

Pregnancy with Pre-existing Heart Disease- Analysis of 50 Cases

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Abstract:

Objective: The aim of this study was to evaluate the maternal and fetal outcome with maternal pre-existing heart disease during pregnancy in terms of maternal complication, fetal complication & mode of delivery.

Materials & Methods: This retrospective cohort study was carried out over a period of 2 years (Jan'

2022-Dec 2023) in Fetomaternal Medicine Department, BSMMU involving 50 admitted pregnant patients with pre-existing heart disease. All cases were followed during pregnancy, labor & early puerperium.

Results: Age of the patient ranging from 18-30 years, most (38.33%) belonged to the age group 20-25 years and five (9.26%) belonged to > 30 years of age group. Most of the patients 17 (34%) were 2nd gravida (34%). Among 50 patients 38 (76%) received regular antenatal checkup. Thirty five (70%) of patients suffered from rheumatic heart disease. Among rheumatic heart disease isolated mitral stenosis (32%) was the predominant cardiac lesion, while atrial septal defect (14%) was the most common form of congenital heart disease. Based on New York Heart Association (NYHA) functional classification. 76% women were in class-I. The rate of Cesarean Section (85.71%) was high in study subjects. The rate of prematurity was high in class II. No baby was delivered stillborn and there was no neonatal death. Out of fifty patients, eight patients developed heart failure during their hospital stay. The duration of stay was shortened in

class I. Two patients of study subject died one from class II and one from class III.

Conclusion: Pregnancy with preexisting heart diseases associated with good maternal & fetal outcome in NYHA class I group.

Introduction:

Cardiovascular disease (CVD) complicates 1-4% of pregnancies and is one of the leading causes of maternal death. Pregnant women with heart disease are at higher risk for cardiovascular complications both in intrapartum and post-partum period. It also have a higher incidence of neonatal complications. Cardiovascular disease has become a cause of increasing concern for Bangladesh with patients suffering from it. The National institute of

cardiovascular disease (NICVD), 2018 study found that the prevalence of the CVD among Bangladeshi Population is 4.5%. It is estimated that 1-4% of

women entering pregnancy either have cardiac disease or diagnosed with the cardiac diseases during pregnancy¹.

Cardiovascular disease is the most important non-obstetric cause of morbidity and mortality in pregnant women occurring to 0.4% to 4.0% pregnancies². The

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reported maternal mortality rate ranges from 0.4 percent in patients with New York Heart Association (NYHA) classification I and II to 6.8 percent or higher among patients with classification III and IV severity. The circulatory changes of pregnancy in the presence of maternal heart disease may result in adverse consequences even death to the mother or fetus. Pregnancy is a challenging to women with heart disease because of the 50% increase in plasma volume and six-fold increase in the risk of thrombosis. In developing countries, many women become pregnant prior to seeking the therapeutic intervention for cardiac lesions and many of them are only diagnosed with heart disease during pregnancy.

Cardiovascular disease in pregnancy is broadly divided into congenital and acquired (rheumatic Valvular Heart Disease) cardiomyopathy, coronary artery disease. In developing countries rheumatic heart disease is the most common type, whereas congenital heart disease is more common in developed countries. Among rheumatic heart disease, mitral stenosis is the predominant lesion and accounts for nearly three quarters of all cases. The presence of maternal heart disease affects the fetus in a few ways. The risk of spontaneous miscarriage and therapeutic abortion increases in women with heart disease. The children born from the mother with congenital heart disease are at increased risk of congenital heart disease. The overall risk of inheriting polygenic cardiac disease is 3-5%, as compared to 1% risk in the general population¹. Some cardiac medications can have adverse effects on the fetus such as ACE inhibitors and warfarin. ACE inhibitors are well known for the teratogenic effects, especially during the first trimester and should therefore be avoided during this period³ In women of childbearing age, Rheumatic and Congenital heart diseases are currently the most frequently found cardiovascular diseases. In developed countries, the prevalence of pregnancy complicated by rheumatic heart disease (RHD) has decreased. The previous ratio of 3:1 for RHD to congenital heart disease complicating pregnancy is now essentially reversed but in developing countries rheumatic heart diseases are still predominant and continue to be a major cause of maternal morbidity and mortality⁴.

The most dominant rheumatic lesions have been mitral stenosis (80%), followed by aortic stenosis (10%), mitral regurgitation (6.6%) and aortic

regurgitation (2.5%)⁵. Nowadays, advancement of cardiovascular surgery improved the prognosis of congenital lesions, many women with severe defects are now reaching the childbearing age.

Detailed assessment of patients throughout pregnancy may lead to initial discovery of heart disease. If diagnosed early, and managed properly with multidisciplinary approach, collaboration of a team of trained obstetricians, cardiologists, anesthetist, pediatrician and nurse, it results in successful outcome for mother and child in majority of cases. This study was designed to evaluate the effect of maternal preexisting heart disease on pregnancy and delivery in terms of maternal and fetal outcome.

Materials & methods:

This retrospective cohort study was carried out from January 2022- December 2023 in Fetomaternal Medicine Department, Bangabandhu Sheikh Mujib Medical University. 50 pregnant patients with congenital or acquired heart disease receiving antenatal care in Fetomaternal OPD or referred from different hospitals or clinics were enrolled in this study. After having informed consent, pregnant patients with congenital or acquired heart disease were included. Patients suffering from diabetes mellitus, pulmonary disease, renal disease or any other endocrinological disease were excluded from this study. After admission, baseline data recorded include age, parity, gestational age, cardiac lesions, New York Heart Association (NYHA) functional class, prior surgical interventions, cyanosis, oxygen saturation, and medication received. For the confirmation of diagnosis and for management purposes, patients were evaluated by both cardiologists and obstetricians regularly. Investigations including ECG and Echocardiography were done in all cases. Patients for the elective cesarean section were also evaluated by anesthesiologists. Gestational age of the women was calculated from last menstrual period, clinical examination and from early ultrasonography. Fetal conditions were assessed by clinical examination, cardiotocography, ultrasonography, biophysical profile and doppler study where needed. The mode of delivery was decided based on maternal and fetal condition. In most cases the mode of delivery was cesarean section, and the patient was evaluated by both cardiologists and anesthesiologists during the pre,

per & post operative period. Those patients who went into spontaneous labor were allowed for vaginal delivery if there were no contraindication. After delivery apgar score and birth weight of the babies were noted and examined by neonatologist. The data collected was present in a prepared data sheet.

Result:

The age of the patients ranging from 18-30years, most (38.33%) belonged to the age group 20-25 years and 3 (5%) belonged to <20 years age group & 5 (09.26%) belonged to >30-year age group. Regarding parity and gravidity, most of the patients 17 (34%) belonged to second gravida and 15 (30%) patients were primigravida out of 50 patients 38 (76%) women received regular antenatal checkup while 12 (24%) were on irregular antenatal care (Table-I)

Table-I
Characteristics of the study subject (n=50)

| Parameter | Frequency/Percentage |
|----------------|------------------------|
| Maternal Age | Mean (\pm SD) 22.00 |
| <20 | 3 (5%) |
| 20-25 | 42 (53.56%) |
| >30 | 5 (9.26%) |
| Gravida | 15 (30%) |
| 2 | 17 (34%) |
| 3 | 14 (28%) |
| 4 or more | 4 (8%) |
| Antenatal care | |
| Regular | 38 (76%) |
| Irregular | 12 (24%) |

Table-II shows that thirty-five (70%) women were suffering from rheumatic heart disease and in the rheumatic heart disease group 16 (32%) had isolated mitral stenosis. 4 (8%) had mitral regurgitation. Both mitral stenosis and mitral regurgitation were present in 4 (8%) patients. Only two (4%) women had isolated aortic stenosis. Fifteen (30%) women were suffering from congenital heart disease, where Atrial septal defect was the most common form (14%). Among the study patients, 10 (20%) women had history of cardiac surgery prior to the present pregnancy and forty (80%) women had no such history (Table-III).

Table-II
Types of heart disease (n=50)

| Diagnosis | Number of patients | Percentage |
|--|--------------------|------------|
| Rheumatic | 35 | 70% |
| Mitral stenosis | 16 | 32% |
| Mitral regurgitation | 4 | 8% |
| Mitral stenosis+mitral regurgitation | 4 | 8% |
| Aortic stenosis | 2 | 4% |
| Mitral stenosis+aortic regurgitation | 2 | 4% |
| Mitral stenosis+aortic regurgitation+pulmonary hypertension | 2 | 4% |
| Mitral stenosis+pulmonary hypertension | 2 | 4% |
| Pulmonary hypertension+congestive cardiac failure | 1 | 2% |
| Mitral stenosis+mitral regurgitation+aortic regurgitation+pulmonary hypertension | 2 | 4% |
| Congenital Heart Disease | 15 | 30% |
| ASD | 7 | 14% |
| VSD | 4 | 8% |
| TOF | 2 | 4% |
| VSD+PHTN | 1 | 2% |
| ASD+VSD+PHTN | 1 | 2% |

Regarding classification of heart disease, thirty-eight (76%) women belonged to class I, eight (16%) women belonged to class II and four (8%) women belonged to class III heart disease according to NYHA classification. None of the patients belonged to class IV on admission (Table- IV)

Table-III
History of cardiac surgery prior to pregnancy (n=50)

| History of cardiac surgery | Number of patients | Percentage |
|----------------------------|--------------------|------------|
| Present | 10 | 20% |
| Absent | 40 | 80% |

Table- IV
Distribution of the patients (n= 50) according to NYHA class on Presentation

| NYHA class | No of patients | Percentage |
|------------|----------------|------------|
| Class-1 | 38 | 76% |
| Class-2 | 08 | 16% |
| Class-3 | 4 | 8% |
| Class-4 | 0 | 0% |

Of fifty women, 49 patients delivered, while only one patient of class II, who was admitted at her 30 weeks of gestation with severe mitral stenosis with pulmonary hypertension, was treated conservatively and was discharged with advice for cardiac surgery. Most women twenty-eight (57.14%) delivered between 37-38 weeks (Table-V).

Table-V*Gestational age of the women (n = 49) at delivery*

| Gestational (weeks) | Number of/Percentage patients |
|---------------------|-------------------------------|
| <35 | 2 (4.08%) |
| 35-36 | 12 (24.48%) |
| 37-38 | 28 (57.14%) |
| 39-40 | 7 (14.28%) |

Table-VI shows that out of 49 patients, only 07 (14.28%) women had normal vaginal delivery while 42 (85.71%) women went through LSCS. Indications for cesarean section were previous cesarean section (32.5%), malpresentation (9%), non-progression of labor (9.28%) and FGR (20.21%)

Table-VI*Mode of Delivery (n=49)*

| Type of delivery | No of patients | Percentage |
|-------------------------|----------------|------------|
| Normal Vaginal Delivery | 7 | 14.28% |
| LSCS | 42 | 85.71% |

Regarding fetal outcome, the rate of prematurity was high among class II and class III while in case of class I, out of 37 women, thirty-one (83.79%) delivered at term and four (10.8%) delivered at preterm. No baby was delivered stillborn or there was no neonatal death (Table- VIII).

Regarding maternal outcome, 8 women developed heart failure. Among them one patient was of class I, 04 patients of class II and 03 patients of class III. Among the patients, two expired (Table-VII). One of them was a case of severe pulmonary hypertension>80 (mmhg), which was of class III heart disease. The patient died on her 6th post operative day. The other patient was a case of congenital heart disease having ASD, VSD with TR, was asymptomatic on admission. She died on her 7th post operative day due to heart failure.

Table-VII*Maternal outcome*

| Functional Classification (NYHA) (n=49) | Term Labor (n=35) No% | Preterm Labor (n=14) No% | Functional Classification (NYHA) (n=50) | Heart failure n=8 (No%) | Hospital stay (days) (n = 2) No% | Mortality |
|---|-----------------------|--------------------------|---|-------------------------|----------------------------------|-----------|
| Class I (n=37) | 31(83.79) | 4(10.8) | Class I (n=38) | 1(2.63) | 4-5 | 0 (0.0) |
| Class II (n=9) | 3(33.33) | 8(88.88) | Class II (n=8) | 4 (50) | 5-7 | 1 (12.5) |
| Class III (n=3) | 1(33.33) | 2(66.66) | Class III (n=4) | 3(75) | 7-8 | 1 (25) |

Table-VIII*Neonatal Outcome (n=49)*

| Functional Classification (NYHA) (n=49) | Still Born | Birth Weight (Kg) |
|---|------------|-------------------|
| Class I | 0 | (2.7) |
| Class II | 0 | (2.4) |
| Class III | 0 | (2.10) |

Discussion:

Pregnancy with preexisting heart disease is a serious issue and a major known cause of maternal mortality 6,7. During the present study period (January 2022 – December 2023), fifty patients with heart diseases were admitted in the Fetomaternal Medicine department of BSMMU. Among them, 35 patients (70%) had rheumatic heart disease and in the rheumatic heart disease group, mitral stenosis was the most common lesion (32%). The rest, 15 (30%) had congenital heart lesions, of which atrial septal defect was the most common form (14%).

A study done by Karaalp⁸ also showed that majority of patients with heart disease in pregnancy had rheumatic heart disease (70%) and most of the rheumatic heart lesions were mitral stenosis. In that study congenital lesion was 30 percent, and atrial septal defect was the most common congenital valvular disease. The findings are similar to this study.

Another study done by Sawhney et al.¹¹ showed that rheumatic valvular disease was 68.5 percent, and mitral stenosis was the most common rheumatic valvular lesion, and congenital valvular disease was 31.5 percent, and atrial septal defect was the most common congenital lesion⁹.

A similar study done by McFaul et al. showed that majority of cases of heart disease in pregnancy were rheumatic in origin and mitral stenosis was the common lesion¹⁰. Amongst congenital ones, atrial septal defect was the most common form. Hence present study findings are consistent with other study findings

In this series, out of 50 patients, 10 (20%) had their lesions surgically corrected before they became pregnant. A study done by Hsich et al.¹¹ showed that 27 percent patients had surgically corrected lesions. Another study done by Sawhney et al.¹² showed 38.6% of patients had undergone surgical correction prior to pregnancy.

In this study, mean (\pm SD) maternal age was 22.00 years. Some of the findings are consistent with the study by Sawhney et al.⁹ who found mean (\pm SD) maternal age was 25.00 years.

In this study 76% of patients were in class I, 16 percent in class II and 8% percent in class III on presentation. In a study by Sawhney et al.¹¹ found 95.4 percent in class I and II and 4.8 percent in

class III. Another study done by Hameed et al. showed that 36 (55%) out of 66 patients were in class I, 28 (42%) in class II and 2 (3%) in class III on presentation¹³.

In this study vaginal delivery was conducted in only 7 (14.28 %) patients who went into labor spontaneously and 42 (85.71%) underwent cesarean section. A study done by Hameed et al.¹⁴ showed mode of delivery was vaginal in 61 (92%) out of 66 patients with valvular heart disease and others had cesarean section due to obstetric indications with cardiac problem. Another study done by Bonow et al.¹⁵ showed mode of delivery was vaginal in 196 (78.1%) out of 251 and cesarean section done on 55 (21.9%) patients. The rate of cesarean delivery was higher in this study compared to other studies. This high rate of cesarean delivery was due to perceived cardiovascular risk for the mother during pregnancy. We did not induce labor in any of the cases due to lack of facilities required for monitoring cardiorespiratory status of the patients during labor and delivery.

Although there were higher incidences of the cesarean section in the present study, the perinatal outcome was good compared to other studies despite early termination in some cases. This might be due to more patients being booked cases, were on regular antenatal care and were admitted at class I stage of the disease, the birth weight of the babies was average, and the neonatal support was also good.

Regarding fetal outcome, the present study showed that live birth rate was 100%. 14 patients had pre-term delivery, of which 4 were in class I, 8 in class II and 2 in class III.

Regarding neonatal outcome, the present study showed that still birth rate was 0%. The body weight (kg) 2.7 in class I, 2.4 in class II and 2.10 in class III.

According to a study done by Sawhney et al.⁹, 2 out of 254 patients had stillbirths, whereas 252 had live babies. According to a different study by Hameed et al.¹⁴, 64 out of 66 individuals had live births, while 2 had stillbirths. Out of 66 deliveries, 15 (23%) were preterm. A different study by Sawhney et al.¹² revealed a 12% preterm birth rate. Patients with valvular heart disease had increased rates of preterm birth, according to studies by Hsich et al.¹¹ and Shime et al.¹⁶

Regarding maternal outcome of pregnant patients with valvular heart disease, 38 (76.0%) patients were in class I, 8 (16%) in class II and 4 (8%) in class III on admission. Heart failure developed in 8 patients, among them 1 patient was in class-I, 4 patients were in class II and 3 patients in class III. In this study, in both the above-mentioned cases of death, pregnancies were contraindicated. Both were young primigravid, non-booked cases, who were asked for termination of pregnancy by their obstetricians in early pregnancy. But they opted to continue it, received irregular ANC with no anticoagulant therapy throughout the pregnancy and in puerperium.

Conclusion:

This study showed most of the study subjects were in reproductive age between 20-25. Mitral stenosis was commonest among Rheumatic heart disease. Atrial septal defect was commonest among congenital heart defect. Class I NYHA was more common (76%) and the history of cardiac surgery among the study subject were only 20%. Most of the patients were delivered at term 71.4% and 85.71% were delivered by cesarean section. Maternal and fetal outcome was good in NYHA class I group.

Recommendation:

The management of these cases should be multidisciplinary to optimize care for these patients throughout pregnancy and in the puerperium and early risk stratification should be done to improve the prognosis of pregnancy in women with heart disease.

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