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Review Article

Unveiling the spectrum of cardiac disease complicating pregnancy: A comprehensive exploration of maternal and fetal outcomes

Manju Mathesan[1]*, **Hephzibah Kirubamani**[1]

[1]*Dept. of Obstetrics and Gynaecology, Saveetha Medical College, Chennai, Tamil Nadu, India*

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ABSTRACT

Background: Cardiac diseases pose a significant non-obstetrical threat to maternal well-being during pregnancy, contributing to nearly 10% of maternal mortality. The intersection of pregnancy and cardiac disease presents a complex scenario, affecting approximately 1-3% of pregnancies. Rheumatic heart disease (RHD) remains a prevalent issue in developing countries, while advancements in pediatric cardiology have increased survival rates for congenital heart disease. This exploration aims to comprehensively understand the impact of cardiac diseases on maternal and fetal outcomes during pregnancy.

Materials and Methods: A prospective observational study conducted over 1 year and 6 months included 40 pregnant women with cardiovascular disease. Antenatal investigations, electrocardiogram, and echocardiography were performed. Maternal and fetal outcomes were assessed, and data were presented as descriptive statistics.

Results: The study revealed a 2.07% prevalence of cardiac disease in 1926 deliveries, with a mean age of 24±4 years. Cesarean section was the predominant mode of delivery (70%). Most cases had NYHA grade I disease (80%). Maternal outcomes were uneventful in 88%, and only 12% had ICU admission. Complications due to cardiac disease were observed in 17.5% of participants. Neonatal outcomes included NICU admission (25%), low birth weight (22.5%), and preterm birth (20%).

Discussion: Cardiovascular complications in pregnancy affect up to 4% of cases. The prevalence in this study aligns with existing literature. Rheumatic heart disease and congenital heart disease were predominant, consistent with global trends. Maternal and perinatal outcomes were favorable in NYHA grades I and II, emphasizing the importance of early intervention and healthcare accessibility.

Conclusion: Cardiac disease is a substantial risk factor for maternal mortality during pregnancy. The study highlights the dual risk of balancing maternal well-being and fetal development. Prevalence, complications, and outcomes underscore the significance of pre-pregnancy counseling, early detection, and multidisciplinary management for optimal pregnancy outcomes.

1. Introduction

Heart diseases are a significant non-obstetrical cause of maternal deaths during pregnancy, contributing to nearly 10% of maternal mortality. They complicate approximately 1-3% of all pregnancies, with congenital defects being present in 70-80% of these cases. In developing countries, rheumatic heart disease (RHD) remains the primary cause of heart disease in pregnant women, with mitral stenosis being the most frequently observed valvular lesion. [1]

Over the years, advancements in pediatric cardiology and cardiac surgery have led to an increase in the survival rate of patients with congenital heart disease, with more than 85% of them now reaching adulthood. However, the growing number of these individuals with heart disease faces new

* *Corresponding author*.
E-mail address: mpargavi700@gmail.com (M. Mathesan).

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challenges during pregnancy, adding to the burden of their condition.[2]

Pregnancy is a dynamic physiological state characterized by numerous adaptations to support the developing fetus.[3] While most pregnancies progress without significant complications, a subset of women faces the intricate challenge of managing pre-existing or newly diagnosed cardiac diseases during this crucial period. The intersection of cardiac conditions and pregnancy introduces a spectrum of complexities that demand a nuanced understanding of the intricate interplay between maternal and fetal health.[4]

Cardiac diseases compounding the challenges of pregnancy encompass a wide range of conditions, from congenital heart defects and valvular abnormalities to acquired conditions such as cardiomyopathies and ischemic heart disease. Each of these conditions presents unique considerations, necessitating a comprehensive exploration to elucidate the impact on both maternal and fetal outcomes.[5]

The confluence of pregnancy and cardiac disease poses a dual risk, requiring a delicate balance between ensuring maternal well-being and safeguarding fetal development.[6] Maternal cardiovascular adaptations, which are essential for accommodating the increased hemodynamic demands of pregnancy, can be compromised in the presence of underlying cardiac pathology. This delicate equilibrium requires meticulous management, often involving a multidisciplinary approach that includes obstetricians, cardiologists, and other healthcare professionals.[7]

This exploration aims to delve into the intricate landscape of cardiac disease complicating pregnancy, offering insights into the diverse array of conditions that clinicians may encounter. By examining the varying presentations, diagnostic challenges, and therapeutic considerations, we strive to provide a comprehensive overview that can inform and guide healthcare practitioners in optimizing outcomes for both mother and child.

2. Aim & Objectives

1. To examine the overall burden of cardiac disease during pregnancy.
2. To evaluate the complications arising from cardiac disease in pregnant individuals.
3. To Assess maternal outcomes linked to cardiac complications during pregnancy.
4. To investigate neonatal outcomes associated with maternal cardiac disease during pregnancy.

3. Materials and Methods

3.1. Study design

This prospective observational study was conducted in the Department of Obstetrics & Gynaecology at Saveetha Medical College and Hospital after obtaining Institute Ethics Committee approval. The study was conducted for a period of 1 year and 6 months from February 2022 to August 2023 in 40 pregnant women with cardiovascular disease.

3.2. Procedure

Pregnant women diagnosed with heart disease previously and newly diagnosed during the antenatal period and in the peripartum period were included in this study. All the study participants underwent routine antenatal investigations like hemoglobin, urine microscopy, blood grouping and Rh typing, glucose challenge test, and serology. An electrocardiogram and echocardiography were done to diagnose heart disease. Pregnant women with cardiac disease were followed up during the antenatal period, and maternal and fetal outcome was studied in all the study participants.

3.3. Statistics

The data are presented as descriptive statistics.

4. Results

In our study, the total number of deliveries in the one-and-a-half-year study period was 1926 cases and the total number of women with cardiac disease was 40, giving a prevalence of 2.07%. The mean age of the study participants was 24±4 years. The majority, 43.3% of the study participants were in the age group of 20-24 years. Ninty five percent of the study participants were booked already. In this study, we found that 70% of the study participants underwent cesarean section as the mode of delivery as shown in Table 1.

Figure 1 shows the different types of cardiac diseases that were presented in the study participants.

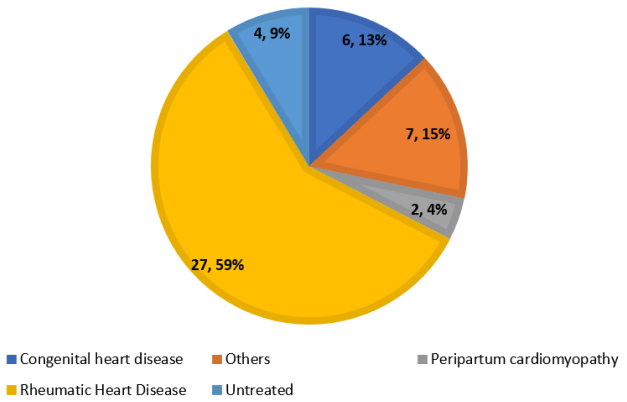

Figure 1: Type of cardiac disease in the study participants

Others in Figure 1 indicates heart disease diagnosed newly during pregnancy as a part of antenatal screening ECHO done at 2^{nd} trimester which includes trivial MR, trivial TR, mild AML PROLAPSE, trivial AR,

Table 1: Baseline characteristics of the study participants

Parameter	Total no. of participants n=40 (%)
Age group (years)	
20-24	17 (43.3)
25-29	16 (36.7)
≥30	7 (20)
Booking status	
Booked	38 (95)
Unbooked	2 (5)
Gravida	
Primigravida	18
Multigravida	22
Gestational age at diagnosis	
newly diagnosed	24(60)
2^{nd} trimester	18(45)
3^{rd} trimester	4(10)
Post -partum	2(5)
Known case of heart disease	16(40)
1. Congenital heart disease (ASD)	6(15)
Corrected (patch closure)	2(5)
Un corrected	4(10)
2. Rheumatic heart disease	10(25)
Type of Delivery	
Natural labour with vaginal delivery	10 (25)
Assisted Vaginal Delivery – Outlet forceps	2 (5)
Cesarean section	28 (70)
Indication	
Fetal distress	10(25)
CPD in labour	8(20)
Failed induction	6(15)
Previous lscs with scar tenderness.	4(10)

IAS aneurysm, bicuspid av calcification, intermembrane aneurysm of inter ventricular septum.

Rheumatic heart disease patients were started on tab.penicillin G 400mg bd since the time of diagnosis depending upon the severity of heart disease.

The maximum of the study participants 80% had grade 1 cardiac disease as per NYHA guidelines as depicted in Figure 2.

Patient with NYHA GRADE-3 had rheumatic heart disease with moderate MS and patient developed congestive cardiac failure on post-operative day-2 and patient shifted to ICU for further management and patient recovered of symptoms on post-operative day-10.

Patient with NYHA Grade-4 had peripartum cardiomyopathy on post-operative day-2 and patient developed cardiac failure signs and symptoms and patient recovered symptomatically on post-operative day 12.

Maternal outcome was uneventful in 88% of the study participants and only 12% of the participants had an ICU admission in the present study as seen in Figure 3.

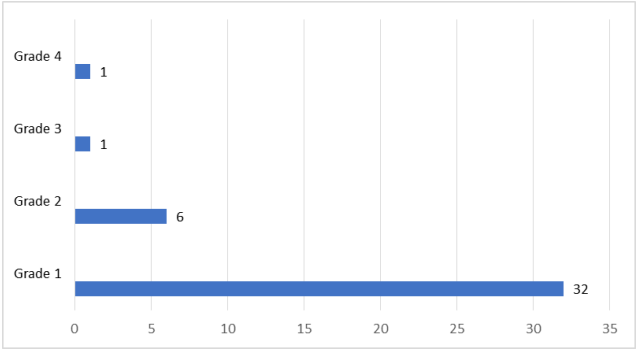

Figure 2: Distribution of cardiac disease as per NYHA grading

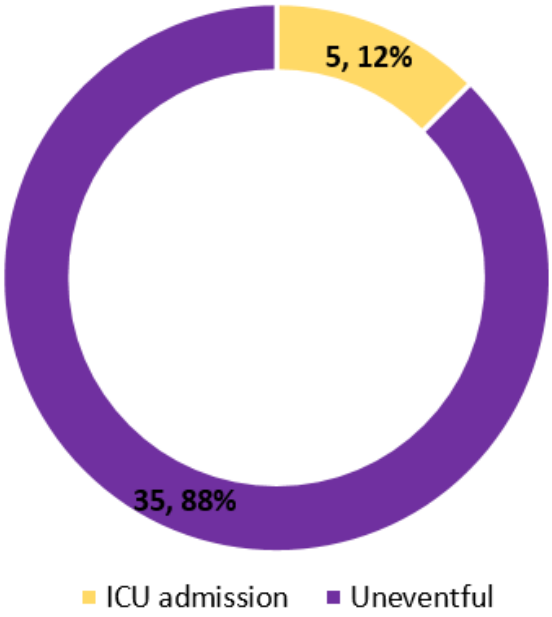

Figure 3: Maternal outcome in the study participants

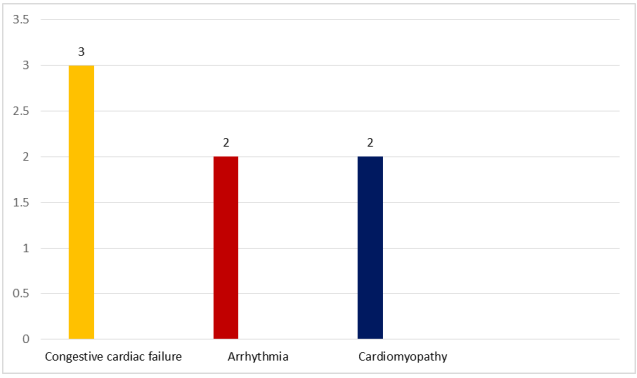

Figure 4: Complications due to cardiac disease in the study participants

The babies of 10 participants had NICU admission in which 6 babies are intubated and started on ionotrops support and out of ventilator support after recovery. 9 babies had low birth weight and 8 babies were preterm in which 5 babies are late pre term and 3 babies are extreme pre term of less than 28 weeks and all the preterm babies were alive and healthy and 3 babies were intubated and later recovered with adequate weight gain, in the study participants as shown in Figure 5.

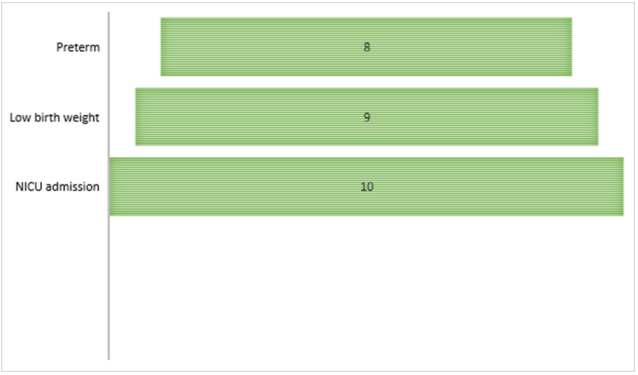

Figure 5: Perinatal outcome in the study participants

5. Discussion

Profound alterations occur in maternal circulation during pregnancy, potentially impacting maternal and fetal well-being, particularly in the presence of underlying heart conditions. Despite no prior known disease, cardiovascular complications may affect up to 4% of pregnancies.[1,2] In our study, the prevalence of heart disease in pregnancy was 2.07%, aligning closely with findings by Dina Aisha Khan et al., where the prevalence was 2.32%.[8] Comparable prevalence rates, ranging from 1.3 to 4.3%, were observed in studies conducted both in India and internationally.[9,10]

The mean age of women with heart disease in our study was 24±4 years, consistent with similar studies.[8,9] Notably, the majority of cardiac cases in our study were attributed to rheumatic heart disease (RHD) at 59% and congenital heart disease (CHD) at 13%, aligning with the findings of Dina Aisha Khan et al., who reported a 41.83% prevalence of RHD. The higher incidence of RHD in developing countries is attributed to factors such as low socioeconomic status, poverty, poor nutrition, inadequate sanitation, and limited access to healthcare services.

In our study, 17.5% of cases experienced cardiac complications, with congestive cardiac failure being the most prevalent at 42.8%, consistent with earlier research.[8–10] Vaginal deliveries accounted for 30% of cases, while 70% underwent cesarean sections. These rates differ from those reported by Stangl et al., indicating the variability in delivery methods across different studies. Importantly, there were no neonatal mortalities in our study population.[11]

As the prevalence of heart diseases in pregnant women rises, particularly in developing countries, it emerges as a significant contributor to maternal mortality. In our study, there were no maternal mortalities, contrasting with findings by Sawhney H et al., who reported a mortality risk of 5-15% in pregnant women with severe symptoms.[12] Rheumatic heart disease remains a leading cause of maternal cardiac complications, often diagnosed at advanced stages, emphasizing the need for increased accessibility to life-saving heart valve surgery.[10–14]

In our study, 80% of cases were classified as NYHA grade I, slightly higher than reported in other studies. This suggests that a greater number of patients sought healthcare earlier, enabling timely treatment initiation and preventing further decompensation.[15] Notably, maternal and perinatal outcomes were favorable in patients with NYHA grades I and II, underscoring the predictive value of NYHA grading for maternal and fetal outcomes. As health facilities improve, the management of pregnant women with congenital heart disease is expected to become even more critical in the future.

6. Conclusion

Cardiac disease stands out as a significant determinant of maternal mortality and morbidity during pregnancy, influenced by maternal health status, NYHA grading, and the presence of complications. In developing countries, rheumatic heart disease (RHD) continues to dominate as the primary cause of maternal heart-related issues during pregnancy, although the incidence of congenital heart disease (CHD) is experiencing an upward trend. Notably, the RHD to CHD ratio is undergoing a reversal, attributed to decreased RHD cases due to advancements in socioeconomic status, education, and healthcare accessibility. Fetal mortality rates appear to be comparatively lower among patients classified as NYHA class I and II.

This study underscores the critical significance of pre-pregnancy counseling, early detection, and timely corrective interventions. It accentuates the necessity for vigilant monitoring and a collaborative, multidisciplinary approach involving obstetricians, cardiologists, neonatologists, and nursing staff to optimize the likelihood of favorable pregnancy outcomes.

7. Source of Funding

None.

8. Conflict of Interest

None.

References

1. Bowater SE, Thorne SA. Management of pregnancy in women with acquired and congenital heart disease. *Postgrad Med J*. 1012;86(1012):100–5.
2. Regitz-Zagrosek V, Gohlke-Ba C, Iung B, Pieper PG. Management of cardiovascular diseases during pregnancy. *Curr Prob Cardiol*. 2014;39(4):85–151.
3. Emmanuel Y, Thorne SA. Heart disease in pregnancy. *Best Pract Res Clin Obstet Gynaecol*. 2015;29(5):579–97.
4. Mcilvaine S, Feinberg L, Spiel M. Cardiovascular Disease in Pregnancy. *Neoreviews*. 2021;22(11):747–59.
5. Martin S, Arafeh J. Cardiac Disease in Pregnancy. *AACN Adv Crit Care*. 2018;29(3):295–302.
6. Gandhi M, Martin SR. Cardiac disease in pregnancy. *Obstet Gynecol Clin North Am*. 2015;42(2):315–33.
7. Brown HL, Smith GN. Pregnancy Complications, Cardiovascular Risk Factors, and Future Heart Disease. *Obstet Gynecol Clin North Am*. 2020;47(3):487–95.
8. Khan DA, Sharma N, Kapoor M, Duwarah SG, Ahanthem SS. The spectrum of heart disease in pregnancy and its outcome in patients visiting a tertiary care centre of northeastern: A prospective study. *J Clin Diagn Res*. 2018;12(7):16–20.
9. Bangal VB, Singh RK, Shinde KK. Clinical Study of Heart Disease Complicating Pregnancy. *IOSR J Pharm*. 2012;2(4):25–8.
10. Puri S, Bharti A, Puri S, Mohan B, Bindal V, Verma S. Maternal heart disease and pregnancy outcomes. *JK Science*. 2013;15:7–10.
11. Stangl V, Schad J, Gossing G, Borges A, Baumann G, Stangl K. Maternal heart disease and pregnancy outcome: A single centre experience. *European Journal of Heart Failure*. 2008;10(9):855–60.
12. Sawhney H, Aggarwal N, Suri V, Vasishta K, Sharma Y, Grover A. Maternal and perinatal outcome in rheumatic heart disease. *Int J Gynaecol Obstet*. 2003;80(1):9–14.
13. Chhetri S, Shrestha NR, Pilgrim T. Pregnancy complicated by heart disease in Nepal. *Heart Asia*. 2014;6(1):26–9.
14. Moutquin JM, Gagnon R, Rainville C, Giroux L, Amyot G, Bilodeau R. Maternal and neonatal outcome in pregnancies with no risk factors. *CMAJ*. 1987;137(8):728–32.
15. Asghar F, Kokab H. Evaluation and outcome of pregnancy complicated by heart disease. *J Pak Med Assoc*. 2005;55(10):416–9.

Author biography

Manju Mathesan, Postgraduate https://orcid.org/0009-0004-0103-1359

Hephzibah Kirubamani, Professor https://orcid.org/0000-0002-0860-6221

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