



Characteristic of Pregnancy in Woman with Rheumatic Mitral Stenosis in Dr. Soetomo Hospital Surabaya from 2015 – 2017

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ABSTRACT

Background: Cardiac disease is 1 of the major causes of maternal mortality. Mitral Stenosis (MS) is a particularly high-risk condition for a pregnant woman in emerging countries, the main cause of MS is a complication from rheumatic heart disease. Objective: To study the maternal and perinatal outcome of pregnancies complicated by mitral stenosis from rheumatic heart disease. Methods: We conduct a cross-sectional retrospective study using electronic medical data records in dr. Soetomo General Hospital over the period of 3 years from 2015 – 2017 involving 36 cases of pregnant women complicated by rheumatic mitral stenosis. The maternal and perinatal outcome was reviewed. Result: Most of the pregnant women with rheumatic mitral stenosis were at 29 - 34 weeks of gestational age. Majority of the patient (61,1 %) was in NYHA II classification for heart failure degree. The Degree of MS was moderate (75 %) and severe (25 %), with a maternal mortality rate was 4/36 patients (11,1 %), and all of the patients were with severe MS had class III/IV heart failure. The main reason for hospital admission was heart failure (50 %). 38 % of women with NYHA Class III/IV had severe MS. Most accompanying valve diseases occur at the patient with severe MS, with *Tricuspid Regurgitation* as the most accompanying valve disease (66,67 %) followed by *Mitral Regurgitation* (36,11 %) and *Aortic Regurgitation* (25 %). Percutaneous Transmitral Valve Commissurotomy (PTMC) was the chosen surgical intervention for valve correction. For a patient with Moderate MS, 6/8 (75 %) of the pregnancy terminated at ≥ 34 weeks of gestational age, compared with 18/28 (64,28 %) patient with Severe MS the pregnancy terminated at < 34 weeks of gestational age. Cesarean section was the most chosen method of delivery for most of the cases. Fetal weight (4/7 cases) at delivery for Moderate MS was > 2500 g, compared with (7/18 cases) was < 2000 g for Severe MS. APGAR Score for Moderate MS cases was 8-10 for 5/7 cases, compared with Severe MS, 16/24 cases were < 8 . Conclusions: Cardiac and obstetric complications from rheumatic mitral disease remain a major challenge in this disease. Early diagnosis and management with good adherent to pre-conceptional and prenatal care remain a key factor for preventing maternal and fetal morbidity and mortality.

Introduction

Rheumatic heart disease is a major problem, with ≤ 1.4 million people dying each year, and is a leading disease in the young, especially in emerging countries. In more developed economies, the diagnosis of rheumatic heart disease is rare and typically found in recent immigrants^{1,2}. Rheumatic heart disease is a sequela of acute rheumatic fever, which is usually a disease of poverty associated with overcrowding, poor sanitation, and other social determinants of poor health^{2,3}. The burden of rheumatic heart disease is found mostly in low-income and middle-income countries and among immigrants and older adults in high-income countries and high prevalence of and mortality due to rheumatic heart disease continue to be reported in many regions, including Africa, South Asia, and the Pacific Islands^{3,4}. It poses a particular problem in pregnant women, in whom the diagnosis is often delayed or missed. The stenotic mitral valve compromises the ability of the heart to increase cardiac output, increasing left atrial and pulmonary pressures and resulting in cardiac failure. Also, an increase in cardiac output is required to provide sufficient uteroplacental blood flow; when this flow is compromised, fetal growth may be reduced¹. The prevalence of clinically silent rheumatic heart disease (21,1 per 1000 people, 95% CI 14,1–31,4) was about seven to eight times higher than that of clinically manifest disease (2,7 per 1000 people, 1,6–4,4)². In emerging countries, rheumatic valve disease is the most common cardiac disease in pregnant women and the most important cause of maternal death². Mitral valve stenosis in particular is a high-risk condition and the most common cause of mitral stenosis is

rheumatic valvular disease, which is often first diagnosed during pregnancy⁴. Data from studies in Indonesia in pregnant women with heart disease in general and specifically in women with rheumatic heart disease are lacking. Such studies are needed to provide evidence for guidelines on the management of pregnancy in women with heart disease and to counsel women with rheumatic heart disease who are contemplating pregnancy. This study aims to assess the maternal and fetal outcomes of pregnancy in women with rheumatic mitral valve disease.

Methods

This study was a cross-sectional retrospective study using electronic medical data records in dr. Soetomo General Hospital from January 2015 until December 2017. The inclusion criteria for this study were a pregnant woman with rheumatic mitral stenosis, while the exclusion criteria were a pregnant woman with non-rheumatic mitral stenosis. This research was approved by the hospital medical committee.

Result

During 3 years period in our study from 2015-2017, we found a total of 36 cases of rheumatic mitral stenosis.

For heart failure associated with the disease, we based on the functional classification criteria of the New York Heart Association (NYHA). Using the above classification, we found the degree of MS was moderate in 75 % and severe in 25 % of the cases as seen in Figure 1. The majority of the cases were associated with class II NYHA heart failure (61,11 %) or worse (19,44 % for class III NYHA and 16,67 % for class IV NYHA).

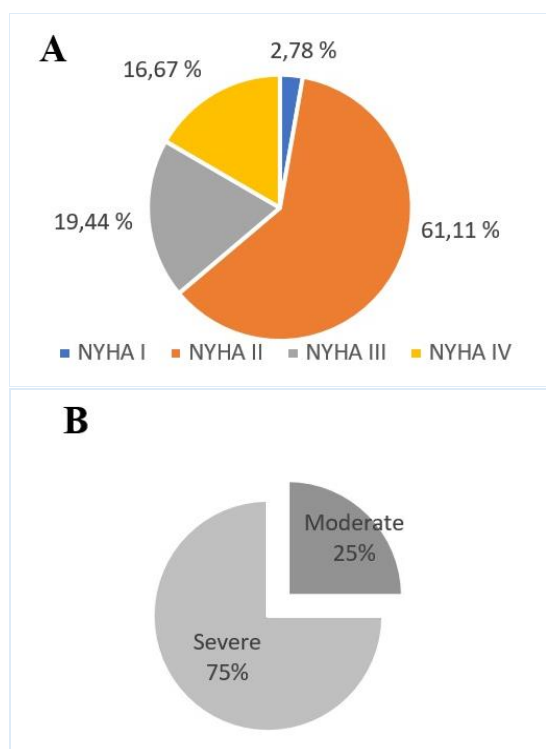


Figure 1. A. Percentage of Heart Failure in total cases with rheumatic heart disease associated with mitral stenosis. **B.** Percentage for disease severity based on the EAE/ASE.

The majority of the patient referred to other health facilities (21 cases). Most of the cases (61,1 % of the patient) were in NYHA II classification for heart failure degree. The main indication for admission to hospital or referral was heart failure (50 %). Demographical data from the cases can be seen in table 1.

Table 1. A demographical characteristic from the cases.

Demographical Data		N
Maternal Age	21-25	2
	26 – 30	10
	31 - 35	13
	36 – 40	7
	41 - 45	4
Gestational Age	< 14 weeks	3
	15 – 24 weeks	6
	25 – 28 weeks	4
	29 – 34 weeks	13
	35 – 41 weeks	10
Parity	0	8
	1	15
	2	11
	3	2

Various heart abnormality was seen in most of the cases. Another associated valve disease was found in a majority of the cases. *Tricuspid Regurgitation* was the most accompanying valve disease (66,67 %) followed by *Mitral Regurgitation* (36,11 %) and *Aortic Regurgitation* (25 %), and the frequency was increased correlated with the severity of the disease. Another serious heart complication from the disease was pulmonary hypertension. As can be seen in Table 2, the degree of pulmonary hypertension was associated with the degree of mitral stenosis. Another non-obstetric complication was anemia (19,4 %) and renal failure (2,7 %). Preeclampsia as the obstetric complication was found in 4 cases (11,1 %). Other obstetric complications can be seen in table 2.

Percutaneous Trans Mitral Valve Commissurotomy (PTMC) was the chosen surgical intervention for valve correction. The surgical intervention was mostly done for severe cases (83,33 %) and was undertaken mostly on 28-34 weeks of gestational age (66,7 %). For a patient with Moderate MS, 6/8 (75 %) of the pregnancy terminated at ≥ 34 weeks of gestational age, compared with 18/34 (52,94 %) patients with Severe MS the pregnancy terminated at < 34 weeks of gestational age. Caesarean Section was the most chosen method for delivery for most of the cases (63,89 %), followed by vaginal delivery (8,33 %) and first-trimester pregnancy induction (13,89 %). Fetal weight (4/7 cases) at delivery for Moderate MS was > 2500 g, compared with (7/18 cases) was < 2000 g for Severe MS. APGAR Score for Moderate MS cases was 8-10 for 5/7 cases, compared with Severe MS, 16/24 cases were < 8 .

Table 2. Non-obstetric and obstetric complications from rheumatic heart disease associated with mitral stenosis.

Maternal Outcome		Degree of Severity	
		Moderate	Severe
Heart Failure (NYHA)	I	0	1
	II	8	14
	III	0	7
	IV	1	5
Arrhythmia (solitary)		4	5
Arrhythmia with thrombus formation		0	3
Pulmonary Hypertension	Mild	4	0
	Moderate	0	4
	Severe	0	8
Accompanying heart disease	Tricuspid Regurgitation	5	19
	Mitral Regurgitation	6	7
	Pulmonary Regurgitation	2	4
	Aortic Stenosis	0	2
Pulmonary edema		0	4
Mitral commissurotomy		1	5
Obstetric complication	Preeclampsia	0	4
	Membrane rupture	0	2
	Preterm labor	0	3
	Obstetrical Haemorrhage	1	1
	Oligohydramnios	1	3
	Gestational Diabetes	1	0
	Fetal Growth Restriction	0	1
Other complication	Anemia	2	5
	Renal Failure	0	1
Maternal death		1	5

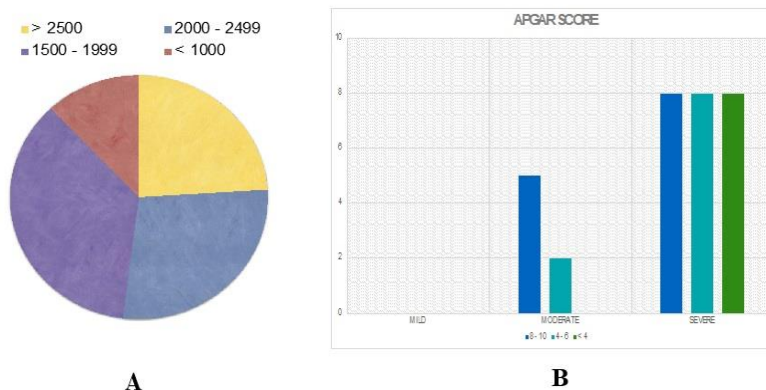


Figure 2. A. Neonatal birthweight on termination. B. Neonatal APGAR Score.

Discussion

This study provides the outcomes of pregnancy in women with rheumatic mitral stenosis. It shows contemporaneous data showing that women with moderate and severe rheumatic mitral stenosis have poor

tolerance for the disease during pregnancy, but that morbidity is high especially in women with severe mitral stenosis. We used The European Association of Echocardiography (EAE) and American Society of Echocardiography (ASE)

recommendations for the echocardiographic assessment of valve stenosis to classified the severity of mitral stenosis (MS) and was defined as follows⁵:

- Mild MS = valve area $>1.5 \text{ cm}^2$ or if area not available: mean gradient $< 6 \text{ mmHg}$
- Moderate MS = valve area 1.0 to 1.5 cm^2 or if area not available: mean gradient 6 to 12 mmHg
- Severe MS = valve area $<1.0 \text{ cm}^2$ or if area not available: mean gradient $>12 \text{ mmHg}$

Moderate to severe heart failure occurred in 97,22 % of women. This finding is not surprising because pregnancy induces an expansion of the plasma volume, which is poorly tolerated in the presence of severe left-sided stenosis. In pregnant women with mitral stenosis, the increase in cardiac output combined with a decrease in filling time due to increased heart rate can result in increased left atrial pressures and pulmonary edema. Even in previously asymptomatic women, further shortening of the diastolic filling period owing to atrial fibrillation or comorbid conditions that further increase heart rates, such as anemia or fever, often causes hemodynamic decompensation⁵. The stenotic mitral valve compromises the ability of the heart to increase cardiac output, increasing left atrial and pulmonary pressures and resulting in cardiac failure. Also, an increase in cardiac output is required to provide sufficient uteroplacental blood flow; when this flow is compromised, fetal growth may be reduced. Mild mitral stenosis usually tolerates well before pregnancy, but if pregnancy occurs before adequate valve correction the disease may progress to a more severe condition. This support by data from the international prospective

registry studies the outcomes of pregnancy in women with rheumatic mitral valve disease¹. Their study shows that 15,8 % of mild mitral stenosis progress to heart failure and 24 % to pulmonary edema. According to data from the Global Burden of Disease, the prevalence of rheumatic heart disease in Indonesia has decreased by 24 % from 1990-2010. Watkins and colleagues in 2015 estimated that Indonesia has 1,18 million cases, and ranked 4th as the top country with the largest estimated number of the disease². As described earlier, this condition usually missed before or during the first pregnancy. Our data shows that majority of the patient has had a successful and uneventful first pregnancy. This indicates that the cardiac condition is unrecognized before and during the first pregnancy in our healthcare facilities. This may be important because the delayed time required to diagnosed and treat the underlying valve disease may allow leading to another accompanying valve complication. Our data support this because we found more cases with accompanying valve disease and arrhythmia in moderate and severe mitral stenosis.

We found that NYHA class $\geq \text{II}$ was an independent predictor of maternal cardiac events during pregnancy and this support by an earlier study from the international prospective registry studies the outcomes of pregnancy in women with rheumatic mitral valve disease¹. Echocardiographic follow-up during pregnancy is important to detect early hemodynamic changes that may precede and possibly predict clinical deterioration. It is noteworthy that 75% of women were known to have mitral valve disease before pregnancy. A third of all women with MS were symptomatic before

pregnancy, and half of the women with severe MS went on to need hospital admission for heart failure during their pregnancy, representing significant morbidity and cost. One could speculate that if those patients with isolated severe mitral stenosis had undergone percutaneous balloon mitral commissurotomy preconception, they would have had a lower risk pregnancy with less chance of morbidity and hospital admission⁶.

Percutaneous balloon mitral commissurotomy is effective and safe during pregnancy and is preferred to a surgical procedure because the latter still carries a risk of fetal demise of $\approx 20\%$ ⁷. Although ideally, any percutaneous or surgical intervention should be undertaken before conception, the threshold for intervention during pregnancy, particularly for percutaneous balloon mitral commissurotomy in isolated severe mitral stenosis, should be lower. Two studies from Indonesia mentioned that percutaneous balloon mitral commissurotomy has a high success rate with a low complication rate and the best timing for intervention has been suggested to be after the fourth month^{8,13,14}. Most of the cases in which mitral commissurotomy was undertaken were between 28-34 weeks. This delay in correction is caused by many factors e.g, operating schedule queue, individual patient's refusal. The majority of the pregnancy terminated at < 34 weeks of gestational age due to worsening cardiac and obstetric conditions. Cesarean section was the most chosen method for termination due to the presence of obstetrical and neonatal compromised. Adverse neonatal outcomes in our study were low birth weight, particularly from preterm pregnancy termination.

Mortality and cardiac deterioration in this study could have been reduced by appropriate pre-pregnancy assessment and intervention as suggested by the guidelines⁹. A delay in patients seeking help is often the main contributing factor to maternal cardiovascular death in emerging countries¹⁰ which may contribute to the previously described high maternal and fetal mortality in sub-Saharan countries¹¹. Hence, adequate counseling of adolescents and young women with rheumatic heart disease about the risks of pregnancy is of utmost importance to convince them to see a cardiologist before getting pregnant. The limitation of this descriptive study is a majority of the cases came from an emergency room with advancing gestational age, hence the optimal cardiac intervention management was limited for selective cases. Another study with optimal obstetric management and timing for cardiac intervention is needed to evaluate better obstetric and fetal outcomes for this disease.

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