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ORIGINAL ARTICLE

Maternal and Fetal Outcome in Cardiac Patients a Cross-Sectional Study at Tertiary Care Setting

ZAREENA BEGUM[1], ASMA GHANI[2], AHMAD FAWAD[3], HAFIZA NIDA MUMTAZ[4], SHAZIA FIRDOS CHOHAN[5], NAUREEN GHANI[6]
[1]*Assistant Professor, Department of Obstetrics and Gynecology, Saidu Group of Teaching Hospitals, Swat*
[2]*Senior Registrar, Department of Obstetrics and Gynecology, Mercy Teaching Hospital / Peshawar Medical College, Peshawar*
[3]*Associate Professor, Department of Cardiology, North West General Hospital, Peshawar*
[4]*Senior Registrar, Department of Obstetrics and Gynaecology, Swat Medical College, Saidu Sharif Swat.*
[5]*Assistant Professor, Department of Obstetrics and Gynecology, Pak Emirates Military Hospital, Rawalpindi*
[6]*Gynaecologist, Department of Obstetrics and Gynecology, PNS Hafeez Hospital, Islamabad*
Correspondence to: Asma Ghani, Email: aleezay1987@gmail.com

ABSTRACT

Background: In low-resource settings, when specialist treatment is unavailable, cardiovascular disease during pregnancy presents severe hazards to the health of both the mother and the fetus.

Objective: To assess maternal and fetal outcomes in pregnant women with cardiac disease admitted to a tertiary care hospital, identifying common cardiac conditions, associated complications, and predictors of adverse outcomes.

Methodology: This cross-sectional study was conducted at the Department of Obstetrics and Gynecology, Saidu Group of Teaching Hospitals, Swat and North West General Hospital, Peshawar over one year (June, 2022 to May 2023). In all, 164 pregnant women who had a history of heart problems were considered. Information on the patient's demographics, heart condition (type and severity), pregnancy, challenges throughout pregnancy, foetal outcomes, and neonatal health were culled from clinical records. Data was summarized using descriptive statistics, and relationships between maternal cardiac problems and fetal outcomes were analyzed using t-tests, with a p-value less than 0.05 being deemed statistically significant.

Results: Out of all cardiac conditions, rheumatic heart disease accounted for 37.80% of cases, congenital heart disease for 29.27%, cardiomyopathies for 19.51%, and ischemic heart disease for 13.41%. Heart failure (25.61%), arrhythmias (21.95%), thromboembolic events (10.98%), and pulmonary edema (12.20%) were among the maternal problems that contributed to the 4.88% maternal death rate. Preterm delivery (45.12%), intrauterine growth restriction (23.17%), and stillbirth (8.54%) were all notable fetal problems; 25.61% of these babies needed to be admitted to the neonatal intensive care unit (NICU). The rates of preterm delivery (53.13%, p = 0.03), NICU hospitalizations (34.38%, p = 0.02), and stillbirth (15.63%, p = 0.01) were greatest among cardiomyopathies, indicating a substantial connection between the severity of the maternal condition and bad newborn outcomes.

Conclusion: Early risk assessment and multidisciplinary care are necessary to enhance maternal and newborn outcomes when maternal heart illness is present, since it is linked with major pregnancy problems.

Keywords: Maternal cardiac disease, pregnancy outcomes, rheumatic heart disease, congenital heart disease.

INTRODUCTION

Globally, cardiovascular disease (CVD) is a major cause of illness and death among mothers. It can be especially difficult during pregnancy because of changes in the body that affect the circulatory system[1]. Pre-existing heart conditions can get worse or previously undiscovered heart diseases can be revealed by the body's higher metabolic needs and blood volume during pregnancy[2]. This can cause problems for both the mother and the baby. It's even more important to take extra care of pregnant women with heart disease in poor countries, where it can be hard to get expert heart and maternity care[3].

There are many types of heart diseases that can happen during pregnancy, such as congenital heart diseases (CHD), rheumatic heart diseases (RHD), ischemic heart diseases (IHD), and cardiomyopathies[4,5]. The type and intensity of a heart problem have a big effect on how well the mother and baby do. There are risks for heart failure, arrhythmias, thromboembolic events, prenatal growth restriction, early birth, and death[6]. Obstetricians, cardiologists, and anesthesiologists must work together to make sure that these high-risk situations are managed in a way that is best for both the mother and the baby[7].

Studies have shown that early detection and the right kind of help can lower the risk of bad results during pregnancy in people who have heart problems[8]. But there is still not a lot of information on what happens to the mother and baby when a pregnant woman with heart disease, especially in places with few resources[9]. It is important to know the range of problems that can happen to the mother and the baby, as well as the things that put people at risk for bad results, in order to improve care and make policy suggestions[10,11].

The goal of this cross-sectional study is to look at what happens to the mother and baby when pregnant women with heart disease go to a tertiary care hospital. This study will give us important information about the load and effects of cardiovascular conditions on the health of mothers and babies by looking at the types, rates, and consequences of cardiovascular disease during pregnancy.

Research Objective: To assess the maternal and fetal outcomes in pregnant women with cardiac disease admitted to a tertiary care hospital, with a focus on identifying the types of cardiac conditions, associated complications, and potential predictors of adverse outcomes.

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METHODOLOGY

Study Design and Setting: This cross-sectional study was conducted at the Department of Obstetrics and Gynecology, Saidu Group of Teaching Hospitals, Swat and North West General Hospital, Peshawar, over a period of one year, from June 2022 to May 2023.

Inclusion and Exclusion Criteria: Women of any age or parity who were hospitalized throughout the research period due to a cardiac diagnosis were included. Excluded from the study were patients whose medical records were missing or incomplete, women whose pregnancies were negatively impacted by non-cardiac medical issues, and patients who were lost to follow-up.

Sample Size: A total of 164 pregnant women with diagnosed cardiac disease were included in the study using a convenient sampling technique.

Data Collection: Demographic information, heart illness type and severity, birth method, obstetric history, maternal problems, foetal outcomes, and neonatal status were all culled from patients' medical records. For the sake of uniformity and precision, we used standardized data gathering forms.

Statistical Analysis: The data was summarized using descriptive statistics. Means and standard deviations were used to represent

continuous data, whilst percentages and frequencies were used for categorical variables. We used t-tests to look for links between the mother's heart health and the baby's health outcomes. Statistical significance was determined by a p-value less than 0.05.

Ethical Approval: The research could not begin without first obtaining ethical permission from the institutions' review boards. Every participant was required to provide their informed permission, and all patient information was kept totally secret.

RESULTS

The study's 164 pregnant women with heart illness were characterized by the following demographic variables, as shown in Table 1. Of the total participants, 53.66 percent were in the 20–30 age bracket, with 31.71 percent being in the 31–40 age bracket. Only 7.32 percent were either under the age of 20 or beyond the age of 40. In terms of parity, 52.44 percent were multigravida and 47.56 percent were primigravida. When it came to the gestational age at delivery, over half of the women (54.88%) had a full-term delivery (>37 weeks), while almost a third had a late preterm delivery (34-37 weeks) and nearly 15% had an early preterm birth (<34 weeks).

Table 1: Demographic Characteristics of Study Participants

Variable		Frequency (n)	Percentage (%)
Age (years)	< 20	12	7.32
	20 – 30	88	53.66
	31 – 40	52	31.71
	> 40	12	7.32
Parity	Primigravida	78	47.56
	Multigravida	86	52.44
Gestational Age at Delivery (weeks)	< 34	26	15.85
	34 – 37	48	29.27
	> 37	90	54.88

The prevalence of various heart disorders among the research subjects is shown in Figure 1. Of the women surveyed, 37.80% had rheumatic heart disease (RHD), and 29.27% had congenital heart disease (CHD). Ischemic heart disease (IHD) affected 13.41% of the subjects, whereas cardiomyopathies affected 19.51 %. The prevalence of both congenital and acquired heart disorders in pregnant women is brought to light by these results.

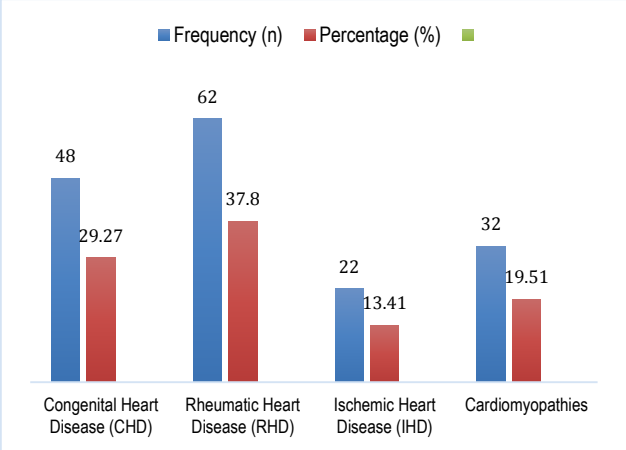

Figure 1: Distribution of Cardiac Disease Types and Severity

The research participants' heart disease severity is shown in Figure 2. There was a considerable percentage with mild illness (43.90%), moderate severity (35.37%), and severe disease (20.73%). In order to comprehend the effects of risk stratification on maternal and foetal outcomes, this categorization is essential for pregnant women with cardiac problems.

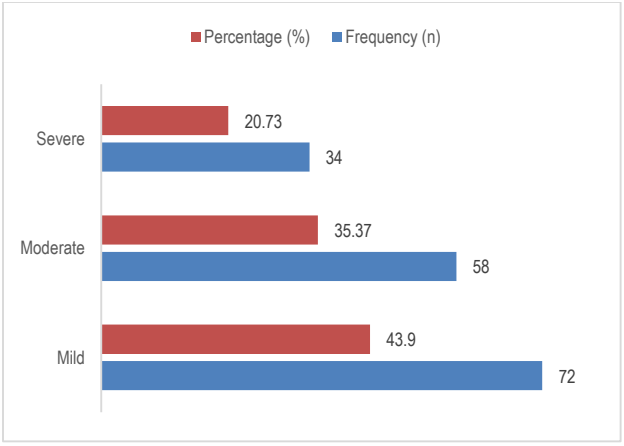

Figure 2: Severity of Cardiac Disease

Table 2 displays the participants' obstetric history along with the manner of delivery. A sizeable minority (23.17%) had suffered a prior miscarriage, and a further 17.68% had been born prematurely in a prior pregnancy. In terms of delivery method, 52.44 percent of women had caesarean sections and 47.56 percent gave birth vaginally. This suggests that cardiac patients are more likely to have surgical intervention in order to reduce risks to both the mother and the unborn child.

Table 2: Obstetric History and Mode of Delivery (n = 164)

Variable		Frequency (n)	Percentage (%)
Obstetric History	Previous Miscarriage	38	23.17
	Previous Preterm Birth	29	17.68
Mode of Delivery	Vaginal Delivery	78	47.56
	Cesarean Section	86	52.44

Figure 3 shows the study's findings on maternal problems. With 25.61% of cases, heart failure was the most prevalent complication, followed by 21.95% with arrhythmias. Twelve percent of the subjects had pulmonary edema, and ten percent had thromboembolic events. The significant rate of maternal death (4.88% of cases) underscores the serious dangers pregnant women with heart problems face.

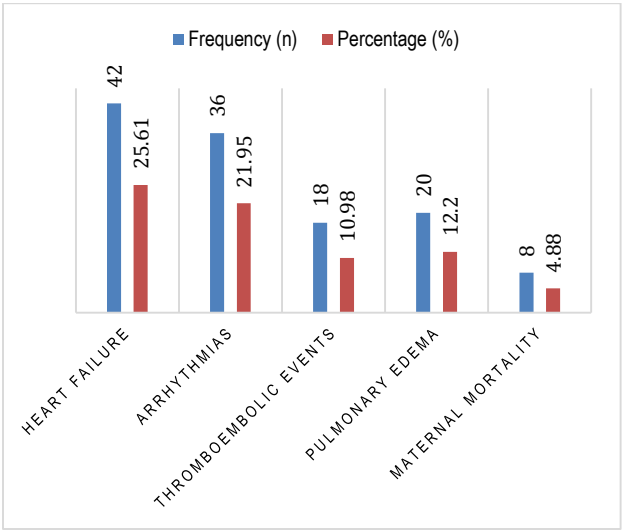

Figure 3: Maternal Complications

Fetal outcomes in the study population are summarized in Table 3. A quarter of the neonates showed signs of intrauterine growth restriction (IUGR), and almost half of them were born prematurely (before 37 weeks). There is a significant burden of fetal problems in pregnancies complicated by maternal cardiac illness, as 8.54% of cases resulted in stillbirths and 25.61% of newborns needed to be admitted to the neonatal intensive care unit (NICU).

Table 3: Fetal Outcomes

Outcome	Frequency (n)	Percentage (%)
Preterm Birth (<37 weeks)	74	45.12
Intrauterine Growth Restriction (IUGR)	38	23.17
Stillbirth	14	8.54
Neonatal Intensive Care Unit (NICU) Admission	42	25.61

The neonatal state at birth is detailed in Table 4. A low birth weight of less than 2.5 kg was recorded by 40.24 percent of the neonates, while 59.76 percent had a normal birth weight of more than 2.5 kg. Also, at 5 minutes, 13.41% of the newborns had an APGAR score below 7, which indicates that they were in distress as neonates. Maternal heart illness significantly impacted infant survival, as 6.10 percent of cases were classified as neonatal fatality.

Table 4: Neonatal Status at Birth

Neonatal Status	Frequency (n)	Percentage (%)
Normal Birth Weight (>2.5 kg)	98	59.76
Low Birth Weight (<2.5 kg)	66	40.24
APGAR Score <7 at 5 minutes	22	13.41
Neonatal Mortality	10	6.10

In Table 5, we can see the results of the t-tests that investigated the correlation between various maternal cardiac abnormalities and fetal outcomes. Infants born to moms with cardiomyopathies had the lowest mean birth weight (2.35 ± 0.60 kg), whereas those born to mothers with ischemic heart disease (2.40 ± 0.55 kg), recurrent heart disease (2.55 ± 0.50 kg), and congenital heart defect (2.60 ± 0.45 kg) had the next lowest. For pregnancies with cardiomyopathies, the rates of preterm delivery (53.13%) and NICU hospitalizations (34.38%) were the greatest, followed by IHD during pregnancy complications. The rates of stillbirth were also higher in situations with cardiomyopathy (15.63%) and IHD (13.64%). These results highlight the important influence of maternal cardiac abnormalities on fetal outcomes, as shown by their statistical significance ($p < 0.05$).

Table 5: Association between Maternal Cardiac Conditions and Fetal Outcomes (t-Test Analysis, n = 164)

Maternal Cardiac Condition	Mean Birth Weight (kg) ± SD	Preterm Birth (%)	NICU Admission (%)	Stillbirth (%)	p-value
Congenital Heart Disease (CHD)	2.60 ± 0.45	41.67	22.92	6.25	0.031
Rheumatic Heart Disease (RHD)	2.55 ± 0.50	46.77	24.19	8.06	0.045
Ischemic Heart Disease (IHD)	2.40 ± 0.55	50.00	31.82	13.64	0.012
Cardiomyopathies	2.35 ± 0.60	53.13	34.38	15.63	0.008

DISCUSSION

The results of this study show that a mother's heart disease has a big effect on both her and her baby's health. Rheumatic heart disease (RHD), which affected 37.80% of the people in our study, was the most common heart problem. It was followed by congenital heart disease (CHD), which affected 29.27%, cardiomyopathies, which affected 19.51%, and ischemic heart disease (IHD), which affected 13.41%. These results are similar to those of earlier research that found that RHD is still the most common heart problem in pregnant women because of the high number of undiagnosed streptococcal illnesses and the limited availability of early medical care[12]. A study by Dooley et al. also found that RHD was common in low- and middle-income countries, which stresses the importance of early screening and the right kind of care[13].

A lot of problems happened to the mothers in our study. Heart failure was the most common (25.61%), then arrhythmias (21.95%), lung edema (12.20%), and thromboembolic events (10.98%). It was found that 4.88% of the time, the mother died. These results are similar to those of an earlier study that found that women with heart disease are much more likely to develop heart failure and arrhythmias during pregnancy because of the extra stress that pregnancy puts on the body's blood vessels[14]. A similar study done in the US also found that the death rate for mothers with heart disease ranged from 3% to 7%, especially for those with serious heart disease[15]. This shows that heart problems during pregnancy are very dangerous.

Preterm birth, intrauterine growth restriction (IUGR), and stillbirths happened in 45.12% of cases, 23.17% of cases, and 8.54% of cases, respectively. Besides that, 25.61% of babies needed to be admitted to the newborn intensive care unit (NICU). A study by Presbitero et al. found that women with heart problems during pregnancy had similar rates of preterm birth (40% to 50%). This was especially true for women with cyanotic congenital heart disease and cardiomyopathies[16]. Another study found a death rate of about 9%, which is similar to ours. This suggests that fetal problems are still a big worry in pregnancies that are complicated by heart disease[17].

Our study found that 40.24% of babies had a low birth weight (<2.5 kg) and 13.41% had an APGAR score of <7 at 5 minutes. There was neonatal death in 6.10 percent of cases. Similar results were found by Parikh et al., who showed that low birth weight and bad effects for the baby are more common in pregnancies where the mother has cardiovascular disease because the placenta isn't working properly and the baby's blood flow is slowed down[18]. Our t-test analysis also showed a strong link between heart problems in the mother and bad outcomes for the baby. Heart problems in the mother with cardiomyopathies and IHD had the highest rates of preterm birth (53.13% and 50%, respectively), NICU admissions (34.38% and 31.82%), and stillbirths (15.63% and 13.64%). These results agree with those of an earlier study that found a link between the seriousness of a mother's heart disease and worse outcomes for the baby. This shows how important it is to start risk stratification early and have multidisciplinary care for these high-risk pregnancies[19].

Study Strengths and Limitations: This research adds to the little evidence that is currently available from low-resource countries about the outcomes for both the mother and the unborn child of pregnant women with heart illness who get tertiary treatment. This study's strength is in the thorough examination of various heart abnormalities, their severity, and their correlation with newborn and mother outcomes. To achieve an acceptable sample size for statistical analysis, 164 individuals were included throughout a one-year period. Findings are also more reliable when consistent data gathering procedures are used. Having said that, there are several caveats to the research. The results may not apply to other populations with various healthcare systems, as the research was conducted in just one location. Unfortunately, the cross-sectional design makes it difficult to draw any firm conclusions about a cause-and-effect link between maternal heart illness and unfavorable pregnancy outcomes. In addition, the research may have suffered from selection bias due to its reliance on hospital records; specifically, it only included admitted patients, which might

have underrepresented less severe cases handled at the outpatient level.

CONCLUSION

High rates of maternal and foetal problems are associated with maternal heart illness, which this research shows to have a major influence on pregnancy outcomes. The cardiac disorder that was most often encountered was rheumatic heart disease. The results highlight the need of specialist prenatal care, early risk assessment, and interdisciplinary therapy for pregnant women with heart illness in order to enhance outcomes for both the mother and the fetus. This high-risk group needs intervention techniques and long-term follow-up to improve prenatal care, since maternal morbidity and newborn problems are common.

REFERENCES

1. Mocumbi AO, Sliwa K, Soma-Pillay P. Medical disease as a cause of maternal mortality: the pre-imminence of cardiovascular pathology: review articles. Cardiovascular journal of Africa. 2016 Mar 1;27(2):84-8. https://hdl.handle.net/10520/EJC188687.
2. Ramlakhan, K.P., Johnson, M.R. & Roos-Hesselink, J.W. Pregnancy and cardiovascular disease. Nat Rev Cardiol 17, 718–731 (2020). https://doi.org/10.1038/s41569-020-0390-z
3. Roos-Hesselink JW, Ruys TP, Stein JI, Thilen U, Webb GD, Niwa K, Kaemmerer H, Baumgartner H, Budts W, Maggioni AP, Tavazzi L. Outcome of pregnancy in patients with structural or ischaemic heart disease: results of a registry of the European Society of Cardiology. European heart journal. 2013 Mar 1;34(9):657-65. https://doi.org/10.1093/eurheartj/ehs270.
4. Brickner ME. Cardiovascular management in pregnancy: congenital heart disease. Circulation. 2014 Jul 15;130(3):273-82. https://doi.org/10.1161/CIRCULATIONAHA.113.002105
5. Nguyen Manh T, Bui Van N, Le Thi H, Vo Hoang L, Nguyen Si Anh H, Trinh Thi Thu H, Nguyen Xuan T, Vu Thi N, Minh LB, Chu DT. Pregnancy with heart disease: maternal outcomes and risk factors for fetal growth restriction. International Journal of Environmental Research and Public Health. 2019 Jun;16(12):2075. https://doi.org/10.3390/ijerph16122075.
6. Siu SC, Colman JM, Sorensen S, Smallhorn JF, Farine D, Amankwah KS, Spears JC, Sermer M. Adverse neonatal and cardiac outcomes are more common in pregnant women with cardiac disease. Circulation. 2002 May 7;105(18):2179-84. https://doi.org/10.1161/01.CIR.0000015699.48605.08
7. Arendt KW, Lindley KJ. Obstetric anesthesia management of the patient with cardiac disease. International journal of obstetric anesthesia. 2019 Feb 1;37:73-85. https://doi.org/10.1016/j.ijoa.2018.09.011.
8. Sattar N, Greer IA. Pregnancy complications and maternal cardiovascular risk: opportunities for intervention and screening?. Bmj. 2002 Jul 20;325(7356):157-60. doi: https://doi.org/10.1136/bmj.325.7356.157 .
9. Poli PA, Orang'o EO, Mwangi A, Barasa FA. Factors Related to Maternal Adverse Outcomes in Pregnant Women with Cardiac Disease in Low-resource Settings. Eur Cardiol. 2020 Nov 13;15:e68. doi: 10.15420/ecr.2020.04.
10. Allotey J, Fernandez S, Bonet M, Stallings E, Yap M, Kew T, Zhou D, Coomar D, Sheikh J, Lawson H, Ansari K. Clinical manifestations, risk factors, and maternal and perinatal outcomes of coronavirus disease 2019 in pregnancy: living systematic review and meta-analysis. bmj. 2020 Sep 1;370. doi: https://doi.org/10.1136/bmj.m3320.
11. SM SC, Sermer M, Harrison DA, Grigoriadis E, Liu G, Sorensen S, BS JF, Farine D, Amankwah KS, Spears JC, Colman JM. Risk and predictors for pregnancy-related complications in women with heart disease. Circulation. 1997 Nov 4;96(9):2789-94. https://doi.org/10.1161/01.CIR.96.9.2789.
12. Peters F, Karthikeyan G, Abrams J, Muhwava L, Zühlke L. Rheumatic heart disease: current status of diagnosis and therapy. Cardiovasc Diagn Ther. 2020 Apr;10(2):305-315. doi: 10.21037/cdt.2019.10.07.
13. Dooley LM, Ahmad TB, Pandey M, Good MF, Kotiw M. Rheumatic heart disease: a review of the current status of global research activity. Autoimmunity reviews. 2021 Feb 1;20(2):102740. https://doi.org/10.1016/j.autrev.2020.102740.
14. Tamirisa KP, Dye C, Bond RM, Hollier LM, Marinescu K, Vaseghi M, Russo AM, Gulati M, Volgman AS. Arrhythmias and heart failure in pregnancy: a dialogue on multidisciplinary collaboration. Journal of cardiovascular development and disease. 2022 Jun 24;9(7):199. https://doi.org/10.3390/jcdd9070199.
15. Callaghan WM, Creanga AA, Kuklina EV. Severe maternal morbidity among delivery and postpartum hospitalizations in the United States. Obstetrics & Gynecology. 2012 Nov 1;120(5):1029-36. DOI: http://10.1097/AOG.0b013e31826d60c5.
16. Presbitero P, Somerville J, Stone S, Aruta E, Spiegelhalter D, Rabajoli F. Pregnancy in cyanotic congenital heart disease. Outcome of mother and fetus. Circulation. 1994 Jun;89(6):2673-6. https://doi.org/10.1161/01.CIR.89.6.2673.
17. Grandi SM, Filion KB, Yoon S, Ayele HT, Doyle CM, Hutcheon JA, Smith GN, Gore GC, Ray JG, Nerenberg K, Platt RW. Cardiovascular disease-related morbidity and mortality in women with a history of pregnancy complications: systematic review and meta-analysis. Circulation. 2019 Feb 19;139(8):1069-79. https://doi.org/10.1161/CIRCULATIONAHA.118.036748.
18. Parikh NI, Gonzalez JM, Anderson CA, Judd SE, Rexrode KM, Hlatky MA, Gunderson EP, Stuart JJ, Vaidya D, American Heart Association Council on Epidemiology and Prevention; Council on Arteriosclerosis, Thrombosis and Vascular Biology; Council on Cardiovascular and Stroke Nursing; and the Stroke Council. Adverse pregnancy outcomes and cardiovascular disease risk: unique opportunities for cardiovascular disease prevention in women: a scientific statement from the American Heart Association. Circulation. 2021 May 4;143(18):e902-16. https://doi.org/10.1161/CIR.0000000000000961.
19. Siu SC, Sermer M, Colman JM, Alvarez AN, Mercier LA, Morton BC, Kells CM, Bergin ML, Kiess MC, Marcotte F, Taylor DA. Prospective multicenter study of pregnancy outcomes in women with heart disease. Circulation. 2001 Jul 31;104(5):515-21. https://doi.org/10.1161/hc3001.093437.

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