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Original Research Article

Maternal and perinatal outcomes of pregnancies complicated by cardiac disease at tertiary level hospital of Uttarakhand

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ABSTRACT

Background: Cardiac disease is the most common cause of indirect maternal deaths and most common cause of death overall. It complicates 1% of all maternal deaths. The maternal and neonatal risks associated with pregnancy in women with cardiac disease receiving comprehensive prenatal care have not been well defined. Objective of present study was to evaluate the burden of cardiac diseases in pregnancy in our hospital, their clinical presentation, type of cardiac lesion, associated complications, maternal and fetal outcome.

Methods: A retrospective study was conducted in Obstetrics and gynecology department at Shri Guru Ram Rai Institute of medical and health sciences, Dehradun from January- 2013 to December-2015. All patients with cardiac diseases during pregnancy or developed during postpartum period were included in the study. Detailed Demographic profile of patients, mode of delivery, perinatal outcome, associated antenatal, intranatal and postnatal complications were analyzed in detail.

Results: There were 37 patients with cardiac disease during pregnancy in our study period. Out of these 32.4% were diagnosed during current pregnancy. Rheumatic heart diseases were seen in 54.05% patients and congenital heart disease seen in 35.1%. out of these 81.1% patients belonged to NYHA class I and II and 18.9% patients in class III & IV. Majority of patients (78.3%) had vaginal delivery. We observed 5.4% maternal mortality and 2.7% of neonatal mortality rate.

Conclusions: Pregnancy in women with heart disease is associated with significant cardiac and neonatal complications. Multidisciplinary approach involving cardiologist, obstetrician and neonatologist improves fetomaternal outcome.

Keywords: Cardiac disease, Peripartum cardiomyopathy, Rheumatic heart disease

INTRODUCTION

Cardiac disorders complicate approximately 1-3% of pregnancies.¹ They account for increased morbidity and mortality rates and pose challenges in management. Diseases of the heart are broadly divided into congenital and acquired. Common congenital heart diseases are atrial septal defect and ventricular septal defect. Acquired group mainly comprises of rheumatic heart disease,

cardiomyopathies and ischemic heart disease. In India and other developing countries RHD is most common cardiac disease.²

Worldwide, mitral stenosis is the most common valvular defect responsible for maternal deaths with cardiac disease. Child bearing women with cardiac disease present a unique challenge to the heart care provider. The physiological changes during pregnancy predispose a

cardiac patient to decompensate. Classic symptoms of cardiac disease mimic common symptoms of late pregnancy like palpitation and shortness of breath with exertion. Detailed assessment of patient throughout pregnancy may lead to initial discovery of heart disease during this period.³ If diagnosed early and managed properly with multidisciplinary approach, collaboration of a team of obstetrician, cardiologist, anesthetist, pediatrician and nurse, it results in successful outcome for mother and child in majority of case.

With this background, we conducted this retrospective study and collected the data to evaluate the burden of cardiac diseases during pregnancy in our geographical region. We also studied their detailed clinical presentation, distribution of different cardiac lesions among pregnant women, mode of delivery, maternal and neonatal outcomes.

METHODS

This retrospective study was carried out at obstetrics and gynecology department of SGRRIM and HS, Dehradun, Uttarakhand over a period of three years i.e. from January-2013 to December-2015. During this time, there were 37 deliveries of patients with cardiac disease. We analyzed the detailed demographic data of these patients regarding age, parity, type of cardiac disease, timing of recognition of heart disease, clinical presentation, mode of delivery, maternal and neonatal outcome. All patient who were diagnosed heart patients before pregnancy, or diagnosed first time during their antenatal visits, or admitted in obstetrics and gynecology department/ or in ICU due to cardiac complications during antenatal and peripartum period were included in this study.

All of these patients were managed by team of obstetrician, cardiologist, pediatrician, anesthetist and ICU care as and when required. Adverse outcomes during the ante partum, intrapartum and post-partum period were classified as maternal (obstetrical) complication, cardiac complication and perinatal complications. Maternal complications were mainly anemia, pregnancy induced hypertension (PIH), post-partum hemorrhage. Cardiac complications were pulmonary edema, sustained symptomatic tachyarrhythmia requiring treatment, cardiac arrest or cardiac death.

Perinatal complications were preterm birth, intra uterine growth retardation (IUGR), still birth and intrauterine demise. Maternal outcome (deterioration of NYHA class, maternal morbidity and mortality) and perinatal outcome (birth weight, preterm, Apgar score, admission to NICU) were documented for each patient.

RESULTS

Table 1 is showing that majority of patients (54.1%) had rheumatic heart disease out of which 29.7% patients had mitral stenosis. 2.7% patient had mitral regurgitation

(MR), 13.5% patients had MS with MR. 5.4% patients had aortic stenosis (AS) and 2.7% patients had aortic regurgitation (AR). Thirteen patients (35.1%) had congenital heart disease, out of which 8.1% patients had atrial septal defect, 18.9% patients had ventricular septal defect, 5.4% patients had patent ductus arteriosus (PDA) and one patient had corrected Fallot's tetralogy.

Table 1: Prevalence of cardiac disease in pregnancy.

Type of cardiac disease	No. (%)
Rheumatic heart disease	20 (54.01)
Mitral stenosis	11 (29.7)
Mitral regurgitation	01 (2.7)
Mitral stenosis+Mitral regurgitation	05 (13.6)
Aortic stenosis	02 (5.4)
Aortic regurgitation	01 (2.7)
Peripartum cardiomyopathy	03 (8.1)
Ischemic heart disease	01 (2.7)
Congenital heart disease	13 (35.1)
Atrial septal defect	03 (8.1)
Ventricular septal defect	07 (18.9)
Patent ductus arteriosus	02 (5.4)
Tetralogy of fallots (corrected)	01 (2.7)

Table 2: Demographic details.

	No. (%)
Age	
<20 years	02 (5.4)
21-30 years	31 (83.8)
31-40 years	04 (10.8)
Parity	
1	16 (43.2)
2	12 (32.4)
3	04 (10.8)
>3	05 (13.6)
Antenatal care	
Booked	15 (40.5)
Un booked	22 (59.4)
Residence	
Rural	17 (45.9)
Urban	20 (54.1)

The majority of patients (43.2%) were primigravida (Table 2). Mean maternal age was 26.21±2.3 years.

81.1% patients belonged to New York Heart Association (NYHA) classification I and II and 18.9% of patients were in NYHA class III and IV. 51.4% patients had single valve involvement and 78.4% of them had mitral stenosis. 8 patients (21.6%) had surgical correction prior to pregnancy (Table 3 and 4).

Maternal complications included anemia in 9 patients (24.3%), pregnancy induced hypertension (PIH) in 5 patients (13.5%). Three patients (8.1%) had post-partum hemorrhage (PPH).

Table 3: Maternal cardiac status.

Cardiac status	Number (%)
Single valve involvement	19 (51.4)
Multiple valve involvement	09 (24.3)
Surgical correction (prior to pregnancy)	08 (21.6)
NYHA classification	
Class I	21 (56.8)
Class II	09 (24.3)
Class III	04 (10.8)
Class IV	03 (8.1)

Table 4: Types of cardiac surgery.

Type of surgery	No. of patients (n=8)
Corrected VSD	1
Corrected ASD	1
Percutaneous Mitral valve commissurotomy	2
Mitral valve repair	3
Balloon valvotomy for pulmonary stenosis	1

Cardiac complications were observed in 14 patients (37.8%), 12 patients (32.4%) had pulmonary edema, 2 patients (5.4%) had atrial fibrillation and we had not seen even a single case complicated by infective endocarditis which can be due to our strict policy for bacterial endocarditis prophylaxis. There were 2 maternal deaths (5.4%) and all of them occurred in patients with NYHA class 3 and 4 (Table 5).

Table 5: Maternal complications.

Type of complication	Complication	No. (%)
Non-cardiac		24 (64.9)
	Anemia	09 (24.3)
	PIH	05 (13.6)
	Abruptio placentae	01 (2.7)
	PPH	03 (8.1)
	Hypothyroid	04 (10.8)
	GDM	01 (2.7)
	Wound infection	01 (2.7)
	Cardiac	
Pulmonary edema		12 (32.4)
Atrial fibrillation		02 (5.4)
Bacterial endocarditis		none
Maternal death		02 (5.4)

In present study, the mean gestational age at the time of delivery was 35.22±4.13 weeks. Majority of patients (94.5%) goes into spontaneous labor. 5.4% patients had induced delivery mainly due to obstetrical indication. 78.3% patients had vaginal deliveries out of which 16.2% patients had instrumental vaginal delivery (Table 6). 21.6% patients had caesarean delivery and Table 7 depicts the main indications for caesarean delivery. In our institution, all cases during caesarean delivery were

attended by experienced cardiac anesthetist resulting in almost nil anesthetic complications.

Table 6: Perinatal outcomes.

Gestational age (average±SD)	35.22±4.13 wk
Spontaneous labor	35 (94.5%)
Induced labor	02 (5.4%)
Normal delivery	23 (62.1%)
Instrumental delivery	06 (16.2%)
Caesarean section	08 (21.6%)
Birth weight (kg)	
Mean	2.51±0.92
<2kg	04 (10.8%)
2-2.5kg	15 (40.5%)
2.6-3.0kg	13 (35.1%)
>3.0kg	05 (13.6%)
Small for gestational age	09 (24.3%)
Still Birth/IUFD	02 (5.4%)
Congenital heart disease in newborn	01 (2.7%)
Apgar score at birth	
9/10 at min	24 (64.9%)
<9/10 at min	11 (29.7%)
Admitted to NICU	19 (54.2%)
Neonatal death	02 (5.7%)

Mean birth weight was 2.51±0.92 kg. 24.3% babies were small for gestational age. In present study 35.1% of patients had preterm delivery (Table 8).

Table 7: Indication for caesarean section in women with heart disease.

Indication	No. of patient (n=8)
APH	1
Malpresentation	2
Non-reassuring FHR	2
Previous LSCS	1
Failed Induction	1
NPOL	1

Table 8: Gestational age at delivery.

Type of heart disease	Total deliveries (n=37)	Term	Preterm
Congenital heart disease	13 (35.1%)	7 (18.9%)	6 (16.2%)
Rheumatic heart disease	20 (54.1%)	15 (40.5%)	5 (13.6%)
Other cardiac disease (cardiomyopathy and ischemic heart disease)	4 (10.8%)	2 (5.4%)	2 (5.4%)

Majority of babies had Apgar score of 9/10 at 5 minutes. 11 babies (29.7%) had Apgar score less than 9/10 at 5 minutes. 54.2% babies were admitted in neonatal

intensive care unit (NICU) and 5.7% babies died during neonatal period due to sepsis.

DISCUSSION

Pregnancy contributes to significant hemodynamic changes i.e. 30-50% increase in cardiac output and blood volume which can lead to cardiac decompensation in cardiac patients. The proportion of women of reproductive age group with congenital heart defects, surgically treated or otherwise has increased substantially in recent decades due to improved surgical and cardiac care.⁴

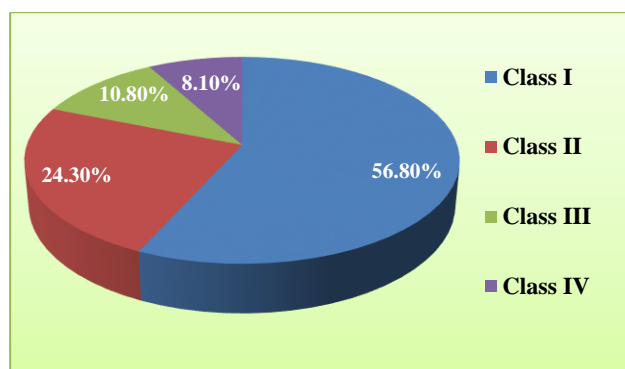


Figure 1: Patient distribution according to NYHA classification.

This study reflects the outcome of cardiac cases during pregnancy in our hospital, a tertiary care centre in Uttarakhand. In present study incidence of cardiac disease was found to be 1.2%. Similar incidence has been reported worldwide.⁵ Despite advent and wide use of antibiotics, post rheumatic valvular heart disease remains the most common cardiac problem universally, especially in developing countries. Our study also showed that rheumatic heart disease is more common than congenital heart disease. Most common dominant cardiac lesion was mitral stenosis, which is comparable to other Indian studies.⁶

Mitral stenosis is the most common potentially lethal heart disease. Maternal risks are increased with increasing severity of mitral stenosis (mitral area <1cm). The presence of aortic valve stenosis simultaneously associated with increased adverse maternal and fetal outcome.

Certain cardiac diseases are associated with unacceptable foeto-maternal outcome, so it is advisable to correct these defects before pregnancy. They are

- Patients in NYHA class III and IV
- Severe left heart obstruction (aortic stenosis with average pressure gradient >50 mm Hg on Doppler ultrasound)
- High grade pulmonary arterial hypertension due to any underlying defect

- Left ventricular ejection fraction <40%
- Severe mitral stenosis i.e. valve area <1cm² and/or average pressure gradient >10mm Hg
- Marfan's syndrome with severe aortic valve involvement
- Severe cyanotic heart diseases.

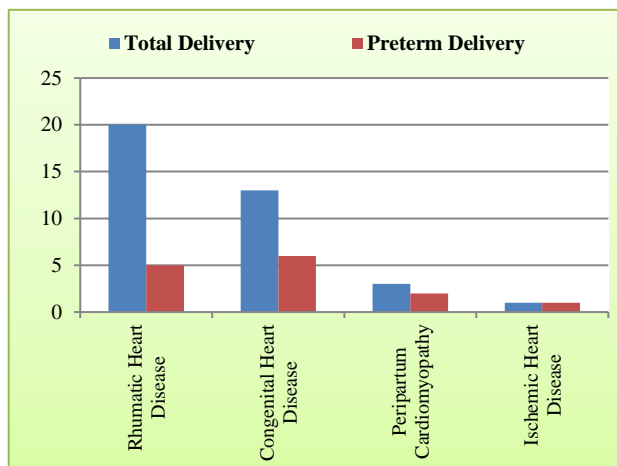


Figure 2: Gestational age at delivery.

Pregnant patients with treated cardiac valvular lesion with prosthetic valve required special management guidelines during delivery to avoid complications like thromboembolic events, endocarditis, structure failure, PPH and fetal embryopathy due to prolonged use of oral anticoagulants.⁷ In present study, we managed 03 patients with prosthetic valves, only 01 patient had moderate post-partum haemorrhage as a complication which was managed at our institution successfully and no mortality observed in this group.

Cardiomyopathy is less common but lethal cardiac complication of late pregnancy and early post-partum period. Its etiology is still not clear, and characterized by onset of CHF associated with left ventricular systolic dysfunction. In present study, we encountered 03 cases of cardiomyopathy. They were managed by intensive cardiac care with the judicious use of diuretics and beta blocker drugs. Patients should be adequately counseled regarding its severity and chances of recurrence in subsequent pregnancies.

Cardiac failure is a major complication during pregnancy and is often associated with maternal death. In this study 32.4% patient had cardiac failure out of which 27.0% patients developed cardiac failure during labor and 5.4% patient developed it during 34 weeks of gestational age. These patients required intensive care monitoring immediately. NYHA class III and IV were associated with poor maternal and fetal outcome.⁸ Vaginal delivery was the most common mode of delivery found in 78.3% cases, followed by caesarean section in 21.6% of cases. This is in accordance with study done by Avila et al.⁹ Indication for caesarean deliveries were obstetrical rather than cardiac disease. Regional anesthesia

(spinal/epidural) given by cardiac anesthetist ensures acceptable fetomaternal outcome.³

In present study 35.1% babies were born preterm, 24.3% babies had growth retardation and 5.4% were still born. 29.7% neonate had low Apgar score. Out of 35 live births 9 neonates were admitted in NICU and 5.4% neonatal mortality occurred due to neonatal sepsis. All neonatal complications were more common in pregnant women in NYHA class III and IV which can be attributed to use of cardio active drugs as digitalis, diuretics and beta blockers, hemodynamic compromise, placental insufficiency and early onset of labor.¹⁰ One baby was diagnosed with congenital birth defect. In general population, the incidence of cardiac defects is 0.8% which increases to 3-5% in babies born to women with cardiac defects. Detailed fetal echocardiography at 22 – 24 weeks of gestation is recommended to diagnose these babies during antenatal period.¹¹ Present study showed a maternal mortality in 5.45 cases and neonatal mortality in 5.7% cases in these results are comparable to other studies done on Indian population.¹² Majority of pregnancies complicated by heart disease in this study had uneventful course with favorable maternal and fetal outcome. Early diagnosis, presence of specialized multidisciplinary team, cardiac ICU and well equipped NICU may have contributed to decreased maternal and neonatal morbidity and mortality.

CONCLUSION

Pre-pregnancy counselling should be universally offered to all women with heart disease to prevent avoidable pregnancy related risks and plan their lives. Early recognition, appropriate pre-pregnancy corrective surgery if required, timely referral to higher centers having multidisciplinary management approach reduces the adverse maternal and neonatal events. Attention must be paid to detailed examination to diagnose cardiac disease which develops de-novo during pregnancy. This is because these patients have the first contact with health care providers during pregnancy.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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