

PREVALENCE OF HEART DISEASE IN PREGNANCY

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ABSTRACT

BACKGROUND

Previously, the high maternal mortality in cardiac patients who became pregnant prompted the assertion: Women with an abnormal heart should not become pregnant. This long-standing notion needs to be revised today.

AIM

To study the prevalence of heart disease in antenatal admissions at Government Rajaji Hospital, Madurai.

METHODOLOGY

An observational study of 3669 antenatal patients being admitted in GRH, Madurai, from March 2016 to April 2016. Both primigravida and multi-gravida with no age restrictions were included in the study. Screening ECHOs were done. Among 3669 admissions, 46 patients were diagnosed to have heart disease. The cardiac diseases include multivalvular heart disease, congenital heart disease, peripartum cardiomyopathy, coronary heart disease, hypertrophic obstructive cardiomyopathy.

RESULTS

The study showed that the prevalence of heart disease in Government Rajaji Hospital is 1.25% and it is more common in 20-30 years of age (p value <0.001), which is significant.

DISCUSSION

Pregnancy and puerperium are important risk factors for heart disease. Heart disease also significantly affects the course of pregnancy. So it is important to diagnose heart disease early in pregnancy. This study emphasizes that heart disease complicating pregnancy forms an important proportion of antenatal mother and needs early diagnosis and management.

CONCLUSION

Though considered rare previously, heart disease contributes to a significant proportion of antenatal mothers (1.25%) and early referral to proper tertiary care centre helps in reducing the mortality and morbidity.

KEYWORDS

Heart Disease, Observational Study, Institutional Delivery, Tertiary Care.

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INTRODUCTION

Cardiac diseases complicate 2% of pregnancies in developing countries like India. It contributes to one-fifths of all maternal deaths. Previously, there was a long-standing notion that women with an abnormal heart should not become pregnant. With increasing experience, it has become clear that not all clinical situations carry the same ominous prognosis. While pregnancy is contraindicated in some conditions (e.g. Eisenmenger's syndrome) or it is associated with significant morbidity in certain conditions (e.g. Mitral stenosis), other conditions such as mitral valve prolapse may have a benign course during pregnancy. Pregnancy is normally characterized by increased stroke volume and cardiac output. Extreme fluctuations in cardiac output occur at the time of labour and after delivery.

Maternal heart disease can lead to cardiac decompensation and death, particularly in the second stage of labour. In addition, co-morbidities such as pre-eclampsia, anaemia, pre-term labour and foetal growth restriction are commonly seen in patients with heart disease. Therefore, patients should be evaluated for underlying cardiac disease to select appropriate management. Risk stratification influences therapeutic decisions during pregnancy.

The physiological changes that occur during pregnancy and in the peripartum period provide a challenge to women with previously undiagnosed or known cardiovascular conditions. Knowledge about the morphological and functional changes in normal pregnancy is important for the timely recognition of cardiac pathology as Cardiovascular Disease (CVD) is a leading cause of non-obstetric mortality during pregnancy. Pregnancy poses a physiological stress test as cardiac output increases by 30–50% close to term. Further haemodynamic stress occurs during labour and many of the effects of pregnancy on CVD persists for several months after delivery.

The complex morphological and functional adaptations of the maternal heart during pregnancy have recently been studied in detail by Savu et al.

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In this study, serial echocardiography was performed to measure conventional parameters such as ventricular dimension and ejection fraction as well as myocardial deformation (Strain). The results revealed increased cardiac performance and progressive left ventricular remodelling throughout pregnancy. Progressive development of eccentric hypertrophy, which recovered post-partum was also observed.

CVD in pregnancy is a complex topic as women can present either pre- or post-partum due to a pre-existing heart disease such as operated or unoperated congenital heart disease, valvular heart disease or an idiopathic dilated cardiomyopathy. Women often present with symptoms and signs of heart failure. On the other hand, there are unique diseases such as Peripartum Cardiomyopathy (PPCM), which most commonly present in the post-partum period to women with no other structural heart disease. This makes management of women with CVD in pregnancy challenging, needing close interaction by cardiologists, obstetricians and intensivists.

MATERIALS AND METHODS

An observational study of 3669 antenatal patients being admitted at GRH, Madurai, was taken. Both primi-gravida and multi-gravida with no age restrictions were included in the study. Among 3669 admissions, 46 patients were diagnosed to have heart disease. All patients were managed by a multi-disciplinary team of obstetricians, cardiologists and paediatricians. Electrocardiogram and Screening Echocardiography were performed in all patients. During labour, infective endocarditis prophylaxis and epidural analgesia were given. Patients with Cardiac failure were managed in the intensive care unit and treated with propped up position, bed rest, oxygen administration, salt restriction, furosemide and digoxin.

Inclusion Criteria

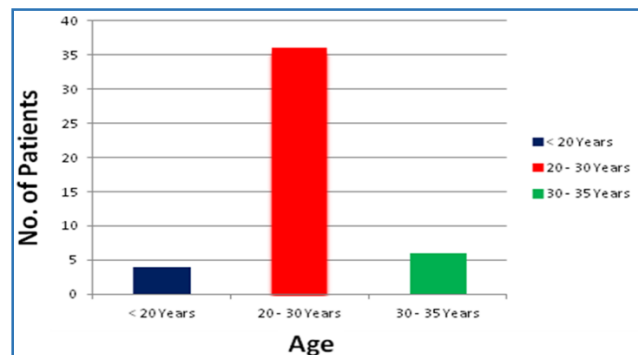
All antenatal patients admitted in Govt. Rajaji Hospital.

OBSERVATION AND RESULTS

The prevalence of heart disease among pregnant women, in our Medical College Hospital was found to be 1.25%. This value correlates with another study conducted at Andhra Medical College, Vishakapatnam.¹ where the prevalence was 1.2%.

Age	No. of Cases	Percentage	Chi square value 28.35 P value <0.001 Significant
<20 years	4	8.6%	
20-30 years	36	78%	
30-35 years	6	13%	

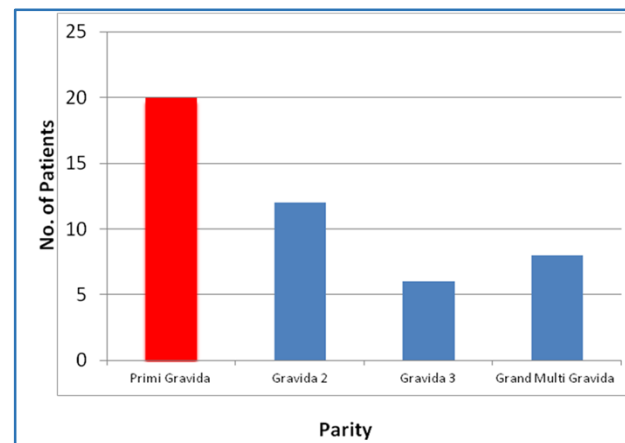
Table 1: Age Distribution vs Prevalence of Heart Disease



78% of patients were belonging to age group 20-30 years (p value=<0.001), which is significant. This value is comparable with a study conducted at S.V. Medical College, Tirupathi, Andhra Pradesh.² where 37% of patients were belonging to age group <20 years and 50% between 21-25 years.

Parity	No. of Cases	Percentage
Primi Gravida	20	43.47%
Gravida 2	12	26.08%
Gravida 3	6	13.04%
Grand Multi Gravida	8	17.39%

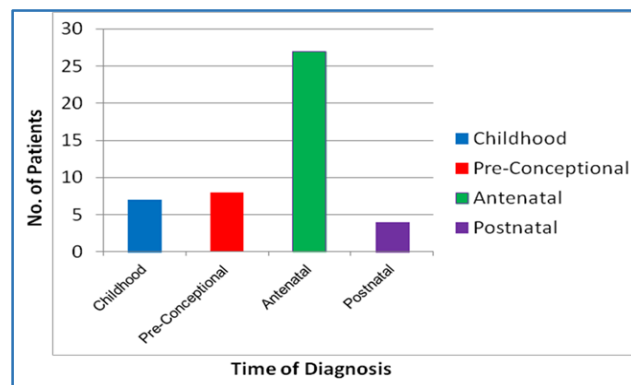
Table 2: Parity vs Prevalence of Heart Disease



In our study, 43.47% of patients with heart disease were primi gravida. In the study at Tirupathi,² 42% of patients were primi gravida, which is almost similar to the prevalence in our study.

	No. of Cases	Percentage	P value <0.001 Significant
Childhood (Congenital)	6	13.04%	
Pre-Conceptional	8	17.3%	
Antenatal	27	58.6%	
Postnatal	4	8.6%	

Table 3: Time of Diagnosis vs Heart Disease



58.6% of patients were diagnosed with heart disease during the antenatal period. While 8.6% were diagnosed only in the postnatal period, which is significant; 15% of the heart disease were congenital, of which 3 cases were Atrial Septal Defect, 1 case was Ventricular Septal Defect and 1 case was Ebstein's anomaly.

Nature of Lesion	ASD	8	17.3%
	VSD	1	2.17%
	MS	3	6.5%
	MR	7	15%
	TR	1	2.17%
	AS	2	4.3%
	Multi-valvular	22	47.8%
	HOCM	1	2.17%
	CAD	1	2.17%
	PPCM	1	2.17%

Table 4: Nature of Lesion vs Prevalence

Multi-valvular heart disease constituted about 47.8% among the patients studied. Among the congenital lesions, ASD was significant with 17.3%. The prevalence of Hypertrophic Obstructive Cardiomyopathy (HOCM), Peripartum Cardiomyopathy (PPCM) and Coronary Artery Disease (CAD) was found to be 2.17% each. This is comparable to the study of pregnancy outcome in National Heart Disease, conducted in S.V. Medical College, Tirupathi.² Andhra Pradesh which showed 45.45% of Atrial Septal Defect.

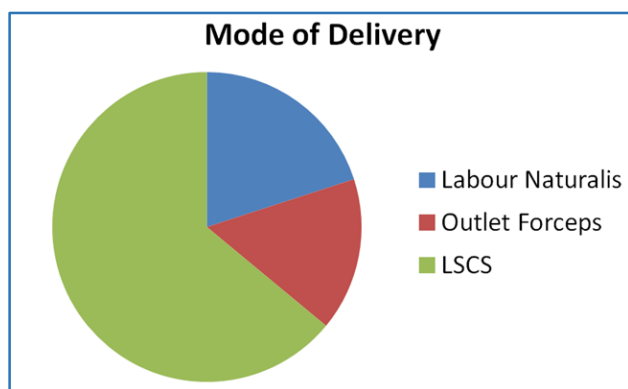
Corrective Surgeries Done	No. of Cases	Percentage
Childhood	3	6.52%
Pre-conceptional	5	10.86%
Antenatal	-	-
Postnatal	1	2.17%

Table 5: Corrective Surgeries in Heart Disease

17.3% of patients had their corrective surgeries done pre-conceptionally, which has largely influenced the prognosis of their respective lesion. Of those, Atrial Septal Defect (ASD) closure was done for 3 patients, mitral valve commissurotomy was done for two patients, Balloon Mitral Valvotomy (BMV), Valve Replacement and Tricuspid Valve Repair were done for 1 patient each. For one patient, mitral valve commissurotomy was done postnatally.

Mode of Delivery	No. of Cases	Percentage	Chi square value 7.35 P value 0.025 Significant
Labour Naturalis	5	10%	
Outlet forceps LSCS	4 16	8% 34.7%	

Table 6: Mode of Delivery vs Heart Disease



Among the mode of delivery, Lower Segment Caesarean Section (LSCS) was found to be 34.7%; 8% of patients were delivered by prophylactic outlet forceps delivery. The indications for LSCS were foetal distress for 8 patients, cephalopelvic disproportion for 4 patients, severe oligohydramnios for 2 patients, suspected scar dehiscence for 1 patient and severe left ventricular dysfunction for 1 patient.

Post-Operative Elective Ventilation	5 Patients	10%
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Table 7: Post-Operative Elective Ventilation in Heart Disease

About 10% of patients required post-operative elective ventilation.

No. of cases went in for failure	11	23.9%
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Table 8: Cardiac Failure in Heart Disease

In our study, about 23.9% cases went in for cardiac failure and were successfully treated. This is comparable to the study of pregnancy outcome in maternal heart disease conducted at S.V. Medical College, Thirupathi.² which showed cardiac failure in 25% of cases.

Referral	No. of Cases	Percentage
PHC	11	23.9%
GH	10	21.7%

Table 9: Referrals in Heart Disease

Among 21 referral patients, 11 patients referred from primary health centre and 10 patients referred from Government Hospitals.

Time of Referral	No. of Cases	Percentage
First trimester	1	4.7
2 nd trimester	3	14.3
Term	9	42.8
In Active labour	3	14.3
Post dated	3	14.3
Post-operative	2	9.6
Total	21	100

Table 10: Time of Referrals in Heart Disease

Three patients were referred in labour and three patients with Prelabour Rupture of Membranes (PROM). When considering gestational age, 1 patient was referred during first trimester, 3 patients during second trimester, 9 patients during term, 3 patients were post-dated and 2 patients referred post-operatively.

Maternal Death	Nil
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Table 11: Time of Referrals in Heart Disease

There were no maternal deaths among the patients with heart disease.

DISCUSSION

Among the 3669 patients studied in the Govt. Medical College and Hospital in Madurai, the prevalence of heart disease was found to be 1.25%.

According to our study, we have drawn the conclusion that 78% patients were belonging to age group 20-30 years and 13% belonged to the age group 30-35 years and 8.6% patients were <20 years.

Our study report shows that 43.4% were Primi Gravida and 26.08% were Gravida 2, 13.04% were Gravida 3 and 17.39% were Grand Multi Gravida. In our study we have observed that 15% of patients were diagnosed as having heart disease in childhood, 17.3% pre-conceptionally, 58.6% antenatally, 8.6% postnatally. Since in our country most of the patients are turning up to hospitals only during antenatal period; the incidence of heart disease in patients is considerably high during this period.

Among the nature of lesions, Atrial Septal Defect (17.3%), Ventricular Septal Defect (2.17%), Hypertrophic Obstructive Cardiomyopathy (2.17%), Peripartum Cardiomyopathy (2.17%), Mitral stenosis (6.5%), Mitral Regurgitation (15%) and multivalvular heart disease (47.8%) were significant contributors. This value is comparable with a prospective study from Southern India done at Andhra Medical College, Vishakhapatnam (Nagamani et al 2015) where mitral stenosis contributes 54% of the type of lesion. This study was a prospective cohort study, which enrolled 60 pregnant patients with heart disease receiving tertiary care at Vishakhapatnam.⁽¹⁾ In another study conducted at S.V. Medical College, Tirupathi.⁽²⁾ Uebeing A et al⁽³⁾ with 100 patients with heart disease Atrial Septal Defect constituted 45.45% and multivalvular heart disease constituted only 16.66% of cardiac lesions. Although Peripartum Cardiomyopathy is contributing only 2.17% in our study, it is important to discuss this in respect to our study, as it is a condition solely predisposed by pregnancy and puerperium.

Rheumatic heart disease, which was present in more than half of patients remains the most frequent cause of valve disease. Although a significant number of patients with rheumatic heart disease had multivalvular lesions. Besides medical treatment, surgical interventions or percutaneous balloon valvuloplasty were frequently effective, resulting in satisfactory maternal outcome. In congenital heart disease, pregnancy was well tolerated by women with cardiac shunts without pulmonary hypertension.

PPCM is a pregnancy-associated myocardial disease with significant morbidity and mortality. A recent position statement from the European Society of Cardiology (Vera Regitz-Zagrosek et al)⁽⁴⁾, Working Group on PPCM defined the disease as an 'idiopathic cardiomyopathy presenting with heart failure secondary to LV systolic dysfunction towards the end of pregnancy or in the months following delivery, where no other cause of heart failure is found.'

Our study report showed 17.3% patients underwent corrective surgery pre-conceptionally, 2.17% postnatally.

In our study 34.7% of patients were delivered by LSCS, which was done due to obstetric reasons; 10% of patients needed post-operative elective ventilation in cases like Mitral Stenosis, where patients are prone to develop cardiac failure in the immediate puerperal period. Soon after delivery, there is sudden transfusion of blood from the lower extremities and uteroplacental circulation, which can pose a threat to the patient's life.

Foetal morbidity is usually due to preterm delivery and intrauterine growth restriction. Another foetal risk is that of congenital heart disease. In our hospital, 27-year-old primi referred from PHC as compliance of palpitation for the past 3 months. She admitted in GRH, history, clinical examination and all investigations were done. In Echocardiography she was diagnosed to have bicuspid aortic valve with normal LV

systolic function, LVEF - 63%. She delivered by Labour natural an alive term female baby, B. Wt - 2.5 kg and admitted in NICU and the baby was diagnosed to have small patent foramen ovale+, left to right shunt and the baby is under regular followup.

Termination of pregnancy should be offered to patients with pulmonary hypertension, Eisenmenger's syndrome, Marfan syndrome with cardiac involvement, single ventricle, dilated cardiomyopathy, etc.

The pregnant cardiac patients should have effective pain relief during labour with epidural analgesia. Almost all cardiac patients should be kept on dry side and their intravenous fluids restricted to be not more than 75 mL/hour. An exception to this rule is patients with aortic stenosis. Early mobilization should be done to avoid thrombus formation. Any infection in the puerperium, however mild, is taken seriously.

Among the 46 cases, due to early referral early diagnosis and proper management no maternal mortality were reported.

An analysis of heart disease cases delivered at our hospital from November 2015 to February 2016 was done; 45 cases of heart disease was diagnosed, among them 29 had vaginal delivery and 16 underwent LSCS.

Nature of Heart Disease	No. of Cases	Percentage
Congenital heart disease	10	22.2
Multivalvular heart disease	32	71.2
HOCM	1	2.2
PPCM	1	2.2
Lutembacher's syndrome	1	2.2
Total	45	100

Among congenital heart disease ASD closure done for 4 patients, VSD closure done for 2 patients, 2 patients underwent mitral valve replacement in pre-pregnant period. In spite of this, 5 cases of maternal death occurred during this period. Maternal mortality is 11%.

Causes of Mortality

Age of Patient	Nature of Lesions
22	PPCM
21	Severe MS/Moderate AR PHT/LVF
21	PPCM/LV dysfunction
27	Large PDA with bidirectional shunt
23	CCF with pulmonary oedema

Because of the high mortality which may be due to comorbid condition, late referral, screening Echos planned for all pregnant women in our hospital for early detection of heart disease.

Period of Study	No. of Cases Heart Disease	Maternal Mortality	Percentage
November 2015 to February 2016	45	5	11
March 2016 to April 2016	46	0	0

From November 2015 to Feb 2016 we had 45 cases, maternal mortality were 11%. But from March 2016 to April

2016, we had 46 cases of heart disease, maternal mortality is nil.

It shows early referral screen of cases with symptoms to rule our heart disease reduces the mortality.

In our study 32-year-old G2P1L1/PFTND/36 weeks of gestation, known case of rheumatic heart disease, mitral valve commissurotomy done at 14 years of age in our hospital and then restenosis with pulmonary hypertension was diagnosed in 2011 and for that balloon mitral valvotomy done. Echo showed LVEF - 60%, S/P BMV, MVO - 1.9 sq cm, PMC restricted mobility PM commissure split, mild MS, mild PHT. Patient delivered by outlet forceps and alive term male baby with 2.5 kg. Due to pre-pregnancy corrective surgeries, both mother and baby well. A 23-year-old G5A4/m/s-9 years/BOH referred from Govt. Hospital.

As a case of ASD closure done 3 years ago. Echo showed LVEF - 65%, IAS patch intact, No residual shunt, No pericardial effusion, Normal biventricular function. Patient was taken up for emergency LSCS due to foetal distress. She delivered an alive term male baby. B wt 2.5 kg. As it is a precious pregnancy, baby admitted in NICU for special care and baby was evaluated and baby was normal. Due to pre-pregnancy corrective surgery, early referral and early diagnosis, effective management both mother and baby are well. A 31-year-old G2 P1L1/PFTND/37 weeks of gestation referred from Govt. Hospital as severe anaemia with pedal oedema.

Patient was admitted in failure, her pulse rate was 220/min and was diagnosed to have supraventricular tachycardia and patient shifted to Intensive Cardiac Care Unit and there supraventricular tachycardia controlled by Inj. Adenosine, Inj. Diltiazem, Inj. Verapamil, Inj. Metoprolol. Finally, SVT controlled diagnosed as PPCM. Echo showed LVEF-30%, Global hypokinesia of LV, Mild MR, Trivial AR, Moderate LV systolic dysfunction, No LV clot, No pericardial effusion, Moderate LV systole dysfunction, IMP:PPCM. Patient continuously monitored in ICU planned for elective LSCS due to severe oligohydramnios and delivered an alive term female baby, birth weight 2.25 kg. 26-year-old G2A1/M/s 2 years/Referred from PHC as short primi/non-severe preeclampsia with c/o breathlessness and diagnosed to be acute pulmonary oedema and patient was put on mechanical ventilator.

She is a known case of RHD-Balloon mitral valvotomy done on 2009 and she was not on regular followup. Echo showed LVEF - 60%, LA is dilated, MVO - 1.0 sq cm, PML restricted mobility, Mild pericardial effusion, Imp. Severe MS, Mild MR, mild AR, Severe PHT. In view of CPD II degree, patient was taken up for LSCS and delivered an alive term female baby 3.1

kg and patient was put on elective mechanical ventilation and patient was put on drugs Tab. Penicillin, Tab, Furosemide, Tab. Metoprolol, and discharged and advised followup in cardiothoracic surgery OPD for further treatment.

A 20-year-old primi, m/s 1-year/38 weeks' gestation, known case of ebstein's anomaly with severe TR referred from Govt. Hospital. Patient has undergone tricuspid valve repair 3 years back. Echo showed LVEF - 62% S/P Ebstein's anomaly repair, RA, RV, dilated/IAS intact, TR moderate. No pulmonary hypertension; normal biventricular function; now nil cardiac symptoms at present. Under careful observation, under epidural analgesia delivered an alive term female baby, birth weight 3 kg by outlet forceps.

CONCLUSION

The study proved that the prevalence of heart disease is 1.25% among the antenatal patients in our hospital. Screening echos done for all referral patients help in detecting heart disease at an earlier date, then effectively managed so that mortality can be made nil as per our study. Previously considered rare due to advances in diagnostic techniques, incidence of heart disease has significantly raised. The importance of early referral lies in the fact that early diagnosis and proper management helps in reducing the morbidity and mortality due to cardiac failure and other complications. The role of institutional delivery cannot be overemphasized, as it causes significant reduction in mortality. In the era of recently advancing medical techniques and high quality care, preventing any preventable death is the duty of all doctors and heart disease complicating pregnancy is one such area in obstetrics.

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