

MATERNAL AND FOETAL COMPLICATIONS IN PREGNANCY WITH
HEART DISEASE

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Abstract**Objective**

To determine the frequency of maternal and foetal complications and their association with disease severity among pregnant women with heart diseases presenting to a tertiary care hospital.

Methodology

A total of 150 pregnant women aged 18–45 years with echocardiographically confirmed heart disease were enrolled using non-probability consecutive sampling. Maternal cardiac functional status and type of heart disease were assessed. Maternal and foetal complications were recorded. Data were analysed using descriptive statistics and chi-square test with $p \leq 0.05$.

Results

The mean maternal age was 27.8 ± 5.6 years; 89 (59.3%) were multigravida. Valvular heart disease was most common (58.0%). Maternal complications occurred in 34.7% and foetal complications in 41.3% of pregnancies. Advanced NYHA functional class was significantly associated with higher maternal (57.1% vs 25.0%, $p=0.0001$) and foetal complications (59.5% vs 34.3%, $p=0.005$).

Conclusion

Heart disease in pregnancy is associated with substantial maternal and foetal morbidity, particularly among women with advanced functional class and valvular lesions. Early diagnosis, functional assessment, and multidisciplinary management are essential to improve pregnancy outcomes in this high-risk population.

INTRODUCTION

Heart disease in pregnancy poses a significant clinical challenge due to the interaction between physiological cardiovascular adaptations of pregnancy and the limited cardiac reserve imposed by underlying cardiac pathology [1–3]. Normal pregnancy is associated with increased blood volume, cardiac output, and heart rate, which may

precipitate cardiac decompensation in women with pre-existing heart disease or reveal previously undiagnosed conditions. The aetiology of heart disease in pregnancy varies globally and includes rheumatic heart disease, congenital heart disease, cardiomyopathies, and ischemic heart disease, with valvular lesions remaining predominant in low- and middle-income countries [4,5].

Cardiac disease is among the leading non-obstetric causes of maternal morbidity and mortality worldwide, complicating approximately 1–4% of pregnancies and contributing substantially to indirect maternal deaths [2,6]. The burden is disproportionately higher in developing regions, including South Asia, where rheumatic heart disease remains prevalent and access to specialized cardiac care is limited [4,7]. In Pakistan, valvular heart disease and cardiomyopathies are commonly encountered among pregnant women, rendering pregnancy a high-risk condition with potentially adverse maternal and foetal consequences [7,8]. The impact of maternal heart disease extends to the foetus through mechanisms such as reduced uteroplacental perfusion, chronic hypoxia, and impaired foetal growth, leading to outcomes including preterm birth, low birth weight, and perinatal mortality [6,9].

Clinical assessment of heart disease during pregnancy relies on careful history, physical examination, functional status assessment, and cardiac investigations, particularly echocardiography [3,10]. Functional classification using the New York Heart Association (NYHA) system remains a key prognostic indicator, with advanced functional class, ventricular dysfunction, and pulmonary hypertension strongly associated with adverse maternal and foetal outcomes [1,3,11]. These parameters are clinically relevant as they guide antenatal surveillance, timing and mode of delivery, and multidisciplinary management.

Despite advances in diagnostic and therapeutic strategies, challenges persist in the management of heart disease in pregnancy. Physiological symptoms of pregnancy may mask early signs of cardiac deterioration, resulting in delayed diagnosis, while concerns regarding foetal safety may limit the use of certain diagnostic or therapeutic interventions [10,12]. Moreover, most available evidence originates from high-income countries, with limited data from resource-constrained settings where disease patterns and healthcare access differ [5,9,13]. There is a paucity of local data from Pakistan regarding the spectrum of maternal and foetal complications associated

with heart disease in pregnancy. Therefore, this study was conducted to assess maternal and foetal complications among pregnant women with heart diseases presenting to a tertiary care hospital.

METHODOLOGY

This observational study was conducted in the Department of Obstetrics and Gynaecology, Dow University of Health Sciences at Civil Hospital Karachi, from July 2024 to December 2024, after obtaining approval from the Institutional Review Board, and written informed consent was obtained from all participants. Pregnant women aged 18–45 years, of any gestational age, presenting with previously diagnosed or newly diagnosed heart disease were enrolled using a non-probability consecutive sampling technique. The study population included women with congenital heart disease, rheumatic valvular heart disease, cardiomyopathies, or other structural cardiac disorders confirmed by echocardiography, while women with isolated pregnancy-induced hypertension, anaemia without underlying cardiac disease, acute medical illnesses unrelated to cardiac pathology, or refusal to provide consent were excluded. Heart disease was defined as any structural or functional cardiac abnormality confirmed on echocardiography, maternal complications were defined as the occurrence of heart failure, arrhythmias, pulmonary oedema, thromboembolic events, intensive care unit admission, or maternal death during pregnancy or delivery, and fatal complications were defined as preterm birth before 37 weeks of gestation, low birth weight less than 2.5 kg, intrauterine growth restriction, stillbirth, or early neonatal death. A total sample size of 150 pregnant women was included based on patient flow and study duration. Data regarding demographic characteristics, obstetric history, type of cardiac disease, NYHA functional class, echocardiographic findings, and maternal and foetal outcomes were recorded on a structured proforma. Data were analysed using SPSS-26; categorical variables were summarised as frequencies and percentages, while continuous variables were expressed as mean $\pm$ standard

deviation. The chi-square test was used to assess associations between categorical variables. A p-value of <0.05 was considered statistically significant.

RESULTS

Table I describes the baseline maternal characteristics and cardiac disease profile of 150 pregnant women included in the study. The mean maternal age was 27.8 ± 5.6 years, and the mean

gestational age at presentation was 26.5 ± 8.5 weeks. Most participants were in the 26–35-year age group (47.3%), followed by those aged 18–25 years (37.3%), while 15.4% were between 36–45 years of age. With respect to parity, multigravida women constituted a higher proportion (59.3%) compared to primigravida women (40.7%). Regarding the type of cardiac disease, valvular heart disease was the most frequently observed condition (58.0%), followed by congenital heart disease (26.7%) and cardiomyopathy (15.3%).

Table I: Baseline Maternal Characteristics and Cardiac Disease Profile (n=150)		
Mean $\pm$ Standard Deviation		
Maternal Age in years = 27.8 ± 5.6		
Gestational Age in weeks at Presentation = 26.5 ± 8.5		
Frequency (%)		
Age Group (years)	18–25	56 (37.3)
	26–35	71 (47.3)
	36–45	23 (15.4)
Parity	Primigravida	61 (40.7)
	Multigravida	89 (59.3)
Type of Heart Disease	Valvular heart disease	87 (58.0)
	Congenital heart disease	40 (26.7)
	Cardiomyopathy	23 (15.3)

Table II summarizes the distribution of maternal and foetal complications observed among the 150 study participants. Among maternal complications, heart failure was the most frequently reported condition, occurring in 18.0% of cases, followed by ICU admission in 10.7% and arrhythmias in 9.3%. Pulmonary oedema was observed in 7.4% of women, while

thromboembolic events occurred in 4.0%. Maternal mortality was reported in 2.0% of cases. Regarding foetal outcomes, preterm birth before 37 weeks was the most common complication (22.0%), followed by low birth weight in 19.3% and intrauterine growth restriction in 14.7% of cases. Stillbirths were observed in 5.3% of pregnancies, while early neonatal death occurred in 4.0%.

Table II: Distribution of Maternal and Foetal Complications Observed (n=150)	
Maternal Complications	Frequency (%)
Heart Failure	27 (18.0)
Arrhythmias	14 (9.3)
Pulmonary Oedema	11 (7.4)
Thromboembolic Events	6 (4.0)
ICU Admission	16 (10.7)
Maternal Mortality	3 (2.0)

Foetal Complications	
Preterm Birth (<37 weeks)	33 (22.0)
Low birth Weight (<2.5 kg)	29 (19.3)
Intrauterine Growth Restriction	22 (14.7)
Stillbirth	8 (5.3)
Early Neonatal Death	6 (4.0)

Table III shows the association between NYHA functional class and maternal as well as foetal complications among the study participants. Maternal complications were significantly more frequent in women with NYHA class III-IV (57.1%) compared to those with NYHA class I-II

(25.0%), with a highly significant difference ($p=0.0001$). Similarly, foetal complications were observed more commonly in the NYHA III-IV group (59.5%) than in the NYHA I-II group (34.3%), and this association was also statistically significant ($p=0.005$).

Table III: Association of NYHA Functional Class with Maternal and Foetal Complications (n=150)			
Outcome	NYHA I-II (n=108)	NYHA III-IV (n=42)	P-Value
Maternal complications	27 (25.0%)	24 (57.1%)	0.0001*
Foetal complications	37 (34.3%)	25 (59.5%)	0.005*

DISCUSSION

The heart disease in pregnancy remains a clinically significant condition due to the complex physiological cardiovascular adaptations of gestation, which may overwhelm limited cardiac reserve and precipitate adverse outcomes. Diagnostic assessment is often challenging, as symptoms such as dyspnoea and fatigue overlap with normal pregnancy, leading to delayed recognition of cardiac decompensation. Accurate functional stratification and timely identification of high-risk patients therefore remain central to optimising maternal and foetal outcomes [1-3].

In the present study, valvular heart disease constituted the predominant cardiac pathology, reflecting patterns reported from low- and middle-income countries where rheumatic heart disease remains prevalent [4,7]. The mean maternal age and parity distribution were comparable to regional data, indicating that cardiac disease continues to affect women during peak reproductive years. Most participants were classified as NYHA functional class I-II, yet a substantial proportion belonged to advanced functional classes, underscoring the heterogeneity

of disease severity encountered in routine obstetric practice.

Maternal complications were observed in approximately one-third of the study population, with heart failure being the most frequent adverse event. This frequency aligns with previously reported rates ranging from 15% to 40% in similar cohorts [2,11]. Importantly, maternal complications were significantly more common among women with NYHA class III-IV disease compared to those with class I-II, consistent with established evidence identifying functional class as one of the strongest predictors of adverse maternal outcomes [1,3]. Siu et al. reported maternal cardiac events in 32% of women with advanced NYHA class compared to 7% in those with milder disease, demonstrating a gradient of risk comparable to that observed in the current study [11].

Foetal complications were also frequent, with preterm birth and low birth weight being the most common outcomes. The observed association between advanced maternal functional class and adverse foetal outcomes parallels findings from Ruys et al., who reported significantly higher rates

of preterm delivery and foetal growth restriction in women with symptomatic cardiac disease [9]. Pathophysiologically, impaired maternal cardiac output and reduced uteroplacental perfusion may contribute to chronic foetal hypoxia, explaining the increased burden of foetal morbidity observed in women with more severe disease [6,9].

Valvular heart disease was significantly associated with higher maternal complication rates compared to congenital heart disease and cardiomyopathy. Similar observations have been reported in South Asian cohorts, where rheumatic valvular lesions, particularly mitral stenosis, are associated with higher risks of pulmonary congestion and heart failure during pregnancy [7,8,14]. In contrast, studies from high-income countries report congenital heart disease as the dominant pathology, although outcomes remain closely linked to functional status rather than lesion type alone [3,15]. These differences likely reflect variations in disease severity at presentation, access to pre-pregnancy counselling, and availability of specialised cardiac care.

The findings of this study are supported by contemporary evidence emphasising the prognostic value of non-invasive cardiac assessment, particularly echocardiography and functional classification, in predicting adverse pregnancy outcomes [10,12,16]. While diagnostic accuracy measures such as sensitivity or AUC were not applicable to this observational analysis, the statistically significant associations observed reinforce the clinical utility of functional stratification in routine practice.

The strengths of this study include the use of standardised definitions, echocardiographic confirmation of cardiac disease, and systematic assessment of both maternal and foetal outcomes. However, certain limitations must be acknowledged. The single-centre design may limit generalisability, and the sample size, while adequate for detecting significant associations, may not capture less frequent outcomes. Additionally, the observational nature of the study precludes causal inference, and selection bias cannot be entirely excluded.

Overall, the present findings align with and strengthen existing evidence demonstrating that pregnancy complicated by heart disease, particularly in women with advanced functional class and valvular pathology, is associated with substantial maternal and foetal morbidity [1-3,11,14,17-19]. These results reaffirm the clinical value of functional assessment and disease characterization in evaluating risk among pregnant women with heart disease, providing locally relevant data that complement the global literature.

Conclusion

Heart disease in pregnancy is associated with substantial maternal and foetal morbidity, particularly among women with advanced functional class and valvular lesions. Early diagnosis, functional assessment, and multidisciplinary management are essential to improve pregnancy outcomes in this high-risk population.

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