

Original research article**Fetomaternal outcome in cases of congenital and acquired heart disease****¹Dr. Bindeeya B. Dhrangiya, ²Dr. Hafsa Vohra**¹3rd Year Resident, B.J. Medical College, Ahmedabad, Gujarat, India²Assistant Professor, B.J. Medical College, Ahmedabad, Gujarat, India**Corresponding Author:**

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Abstract

Background: cardiac disease in pregnancy is a high-risk pregnancy and major problem worldwide particularly developing countries. Present scenario the incidence of pregnancy with congenital heart disease is high in developed countries. While developing countries like India incidence of RHD is still high. Aims of this study is to find out incidence of cardiac disease in pregnancy and to assess fetomaternal outcome of this high risk pregnancy.

Material & Methods: Analysis of maternal and fetal outcome in 100 cases of cardiac disease in pregnancy was carried out in the department of Obstetrics and Gynecology in B.J. Medical College civil Hospital, Ahmedabad at a tertiary care center from 01/08/2016 to 31/07/2018.

Result: In the present study prevalence of cardiac disease 0.67%. Among them the RHD was highest contributing lesion (63%) and Mitral stenosis is main causes in valvular lesion. Majority delivered vaginally (48.9%). Complications of this type of pregnancy were congestive cardiac failure, thromboembolism and 4% ratio of maternal mortality occurred.

Conclusion: Cardiac disease has major impact on pregnancy and its outcome. It is a team effort by obstetricians, cardiologist, neonatologist to achieve successful pregnancy. Regular antenatal checkup and strict vigilance during the risk period when patient may develop complications as a result of hemodynamic changes can avoid the complication.

Keywords: Fetomaternal, congenital, acquired heart disease

Introduction

Heart disease complicates more than 1 percent of all pregnancies and now is leading cause of indirect maternal deaths-accounting of 20 percent of all cases ^[1]. Pregnancy comes as a temporary complication in the disease process of a patient with a cardiac lesion. Prevalence of heart disease in pregnancy varies from 0.3%-3.5% ^[2]. It is the fourth common cause of maternal mortality and one of the most important non obstetrical causes of maternal death. Previously most women with diagnosed heart disease were advised to avoid pregnancy and labor and termination was advised. But in modern obstetrical practice, pregnancy in a patient with a heart disease is no longer an unacceptable hazard. Joint management between the obstetrician and the cardiologist has improved the outcome of pregnancy and reduced maternal risks. Disease pattern varies widely when developed and underdeveloped countries are compared (Uelen and Glechen 1982). In U.S.A. and Western Europe incidence of RHD has declined. In India and Nigeria acute and chronic RHD still constitutes a major health problem among pregnant women. Though heart disease is often a worrying problem, the study shows that outcome of pregnancy is generally satisfactory and majority of the patients with proper management achieve normal vaginal delivery after spontaneous onset of labor.

Aims and Objectives

- 1) To find out incidence of various cardiac lesions and presentations of heart diseases in pregnant women during my study between 01/08/16 to 31/07/18 among 14708 indoor patients in a tertiary care center.
- 2) To find out causes of and management of a pregnancy with a heart disease.
- 3) To find out causes leading to cardiac decompensation and possible prophylactic measures.
- 4) To assess maternal and fetal outcome and prognosis.

Material and Method

This study, an analysis of maternal and fetal outcome in 100 cases of cardiac disease in pregnancy was carried out in the department of Obstetrics and Gynecology in B.J. Medical College civil Hospital, Ahmedabad at a tertiary care center from 01/08/2016 to 31/07/2018.

Inclusion criteria

- Patients who were known case of RHD or diagnosed during present pregnancy.
- Patients with congenital heart disease.
- Patients with ischemic heart disease.
- Patients with prosthetic heart valves and surgically corrected heart disease.
- Patients who developed cardiac complication like cardiac myopathy during antenatally, intrapartum, postpartum period.

Observation and Discussion

In our study, out of total 14,708 deliveries during period 01/08/2016 to 31/07/2018, there were 100 cases of pregnancy with cardiac disease and they were studied in terms of maternal and fetal outcomes. Total 14708 patients were registered as indoor patients at our setup during the study period. Prevalence of cardiac disease during the study was 0.67%.

The obstetrician is the key person responsible for the health of mother and the infant during the pregnancy and delivery. If pregnancy is complicated by heart disease, multidisciplinary approach and regular supervision of the patient during pregnancy can achieve best results. This study was conducted at our hospital and the obstetric and fetal outcome of 100 patients with heart disease was studied during the study period. In addition to routine antenatal workup, cardiologists decided type and severity of cardiac lesion and also evaluated patient with heart disease.

Following are the observations:

Table 1: Prevalence of cardiac disease reported by other authors

Author	Year	Prevalence (%)
Tayyiba Wasim <i>et al.</i> [7]	2005	1%
Kapoor P <i>et al.</i> [8]	2015	1.2%
Pandey K. <i>et al.</i> [3]	2016	0.8%
Saima Salam <i>et al.</i> [5]	2017	4.3%
Present study	2019	0.67%

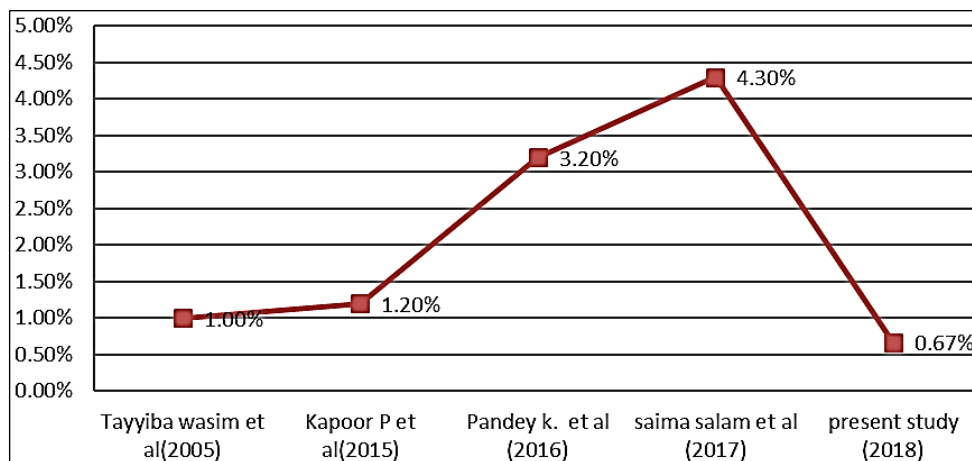


Fig 1: Prevalence of heart disease as reported by other authors

Above figure shows prevalence of heart disease in present study. It indicates that prevalence of heart disease in present study is lower than Tayyiba Wasim [7] *et al.*, Kapoor P *et al.* [8] and Pandey K. *et al.* [3], Saima Salam *et al.* [5] and studies.

Table 2: Heart Disease and Maternal age

Age in years	No. of patients (n=100)	Percentage (%)	Pandey K. <i>et al.</i> study (2016) ³
18- 20	7	7%	28%
21-25	49	49%	36%
26-30	24	24%	28%
31-40	20	20%	8%
Total	100	100%	100%

In Present study Out of 100 patients, 7 patients were from 18-20 year age group, 49 patients were from 21-25 years of age group, 24 patients were 26-30 years age group, while 20 patients were 31-40 years age group. In Present study youngest patient was 18 years old and the oldest was 39 years old. This suggests cardiac disease during pregnancy was more common in younger age group.

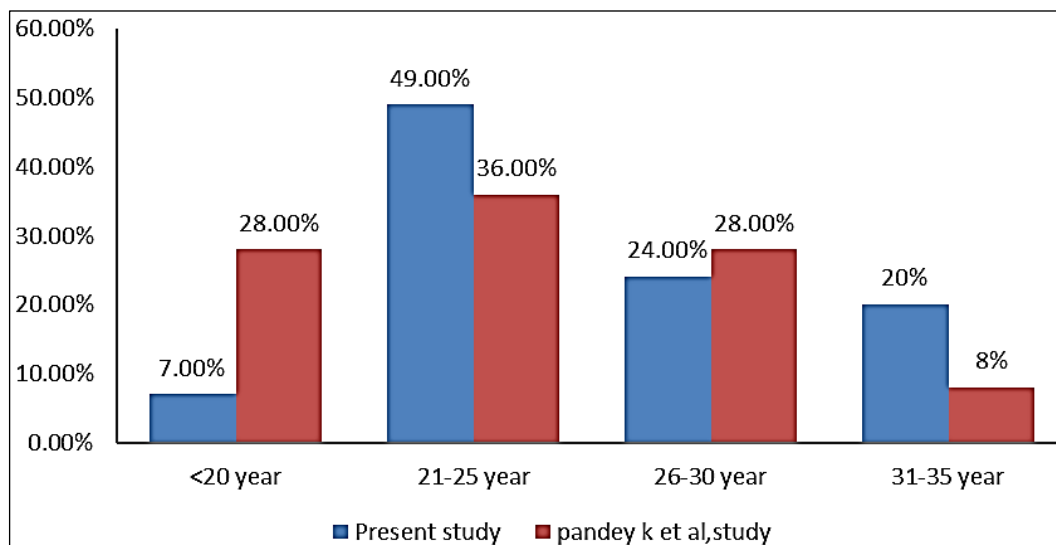


Fig 2: Comparison of Maternal age distribution in patient of Heart disease

Above figure shows age distribution of the patients in present study and Pandey k *et al.* study [3]. It indicate that heart disease in our study is most common in 21-25 year (younger) age group patients which is comparable to Pandey k *et al.* [3] study.

Table 3: Comparison of Parity of patients in present study and Other studies

Parity	Present study (%)	S Abbasi <i>et al.</i> 2017 [10]
Primigravida	62%	62.7%
2 nd gravida	22%	25.6%
3 rd gravida or more	16%	11.8%

In the present study, there were 62 primi gravid patients, 22 patients second gravid patients, 8 third gravid patients and 8 patients were grand multigravida patients. As most of patients were first time diagnosed as case of cardiac disease during first time of conception during antenatal visits, intrapartum or postpartum almost two third of patient were primi para patient. Hence majority of 2nd gravida, 3rd gravida and multigravida patients were already known cases of cardiac disease and some patients were on cardiac drug management.

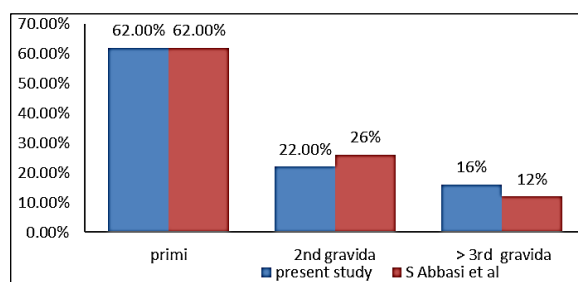


Fig 3: Comparison of Parity of patients in present study and other Studies

Above figure shows Parity distribution of patients in the present study and S Abbasi *et al.* [10]. It indicates that heart disease in present study is most common in primigravida patients, which is comparable to S Abbasi [10] studies.

Table 4: Heart Disease and gestational age

Gestational Age in Weeks	No. of patients (n=96)	Percentage (%)
<34 week	38	38%
34-36 week	28	28%
>=37 week	30	30%

In the present study, total of 100 patient 96 patient delivered, while 2 patients underwent termination of pregnancy while one patient had spontaneous abortion and one patient had 2nd trimester IUD. 42 patients were below 34 weeks of Gestational age, 25 patients were 34-36 weeks of gestation and 33 patients were more than 37 week of gestational age which shows most of patients were below 37 weeks of gestational age because in cardiac patient the chances of preterm deliveries are higher.

Table 5a: Etiological distribution in pregnancy with Heart disease

Type of Heart Disease	No of Cases
Rheumatic Heart Disease	63
Cardiomyopathy	5
Cardiac Arrhythmias	3
Atrial Septal Defects	11
Ventricular Septal Defects	6
Mitral Valve Prolapse	5
Bicuspid Aortic Valves	2
Tetralogy of Fallot	2
Primary Pulmonary Arterial Hypertension	3

In the present study out of 100 cases, 63 patients were found to have Rheumatic Heart Disease. Among all presentations of Rheumatic Heart Disease, Mitral stenosis is the predominant lesion and accounts for nearly three quarters of all cases. In these patients prognosis and complications are directly associated with the degree of valvular stenosis. Mitral valve area <2cm² were at greatest risk^[1].

Cardiomyopathies are being increasingly recognized, with three main types-Dilated, restrictive and hypertrophic cardiomyopathy. In Present study 5 patients had been diagnosed with Cardiomyopathies. In which 2 cases were Dilated cardiomyopathies and peripartum cardiomyopathies and one cases were Hypertrophic cardiomyopathies and one was restrictive cardiomyopathies.

2 patients had been diagnosed with Bicuspid aortic valve.

With advances in surgical techniques, the prognosis of congenital heart disease has improved and majority have survived in adulthood. In the present study, the commonest lesion in congenital heart disease found during pregnancy was Atrial septal defect in 11 patient. Pregnancy is well tolerated unless pulmonary hypertension has developed, but this is uncommon.¹ Ventricular septal defects were found in 5 patients. Cardiac Arrhythmias were found in 3 cases, Mitral valve prolapse were found in 5 cases.

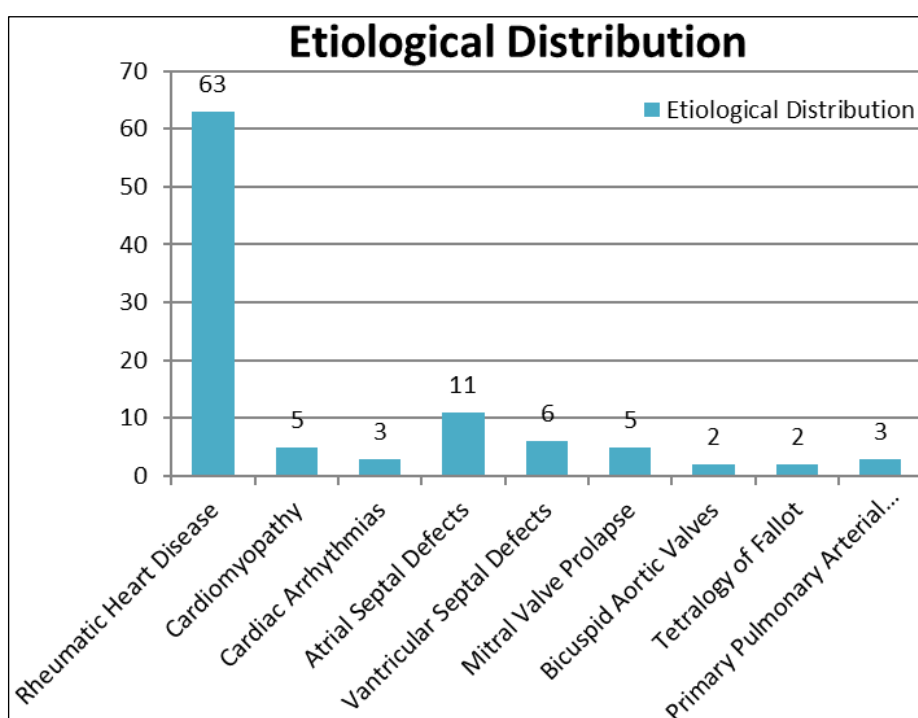


Fig 5: Etiological Distribution

Table 5b: Comparison of Etiology with Heart disease

Etiology of Heart disease	Present study	Salam S. Mushtaq study 2017 ^[5]
Rheumatic Heart Disease	63%	56.6%
Congenital Heart Disease	21%	13.3%
Miscellaneous	16%	30%

RHD still constitutes the major group of heart disease in pregnancy, especially in the developing countries. Various authors have reported proportion of RHD from 56.6% in Salam S. Mushtaq *et al.* ^[5]. In present series RHD consisted 63 out of 100 cases which account to 63%. Various authors ranging from 4% to 8% have described the proportion of CHD. This series shows that CHD constitutes 21% of total cases of heart disease may be due to easy availability of diagnostic techniques like 2D-Echo. So, trivial conditions like bicuspid aortic valves and mitral valve prolapse have also been increasingly recognized in minimally symptomatic patients.

Table 6: Mode of Deliveries in Heart disease

Mode of Delivery	No of Patients	Percentage %	Kapoor P <i>et al.</i> ^[8] (2016)	P Sneha <i>et al.</i> ^[9] (2017)
Vaginal Delivery				
1. Vaginal Delivery	47	48.9%	44%	39%
2. Assisted Vaginal Delivery				
-Forceps	07	7.2%	19%	13%
-vacuum	06	6.25%		
LSCS	36	37.5%	31%	41%
Total	96	100		

In Present study, out of Total 96 Deliveries 47 were vaginal Delivery. Among this 13 were Instrumental Delivery to cut short 2nd stage of labor. Vaginal delivery is better option than cesarean section for women with heart disease. The risk of bleeding, infection and thrombotic complications is less and vaginal delivery is not associated with acute shift in blood volume that happens during cesarean section. Out of 13 Instrumental Delivery 7 were Forceps Delivery and 6 were Ventouse Delivery. Moreover, 36 Lower segment cesarean section were performed. Most of the LSCS were performed due to obstetric Indication. With each different maternal condition and cardiac disease it is essential to remember that delivery itself does not necessarily improve the maternal condition and in fact worsen it. Clearly, both maternal and fetal status must be considered in the decision to hasten delivery under circumstances ^[1].

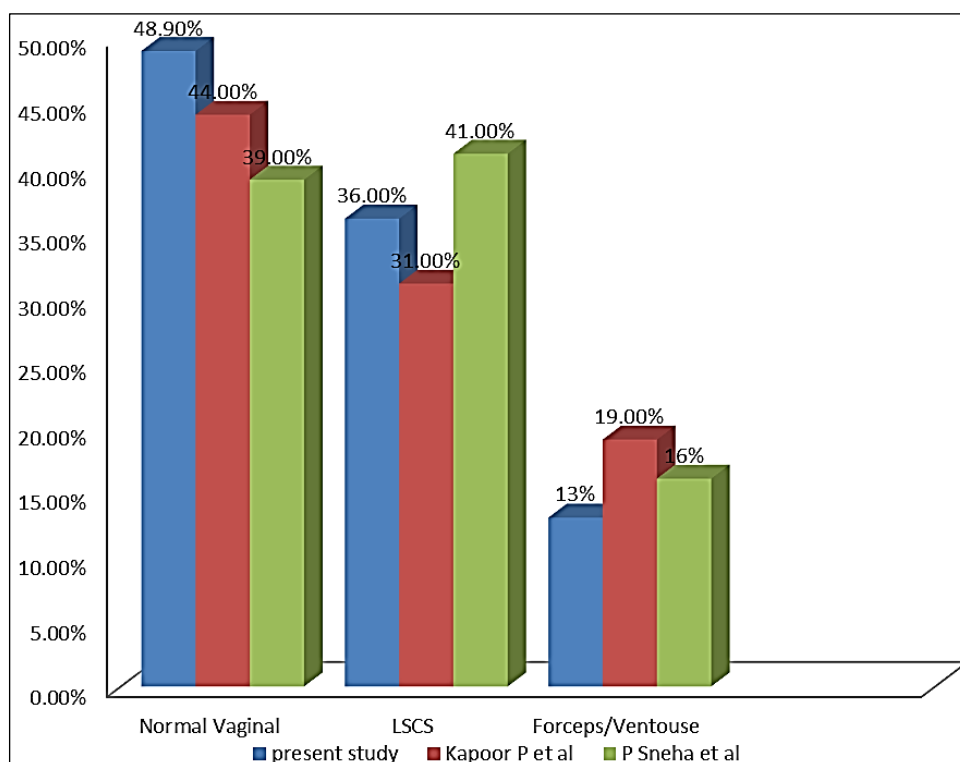


Fig 6: Comparison of Mode of Delivery with present study

The above table shows comparison of mode of delivery of present study with other authors. The incidence of normal vaginal delivery coincides well with those of authors like P. Sneha *et al.* [9], which is approximately 38% to 40%. The incidence of ventouse and forceps also coincides with that of P sneha [9]. But due to increased safety of modern anesthesia especially general (inhaled) anesthetics rates of LSCS are much higher in present study for various cardiac and also obstetric indications.

Table 7: Indications of LSCS

Indication	No of Patients
Malpresentation	6
Fetal Distress	11
Cardiac disease (Severe MS, severe AS)	6
IUGR	3
Prev CS	10
Total	36

The patients with Heart disease normally have spontaneous normal vaginal delivery in most of the cases. In our study, 36% patients had to undergo LSCS. The indications of the cesarean were obstetrical in majority of the cases. Out of 36, Most common indication were Fetal Distress and case of Previous cs. Only 6 LSCS were due to cardiac indication.

Table 8: Complications of Heart Disease

Complications	Other
Congestive Cardiac Failure	8
Pneumonia	2
Pleural Effusion	6
Pulmonary Edema	6
Thromboembolism	1
Maternal Mortality	4
Post-Partum Hemorrhage	4
ICU admission	59

The above table shows Out of 100 patients 59 patients were admitted in ICU for complication and management and observation. Total 32 patients developed complications. Out of 100 cases, 8 patients developed CCF,6 patient were developed pleural effusion and 6 patients were developed pulmonary edema. No patient developed acute rheumatic fever probably due to improved and regular prophylaxis by Inj. Benzathine Penicillin 1.2 MU IM every 21 days which is very effective drug in preventing attacks of rheumatic fever. Most of the patients who developed complications belonged to NYHA grade 3 to 4 from the very beginning and thus this shows that as the functional grade increases the incidence of cardiac decompensation also increases. Those patient with a treated cardiac valvular lesion with prosthetic valve pose special problem at time of delivery. These patients were increased at risk to develop complication like thrombosis, endocarditis. With improvement in the available medical care, proper and well facilitated ICCU, the care of the patient with heart disease should not be a major problem for the modern obstetrician and cardiologist.

Table 9: Fetal outcome in term of maturity and viability in the present study

Full term	Frequency	Percentage
Live birth	54	54.8%
Still birth	04	04.3%
Preterm		
Live birth	32	32.5%
Still birth	6	6.25%

In present study 38 were preterm deliveries, out of them 32 were live birth, 6 were still birth and 1 was abortus, while 58 were full term deliveries out of them 54 were live birth, 4 still born.

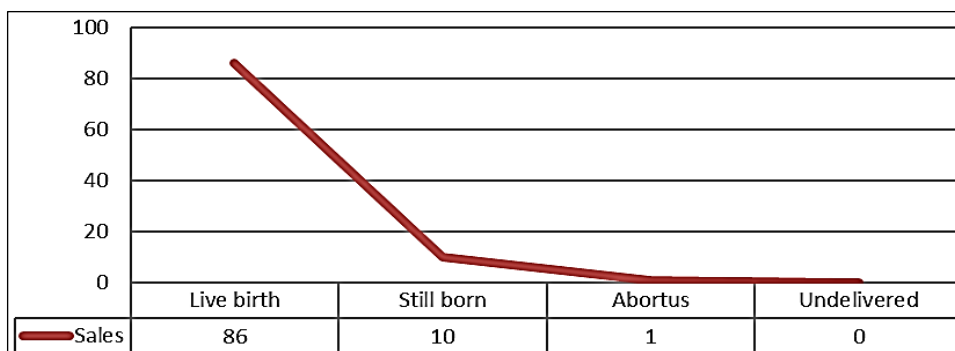


Fig 7: Fetal outcome in the present study

In the present study out of 100 fetus, 86 were delivered live either pre term or full term, 10 babies were still born, 1 abortus IUD and no case was remain undelivered.

Table 9b: Percentage of NICU admission in the present study

NICU admission	No. of baby	Percentage
Full term	8	8.33%
Preterm	26	27%

In the present study out of total 86 live birth 34 babies were admitted in the NICU, among them 8 babies were full term and 26 babies were preterm. It indicates that prematurity is the leading cause for NICU admission in present study. The fetal outcome in RHD (especially with corrected valvular pathology) is usually good and only a little different from those in patients who don't have cardiac disease.

Table 10: Maternal mortality in Present study

Cause of Death	No. of Patient
Pulmonary oedema	1
Atrial Fibrillation	1
Primary pulmonary Hypertension leading to congestive cardiac failure	1
Eisenmenger disease	1

In present study 4 patients expired due to cardiac disease, one from Pulmonary oedema, one from Atrial Fibrillation, one from congestive cardiac failure and one from Eisenmenger disease.

Pulmonary oedema is caused by alteration in forces that govern the movement of fluid in pulmonary alveoli [2]. Increased pulmonary capillary pressure due to fluid overload or CHF and altered capillary permeability due to endothelial cell injury most common mechanism. In cardiac disease, pulmonary edema results from inability of the diseased heart to compensate for acute or chronic increase in intravascular volume. Atrial fibrillation and flutter may be seen with mitral valve disease. The type of therapy should be choosed according to stage of pregnancy². Direct current can be performed without fetal damage in women who become haemodynamically unstable. one patient was expired due to unstability of heart rate.

Congestive cardiac failure is seen most commonly as complication of Cardiomyopathy in late pregnancy and early postpartum period in which left ventricular systolic dysfunction develops. Vigorous heart failure treatment in ICCU with bed rest, diuretics, B blocker are three plain elements for successful management of patients. Majority responded well and recovered. Only one patient expired.

In Eisenmenger disease, consist of pulmonary hypertension with reversed or bidirectional shunt at atrioventricular or atriopulmonary level. Maternal mortality is approximately 20-50% and total fetal wastage is also high [2]. Because of high mortality rate pregnancy is contraindicated. Despite the medical and obstetrical care, these patients often die in postpartum period from irreversible cardiovascular collapse. In present study one death was reported with Eisenmenger disease.

Table 10b: Comparison of Maternal mortality in Heart disease

Maternal Mortality	Percentage
Pandey <i>et al.</i> [3] (2016)	5.12%
P Sneha <i>et al.</i> [9] (2017)	2.79%
Salam s <i>et al.</i> [5] (2017)	4.4%
Present study	4%

As compared with other study maternal mortality rate was comparable with study like Salam S *et al.* [5] and Pandey *et al.* [3].

Summary

The present study was conducted at our hospital B.J. Medical college, Civil Hospital, Ahmedabad, a tertiary care center. The obstetrical and fetal outcome of 100 patients with heart disease among 14708 deliveries was studied during my study period during 01/08/2016 to 31/07/2018.

Following are the results

- The prevalence of Heart Disease in present study is 0.67%.
- The majority of the patients were of age <30 years of age (80 patients) and among them most were between 21-25 years of age (49 patients). Younger patients were more common because of at time of antenatal or post-partum first time diagnosed as case of heart disease.
- In Present study there were 62 primi gravida, 22 second gravida, 8 third gravida and 8 were grand multi gravida patients. Primi patient were more common because of primi patient were most commonly first time diagnosed During pregnancy.
- In Present study Majority of patients 42 patients were below 34 weeks of Gestational age, 25 patients were 34-36 weeks of gestation and 33 patients were more than 37 week of gestational age. During pregnancy there are several period when danger of cardiac decompensation is especially great like at 12-16 weeks gestation, 2nd one between 28 and 32 week gestation, another dangerous time is during labor and delivery, another time is at time of delivery and placenta and final dangerous time is 4-5 days after delivery.²No single case of post-datism were noted in the present study.
- RHD is still a major group of heart disease in pregnancy among which mitral valve disease is the commonest. RHD constituted 63% cases of all heart diseases during present study. In RHD most common lesion found was Mitral stenosis. There were not even single case of rheumatic fever was noted. Rheumatic heart disease patient prophylaxes of inj. Benzathine penicillin and B blocker or Diuretics were given. Which help to cure Infective Endocarditis.
- In Present study out of 100 cases 58 cases had been delivered Full term, while 38 patient had preterm delivery, out of 2 patient one with Eissenmenger syndrome and one with Tetralogy of Fallot were advised to MTP, termination of the pregnancy were done.
- In Present study 47% patients had vaginal deliveries and 36% had LSCS while 13% underwent instrumental (ventouse/forceps) vaginal deliveries for cut short of 2nd stage of labour. Vaginal delivery is more preferable as compared to LSCS.
- Antibiotics prophylaxis is must in all cases of RHD for prevention of infective endocarditis. Out of 68 cases of RHD, all were taking Penicillin prophylaxis already and they were advised to continue the same. So, as a result not a single patient presented with a rheumatic fever nor developed during their period of hospitalization.
- In Present study,38% of patients had preterm deliveries thus preterm labor is common in patients with cardiac diseases. Many of them where crosses gestational age more than 34 weeks and have maturity between 34-36 weeks which gives good outcome of baby despite of preterm delivery. Not a single patient had postdatism.
- Throughout the study 4 maternal mortalities occurred- 1 from pulmonary oedema, 1 from atrial fibrillation, 1 from congestive cardiac failure due to primary pulmonary hypertension and 1 from Eissenmenger Syndrome. Thus making case fatality ratio of 4%. Certain cardiac condition like primary pulmonary hypertension, Eissenmenger syndrome is contraindicated for pregnancy. This type of patient required pre-conceptional counseling and avoidance of pregnancy.

Conclusion

The results of our study indicate that heart disease forms a substantial proportion of medical illness complicating pregnancy. Cardiac disease presents problems both to the obstetrician and as well as to the physician, cardiologist and to the neonatologist. But the majority of pregnancies complicated by Heart disease are uneventful with a favorably good outcome for both the mother and the fetus if appropriate Antenatal and medical care is availed. This study conclude that Rheumatic heart disease is still a predominant cardiac lesion affecting pregnancy and its outcome. Early detection, treatment like benzathine penicillin and Diuretics, proper follow up and correction prior to pregnancy shall improve outcome and decrease in maternal mortality and morbidity.

The time to learn about identifying high risk factor pregnancy, different mode of deliveries, in such patients is prior to pregnancy. The management includes intensive care throughout pregnancy and also during labor and postpartum. The earliest signs of complication need to be watched for. Vigilance with combined efforts from the obstetrician, a physician and a cardiologist and is mandatory for successful course and outcome of pregnancies complicated by heart diseases.

Educating the community about the cardiac disease and its complications, need for early detection of cardiac lesion, close monitoring during antenatal period, intrapartum period and postpartum care play a vital role in achieving good fetomaternal outcome. Failure to systematically search for cardiac disease in pregnant women has led to late diagnosis and high rates of fatal complications. Therefore effective

screening for cardiac disease in pregnant women is warranted.

Due to improved medical care, surgical correction of congenital lesions, more women are able to survive till the reproductive age group, hence increase number of pregnancy with heart disease are seen in modern times. The newer investigations liked 2D-Echo and Trans Esophageal Echography are becoming easily accessible for the patients and also are better Intensive Care Unit services available so that management of patients with Heart diseases with pregnancy should not be a big problem in the future.

There is no silver bullet policy to reduce morbidity and mortality of cardiac disease. Use of prophylactic antibiotics, anti-failure treatment during labor may bring down the incidence of infective endocarditis and cardiac failure during antenatal as well as puerperal period.

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