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Maternal heart disease and pregnancy complications: a tertiary hospital experience from Turkiye

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ABSTRACT

Objectives: Maternal heart disease is a leading cause of non-obstetric maternal mortality and morbidity, complicating the necessary physiological changes during pregnancy. This study aimed to evaluate maternal and perinatal outcomes in pregnancies complicated by maternal heart disease.

Methods: A retrospective analysis was conducted from November 2022 to November 2023 at a tertiary care hospital. Ninety-three pregnant women with maternal heart disease were included and categorized into congenital heart disease, rheumatic heart disease, and other cardiac conditions. Data on demographics, obstetric complications, and perinatal outcomes were analyzed.

Results: Among the participants, 47.3% had rheumatic heart disease, 37.6% had other cardiac conditions, and 15.1% had congenital heart disease. Maternal outcomes included a 29% incidence of preterm delivery, and an 8.6% occurrence of fetal growth restriction, and 7.5% of mothers requiring postpartum intensive care. However, no maternal mortality was observed. Neonatal outcomes included a 30.3% admission rate to the neonatal intensive care unit and a 12.9% incidence of respiratory distress syndrome, with no recorded fetal mortality. Outcomes were consistent across the three cardiac disease groups, demonstrating the effectiveness of multidisciplinary care approaches.

Conclusions: Early diagnosis, individualized care, and multidisciplinary management are essential for improving outcomes in pregnancies with maternal heart disease. Despite no observed maternal or fetal mortality, high rates of preterm births and neonatal complications emphasize the need for targeted interventions. Addressing modifiable risk factors like hypertension and obesity is critical. Multicenter studies with larger cohorts are recommended to enhance management strategies.

Keywords: Maternal heart disease, pregnancy outcomes, rheumatic heart disease, neonatal complications, high-risk pregnancies

Maternal heart disease affects 1% to 4% of all pregnancies and is the leading cause of non-obstetric maternal mortality [1-3]. Pregnancies complicated by maternal heart disease are linked to increased maternal morbidity due to obstetric complications including preterm birth, postpartum hemorrhage, placental abruption, miscarriage, heart failure, preeclampsia, eclampsia, higher intensive care unit ad-

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mission rates, and an elevated risk of thromboembolism [4]. Furthermore, prematurity and fetal growth restriction (FGR) are significant factors that elevate fetal morbidity in these cases. Especially in low- and middle-income countries, inadequate prenatal care and delayed diagnosis further increase this risk [5].

To meet the increased metabolic demands of pregnancy and childbirth, significant cardiovascular changes take place [6]. Starting around the fifth week of pregnancy, systemic vasodilation begins, leading to a decrease in systemic vascular resistance [7]. During pregnancy and childbirth, systemic blood volume and stroke volume increase by 30-50%, whereas pulmonary vascular resistance decreases [6, 8]. Healthy pregnant women generally adapt well to these physiological changes. However, the presence of pre-existing or newly diagnosed cardiac dysfunction may impair with these natural physiological adaptations during pregnancy, increasing the risk of adverse maternal, obstetric, fetal, and neonatal outcomes [9]. An inability to adapt to these changes may also serve as an early indicator of previously undiagnosed heart disease [10].

Maternal heart disease has multiple causes, and the prevalence of rheumatic and ischemic heart disease among pregnant women is rising due to hypertension, diabetes, obesity, advanced maternal age, and prior Coronavirus disease 2019 (COVID-19) infection. At the same time, patients with congenital heart disease are surviving longer due to advances in medical treatment [11-16].

Early diagnosis and appropriate management of cardiac conditions during pregnancy, along with increased awareness among both patients and healthcare providers and adherence to established treatment guidelines, can help reduce maternal-fetal morbidity and mortality. This study aimed to present our findings about pregnant women with maternal cardiac disease and their perinatal outcomes. The study focused on patients who were tracked at a tertiary care hospital.

METHODS

This retrospective analysis was conducted in the Perinatology Clinic of Ankara Etlik City Hospital between November 2022 and November 2023. The annual birth rate at our clinic is approximately 12,800. The study included ninety-three patients diagnosed with maternal cardiac disease before, during, or after pregnancy who received medical care at our clinic during the study period. The patients were categorized into three groups: congenital heart disease (e.g., tetralogy of Fallot, patent ductus arteriosus, atrial septal defect), rheumatic heart disease (including mitral valve stenosis, mitral valve regurgitation, aortic valve regurgitation) and other heart diseases (e.g., Brugada syndrome, cardiomyopathy, and arrhythmias).

The study included patients aged 18 to 45, but excluded those who did not continue treatment at our hospital or whose medical data were inaccessible. Demographic data, including age, gravida, parity, and body mass index (BMI), were collected for all patients. The gestational age was determined using the patient's last menstrual period (LMP) as a reference and subsequently verified through ultrasound examination. Parameters such as obstetric complications (premature birth, placental abruption, premature rupture of membranes, gestational diabetes, high blood pressure during pregnancy, miscarriage, etc.), newborn birth weight, gender, APGAR scores at 1 and 5 minutes, need for neonatal intensive care and neonatal sepsis, were all recorded. The patients' cardiac follow-up data, including electrocardiographic and echocardiographic findings, were also evaluated. Patient data were obtained from electronic health records and the hospital's data management system.

The study was conducted under the principles specified in the Declaration of Helsinki. The Ankara Etlik City Hospital's Ethics Committee gave its permission to the study protocol (approval number: 2023-474).

Statistical Analysis

Statistical analysis was conducted using the IBM Corporation SPSS version 22.0 (IBM Corporation, Armonk, NY, USA). The Kolmogorov-Smirnov test was employed to assess adherence to a normal distribution. The descriptive statistics of continuous variables are presented as the "mean±standard deviation" for variables that follow a normal distribution and as the "median (min-max value)" for variables that do not. The chi-squared test or Fisher's exact test was used to compare categorical variables. The independent sample t-test was used to compare continuous variables that were normally distributed, while the Mann-Whitney U test was used to compare continuous variables that

were not normally distributed. A P-value of less than 0.05 was used as the threshold for statistical significance in all tests.

RESULTS

In our study, forty-four of ninety-three patients (47.3%) had rheumatic heart disease, fourteen (15.1%) had congenital heart disease, and thirty-five (37.6%) had other heart diseases that could not be categorized into these two groups (Fig. 1). Maternal heart disease was diagnosed in eighty (86%) patients before pregnancy, in nine (9.7%) patients during pregnancy, and in four (4.3%) patients after pregnancy. The median gestational age at diagnosis was 31 weeks (range: 8–36 weeks).

Table 1 displays the demographic features of pregnant women who have maternal heart disease. The mean age of our patients was 30.05±5.6 years and their body mass index (BMI) was 30.57±4.4 kg/m2. Out of the patients enrolled in the study, four (4.3%) were smokers, four (4.3%) conceived through in vitro fertilization, thirty-two (34.4%) adhered to regular medication and forty-two (45.2%) had never given birth before. The mean gestational age at delivery was 38+2 weeks (range: 23+0 to 41+2 weeks). Of these patients, five (11.4%) patients with rheumatic heart disease and two (14.3%) patients with congenital heart disease, a total of seven (7.5%) patients required intensive care. A total of four (4.3%) patients required a postpartum blood transfusion. Out of the patients involved in the study, 67% underwent a cesarean section for childbirth, while 33% had a normal vaginal delivery. The average hospital stay of our patients was two (0-13) days.

Seventy-nine (84.9%) of ninety-three patients did not have hypertension. Four (4.3%) patients had chronic hypertension before pregnancy. Gestational hypertension occurred in six (6.5%) patients and preeclampsia in four (4.3%) patients during pregnancy. Of the ninety-three patients, two (2.2%) had pregestational diabetes and eight (8.6%) had gestational diabetes. FGR was observed in eight (8.6%) of ninety-three pregnant women with maternal cardiac disease, and intrahepatic cholestasis of pregnancy occurred in one (1.1%) patient. The pregnancies of two (2.2%) patients ended in miscarriage. While polyhydramnios was observed in five (5.4%) patients, oligohydramnios was observed in eight (8.6%) patients.

Table 2 displays the laboratory parameters of pregnant women who have maternal heart disease. The mean prenatal hemoglobin of the patients enrolled in the study was 11.8±1.4 g/dL, while the mean postnatal hemoglobin was 10.5 ±1.4 g/dL. The mean platelet

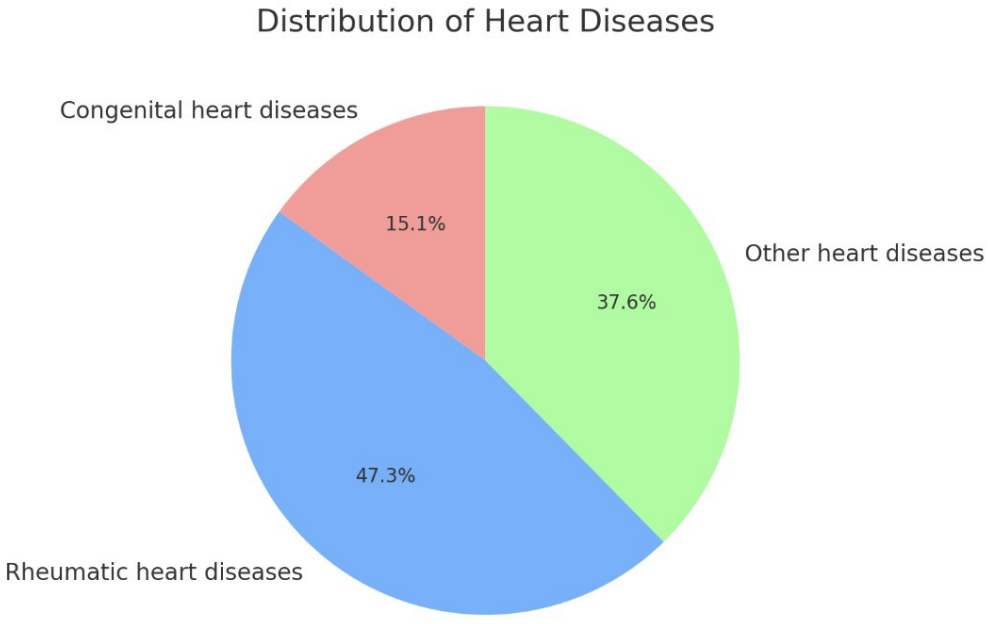

Fig. 1. Distribution of maternal heart diseases included in the study.

Table 1. Demographic characteristics of pregnant women with maternal heart disease

Parameter	Patient group n=93 (100%)	Congenital heart disease n=14 (15.1%)	Rheumatic heart disease n=44 (47.3%)	Others n=35 (37.6%)
Age (years)	30.05±5.6	28.64±5.9	30.18± .8	30.46±5.4
Body mass index (kg/m²)	30.57±4.4	32.51±5.5	30.51±6.4	29.88±3.78
Weight gain during pregnancy (kg)	10 (0-34)	10 (4-24)	11.5 (0-34)	10 (1-32)
Gravida	2 (1-11)	1.5 (1-6)	2 (1-11)	2 (1-6)
Parity	1 (0-4)	0.5 (0-2)	1 (0-4)	1 (0-4)
Nulliparous	42 (45.2)	8 (57.1%)	22 (50)	22 (50)
In vitro fertilization	4 (4.3)	1 (7.1%)	1 (2.3)	1 (2.3)
Smoking	4 (4.3)	1 (7.1%)	1 (2.3)	1 (2.3)
Chronic medication use	32 (34.4)	4 (28.6%)	16 (36.5)	16 (36.5)
Gestational weeks at delivery	38+2 (23+0–41+2)	38+3 (33+6– 41+0)	38+2 (23+0– 41+1)	37+3 (23+5– 41+2)
Hospitalization duration (day)	2 (0-13)	2 (1-6)	2 (0-6)	2 (0-13)
Admission to intensive care unit	7 (7.5)	2 (14.3)	5 (11.4)	0 (0)
Need for blood transfusion	4 (4.3)	0 (0)	3 (6.8)	1 (2.9)
Birth method				
Cesarean section	61 (67)	10 (71.4)	28 (65.1)	23 (67.6)
Normal spontaneous vaginal birth	30 (33)	4 (28.6)	15 (34.9)	11 (32.4)

Data are expressed as mean±standard deviation, median (min-max) or n (%) where appropriate.

count of the patients was 224 (10-502) ×109/L, the mean fibrinogen level was 468.5 (270-844) mg/dL, the thyroid-stimulating hormone level was 2 (0.34-9.43) mIU/L and the albumin level was 36 (25-49) g/L.

An echocardiography was performed in seventy-eight (83.9%) of ninety-three patients, while an electrocardiography (ECG) was performed in all patients.

Table 2. Laboratory parameters of pregnant women with maternal heart disease

Hemoglobin level before birth (g/dL)	11.8±1.4
Hemoglobin level after birth (g/dL)	10.5±1.4
Platelet count (×10⁹/L)	224 (10-502)
Fibrinogen count (mg/dL)	468.5 (270-844)
Thyroid stimulating hormone (mIU/L)	2 (0.34-9.43)
Albumin (g/L)	36 (25-49)

Data are expressed as mean±standard deviation or median (min-max) where appropriate.

No changes were detected in the ECGs of eighty (86%) patients. The pathological changes detected in the ECG are listed in Table 3. Incomplete right bundle branch block was present in five (5.4%) patients participating in the study, negative T wave in four (4.3%) patients, ventricular extrasystole in one (1.1%) patient, precordial ST depression in one (1.1%) patient, interventricular conduction delay in one (1.1%) patient, supraventricular extrasystole in one (1.1%) patient, atrial fibrillation in one patient and ventricular fibrillation in one (1.1%) patient. A simultaneous occurrence of ventricular fibrillation and a negative T wave was observed in one patient's ECG, while a partial right bundle branch block and a negative T wave were observed concurrently in another patient's ECG.

Also, Table 3 shows the symptoms seen in pregnant women with maternal heart disease. Thirteen (14%) of the patients had dyspnea, ten (10.8%) had palpitations, seven (7.5%) had chest pain, six (6.5%) had cardiac arrhythmia and four (4.3%) had lower extremity edema.

Table 3. Pathological changes detected on ECG and symptoms seen in pregnant women with maternal heart disease

	Patient group (n=93)
ECG changes	
Incomplete right bundle branch block	5 (5.4%)
Negative T wave	4 (4.3%)
Ventricular extrasystole	1 (1.1%)
Precordial ST segment depression	1 (1.1%)
Interventricular conduction delay	1 (1.1%)
Supraventricular extrasystole	1 (1.1%)
Atrial fibrillation	1 (1.1%)
Ventricular fibrillation	1 (1.1%)
Symptom	
Dyspnea	13 (14%)
Palpitation	10 (10.8%)
Chest Pain	7 (7.5%)
Arrhythmia	6 (6.5%)
Lower extremity edema	4 (4.3%)
Pulmonary edema	0 (0%)

Data are expressed as n (%). ECG=Electrocardiography

Two (2.2%) out of ninety-three pregnant women with maternal heart disease resulted in miscarriage and not a live birth. There are a total of ninety-three newborns since two (2.2%) of the remaining ninety-one patients were twin pregnancies. Table 4 displays the perinatal results of expectant mothers with maternal heart disease. Out of the infants born to expectant mothers with maternal cardiac disease, fifty-one (54.8%) were female and forty-two (45.2%) were male. The average weight of the newborns was 3 060 (550-4 350) g and their APGAR scores were 9 (3-9) in the first minute and 10 (4-10) in the 5th minute. Twelve (12.9%) of the newborns had respiratory distress syndrome (RDS). Of these, two (14.2%) were in the congenital heart disease group, six (13.6%) in the rheumatic heart disease group, and four (11.4%) in the other heart disease group. Thirty (30.3%) newborns required intensive care. Of these, six (42.9%) belonged to the congenital heart disease group, thirteen (30.2%) to the rheumatic heart disease group, and eleven (32.4%) to the other heart disease group. In four (4.4%) patients, fetal distress developed during delivery. Of these, one (7.1%) belonged to the congenital heart disease group, two (4.7%) to the rheumatic heart disease group and one (2.9%) to the other heart disease group. Preterm birth occurred in twenty-seven (29%) pregnancies. Of these, four (28.6%) belonged to the congenital heart disease group, ten (23.3%) to the rheumatic heart disease group, and thirteen (38.2%) to the other heart disease group. Neonatal sepsis developed in two (2.2%) of the newborns. One (2.9%) of the neonates who developed neonatal sepsis was the child of a mother with rheumatic heart disease, while one (2.9%) belonged to the other heart disease group. Fourteen (15%) neonates received phototherapy due to hyperbilirubinemia. Of these newborns, eight (57.1%) were in the congenital heart disease group, two (14.2%) in the rheumatic heart disease group, and four (28.5%) in the other heart disease group.

In Table 5, patients were divided into two groups: rheumatic and non-rheumatic heart disease, and their demographic data were compared. 44 (47.3%) patients had rheumatic heart disease, while 49 (52.7%) patients belonged to the non-rheumatic heart disease group. maternal age, BMI, weight gain during pregnancy, gravida, parity, and nulliparity were similar in both groups (P=0.838, P=0.912, P=0.344, P=0.565, P=0.971, and P=0.374, respectively). One (2.3%) of the pregnant women with rheumatic heart disease and three (6.1%) of the pregnant women with non-rheumatic heart disease were in vitro fertilization pregnant women, and there was a similarity between the groups (P=0.619). Smoking and postpartum blood transfusion requirements were also similar between groups (P=0.619 and P=0.341, respectively). Gestational weeks at delivery, length of postnatal hospital stay, admission to the neonatal intensive care unit (NICU) and birth method were similar in both groups (P=0.814, P=0.227, P=0.219 and P=0.713, respectively).

Table 6 compares the perinatal outcomes of patients with rheumatic heart disease and non-rheumatic heart disease. Fetal gender, fetal weight, APGAR score at the first minute, and APGAR score at the fifth minute were similar between the two groups (P=0.435, P=0.853, P=0.837 and P=0.849, respectively). RDS, NICU admission, fetal distress, and preterm birth rates were also similar between the two groups (P=0.989, P=0.599, P=1, and P=0.205, respectively).

Table 7 shows the laboratory values of patients

Table 4. Perinatal outcomes of pregnant women with maternal heart disease

Parameter	Patient group n=93 (100%)	Congenital Heart disease n=14 (15.1%)	Rheumatic heart disease n=44 (47.3%)	Others n=35 (37.6%)
Gender				
Female	51 (54.8%)	7 (50%)	26 (59.1%)	18 (51.4%)
Male	42 (45.2%)	7 (50%)	18 (40.9%)	17 (48.6%)
Fetal weight (gr)	3060 (550-4350)	3210 (1890-3820)	3000 (550-4350)	3000 (850-3880)
1st min. APGAR	9 (3-9)	9 (5-9)	9 (3-9)	9 (5-9)
5th min. APGAR	10 (4-10)	10 (6-10)	10 (4-10)	10 (7-10)
Respiratory distress syndrome	12 (12.9%)	2 (14.2%)	6 (13.6%)	4 (11.4%)
Admission to neonatal intensive care unit	30 (30.3%)	6 (42.9%)	13 (30.2%)	11 (32.4%)
Fetal distress	4 (4.4%)	1 (7.1%)	2 (4.7%)	1 (2.9%)
Preterm birth	27 (29%)	4 (28.6%)	10 (23.3%)	13 (38.2%)
Neonatal sepsis	2 (2.2%)	0	1 (2.9%)	1 (2.9%)
Need for phototherapy	14 (15%)	8 (57.1%)	2 (14.2%)	4 (28.5%)

Data are expressed as median (min-max) or n (%) where appropriate.

Table 5. Comparison of demographic characteristics according to patients with rheumatic or non-rheumatic heart disease

	Rheumatic heart disease n=44 (47.3%)	Non-rheumatic heart disease n=49 (52.7%)	P value
Age (years)	30.18±5.8	29.94±5.59	0.838[a]
Body mass index (kg/m²)	30.51±6.5	30.64±4.5	0.912[a]
Weight gain during pregnancy (kg)	11.5 (0-34)	10 (1-32)	0.344[b]
Gravida	2 (1-11)	2 (1-6)	0.565[b]
Parity	1 (0-4)	1 (0-4)	0.971[b]
Nulliparous	22 (50%)	20 (40.8%)	0.374[c]
In vitro fertilization	1 (2.3%)	3 (6.1%)	0.619[d]
Smoking	1 (2.3%)	3 (6.1%)	0.619[d]
Gestational weeks at delivery	38+2 (23+0-41+1)	38 (23+5-41+2)	0.814[b]
Hospitalization duration (day)	2 (0-6)	2 (0-13)	0.227[b]
Admission to the intensive care unit	5 (11.4%)	2 (4.1%)	0.219[d]
Need for blood transfusion	3 (6.8%)	1 (2%)	0.341[d]
Birth method			0.713[c]
Cesarean section	28 (65.1%)	33 (68.8%)	
Normal spontaneous vaginal birth	15 (34.9%)	15 (31.3%)	

Data are expressed as mean±standard deviation, median (min-max) or n (%) where appropriate.
[a]Student t-test, [b]Mann Withney-U, [c]Pearson chi square, [d]Fisher's exact test

Table 6. Perinatal outcomes of pregnant women according to rheumatic or non-rheumatic heart disease

Parameters	Rheumatic heart disease n=44 (47.3%)	Non-Rheumatic heart disease n=49 (52.7%)	P value
Gender			0.435[a]
Female	26 (59.1%)	25 (51%)	
Male	18 (40.9%)	24 (49%)	
Fetal weight (gr)	3000 (550-4350)	3080 (850-3880)	0.853[b]
1st min. APGAR	9 (3-9)	9 (5-9)	0.837[b]
5th min. APGAR	10 (4-10)	10 (6-10)	0.849[b]
Respiratory morbidity	6 (13.6%)	6 (12.2%)	0.989[a]
Admission to neonatal intensive care unit	13 (30.2%)	17 (35.4%)	0.599[a]
Fetal distress	2 (4.7%)	2 (4.2%)	1[c]
Preterm birth	10 (23.3%)	17 (35.4%)	0.205[a]

Data are expressed as median (min-max) or n (%) where appropriate.
[a]Pearson chi square, [b]Mann Withney-U, [c]Fisher's exact test

with rheumatic and non-rheumatic heart disease. Hemoglobin levels before birth, hemoglobin levels after birth, platelets, fibrinogen, and albumin were similar between the groups (P=0.156, P=0.827, P=0.080, P=0.587, and P=0.656, respectively).

DISCUSSION

Our study provides a current evaluation of maternal and neonatal complications in pregnant women with maternal heart disease. Rheumatic heart disease was the most common, affecting 47.3% of the patients. Additionally, hypertensive disorders were the most frequently observed comorbidity, present in 15.1% of pregnant women with maternal heart disease. In our study, the mean age of pregnant women with heart disease was below 35 years and 86% of them were diagnosed before getting pregnant. Seven patients (7.5%) required postpartum intensive care and no maternal mortality was observed. Preterm birth occurred in twenty-seven (29%) of the cases. Among the neonates, thirty (30.3%) required NICU, twelve (12.9%) developed RDS, two (2.2%) developed neonatal sepsis, and

Table 7. Comparison of laboratory parameters of pregnant women according to rheumatic or non-rheumatic heart disease

Parameters	Rheumatic heart disease n=44 (47.3%)	Non-rheumatic heart disease n=49 (52.7%)	P value
Hemoglobin level before birth (g/dL)	12.06±1.32	11.65±1.44	0.156[a]
Hemoglobin level after birth (g/dL)	10.55±1.57	10.61±1.27	0.827[a]
Platelet count ($\times 10^9$/L)	229 (11-502)	215 (99-373)	0.080[b]
Fibrinogen count (mg/dL)	468 (270-844)	469 (346-739)	0.587[b]
Albumin (g/L)	36 (25-46)	35 (26-49)	0.656[b]

Data are expressed as mean±standard deviation, median (min-max).
[a]Student t-test, [b]Mann Withney-U,

fourteen (15%) required phototherapy. No fetal mortality was observed.

The etiology of maternal heart disease is multifactorial, with rheumatic heart disease being the predominant condition observed during pregnancy [15, 17]. In a study by Subbaiah *et al*. [18] which examined the outcomes of pregnant women with maternal heart disease, rheumatic heart disease was predominant, affecting 64% of the patients. That study included one hundred patients with maternal heart disease and reported an 18% rate of fetal complications. In addition, twelve patients had gestational diabetes mellitus and nine had hypertensive pregnancy disorders [18]. In a study by Madazlı *et al*. [19], the outcomes of 144 pregnant women with maternal heart disease were analyzed, with 87.5% of these patients having rheumatic heart disease. Maternal morbidity was observed in sixteen cases (11.1%) and perinatal mortality in six cases (4.2%) [19]. In their review, Drenthen *et al*. [20] examined the pregnancy outcomes of patients with congenital heart defects. While most of them experienced a healthy pregnancy, maternal morbidity was observed in 11% of patients, with heart failure developing most frequently in these patients [20]. In our study, 47.3% of patients had rheumatic heart disease and 15.1% had congenital heart disease, with rheumatic heart disease being the predominant group. The most common concomitant disease in maternal heart disease was hypertension, followed by diabetes mellitus patients. There was no maternal mortality among our patients. When looking at patients with and without rheumatic heart disease, maternal and perinatal morbidity rates were similar. These findings underscore the need for early detection, risk stratification, and implementation of personalized care plans, especially in areas where rheumatic heart disease is common.

Prematurity and fetal growth restriction are prevalent factors that contribute to increased fetal morbidity in pregnant women with maternal cardiac disease [5]. In a prospective study by Beaton *et al*. [21] conducted at three centers, the prevalence of maternal heart disease and perinatal outcomes were assessed. Out of fifty-four patients with maternal heart disease, fifty-one (87.9%) had rheumatic heart disease. This study reported one maternal death and three cases of fetal morbidity, with all three pregnancies resulting in preterm labor [21]. In their meta-analysis of rheumatic heart disease, Liaw *et al*. [22] evaluated a total of 11 studies and found a high rate of premature births (9.35%-42.97%), FGR (6.76%-22.40%) and perinatal deaths (0.00%-9.41%) in rheumatic heart disease [22]. Nyugen Manh *et al*. [5] conducted a study to examine the connection between maternal heart illness and FGR. They discovered that FGR occurred in 9.15% of the cases, indicating a notable correlation with maternal heart disease [5]. Similarly, Khanna *et al*. [23] included 80 pregnant women in their descriptive study. 4 (5%) of the pregnant women with rheumatic heart disease had FGR and 19 (23.7%) had preterm delivery. A further investigation conducted by Rezk *et al*. [24] analyzed the rates of maternal and fetal mortality and morbidity in a sample of 192 pregnant women diagnosed with rheumatic heart disease. The study revealed elevated rates of maternal illness in both cohorts, accompanied by heightened rates of preterm birth and hospitalizations to the neonatal critical care unit [24]. In our study, there was no significant difference in perinatal mortality and morbidity between the groups with and without rheumatic heart disease. As indicated, no fetal mortality was observed in our study, while preterm birth was the most significant factor contributing to fetal morbidity, occurring in twenty-seven cases (29%). The rate of FGR among our patients was 8.6%, with eight patients affected. The fact that no fetal mortality was observed demonstrates the effectiveness of the multidisciplinary treatment approaches implemented in a tertiary health center. However, these complication rates in high-risk pregnancies highlight once again the need for more effective strategies for the management of maternal heart disease.

Limitations

This study has some limitations. First, the generalizability of the results and the assessment of cause-effect relationships is limited due to the single-center and retrospective study design. The small sample size can reduce statistical power, especially when comparing subgroups. In addition, the lack of detailed information on the specific treatment protocols applied to the patients makes it difficult to assess the impact of treatment approaches on outcomes. Future multicentre and prospective studies can be planned to improve the generalizability of the results and data quality.

CONCLUSION

This study comprehensively evaluates maternal and neonatal outcomes in pregnancies complicated by maternal heart disease and emphasizes the critical importance of early diagnosis, regular follow-up, and multidisciplinary management. The fact that there was no maternal mortality in our study demonstrates the potential benefits of effective prenatal care, individualized treatment plans, and coordinated efforts by healthcare teams. However, the high rates of preterm births (29%), the need for NICU (30.3%), and RDS (12.9%) highlight the ongoing challenges in dealing with these high-risk pregnancies. It also emphasizes the importance of interventions targeting modifiable risk factors such as hypertension, diabetes, and obesity, which are common in this patient group. Public health strategies to reduce these risk factors, raise awareness, and provide pre-conception counseling can be effective in reducing the risks associated with maternal heart disease. Multicenter studies with larger sample groups can contribute to the development of management strategies by providing more comprehensive information on the impact of maternal heart disease on pregnancy.

Ethical Statement

The study was conducted under the principles specified in the Declaration of Helsinki. The Ankara Etlik City Hospital's Ethics Committee gave its permission to the study protocol (approval number: 2023-474 and date 16.08.2023).

Authors' Contribution

Study Conception: GK; Study Design: GK; Supervision: ATÇ; Funding: N/A; Materials: HA, Sİ; Data Collection and/or Processing: ZS, AAF, UK; Statistical Analysis and/or Data Interpretation: UK, AAF; Literature Review: GK; Manuscript Preparation: GK; and Critical Review: GK, ATÇ.

Conflict of interest

The authors disclosed no conflict of interest during the preparation or publication of this manuscript.

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