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Maternal and fetal outcome in pregnancies with maternal cardiac diseases

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Abstract
Background: About 1-3 % of pregnancies are complicated by heart disease1, 2. Heart disease constitutes the major non-obstetric cause of maternal deaths. Cardiac diseases in pregnancy are broadly classified into congenital and acquired. The acquired group includes rheumatic heart disease, cardiomyopathies, ischemic heart disease. Among acquired group, rheumatic heart disease is commonest in developing countries including India. Ischemic heart diseases and cardiomyopathies are common in the developed countries.
Aims & Objectives:
1. Analyse the outcomes of pregnancies- both maternal and fetal complicated with maternal cardiac diseases.
2. To study the various maternal and fetal morbidity parameters in pregnancies complicated by heart disease and to find their incidence.
3. To study the factors contributing to maternal and fetal morbidity and mortality in cardiac disease.

Materials and Methods: This prospective study on maternal and fetal outcome in pregnancies with maternal cardiac diseases was done in the Department of Obstetrics and Gynaecology, Govt. RSRM Hospital, Stanley Medical College, Chennai. This is a government referral centre for all the surrounding hospitals. The study was conducted over the period of 10 months from January 2017 to September 2017.
All pregnant women diagnosed to have heart disease and admitted to the hospital for either safe confinement or terminations of pregnancy, any cardiac complications were included in the study. Pregnant women with heart disease and labour pain admitted through casualty are also included.
Results: This study was conducted in the Department of Obstetrics and Gynaecology, Govt. RSRM hospital, Stanley Medical College, Chennai for a period of ten months from January 2017 to October 2017. A total number of 100 pregnant women with heart disease were included in the study.
Conclusion: Heart disease is the most common non obstetric cause of maternal morbidity and mortality. It also has a major impact on neonatal outcome. Favorable outcome is noted in women with NYHA class I and II, avoidance of factors precipitating heart failure like anemia, infections, arrhythmias, regular cardiac follow up, strict adherence to cardiac medications.

Keywords: Maternal cardiology, NYHA & outcomes

Introduction
About 1-3 % of pregnancies are complicated by heart disease [1, 2]. Heart disease constitutes the major non-obstetric cause of maternal deaths. Cardiac diseases in pregnancy are broadly classified into congenital and acquired. The acquired group includes rheumatic heart disease, cardiomyopathies, ischemic heart disease. Among acquired group, rheumatic heart disease is commonest in developing countries including India [3, 4, 5]. Ischemic heart diseases and cardiomyopathies are common in the developed countries.
In normal pregnancy, there is a raise in stroke volume and cardiac output [1, 3]. These changes are further aggravated in heart disease. Comorbidities like anemia, urinary tract infections, pre-eclampsia increase the burden on the heart and aggravate heart failure. Hence, antenatal mothers with heart disease need close monitoring and careful follow up.
With advances in the comprehensive cardiac and obstetric care, the pregnant women are having safe motherhood. Many of the studies conducted previously were retrospective and in small series. Prospective study was done over a period of 10 months among women attending a government hospital for safe confinement, termination of pregnancy and intensive care.

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Materials and Methods

This prospective study on maternal and fetal outcome in pregnancies with maternal cardiac diseases was done in the Department of Obstetrics and Gynaecology, Govt. RSRM Hospital, Stanley Medical College, Chennai. This is a government referral centre for all the surrounding hospitals. The study was conducted over the period of 10 months from January 2017 to September 2017.

All pregnant women diagnosed to have heart disease and admitted to the hospital for either safe confinement or terminations of pregnancy, any cardiac complications were included in the study. Pregnant women with heart disease and labour pain admitted through casualty are also included.

Inclusion Criteria

1. All patients with heart disease complicating pregnancy irrespective of gestational age - without any other medical illness.
2. Pregnant women diagnosed to have cardiac disease during hospital stay.

Exclusion Criteria

1. Pregnant patients with associated medical illness like anemia, PIH, chronic kidney disease, GDM are excluded from the study.
2. Those who did not give consent for the study.

Pregnant women with cardiac disease in NYHA class I and II are admitted at 36 weeks of gestation. NYHA class III and IV are admitted to hospital at once the diagnosis is made. Cardiac symptoms if arise at any period of gestation are admitted immediately and intensive care is given to such patients. Conditions precipitating heart failure like anemia, infections, preeclampsia should be treated promptly. Drugs taken by cardiac patients should be revised and cardiology opinion to be obtained. Penicillin prophylaxis is given in RHD. Infective endocarditis prophylaxis-Inj. Ampicillin (50mg/kg) and Inj. Gentamycin (3mg/kg).

Caesarean delivery is done for obstetric indications few cardiac indications for LSCS are pulmonary hypertension, Eisenmenger syndrome, Coarctation of aorta. During labour patient is kept in bed in propped up position, nasal oxygen administered. IE prophylaxis if needed is administered. Strict monitoring of vital signs, restriction of IV fluids, cardiac drugs to be continued in intrapartum period when needed. Second stage of labour is curtailed by applying outlet forceps with liberal episiotomy. Episiotomy wound is sutured in layers. In the postpartum period patient is monitored for PPH, pulmonary edema, LRI and special precautions are taken to prevent these complications. Cardiologist review should also be obtained in postpartum period. Breast feeding was started as early as possible. Babies were examined by pediatrician. All newborn babies are immunized as per national schedule.

Obstetric Outcome

Obstetric complications observed in mother are missed abortion, incomplete abortion, preterm labour, one maternal death due to atrial fibrillation with embolic manifestation. Otherwise, women are delivered by natural labour, Lscs or by assisted vaginal delivery.

Cardiac Outcome

Cardiac complications observed were pulmonary edema, intra op fall in saturation, sudden worsening of NYHA grade or sudden cardiac arrest and cardiac death.

Neonatal Outcome

Neonatal outcomes observed were low birth weight, preterm birth, small for gestation, IUGR, large for gestation, baby with single umbilical artery, respiratory distress syndrome. These babies require admission to NICU.

Postnatal women who delivered are counselled for adapting any of the available forms of contraception and also the risks involved in future pregnancies should be explained to the patient and her partner, which is most important. Birth spacing for a minimum of three years should be advised for primigravida mothers. Puerperal sterilization is advised for the women who have completed their families. In women in whom PS could not be done, vasectomy is advised to their spouse. In the women who have not completed their family or in whom sterilization procedures could not be carried out IUCDs are inserted under strict aseptic precautions with infective endocarditis prophylaxis.

Table 1: Obstetric Code

	Frequency	Percentage
Primi	52	52.0%
Multi	48	48.0%
Total	100	100

Among the 100 pregnant women with heart disease admitted to the hospital 52 were Primi gravida and multigravida were 48 in numbers. Prevalence of heart disease in our hospital is 1.29%.

Table 2: Gestational Age

	Frequency	Percentage
Ist Trimester	13	13.0%
Preterm	4	4.0%
Term	82	82.0%
Postdated	1	1.0%
Total	100	100

Gestational age in the pregnant women at the time of admission to the hospital was studied: 82% of the patients belong to term gestation. Preterm labour 4% of the cases and first trimester abortion occurred in 13%. 1 women with heart disease was referred to our hospital as postdated.

Table 3: Nyha Grading

	Frequency	Percentage
I	85	85.0%
II	13	13.0%
III	2	2.0%
Total	100	100

The cardiac functional status of the pregnant women with heart disease at the time of admission to the hospital was studied: Most of the patients have stable cardiac status and they fall under class I-85%. 13% of the pregnant women belong to NYHA class II and 2% of the cases belong to NYHA class III at the time of admission.

Table 4: Age Range

	Frequency	Percentage
Up to 20 yrs	11	11.0%
21 - 25 yrs	43	43.0%
26 - 30 yrs	39	39.0%
Above 30 yrs	7	7.0%
Total	100	100

Age wise distribution among the pregnant women with heart disease was studied: About 43% were in the age group of 21 to 25 years, 39% of the cases come under 26 to 30 years. There were 7% of the cases above 30 years. Teenage pregnancy was seen in 11% of the cases.

Table 5: Type of Heart Disease

	Frequency	Percentage
CHB	1	1.0%
CHD	29	29.0%
MVP	14	14.0%
RHD	56	56.0%
Total	100	100

Echocardiography helps in diagnosing heart disease in pregnant women. About 56% of the women had rheumatic heart disease and 29% had congenital heart disease. Mitral valve prolapse is seen in 14% of the cases and is mostly an incidental finding during ECHO study. Congenital heart block was seen in 1case and it is belongs to type 1 CHB.

About 27 pregnant women were found to have heart disease during the antenatal period, 3 cases diagnosed during the postnatal period. Among this postnatal cases 1 women found to have VSD with eisenmenger syndrome and she was started on *T. digoxin*, *T. bosentan*. 1 women was diagnosed as having heart disease during intraoperative period and ECHO confirmed diagnosis in the postoperative period as RHD-MS.

Table 6: CHD Type

Type of CHD	Number	Percentage
ASD	10	34.48%
ASD with PHT	2	6.90%
VSD	7	24.13%
TOF	4	13.81%
PDA	6	20.68%
Total	29	100

In our study, commonest congenital heart disease noted was ASD. Along with ASD pulmonary hypertension developed in 2 cases. 7 patients with congenital heart disease belong to VSD in our study.

Surgeries

In 100 cases about 23 pregnant women underwent cardiac surgery and 1 women diagnosed as a case of ASD is planned for ASD closure after delivery. Various types of surgical corrections underwent are as follows:

Table 7: PDA ligation done for 5 (21.73%) cases,5 cases for ASD closure, TOF corrected for 4 women, 4 cases of Closed Mitral Commisurotomy and 3(13.04%) women had mitral valve replacement

Corrective Procedure	No. of women	Percentage
Mitral valve replacement	3	13.04%
Closed mitral commisurotomy	4	17.40%
Double valve replacement	1	4.35%
ASD Closure	5	21.73%
VSD Closure	1	4.35%
PDA ligation	5	21.73%
TOF corrected	4	17.40%
Total	23	100

Mode of Delivery

Among 100 pregnant women 14 cases were admitted during their firsttrimester with complaints such as bleeding per vaginum, ultrasound finding of missed abortion and manual vacuum aspiration with check curettage is done for such cases. Among the remaining 86 cases, caesarian section was performed in 56 women including both elective and emergency procedures. Pregnant women admitted to the labour ward with adequate cervical dilatation and satisfactory progress of labour with stable cardiac status is allowed a natural course of labour. About 15 women had outlet forceps delivery and it is mainly done to cut short the second stage of labour.

Table 8: 65.2% of women had Operative surgery (Elective-26.8%+Emergency-38.4%)

	Frequency	Percentage
Assisted vaginal delivery	15	17.4%
Elective	23	26.8%
Emergency	33	38.4%
Labour natural	15	17.4%
Total	86	100

Type of Anesthesia

Anesthesia was administered to 45.7% of the cases and general anesthesia was given to 11.4% of cases. 22.8% of the pregnant women were administered combined spinal epidural. About 14 cases were admitted in the first trimester with missed abortion, incomplete abortion and IV sedation was administered to them, which also includes 1 case of molar pregnancy.

Table 9:

	Frequency	Percentage
Combined epidural spinal	16	22.85%
GA	8	11.44%
IV sedation	14	20.0%
Spinal	32	45.71%
Total	70	100

Duration of stay in ICU

Cardiac patients with NYHA grade 3 or 4, Severe MS with atrial fibrillation, AS, uncorrected cyanotic heart disease requires intensive care. Women in the postnatal period also require intensive care since they can develop cardiac failure. About 68% of the cases were observed for 24 to 48 hours.

Table 10:

	Frequency	Percentage
< 24 hrs	11	11.0%
24 - 48 hrs	68	68.0%
48 - 72 hrs	6	6.0%
> 72 hrs	15	15.0%
Total	100	100

Patients diagnosed to have MS with pulmonary hypertension, MS with atrial fibrillation requires a longer period of ICU stay.

Reason for NICU admission

Neonates born by assisted vaginal delivery were observed in NICU, which includes 29 babies. 3 babies required IV antibiotics - Their mothers admitted with complaints of draining per vagina. 2 babies found to have single umbilical artery and further investigations found to be normal. Anomaly scan of the fetus showing mild hydroureteronephrosis investigated postnatlly and it is on regular follow up at pediatric OPD.

Table 11:

	Frequency	Percentage
Anamolies	3	3.0%
IV Antibiotics	3	3.0%
Nil Observation	65	65.0%
	29	29.0%
Total	100	100.0

Birth Weight

Neonatal outcome in terms of birth weight of the babies were studied. Most of the babies born are with birth weight of 2.5 to 3kgs.

69.8% of the babies come under this group. 23.3% of the babies have birth weight of more than 3kgs. Low birth weight was seen in 7% of the cases.

Table 12:

	Frequency	Percentage
< 2.5 kgs	6	7.0%
2.5 - 3 kgs	60	69.7%
> 3 kgs	20	23.3%
Total	86	100

Out of this birth, weight of 1 baby was 4kg and admitted in NICU evaluated for large for gestation. Baby was discharged from NICU on 6th postnatal day.

Table 13:

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Age	100	19	38	25.29	3.566
Duration of disease	65	0.03	26.0	9.740	6.5515
Baby weight	86	1.6	4.1	2.910	.3575
Duration of hospital Stay/days	100	5	28	14.03	5.028

ECHO Findings

Table 14:

		Type of heart disease				Total
		CHB	CHD	MVP	RHD	
ECHO	Abnormal	1	22	13	54	90
	Normal	0	7	1	2	10
	Total	1	29	14	56	100

ECHO findings are categorized in to normal or abnormal based on EF, PHTN, valve area, residual shunt lesion etc. Among RHD 96.42% have abnormal findings in ECHO.78.56%of women with CHD are found to have abnormal ECHO findings. The comparison between Echo and Heart disease types shows that there is statistical significance with P = 0.026.

Summary

1. The study was conducted in the Department of Obstetrics and Gynaecology, GOVT RSRM Hospital, Stanely Medical College, during January 2017 to October 2017.
2. 100 cases of heart disease complicating pregnancy were studied.
3. The prevalence of heart disease among the women who delivered here was 1.29%.
4. Of 100 women, 86 were admitted for safe confinement and 14 cases were admitted for first trimester abortion.
5. 33% of the women were diagnosed to have heart disease for first time in pregnancy. Of these, RHD was seen in 19% of cases, MVP seen in 6%, CHD in 7% cases, CHB in 1%.
6. Teenage pregnancy with heart disease was found in 11 cases.
7. Rheumatic heart disease is seen in 56% of the cases and congenital heart disease in 29% of the women.
8. 98 women (98%) had NYHA class I or II symptoms.
9. Isolated MS was seen in 19 cases (33.34%).
10. ASD was the commonest congenital heart disease, seen in 10 (34.48%) women. ASD with PHT is seen in 2 cases.
11. 23 women had undergone cardiac corrective surgeries. Of these surgery for congenital heart disease was done in 15 patients,
12. 8 patients underwent surgery for RHD
13. 56 women (65.20%) delivered by Cesarean section and 30 (34.8%)

Conclusion

Heart disease is the most common non obstetric cause of maternal morbidity and mortality. It also has a major impact on neonatal outcome. Favorable outcome is noted in women with NYHA class I and II, avoidance of factors precipitating heart failure like anemia, infections, arrhythmias, regular cardiac follow up, strict adherence to cardiac medications. Pregnancy should be avoided in women with severe type of heart disease and in such cases; surgical procedures should be performed in the pre pregnancy period itself. Pregnant women with heart disease are advised to have regular and frequent antenatal visits. During pregnancy, corrective procedures if required should be done in the second trimester but it carries significant fetal risk. Cardiac drugs taken prior to pregnancy should be reviewed by the cardiologist. Delivery should preferably conduct in a tertiary care centre with multi-disciplinary approach. Fetal ECHO performed around 20 weeks of gestation to find out inherited heart diseases in newborn. Universal access to obstetric and cardiac care and use of standard treatment protocol will definitely improve the outcome in women with cardiac disease.

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