

DOI: <https://dx.doi.org/10.18203/2320-1770.ijrcog20261249>

Original Research Article

Postpartum cardiovascular outcomes among pregnant women with known heart diseases

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Received: 16 March 2026

Revised: 14 April 2026

Accepted: 15 April 2026

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ABSTRACT

Background: Maternal heart disease has emerged as a major threat to safe motherhood and women's long-term cardiovascular health, and the postpartum period is a time of heightened risk for cardiovascular disease-related maternal morbidity and mortality. Therefore, the present study aimed to evaluate the effect of preconceptional counselling on postpartum cardiovascular outcomes among pregnant women with known heart disease in Bangladesh.

Methods: This hospital-based cohort study was conducted at the Department of Obstetrics and Gynaecology, Fetomaternal Medicine Unit, Dhaka Medical College Hospital (DMCH); the Department of Fetomaternal Medicine, Bangabandhu Sheikh Mujib Medical University (BSMMU); and the National Institute of Cardiovascular Diseases (NICVD), Dhaka, Bangladesh from February 2020 to March 2021, including 73 postpartum women with heart disease. Demographic, obstetric, cardiac data, NYHA class, preconceptional counselling, and maternal outcomes were collected and analyzed using SPSS v26 (Chi-square, $p < 0.05$).

Results: Among 73 pregnant women (39 known, 34 incidentally diagnosed), younger age, lower socioeconomic status, education, and parity differed significantly between groups ($p < 0.001$). LUCS was more frequent in known cases, vaginal delivery in incidental cases ($p < 0.001$). Rheumatic heart disease predominated (41/73), and NYHA class I was higher in known cases ($p < 0.001$). Cardiac events occurred in 45.2%, mostly in incidental cases (63.6% vs. 36.4%, $p = 0.010$; RR=1.96), particularly in multiparas; outcomes did not vary by disease type.

Conclusions: Awareness and early diagnosis of maternal heart disease, combined with timely multidisciplinary care, significantly reduce postpartum cardiovascular complications.

Keywords: Postpartum cardiovascular outcomes, Heart disease in pregnancy, Preconceptional counselling

INTRODUCTION

Maternal heart disease has emerged as a major threat to safe motherhood and women's long-term cardiovascular health in recent years in Bangladesh. The postpartum

period is a time of heightened risk for cardiovascular disease-related maternal morbidity and mortality. Cardiovascular disease is the most important non-obstetric cause of death in pregnant women, occurring in 0.4–4.0% of pregnancies, with reported maternal mortality ranging

from 0.4% in patients with New York Heart Association (NYHA) class I–II to 6.8% or higher in class III–IV patients.¹ Among cardiovascular mortality, peripartum cardiomyopathy is identified as the leading cause of late postpartum death. Women with cardiac disease are at high risk of immediate postpartum complications during early puerperium (first 7 days after delivery) and up to 6 months postpartum.²

There are two groups of cardiac disease in women of childbearing age: congenital and acquired heart disease. Acquired heart disease includes rheumatic heart disease (RHD), cardiomyopathies, and ischemic heart disease, with RHD being most common in developing countries.³ This rising trend in maternal deaths related to cardiovascular disease appears to be driven by acquired heart disease. The most common presentations of maternal acquired heart disease during the postpartum period are heart failure, myocardial infarction, arrhythmia, or aortic dissection.⁴ Approximately 0.2–4% of all pregnant women are affected by heart disease and 15% of maternal mortality is associated with cardiac disorders.² The risk is compounded by common concurrence of immediate postpartum obstetric complications such as cardiogenic pulmonary edema, arrhythmias, haemorrhage, hypertensive disorders, and infections. Preexisting cardiovascular disease or new-onset peripartum cardiomyopathies may initially present during pregnancy or in the postpartum period. The hemodynamic changes during labor and delivery are sudden, with approximately 500 ml of blood released into circulation with each uterine contraction, rapidly increasing cardiac output and blood pressure. Blood loss during delivery, around 400 ml in vaginal delivery and 800 ml in caesarean section, adds further hemodynamic burden. Abrupt increases in venous return after delivery due to autotransfusion from the uterus can continue up to 24–72 hours, potentially causing pulmonary edema. All these abrupt changes contribute to cardiac complications in the postpartum period.

Physiologic changes gradually return to baseline by two weeks postpartum. Peripartum cardiomyopathy most frequently presents in the first postpartum week, with 75% presenting within the first month.² Pregnant or postpartum women with cardiovascular disease frequently present with shortness of breath, new-onset cough, or chest pain.⁵ Therefore, evaluation of postpartum cardiovascular outcomes is crucial, whether patients are symptomatic or asymptomatic.

Preconceptional counselling can reduce adverse cardiovascular symptoms and complications in pregnancy and postpartum. Counselling provides detailed information about the disease, treatment options, sexual activity, conception, pregnancy continuation risks, need for cardiac surgery or interventions, and expected maternal–fetal outcomes. It also allows up-to-date assessment of cardiac status and review of medications, such as cessation of angiotensin-converting enzyme (ACE) inhibitors in the event of pregnancy, and

optimization of anticoagulation strategies for mechanical valve replacements. General advice on risk reduction, including weight optimization, smoking cessation, diet, folic acid supplementation, and expected medical support during pregnancy, is also provided. Pre-pregnancy counselling may include discussion of antepartum, intrapartum, and postpartum complications and is conducted by both cardiologists and obstetricians. Limited research exists on the effect of preconceptional counselling on postpartum cardiovascular outcomes. Studies have shown improved maternal outcomes in women who received pre-pregnancy counselling. In prospective observational studies, women who received counselling developed cardiac events at lower rates (3.8%) compared with those without counselling (7.4%).^{6,7} Cardiac events are defined as heart failure, pulmonary edema, arrhythmia, or similar complications. In Bangladesh, there is no study on the prevalence of preconceptional counselling among women with heart disease or its effect on postpartum cardiovascular outcomes. This study aims to fill that knowledge gap. Due to ethical and structural constraints, the researcher cannot provide preconceptional counselling to participants. This ambispective cohort study identifies women with known cardiac illness from postpartum history and prospectively follows them to determine postpartum outcomes. Ultimately, this study will enhance knowledge, guide preventive measures during preconceptional, antenatal, intranatal, and postpartum periods, and help reduce postpartum cardiovascular complications as well as maternal morbidity and mortality.

METHODS

This hospital-based cohort study was conducted at the Department of Obstetrics and Gynaecology, Fetomaternal Medicine Unit, Dhaka Medical College Hospital (DMCH); the Department of Fetomaternal Medicine, Bangabandhu Sheikh Mujib Medical University (BSMMU); and the National Institute of Cardiovascular Diseases (NICVD), Dhaka, Bangladesh, between February 2020 and March 2021. A total of 73 postpartum women with heart disease (up to 5 months after delivery) were included, selected based on specific inclusion and exclusion criteria, to evaluate postpartum cardiovascular outcomes among women with known or incidental diagnosis of heart disease.

Inclusion criteria

Women in the postpartum period (up to 5 months after delivery) with heart disease during pregnancy.

Exclusion criteria

Postpartum women with heart disease and any of the following conditions during pregnancy: anaemia, hypertensive disorders, gestational diabetes mellitus (GDM), bronchial asthma, or renal disease. Women

postpartum after abortion or medical termination of pregnancy. Maternal death.

Data collection procedure

Eligible patients were assessed by attending physicians and the principal investigator. Demographic, obstetric, and cardiac data, along with pregnancy outcomes, were collected using structured questionnaires and medical records. Patients were followed from hospitalization until 5 months postpartum: uncomplicated cases were monitored monthly via telecommunication, while complicated cases were followed until treatment completion and then monthly by clinic visits or telecommunication. Patients receiving care outside the study institutions were excluded from follow-up.

Variables

Maternal variables included age, education, socioeconomic status, parity, gestational age at delivery, and mode of delivery (vaginal delivery or lower uterine caesarean section). Cardiac variables included type of heart disease (rheumatic/valvular, congenital, or cardiomyopathy), preconceptional counselling, and NYHA functional class (I–IV). Maternal cardiovascular outcomes included cardiac events: heart failure, postpartum cardiomyopathy, arrhythmia, pulmonary edema, and myocardial infarction.

Statistical analysis

Data were analysed using SPSS version 26. Categorical variables were presented as frequencies and percentages.

Group comparisons were performed using Chi-square (χ^2) tests, with $p < 0.05$ considered statistically significant. Results were summarized in tables.

Ethical considerations

Ethical approval was obtained from the Ethical Review Committees of DMCH, BSMMU, and NICVD. Written informed consent was obtained from all participants. Confidentiality was strictly maintained, and data were recorded anonymously. The study involved non-invasive procedures, posing minimal risk, in accordance with the Declaration of Helsinki (1964).

RESULTS

Table 1 presents the distribution of age, socioeconomic status, educational attainment, and parity among Group I (patients with known heart disease) and Group II (patients with incidental diagnosis of heart disease). The age distribution was not significantly different between the groups ($p = 0.090$), whereas significant differences were observed for socioeconomic status, educational level, and parity ($p < 0.001$).

Women aged 18–30 years were 1.63 times more likely to be aware of their heart disease compared with those older than 30 years. Table 2 shows the distribution of delivery timing among Group I (patients with known heart disease) and Group II (patients with incidental diagnosis of heart disease). Most deliveries occurred between 37–39 weeks in both groups. There was no statistically significant difference in timing of delivery between groups ($p = 0.180$).

Table 1: Comparison of study groups according to age, socioeconomic status, educational level, and parity (n=73).

Variable	Group I (n=39) N (%)	Group II (n=34) N (%)	Total N (%)	P value	
Age (years)	18–30	30 (61.2)	19 (38.8)	49 (67.1)	0.090
	>30	9 (37.5)	15 (62.5)	24 (32.9)	
Socioeconomic status	Poor	6 (21.4)	22 (78.6)	28 (38.4)	<0.001
	Average	23 (71.9)	9 (28.1)	32 (43.8)	
	Good	10 (76.9)	3 (23.1)	13 (17.8)	
Educational status	Illiterate	5 (18.5)	22 (81.5)	27 (37.0)	<0.001
	Primary	12 (60.0)	8 (40.0)	20 (27.4)	
	Secondary	10 (76.9)	3 (23.1)	13 (17.8)	
	College	7 (100.0)	0 (0)	7 (9.6)	
	Graduate	5 (83.3)	1 (16.7)	6 (8.2)	
Parity	Primi	10 (62.5)	6 (37.5)	16 (21.9)	<0.001
	Multi	29 (50.9)	28 (49.1)	57 (78.1)	

Table 2: Comparison of study groups according to time of delivery (n=73).

Time of delivery	Group I (n=39) N (%)	Group II (n=34) N (%)	Total N (%)	P value
≤36 weeks	3 (50.0)	3 (50.0)	6 (100.0)	0.180
37–39 weeks	35 (57.4)	26 (42.6)	61 (100.0)	
≥40 weeks	1 (16.7)	5 (83.3)	6 (100.0)	
Total	39 (53.4)	34 (46.6)	73 (100.0)	

Table 3: Comparison of study groups according to mode of delivery (n=73).

Mode of delivery	Group I (n=39) N (%)	Group II (n=34) N (%)	Total N (%)	P value
Vaginal delivery	4 (22.2)	14 (77.8)	18 (100.0)	<0.001
LUCS	35 (63.6)	20 (36.4)	55 (100.0)	
Total	39 (53.4)	34 (46.6)	73 (100.0)	

Table 4: Comparison of cardiovascular disease categories among study groups (n=73).

Cardiovascular disease	Group I (n=39) N (%)	Group II (n=34) N (%)	Total N (%)	P value	
Rheumatic heart disease	Isolated mitral stenosis	14 (60.9)	9 (39.1)	23 (100.0)	0.890
	Combined mitral stenosis and mitral regurgitation	4 (36.4)	7 (63.6)	11 (100.0)	
	Mitral stenosis with aortic valve disease	3 (42.9)	4 (57.1)	7 (100.0)	
	Subtotal	21 (51.2)	20 (48.8)	41 (100.0)	
Congenital heart disease	Atrial septal defect	7 (53.8)	6 (46.2)	13 (100.0)	
	Ventricular septal defect	2 (40.0)	3 (60.0)	5 (100.0)	
	Patent ductus arteriosus	2 (100.0)	0 (0.0)	2 (100.0)	
	Subtotal	11 (55.0)	9 (45.0)	20 (100.0)	
Dilated cardiomyopathy	7 (58.3)	5 (41.7)	12 (100.0)		
Total	39 (53.4)	34 (46.6)	73 (100.0)		

Table 5: Comparison of NYHA functional classification between study groups (n=73).

NYHA classification	Group-I (n=39)	Group-II (n=34)	Total (n=73)	P value
NYHA I	28	13	41	<0.001
% within NYHA class	68.30	31.70	100	
% within group	71.80	38.20	56.20	
NYHA II	11	16	27	
% within NYHA class	40.70	59.30	100	
% within group	28.20	47.00	37.00	
NYHA III	0	3	3	
% within NYHA class	0	100	100	
% within group	0	8.80	4.10	
NYHA IV	0	2	2	
% within NYHA class	0	100	100	
% within group	0	5.90	2.70	
Total	39	34	73	
% within NYHA class	53.40	46.60	100	
% within group	100	100	100	

Table 3 presents the distribution of delivery modes among Group I (patients with known heart disease) and Group II (patients with incidental diagnosis of heart disease). Vaginal deliveries were more frequent in Group II, whereas lower uterine cesarean sections (LUCS) were more common in Group I. The difference in mode of delivery between the groups was statistically significant ($p < 0.001$). Table 4 displays the distribution of cardiovascular disease types in Group I (patients with known heart disease) and Group II (patients with incidental diagnosis of heart disease). Rheumatic heart disease was the most common category, followed by congenital heart disease and dilated cardiomyopathy. No statistically significant differences were observed between the groups across disease categories ($p = 0.890$). Table 5

presents the distribution of patients according to the New York Heart Association (NYHA) functional classification in Group I (patients with known heart disease) and Group II (patients with incidental diagnosis of heart disease).

A significantly higher proportion of patients in Group I were classified as NYHA I, while more patients in Group II fell into NYHA II–IV categories ($p < 0.001$).

Table 6 compares the occurrence of cardiac events between Group I (patients with known heart disease) and Group II (patients with incidental diagnosis of heart disease). Cardiac events were significantly more frequent in Group II (63.6%) than in Group I (36.4%) ($p = 0.010$), with a relative risk of 1.96.

Table 6: Comparison of cardiac event status between study groups (n=73).

Cardiac event status	Group-I (n=39)	Group-II (n=34)	Total (n=73)	P value
Cardiac event	12	21	33	0.010
% within cardiac event	36.40	63.60	100	
% within group	30.80	61.80	45.20	
No cardiac event	27	13	40	
% within cardiac event	67.50	32.50	100	
% within group	69.20	38.20	54.80	
Total	39	34	73	
% within cardiac event	53.40	46.60	100	
% within group	100	100	100	
Relative risk	0.539	1.958	–	

Table 7: Comparison of cardiac outcomes by heart disease type (n=73).

Variable	Group I (n=39) N (%)	Group II (n=34) N (%)	Total (n=73) N (%)	P value
Rheumatic (valvular) heart disease	21 (51.2)	20 (48.8)	41 (100)	0.280
Cardiac arrhythmia	2 (40.0)	3 (60.0)	5 (100)	
Pulmonary edema	2 (33.3)	4 (66.7)	6 (100)	
Heart failure	1 (25.0)	3 (75.0)	4 (100)	
Post-partum cardiomyopathy	0 (0)	0 (0)	0 (0)	
Myocardial infarction	0 (0)	1 (100)	1 (100)	
No complication	16 (64.0)	9 (36.0)	25 (100)	0.620
Congenital heart disease	11 (55.0)	9 (45.0)	20 (100)	
Cardiac arrhythmia	1 (33.3)	2 (66.7)	3 (100)	
Pulmonary edema	2 (40.0)	3 (60.0)	5 (100)	
Heart failure	1 (50.0)	1 (50.0)	2 (100)	
Post-partum cardiomyopathy	0 (0)	0 (0)	0 (0)	
Myocardial infarction	0 (0)	0 (0)	0 (0)	0.540
No complication	7 (70.0)	3 (30.0)	10 (100)	
Dilated cardiomyopathy	7 (58.3)	5 (41.7)	12 (100)	
Cardiac arrhythmia	0 (0)	1 (100)	1 (100)	
Pulmonary edema	0 (0)	0 (0)	0 (0)	
Heart failure	1 (33.3)	2 (66.7)	3 (100)	
Post-partum cardiomyopathy	2 (66.7)	1 (33.3)	3 (100)	0.070
Myocardial infarction	0 (0)	0 (0)	0 (0)	
No complication	4 (80.0)	1 (20.0)	5 (100)	
All patients – total	39 (53.4)	34 (46.6)	73 (100)	
Cardiac arrhythmia	3 (33.3)	6 (66.7)	9 (100)	
Pulmonary edema	4 (33.3)	8 (66.7)	12 (100)	
Heart failure	3 (33.3)	6 (66.7)	9 (100)	0.070
Post-partum cardiomyopathy	2 (66.7)	1 (33.3)	3 (100)	
No complication	27 (67.5)	13 (32.5)	40 (100)	

Table 7 presents the distribution of cardiac outcomes according to heart disease type among Group I (patients with known heart disease) and Group II (patients with incidental diagnosis of heart disease). Overall, no statistically significant differences were observed between the groups for individual outcomes across rheumatic, congenital, or dilated cardiomyopathy ($p>0.05$). The most common outcome in all patients was the absence of complications (40/73, 54.8%), followed by pulmonary edema (12/73, 16.4%) and heart failure (9/73, 12.3%). Table 8 summarizes the occurrence of cardiac events in

relation to parity among Group I (patients with known heart disease) and Group II (patients with incidental diagnosis of heart disease). Cardiac events were more frequent in multigravida women (28/57, 49.1%) compared with primigravida women (5/16, 31.3%). Multigravida women had a significantly higher risk of cardiac events (Relative Risk=0.466, $p=0.010$), whereas the difference in primigravida women was not statistically significant. Table 9 presents the relationship between cardiac events and gestational age at delivery among Group I (patients with known heart disease) and Group II (patients with

incidental diagnosis of heart disease). Cardiac events occurred across all time frames, with the highest proportion in the 37–39 weeks group (22/61,36.1%). The

relative risk was significant for deliveries at 37–39 weeks (RR=0.525, p=0.020), whereas events at ≤36 weeks and ≥40 weeks were not statistically significant

Table 8: Comparison of cardiac events according to parity (n=73).

Parity	Cardiac event status	Group I (n=39) N (%)	Group II (n=34) N (%)	Total (n=73) N (%)	Relative risk	P value
Primi	Cardiac event	3 (60.0)	2 (40.0)	5 (100)	0.943 / 1.100	1.000
	No cardiac event	7 (63.6)	4 (36.4)	11 (100)		
Multi	Cardiac event	9 (32.1)	19 (67.9)	28 (100)	0.466 / 2.187	0.010
	No cardiac event	20 (69.0)	9 (31.0)	29 (100)		
Total	Cardiac event	12 (36.4)	21 (63.6)	33 (100)	0.539 / 1.958	<0.001
	No cardiac event	27 (67.5)	13 (32.5)	40 (100)		
Total sample		39 (53.4)	34 (46.6)	73 (100)		

Table 9: Comparison of cardiac events according to time of delivery (n=73).

Time of delivery	Cardiac event status	Group I (n=39) N (%)	Group II (n=34) N (%)	Total (n=73) N (%)	Relative risk	P value
≤36 weeks	Cardiac event	3 (60.0)	2 (40.0)	5 (100)	Cannot be computed / 0.400	1.000
	No cardiac event	0 (0)	1 (100)	1 (100)		
37–39 weeks	Cardiac event	8 (36.5)	14 (63.6)	22 (100)	0.525 / 2.068	0.020
	No cardiac event	27 (69.2)	12 (30.8)	39 (100)		
≥40 weeks	Cardiac event	1 (16.7)	5 (83.3)	6 (100)	Cannot be computed	N/A
	No cardiac event	0 (0)	0 (0)	0 (0)		
Total sample		39 (53.4)	34 (46.6)	73 (100)		

Table 10: Comparison of cardiac events according to mode of delivery (n=73).

Mode of delivery	Cardiac event	Group-I (n=39) frequency (%)	Group-II (n=34) frequency (%)	Total (n=73)	P value
Vaginal delivery	Cardiac event	0 (0)	10 (100)	10 (100)	0.040
	No cardiac event	4 (50)	4 (50)	8 (100)	
LUCS	Cardiac event	12 (52.2)	11 (47.8)	23 (100)	0.130
	No cardiac event	23 (71.9)	9 (28.1)	32 (100)	
Total	Cardiac event	12 (36.4)	21 (63.6)	33 (100)	0.010
	No cardiac event	27 (67.5)	13 (32.5)	40 (100)	
Total		39 (53.4)	34 (46.6)	73 (100)	

Table 10 illustrates the distribution of cardiac events in relation to mode of delivery among Group I (patients with known heart disease) and Group II (patients with incidental diagnosis of heart disease). Cardiac events were significantly more frequent in patients undergoing lower uterine cesarean section (LUCS) compared with vaginal delivery. Notably, no cardiac events occurred in Group I among women who had vaginal deliveries, whereas all cardiac events in vaginal deliveries occurred in Group II (p=0.040). The overall occurrence of cardiac events differed significantly between the two groups (p=0.010).

DISCUSSION

Heart disease complicates approximately 1% of all pregnancies.⁸ Early diagnosis, counselling, and proper management are key to reducing maternal mortality and

morbidity. In this study, data were collected on maternal age, socioeconomic status, educational level, counselling status, time and mode of delivery, type of pre-existing cardiac condition, parity, and adverse cardiac events. The study included 39 pregnant women with known heart disease who had preconception counselling (Group I) and 34 women with incidental diagnosis of heart disease (Group II). Most patients (67.1%) in our study were aged 18–30 years, and the difference in age distribution between groups was not statistically significant (p=0.090). Similar findings were reported in India, where 98.6% of patients were 18–35 years old.⁹ In Vietnam, patients younger than 35 years comprised 86.97% of the study population.³

Regarding socioeconomic status, 78.6% of patients from the poor category belonged to Group II, which may have contributed to their lack of awareness about antenatal care

and their cardiac condition. A comparable study from India reported 76.67% of participants in the lower socioeconomic category.⁷ Similarly, 81.5% of illiterate patients belonged to Group II. The significant difference in educational status ($p < 0.001$) likely impacted awareness of their heart disease and subsequent outcomes. In Bangladesh, only 47% of women received four or more antenatal care visits, and the frequency of ANC was influenced by age, education, wealth, and residency.¹⁰ Thus, poverty and illiteracy are important barriers to ANC and preconception counselling.

Most patients (61/73) delivered between 37–39 weeks of gestation, similar to the 75% of cases delivered after 37 weeks reported previously.⁹ In our study, 56 out of 73 patients (76.7%) were delivered by LUCS, with 63.6% belonging to Group I. Vaginal deliveries occurred more frequently in Group II (77.8%), and this difference in mode of delivery was statistically significant ($p < 0.001$). The higher frequency of LUCS in Group I may reflect proper pregnancy planning and timely hospital admission. A nationwide survey reported that one-third of deliveries in Bangladesh were by caesarean section; however, this reflects the general population, not pregnancies complicated by heart disease.¹⁰ The distribution of primiparous and multiparous women was comparable between groups ($p > 0.05$), consistent with previous findings.⁹

Rheumatic heart disease (RHD) was the most common underlying cardiac condition in our study (41/73 cases). In developing countries like Bangladesh, RHD remains highly prevalent. In India, the frequency of RHD among pregnant women varies from 84% to 88%.⁷⁻⁹ A South African study also reported RHD as the most frequent cardiac disease in pregnancy.¹¹ Among the 41 RHD patients in our study, 23 had isolated mitral stenosis, followed by combined mitral stenosis and mitral regurgitation ($n=11$) and mitral stenosis with aortic valve disease ($n=7$). Another study reported that 69.41% of pregnant women with valvular lesions had mitral stenosis, and mitral regurgitation was the second most common lesion.⁸ Distribution of RHD, congenital heart disease, and dilated cardiomyopathy between Group I and Group II was similar ($p > 0.05$).

Regarding functional status, 56.2% of patients were NYHA I and 37% were NYHA II. A study from India reported 77.4% of patients in NYHA I–II.⁹ Another study also reported approximately 80% of patients in NYHA I–II.⁷ Advanced NYHA class (III–IV) was observed only in Group II, highlighting the importance of awareness and preconception counselling.

Adverse maternal cardiac events were defined as cardiac arrhythmia, heart failure, pulmonary edema, thromboembolic events, hospitalization for cardiac interventions, infective endocarditis, or myocardial infarction.¹² In our study, 33/73 (45.2%) women experienced adverse cardiac events. This frequency aligns

with a recent Indian study reporting 42.5%.¹² Notably, 63.6% of cardiac events occurred in Group II, a statistically significant difference ($p=0.010$). Women unaware of their heart disease had a 1.96 times higher risk of developing postpartum cardiac events, confirming that awareness and counselling reduce maternal complications. Similarly, another study reported lower maternal complications in early-diagnosed women (8.9% vs 57%).⁷ ESC 2018 guidelines recommend preconception counselling for women with heart disease.¹³ Another study emphasized early diagnosis, preconception counselling, and timely management.¹⁴ Pulmonary edema was the most frequent cardiac event (36.4%) in this study. A previous study reported a higher incidence.¹⁵ Heart failure and arrhythmia each accounted for 27.3% of cardiac events, similar to findings from other studies.³⁻⁷ The distribution of complications by type of heart disease between groups was not statistically significant, likely due to small numbers in some categories. Delivery between 36–39 weeks was associated with a significantly lower risk of postpartum cardiac events ($p < 0.05$). Relative risk assessment showed that Group II had a 2.07 times higher risk of developing cardiac events during delivery at 37–39 weeks. Although vaginal delivery is generally preferred, in our study it was associated with cardiac events among women unaware of their cardiac illness.^{16,17}

Multiparous women with known heart disease had significantly fewer cardiac events ($p < 0.05$). Multiparous women in Group II had a 2.19 times higher risk of developing cardiac events compared with Group I, consistent with previous findings regarding parity and postpartum events in congenital heart disease.¹⁸ They also reported that an uneventful first pregnancy was associated with an odds ratio of 5.5 for having uneventful subsequent pregnancies. Improved healthcare systems, adequate preconception counselling, and proper perinatal care likely contributed to lower mortality in the population studied.¹³ In Bangladesh, only 76% of pregnant women received ANC from a qualified doctor, and only 49% of deliveries occurred in healthcare facilities.¹⁰ Therefore, pregnancies complicated by cardiac disease should be managed by a multidisciplinary team, termed the “Pregnancy Heart Team.”¹⁹

Limitations

Time and resources were limited. A larger sample size could have allowed analysis of the association between individual cardiac events, heart disease type, and the role of pre-conception counselling. The COVID-19 pandemic adversely affected patient admissions to the hospital. This study was conducted in only three centres, which may not represent the situation of the entire country.

CONCLUSION

Maternal heart disease has emerged as a major threat to safe motherhood and postpartum cardiovascular health. This cohort study found that awareness of pre-existing

cardiac illness was associated with significantly better postpartum NYHA functional status compared to women with an incidental diagnosis of heart disease. Postpartum cardiovascular complications were significantly lower in the cohort with known heart disease, with pulmonary edema, cardiac arrhythmia, and heart failure being the most frequent outcomes. Vaginal delivery was associated with a higher risk of cardiovascular complications in women unaware of their cardiac condition, whereas multiparous women with known heart disease and deliveries at 37–39 weeks had a significantly lower risk of postpartum cardiac events. These findings underscore the need for mass screening of women of childbearing age, as many may remain asymptomatic until adulthood. Pregnancy can reveal previously asymptomatic cases and exacerbate existing cardiac conditions. Early diagnosis, proper preconception counseling, and timely multidisciplinary care are essential for the optimal management of these high-risk patients.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Shoma HS, Mili FS, Akter MS, Najnin F, Prue J, Sultana N. Postpartum cardiovascular outcomes among pregnant women with known heart diseases. *Int J Reprod Contracept Obstet Gynecol* 2026;15:1520-7.