed by cardiomyopathy, ventricular septal defect and mitral valve prolapse. 12 patients had undergone surgical correction of valvular lesions. Most common maternal complications seen were Anemia followed by pulmonary hypertension and pulmonary edema. There were total 4 (3.23%) maternal deaths during study period. Causes of maternal mortality included dilated cardiomyopathy, pulmonary edema, infective endocarditis and congestive cardiac failure. Maternal mortality associated with heart diseases was found in 3.39% patients of overall maternal mortality during study period. Out of 124 patients 71 (57.26%) underwent normal vaginal delivery while caesarian section was done in 32 (25.81%) cases. Most common indication for LSCS was foetal distress (8.87%). Analysis of neonatal outcome revealed that 92 (44.19%) babies were born full term while 32 (25.81%) were premature. 47 (37.89%) babies were born with birth weight of more than 2.5 kg while 61 (49.53%) were low birth weight babies. Perinatal mortality in patients with rheumatic valvular heart disease was 12.90%. The most common causes of neonatal mortality in these patients were prematurity with birth asphyxia which was seen in 4 (3.22%) neonates.

Conclusion: The management of pregnant woman with heart disease requires a multidisciplinary team work for optimal maternal and fetal outcome. Early diagnosis, good antenatal care and early recognition and treatment of complications will have a favorable impact on maternal and neonatal outcome. Being the commonest cause of heart disease during pregnancy rheumatic heart disease must be treated according to standard protocol. Fetal outcome is affected by NYHA functional classification and is better in grade I and II. In patients with heart disease normal delivery is preferable and caesarian section should only be considered for obstetric indications.

Keywords: Heart disease in pregnancy, New York Heart association, Rheumatic heart disease, multidisciplinary approach.

Introduction

Pregnancy with heart disease is a high risk pregnancy that poses significant challenge to attending clinician. Cardiac disease has significant impact on maternal health during pregnancy, labour and delivery.

Heart disease in pregnant women is most commonly due to rheumatic heart disease, congenital abnormalities and less commonly due to ischemic heart disease or cardiomyopathy. Now a day the pattern of heart disease in pregnancy has changed with decrease in frequency of rheumatic heart disease. Advances in medical and surgical management of patients with congenital heart disease have increased the number of these women undertaking pregnancy. But in developing countries like India rheumatic disease is still predominant. Mitral stenosis being the most common lesion. The number of women with heart disease who reach childbearing age in a good functional state increases continuously, as advances in diagnosis and treatment improve overall health and prognosis. As a result, pregnancy becomes a realistic option for many of these young women.

Increased cardiac demands during the course of pregnancy potentially increase morbidity and mortality in women with underlying heart disease. Heart disease is an important indirect cause of maternal mortality. Pregnancy – associated cardio circulatory changes – primarily, increase in heart rate, stroke volume, and cardiac output, as well as reduction in systemic vascular resistance – may threaten maternal outcome, which in turn holds fetal implications.

During pregnancy, labor and puerperium there are remarkable changes involving the heart and the circulation ^[1]. The association of heart disease and pregnancy is of serious risk to mother ^[2]. Pregnancy in a cardiac patient places an extra mechanical burden on the diseased heart of the patient ^[3]. However majority of women with cardiac disease can tolerate pregnancy successfully. Over the past two decades, progressive decline in maternal mortality due to cardiac disease in pregnancy has been noticed. This has been due to a number of factors including better understanding of cardiovascular adaptation during pregnancy, improvement in medical therapy, surgical treatment of the heart disease ^[4]

and some change in pattern of heart disease. With good antenatal care and modern investigation a greater number of patients are detected to have heart diseases. Improvement of socioeconomic status with stress on sanitation, hygiene, early active treatment of rheumatic condition with prolonged antibiotic course, prevention of recurrence, early detection of cardiac lesion, proper management of heart failure, prevention of anemia and increased use of closed mitral valvotomy, has led to reduction of maternal mortality^[5].

Despite the improvement in antibiotic, diuretics, technique of anesthesia, surgery, intensive care facilities, and pregnancy with heart disease is one of the most important cause of maternal mortality in developing countries^[6,7]. Fetal mortality, morbidity are directly related to the quality of supervision given to the mother during antenatal period and intranatal period. So the present study is carried out to find out the type of heart disease in tertiary care hospital and to assess maternal and fetal outcome in pregnancy with heart disease^[8,9].

Materials and Methods

It was a prospective, observational study conducted at Department of Obstetrics and Gynaecology in tertiary care hospital over a period of 2 years.

Inclusion Criteria: - All patients who have cardiac disease in pregnancies admitted in obstetrics and Gynaecology at tertiary care hospital during the study period.

Exclusion Criteria: - Excluding cases of heart disease who were admitted in our tertiary care centre in post partum period.

During the study period total pregnant women with heart disease delivered at tertiary care hospital were registered in the study. Diagnosis of heart disease was based on Clinical examination, ECG, 2D Echocardiography and Cardiac surgery (if performed previously). In all the booked cases, at their first antenatal visit, type of heart disease was noted and their NYHA functional class was determined. History of present illness and

obstetric history was taken with special reference to cardiac disease and its complications. All women were examined to grade them according to NYHA functional classification^[10].

All admitted patients were monitored for development of any cardiac (congestive cardiac failure, arrhythmia, thromboembolism, infective endocarditis) or obstetric complications. The indications for admission were noted.

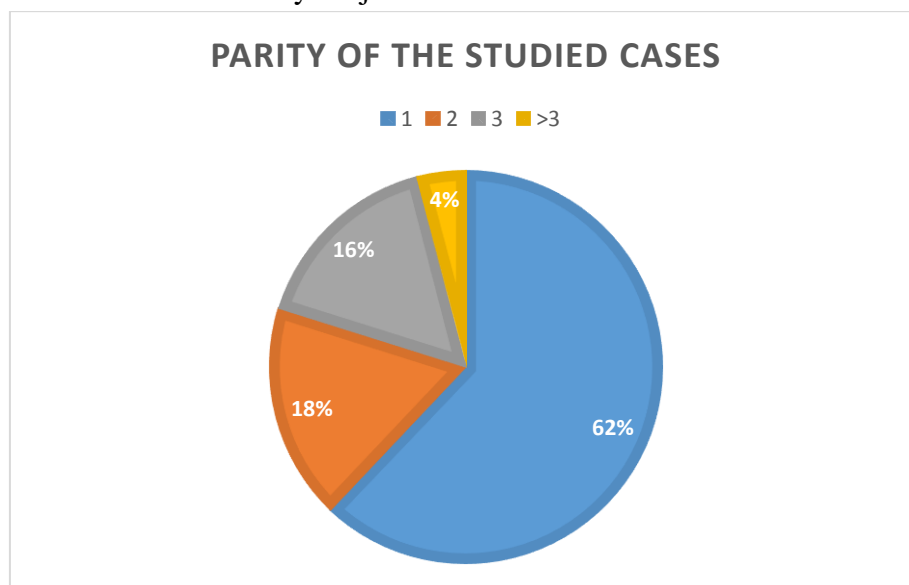
Similarly in all unbooked cases, history of present illness and detailed obstetric history was taken and they were evaluated for type of heart disease and NYHA functional class. Any cardiac or obstetric complications were noted.

In all patients any shift of NYHA functional class was noted. Past menstrual history was asked along with date of last menstrual period to calculate gestational age. General and obstetric examination was performed according to the proforma. Routine investigation and details of all special investigations related to cardiac disease and fetal well-being were noted. Mode of delivery and neonatal outcome was recorded according to the proforma. During postnatal period all patients were followed up to discharge from hospital for any obstetrical, cardiac and neonatal complications. Details of maternal and neonatal morbidity and mortality were noted.

Results

This study was a prospective study. All 124 cases of heart disease admitted in the obstetrics and gynecology department were included in this study. Exclusion criteria were well observed. Total numbers of deliveries during study period were 17,898. Out of these there were 124 cases of heart disease. So incidence of heart disease was 0.692%. Mean age \pm SD (years) = 24 ± 3.40 , Range (years) = 18 to 35.

Analysis of parity of the patients revealed that 77 (62.10%) of study subjects had parity 1 followed by 22 (17.74%) subjects with parity 2. However, only 5 study subjects i.e. 4.03% had parity > 3 (Graph 1).

Graph 1. Parity wise distribution of study subjects

Study of Educational qualification of the studied subject showed that maximum number i.e. 31 (25%) cases were educated upto secondary school, followed by 28(22.58%) cases of higher secondary school. 55.64% of patients were from urban area and 44.36% were from rural area.

An analysis of socioeconomic status of the studied subjects was done by kuppuswamy classification in urban areas and prasad classification in rural areas. It showed that in kuppuswamy

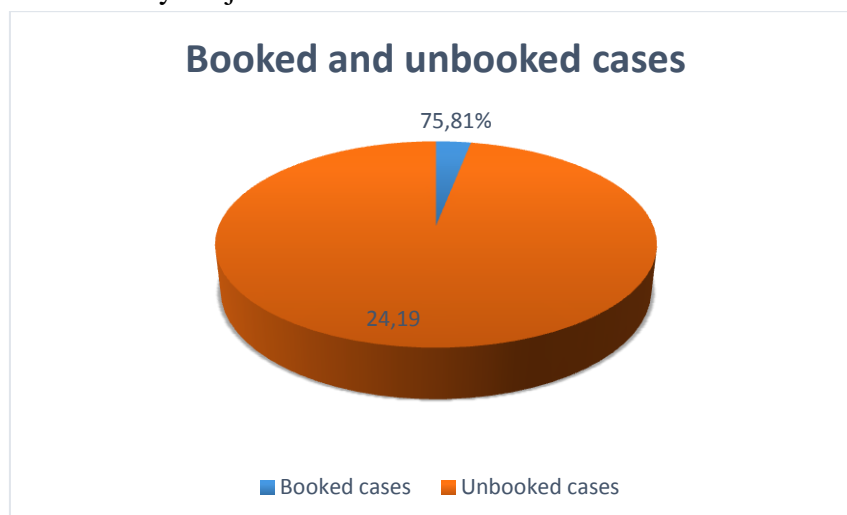
classification majority of cases i.e. 26 belonged to class 3 and In Prasad classification majority of cases i.e. 23 belong to class 5.

An analysis of gestational age at the time of admission of study subjects revealed that maximum numbers of admission were between 34-37 wks of gestation (31.46%). 72.58% of admissions were before 37wks of gestation (Table 1).

Table .1 Gestational age at admission of study subjects

Gestational Age	No of cases	Percentage
<28 weeks	20	16.12%
28 to 34 weeks	31	25%
34 to 37 weeks	39	31.46%
>37weeks	34	27.42%
Total	124	100%

Maximum subjects i.e. **94 (75.81%)** were booked cases. These subjects were booked either in GMC or outside GMC. Unbooked subjects were 30 (24.19%).

Graph 2: Booking status of study subjects

An analysis of distribution of study subjects according to chief complaint showed that most common chief complaint was breathlessness which was present in 73 (58.87%) cases. Most of

them presented with multiple complaints like Labour pain (**22.58%**), Edema feet (19.35%) & Cough (21.77%).

Table 2 : Chief Complaints of study subjects.

Complaints	No of cases (n=124)	Percentage
Breathlessness	73	58.87%
Labour pains	28	22.58%
Cough	27	21.77%
Edema feet	24	19.35%
Bleeding per vaginum	16	12.90%

Table.3 shows NYHA classification. Maximum number i.e 88(70.96%) subjects were of NYHA class I. Class I and II together constitute 105

(84.63%) cases. Only 5 i.e. 4.03% cases were of Class IV

Table 3.NYHA Classification

NYHA Grades	No of cases	Percentage
I	88	70.96%
II	17	13.70%
III	14	11.31%
IV	5	4.03%
Total	124	100%

Amongst the studied cases The commonest type of heart disease was Rheumatic, which constitute 83 (66.94%) subjects. Rheumatic & congenital heart disease together constitutes 113 (91.13%) subjects (Table 4).

Table 4 : Type of heart disease in pregnancy

Type	No of cases	Percentage
Rheumatic	83	66.94%
Congenital	30	24.19%
Peripartum cardiomyopathy	7	5.66%
HOCM	4	3.31%

Amongst the pregnant patients who had rheumatic valvular lesions Single valve lesion constituted 33(26.6%) subjects, of which 18 i.e. 14.51% were of mitral stenosis. Mitral stenosis was the most common cardiac valve lesion. Multiple valve lesions constitute 50(40.3%) subjects. Mitral

stenosis with mitral regurgitation and mitral stenosis, mitral regurgitation with aortic regurgitation constitute 8(6.45%) cases each and were the most common multiple valve lesions (Table 5).

Table 5. Rheumatic cardiac lesion in study subjects

Rheumatic(83)	No of cases	Percentage
Single valve lesion (33)		
MS	18	14.51%
MR	8	6.45%
TR	7	5.64%
Multiple Valve Lesions (50)		
MS+MR	8	6.45%
MR+TR	7	5.64%
MS+TR	6	4.83%
AR+TR	3	2.42%
MR+AR	2	1.61%
MS + AR	2	1.61%
MS+MR+AR	8	6.45%
MS+TR+AF	3	2.42%
MS+MR+PAH	3	2.42%
MS+MR+TR	3	2.42%
MR+TR+AR	3	2.42%
TR+MR+PAH	2	1.61%

Table.6 Shows distribution of congenital cardiac lesion in study subjects. Among congenital lesions ASD 12 (9.67%) was the most common lesion.

In overall cardiac lesions mitral stenosis was the commonest lesion followed by ASD. Cardiomyopathy (peripartum and HOCM) was present in 11 (8.87%) cases. Mitral valvotomy, mitral valve replacement, aortic valve replacement was done in 6(4.84%), 5(4.03%), & 1(0.8%) cases respectively

Table 6. Congenital and other cardiac lesions in studied subjects

Congenital (30)	No.of.cases	Percentage
ASD	12	9.67%
VSD	8	6.45%
MVP	8	6.45%
PDA	2	1.61%
Other (21)		
Cardiomyopathy	11	8.87%
Pulmonary artery hypertension	5	4.03%
Global hypokinesia	3	2.42%
Coronary artery disease	2	1.61%
Prior Cardiac Surgery (12)		
Mitral valvotomy	6	4.84%
Mitral valve replacement	5	4.03%
Aortic valve replacement	1	0.8%

Table.7 shows Known and unknown cases of Heart disease in study subject. Only 25 cases of heart disease were knowing that they have heart disease. 12 subjects among known cases had undergone cardiac surgery before conception.

Table no.7 Known cases of heart disease in study subjects.

Known	No of cases	Percentage
Yes	25	21%
No	99	79%

Table 8 shows the maternal complications in study subjects. In non cardiac complications anemia was associated with heart disease in 12 i.e. 9.67% subjects and PIH in 9 i.e. 7.26% of subjects. Wound infection was present in 3 i.e. 2.42% cases who had undergone caesarean section.

Table 8 Maternal complications in study subjects.

Complications	No of cases	Percentage
Non cardiac		
Anaemia	12	9.67%
PIH	9	7.26%
Wound infection	3	2.42%
Placenta previa,	1	0.8%
Abruptio placentae	1	0.8%
Postpartum haemorrhage	1	0.8%
Cardiac		
Pulmonary edema	4	3.22%
Atrial fibrillation	3	2.42%
Congestive cardiac failure	2	1.61%
Bacterial endocarditis	1	0.8%
Maternal death	4	3.22%

Rest 13 subjects among known cases had regular cardiac and antenatal checkup. 99(79%) subjects were unknown about their cardiac lesion and were diagnosed as case of heart disease in our tertiary care centre during study period.

In cardiac complications, pulmonary edema was the commonest one (3.22%). There was only one subject of bacterial endocarditis. Maternal death constituted in about 3.22% of subject.

Table 9. Shows gestational age at delivery/abortion. Maximum subjects i.e. 92 (74.19%) were delivered at gestational age more than 37

weeks. Spontaneous and induced abortion constituted 16 (12.90%) subjects.

Table 9. Gestational age at delivery/abortion in study subjects

Gestational age	No of cases	Percentage
≤20 weeks	16	12.90%
>20to 34 weeks	7	5.65%
34 to 37 weeks	9	7.26%
>37 weeks	92	74.19%
Total	124	100%

Table 10 shows obstetric outcome in study subjects. 71 (57.26%) cases had vaginal delivery. Among 71 cases, 64 (51.61%) subjects had spontaneous labour and 7(5.65%) had induced labour. Among 7 induced cases, induction in 4 cases was done due to uncontrolled hypertension and in remaining 3 cases due to derange Doppler. Caesarean section was done in 32 (25.81%)

subjects. Instrumental delivery was done in 5(4.03%) study subjects. In all 5 deliveries ventouse was applied. Spontaneous abortion occurred in 12 subjects (9.68%). Medical termination of pregnancy was done in 4 (3.22%) subjects for indication being contraceptive failure at gestational age range between 8weeks to 10 weeks.

Table no.10. Obstetric outcome in study subjects.

Obstetric outcome	No of cases	%
Vaginal delivery	71	57.26%
Spontaneous labour	64	51.61%
Induced labour	7	5.65%
Caesarean section	32	25.81%
Emergency	24	19.36%
Elective	8	6.45%
Instrumental delivery	5	4.03%
Ventouse	5	4.03%
Spontaneous abortion	12	9.68%
Medical termination of pregnancy	4	3.22%
Total	124	100%

Table 11 shows distribution according to indication of caesarean section in study subjects. In emergency caesarean section the most common

indication was fetal distress i.e. 8.87%. In elective caesarean section the most common indication was Cephalopelvic disproportion i.e.2.41%.

Table 11. Indication for caesarean section in study subjects

Indications	No of cases (n=32)	Percentage
Emergency		
Foetal distress	11	8.87%
PROM>12hrs	4	3.22%
Malpresentation	4	3.22%
Failure of induction	3	2.41%
Prev 2 LSCS	2	1.61%
Elective		
CPD	3	2.41%
Malpresentation	2	1.61%
Unfavourable cervix	2	1.61%
Eisenmengers Syndrome	1	0.8%

Table 12 shows causes of maternal death. There were 4 maternal deaths. Dilated cardiomyopathy, immunocompromise (HIV) and multiorgan failure was the cause of 1st maternal death. 2nd maternal death was due to pulmonary embolism, severe

pulmonary artery hypertension. 3rd maternal death was due to infection endocarditis, septic shock and pulmonary thromboembolism. 4th maternal death was due to peripartum cardiomyopathy, congestive cardiac failure, severe anemia.

Table no.12. Causes of maternal death in heart disease study subjects

Cause	No. Of patients (n=4)	Percentage
Dilated cardiomyopathy, immunocompromise(HIV), multiorgan failure	1	0.8%
Pulmonary embolism , Severe pulmonary artery hypertension	1	0.8%
Infective endocarditis, septic shock, pulmonary thromboembolism	1	0.8%
Peripartum cardiomyopathy, congestive cardiac failure, severe anaemia.	1	0.8%

Table 13 shows details of maternal mortality in heart disease cases. All 4 cases of maternal mortality were unbooked cases. They had never gone to any hospital for antenatal check up. For the first time they had gone to the PHC and were referred to our tertiary care centre .On admission 2 cases had NYHA grade 3 and 2 cases had NYHA grade 4. All cases were primigravida and were

delivered vaginally. 3 cases (case no.1, 2, 3) had preterm vaginal delivery. DCM (case no.1) and IE(case no.3) cases delivered a preterm stillborn baby where as in PAH(case.no.2) case there was early neonatal death. Case of peripartum-cardiomyopathy (case no.4)delivered vaginally a fullterm live baby of weight 2.6kg

Table 13. Details of maternal mortality in heart disease study subjects

Details	1)Dilated cardiomyopathy	2)Pulmonary artery hypertension	3)Infective endocarditis	4)Peripartum cardiomyopathy
Age (yrs)	23	27	24	24
Parity	P1	P1	P1	P1
GAA (weeks)	31	35	34	37
Booking	Unbooked	Unbooked	Unbooked	Unbooked
NYHA	4	3	3	4
GAD (weeks)	31	35	34	38
MOD	Vaginal	Vaginal	Vaginal	Vaginal
Perinatal outcome	Preterm stillborn	Preterm early neonatal death	Preterm stillborn	Fullterm live baby
Birth wt(kg)	1.6	1.4	1.7	2.6
Admission to delivery interval	6hrs	13hrs	8hrs	7days
Admission to death interval	16hrs	28hrs	31hrs	8days
GAA - Gestational Age at Admission; GAD - Gestational Age at Delivery MOD - Mode of Delivery.				

Table 14 shows different causes of maternal deaths during study period in our department.

Most common cause of maternal deaths was

eclampsia. Heart disease was the cause of maternal death in 3.39% of cases.

Table 14. Causes of maternal death during the study period in our department.

Causes	Number (n=118)	Percentage
Eclampsia	15	12.71%
Septicemia	13	11.02%
Preeclampsia	12	10.17%
Hepatitis	11	9.32%
Malaria	9	7.63%
Anaemia	9	7.63%
Hemorrhage	8	6.78%
Cerebrovascular episodes	7	5.93%
ARDS	7	5.93%
Viral encephalitis	6	5.09%
Heart disease	4	3.39%
Sickle cell disease	4	3.39%
Dengue	4	3.39%
Pneumonia	3	2.54%
Seizer disorder	3	2.54%
Diabetes	3	2.54%

Table 15 shows distribution according to birth weight of babies. Among 124 cases 16 cases were of abortions. So the above table shows distribution

of birth weight of babies in remaining 108 cases. Most (43.54%) of the babies had birth weight between 2-2.5kg.

Table 15. Birth weight of babies of study subjects.

Birth weight (kg)	No of cases	Percentage
1-1.5	3	2.77%
1.5-2	4	3.22%
2 - 2.5	54	43.54%
2.5 - 3.0	35	28.22%
>3	12	9.67%

Table 16 shows the NICU admission. 18 babies required NICU admission. Out of 18 babies 10 babies had early neonatal death.

Table 16. NICU admission

NICU admission	No of cases	Percentage
Present	18	14.52%
Absent	106	85.48%
Total	124	100%

Table 17 shows perinatal mortality in different type of heart disease. In rheumatic heart disease cases there were 8 stillborn (6 fresh and 2 macerated), and 8 early neonatal death. In congenital heart disease cases there were 2 stillborn (2 fresh and no macerated). There were 1

stillborn and 2 early neonatal death in other (cardiomyopathy) type of heart disease. Thus rheumatic heart diseases constitute 12.90%, congenital heart diseases constitute 1.61% and other constitutes 2.42% of perinatal mortality.

Table 17 Perinatal mortality in different types of heart disease

Type of heart disease	Stillborn		Early neonatal death	Total	%
	Fresh	Macerated			
Rheumatic	6	2	8	16	12.90
Congenital	2	0	0	2	1.61
Other	1	0	2	3	2.42

An analysis of causes of neonatal death showed that Prematurity with birth asphyxia was the cause of 4(3.22%) of neonatal death. 2(1.61%) neonatal deaths were due to aspiration pneumonia and

septicemia each. 1(0.80%) neonatal death was due to respiratory distress syndrome and extreme prematurity each.

Table 18 Causes of neonatal death

Cause	Cases(n=10)	Percentage
Prematurity with birth asphyxia	4	3.22%
Aspiration pneumonia	2	1.61%
Septicaemia	2	1.61%
Respiratory distress syndrome	1	0.80%
Extreme prematurity	1	0.80%

Discussion

Cardiac diseases continue to be a risk factor for maternal and neonatal morbidity and mortality. This study reflects the maternal and fetal outcome in pregnant women with cardiac disease managed at a tertiary care referral centre in India.

In western countries, maternal heart disease complicates 1–3% of pregnancies and is the third common cause of maternal death during pregnancy^[11]. In other parts of the world with the declining incidence of rheumatic fever and the significant advances in the management of congenital heart disease, the ratio of rheumatic heart disease to congenital heart disease in pregnancy has decreased to approximately 1:3. In India heart disease complicates 0.1 to 4% pregnancies^[12].

In present study total 124 cases were studied over a period of 2. The detail history was recorded and each case was followed up till discharge from hospital. The data was recorded in master sheet and tabulated to observe the outcome.

During study period total numbers of deliveries were 17,898 and total numbers of cases of heart disease were 124. Thus incidence of heart disease in present study is 0.692%. The lowest incidence reported is 0.42 % in Devabhaktuni study^[13] and the highest incidence was reported in Vidyadhar Bangal study^[14], while in the present study, it is 0.692%.

Heart disease in pregnant women is most commonly due to rheumatic heart disease, congenital abnormalities and less commonly due to ischemic heart disease or cardiomyopathy. In developing countries like India rheumatic disease is still predominant^[15].

It is evident from the above table that in all studies rheumatic heart disease was more common than congenital and other heart disease which were conducted in developing countries like India, while the study conducted in Germany by Verene Stangl^[16] showed congenital heart disease is more common than rheumatic heart disease. In our study also rheumatic heart disease was more common than congenital heart disease.

The present study group includes 62.09% cases of primigravida while rests were multi gravidae. Richa Garg also analyzed the parity and found 60% primigravida. The mean age of women participated in study is 24+3.4yrs. This mean age group value is in accordance with that of given by Richa Garg as 24.45±3.6^[17].

Majority of our patients were in NYHA class I and II (84.66%). Though patients with NYHA class III and IV were less in number, they had the worst maternal and perinatal outcomes. The values of present study and other studies are roughly in the same range and comparable with each other. Most of women delivered vaginally (61.29%) and caesarean section (25.81%) was done for obstetric indications only. 64 cases were full term normally delivered, 12 had preterm vaginal delivery. We had 5 successful VBAC. Vacuum was applied in 5 cases to cut short the second stage of labour. Vaginal delivery is the commonest mode of delivery in present study. These findings in present study correlate well with above mention studies.

In our series there were 4 (3.2%) maternal deaths. These patients belonged to NYHA III and IV category which was similar to various articles who found increased rates of mortality and morbidity in these classes of patients^[18]. The values of maternal mortality in present study and other study are roughly in the same range. The values of perinatal mortality in present study and other study are roughly in the same range. Maternal heart disease was associated with an increased risk of neonatal complications. The severity of symptoms during pregnancy is a better indicator of perinatal outcome than duration and type of heart disease^[19, 20].

In our series mean birth weight was 2.54 kilograms. 11 (8.87%) babies were stillborn, 10 (8.06%) babies had early neonatal death and 18 (14.52%) babies required Neonatal intensive care unit admission. The clinical evaluation of all live births did not show any evidence of congenital heart disease.

Conclusion

The management of pregnant woman with heart disease requires a multidisciplinary team for optimal maternal and fetal outcome. Good antenatal care with combined obstetric, cardiac and anesthesiologist expertise is essential for successful course and outcome of pregnancies complicated, by heart disease. Pregnancy should not be allowed to proceed, if possible, in patients with uncorrected severe valvular lesions, as maternal and fetal morbidity and mortality are high. For those with milder disease, pregnancy is best undertaken after the valvular lesion has been rectified or stabilized. Pregnant women with rheumatic heart disease of moderate-severe mitral stenosis, severe pulmonary hypertension and atrial fibrillation are at high risk of heart failure. The fetal outcome is not good in cases of NYHA class III and IV. Vaginal delivery is safer and caesarean section should be reserved only for obstetric indications. Maternal and perinatal outcome can be improved by team approach at tertiary care centre.

Conflict of Interest: None

References

1. Cunningham F G et al. William Obstetrics, 20th Ed. Appleton and Lange 1997;206-2017.
2. Anantha Subramaniam L, Anantha Subramaniarn C, and Geetha N. Pregnancyand Labour in cardiac patients ObstGynae. India 1980; 30: 479-482.
3. Sharma R, Garg S. Clinical study on Pregnancy with heart disease 1984; 828-10.
4. Guleria R, Vashist K, Dhall G I, Grover A, Wahi P L. Pregnancy with heart disease Eperience at Postgraduate Institute of Medical Education and Research. Chandigarh. J. of Phvsicans of India 1990;38: 902-906.
5. Nafeesa Beebi A and Bhuvaneshwari Cardiac disease complicating PregnancyLabour and Puerperium J of ObstGynac of India 1984;1027-1030.
6. Haththotuwa, Hasanthi R. Maternal mortality due to cardiac disease in Sri Lanka International Journal of Gynecology and Obstetrics , Volume 104 , Issue 3 , 194 – 198.
7. J Burlingame, B Horiuchi, P Ohana, A Onaka and L M SauvageThe contribution of heart disease to pregnancy-related mortality according to the pregnancy mortality surveillance system *Journal of Perinatology* **32**, 163-169 (March 2012)
8. Pillutla P, Nguyen T, Markovic D, Canobbio M, Koos BJ, Aboulhosn JA. Cardiovascular and Neonatal Outcomes in Pregnant Women With High-Risk Congenital Heart Disease. *Am J Cardiol.* 2016 May 15;117(10):1672-7.
9. Yaghoubi A, Mirinazhad M. Maternal and neonatal outcomes in pregnant patients with cardiac diseases referred for labour in northwest Iran. *J Pak Med Assoc.*2013 Dec;63(12):1496-9.
10. Miller-Davis C, Marden S, Leidy NK. The New York Heart Association Classes and functional status: what are we really measuring? *Heart Lung.* 2006 Jul-Aug;35(4):217-24.
11. Franklin WJ, Benton MK, Parekh DR. Cardiac Disease in Pregnancy. Coulter SA, ed. *Texas Heart Institute Journal.* 2011;38(2):151-153.
12. Arora N, Kausar H, Jana N, Mandal S, Mukherjee D, Mukherjee R. Congenital heart disease in pregnancy in a low-income country. *Int J Gynaecol Obstet.* 2015 Jan;128(1):30-2.
13. Devabhaktuni P, Devinenik K, Vemuri U, et al. Pregnancy outcome in chronic rheumatic heart disease. *J ObstetGynaecol India.* 2009;59:41–6.
14. Vidyadhar B Bangal, Rashmi K Singh ET AL (2012), Kunaal K Shinde: Clinical Study of Heart Disease Complicating

- Pregnancy. IOSR Journal of Pharmacy 2012;2 (4): 25-28.
15. Subbaiah M, Sharma V, Kumar S, Rajeshwari S, Kothari SS, Roy KK, Sharma JB Singh N. Heart disease in pregnancy: cardiac and obstetric outcomes. Arch Gynecol Obstet. 2013 Jul;288(1):23-7.
 16. VerenaStangl, Johanna Schad, Gabriele Gossing, Adrian Borges, Gert Baumann, Karl Stangl. Maternal heart disease and pregnancy outcome: A single-centre experience. European Journal of Heart Failure 10 .2008; 855–860.
 17. RichaGarg, AnujaBhale Rao, Krutika Bhale Rao.Clinical Study of Heart Disease Complicating Pregnancy. Journal of Evolution of Medical and Dental Sciences. 2014;3(27):7398-7405
 18. Martins LC, Freire CM, Capuruçu CA, NunesMdo C, Rezende CA. Risk Prediction of Cardiovascular Complications in Pregnant Women With Heart Disease. Arq Bras Cardiol. 2016 Apr;106(4):289-96.
 19. De Swiet M. Maternal mortality from heart disease in pregnancy. *British Heart Journal*. 1993;69(6):524.
 20. Zöllner J, Curry R, Johnson M. The contribution of heart disease to maternal mortality. CurrOpinObstet Gynecol. 2013 Apr;25(2):91-7.