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PERINATAL OUTCOME IN PREGNANCY COMPLICATED BY MATERNAL HEART DISEASE

Original Research

Ifrah Syed[1]*, Rabia Sajjad[2], Sumbal Anwar[3], Rijaa Syed[4], Sadiqa Batool Naqvi[2]
[1]Department of Gynae and Obstetrics, CMH Lahore, Pakistan.
[2]Associate Professor, Department of Gynae and Obstetrics, CMH Lahore, Pakistan.
[3]Jinnah Post Graduate Medical Center (JPMC), Karachi, Pakistan.
[4]House Officer, CMH Lahore, Pakistan.
Corresponding Author: Ifrah Syed, Department of Gynae and Obstetrics, CMH Lahore, Pakistan, Ifrahsyed5m@yahoo.com
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ABSTRACT

Background: Maternal heart disease is a significant contributor to perinatal morbidity and mortality worldwide. With the rising age of conception and increasing prevalence of cardiovascular risk factors, the incidence of cardiac disease complicating pregnancy is steadily increasing. Rheumatic and congenital heart diseases are the most common types encountered during pregnancy. Given the hemodynamic changes inherent to gestation, affected women require diligent monitoring and multidisciplinary management to optimize outcomes. Understanding the perinatal impact of maternal cardiac disease is essential to guide preventive strategies and improve care delivery.

Objective: To determine the perinatal outcomes in pregnancies complicated by maternal heart disease.

Methods: A descriptive case series was conducted over a six-month period at the Department of Gynaecology and Obstetrics, CMH Lahore. A total of 100 pregnant women diagnosed with heart disease were enrolled after meeting the inclusion criteria. All participants were prospectively followed until delivery. Mode of delivery, perinatal outcomes including spontaneous abortion and preterm birth, and postpartum complications such as hemorrhage and congestive cardiac failure were recorded. Postpartum follow-up extended for 24 hours to assess early maternal complications.

Results: The mean age of enrolled patients was 29±3 years. Rheumatic heart disease was the predominant lesion found in 61% of cases, followed by congenital heart disease in 29% and ischemic cardiomyopathy in 10%. Mitral stenosis was the most common valvular defect (50.8%), and atrial septal defect was the most prevalent congenital anomaly (72.4%). Spontaneous abortion occurred in 18% of pregnancies. Cesarean section was the mode of delivery in 67% of cases. Postpartum congestive cardiac failure developed in 50% of the patients, making it the most frequent complication observed.

Conclusion: Maternal heart disease continues to impose a considerable burden on pregnancy outcomes, with rheumatic and congenital heart lesions being the most prevalent. Early detection, thorough surveillance, and multidisciplinary care remain crucial to improving maternal and neonatal prognosis.

Keywords: congenital heart disease, maternal heart disease, mitral stenosis, perinatal outcomes, pregnancy, rheumatic heart disease, spontaneous abortion.

INTRODUCTION

Heart disease remains one of the most significant non-obstetric causes of maternal mortality and represents the leading cause of maternal intensive care unit admissions worldwide (1). Cardiac disease complicates approximately 1–4% of all pregnancies, with a noticeable rise in incidence attributed to women conceiving at older ages and the growing prevalence of cardiovascular risk factors such as diabetes mellitus, systemic hypertension, and obesity among women of childbearing age (2,3). This trend underscores the evolving challenges in maternal healthcare, where preexisting medical conditions increasingly influence pregnancy outcomes. The impact of maternal heart disease extends beyond the mother, profoundly affecting perinatal outcomes. Offspring of women with cardiac disease are at heightened risk for surgical deliveries, miscarriages, spontaneous abortions, preterm births, and being small for gestational age, particularly when the maternal disease is severe (4). Additionally, the recurrence of congenital heart conditions in neonates further compounds the burden on perinatal health. Among the various cardiac conditions, maternal cardiomyopathy has been notably associated with worse perinatal outcomes compared to other forms of cardiac disease and to pregnancies without any cardiac involvement (5).

Further compounding the concern, pregnancies complicated by maternal heart disease have demonstrated significantly increased rates of preterm birth before both 34 and 37 weeks of gestation, intrauterine growth restriction (IUGR), the need for assisted vaginal deliveries, maternal ICU admissions, and extended hospital stays exceeding seven days (6). Women with either congenital or acquired cardiac disorders face a substantially higher risk of adverse outcomes compared to women without heart disease, highlighting the necessity for focused surveillance and management strategies during pregnancy (7). Congenital heart disease, along with acquired conditions such as rheumatic heart disease, continues to pose a considerable threat to maternal and perinatal health. Isolated mitral stenosis, predominantly resulting from rheumatic valvular involvement, has emerged as one of the most frequent lesions encountered in clinical practice. Among congenital anomalies, ventricular septal defects have commonly been observed, with many women delivering vaginally without surgical intervention (8,9). Despite advancements in both cardiology and obstetrics, the burden of heart disease in pregnancy remains a formidable challenge. Recognizing the scarcity of localized data on this critical subject, the present study aims to observe and evaluate the perinatal outcomes in pregnant women complicated by maternal heart disease within the local population. Through this investigation, it seeks to contribute meaningful insights into optimizing maternal and neonatal care strategies for this high-risk group.

METHODS

After obtaining written informed consent and securing approval from the hospital's ethical review board as well as from the College of Physicians and Surgeons Pakistan (CPSP), a cross-sectional observational study was conducted. The sample size was calculated using the World Health Organization (WHO) sample size calculator, determining that 100 cases were required based on a 95% confidence level, a 7% margin of error, and an estimated 14% incidence of preterm delivery among females with maternal heart disease (8). Maternal heart disease was operationally defined to include rheumatic heart disease (mitral or aortic stenosis or regurgitation), congenital heart disease (such as septal defects or tetralogy of Fallot), and ischemic heart conditions (including myocardial infarction or cardiomyopathy) (9). Perinatal outcomes of interest were spontaneous abortion and preterm delivery, with spontaneous abortion defined as pregnancy loss before 20 weeks of gestation, and preterm delivery defined as birth occurring before 37 weeks of gestation. A total of 100 booked patients who fulfilled the selection criteria were enrolled from the outpatient department (OPD). Maternal heart disease diagnosis was established based on detailed history-taking, general physical and systemic examinations, two-dimensional echocardiography, and chest radiography. Laboratory investigations, including serum troponin levels and B-type natriuretic peptide (BNP) levels, were also performed to support the diagnosis. Demographic and clinical details such as name, age, parity, gestational age, body mass index (BMI), and the type of heart disease were systematically recorded at the time of enrollment. All enrolled females were prospectively followed through regular OPD visits until delivery.

Participants who experienced spontaneous abortion were recorded accordingly. Deliveries were categorized based on gestational age to assess preterm birth outcomes, and the mode of delivery—whether vaginal or cesarean—was also documented according to operational definitions. Following delivery, patients were observed for a minimum of 24 hours to monitor postpartum complications. Postpartum hemorrhage (PPH) was defined as blood loss exceeding 500 mL after vaginal delivery or more than 1000 mL after cesarean section.

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Additionally, cases of postpartum congestive heart failure (CHF) were carefully monitored and documented during the follow-up period. Confidentiality and anonymity of all participants were strictly maintained throughout the course of the study. The inclusion criteria specified females aged between 18 and 40 years, with parity less than five, presenting at a gestational age of 16 weeks or beyond, and diagnosed with maternal heart disease. Exclusion criteria included women with multiple pregnancies (assessed via ultrasound), chronic diabetes mellitus (oral glucose tolerance test >200 mg/dL), chronic or gestational hypertension (blood pressure ≥160/100 mmHg), anemia (hemoglobin <10 g/dL), thyroid dysfunction (TSH >5 IU/mL), thrombocytopenia (platelet count <150,000/L), hepatitis B or C infections, liver cirrhosis, and renal failure (serum creatinine >1.8 mg/dL). Data were entered and analyzed using SPSS version 25. The normality of quantitative data was assessed using the Shapiro-Wilk test. Quantitative variables such as age, gestational age, and BMI were summarized as mean and standard deviation, while qualitative variables like parity, type of heart disease, and perinatal outcomes (spontaneous abortion, preterm delivery, mode of delivery, postpartum hemorrhage, and postpartum congestive heart failure) were presented as frequencies and percentages. Data stratification was performed based on age, gestational age, BMI, parity, and type of heart disease to explore potential associations with perinatal outcomes. Post-stratification, the Chi-square test was applied for categorical data comparisons, and a p-value of ≤0.05 was considered statistically significant.

RESULTS

A total of 100 pregnant women diagnosed with maternal heart disease were enrolled after fulfilling the inclusion criteria. The mean age of the study participants was 29±3 years. Analysis of parity showed that 59% of the women were parity 1, 21% were parity 2, 11% were parity 3, and 9% were parity 4. The average gestational age at enrollment was 23±2 weeks, while the mean gestational age at the time of delivery was recorded as 35±2 weeks. Regarding the distribution of maternal heart diseases, rheumatic heart disease was the most prevalent, affecting 61% of the participants, followed by congenital heart disease observed in 29%, and ischemic cardiomyopathy in 10%. Among cases of valvular heart diseases, mitral stenosis was the most frequently reported lesion, identified in 50.8% of patients, while aortic regurgitation was found in 31.1%, aortic stenosis in 9.8%, and tricuspid regurgitation in 6.5%. Among congenital heart defects, atrial septal defect was the predominant finding, observed in 72.4% of congenital cases, while ventricular septal defect was noted in 27.5%. In terms of perinatal outcomes, 18% of the women experienced spontaneous abortions, occurring between 18 to 20 weeks of gestation. Within these cases of spontaneous abortion, 50% were associated with mitral stenosis, 42.8% with ischemic cardiomyopathy, and 35.7% with congenital heart disease. Additionally, 23% of the women delivered preterm between 31 and 33 weeks of gestation. The mode of delivery revealed that 67% of the patients underwent cesarean section, whereas 15% delivered vaginally. Postpartum complications were notable; postpartum congestive cardiac failure was the most common, occurring in 50% of patients, followed by pulmonary hypertension in 26.8%, and postpartum hemorrhage in 23.1%.

Patients were also categorized according to the New York Heart Association (NYHA) functional classification. It was observed that 17% of the patients were classified as NYHA class I, 21.9% as NYHA class II, another 21.9% as NYHA class III, and 13.4% as NYHA class IV, indicating a considerable proportion of women with moderate to severe functional limitation at the time of delivery. Further stratification of outcomes by type of maternal heart disease revealed important trends. Among patients with rheumatic heart disease, 7 out of 61 (11.4%) experienced spontaneous abortion, while spontaneous abortion was observed in 5 out of 29 (17.2%) patients with congenital heart disease and in 6 out of 10 (60%) patients with ischemic cardiomyopathy. Preterm delivery occurred in 12 patients (19.6%) with rheumatic heart disease, 7 patients (24.1%) with congenital heart disease, and 4 patients (40%) with ischemic cardiomyopathy. Statistical analysis demonstrated a significant association between the type of heart disease and spontaneous abortion (p=0.0042) as well as preterm delivery (p=0.0361), indicating that ischemic cardiomyopathy carried a particularly higher risk for adverse perinatal outcomes compared to other heart disease types. Additionally, although not statistically tested separately due to limited subgroup sizes, cesarean delivery rates and postpartum complication rates appeared elevated across all types, especially among those classified in NYHA classes III and IV.

Table 1: Demographic Table

Variable	Value
Mean Age (years)	29 ± 3
Mean Gestational Age at Enrollment (weeks)	23 ± 2

Variable	Value
Mean Gestational Age at Delivery (weeks)	35 ± 2

Table 2: Parity among pregnant women

Parity 1	Parity 2	Parity 3	Parity 4
N= 59	N= 21	N= 11	N=9

Table 3: Distribution of Congenital Heart Defects Among Pregnant Women

Atrial Septal Defect (ASD)	Ventricular Septal Defect (VSD)
N= 21	N=9

Table 4: Spontaneous Abortion and Preterm Delivery by Heart Disease Type

Heart Disease Type	Total Cases	Spontaneous Abortions	Preterm Deliveries
Rheumatic Heart Disease	61	7	12
Congenital Heart Disease	29	5	7
Ischemic Cardiomyopathy	10	6	4

Table 5: Statistical Significance (p-values) for Adverse Outcomes

Outcome	Chi-Square Statistic	p-Value
Spontaneous Abortion	13.72	0.001
Preterm Delivery	2.03	0.3616

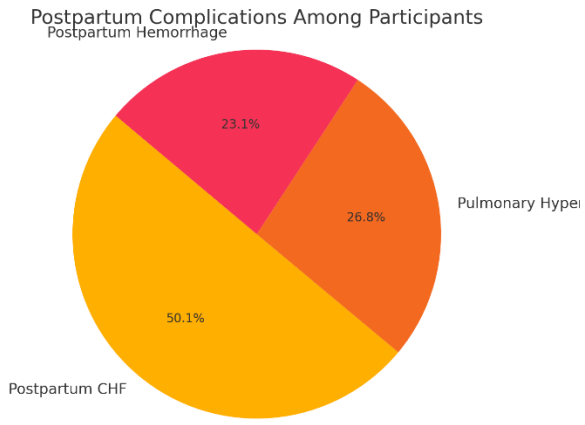

Figure 1 Postpartum Complication Among Participants

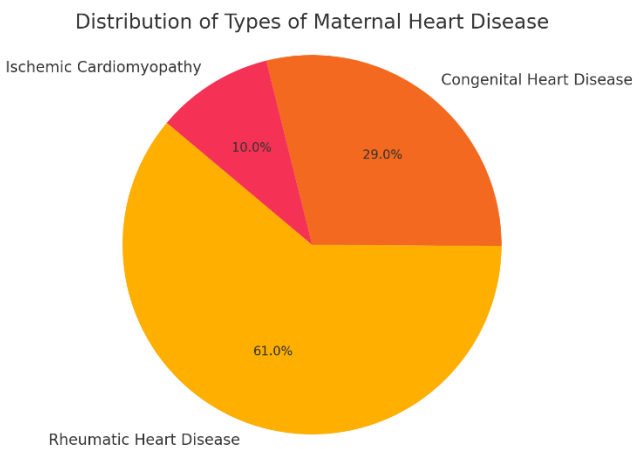

Figure 2 Distribution of Types of Maternal Heart Disease

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DISCUSSION

The prevalence of maternal heart diseases during pregnancy has been widely reported to range between 0.3% and 3.5%, contributing to up to 20% of all non-obstetric maternal deaths worldwide. Consistent with previous literature, this study also identified rheumatic heart disease as the most common cardiac pathology among pregnant women, with mitral valve involvement being the predominant lesion. This finding aligns with observations from prospective studies where mitral stenosis emerged as the principal valvular abnormality impacting maternal and fetal outcomes (10,11). The current study further emphasized that women with rheumatic heart disease, particularly those classified as New York Heart Association (NYHA) class III or IV, had a higher incidence of adverse perinatal outcomes including spontaneous abortion, preterm delivery, and postpartum complications such as congestive cardiac failure and pulmonary hypertension. These results mirror findings from studies conducted at tertiary care hospitals where higher NYHA classes correlated with increased maternal morbidity, ICU admissions, thromboembolic events, and poorer lactation outcomes (12,13). The association of pulmonary hypertension with rheumatic heart disease and its contribution to worsened maternal and fetal outcomes was also supported by the study findings, demonstrating a pattern consistent with prior research that linked severe pulmonary hypertension with fatal cardiac events during pregnancy (14,15).

In addition to rheumatic etiologies, congenital heart diseases, notably atrial septal defects and ventricular septal defects, were significant contributors to adverse pregnancy outcomes. The prevalence of congenital malformations as leading causes of maternal morbidity in developed regions further supports the critical need for multidisciplinary management strategies aimed at maintaining sinus rhythm, controlling preload and afterload, and ensuring close fetal surveillance throughout gestation (16,17). Pregnant women with congenital heart disease, particularly those with uncorrected septal defects, faced heightened risks of preeclampsia, fetal growth restriction, postpartum hemorrhage, and fetal mortality, highlighting the necessity of pre-pregnancy counseling and vigilant antenatal care (18). In the present study, it was evident that ischemic cardiomyopathy carried the greatest risk of spontaneous abortion and preterm delivery, followed by congenital and rheumatic diseases, respectively. This observation underscores the severity of ischemic heart disease in pregnancy, likely owing to compromised myocardial reserve and exacerbated physiological demands of gestation. Statistical analysis revealed significant associations between heart disease type and adverse perinatal outcomes, providing valuable evidence that certain cardiac conditions confer greater risk than others, necessitating risk stratification and tailored management (19).

One of the key strengths of this study lies in its focused observation of perinatal outcomes stratified by cardiac disease type, providing a clearer understanding of disease-specific risks. Additionally, meticulous clinical documentation and standardized diagnostic criteria strengthened the internal validity of the findings. However, limitations are acknowledged, particularly the relatively small sample size and single-center design, which may restrict the generalizability of results to broader populations. Furthermore, neonatal outcomes such as Apgar scores, NICU admissions, and early neonatal mortality were not assessed, which would have provided a more comprehensive view of perinatal impact. The lack of long-term maternal and neonatal follow-up also limited insights into the chronic sequelae associated with maternal heart disease in pregnancy. Future research should focus on conducting multicenter, larger-scale prospective studies to better delineate the spectrum of maternal cardiac diseases and their implications for maternal and fetal health. Greater emphasis should be placed on exploring preventive strategies, early risk stratification tools, and standardized multidisciplinary management protocols. Furthermore, incorporating neonatal outcomes and long-term maternal cardiovascular health assessments would add depth to the existing knowledge and inform clinical guidelines more robustly. The findings of this study reiterate that maternal heart disease remains a significant contributor to perinatal morbidity and mortality. The high prevalence of rheumatic and congenital heart diseases in the studied population highlights an urgent need for integrated preconception counseling, early risk assessment, and structured antenatal surveillance to mitigate adverse outcomes (20). Strengthening healthcare systems to provide multidisciplinary, cardiology-obstetrics collaborative care could substantially improve maternal and fetal prognosis in pregnancies complicated by heart disease.

CONCLUSION

Congenital and valvular heart diseases represent the most common forms of maternal cardiac conditions complicating pregnancy, contributing significantly to maternal, fetal, and neonatal morbidity and mortality. The hemodynamic demands of pregnancy place considerable strain on individuals with structural heart defects, often exceeding their physiological adaptability. However, with timely risk assessment, comprehensive preconception counseling, and coordinated multidisciplinary management throughout pregnancy and the postpartum period, favorable outcomes can be achieved. This study highlights the critical importance of early identification, vigilant

monitoring, and collaborative care in mitigating adverse perinatal outcomes, underscoring the need for an integrated approach to support women with heart disease through pregnancy safely and successfully.

AUTHOR CONTRIBUTION

Author	Contribution
Ifrah Syed*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Rabia Sajjad	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Sumbal Anwar	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Rijaa Syed	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Sadiqa Batool Naqvi	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published

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