Section: Obstetrics and Gynaecology

Original Research Article

THE SPECTRUM OF HEART DISEASE IN PREGNANCY AND ITS OUTCOME IN PATIENTS VISITING A TERTIARY CARE CENTRE

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Abstract

Background: The increasing prevalence of heart disease in pregnant women is attributed to factors such as rising rates of diabetes, hypertension, and obesity as well as advancements in congenital heart disease treatment. Rheumatic heart disease (RHD) remains predominant in India, in contrast to the Western prevalence of congenital heart disease (CHD). This study aimed to analyse the prevalence, spectrum, and impact of heart disease on pregnancy at a tertiary care centre in South India. **Materials and Methods:** This prospective observational study was conducted over 12 months at K.A.P.V. Government Medical College & MGMGH, Trichy, including 100 pregnant women with heart disease. Participants were assessed for functional cardiac status (NYHA classification) and underwent detailed antenatal and cardiac evaluations, including ECG and 2D Echo. Maternal and neonatal outcomes, including the mode of delivery, birth weight, and NICU admission, were recorded. Data analysis was performed using SPSS version 21.0. **Result:** RHD was the most common cardiac condition (55%), followed by CHD (26%). Most participants were NYHA Class I (52%) or II (41%). Vaginal delivery was the predominant mode of delivery (73%), while cesarean sections accounted for 27%. Good neonatal outcomes were reported in 74% of the cases, with 18% of NICU admissions. Maternal complications included pre-eclampsia (4%), pulmonary oedema (2%), and mortality due to cardiac failure (5%). **Conclusion:** Rheumatic heart disease is the most prevalent cardiac condition during pregnancy in low-income settings. Comprehensive multidisciplinary management is crucial for optimizing maternal and neonatal outcomes, emphasizing early diagnosis, effective antenatal follow-up, and safe delivery.

INTRODUCTION

The increasing prevalence of heart disease in pregnant women can be attributed to the rising incidence of diabetes, hypertension, and obesity as well as significant advancements in the treatment of congenital heart disease.[1] The prevalence of cardiac disease during pregnancy is estimated to range from 0.3% to 3.5%. Indirect maternal deaths have emerged as the leading cause of mortality, accounting for 20.5% of all maternal fatalities.[2]

In the Western world, congenital heart disease (CHD) represents the most common form of heart disease, contributing to 75–82% of cases, with shunt lesions accounting for 20–65% of these cases.[3] In contrast, in low- and middle-income countries such as India, rheumatic heart diseases (RHDs) continue to dominate, accounting for 56–89% of all cardiovascular diseases during pregnancy.[4] Historically, congenital heart disease affects only 5% of pregnant women with cardiac conditions. However, in developed nations, most pregnant women with heart disease now have congenital heart conditions.[5]

Maternal and perinatal morbidity and mortality associated with pregnancies complicated by cardiac conditions vary depending on the type of cardiac disease, the patient's functional status, and pregnancy-related complications. Maternal complications include cardiac failure, pulmonary oedema, cardiogenic shock, arrhythmias, thromboembolism, and, in severe cases, maternal mortality.[6] Perinatal complications include low birth weight, intrauterine growth restriction (IUGR), preterm birth, and congenital heart disease in the fetus.[7]

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India, a lower-middle-income country with an economy largely reliant on agriculture, faces unique challenges in managing pregnancies complicated by cardiac disease. In 2015, the maternal mortality ratio was reported at 54 per 100,000 live births, with approximately 8,000 neonatal deaths annually.[8] Compared to high-income countries, the management of Indian mothers and children with cardiac diseases is significantly more complex due to delayed diagnosis, insufficient infrastructure, and limited availability of essential medications.[8] This underscores the importance of a thorough evaluation of pregnant women with cardiac conditions to establish optimal prenatal care, which is crucial for improving maternal and perinatal outcomes.[9]

Despite the critical importance of this issue, there is limited published data on maternal outcomes in pregnant women with cardiac diseases in India.[10] Fetal growth restriction (FGR), which affects 3–7% of all pregnancies, is associated with adverse outcomes, including stillbirth,[11] neonatal mortality,[12] hypoxic-ischemic encephalopathy,[13] the need for special education, and a range of health issues persisting into adulthood.[14] Thus, the risks associated with FGR warrant careful investigation.

Few studies have been conducted in South India on pregnancies complicated by cardiac disease despite the rising incidence of this condition. Therefore, the current study was designed to provide insight into the changing patterns and outcomes of this increasingly prevalent and life-threatening condition at a tertiary care centre in South India. This study aimed to determine the prevalence, spectrum of disorders, and outcomes of pregnancies complicated by heart disease.

Aim

This study aimed to analyse the prevalence, spectrum, and impact of heart disease on pregnancy, including maternal and perinatal outcomes, and reduce maternal mortality through early diagnosis, effective antenatal follow-up, treatment, and safe delivery practices.

MATERIALS AND METHODS

This prospective observational study included 100 pregnant women with heart disease in the Department of Obstetrics & Gynecology at the K.A.P.V Government Medical College and MGMGH, Trichy, November 2020 to October 2021. This study was approved by the Institutional Ethics Committee before initiation, and informed consent was obtained from all patients.

Inclusion Criteria

Pregnant women with various heart diseases (Rheumatic, Congenital, Vascular, Ischemic, etc.) enrolled in the AN OPD/IPD ward. All pregnant women with heart disease were admitted to the hospital for safe confinement.

Exclusion Criteria

Pregnant women without heart disease but presenting with symptoms and signs suggestive of heart disease or cardiac failure (non-cardiac cause) were subjected to meticulous history taking, and detailed examination and those who were not diagnosed with heart disease were excluded.

Methods

Detailed antenatal, obstetric, and cardiac histories were obtained from all patients. The functional cardiac status of the women was assessed according to the New York Heart Association (NYHA) classification. Cardiologists' opinions were obtained, an ECG was performed, and a 2D echo was performed to confirm structural heart disease. Routine laboratory investigations and the necessary investigations were performed. Age, parity, gestational age, NYHA classification, cardiac lesion (congenital, rheumatic, miscellaneous), medications, surgical correction, mode of delivery, maternal and perinatal outcomes, birth weight of babies, need for neonatal intensive care unit (NICU) admission for neonates, and maternal and neonatal complications were recorded. Data are presented as percentages and number of cases.

RESULTS

Of the 100 patients, most were in age groups–21-25 years and 26-30 years, 35 (35%), 31-35 years (14%), over 36 years (9%), and under 20 years (7%). Regarding occupation, 91 (91%) of the patients were housewives, while other jobs, such as coolie (4%), lab technicians, lecturers, staff nurses, tailors, and teachers each accounted for 1%. In terms of education, 49 (49%) of the patients were high school graduates, 21 (21%) were in primary school, 13 (13%) were in middle school, and 3 (3%) were undergraduates. Only 1 patient (1%) was uneducated. Socioeconomically, 74 (74%) patients were living below the poverty line, showing significant economic challenges in this group [Table 1].

Of the 100 patients, 65 (65%) were multipara and 35% were primipara. Most patients were in Class I, and 52 (52%) had heart function, indicating no significant limitations. Class II was observed in 41 (41%) patients, indicating mild limitations. The most common heart condition was rheumatic heart disease, in 55 (55%). There were 26 (26%) congenital heart problems, 13 (13%) mitral valve prolapse, 4 (4%) heart weakness during pregnancy, and 2 (2%) complete heart blocks. Among the patients with rheumatic heart disease, 21 (38.2%) had combined valve problems, 12 (21.8%) had valve narrowing, and 10 (18.2%) had valve leakage. Other combinations of valve issues were present in 7 patients (12.7%) [Table 2].

ASD was the most common congenital heart disease in 18 patients (69.2%). Pulmonary valve stenosis and bicuspid aortic valve disease were observed in four patients (15.4%), and ventricular septal defect and Ebstein's anomaly in one patient each (3.8%). Vaginal delivery occurred in 73 patients (73%) and cesarean section (LSCS) occurred in 27 patients

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(27%). Outlet forceps were used in 49 (49%) patients, emergency deliveries in 20 (20%), natural labor in 18 (18%), elective deliveries in 7 (7%), spontaneous deliveries in 4 (4%), and assisted breech in 2 (2%). Reasons for LSCS were previous cesarean 9 (33.3%), cephalopelvic disproportion 6 (22.2%), oligohydramnios 5 (18.5%), fetal distress 2 (7.4%), failed induction 2 (7.4%), multiple valve lesions 2 (7.4%), and aortic stenosis 1 (3.7%). Birth weights were 2.6-3 kg in (53%), 2.1-2.5 kg in 40 (40%), less than 2 kg in 2 (2%), and above 3.1 kg in 5 (5%) [Table 3].

Morbidity among patients including cardiogenic shock was 1 (1%), HELLP syndrome 1 (1%), postpartum haemorrhage 1 (1%), pre-eclampsia 4 (4%), pre-term labor 7 (7%), pulmonary oedema 2 (2%), and tachyarrhythmia 1 (1%). Most patients had no complications 83 (83%). NICU admissions were required for 18 (18%) newborns, whereas 82 (82%) did not require admission. Fetal outcomes showed good neonatal outcomes in 74 (74%) cases. Other outcomes included birth asphyxia 9 (9%), preterm birth 7 (7%), respiratory distress syndrome 5 (5%), small for gestational age 3 (3%), and meconium aspiration 2 (2%). Neonates with congenital heart disease were observed in four (4%) cases, while 96 (96%) had no such condition [Table 4].

Of the 100 patients, 76 (76%) had safe deliveries. Procedures for mitral valve replacement (MVR) or aortic valve ballooning (AVB) were performed in 8 patients (8%), and treatment for embolic complications was performed in 6 patients (6%). Recovery from peripartum cardiomyopathy (PPCM) was in 12 (12%) cases, while heart disease was accidentally diagnosed during pregnancy in 14 (14%). Mortality due to cardiac failure was observed in 5 (5%) patients. Mechanical ventilation was in 9 (9%) and arrhythmia or pulmonary edema in four (4%). No cases of infective endocarditis were reported [Table 5].

Table 1: Demographic and socioeconomic characteristics of pregnant women with heart disease.

		Frequency (%)
Age (In years)	<20	7 (7%)
	21-25	35 (35%)
	26-30	35 (35%)
	31-35	14 (14%)
	>36	9 (9%)
Qualification	Uneducated	1 (1%)
	Primary school	21 (21%)
	Middle school	13 (13%)
	High school	49 (49%)
	Undergraduate	3 (3%)
	Postgraduate	13 (13%)
Occupation	Coolie	4 (4%)
	Housewife	91 (91%)
	Lab technician	1 (1%)
	lecturer	1 (1%)
	Staff Nurse	1 (1%)
	Tailor	1 (1%)
	Teacher	1 (1%)
Socio-economic	> poverty line	26 (26%)
	< poverty line	74 (74%)

Table 2: Obstetric profile and NYHA classification of pregnant women with heart disease

		Frequency (%)
Obstetric score	Multipara	65 (65%)
	Primipara	35 (35%)
NYHA class	Class I	52 (52%)
	Class II	41 (41%)
	Class III	3 (3%)
	Class IV	4 (4%)
Heart disease	Complete heart block	2 (2%)
	Congenital heart diseases	26 (26%)
	Mitral valves prolapse	13 (13%)
	Peripartum cardiomyopathy	4 (4%)
	Rheumatic heart disease	55 (55%)
RHD Lesion	Isolated MS	12 (21.8%)
	Isolated MR	10 (18.2%)
	MS/MR	21 (38.2%)
	MS/MR/AR	5 (9.1%)
	Other combined lesions	7 (12.7%)

Table 3: Spectrum of congenital heart diseases and delivery methods

		Frequency (%)
Type of CHD	ASD	18 (69.2%)
	Pulmonary valve stenosis	4 (15.4%)
	Bicuspid aortic valve disease	4 (15.4%)

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	Ventricular septal defect	1 (3.8%)
	Ebstein's anomaly	1 (3.8%)
Mode of delivery	LSCS	27 (27%)
	Vaginal delivery	73 (73%)
Type of delivery	Elective	7 (7%)
	Emergency	20 (20%)
	Labor natural	18 (18%)
	Assisted breech	2 (2%)
	Outlet forceps	49 (49%)
	Spontaneous expulsion	4(4%)
Indication for LSCS	Cephalopelvic Disproportion	6 (22.2%)
	Failed induction	2 (7.4%)
	Fetal distress	2 (7.4%)
	Oligohydramnios	5 (18.5%)
	Previous LSCS	9 (33.3%)
	AS	1 (3.7%)
	Multiple valvular lesions	2 (7.4%)
Birth weight (kg)	<2	2 (2%)
	2.1-2.5	40 (40%)
	2.6-3	53 (53%)
	>3.1	5 (5%)

Table 4: Maternal and neonatal morbidity and mortality outcomes

		Frequency (%)
Morbidity	Cardiogenic Shock	1 (1%)
	HELPP Syndrome	1 (1%)
	Postpartum haemorrhage	1 (1%)
	Pre-eclampsia	4 (4%)
	Pre-term labor	7 (7%)
	Pulmonary edema	2 (2%)
	Tachyarrhythmia	1 (1%)
	Nil	83 (83%)
NICU admission	No	82 (82%)
	Yes	18 (18%)
Fetal outcome	Birth asphyxia	9 (9%)
	Good fetal/neonatal outcome	74 (74%)
	Meconium aspiration	2 (2%)
	Preterm	7 (7%)
	Respiratory distress syndrome	5 (5%)
	Small for gestational age	3 (3%)
Neonates with congenital heart disease	Yes	4 (4%)
	No	96 (96%)

Table 5: Maternal outcomes including procedures and complications

Maternal outcome	**Frequency (%)**
Safe delivery	76 (76%)
Procedure for MVR/AVB	8 (8%)
Treatment for embolic complication	6 (6%)
PPCM recovered	12 (12%)
Accidentally diagnosed with heart disease during pregnancy	14 (14%)
Mortality due to cardiac failure	5 (5%)
Infective endocarditis	0
Mechanical ventilation	9 (9%)
Arrhythmia/Pulmonary edema	4 (4%)

DISCUSSION

In our study, most women were in the age groups of 21–25 years and 26–30 years, each comprising 35% of the total participants. Overall, 77% of the women were below 31 years of age. These findings are similar to those reported by Roos-Hesselink et al,[1] where the average age of the participants was 29.5 years. Similarly, Chhetri et al,[15] reported a mean age of 25 years among 53 pregnant women with cardiac disease.

Regarding parity in our study, multiterm deliveries were much more common (65%) than first-time deliveries (35%). This result is in line with the findings of Stangl et al,[16] who reported more multiterm deliveries in their study. When we categorized patients based on the New York Heart Association (NYHA) functional classification, most women (52%) were in class I, followed by 41% in class II, and only 3% in class III. Similar results were reported by Bhatla et al,[17] where most patients in NYHA class I or II had fewer complications and healthier babies than those in class III or IV.

RHD was the most common heart condition in our study, affecting 55% of the women. This finding aligns with that of Nqayana et al,[18] who reported RHD in 19% of patients in their study. Among the women with RHD in our study, the most common

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lesions were combined mitral stenosis and mitral regurgitation (MS/MR) (38.2%), followed by isolated mitral stenosis (21.8%) and isolated mitral regurgitation (18.2%). Arnoni et al,[19] also reported that mitral stenosis was a major RHD lesion in 40% of their cases.

Regarding delivery methods in our study, 73% of the women had normal vaginal deliveries, while 27% underwent cesarean sections. Instrumental vaginal deliveries were performed in 23.06% of the cases to shorten the second stage of labor. Stangl et al,[16] reported a lower rate of vaginal deliveries (45.2%) and a higher rate of cesarean sections (54.8%). In our study, all women with heart valve disease, previous surgeries, congenital heart disease, or a history of infective endocarditis (IE) were administered IE prophylaxis.

Neonatal outcomes in our study showed that 53% of babies had a birth weight between 2.6–3 kg, while 40% weighed between 2.1–2.6 kg. Only 2% of the infants weighed <2 kg. These results are similar to those reported by Stangl et al,[16] and Sawhney et al,[20] who observed low birth weight in 16.7% of cases. Additionally, only 18% of the babies in our study required NICU admission, whereas 82% did not. Overall, the fetal outcomes in our study were positive. Most babies (74%) were born healthy without complications, 9% had birth asphyxia, and 7% were born preterm. Importantly, no neonatal deaths were reported. Puri et al,[21] reported a similar percentage of live births (86%); however, they observed 14% stillbirths. Ruys et al,[22] reported that congenital heart disease in pregnant women is associated with higher rates of stillbirths (2–5%) and preterm deliveries (> 30%).

Our findings showed that maternal heart conditions can have significant effects on pregnancy outcomes. This highlights the importance of close monitoring and specialized care for pregnant women with heart disease.

CONCLUSION

Rheumatic heart disease was the predominant lesion, followed by congenital heart disease. The incidence of RHD for years has continued to be higher, as most of the patients belong to low socioeconomic classes where poverty, poor nutrition, low levels of sanitation and hygiene, and inaccessibility to health services are common. In pregnancies complicated with cardiac disorders, maternal and perinatal mortality and morbidity depend on the type of disorder, functional status of the patient, and complications associated with pregnancy. Hence, a multidisciplinary approach has been adopted by obstetricians, cardiologists, anaesthetists, and neonatologists, and early diagnosis, treatment, and proper follow-up are performed, reducing mortality has been reduced.

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