

**ORIGINAL RESEARCH****Materno-foetal outcome among pregnant woman with heart disease: a hospital based retrospective study****<sup>1</sup>Dr.Aparajita Gulati 2.Dr. Rajni Agarwal**<sup>1</sup>Associate Professor, 2Assistant Professor, Department of Obstetrics & Gynecology, Venkateshwara Institute of Medical Science, Gajraula, Uttar Pradesh, India**Corresponding author**

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**ABSTRACT**

**Background:** Heart disease is a major cause of maternal mortality and morbidity during both the antepartum and postpartum periods. Heart disease occurs less frequently than 1% of the time during pregnancy. Cardiovascular disorders complicate about 1% of all pregnancies. A thorough evaluation of the patient throughout the entire pregnancy may result in the early detection of heart disease. So, the present study was conducted with an aim to assess the effect of heart disease in pregnancy and its outcome.

**Methods:** This study was a cross-sectional study of the maternal-fetal outcomes of cardiac disease-related pregnancies over the last five years that were followed at tertiary care hospitals in North India. The study was carried out for three months after receiving institutional review board ethical approval. The study comprised pregnant patient files with pre-existing or newly diagnosed heart illness during pregnancy. Maternal age, parity, York Heart Association (NYHA) functional class, and materno-fetal outcome were among the variables that were recorded. The collected data was entered in the MS excel sheet. The variables were presented as frequency and percentages.

**Results:** In our study, a prevalence of 1.5% of heart disease was observed among pregnant women. Four fifth of pregnant women (80.0%) with heart disease were primigravida. Among enrolled pregnant women four fifth of the women were having rheumatic heart disease (84.2%). Among pregnant women with rheumatic heart disease (RHD), the single valvular lesions were seen in 28.7% of pregnant women (20.3% of mitral stenosis and 5.1% of mitral regurgitation). 52.9% of pregnant women were having grade II functional class as per NYHA. Congestive cardiac failure as complication was observed in 15.7% of pregnant women. Among alive neonates, 29.2% of neonates were preterm, and 7.7% of neonates were having IUGR, 15.4% needed NICU admission

**Conclusion:** In underdeveloped nations, maternal and perinatal morbidity from rheumatic heart disease is high and accounts for a large portion of cardiac disease in pregnancy. When congenital heart disease is treated early in life, morbidity and mortality are reduced.

**Keywords:** IUGR, NICU, Rheumatic heart disease, Pregnancy, New York Heart Association

## INTRODUCTION

Heart disease is a major cause of maternal mortality and morbidity during both the antepartum and postpartum periods. Rheumatic heart disease is more prevalent in developing nations than cardiomyopathies and congenital heart disease, which are more prevalent in developed nations. Heart disease occurs less frequently than 1% of the time during pregnancy [1]. The foetus is affected by maternal heart disease in a variety of ways. Women with heart disease are more likely to experience spontaneous miscarriage and therapeutic abortion [2].

The risk of congenital heart disease is higher in offspring born to mothers who have the condition. Compared to 1% risk in the general population, the overall risk of inheriting polygenic heart disease is between 3 and 5% [3]. Several cardiac drugs, including ACE inhibitors, warfarin, and statins, can be harmful to the developing foetus. ACE inhibitors should not be used during the first trimester since they are known to have teratogenic effects. Fetal hypotension and reduced renal blood flow can result from exposure in the second and third trimesters [4]. Pregnancy's relative immunosuppression raises the risk of infection such as urinary tract infection. The heart rate could rise as a result, potentially compromising cardiac function.

Cardiovascular disorders complicate about 1% of all pregnancies. Rheumatic heart disease (RHD) related pregnancies have become less prevalent in developed nations, but they are nonetheless prevalent and continue to be a major source of maternal morbidity and mortality in poor nations [5,6]. Given that foetal health depends on an adequate and ongoing supply of maternal blood that is highly oxygenated, it is only reasonable to anticipate that the foetus will likewise be affected in these mothers [5].

A thorough evaluation of the patient throughout the entire pregnancy may result in early detection of heart disease. In the majority of cases, a satisfactory outcome for mother and child is achieved when the condition is detected early and effectively managed with a multidisciplinary approach, participation of a team of skilled obstetricians, cardiologists, anaesthetists, paediatricians, and nurses [7]. Only a few detailed studies have been done; the majority of data on the pregnancy course in patients with cardiovascular disease comes from case reports or case series [2,8,9]. So, the present study was conducted with an aim to assess the effect of heart disease in pregnancy and its outcome.

## MATERIALS and METHODS

This study was a cross-sectional study of the maternal-fetal outcomes of cardiac disease-related pregnancies over the last five years (January 2016 to December 2020) that were followed at tertiary care hospitals in North India. The study was carried out for three months (June 2021 to August 2022) after receiving institutional review board ethical approval. The study comprised pregnant patient files with pre-existing or newly diagnosed heart illness during pregnancy, as confirmed by a cardiologist based on clinical and paraclinical evidence of heart disease (echocardiography and electrocardiogram (ECG) abnormalities). Incomplete patient files for pregnant patients were excluded. Following that, we obtained information from birth registrations as well as from patient files during pregnancy, delivery, and postpartum.

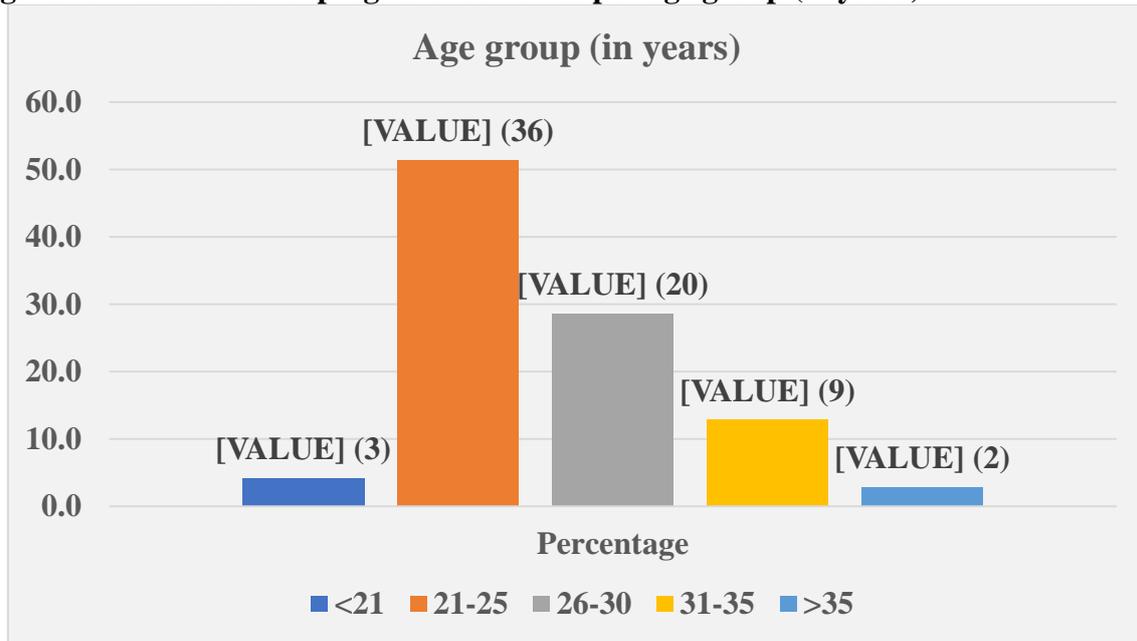
If a patient became pregnant more than once throughout the course of the trial, each pregnancy was treated as an independent event. Maternal age, parity, gravidity, residence (rural vs. urban), New York Heart Association (NYHA) functional class, cardiac lesion type, echocardiographic and electrocardiogram lesion details, the mode of delivery, and materno-fetal outcome were among the variables that were recorded during the antepartum, peripartum, and postpartum periods. Based on complications during pregnancy, labour, postpartum, or maternal mortality, maternal outcome was evaluated. In each case, the perinatal outcome (stillbirth, preterm birth, birth weight, Apgar score, intrauterine growth

retardation [IUGR], NICU admission, and congenital cardiac anomaly) was recorded. The collected data was entered in the MS excel sheet. The variables were presented as frequency and percentages.

## RESULTS

A total of 4536 pregnant women records with known outcome was retrieved and out of those 70 cases were having cardiac disease, which reflects a prevalence of 1.5% of heart disease among pregnant women. In our study, a total of 70 pregnant women with heart disease were enrolled in the study. Around half of pregnant women (51.4%) were in the 21-25 years of age group and the mean age was 24.6 years (Figure 1).

**Figure 1: Distribution of pregnant women as per age group (in years)**



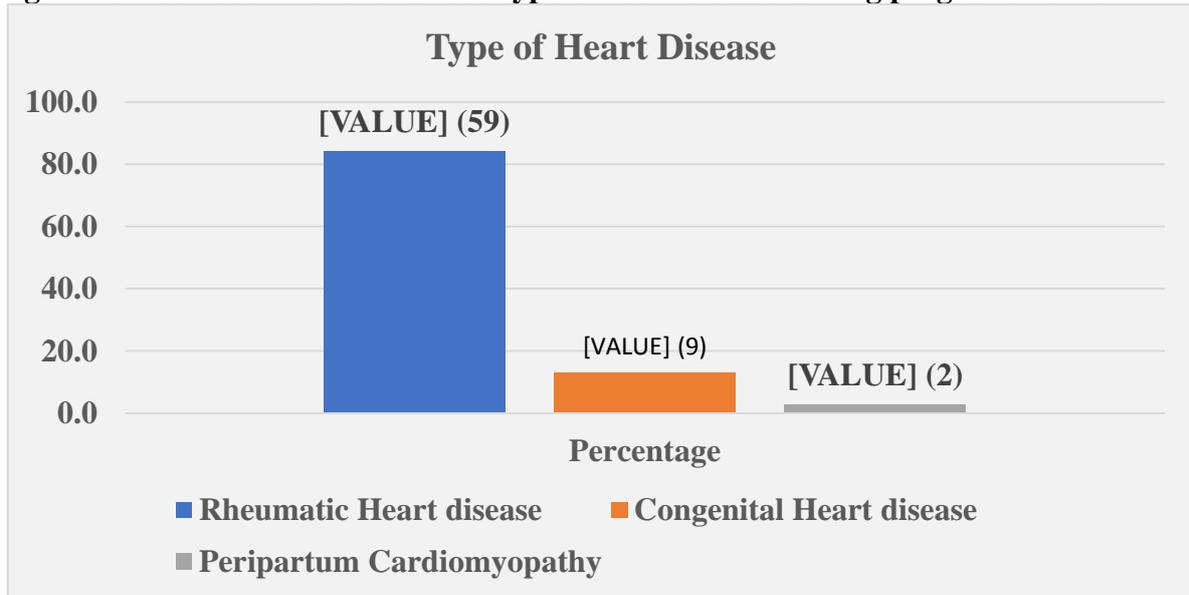
Four fifth of pregnant women (80.0%) with heart disease were primigravida. The two third of pregnant women were residing in the rural area (61.4%) and 38.6% of pregnant women were residing in the urban area (Table 1).

**Table 1: Baseline characteristics of the pregnant women with heart disease**

Variable	Frequency	%
<b>Gravida</b>		
Primigravida	56	80.0
Multigravida	14	20.0
<b>Residence</b>		
Urban	27	38.6
Rural	43	61.4

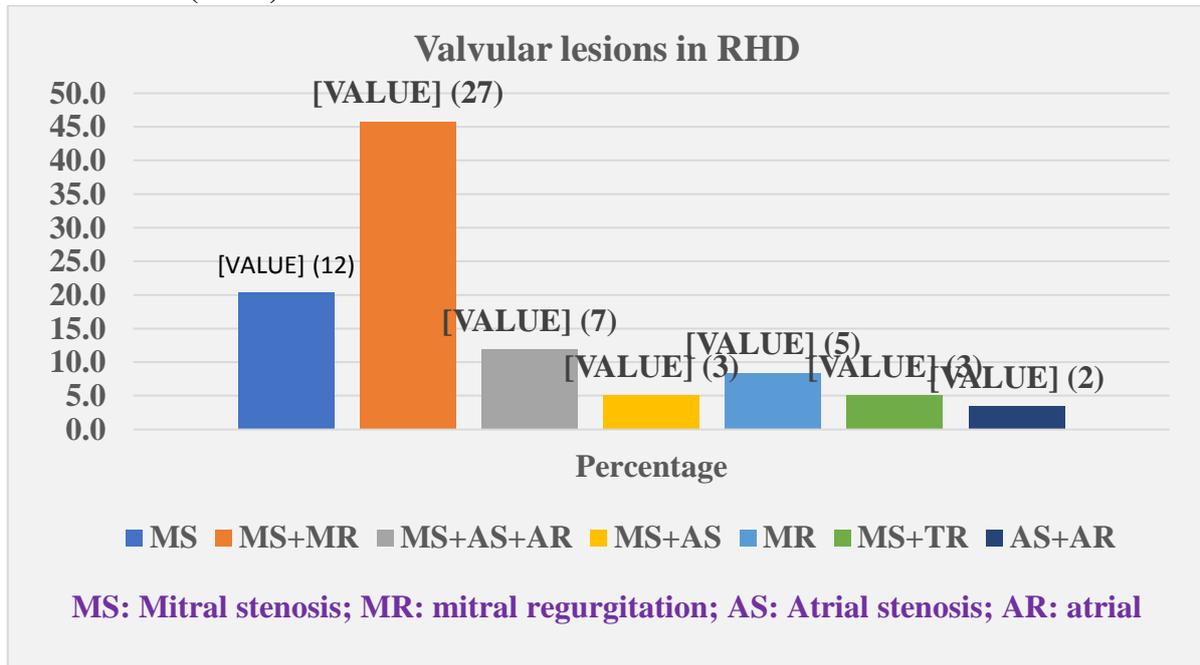
Among enrolled pregnant women four fifth of the women were having rheumatic heart disease (84.2%), 12.9% were having congenital heart disease and 2.9% were peripartum cardiomyopathy (Figure 2).

**Figure 2: Distribution of the various type of heart disease among pregnant women**

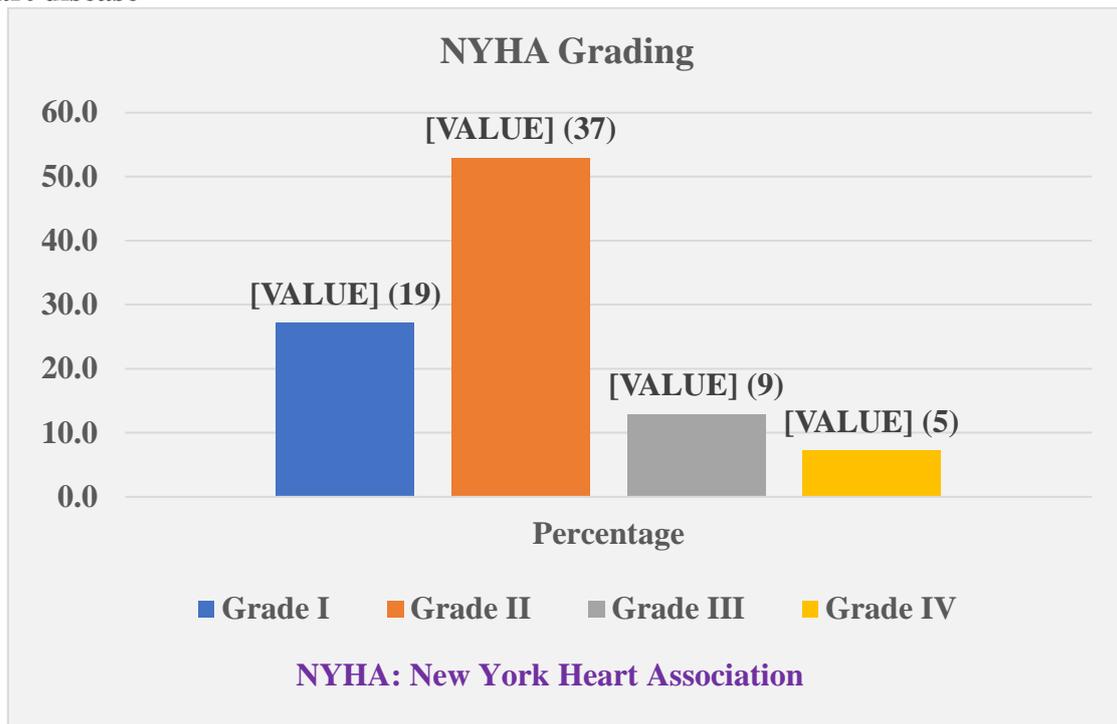


Among pregnant women with rheumatic heart disease (RHD), the single valvular lesions were seen in 28.7% of pregnant women (20.3% of mitral stenosis and 5.1% of mitral regurgitation). Double valvular lesions were seen in 59.4% and 11.9% of pregnant women were having triple valvular lesions (mitral stenosis, atrial stenosis and atrial regurgitation) (Figure 3).

**Figure 3: Distribution of the valvular lesions among pregnant women with rheumatic heart disease (RHD)**



The pregnant women with heart disease were graded as per NYHA, 52.9% of pregnant women were having grade II functional class as per NYHA. 7.1% of pregnant women were having grade IV functional class as per NYHA (Figure 4).

**Figure 4: Grading of functional class according to NYHA among pregnant women with heart disease**

More than three fourth of pregnant women with heart disease delivered via LSCS (78.6%) and in 4.3% of pregnant women the termination of pregnancy was done as indicated. Complication was observed in 20.0% of pregnant women [congestive cardiac failure (15.7%) and maternal mortality (4.3%)]. Among alive pregnant women (n=67), stillbirth was observed in 3.0% of pregnant women. Among alive neonates (n=65), 29.2% of neonates were preterm, and 7.7% of neonates were having IUGR, 15.4% needed NICU admission (Table 2).

**Table 2: Pregnancy outcome among pregnant women with heart disease**

Pregnancy outcome	Frequency	%
<b>Maternal outcome</b>		
<b>Mode of Delivery</b>		
LSCS	55	78.6
Vaginal Delivery	12	17.1
Termination of Pregnancy	3	4.3
<b>Complications</b>		
Yes	14	20.0
No	56	80.0
<b>Type of Complications</b>		
Congestive Cardiac failure	11	15.7
Maternal Mortality	3	4.3
<b>Perinatal outcome</b>		
<b>Birth (n=67)</b>		
Live	65	97.0
Stillbirth	2	3.0
<b>Preterm (n=65)</b>		
Yes	19	29.2
No	46	70.8
<b>IUGR(n=65)</b>		

Yes	5	7.7
No	60	92.3
<b>NICU admission(n=65)</b>		
Yes	10	15.4
No	55	84.6
<b>Congenital anomaly(n=65)</b>		
Yes	0	0.0
No	65	100.0

**LSCS: lower segment caesarean section; IUGR: Intrauterine Growth Retardation; NICU: Neonatal Intensive Care Unit**

## DISCUSSION

In our study, a prevalence of 1.5% of heart disease was observed among pregnant women, but a higher prevalence was reported by Puri et al., [10]. Four fifth of pregnant women (80.0%) with heart disease were primigravida. In a study by Bangalet al., 70% of pregnant women were either primigravida or primipara [11].

Among enrolled pregnant women the four fifth of the women were having rheumatic heart disease (84.2%). Among pregnant women with rheumatic heart disease (RHD), the single valvular lesions were seen in 28.7% of pregnant women (20.3% of mitral stenosis and 5.1% of mitral regurgitation). Double valvular lesions were seen in 59.4% and 11.9% of pregnant women were having triple valvular lesions (mitral stenosis, atrial stenosis and atrial regurgitation). These results were in consensus with Bhatla et al., Bangalet al., Mazhar et al., and Pratibha et al., [1,11,12,13]. However, due to the widespread use of antibiotics that are effective against streptococcal infections, the incidence of RHD has significantly decreased in developed nations. Hence, the current study suggests that streptococcal infections in children and adolescents are not adequately treated.

The pregnant women with heart disease were graded as per NYHA, 52.9% of pregnant women were having grade II functional class as per NYHA. 7.1% of pregnant women were having grade IV functional class as per NYHA, which is similar to the studies of Sneha et al., and Indira et al., [14,15].

More than three fourth of pregnant women with heart disease delivered via LSCS (78.6%) Similar findings were observed in the studies by Malhotra et al., Hameed et al., and Traill et al., [15,16,17]. But higher vaginal delivery for pregnant women with cardiac disease was observed in studies by Mazhar et al., (76.2%); and Bangal et al., (62.8%) [11,12]. In our study, among 4.3% of pregnant women, the termination of pregnancy was done as indicated which was similar to the study by Puri et al., [10].

Complication was observed in 20.0% of pregnant women [congestive cardiac failure (15.7%)]. The significant hemodynamic changes that occur during pregnancy, with nutritional anaemia being the most frequent cause in developing nations, are the reason for the increased prevalence of congestive cardiac failure. The studies by Hameed et al., Desai et al., and Traill et al., showed the congestive cardiac failure among more than one third of pregnant women with cardiac diseases [16,17,18]. In present study, the maternal mortality was observed among 4.3% of pregnant women with heart disease. Similar findings were observed in the study by Yaghoubi et al., Stangl et al., Akhter et al., and Sheela et al., [19,20,21,22].

Among alive pregnant women (n=67), stillbirth was observed in 3.0% of pregnant women. Among alive neonates (n=65), 29.2% of neonates were preterm, and 7.7% of neonates were having IUGR, 15.4% needed NICU admission. Similar results were observed in the studies by Salam et al., and Devabhaktuni et al., [23,24]. Studies have shown valvular repair and

replacement in RHD patients should be performed before pregnancy for a better maternal and fetal outcome [17,25,26,27].

## CONCLUSIONS

In underdeveloped nations, maternal and perinatal morbidity from rheumatic heart disease is high and accounts for a large portion of cardiac disease in pregnancy. When congenital heart disease is treated early in life, morbidity and mortality are reduced. The gravely threatening lesions, on the other hand, do not reach reproductive age. Early detection, effective counselling, continuous follow-up, proper foetal surveillance, and postpartum follow-up of these women are all necessary. To avoid complications for the mother, major surgical procedures like balloon mitral valvotomy, closed mitral valvotomy, and mitral valve replacement should ideally be done prior to becoming pregnant. Nonetheless, a multi-specialty strategy, which includes early medical, surgical, obstetric, and nursing care, remains the cornerstone for these women's optimal maternal and foetal outcomes.

## REFERENCES

1. Bhatla N, Lal S, Behera G, Kriplani A, et al. Cardiac disease in pregnancy. *Int J Gynecol Obstet.* 2003;82(2):153-9.
2. Siu SC, Colman JM, Sorensen S, et al. Adverse neonatal and cardiac outcomes are more common in pregnant women with cardiac disease. *Circulation.* 2002;105:2179-84.
3. Romano Zelekha O, Hirsh R, Blieden L, Green M, Shohat T. The risk for congenital heart defects in offspring of individuals with congenital heart defects. *Clin Genet.* 2001;59:325-9.
4. Cooper WO, Hernandez Diaz S, Arbogast PG, et al. Major congenital malformations after first trimester exposure to ACE inhibitors. *N Engl J Med.* 2006;354(23):2443-51.
5. Arafeh JM, Baird SM. Cardiac disease in pregnancy. *Crit Care Nurs Q.* 2006;29:35-52.
6. Dobbenga-Rhodes YA, Prive AM. Assessment and evaluation of the woman with cardiac disease during pregnancy. *J Perinat Neonatal Nurs.* 2006;20:295-302.
7. Trinidad D, Cox RA. Heart diseases during pregnancy. *P R Health Sci J.* 2006;25:259-65.
8. Siu SC, Sermer M, Harrison DA, et al. Risk and predictors for pregnancy-related complications in women with heart disease. *Circulation.* 1997;96:2789-94.
9. Khairy P, Ouyang DW, Fernandes SM, Lee-Parritz A, Economy KE, Landzberg MJ. Pregnancy outcomes in women with congenital heart disease. *Circulation.* 2006;113:517-524.
10. Puri S, Bharti A, Puri S, Mohan B, Bindal V, Verma S. Maternal heart disease and pregnancy outcomes. *JK Sci.* 2013;15(1):7-10.
11. Bangal VB, Singh RK, Shinde KK. Clinical study of heart disease complicating pregnancy. *IOSR JPharmacy.* 2012;2(4):25-8.
12. Mazhar SB, Gul-e-Irum. Fetomaternal outcome in pregnancy with cardiac disease. *J Coll Physicians Surg Pak.* 2005;15(8):476-80.
13. Pratibha D, Kiranmai D, Rani VU, Vani NG. Pregnancy outcome in chronic rheumatic heart disease. *J ObstetGynecol India.* 2009;59(1):41-6.
14. Sneha P, Sarojama C, Nagarathamma R. Cardiac disease complicating pregnancy: A tertiary care center experience. *JMed Sci.* 2017;3(2):41-4.
15. Indira I, Sunitha K, Jyothi. Study of Pregnancy Outcome in Maternal Heart Disease. *IOSRJDental Med Sci.* 2015;14(7):6-10.
16. Malhotra M, Sharma JB, Tripathii R, AroraP, Arora R. Maternal and fetal outcome in valvular heart disease. *IntJGynecolObstet.* 2004;84(1):11-16.
17. Hameed A, Karaalp IS, Tummala PP, et al. The effect of valvular heart disease on maternal and fetal outcome of pregnancy. *J Am Coll Cardiol.* 2001;37(3):893-9.

18. Traill TA. Valvular heart disease and pregnancy. *Cardiol Clin.* 2012;30(3):369-81.
19. Desai DK, Adanlawo M, Naidoo DP, Moodley J, Kleinschmidt I. Mitral stenosis in pregnancy: a four-year experience at King Edward VIII Hospital, Durban, South Africa. *BJOG.* 2000;107(8):953-8.
20. Yaghoubi A, Mirinazhad M. Maternal and neonatal outcomes in pregnant patients with cardiac diseases referred for labour in northwest Iran. *J Pak Med Assoc.* 2013;63(12):1496-9.
21. Stangl V, Schad J, Gossing G, Borges A, Baumann G, Stangl K. Maternal heart disease and pregnancy outcome: A single-centre experience. *Eur J Heart Failure.* 2008;10(9):855-60.
22. Akhter N, Rahman F, Salman M, et al. Valvular heart disease in pregnancy: maternal and fetal outcome. *Mymensingh Med J.* 2011;20(3):436-40.
23. Sheela CN, Karanth S, Patil CB. Maternal cardiac complications in women with cardiac disease in pregnancy. *Int J Pharm Biomed Res.* 2011;2(4):261-5.
24. Salam S, Mushtaq S, Mohi-ud-Din K, Gul I, All A. Maternal and fetal outcome in pregnancy with heart disease in tertiary care hospital in India. *Int J Reprod Contracept Obstet Gynecol.* 2017;6(9):3947-51.
25. Devabhaktuni P, Devineni K, Vemuri UR, Namani GV. Pregnancy outcome in chronic rheumatic heart disease. *J ObstetGynecol India.* 2009;59(1):41-6.
26. Oakley CM. Valvular disease in pregnancy. *Curr Opin Cardiol.* 1996;11(2):155-9.
27. Nelson-Piercy C, Chakravarti S. Cardiac disease and pregnancy. *Anaesth Intensive Care Med.* 2007;8(8):312-6.
28. Franklin WJ, Gandhi M. Congenital heart disease in pregnancy. *Cardiol Clin.* 2012;30(3):383-94.