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Maternal & Foetal Outcome in Pregnant Women with Heart Disease in a Tertiary Care Centre

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I. INTRODUCTION

Heart disease is a leading medical condition contributing to maternal mortality and morbidity throughout pregnancy and postpartum.(Gandhi and Martin, 2015) Its prevalence in pregnancy ranges from 0.3% to 3.5%. Maternal and perinatal mortality and morbidity in pregnancies affected by cardiac problems vary depending on the disorder, the patient's functional level, and the pregnancy's difficulties(Abhilashi et al., 2018). Risks for heart failure, pulmonary edema, shock (cardiogenic), arrhythmia, and thromboembolism are included in maternal morbidity.

The presence of maternal heart disease affects the fetus in several ways. The risk of abortion, whether spontaneous or therapeutic, increases in women with heart disease. Some HD drugs, including ACE inhibitors, also affect the fetus(Owens et al., 2018). Children born from a mother with congenital heart disease are at increased risk for congenital heart disease. The uncompensated cardiac disease causes a reduced oxygen supply, which compromises fetal growth and can cause growth limitation, preterm, or even fetal death (Yaghoubi and Mirinazhad, 2013). Low birth weight babies, fetal congenital heart disease, preterm birth, and intrauterine growth retardation are a few examples of perinatal outcomes (Owens et al., 2018). Neonatal complications, including cardiomyopathy and portal hypertension, were more common in the offspring of pregnant HD women (Hu et al., 2020). Significant adverse cardiac events, prior diabetes mellitus, preeclampsia, obstetric difficulties, and preexisting diabetes mellitus have all been independently associated with an elevated risk of neonatal adverse clinical events (NACE) (Thamizhselvi, 2013).

The spectrum of cardiovascular disease is changing and varies between countries. In developing countries, rheumatic heart disease is the most typical type, whereas cardiomyopathies and congenital heart disease are more common in developed countries. Women in developed countries can readily access excellent prenatal care, counseling, and treatments for cognitive impairment. Still, in underdeveloped countries, few pregnant women with heart disease are evaluated and given prenatal counseling. (Yaghoubi and Mirinazhad, 2013) In developed countries, the prevalence of RHD has reduced. However, in developing countries, RHDs are a common cause of morbidity and mortality in expectant mothers. The most common heart defects associated with rheumatic disease are mitral stenosis (up to 80%), aortic stenosis (10%), mitral regurgitation (6.6%), and AR (2.5%).(Khan et al., 2018)

Pregnancy complications caused by cardiac illness are dangerous and need extra care during pregnancy and labour. Heart disease-related morbidity and death may rise when women give birth before reproductive age. As a result, high-risk obstetric units need to be ready with preconception counseling and early pregnancy termination for people with high-risk heart disease(Abhilashi et al., 2018). Hence this study aimed to study the maternal and fetal outcome in pregnant women with heart disease above 24 weeks of gestation admitted for delivery in a tertiary care teaching hospital.

Methodology:

Study Design and study setting

A Prospective observational study at SAT Hospital, Trivandrum.

Study period

Data collection from February 2022 - to November 2022.

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Ethics Committee
Obtained ethical clearance from institutional ethics committee (IEC) - Women ethics committee HEC NO 01/16/2022/MCT]

Inclusion criteria
Pregnant women with heart disease, previously established or diagnosed during pregnancy above 24 weeks of gestation, admitted for delivery, primi/multigravida, singleton/multiple pregnancies.

Exclusion criteria
Pregnant women with heart disease were admitted to SAT for other medical ailments and those unwilling to participate in the study.

Sample size
Sample size calculation is based on a study titled "The Clinical study of maternal and perinatal outcomes in heart disease complicating pregnancy at the tertiary referral center of Telangana state" Lakshmi PrasannaKosurui, K ArunaKumari. (Kumari et al., 2018). The sample size of 247 is obtained using the formula n= (Z 1-α/2) 2 x p (1-p) d 2 p-expected percentage d-relative precision (it is recommended to fix the value d from a minimum of 10%to a maximum of 20%.

Sampling procedure
All pregnant women with heart disease above 24 weeks of gestation admitted for delivery in SAT hospital willing to give consent that fits inclusion criteria will be taken till the required sample is met during the study period.

Study tool and data collection technique: Semi-structured proformawhich includes documenting history, clinical examination details and blood profile, the maternal and fetal outcome of the patients at the time of delivery and followed up till discharge was used to collect data from the study population. Case records and labour room records were also used for data collection.

Analysis
The data was tracked in an Excel sheet and analysed with IBM SPSS version 27. Quantitative variables are expressed as mean and standard deviation. Qualitative variables are expressed using percentages. The association of different variables was assessed using the Chi-square test.

II. RESULTS

The results of the study Maternal and fetal outcome in pregnant women with heart disease above 24 weeks of gestation admitted for delivery in SAT, Government Medical College Trivandrum' is given below. Two hundred forty-seven participants (247) were included in the study. Most of the study participants were from the age group 25-30, 34 %. Only 0.6 % was from the age group greater than 35. The urban-rural distribution was almost equal. The participants' socioeconomic status varies slightly, with around 60 per cent belonging to BPL and 40 per cent to APL. (Tbale1)

Table 1 Baseline characteristics of participants

Variable	**Categories**	**Frequency**
Age	18-25 years	73
	25-30 years	84
	30-35 years	75
	>35 years	15
Living environment	Urban	124
	Rural	123
SES	Below poverty line	150
	Above poverty line	100
Time of diagnosis	Current pregnancy	136
	Prior to pregnancy	111
Diagnosis timing of prior pregnancy diagnosed participants	Previous pregnancy	9
	Not during pregnancy	102
Prior medical history	Prior heart failure	1
	Prior AF	8
	Prior oral anticoagulant therapy	19
PRE-PREGNANCY DETAILS		
NYHA classification	CLASS I	51

	CLASS II	50
	CLASS III	9
	CLASS IV	1
Surgical or medical interventions	ASD closure	16
	VSD closure	10
	PDA ligation	9
	TOF correction	7
	Pacemaker implantation	8
	Valve replacement	1
	Balloon mitral valvotomy	4
Medication history of the participants (n=94)	Penicillin	54
	Beta-blockers	21
	Warfarin	19
	Dicoumarol	0
PREVIOUS PREGNANCY DETAILS		
Mode of delivery during a previous pregnancy	Vaginal	34
	Instrumental	2
	LSCS	24
Prior pregnancy gestational age (GA) at delivery (in weeks)	37	17
	38	22
	39	19
	40	2
Fetal outcomes of previous pregnancy	Live birth	60
Birth weight	LGA	1
	AGA	43
	LBW	16
Antenatal/ postnatal decompensation	Heart failure	1
	Arrhythmia	9
Obstetric score of present pregnancy	Primi gravida	146
	Multi gravida	101
Singleton/ multiple pregnancy	Singleton	238
	Multiple	9
Maternal risk factors during pregnancy	GDM	79
	Overt DM	15
	Hypertensive disorder in pregnancy	39
	Chronic hypertension	15
	Hypothyroid	74
	Hyperthyroid	4
	Anemia	51
	Drug allergy	22
	Respiratory disorder	11
	Seizures	8
Fetal risk factors	FGR	44
	Oligohydraminos	41
	Abnormal fetal echo	10
Type of heart disease diagnosed	Rheumatic heart disease (RHD)	120
	Congenital heart disease	52
	Cardiac Arrhythmia	63
	Cardiomyopathy	12
Rheumatic valvular heart disease	Moderate MS with mild MR	16
	Moderate MS with Moderate MR	4
	Moderate mitral regurgitation	22
	Mild MR	2

	PROSTHETIC VALVE/Moderate MS with Moderate MR	1
	Mild TS with moderate TR	7
	Moderate tricuspid regurgitation	18
	Moderate AS	8
	Mild AS	9
	Mild AR	19
	Moderate pulmonary regurgitation	9
	Moderate pulmonary stenosis	2
	MVP	3
Congenital heart disease (CHD) types	Acyanotic congenital heart disease	43
	Cyanotic congenital heart disease	9
	Atrial septal defect (ASD)	21
	Ventricular septal defect (VSD)	13
	Patent ductus arteriosus (PDA)	9
	Ebstein anomaly	2
	Tetralogy of Fallot (TOF)	7
CHD Correction status	CHD corrected	42
	CHD uncorrected	10
Types of arrhythmias in the participants	**BRADYAARRYTHMIA**	**40**
	First-degree atrioventricular block	11
	Second-degree atrioventricular block	13
	Complete heart block	8
	Sick sinus syndrome	3
	LBBB	4
	RBBB	1
	TACHY ARRYTHMIA	**23**
	Ventricular premature complex (VPC)	6
	Wolff- Parkinson-White syndrome (WPW)	6
	Supra-ventricular tachycardia (SVT)	2
	Atrial fibrillation	9
Types of cardiomyopathies	DCM	11
	HOCM	1
Types of interventions done	Pacemaker implants	8
	TOF correction	7
	PDA ligation	9
	ASD closure	16
	Balloon mitral valvotomy	4
	Valve replacement	1
	VSD patch closure	10
Present symptoms- NYHA classification	CLASS I	73
	CLASS II	141
	CLASS III	17
	CLASS IV	16
CLINICAL SIGNS		
BMI	18-24.9	13
	25-29.9	148
	30-34.9	34
	>35	36

	>40	9
Weight gain	<11 kg	68
	11-16 kg	143
	>16 kg	36

Pre-Pregnancy Details:

Among the 111 patients diagnosed before the current pregnancy both NYHA classes I and II have more than 45% per cent of patients in them. Only very few were in class III and 1 in IV.Among the 111 patients, 19 had a prior history of oral anticoagulant therapy, eight had AF history, and only one had a history of heart failure. ASD closure correction is the most done intervention; 16(29.1%) patients have done that. VSD closure and PDA ligation are the subsequent common procedures done by 11 and 9 patients, respectively. 57.45% have used penicillin, beta-blockers and warfarin stands next, used by 22.35 and 0.2%.

Previous Pregnancy Details:

Among the 111 patients who had previous history of heart disease 60 were in multiparous status. Out of which 24 had undergone LSCS in prior pregnancy, 34 had to undergo normal vaginal delivery and only 2 had instrumental delivery.

Most participants delivered at 38 weeks of gestation, followed by 39 and 37 weeks. 100 % had live birth previously. Most of the babies had appropriate gestational age weights, and 71.7 %of them were AGA. Only 1.6% was LGA, and 21.7% were LBW babies. Among the 10 participant who had prior decompensation history, one had a heart failure history, and 90% had an arrhythmia history.

Present Pregnancy Details:

Most of the participants were of primi gravida, 59 per cent and multi gravida around 41 per cent. Most of the pregnancies were singleton, 96.3 per cent, and the rest were twin pregnancies. The mean gestational age at registration was 20.6 weeks with a standard deviation of 9.1, ranging from 5 to 35 weeks.

Among the risk factors, gestational diabetes mellitus was high, with 79 (24.8%) participants. Hypothyroidism ranked second, with 74 participants having it and anemia and hypertensive disorders in pregnancy ranked next to it, with 51 and 39 participants. Fetal growth retardation and oligohydramnios rank high among the fetal risk factors. 10 had abnormal fetal echo.

Among heart diseases, RHD ranks high (48.58), Arrythmia ranks second (25.5%) followed by congenital heart disease (21.05%). Mitral valvular lesion ranks high among RHD among which moderate MR is 18.3%, moderate MS with MR accounts 16.6% followed by mild AR (15.8%) and moderate TR (15%). Among congenital heart diseases,82.7% are Acyanotic. ASD ranks highest with 40.38 per cent, and VSD and PDA rank second and third with 25% and 17.31%.80.77% underwent correction surgeries. Bradyarrhythmia was the most common arrhythmias that occurred among the participants say 63.5% among which second degree AV block ranks high (20.6%). Among 36.5% of tachyarrhythmia VPC and WPW were 9.52%. Common cardiomyopathy identified were of the type dilated, with 11 participants having them. Inflammatory heart disease-myocarditis was diagnosed in 4 participants. ASD closure was the most performed interventions 16 participants had them, and VSD patch closure was the second most common, with 10 participants. Eight participants implanted pacemakers.

Most participants, 141 (57%), fall into NYHA class II. Thirty per cent of the participants were in class I and the least in class IV, 6 per cent.Dyspnea was found to be the most common symptom; 53 per cent had it, palpitation was the next common symptom, and 14 per cent had palpitations.

Clinical Signs:

Most participants fall in the healthy BMI group, 18-24.9, 60 per cent. 5 per cent were underweight, and 4 per cent had BMI over 40. Around 25 per cent fall under the obese category. Majority say 57.9% had normal weight gain.(Table 2)

Table 2 Clinical findings of participants

	Categories	**Frequency (n)**
CLINICAL FINDINGS		
Heart Rate	Normal	178
	Tachycardia	54
	Bradycardia	15

Respiratory rate	Normal	245
	Tachypnea	2
	Bradypnea	0
Blood pressure	Normal	218
	Hypertensive	29
	Hypotensive	0
SPO2	>95%	247
Murmur (n=124)	Systolic murmur	71
	Diastolic murmur	53
BASELINE INVESTIGATIONS		
Blood sugar/GTT	Normal	160
	Abnormal	87
Hemoglobin- Anemia	Normal	135
	Mild	57
	Moderate	19
	Severe	36
Serum Creatinine	Normal	245
	Abnormal	2
ECG abnormalities	**Arrhythmia (n=104)**	**Frequency**
	Sins bradycardia	10
	First-degree atrioventricular block	11
	Second-degree atrioventricular block	13
	Complete heart block	8
	Sick sinus syndrome	3
	LBBB	4
	RBBB	1
	Sins tachycardia	31
	Ventricular premature complex (VPC)	6
	Wolff- Parkinson-White syndrome (WPW)	6
	Supra-ventricular tachycardia (SVT)	2
	Atrial fibrillation	9
Modified WHO risk assessment scale	m WHO I	0
	m WHO II	34
	m WHO II-III	146
	m WHO III	29
	m WHO IV	38
CARPREG scoring	Score 0	181
	2	41
	>2	25
CARPREG II scoring	Score 1	157
	2	9
	3	25
	4	23

	>4	33
ZAHARA scoring	Score 0	151
	0.5	23
	1.5-2.5	53
	2.5-3.5	16
	>3.5	4
Echocardiography findings	Normal	73
	Abnormal	174
Heart chamber condition	Normal	133
	Dilated right atrium	41
	Dilated right ventricle	46
	Dilated left atrium	16
	Dilated left ventricle	11
Ventricular function	Normal	77
	Mild LV dysfunction	67
	Moderate dysfunction	36
	Severe dysfunction	0
	Diastolic dysfunction	67
Mitral valve morphology		
Mitral valve	Native	173
	Prosthetic	1
Mitral stenosis (MS)	Absent	152
	Mild	0
	Moderate	22
	Severe	0
Mitral regurgitation (MR)	Absent	138
	Mild	22
	Moderate	14
	Severe	0
Aortic valve morphology		
Aortic valve	Native	173
	Prosthetic	1
Aortic stenosis (AS)	Absent	156
	Mild	9
	Moderate	9
	Severe	0
Aortic regurgitation (AR)	Absent	146
	Mild	19
	Moderate	1
	Severe	0
Pulmonary valve morphology		
Pulmonary valve	Native	174
	Prosthetic	0
Pulmonary stenosis (PS)	Absent	157
	Mild	15
	Moderate	2
	Severe	0

Pulmonary regurgitation (PR)	Absent	159
	Mild	6
	Moderate	9
	Severe	0
Tricuspid valve morphology		
Tricuspid valve	Native	174
	Prosthetic	0
Tricuspid stenosis (TS)	Absent	166
	Mild	8
	Moderate	0
	Severe	0
Tricuspid regurgitation (TR)	Absent	137
	Mild	6
	Moderate	31
	Severe	0
Other cardiac problems identified		
Pulmonary arterial hypertension (PAH)	Absent	163
	Mild	11
	Moderate	0
	Severe	0
Inter Atrial septum (IAS)	Normal	153
	Abnormal	21
Abnormal IAS	Primum	3
	Secundum	2
	Surgical procedure done- Closure	16
Interventricular septum	Normal	161
	Abnormal	13
Abnormal IVS	Perimembranous	3
	Surgical procedure done- Closure	10
Current Cardiac drugs	Penicillin	62
	Heparin	21
	Aspirin	21
	Beta blockers	42

Among clinical findings, a significant finding of heart rate was found normal among most participants, 72 per cent and tachycardia were found among 22 per cent. Respiratory rate was found normal among almost all participants, 99 per cent. Blood pressure was also found normal among most of them, 88 per cent. Only 11 per cent was hypertensive. Sp02 was >95% for all patients. Seventy-one participants had a systolic murmur, and 53 had a diastolic murmur.

Blood sugars were found to be elevated among 35 per cent. Thirty per cent had abnormal ECG findings. Around d 23 per cent had mild anemia and 15 per cent had severe anemia. Among the 74 participants with abnormal findings, tachyarrhythmia was the most common finding; 18 per cent had it. Majority had sinus tachycardia say 31 participants. Brady arrhythmia was second common abnormality where first and second degree atrioventricular block accounts more than half of the cases say 24 participants.

Cardiac Assessment and Triage:

The modified WHO risk assessment showed that 60% of participants fell under the WHO II-III category, with the least number falling under the WHO III category (12%). In the CARPREG scoring, the majority (73.3%) had a score of 0, while 10% had a score greater than 2. For CARPREG II scoring, most participants (64%)

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fell under the score 1 category, while 13.4% had a score greater than 4. Score 2 had the fewest participants, accounting for 9%. In the ZAHARA scoring, most participants had a score of 0, with only 4% having a score greater than 3.5.

Among the participants, 30% had abnormal echocardiography findings, while the remaining had normal findings. The most common heart chamber condition was dilated RV, observed in 18.6% of participants, followed by dilated RA in 16.6%. Mild LV and diastolic dysfunction were the most common ventricular functional defects, found in 27.1% of participants. Among those with abnormal mitral valve morphology, 22 had moderate MS, 22 had mild MS, and 14 had moderate MR. Nine participants had moderate AS, nine had mild AS, and 19 had mild AR. Regarding pulmonary valve abnormalities, 15 participants had mild PS, six had mild PR, and nine had moderate PR. For tricuspid valve abnormalities, eight participants had mild TR, 31 had moderate TR, and six had mild TR. Mild PAH was diagnosed in 11 participants, and abnormal IAS was found in 21 participants, with surgical closure performed in 16 cases. Abnormal interventricular septum was found in 13 participants, with surgical closure conducted in 10 cases.

Obstetric Outcome:

The study revealed that most participants had term deliveries, with hypertension being the most common obstetric indication for intervention. An equal number of participants had normal deliveries and cesarean sections, with the majority of cesarean sections being elective. Postpartum hemorrhage, particularly traumatic PPH, was a notable complication, along with lower respiratory tract infections/pneumonia and sepsis. Adverse cardiovascular outcomes included arrhythmia, anemia worsening cardiac conditions, and thrombotic manifestations.(Table 3)

Table 3 Obstetric outcomes

Variable	**Categories**	**Frequency**
Obstetric outcome	Term	207
	Late preterm	39
	Early preterm	1
Onset of labour (n 188)	Spontaneous	103
	Induced	85
Obstetric and cardiac indications for induction of labor		
Obstetric (n=84)	On date	25
	FGR	7
	GDM	6
	Hypertension	38
	Twin pregnancy	7
	Transaminitis in pregnancy	1
Cardiac (n=1)	Previous h/o heart failure at term	1
mode of delivery	Normal vaginal	94
	Instrumental	59
	LSCS	94
LSCS		
	Elective	53
	Emergency	41
Obstetric indication for LSCS (n= 83)		
	Failed induction	8
	Pathological CTG	2
	Moderate MSAF	6
	Arrest of decent	9
	2nd degree CPD	9
	Previous LSCS	48
	Stage 2/3 FGR	1
Cardiac indication for LSCS (n=11)		
	Suspected Pulmonary edema	5
	Arrythmia	6
Type of anesthesia given	Spinal	73

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	Epidural	0
	General	21
Postpartum hemorrhage types	Atonic	17
	Traumatic	24
	Others	11
Postnatal complications	CVT	1
	Sepsis	17
	VTE	9
	Hypertensive diseases	7
	Wound infection	8
	Hematoma	2
	LRTI/Pneumonia	27
	PPH	52
	NIL	124
Cardiovascular outcome	CHF	5
	Pulmonary Edema	3
	Other thrombotic manifestation	9
	Bleeding manifestation	1
	Arrhythmia	20
	Anemia worsening cardiac Condition	14
Duration of hospital stay (days)	<5	96
	5-10	53
	10-15	58
	>15	40

Fetal Outcome:

The study showed positive fetal outcomes, with all participants having live births. Most of the neonates were delivered at term, and the majority were AGA. However, a significant proportion of neonates required NICU admission, primarily due to respiratory distress. At the time of discharge, participants showed improvements in their symptoms, with a preference for barrier methods for contraception and a notable proportion undergoing tubectomy. (Table4)

Table 4 Fetal outcomes

Variable	**Categories**	**Frequency**
Fetal outcome	Live birth	247
	Still birth	0
	IUD	0
Live fetal birth outcome	Term	200
	Late preterm	46
	Early preterm	1
Birth weight	LGA	16
	AGA	173
	LBW	53
	VLBW	2
	ELBW	0
APGAR score at 1 minute	5	2
	6	29
	7	91
	8	107
	9	18
APGAR at 5 minutes	6	1
	7	1
	8	34

	9	211
NICU admission	Not admitted	127
	Admitted	120
Neonatal outcomes	Respiratory distress	84
	IUGR	46
	Jaundice	36
	Prematurity	32
	Sepsis	19
	Heart disease	15
	DIC	5
	Congenital anomaly	1
Mode of contraception	IUCD	19
	Barrier	133
	Tubectomy	95

III. DISCUSSION

The study aimed to assess the maternal and neonatal complications in pregnant women with cardiac disease. A total of 247 pregnant women with heart disease were included in the study. The findings were compared with other studies conducted in different regions to provide a comprehensive assessment.

The mean age of the patients in the study was found to be higher (between 25 and 30 years) compared to a study conducted in Haryana where the mean age was 23.16 years(Kumar et al., 2021). Rheumatic heart disease (RHD) was the most prevalent cardiac disorder, accounting for 48.58% of cases, followed by congenital heart disease (CHD) at 60.22%. The prevalence of RHD varied across different studies, ranging from 48% to 64%.(Kosuru and Kumari, 2018; Salam et al., 2017)

Arrhythmia was the second most common cardiac disorder, followed by congenital heart disease and cardiomyopathy. Among RHD cases, mitral valve lesions were the most common, with moderate mitral regurgitation being the most prevalent. The incidence of CHD was higher in some studies compared to RHD, indicating improved diagnosis and management of CHD in the developing world.

The study found that the majority of patients belonged to NYHA class I and II, indicating mild to moderate symptoms. Dyspnea was the most common symptom reported. Most participants had a healthy body mass index (BMI), but around 25% fell under the obese category, which increased the risk of cardiac and obstetric complications.

Cardiac risk assessment was performed using different scoring systems, including modified WHO risk assessment, CARPREG scoring, CARPREG II scoring, and ZAHARA scoring. The majority of patients fell into the low-risk categories, indicating a lower risk of cardiac complications during pregnancy.

Obstetric outcomes showed an equal rate of cesarean section and normal delivery, with a significant percentage undergoing instrumental delivery. Hypertension was the most common obstetric indication for interventions. Postpartum hemorrhage was the most common postnatal complication, followed by lower respiratory tract infections and sepsis.(Abhilashi et al., 2018; Justin Paul et al., 2023; Salam et al., 2017)

Neonatal outcomes included a high live birth rate of 100%. Preterm birth, intrauterine growth restriction (IUGR), and respiratory distress were the most common adverse neonatal outcomes. Neonates born to mothers with cardiac disease also had an inherent risk of congenital heart disease, although the incidence was lower in the study compared to other studies.(Abhilashi et al., 2018; Salam et al., 2017)

Contraceptive practices were assessed, with most participants preferring barrier methods. Tubectomy was the most common permanent sterilization method chosen.

IV. CONCLUSION

The study implies that most pregnant women with cardiac disease complicating pregnancy did not mention particular issues during antenatal visits. All pregnant women should have regular cardiac auscultation in addition to a routine obstetric examination, and a cardiologist should confirm any suspicion of heart disease. Moreover, all prenatal patients should receive ECHO screening for early heart disease diagnosis irrespective of gestational age. When spontaneous vaginal birth is planned, it is critical to monitor the patient with heart disease who is complicating pregnancy at all stages of labour. The partograph must be meticulously plotted. As a result, the number of primary sections performed on patients with heart difficulties may drop, while vacuum and outlet forceps deliveries (without fetomaternal compromise) may increase. All heart disease-complicated mothers should be counseled on the appropriate means of contraception throughout the antenatal period. Pregnancy heart disease is connected with severe maternal and perinatal morbidity and mortality.

Limitations of the study

The research was conducted with 247 participants, and a larger sample size is required to generalize the findings. Other associated comorbidities affect maternal and fetal outcomes, causing errors in outcomes. Neonates should be followed up on for late-onset disease because our study only observed them,until discharge, which was a limitation.

No Conflicts of Interest

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