

**Retrospective Study of Pregnancy Outcomes in Women with Heart Disease**<sup>1</sup>Dr. M. P. A Sai Lakshmi, <sup>2</sup>Dr. Swetha. N**Corresponding Author:** Dr. Swetha. N**How to citation this article:** Dr. M. P. A Sai Lakshmi, Dr. Swetha. N, “Retrospective Study of Pregnancy Outcomes in Women with Heart Disease”, IJMACR-January - 2023, Volume – 6, Issue - 1, P. No.512– 517.**Open Access Article:** © 2023, Dr. Swetha. N, et al. This is an open access journal and article distributed under the terms of the creative commons attribution license (<http://creativecommons.org/licenses/by/4.0>). Which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.**Type of Publication:** Original Research Article**Conflicts of Interest:** Nil**Abstract**

**Introduction:** Maternal heart disease has emerged to be a major threat to safe motherhood and is a major cause of maternal mortality in industrialized countries. Additionally, signs and symptoms experienced during a normal pregnancy and those of cardiac disease are similar, resulting in a confusing clinical picture.

**Methodology:** In our retrospective study, we present a series of 13 cases of heart diseases in pregnancy along with a discussion about effects of pregnancy on cardiac function, diagnostic difficulties and challenges of obstetric management.

**Results:** 7 of the patients on admission were in labour and 6 of them were not in labour. No preterm deliveries were noted among the 13 patients.

5 of the subjects had full term normal delivery (FTND), 5 of them had vacuum assisted full term vaginal delivery, 2 of them had elective LSCS and 1 emergency LSCS. Only one patient had complications (acute pulmonary edema) and others delivered without complications.

**Conclusion:** Cardiac disease is a major cause of maternal mortality in industrialized countries. While pregnancy in women with heart disease in general is associated with increased risks of maternal mortality (0.6%), cardiovascular, obstetric, and foetal complications, many patients tolerate pregnancy well.

**Keywords:** diagnostic, symptoms, cardiovascular

**Introduction**

Maternal heart disease has emerged to be a major threat to safe motherhood and women’s cardiovascular health in the long-term and is a major cause of maternal mortality in industrialized countries <sup>(1)</sup>. Mortality due to maternal heart disease is increasing while leading causes such as haemorrhage and infection are declining. According to the most recent statistics from the World Health Organization (WHO), maternal mortality in developed economies is around 12 per 100 000 live births (0.012%) and 239 per 100 000 live births (0.2%) in emerging economies <sup>(2)</sup>.

Maternal heart disease complicates between 1% and 4% of pregnancies, and accounts for up to 15% of maternal deaths <sup>(3,4)</sup>.

Among cardiac diseases in pregnant women, survival of women with congenital heart disease predisposes a risk of cardiac arrest increasing the burden of maternal heart disease<sup>(5)</sup>. Pregnancy, a circulatory burden in itself, primarily due to volume loading, has an impact even on a healthy woman's life.

In the face of residual lesions or sequelae after correction or an uncorrected maternal congenital heart defect, this burden may have deleterious effects on the health of both the mother and her offspring. Cardiac, obstetric, and neonatal complications all appear to be more prevalent<sup>(6,7)</sup>.

Additionally, signs and symptoms experienced during a normal pregnancy and those of cardiac disease are similar, resulting in a confusing clinical picture.

The risk of complications in pregnancy depends on the underlying cardiac diagnosis, ventricular and valvular function, functional class, presence of cyanosis, pulmonary artery pressures, and other factors. Comorbidities should also be taken into consideration and hence risk stratification should be individualized.

In our current study, we present a series of 13 cases of heart diseases in pregnancy along with a discussion about effects of pregnancy on cardiac function, diagnostic difficulties and challenges of obstetric management.

#### **Aims and objectives**

- To study the diagnostic difficulties.
- Importance of risk stratification.
- To study the obstetric challenges in management of labour.

#### **Methodology**

In this retrospective study, we present 13 high risk cardiac cases, their diagnosis, management and outcome. All cases were admitted in Department of

Obstetrics and Gynaecology of Rajarajeswari Medical College And Hospital, Bengaluru from 2021 JULY - 2022 July for various indications. Risk stratification was done for each case according to modified WHO classification, and managed accordingly.

#### **Results**

In this case series, we report a series of 13 cases of pregnant women who had history of cardiac disease, or in whom a diagnosis of heart disease has been made during or after pregnancy. Patients' data collected from the obstetrics and Gynaecology department of a private medical college in Bengaluru, Karnataka.

In our patient group the average age was 24.3 years  $\pm$  3.54 years. Of the 13, 10 were booked cases and 3 were unbooked cases (Figure 1). 6 of the patients were Primigravida while 7 of them were multiparous. 4 of them were unknown cases and 9 of them were known cases. 8 of the patients had congenital heart diseases, 3 of them had rheumatic heart disease and 2 of them had valvular heart disease.

7 of the patients on admission were in labour and 6 of them were not in labour. No preterm deliveries were noted among the 13 patients. 5 of the subjects had full term normal delivery (FTND), 5 of them had vacuum assisted full term vaginal delivery, 2 of them had elective LSCS and 1 emergency LSCS. Only one patient had complications (acute pulmonary edema) and others delivered without complications. No maternal or foetal death occurred.

Figure 1: Frequency of distribution of booked and unbooked cases.

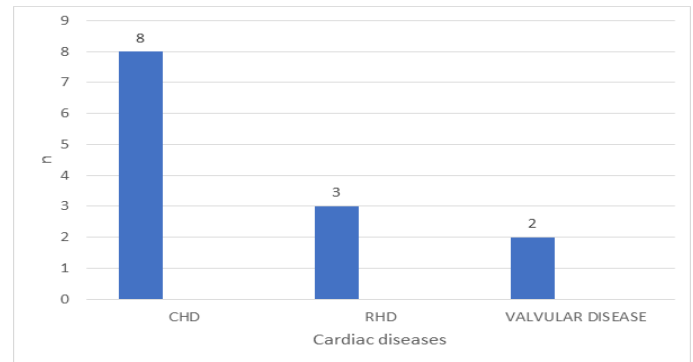
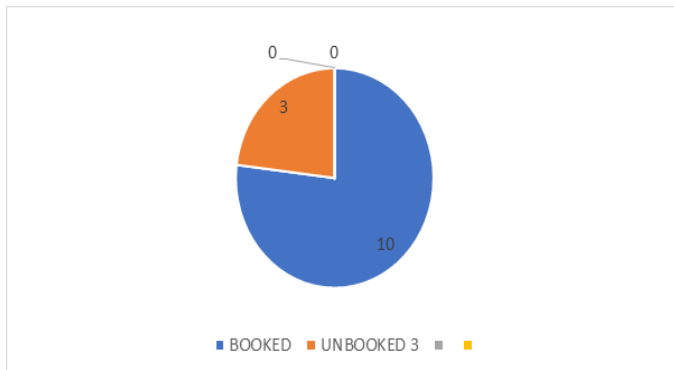


Figure 2: Distribution of cardiac disease among the patients

Table 1: Summary table

No.	Age	Parity	POG	Known case	Cardiac disease	M WHO	Booked	Labour	Termination of pregnancy	Complications	APGAR
1	24	G3P2L2	37+4	Yes	Atrial myxoma excision	1	Yes	No	Elective lscs	NO	8,9
2	25	G5P3L3A1	38+3	Yes	Chd(asd)	1	No	Yes	Ftnd	NO	8,9
3	18	PRIMI	36+5	Yes	Chd(vsd)	1	Yes	Yes	Va ftvd	NO	8,9
4	23	G3A2	38+2	Yes	Chd(asd)	1	No	Yes	Ftnd	NO	8,10
5	28	PRIMI	37+2	No	Rhd (post ptmc)	1	Yes	Yes	Va ftvd	NO	8,9
6	26	G5P2L2A2	37+3	Yes	Chd(asd)	1	Yes	Yes	Ftnd	NO	9,9
7	22	PRIMI	37	No	Chd(asd)	1	No	Prom	Va ftvd	NO	8,9
8	27	PRIMI	39+6	Yes	Chd(asd)	1	Yes	No	FTND-induced	NO	8,9
9	18	PRIMI	37+2	No	Chd(asd)	1	Yes	No	FTVD (oligo)	NO	8,9
10	27	PRIMI	38+4	Yes	Mitral valve repair	1	Yes	No	Va ftvd	Acute pulmonary edema	9,10
11	22	G2P1L1	35+6	Yes	Rhd (mild ar, mild mr)	1	Yes	No	Emergency lscs	NO	8,9
12	28	G2A1	39+2	Yes	Rhd (severe ms, pah)	IV	Yes	No	Elective lscs	NO	8,9
13	28	PRIMI	37+6	No	Chd(asd)	1	Yes	Yes	Va ftvd	NO	7,9

**Discussion**

Cardiac disease is a major cause of maternal mortality in industrialized countries. Neonatal mortality is 4% The new Sustainable Development Goals have targeted a reduction in worldwide maternal mortality to <70 deaths per 100 000 live births by 2030<sup>(8)</sup>.

Among the many changes that occur during pregnancy, those with worse impact on cardiac disease include decrease in systemic vascular resistance, increase in

intravascular volume, variation in cardiac output and hypercoagulability. Physiologically CO increases by 40-45% achieved by an increase in stroke volume. There is a decrease in systemic and pulmonary vascular resistance<sup>(9, 10)</sup>. The intravascular volume increases progressively during pregnancy and this could be particularly problematic in cases of valvular disease, such as mitral or aortic stenosis<sup>(9, 10)</sup>. In these cases there

may be a failure in maintaining a sufficient cardiac output.

Since physiological changes during pregnancy may cause symptoms similar to those observed in heart disease, it is important to pay attention to symptoms and signs that are observed in the second instance. These signs include: Cardiac signs: Heart rate >100 bpm, 4th heart sound, harsh systolic murmur, diastolic murmur, chest pain, pulmonary signs: Pleural effusion, pulmonary edema, important shortness of breath, orthopnea, nocturnal cough, and/or paroxysmal dyspnea, heart disease can be either congenital or acquired (e.g., coronary artery disease, cardiomyopathy) cardiac disease which should be further investigated.

In our study, cardiac complications occurred during 7.6% of the 13 pregnancies, similar to a study by Drenthen W et al.,<sup>(11)</sup>. Acute pulmonary edema was the noted complication.

The lower prevalence of cardiac complications was largely attributable to the lower incidence of heart failure. The highest mortality/heart failure rates are found among women with PAH, CMP, and VHD. ROPAC shows 11% cardiac failure out of which 7% is in first week postpartum. Drenthen W et al.,<sup>(11)</sup> also stated that 7% to 8% of cases of pregnancy with congenital cardiac disease develop complications. These include cardiogenic pulmonary edema and dysrhythmias. Women with cardiac disease have an increased risk of obstetric complications, including premature labour, pre-eclampsia, and postpartum haemorrhage. Evaluation of risk of complications in pregnant women can be achieved by using several methods like NYHA classification and it is most important tool to evaluate the risk of complications. Higher NYHA classification is associated with a greater risk<sup>(10)</sup>.

However, many more score systems have been established to assess the risk, among which the modified WHO score is the most accurate predictor of pregnancy risk available<sup>(12-14)</sup>.

It was recently found that maternal cardiac function is related to uteroplacental flow parameters, while uteroplacental flow is impaired in women with CHD. Since uteroplacental flow is related to offspring outcome, the high prevalence of offspring complications in women with cardiac disease may be explained by suboptimal placental function related to maternal cardiac dysfunction<sup>(15)</sup>.

Vaginal and caesarean birth are considered to be associated with low risk of bacteraemia, thus that an antibiotic prophylaxis is not recommended<sup>(16)</sup>. However, pregnant women with prosthetic cardiac valve or surgically constructed palliative shunts are prone to a prophylactic antibiotic therapy<sup>(16)</sup>.

Vaginal birth (with caesarean section when an obstetric indication exists) is generally accepted in most cases of congenital or acquired cardiac disease. However, conditions such as ascending aorta dilation (>45 mm), symptomatic severe aortic stenosis, and severe heart failure could be indications for caesarean delivery<sup>(10,17)</sup>.

### Conclusion

The above work is a case series of 13 patients of pregnancy in cardiac disease who have been admitted to the Gynaecology-obstetrics department. Cardiac disease is a major cause of maternal mortality in industrialized countries. While pregnancy in women with heart disease in general is associated with increased risks of maternal mortality (0.6%), cardiovascular, obstetric, and foetal complications, many patients tolerate pregnancy well. In pregnant women with high risk for cardiac events, cardiac interventions should be considered before

conception if the risk benefit ratio is favorable. Further studies are required to assess the optimal management of these patients, with particular emphasis on cardiac medication use, including anticoagulation regimes and mode of delivery.

## References

1. ACOG Practice Bulletin No. 212: Pregnancy and Heart Disease. *Obstetrics & Gynecology* 133(5): p e320-e356, May 2019. | DOI: 10.1097/AOG.0000000000003243
2. Maternal mortality [Internet]. World Health Organization. World Health Organization; [cited 2023Jan9]. Available from: <https://www.who.int/news-room/fact-sheets/detail/maternal-mortality>
3. Regitz-Zagrosek V, Roos-Hesselink JW, Bauer Sachs J, Blomstrom-Lundqvist C, Cifkova R, De Bonis M, Iung B, Johnson MR, Kintscher U, Kranke P, Lang IM, Morais J, Pieper PG, Presbitero P, Price S, Rosa no GMC, Seeland U, Simoncini T, Swan L, Warnes CA;ESC Scientific Document Group. 2018 ESC Guidelines for the management of cardiovascular diseases during pregnancy. *Eur Heart J* 2018; 39:3165–3241.
4. Knight M, Nair M, Tuffnell D, Shakespeare J, Kenyon S, Kurinczuk JJ, eds; on behalf of MBRRACE-UK. *Saving Lives, Improving Mothers' Care—Lessons Learned to Inform Maternity Care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2013–15*. Oxford: National Perinatal Epidemiology Unit, University of Oxford; 2017.
5. Roos-Hasselink JW, Dukevot JJ, Thomas SA. Pregnancy in high-risk cardiac conditions. *Heart*. 2009;95(8):680-6.
6. Drenthen W, Pieper PG, Roos-Hesselink JW, van Lottum WA, Voors AA, Mulder BJ, van Dijk AP, Vliegen HW, Yap SC, Moons P, Ebels T, Van Veldhuisen DJ. Outcome of pregnancy in women with congenital heart disease: a literature review. *J Am CollCardiol* 2007; 49:2303–2311.
7. Drenthen W, Boersma E, Balci A, Moons P, Roos-Hesselink JW, Mulder BJM, et al. Predictors of pregnancy complications in women with congenital heart disease. *European Heart Journal*. 2010;31(17):2124–32.
8. Alkema L, Chou D, Hogan D, Zhang S, Moller AB, Gemmill A, Fat DM, Boerma T, Temmerman M, Mathers C, Say L;United Nations Maternal Mortality Estimation Inter-Agency Group collaborators and technical advisory group. Global, regional, and national levels and trends in maternal mortality between 1990 and 2015, with scenario-based projections to 2030: a systematic analysis by the UN Maternal Mortality Estimation Inter-Agency Group. *Lancet* 2016; 387:462–474.
9. Drenthen W, Boersma E, Balci A. ZAHARA Investigators. Predictors of pregnancy complications in women with congenital heart disease. *Eur Heart*. 2010;31(17):2124-32.
10. El Ghali EH, Meziyane J, Aouragh S, Taheri H, Saadi H, Mimouni A. Cardiac disease and pregnancy: a case series of 19 patients. *Int J Reprod ContraceptObstetGynecol* 2022; 11:1574-7.
11. Drenthen W, Boersma E, Balci A, Moons P, Roos-Hesselink JW, Mulder BJ, Vliegen HW, van Dijk AP, Voors AA, Yap SC, van Veldhuisen DJ, Pieper PG; ZAHARA Investigators. Predictors of pregnancy complications in women with congenital heart disease. *Eur Heart J*. 2010 Sep;31(17):2124-32. doi: 10.1093/eurheartj/ehq200. Epub 2010 Jun 28. PMID: 20584777.

12. Balci A, Sollie-Szarynska KM, van der Bijl AG. ZAHARA-II investigators. Prospective validation and assessment of cardiovascular and offspring risk models for pregnant women with congenital heart disease. *Heart*. 2014;100(17):1373-81.
13. Pijuan-Domènech A, Galian L, Goya M. Cardiac complications during pregnancy are better predicted with the modified WHO risk score. *Int J Cardiol*. 2015; 195:149-54.
14. Fu Q, Lin J. Predictive accuracy of three clinical risk assessment systems for cardiac complications among Chinese pregnant women with congenital heart disease. *Int J Gynecol Obstet*. 2016;134(2):140-4.
15. Pieper PG, Balci A, Aarnoudse JG, et al. Uteroplacental blood flow, cardiac function, and pregnancy outcome in women with congenital heart disease. *Circulation* 2013; 128:2478–87.
16. Wilson W, Taubert KA, Gewitz M. Prevention of infective endocarditis: guidelines from the American Heart Association: a guideline from the American Heart Association Rheumatic Fever, Endocarditis, and Kawasaki Disease Committee, Council on Cardiovascular Disease in the Young, and the Council on Clinical Cardiology, Council on Cardiovascular Surgery and Anesthesia, and the Quality of Care and Outcomes Research Interdisciplinary Working Group. *Circulation*. 2007; 116:1736-5.
17. Dye TD, Gordon H, Held B, Tolliver NJ, Holmes AP. Retrospective maternal mortality case ascertainment in West Virginia, 1985 to 1989. *M J Obstet gynecol*. 1992;167(1):72-6.