

# Pregnancy Outcome in Women with Heart Disease in a Tertiary Care Centre in Kolkata, India

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## ABSTRACT

### BACKGROUND

The incidence of cardiac lesions is less than 1 % amongst hospital deliveries. The commonest cardiac lesion is of rheumatic origin followed by the congenital ones. Heart diseases have a significant impact on maternal and perinatal morbidity and mortality. The purpose of the study was to find out the specific heart lesion in pregnancy in a particular demographic area and evaluate the maternal and perinatal outcome.

### METHODS

This was a two-year retrospective observational study done by reviewing the records of all the mothers with heart diseases admitted for pregnancy from April 2016 to March 2018.

### RESULTS

The study included 42 patients. The majority of heart lesions was mitral stenosis of rheumatic origin. Prophylactic forceps in second stage of labour was the major method of delivery. As far as the perinatal outcome is concerned, low birth weight and prematurity were the major problem in the babies born to these mothers.

### CONCLUSIONS

With advances in medical care and surgical approach, the obstetricians should be prepared to manage an increasing number of women with heart disease during pregnancy. A combined multidisciplinary care is essential in managing these cases.

### KEY WORDS

Rheumatic Heart Disease, Congenital Heart Disease, Cardiac Failure, Forceps Delivery, Prematurity

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**BACKGROUND**

Vast improvement in the medical care and advances in the surgical techniques over the past few decades have enabled an increasing number of women with congenital and acquired childhood heart disease surviving into childbearing age and opting for pregnancy, thus causing a major concern for the obstetrician. Although the maternal mortality rate in these patients has decreased from 2.7 % to 5 % according to various reports,<sup>1,2,3,4</sup> the morbidity in this high-risk group is still a problem. The increased morbidity is related to immense haemodynamic alteration in the mother beginning as early as five weeks of gestation.<sup>5</sup> The hormone mediated increase in blood volume, red cell mass and heart rate results in increased cardiac output by 30 - 50 %.<sup>6</sup> Stroke volume begins to increase at 5 weeks of gestation, peaks at 31 weeks and then gradually declines till term.<sup>6</sup> There is also a decrease in the peripheral vascular resistance due to circulating prostaglandins, hormones and low resistance vascular bed in placenta. During labour and delivery, the supine position, uterine contractions, anxiety and pain increase the risk of maternal cardiovascular and haemodynamic decompensation.<sup>7,8</sup> This is the reason why these women with cardiac problem need special attention and multidisciplinary care by cardiologist and obstetricians throughout pregnancy and especially during labour and delivery. Majority of women start labour spontaneously and deliver vaginally. Elective induction of labour may be needed in few cases. This depends on the availability of multidisciplinary team members, to help the woman during the peripartum period.

The present study was conducted to -

1. determine the specific heart lesions.
2. evaluate maternal and perinatal outcome.

**METHODS**

This was a retrospective observational study that was conducted in the Department of Obstetrics & Gynaecology, Chittaranjan Seva Sadan, Kolkata from April 2016 to March 2018. Permission from hospital ethical committee was taken and informed consent was properly documented.

All the cases of heart disease with pregnancy admitted during the aforesaid period irrespective of age, parity and duration of gestation were included. Heart disease with severe anaemia, severe hypertension, and placenta praevia were excluded from the study.

All the cases were subjected to history taking with special emphasis to age, parity, previous pregnancy and labour events, specific complains related to cardiovascular system and their relationship with physical activity, medications and prior surgical intervention. A thorough general, cardiac and obstetric examination was performed next. Apart from routine antenatal investigations, the special investigations done in each case were - electrocardiogram (ECG), echocardiography and ultrasound sonography (USG).

The events during ante partum, intra partum, postpartum period was recorded and the newborn was examined at birth for Apgar score, birth weight and congenital anomaly. A note was kept regarding the first 7 days of neonatal period.

**Statistical Analysis**

Data analyses were carried out using Statistical Product Service Solution (SPSS) IBM version 21.0. Descriptive statistics such as mean, standard deviation and range values were computed for quantitative variables. Frequency data across categories were compared using chi-square / Fishers exact test as appropriate.

**RESULTS**

The study included 42 patients. Age of the patients shows that majority of the women were aged between 18 - 30 (88.09 %) whereas only 4 (9.52 %) were above 30 years and 1 patient (2.3 %) was below 18 years of age.

Age	No	%
< 18 years	1	2.3 %
18 - 30 years	37	88.09 %
> 30 years	4	9.52 %
Gravida	No	%
G1	27	64.28 %
G2	13	30.95 %
G3	2	4.76 %
G4 & above	Nil	0.00 %
Type	No	%
Rheumatic	30	71.43 %
MS	19	63.33 %
MR	0	00.00 %
MS + MR	7	23.33 %
AS	3	10.00 %
AR	0	00.00 %
MS + AS	1	3.33 %
Congenital	12	28.57 %
ASD	3	25.00 %
VSD	3	25.00 %
Fallot tetralogy	2	16.66 %
Primary pulmonary hypertension	1	8.33 %
Coarctation of aorta	2	16.66 %
Marfan syndrome	1	8.33 %

**Table 1. Age, Gravidity, and Types of Heart Diseases of the Patients**

In the gravidity of the patients, the gravidity of the women under study; majority of them were primigravidae i.e. 88.09 %, followed by second gravidae (30.95 % and third gravidae 4.76 %). Regarding the nature of heart lesion, 30 women out of 42 (71.43 %) had rheumatic heart disease of whom 19 (63.33 %) had mitral stenosis as the sole lesion. Combined mitral stenosis and regurgitation occurring in 7 cases, was the second common lesion. In 12 women (28.57 %) the cardiac lesion was congenital in origin of which atrial septal defect (ASD) and ventricular septal defect (VSD) (3 cases each) were most common lesions.

Table 2 shows that out of 30 cases of rheumatic heart disease, only 6 (20 %) had surgical correction prior to the present pregnancy whereas 2 patients out of 12 cases of congenital heart disease had prior surgical intervention.

Type	No. of Cases	Operated	%
Rheumatic	30	6	20.00 %
Congenital	12	2	16.60 %
Total	42	8	19.57 %

**Table 2. Prior Surgical Operation**

New York heart associated classification at the time of admission as shown in Table 5 denotes that 85.71 % of the

women were NYHA class I, 11.90 % were class II and only 1 patient (2.38 %) was class III at the time of admission.

Class	No	%
Class I	36	85.71 %
Class II	513	11.90 %
Class III	12	02.38 %
Class IV	0	00.00 %
Total	42	100.00 %

**Table 3. Functional Classifications on Admission (NYHA)**

Outcome of pregnancy is shown in Table 3. Normal delivery occurred in 8 patients (19.04 %), prophylactic forceps was used to cut short the second stage of labour in 27 cases (64.28 %) and lower segment caesarean section (LSCS) was needed in 7 cases (16.66 %).

The indication of LSCS in 5 cases was because of cephalopelvic disproportion (CPD) in 2, nonprogress of labour in 1, malpresentation in 1, post CS pregnancy in 1 whereas in the rest 2 cases, the indication for LSCS was clinical deterioration of heart disease.

Labour was spontaneous in onset in 33 cases (78.57 %); induction was done in 5 cases (11.90 %) and indications were all obstetric i.e., intrauterine fetal death (IUFD) in 2 cases, prelabor rupture of membranes (PROM) in 3 cases.

Methods of Delivery	No.	%
Spontaneous	33	78.57 %
Induced	5	11.90 %

**Table 4 (a). Outcome of Pregnancy, Mode of Onset of Labour**

\*4 cases had elective section.

\*\*Reason for Induction: IUFD in 2 cases and PROM in 3 cases.

	No.	%
< 37 weeks	12	28.57 %
(37 - 40 weeks)	30	71.43 %
> 40 weeks	0	0 %

**Table 4 (b). Outcome of Pregnancy, Gestational Age at Delivery**

	No.	%
Normal	8	19.04 %
Instrumental (forceps)	27	64.29 %
LSCS	7	16.67 %

**Table 4 (c). Outcome of Pregnancy, Mode of Delivery**

\* Indication for LSCS: Obstetric-5 (CPD-2, Nonprogress of labour-2, Post C.S. in labour-1, Malpresentation-1); Cardiac-2.

Complications	No.	%
Deterioration (clinical / echocardiographic) G1	3	7.14 %
Cardiac failure G2	4	9.52 %
Pulmonary hypertension	2	4.76 %

**Table 5 (a). Maternal Complications, Antenatal**

Complications	No.	%
Cardiac failure	6	14.28 %
Atrial fibrillation	1	2.38 %
PPH	2	4.76 %
Puerperal sepsis	2	4.76 %
Maternal death	3	7.16 %

**Table 5 (b). Maternal Complications, Intrapartum and Postpartum**

\* Cause of death - Cardiac failure in 2 cases, atrial fibrillation with pulmonary embolism in 1 case

Maternal complications are recorded in (Table 5). During antenatal period, 3 patients (7.14 %) had echocardiographic and clinical deterioration of cardiac function, while 4 (9.52 %)

developed cardiac failure and 2 (4.76 %) had pulmonary hypertension. intrapartum and postpartum cardiac complications were cardiac failure (14.28 %) and atrial fibrillation (4.70 %) while obstetric complication include postpartum haemorrhage (PPH) and puerperal sepsis in only 4.70 % each. Maternal death occurred in 3 cases (7.14 %).

As far as the perinatal outcome was concerned, low birth weight (47.65 %) and prematurity (28.57 %) were the major problems in the babies born to these mothers. IUFD occurred in 2 cases (4.76 %). Perinatal mortality was also high i.e. 30.95 % consisting of 2 cases of IUFD and 11 cases of early neonatal death. Congenital heart disease was recorded in 2 neonates (4.76 %) [Table 6].

Conditions	No.	%
Low birth weight	20	74.61 %
Preterm	12	28.57 %
IUFD	2	4.76 %
Congenital heart disease in new born	2	4.76 %
Low Apgar score < 5 at birth	16	38.09 %
Perinatal mortality (stillbirth + neonatal death in 1 <sup>st</sup> week)	13	30.95 %

**Table 6. Perinatal Outcome**

Birth weight record [Table 7] shows a high incidence of low birth weight babies born to these mothers (below 2 kg - 14.28 % and 2 - 2.4 kg - 33.35 %). 17 babies (40.47 %) were between 2.5 and 3 kg range and 5 (11.90 %) were above 3 kg.

Wt.	No.	%
< 2 Kg.	6	14.28 %
2 - 2.4 Kg.	14	33.34 %
2.5 - 3 Kg.	17	40.47 %
> 3 Kg.	5	11.91 %

**Table 7. Birth Weight**

## DISCUSSION

The prevalence and incidence of heart disease in pregnancy varies between 4 % in a recent U.K. study<sup>9</sup> and 1.5 % in a similar study from Srilanka.<sup>10</sup> The present study does not reflect the true incidence of heart disease in pregnancy as some cases were excluded due to associated complications.

The age and gravidity distribution of study group reflects a preponderance of young primigravidae, the cause of which is obvious as older and multiparous patients with heart disease are discouraged from being pregnant.

The dominant heart lesion in the present study is rheumatic heart disease (71.43 %) of which mitral stenosis tops the list (63.3 %). In all the previous series, Rheumatic heart disease is still the commonest and by far the most important is mitral stenosis.<sup>10,11</sup> However, in a study from London,<sup>9</sup> only 12 % of 73 pregnant women had rheumatic lesion.

Amongst the congenital heart diseases, VSD, ASD, Fallot's tetralogy and coarctation of aorta were the common lesions found in the present study. No case of patent ductus arteriosus (PDA) was there in the study group. In all the previous series from Dublin (1981),<sup>12</sup> Leicester (1985),<sup>13</sup> London (1998),<sup>9</sup> Srilanka (1995), ASD, VSD and PDA accounted for more than 60 % of the cases.

The surgical correction prior to pregnancy offers better results as far as maternal and neonatal outcome is concerned.<sup>9,10,12</sup> However, in the present study only about 19.37 % of the cases had prior surgical correction which is far, and few compared to other parts of the world. None of the cases in present study had surgical correction during pregnancy.

85.71 % of the parents in the present series had NYHA class I and 11.90 % had class II diseases at the time of admission. 3 patients of class I deteriorated to Class II during antenatal period subsequently. This classification is important in assessing maternal and foetal outcome as maternal mortality varies directly to functional class i.e. 4 % for NYHA class I and II, 6.8 % for class III and IV. Foetal mortality also is greatly influenced by maternal functional class, varying from 0 % for class I to 30 % for class IV.<sup>14,15</sup>

Regarding the outcome of pregnancy and labour, the present study shows that 33 out of 42 women had spontaneous onset of labour. Induction was done in 5 cases and the indication for induction had been obstetric in all the cases i.e. IUFD in 2 cases and PROM in 3.

Induction of labour in heart disease with pregnancy is still a controversial issue. The risks of failed induction and sepsis are the area of concern. However, a recent study by Galia Oran et al in 2004<sup>16</sup> compared the maternal and perinatal outcome in 2 groups of patients of heart disease – one group comprising of 47 patients who had induction with PGE2 and the other group of 74 patients who had spontaneous onset of labour. No difference in the complication rates in the two groups was observed by the authors and hence it was inferred that induction of labour was a safe procedure in women with heart disease.

7 women (16.66 %) in the present series needed LSCS. The indication of 2 of them was cardiac i.e. deteriorating cardiac function for which urgent termination was decided upon by LSCS. In the rest 5 cases the indications were obstetric as already described.

Amongst the maternal complications, acute left ventricular failure and pulmonary oedema appeared the most dreaded one, occurring in 6 patients (14.28 %) in immediate postpartum period and all such cases were functional class II or III at the onset of labour. One patient developed atrial fibrillation soon after delivery. None of the patients had infective endocarditis.

Obstetric complications as PPH and puerperal sepsis were not very frequent.

Maternal death occurred in 3 cases (7.14 %) – 2 cases due to acute left ventricular failure (LVF) and the other one due to pulmonary embolism as a sequel to atrial fibrillation in spite of vigorous management. All these 3 cases were uncorrected rheumatic mitral stenosis with functional class II and III and all 3 deaths were postpartum. Interestingly, none of the congenital heart disease cases had fatality in the present series.

Previous reviews show that maternal mortality is very high in Eisenmenger's Syndrome (30 - 50 %)<sup>17</sup>, primary pulmonary hypertension<sup>18</sup> (40 - 50 %) and in Fallot's tetralogy (4 - 20 %).<sup>19</sup> One case of primary pulmonary hypertension in the present series however had uneventful recovery.

Although rheumatic heart disease is still an important cause of maternal mortality in developing countries, no death due to the same has been reported in U.K. between 1994 and

1996.<sup>20</sup> Rush et al. reported a maternal mortality of 7 % in 450 women with rheumatic heart disease in South Africa.<sup>21</sup>

The major problem as far as perinatal outcome is concerned in the present study has been low birth weight (47.61 %) and prematurity (28.57 %). These two factors have mainly contributed to a reasonably high perinatal mortality (30.95 %).

Foetal outcome in women with rheumatic heart disease has been found to be good in a previous study by Sugrue D et al. 1981, although the birth weight was low.<sup>12</sup>

In the present series, 2 newborns out of 12 mothers with congenital heart disease had congenital heart lesion similar to the maternal variety. This recurrence pattern has been observed by previous studies at varying incidence of 3 - 14 % mostly in the left sided outflow obstruction.<sup>22,23</sup>

## CONCLUSIONS

With advances in medical care and surgical approach, the obstetricians should be prepared to manage an increasing number of women with heart disease during pregnancy. A combined multidisciplinary care is essential in managing these cases. Rheumatic heart disease is the major problem in our setting even today. Functional NYHA classification is important as far as maternal and foetal prognosis is concerned. Intensive care during antenatal, intranatal and postnatal period reduces the maternal mortality to a great extent. Although induction of labour is a debatable issue in women with heart disease, recent reports are coming in favour of safe induction in this high-risk group. LSCS is usually indicated for obstetric reason, however, it may have to be done as a method of safe termination in worsening heart condition close to term. Perinatal outcome is not unfavourable in well controlled cases apart from an increased incidence of low birth weight and prematurity.

Data sharing statement provided by the authors is available with the full text of this article at jemds.com.

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