The Mode of Delivery and Length of Stay among Pregnant Women with Heart Disease in Makassar

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ABSTRACT

***Background**: The cardiovascular system undergoes physiological and pathological changes due to pregnancy. Heart disease is the leading cause of maternal morbidity and mortality during pregnancy. Pregnancy-related complications are common in mothers, approximately 1-4% of cases. In most countries in the world, including Indonesia, the number of cases and prevalence of heart disease complicating pregnancy is low. **Objectives**: This study focuses on the relationship of heart disease in pregnancy with the mode of delivery and length of stay among pregnant women in Dr. Wahidin Sudirohusodo Hospital 2017-2022. **Methods**: This cross-sectional study was conducted on 124 pregnant women who were determined through a purposive sampling method and carried out in October 2023 - December 2024 at Dr. Wahidin Sudirohusodo Hospital using secondary data, namely medical records of patients diagnosed with heart disease in pregnancy. Data analysis was performed univariately and bivariately using the chi-square comparative test. **Results**: Correlation between variables was analyzed using chi-square comparison test and a significant correlation was obtained for heart disease in pregnancy with mode of delivery (p-value; 0.001 <0.05), and length of stay (p-value; 0.000) **Conclusion**: There is a significant relationship between heart disease in pregnancy with mode of delivery and length of stay in laboring women at Dr. Wahidin Sudirohusodo Hospital Makassar. The severity of heart disease in pregnant women can affect the mode of delivery, so counseling before delivery is very important, it is expected to determine the right choice of delivery to reduce the risk of morbidity, mortality and length of stay in mothers.*

***Keywords**: Heart disease in pregnancy, Mode of delivery, Length of stay*

INTRODUCTION

The cardiovascular system undergoes physiological and pathological changes as a result of pregnancy (Morton, 2021). Heart disease is the leading cause of maternal morbidity and mortality during pregnancy. Pregnancy-related complications are common in mothers, approximately 1-4% of cases. In most countries in the world, including Indonesia, the number of cases and prevalence of heart disease that complicates pregnancy is very low (Roberts & Adamson, 2013).

Previous research Hayward & Ryland (2017) suggests that women with chronic heart disease (CHD) are more likely to have a surgical delivery. However, the underlying explanation remains unclear. Cesarean section (CS) delivery is more common in women who have had previous cesarean deliveries, such as cases of breech presentation, dystocia, and fetal distress. Women who undergo cesarean delivery are also less likely to experience symptoms of fetal distress. Therefore, it seems that fetal instability does not lead to more women undergoing cesarean delivery. Doctors or patients may prefer to plan a section delivery due to the belief that the procedure has less impact on the mother's body (Doraiswamy et al., 2021). The study showed that the section delivery rate was higher in women with complicated CHD at 46.2% and 38.8% with non-complicated CHD.

Women with CHD require longer hospital stays after delivery compared to

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women without CHD. In addition, the length of hospitalization also increases with the complexity of the CHD. At Dr. Kariadi Hospital, maternity patients were admitted for 2-43 days, with an average of 9-14 days. The longest patient stay was 43 days with a diagnosis of peripartum cardiomyopathy and NYHA IV heart failure. Pregnant women with heart disease are at high risk in pregnancy (Kirkegaard et al., 2021).

Almost all women with NYHA class I and II can bear children without experiencing morbidity. Unless there is an obstetric indication for caesarean delivery, patients with NYHA class I/II without pulmonary hypertension may be considered for vaginal delivery. As patients with NYHA class III/IV or severe decline in systemic ventricular function are at higher risk during pregnancy, the approach to delivery for patients with NYHA class III/IV should be to consider undergoing caesarean delivery. This consideration is based on the woman's willingness to make the decision to keep her fetus knowing the risks and cooperating fully with the doctor about the treatment plan (Cunningham et al., 2021).

Based on the above background, researchers are interested in conducting research on the relationship between heart disease in pregnancy with the mode of delivery and length of stay. The purpose of this study was to determine whether there is a relationship between heart disease in pregnancy with the mode of delivery and length of stay.

METHODS

This cross-sectional study was conducted on 124 pregnant women who were determined through purposive sampling method and carried out in October 2023-December 2024 at Dr Wahidin Sudirohusodo hospital using secondary data, namely medical records of patients diagnosed with heart disease in pregnancy. Data analysis was performed univariately and bivariately using the chi-square comparative test.

The sample cases comprised 62 people, namely pregnant women diagnosed with heart disease, who have complete medical record data, and had a previous history of heart disease and hypertension. The control sample was 62 people, namely pregnant women who were not diagnosed with heart disease, had complete medical record data and pregnant women in 2021 from January to December (the first five patients at the beginning of January-October and six patients at the beginning of November-December).

The data were analyzed using univariate test and then chi-square comparative test for bivariate analysis to see the association of heart disease in pregnancy with mode of delivery and lenght of stay. This study has obtained ethical approval from the Health Research Ethics Committee of the State Islamic University of Alauddin Makassar with number: E.015/KEPK/FKIK/I/2023.

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RESULTS AND DISCUSSION

Table 1. Distribution of Sample Characteristics.

Characteristics	n (%)
Mother's Age	
< 35 years	97 (78.2 %)
≥ 35 years	27 (21.8 %)
Parity	
Primipara	56 (45.2%)
Multipara	63 (50.8%)
Grande multipara	5 (4%)
School education	
Elementary school	11 (8.9%)
Junior High school	15 (16.1%)
Senior High school	53 (42.7%)
Diploma And Bachelor degree	31 (29.1%)
Master's degree	4 (3.2%)
Work	
Housewives	70 (56.5%)
Student	2 (1.6%)
Private Employer	33(26.6%)
Temporary Employer	7(5.6%)
Civil servants	12(9.7%)
History of congenital heart disease	
Yes	17 (16%)
No	107 (84%)
History of hypertension	
Yes	19 (18%)
No	105 (82%)
Heart disease in pregnancy	
Yes	62 (50%)
No	62 (50%)
Mode Of delivery	
Vaginal	48 (38.7%)
Caesarean section	76 (61.3%)
Length of stay	
Short treatment (≤5 days)	70 (56.5%)
Length of stay (>5 days)	54 (43.5%)
Total	124 (100%)

Table 1 shows the distribution of patient characteristics among 124 samples, consisting of age, education, occupation, and parity. Based on age, it can be seen that the majority of the sample, as many as 97 (78.2%), were in the age group under 35 years, and 27 (21.8%) mothers were 35 years old and older. Based on education, it can be seen that the majority of the sample has a high school education, as many as 53 (42.7%). Based on occupation, it can be seen that the majority of the sample are housewives, as many as 70 (56.5%). Based on parity, it can be seen that the majority of multiparous samples are 63 (50.8%). Based on a history of congenital heart disease as many as 17 people (16%), and a history of hypertension as many as 19 people (18%). Based on this study, there were 62 types of heart disease cases in pregnancy out of 114 people who fit the inclusion criteria recorded at Dr. Sardjito Hospital. Forty-eight people (38.7%) had vaginal cases, and 76 people (61.3%) had Caesarean section. A total of 70 people (56.5%) underwent hospitalization ranging from less than equal to five days, which was classified as short hospitalization, while the length of hospitalization was more than five days for as many as 54 people (43.5%).

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Table 2. Distribution of Heart Disease Patients in Pregnancy.

Diagnosis	n (%)	Mode of Delivery	
		Vaginal n (%)	C- Section n (%)
Congestive heart failure NYHA I	3(4.8)	3(4.8)	
Congestive heart failure NYHA II	2(3.2)	1(1.6)	1(1.6)
Congestive heart failure NYHA III	14(22.6)		14(22.6)
Congestive heart failure NYHA IV	1(1.6)		1(1.6)
Chronic hypertension	3(4.8)	3(4.8)	
Pulmonary hypertension	9 (14.5)	1(1.6)	8(12.9)
Acute myocardial infection	4(6.5)		4(6.5)
Cardiomyopathy, not specific	2(3.2)		2(3.2)
Endocarditis	1(1.6)	1(1.6)	
Rheumatic myocarditis	1(1.6)	1(1.6)	
Atrial septal defect	2(3.2)	2(3.2)	
Pericardial effusion	1(1.6)		1(1.6)
Severe maternal mitral stenosis	2(3.2)		2(3.2)
Nonrheumatic mitral (valve) prolapse	3(4.8)		3(4.8)
Supraventricular tachycardia	6(9.6)		6(9.6)
Rheumatic mitral valve disease	1(1.6)		1(1.6)
Premature atrial depolarization	1(1.6)	1(1.6)	
Severe vulvar pulmonary stenosis	1(1.6)		1(1.6)
Long Qt syndrome	1(1.6)	1(1.6)	
First degree atrioventricular block	1(1.6)		1(1.6)
Premature ventricular contraction	1(1.6)		1(1.6)
Ventricular premature depolarization	1(1.6)		1(1.6)
Atrial fibrillation	1(1.6)	1(1.6)	
Total	62 (100)	15(24.1)	47 (75.9)

Table 2 shows patients with heart disease who underwent vaginal delivery were 15 people (24.1%), with a diagnosis of congestive heart failure (CHF) NYHA I as many as three people (4.8%), CHF NYHA II as many as one person (1.6%), chronic hypertension as many as three people (4.8%), pulmonary hypertension as many as one person (1.6%), endocarditis as many as one person (1.6%), rheumatic myocarditis as many as one person (1.6%), atrial septal defect as many as two people (3.2%), premature depolarization of the atrium as many as one person (1.6%), long Qt syndrome as many as one person (1.6%), atrial fibrillation as many as one person (1.6%). In this study, patients with heart disease who underwent cesarean section delivery were 47 people (75.9%), with a diagnosis of CHF NYHA II as many as one person (1.6%), CHF NYHA III as many as 14 people (22.6%), CHF NYHA IV as many as one person (1.6%), and pulmonaryhypertension as many as eight people (12.9%). Myocardial infection was found in as many as four people (6.5%); cardiomyopathy, unspecified, as many as two people (3.2%); pericardial effusion, as many as one person (1.6%); severe maternal mitral stenosis two people (3.2%); nonrheumatic mitral (valve) prolapse three people (4.8%); supraventricular tachycardia six people (9.6%); rheumatic mitral valve disease one person (1.6%); pulmonary stenosis savere valvar one person (1.6%); first degree atrioventricular block one person (1.6%); premature ventricular contraction one person (1.6%); and *v*entricular premature depolarization one person (1.6%).

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Table 3. Relationship between Heart Disease in Pregnancy and Mode of Delivery at Dr. Wahidin Sudirohusodo Hospital 2017-2022.

Heart disease in pregnancy	Mode of Delivery						*p-value*
	Vaginal		Sectio caesarea		Total		
	n	(%)	n	(%)	n	(%)	
Yes	15	31.3	47	61.8	62	50	
No	33	68.7	29	38.2	62	50	<0.000
Total	48	100	76	100	124	100	

Table 3 shows the bivariate analysis using the chi-square test for the association of heart disease in pregnancy with the mode of delivery. In patients diagnosed with heart disease during pregnancy, 15 people (31.3%) underwent vaginal delivery, and 47 people (61.8%) underwent cesarean section delivery. In patients who did not experience heart disease in pregnancy, as many as 33 people (68.7%) used vaginal delivery routes and 29 people (38.2%) used cesarean section delivery routes. The results of the analysis of the relationship between heart disease in pregnancy and mode of delivery with the chi-square test obtained a p-value <0.001, where the p-value was <0.05. Based on these values, statistically, it can be said that the null hypothesis (HO) in this study is not accepted, meaning that there is a significant relationship between heart disease in pregnancy and the mode of delivery. The results of the analysis show the relationship between heart disease in pregnancy and mode of delivery.

Table 4. Relationship between Heart Disease in Pregnancy and Length of Stay at Dr. Wahidin Sudirohusodo Hospital 2017-2022.

Heart disease in pregnancy	**length of stay**						*p-value*
	Short Treatment (≤5 days)		Long treatment (>5 days)		Total		
	n	(%)	n	(%)	n	(%)	
Yes	25	35.7	37	68.5	62	50	
No	45	64.3	17	31.5	62	50	<0.000
Total	70	100	54	100	124	100	

Table 4 shows bivariate analysis using the chi-square test to determine the relationship between heart disease in pregnancy and mode of delivery. The length of treatment based on the diagnosis of heart disease in pregnancy consists of a short treatment group with a total of 25 people (35.7%) and a long treatment group with a total of 37 people (68.5%). While those who did not experience heart disease in pregnancy with the length of treatment, in the short treatment group comprised 45 people (64.3%), and in the long treatment group, 17 people (31.5%). The results of the chi-square bivariate analysis showed a p-value of 0.001 <0.05, which indicates a significant relationship. It indicates that mothers who experience heart disease during pregnancy are associated with longer periods of care.

The consequences of heart disease in pregnancy are enormous. Heart disease is the leading cause of maternal death in developed countries, but it is beginning to emerge in developing countries as the number of heart diseases in low- and middle-income countries increases (Mocumbi et al., 2016).

However, the prevalence of CS in heart disease during pregnancy can be caused by various complications, including the severity of heart failure, which is classified according to the New York Heart Association (NYHA) Heart Failure Classification, and some are accompanied

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by complications of other diseases. In research conducted by Nurdin et al. (2021), it was found that the prevalence of premature rupture of membranes (PROM) for CS levels above 12 hours was 32.1%. Meanwhile, in the research results in Table 3, it is known that 61.8% of mothers had heart disease during pregnancy using the CS birth method, so the prevalence of CS in mothers who had heart disease and the prevalence of CS due to premature rupture of membranes differed significantly in the rate of SC (Nurdin et al., 2021).

The study conducted by Nguyen Manh (2019) showed that rheumatic heart disease (RHD) is the most common during pregnancy in developing countries. The study supports the idea that heart disease is currently the main factor affecting women's pregnancy outcomes. As many as 9.15% of the women studied had fetal growth restrictions after 22 weeks of pregnancy. For pregnant women with heart disease, hypertension, the type of heart disease (ASD and tetralogy of Fallot), and its complications (heart failure and pulmonary edema) are significant risk factors (Zhang et al., 2022). The study (Nguyen Manh et al., 2019) provides a foundation to encourage the community to implement medical care during pregnancy for mothers diagnosed with heart disease.

Planned delivery is an important option for pregnant women with cardiovascular diseases (CVDs) and their providers. For obstetric indications, cesarean delivery is usually recommended according to consensus guidelines, except for high-risk diseases (Canobbio et al., 2017). The recommendation for vaginal delivery as the preferred method of delivery for women with CHD is based on the different hemodynamic loads during vaginal delivery and cesarean section, resulting in significant cardiovascular changes. Factors are such as spinal anesthesia during a cesarean section and greater blood loss during labor (Ouzounian, 2014).

CHD severity can be used as a tool to predict the risk of a primary caesarean section because the rate of a primary caesarean section increases with CHD severity (Denayer et al., 2021). Women with a history of severe CHD. Women diagnosed with CHD may prefer vaginal delivery or a cesarean section independently due to their experience with hospitals and their medical history (Hrycyk et al., 2016).

Relationship between Heart Disease in Pregnancy and Mode of Delivery at Dr. Wahidin Sudirohusodo Hospital 2017-2022

Based on the results of research on the relationship of heart disease in pregnancy found vaginal delivery routes as many as 15 people (31.3%) and caesarean section as many as 47 people (61.8%) at Dr. Wahidin Sudirohusodo Hospital Makassar. The results of the analysis of the relationship between heart disease in pregnancy and mode of delivery with the chi-square test obtained a p-value < 0.001, where the p value < 0.05. Based on this value, statistically, it can be said that Ha in this study is accepted, meaning that there is a significant relationship between heart disease in pregnancy and the mode of delivery.

The results of this study are in accordance with research conducted by Eggleton, McMurrugh and Aiken (2022), which stated that women with cardiomyopathy more often give birth by cesarean delivery than women without heart disease. obtained in patients who experienced heart disease during pregnancy and gave birth by cesarean delivery method, as many as 122 people (79.74%), and vaginal 25 people (16.67%) (Trisnawan et al., 2023).

The results of research by Hussey and Hussey (2021) suggest performing vaginal delivery with good neuraxial anesthesia. Sectio caesarean delivery is usually the preferred mode of delivery in women with heart disease, although the rate of caesarean section delivery is higher in women with heart disease. In the conclusion of their research, Nanna and Stergiopoulos (2014) said that vaginal delivery does not cause complications in most women with heart disease. The advantages are preventing blood loss, faster recovery, the absence of abdominal surgery, and decreased thrombogenic risk. Research by Vidal (2016) states caesarean section delivery eliminates hemodynamic changes in the laboring mother. Allowing for more precise hemodynamic monitoring and management. However, this increases the risk of venous thromboembolism, infection, and postpartum hemorrhage (Bukhari et al., 2022).

In the results of a study by Hidano and Uezono (2011) of 151 pregnancies in

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128 women with congenital heart disease, there were 84 vaginal deliveries and 67 caesarean section deliveries. Caesarean section deliveries were performed under neuraxial anesthesia (51) or general anesthesia (16). Neonatal complications occurred in 11 of 84 (13%) pregnancies with vaginal delivery and in 25 of 67 (37%) pregnancies with cesarean delivery. Twenty-three section deliveries occurred due to maternal cardiac problems and were associated with an incidence of maternal (35%) and neonatal (65%) cardiac complications.

Relationship between Heart Disease in Pregnancy and Length of Stay at Dr. Wahidin Sudirohusodo Hospital 2017-2022

Based on the results of the study of the relationship between heart disease in pregnancy and the length of treatment, consisting of 25 people (35.7%) in the short treatment group and 37 people (68.5%) in the long treatment group, the results of the chi-square bivariate analysis showed a p-value of 0.000 <0.05, which indicates a significant relationship. It indicates that mothers who experience heart disease during pregnancy are associated with longer periods of care.

In line with research conducted by Kirkegaard (2021) with a national register-based cohort study method, hospital stays after giving birth were significantly longer in women with chronic heart disease (CHD) compared to women without CHD. Furthermore, the length of hospitalization increased as the complexity of CHD increased. The results of the study by Kirkegaard et al. (2021) showed that 29 women with complex CHD (11.1%) and 191 women with non-complex CHD (6.0%) received treatment for more than seven days.

In research conducted by Wiyati & Wibowo (2013) from 2000 to 2010, there was a significant increase in maternity mothers with CHD from 9.0 per 10,000 hospitalizations. The length of hospitalization in maternity mothers with CHD is often due to obstetric complications that occur in women with CHD.

CONCLUSION

There is a significant relationship between heart disease in pregnancy and the mode of delivery and length of stay in laboring women at Dr. Wahidin Sudirohusodo Hospital Makassar. The severity of heart disease in pregnant women can affect the mode of delivery, so counseling before delivery is very important. It is believed that determining the right choice of delivery is essential to reduce the risk of morbidity, mortality, and length of stay in mothers.

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