



Maternal and Neonatal Outcomes in Pregnancy with Heart Disease in 2015-2019

Dwi Fenny Amir¹, Makmur Sitepu¹, Khairani Sukatendel¹, Sarma Lumbanraja¹, Indra G Munthe¹, Riza Rivany¹

¹Department of Obstetric and Gynecology, Faculty of Medicine, Universitas Sumatera Utara, RSUP H. Adam Malik Medan

Abstract

Pregnancy with heart disease is non-obstetric maternal death causes which has significantly impact on maternal morbidity and mortality, therefore early identification and optimal management of heart disease in pregnancy is needed to improved fetomaternal outcomes. This research purposed to determine maternal and neonatal outcomes in pregnancies with heart disease at Haji Adam Malik General Hospital Medan. This is an observational study, with cross-sectional/cross-sectional research design carried out at Inpatient Installation and Outpatient Installation at RSUP Haji Adam Malik Medan from January 2020 until completion. The sampling technique used was non-probability sampling with total sampling method from medical records of pregnant women with heart disease recorded at RSUP Haji Adam Malik Medan in January 2015 - December 2019 which met inclusion criteria. The data analysis used is univariate analysis, namely by analyzing frequency distribution of the independent and dependent variables. Frequency Distribution of heart disease in pregnancy based on maternal complications, most common complications were Arrhythmia in about 13 cases (35%) followed by heart failure with NYHA class II, namely 8 cases (21.6), followed by heart failure with NYHA class I and NYHA III, namely 5 cases (13.5%) each and NYHA class IV namely 2 cases (5.4%) and lastly followed by pulmonary edema, impending respiratory failure, stroke and thrombosis, namely 1 cases (2.7%) each. Frequency Distribution of neonatal outcomes in pregnancies with heart disease was mostly live births as many as 33 cases (89.1%) with highest number being healthy babies (Vigorous) as many as 16 cases (43.2%), followed by Moderate Asphyxia as many as 13 cases (35.1%), mild asphyxia and severe asphyxia as many as 2 cases (5.4%) each. For stillborn babies, there were 4 cases (10.8%) with IUFD and 2 cases (5.4%) with still birth. Prevalence of pregnant women with heart disease who was treated at RSUP Haji Adam Malik Medan on period January 2015 to December 2019 was 2.8%. Based on cardiovascular complications, mostly cases experienced arrhythmia as much as 13 cases (35%). Based on neonatal outcome, mostly babies born alive and healthy (vigorous) as many as 16 cases (43.2%).

Keywords: Maternal outcomes, neonatal outcomes, Heart disease in pregnancy, arrhythmia

I. INTRODUCTION

Pregnancy with heart disease is one of leading non-obstetric maternal death causes which is quite important in women aged 25-44 years. Because it is relatively common in childbearing age, heart disease (to varying degrees) complicates about 1% of pregnancies.^{[1],[2]} Worldwide incidence, especially heart and vascular disease in pregnant women, was 1-4% and incidence of heart disease with complications in pregnancy was 1%.^[3]

Hypertension is most common cause of heart disease in pregnancy, occurring as much as 6-8% of all pregnancy cases and is closely related to occurrence of heart failure. While in developing countries most common cause is rheumatic heart disease.^{[4],[5]} Heart failure often occurs at 31 weeks gestation with highest incidence at end of second trimester (34%) or peripartum (31%) which is more likely to cause maternal and fetal death compared to pregnancies without complications of heart failure.^[4]

In United States, it is reported to be less than 2%. In United Kingdom, number maternal death cases due to heart disease in 2003 - 2005 was 2.2 cases per 100,000 pregnancies.^{[1],[6],[7],[8]} In Hasan Sadikin Hospital, maternal mortality rate due to heart defects in 1994-1998 was 5.4% (2 and 37 cases), while in RSUPN Dr. Cipto Mangunkusumo on 2001, heart disease caused 10.3% maternal deaths and was leading cause of death after preeclampsia/ eclampsia and postpartum hemorrhage.^{[4],[5],[9],[10],[11]}

The perinatal mortality rate in Indonesian hospitals ranges from 77.3 to 137.7 per 1,000 live births and maternal mortality rate is 359 per 100,000 live births. The results of research at Dr. RSUP. Kariadi Semarang in 1993-1998 found maternal mortality rate was 35%, mainly in referral and emergency cases, most of which late diagnosis, while in 2005-2009 there were 59 cases (66%) pregnancies with heart disease accompanied by heart failure.^{[1],[4],[9]}

RSUP Haji Adam Malik as tertiary service center, received many referrals for pregnant cases with heart disease. Heart disease in pregnancy has impact on maternal morbidity and mortality. The efforts focus to accelerate reduction in maternal mortality (MMR) is detection, treatment and referral of high-risk pregnancies or deliveries, including heart disease in pregnancy.^[12] Management of heart disease in pregnancy problem is preventing and overcoming heart failure which has a direct impact on maternal and fetal morbidity and mortality.^[13]

For this reason, researchers reassured need to conduct research about incidence, characteristics, maternal and perinatal outcomes in pregnancies with heart disease at RSUP Haji Adam Malik Medan, and this research result are expected to be used as basic evidence for evaluation of obstetric services in pregnancies with heart disease, especially at RSUP Haji Adam Malik Medan during 2015–2019 period.

II. MATERIAL AND METHODS

This is an observational study, with cross-sectional/cross-sectional research design carried out at Inpatient Installation and Outpatient Installation at RSUP Haji Adam Malik Medan from January 2020 until completion. The sampling technique used was non-probability sampling with total sampling method from medical records of pregnant women with heart disease recorded at RSUP Haji Adam Malik Medan in January 2015 - December 2019 which met inclusion criteria, namely gestational age of more than 20 weeks, pregnant women who did not suffer from heart disease who have other comorbidities such as severe preeclampsia, lung disease, thyroid disease, anemia, and unknown causes, patient still alive before delivery and is not included in exclusion criteria, namely incomplete medical record data. The data analysis used is univariate analysis, namely by analyzing frequency distribution of the independent and dependent variables.

III. RESULTS AND DISCUSSIONS

The incidence of pregnant cases with heart disease was 37 people (2.8%) from 1,288 pregnant women. The incidence on 2015 and 2017 each year was highest with 10 cases each but with different percentage, namely 3.5% and 4.2% then followed by 2016 with 8 cases (2.7%) then in 2019 with 5 cases (2.3%) and last in 2018 with 4 cases (1.5%).

Table 1. Incidence of heart disease in pregnancy.

Years	Pregnant Cases with Heart otal pregnant cases (n)		Percentage (%)
	Disease		
2015	10	283	3.5
2016	8	291	2.7
2017	10	238	4.2
2018	4	264	1.5
2019	5	212	2.3
Total	37	1.288	2.8

Frequency Distribution of heart disease in pregnancy based on sociodemographics found that most pregnant women with heart disease were aged 20-35 years as much as 31 cases (83.8%), followed by aged > 35 years as much as 4 cases (10.8%) and then followed by aged < 20 years, namely 2 cases (5.4%). Based on education, it was found that educational status of pregnant women with heart disease was mostly obtained in high school education level, namely 16 cases (43.2%) followed by elementary education, namely 6 cases (16.2%), then diploma and Bachelor each with 5 cases (13.5%), then juniot high school as much as 4 cases (10.8%) and the last one didn't have any education, namely 1 case (2.7%). Based on occupation, it was found that pregnant women with heart disease mostly housewives, namely 20 cases (54.1%), followed by civil servants 11 cases (29.7%), private sector employees, namely 5 cases (13.5%) and others job was 1 cases (2.7%).

Table 2. Frequency Distribution of Heart Disease in Pregnancy Based on Sociodemography

Sociodemography	Cases of Pregnancy with Heart Disease (n=37)	Percentage (%)
Age (years old)		
< 20	2	5.4
20 – 35	31	83.8
> 35	4	10.8
Education		
Didn't school	1	2.7
Elementary School	6	16.2
Junior High School	4	10.8
Senior High School	16	43.2
Diploma	5	13.5
Bachelor	5	13.5
Occupation		
Housewife	20	54.1
Civil servants	11	29.7
Private sector employees	5	13.5
Others	1	2.7

Frequency Distribution of heart disease proportion based on obstetrical profile which is parity status, mostly in nulliparous namely 31 cases (83.8%), followed by multiparous as much as 5 cases (13.5%) and grandemultiparous as much as 1 cases (2.7%). Based on gestational age, highest pregnancy age was found at 28-34 weeks and 34-36 weeks, namely 11 cases (29.7%) each, followed by 20-28 weeks gestation, namely 10 cases (27%), then 37-40 weeks (10,8%) namely 4 cases and gestational age > 40 weeks namely 1 cases (2.7%). The highest number of pregnancies was found in single fetuses with total of 36 cases (97.3%), and followed by multiple fetuses, namely 1 cases (2.7%). Antenatal care visits were mostly carried out for 4 times with total of 30 cases (81.1%), followed by number of visits <4 times, namely 7 cases (18.9%). And lastly, based on method of delivery, mostly patient by section caesarean, namely 20 cases (54.1%) and followed by spontaneous vaginal birth, namely 17 cases (45.9%).

Table 3. Frequency Distribution of Heart Disease in Pregnancy based on Obstetric Profile

Obstetric Profile	Total (n)	Percentage (%)
Parity		
≤ 1	31	83,8
2 – 5	5	13,5
≥ 5	1	2,7
Gestational Age (weeks)		
20 – 28	10	27,0
28 – 34	11	29,7
34 – 36	11	29,7
37 - 40	4	10,8
≥40	1	2,7
Number of pregnancies		
Single	36	97,3
Multiple	1	2,7
Antenatal care visits		
< 4 times	7	18,9
≥ 4 times	30	81,1
Methods of delivery		
SVB	17	45,9
SC	20	54,1

Frequency Distribution of heart disease in pregnancy based on echocardiographic data showed that highest results were heart valve disease, namely 8 cases (21.6%), followed by heart hypertension, pulmonary hypertension, and others, namely 7 cases (18.9%) and followed by congenital heart and peripartum cardiomyopathy with 5 cases (13.5%) and 3 (6.1%) cases, respectively.

Table 4. Frequency Distribution of heart disease in pregnancy based on echocardiographic data

Echocardiographic data	Total (n)	Percentage (%)
Congenital Heart Disease	5	13.5
Heart Valve Disease	8	21.6
Hypertensive Heart Disease	7	18.9
Pulmonary Hypertension	7	18.9
Peripartum cardiomyopathy	3	6.1
Others	7	18.9

Frequency Distribution of heart disease in pregnancy based on maternal complications, most common complications were Arrhythmia in about 13 cases (35%) followed by heart failure with NYHA class II, namely 8 cases (21.6), followed by heart failure with NYHA class I and NYHA III, namely 5 cases (13.5%) each and NYHA class IV namely 2 cases (5.4%) and lastly followed by pulmonary edema, impending respiratory failure, stroke and thrombosis, namely 1 cases (2.7%) each.

Table 5. Frequency Distribution of Heart Disease in Pregnancy based on Maternal Complications

Complication	Total (n)	Percentage (%)
Heart Failure		
NYHA I	5	13.5
NYHA II	8	21.6
NYHA III	5	13.5
NYHA IV	2	5.4
Pulmonary edema	1	2.7
Impending Respiratory Failure	1	2.7
Arrhythmia	13	35
Stroke	1	2.7
Thrombosis	1	2.7

Frequency Distribution of neonatal outcomes in pregnancies with heart disease was mostly live births as many as 33 cases (89.1%) with highest number being healthy babies (Vigorous) as many as 16 cases (43.2%), followed by Moderate Asphyxia as many as 13 cases (35.1%), mild asphyxia and severe asphyxia as many as 2 cases (5.4%) each. For stillborn babies, there were 4 cases (10.8%) with IUFD and 2 cases (5.4%) with still birth.

Table 6. Frequency Distribution of neonatal outcomes in pregnancies with heart disease.

Baby Condition	Total (n)	Live birth percentage (%)
Vigorous	16	43,2
Mild Asphyxia	2	5,4
Moderate Asphyxia	13	35,1
Severe Asphyxia	2	5,4
Stillbirth		
IUFD	2	5,4
Stillbirth	2	5,4

In Germany study on 93 pregnant women with heart disease who were followed for 10 years, complications incidence was 12.9%. Mothers with heart disease without risk factors, showed likelihood of cardiovascular complications during pregnancy is about 5% increased to 25% with one risk factor and 75% with more than one risk factor. In a study at Toronto Hospital on 1986-1994, cardiac complications in pregnant women with heart disease without risk factors were 3%, with one risk factor 30%, and with more than one risk factor 66%.^{[14],[15]} Maternal mortality rate is 8.5%, which is higher than other studies abroad with 1.1%.^[16] The perinatal mortality rate is 16.9%. Other studies stated that pregnancy with heart disease contributes to 9.7 % perinatal complications. In 1982 study of 482 pregnancies in mothers with congenital heart disease, it was found that mothers with NYHA I had lower cardiovascular morbidity and higher rates of live births.^[17] A complete and thorough assessment of maternal and fetal risk is basis for optimal patient management. Although there is a wide variety of cardiac abnormalities and functional status, there are several predictors during pregnancy proposed by Siu et al. In a prospective multicenter study involving 562 pregnant women with heart disease at 13 Canadian hospitals, identified poor NYHA classes or cyanosis, left ventricular systolic dysfunction, and left heart obstruction are important factors in determining maternal cardiovascular complications. In clinical application this classification has proven to be very useful as basis for determining fetomaternal risk.^[18] This research results obtained data on maternal complications as much as 62.5% in high risk group and 17.1% in low risk group, with p value = 0.000. All maternal deaths in 5 cases (8.5%) occurred in high-risk group. The maternal mortality rate in high-risk group ranges from 5-15%. The presence of heart disease appears to increase risk of obstetric complications. In a retrospective study of 112 pregnancies in women with congenital heart disease, Ouyang et al reported 32.6% cases of adverse obstetric outcomes.^[19] Preterm labor and postpartum hemorrhage are most frequently seen complications. Premature labor is caused by premature rupture of membranes and indicates delivery. The increased rate of postpartum haemorrhage may be due to increased rate of elective deliveries. However, use of anticoagulation in peripartum period and cyanosis are independent predictors of postpartum hemorrhage. The only cardiac lesion with specific increased risk is coarctation aorta, which is associated with increased risk of pregnancy-induced hypertension.^[11]

If obstetric complications do occur, this can have a significant impact on pregnancy outcomes. For example,

preeclampsia increases risk of cardiac decompensation and death while postpartum hemorrhage can lead to hypovolemic shock, which is often not well tolerated. Relative immunocompromise in pregnancy increases \ risk of infection (eg urinary tract infection). This can increase \ heart rate, potentially worsening heart function. Data on \ neonatal outcomes proportion found mostly infants were alive, namely 33 cases (89.1%). This figure is not much different from \ research conducted at Kariadi Hospital, Semarang, which is around 90.5%. A complete and thorough examination of maternal and fetal risks is basis for optimal patient management. ^{[1],[4],[9]}

Perinatal mortality in high risk group was 25.4% compared to 17.1% in low risk group. The maternal mortality rate in high-risk group was 20.8%, this amount was higher than other studies where risk of death ranged from 5-15%. In Canadian study, pregnant women with heart disease had 17% incidence of neonatal complications. Heart disease has an adverse effect on pregnancy and fetus in the womb. If mother suffers from hypoxia and cyanosis, abortion can occur, if pregnancy continues, premature or full-term births with low birth weight (dysmaturity) may occur. The presence of hypoxia and fetal distress in labor causes neonate to be stillborn or have a low APGAR score. In this research, there were 2 cases of stillbirth (5.4%), this is in accordance the literature which states that risk of stillbirth in pregnant women with heart disease has higher risk of 6.1 times compared to low-risk group.^[18]

IV. CONCLUSION

Prevalence of pregnant women with heart disease who was treated at RSUP Haji Adam Malik Medan on period January 2015 to December 2019 was 2.8%. Based on cardiovascular complications, mostly cases experienced arrhythmia as much as 13 cases (35%). Based on neonatal outcome, mostly babies born alive and healthy (vigorous) as many as 16 cases (43.2%).

V. ACKNOWLEDGEMENT

The researcher would like to thank supervisor of Department of Obstetric and Gynecology, RSUP H. Adam Malik Medan and all kindly person who involved in completion of this research. The researcher also admits that there are weaknesses in this research, so further research is needed to confirmed this research result.

REFERENCES

1. Wiyati PS, B wibowo. Luaran Maternal dan Perinatal pada Hamil dengan Penyakit Jantung di RSUP Dr. Kariadi Semarang. *Majalah Obstetri & Ginekologi*, 2013; 21 (1): 20-30.
2. Rampengan SH. *Penyakit Jantung Pada Kehamilan*. Badan Penerbit FKUI, 2014; hal 1- 134
3. Latif L, Iqbal UJ. Prevalence of cardiac diseases; during pregnancy and its fetomaternal outcome. *Professional Med J* 2015;22(11):1443-1448. DOI:10.17957/TPMJ/15.2990
4. Hadi NHT. *Luaran Maternal dan Perinatal Kehamilan dengan Penyakit Jantung yang Dilahirkan Secara Pervaginam dan Perabdominam di RSUP Dr. Kariadi Periode 2010-2015*. Skripsi Mahasiswa Fakultas Kedokteran Universitas Diponegoro; 2016.
5. Suraya, I. *Kehamilan dengan Penyakit Jantung Penghalang atau Tantangan?* : unhamka.journal.ac.id., 2015; (2): 12-20
6. Royal college of Obstetrician and Gynaecologist. *Cardiac Disease and Pregnancy : Good Practice*, 2011, hal 1-18.
7. Sedyawan, 2008; Yassin dkk., *Epidemiology of Cardiac Disease during Pregnancy in Khartoum Hospital, Sudan*. *J Women's Health Care*. 2015
8. Shah, T.M., *et al*. Cardiac Disease in Pregnancy-A Study of Maternal and Fetal Outcome. *IAIM*. 2015;2(1):22-29
9. Watkins, D. A., Sebilane, M., Engel, M. E. & Mayosi, B. M., 2012. The Burden Of Antenatal Heart Disease in South Africa : A Systematic Review. *BMC Cardiovascular Disorders*, Volume 12, pp. 1-9.
10. Farhan, H.A., Yaseen, I.F. Heart disease in pregnancy—clinical pattern and prevalence: initial data from the first cardio-maternal unit in Iraq. *BMC Res Notes* **12**, 491. 2019. <https://doi.org/10.1186/s13104-019-4523-6>
11. Karamlou, T., *et al*, A Growing Problem: Maternal Death and Peripartum Complications are Higher in Women with Grown-up Congenital Heart Disease. *The Society of Thoracic Surgeon*. 2011. Doi: 10.1016/j.athorasc.2011.05.088
12. Paramita DA, Fathoni M. *Penyakit Jantung Bawaan Pada Kehamilan*. *CDK* 244, 2016; 43 (9) : 665-668.
13. Defrin. *Penyakit Jantung Dalam Kehamilan* : Dalam Seminar Nasional; Penanganan Kegawatdaruratan Ibu Hamil dengan Penyakit Jantung dan Eksistensi Bidan Indonesia di Era Uji

Kompetensi, 2016.

14. Perkumpulan Obstetri dan Ginekologi Indonesia, 2012. Tatalaksana Kehamilan Dengan Penyakit Jantung. Malang: Perkumpulan Obstetri dan Ginekologi Indonesia.
15. Thorne SA. Pregnancy in heart disease. *Heart* 2004;90:450e6
16. Konar, H., & Chaudhuri, S. Pregnancy complicated by maternal heart disease: a review of 281 women. *Journal of obstetrics and gynaecology of India*. 2012.62(3), 301–306. <https://doi.org/10.1007/s13224-012-0220-2>
17. Suryono & Karyono, J. Association Between Heart Disease In Pregnancy With Cardiac Events. *Folia Medica Indonesiana*, 2010. Volume 46, pp. 139-145
18. Akinwusi, *et al.* Cardiovascular and electrocardiographic changes in Nigerians with a normal pregnancy. *Cardiovascular journal of Africa*.2011. 22. 71-5. 10.5830/CVJA-2010-043
19. Ford, A., *et al.* Maternal Congenital Cardiac Disease Outcomes of Pregnancy in a Single Tertiary Care Centre. *American College of Obstetricians and Gynecologists*. 2008

