# Fetomaternal Outcome in Pregnancy and Labour with Rheumatic Heart Disease

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*Abstract*
*Background: Rheumatic heart disease (RHD) is the commonest acquired heart disease in India and other developing countries.This study was undertaken to determine the incidence of RHD with pregnancy and to study the maternal and fetal outcomes in pregnancy complicated by RHD in our institution.*
*Methods: This study enrolled all pregnant patients presenting at RIMS labour room and OPD with Rheumatic heart disease. Based on inclusion criteria, the patients were admitted and followed up.*
*Results and conclusion: The results of this study showed that the incidence of heart disease was 1.2% for all deliveries occurring during our study period from July 2019 to October 2020 of which RHD accounted for 76.5%. Mitral stenosis was the most common valvular lesion.Most of the patients delivered through vaginal route. Caesarean section was reserved for obstetrical indications only. Fetal distress and pulmonary artery hypertension were the most common causes of emergency and elective caesarean sections respectively. There were 3 maternal mortalities, the cause pulmonary hypertension being the most common.*
*Keywords: RHD, pregnancy*

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## I. Introduction

RHD remains a major health problem in the developing countries and as far as Indian scenario is concerned its incidence is very high. Prevalence of rheumatic fever has been attributed to overcrowding and unhygienic living related to low socioeconomic status. In developing countries, RHD continues to be a major cause of cardiac morbidity and mortality especially among young adult females.[1]

Normal pregnancy is characterized by a raise in stroke volume and cardiac output.[2,3] Labour and delivery can cause drastic changes in cardiac output. In the presence of maternal heart disease, the circulatory changes of pregnancy may result in decompensation or death of the mother and/or the fetus.

Comorbidities such as anaemia, pre-eclampsia and intrauterine growth retardation are also common in mothers with cardiac disease which need careful evaluation and management.[4,5]

A multidisciplinary approach including obstetrician, cardiologist, anaesthesiologist, paediatrician is an important principle for management and care of the pregnant patient with rheumatic valvular disease. This approach should include all the preconception, antepartum, intrapartum, anaesthetic, postpartum, contraceptive and endocarditis prophylaxis considerations.

With advance in medical care more number of women in child bearing age areundergoing valve replacement procedures bringing with it problems related to anticoagulation and its impact on future pregnancies. These women have to be counselled on the maternal and fetal effects of these drugs on pregnancy.

This prospective study emphasizes to find incidence, assess maternal and fetal outcome and analyse prognostic factors that would help to formulate necessary guidelines for safe motherhood in pregnant women presenting with RHD.

## II. Aims And Objective:

- To study Incidence of rheumatic heart disease with pregnancy.
- To study the maternal and foetal outcomes in pregnancies complicated by rheumatic heart
- disease in our institution.
- To analyse possible prognostic factors that would enable us to formulate necessary
- guidelines for safe motherhood.

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## III. Materials and Methods

The present work comprises a prospective observational study, carried out in Deptt. Of Obstetrics and gynecology at RIMS, Ranchi between July 2019 to October 2020.

**Inclusion Criteria**:
All patients with Rheumatic heart disease (MS, MR, AR, AS: as diagnosed from history, clinical examination and echocardiography) who were
o On long term treatment
o Newly diagnosed
o Surgically operated on
o And in need of medical termination and sterilization were included for the study.
o Incidental diagnosis coming with undiagnosed RHD with pregnancy with complications

**Exclusion Criteria**:
Patients with
o Mitral valve prolapse with mitral regurgitation
o Isolated aortic stenosis
o Congenital heart disease
The study was conducted on patients chosen on purposive sampling technique based on inclusion and exclusion criteria. All patients will be meticulously followed up antenatally as well as from admission till discharge. The clinical course during pregnancy and the maternal, foetal outcomes will be studied and recorded in a special designed performa, compiled and analyzed.

## IV. Observation and Results :

The total number of patients included in the study was 65.

**Incidence of heart disease**

**Table 1**. Incidence of heart disease

| Total number of deliveries | Patients with heart disease | Incidence |
|---|---|---|
| 7083 | 85 | 1.2 |

A total of 7083 deliveries occured during the study period from July 2019 to October 2020. 85 of pregnant patients had heart disease constituting incidence of 1.2%.

**Rhd in patients with heart disease**

**Table 2.** RHD in patients with heart disease

| Heart disease | RHD | Percentage (%) |
|---|---|---|
| 85 | 65 | 76.5 |

Out of total 85 pregnancy with heart disease, 65 had Rheumatic Heart Disease accounting for 76.5% cases of heart disease during pregnancy.

**Age distribution of patients**

**Table 3.** Age distribution of patients

| Age group (Years) | No. of patients | Percentage (%) |
|---|---|---|
| ≤20 | 5 | 7.7 |
| 21-25 | 39 | 60 |
| 26-30 | 13 | 20 |
| >30 | 8 | 12.3 |

Maximum number of pregnant patients with RHD (60%) were in age group of 21 – 25 years. The Mean age of presentation was 24.8 years. Only 5 (7.7%) patients had teenage pregnancy. There were 8 women (12.3%) who were above 30 years.

**Socioeconomic status**

**Table 4.** Socioeconomic status

| Socioeconomic class (Modified B.G. Prasad Scale) | No. of patients | Percentage (%) |
|---|---|---|
| I | 2 | 3.1 |
| II | 4 | 6.2 |
| III | 7 | 10.8 |
| IV | 12 | 18.5 |
| V | 40 | 61.5 |

Most of the pregnant patients with RHD belonged to low socioeconomic status. 40 (61.5%) of them were in class V of socioeconomic scale.

**Gravida**

**Table 5.** Gravida

| Gravida | No. Of patients | Percentage (%) |
|---|---|---|
| Primi | 42 | 64.6 |
| G2 | 15 | 23.1 |
| G3 | 3 | 4.6 |
| G4 | 3 | 4.6 |
| G5 | 2 | 3.1 |

Most of the patients (64.6%) were primigravida. There were 2 (3.1%) cases who were 5th gravida.

**Booked or unbooked pregnancy**

**Table 6.** Booked or unbooked pregnancy

| Pregnancy | No. Of patients | Percentage (%) |
|---|---|---|
| Booked | 12 | 18.5 |
| Unbooked | 53 | 81.5 |

Most of the pregnancies (81.5% cases) were unbooked.

**Type of valve lesion in RHD**

**Table 7.** Type of valve lesion in RHD

| Lesion | No. Of patients | Percentage (%) |
|---|---|---|
| MS | 30 | 46.2 |
| MR | 16 | 24.6 |
| Combined mitral valve lesion | 13 | 20 |
| Multivalvular | 6 | 9.2 |

Isolated mitral stenosis was the most common RHD present in 30 (46.2%) patients and it was also seen as a part of combined lesion in another 19 women. Isolated MR was present in 16 (24.6%) women. Multivalvular lesion was present in 6 (9.2%) patients

**Severity of mitral stenosis**

**Table 8.** Severity of mitral stenosis

| Severity of MS | No. Of patients | Percentage (%) |
|---|---|---|
| Mild | 7 | 10.8 |
| Moderate | 18 | 27.7 |
| Severe | 5 | 7.7 |

Most of the pregnant patients with RHD had moderate severity of mitral stenosis (27.7%) while severe mitral stenosis was present in 5 (7.7%) patients.

**NYHA functional class**

**Table 9.** NYHA functional class

| NYHA Class | No. of patients | Percentage (%) |
|---|---|---|
| I | 15 | 23.1 |
| II | 39 | 60 |
| III | 8 | 12.3 |
| IV | 3 | 4.6 |

Most of the women (60% cases) belonged to NYHA class II and about 4.6% patients had class IV symptoms severity

**Pre existing medical conditions in patients with RHD**

**Table 10.** Pre existing medical conditions in patients with RHD

| Pre-existing medical condition | No. of patients | Percentage (%) |
|---|---|---|
| Anemia | 14 | 21.5 |
| Hypothyroidism | 4 | 6.2 |

There were 18 patients (27.7%) with pre-existing medical condition, anemia was the most common pre-existing medical condition present in 14 (21.5%) patients with RHD

**Pregnancy induced condition in patients with RHD**

**Table 11.** Pregnancy induced condition in patients with RHD

| Pregnancy induced conditions | No. Of patients | Percentage (%) |
|---|---|---|
| Gestational hypertension | 4 | 6.1 |
| Pregnancy induced rupture of membrane | 3 | 4.6 |
| Gestational diabetes mellitus | 3 | 4.6 |
| Antipartum hemorrhage | 2 | 3.1 |

Pregnancy induced condition in RHD was present in 12 (18.5%) patients. Gestational hypertension was the most common condition present in 4 patients (6.1%) with RHD

**Operated vs non operated RHD**

**Table 12.** Operated vs non operated RHD

| Surgical correction | No. Of patients | Percentage |
|---|---|---|
| **Non operated** | 55 | 84.6 |
| **Operated** | **10** | **15.4** |
| Mitral valvuloplasty | 5 | 7.5 |
| Mitral valve replacement | 3 | 3.1 |
| Commisuroplasty | 2 | 4.5 |

Out of 65 patients with RHD, majority of the patients (84.6%) had no surgical correction of the valvular lesion prior to pregnancy, only 10 patients (24.6%) had underwent corrective surgery prior to pregnancy. Most common surgical correction was mitral valvuloplasty done in 5 patients followed by mitral valve replacement

**Patients on oral anticoagulants**

**Table 13.** Patients on oral anticoagulants

| Oral anticoagulants | No. Of patients | Percentage (%) |
|---|---|---|
| Yes | 8 | 80 |
| No | 2 | 20 |

Out of 10 patients with RHD who had undergone surgical correction 8 were on oral anticoagulants

**Pregnancy outcome**

**Table 14.** Pregnancy outcome

| Outcome | No. Of patients | Percentage (%) |
|---|---|---|
| NVD | 36 | 55.4 |
| Forceps | 5 | 7.7 |
| LSCS | 24 | 36.9 |

Most common mode of delivery was vaginal in 55.45 cases. Vaginal delivery with outlet forceps was attempted in 5 (7.7%) cases. Caesarean was done in 24 cases (36.9%) and was mostly reserved for obstetric indications (15 cases)

**Nature of onset of labour**

**Table 15.** Nature of onset of labour

| Nature of onset of labour | No. of patients | Percentage (%) |
|---|---|---|
| Spontanneous | 46 | 70.7 |
| Induced | 0 | 0 |
| Patients did not go into labour | 19 | 29.3 |

Out of total 65 patients with RHD who delivered 46 (70.7%) had spontaneous onset of labour. Induction of labour was not the preferred choice at our institute.

**Indication of emergency LSCS**

**Table 16.** Indication of emergency LSCS

| Indication | No. of patients | Percentage (%) |
|---|---|---|
| Fetal distress | 4 | 6.2 |
| PROM with Oligohydramnios | 3 | 4.6 |
| Transverse lie | 2 | 3.1 |
| Previous LSCS | 2 | 3.1 |
| Breech in labour | 1 | 1.6 |

| | | |
|---|---|---|
| CPD in labour | 1 | 1.6 |
| DTA | 1 | 1.6 |
| Severe pre eclampsia | 1 | 1.6 |

Most of the time caesarean was reserved for obstetric causes. Fetal distress was the most common cause (6.2%) for emergency LSCS followed by oligohydramnios with PROM in 4.6% cases.

## Indication of elective LSCS

**Table 17.** Indication of elective LSCS

| Indication | No. of patients | Percentage (%) |
|---|---|---|
| PAH | 4 | 6.2 |
| Previous LSCS | 3 | 4.6 |
| IUGR with oligohydramnios | 2 | 3.1 |

Out of 9 cases of elective LSCS for non obstetric cause, 4 patients had PAH being the most common non obstetric indication for elective LSCS.

## Antenatal complications associated with RHD

**Table 18.** Antenatal complications associated with RHD

| Complications | No. Of patients | Percentage (%) |
|---|---|---|
| PAH | 3 | 4.6 |
| Arrhythmia | 2 | 3.1 |
| CCF | 2 | 3.1 |
| Pulmonary edema | 1 | 1.5 |

Almost 8 patients had antenatal complication associated with RHD. PAH was the most common complication (4.6%) in patients with RHD at the time of admission.

## Postpartum complications associated with RHD

**Table 19.** Postpartum complications associated with RHD

| Complications | No. Of patients | Percentage (%) |
|---|---|---|
| CCF | 10 | 15.4 |
| Acute pulmonary edema | 4 | 6.2 |

The most common complication developed in patients with RHD in postpartum period was CCF (15.4%).

## Maternal mortality in RHD

**Table 20.** Maternal mortality in RHD

| Causes | No. Of patients | Percentage (%) |
|---|---|---|
| CCF | 1 | 1.5 |
| Pulmonary edema | 2 | 3.1 |

Out of 65 pregnant patients with RHD there were 3 deaths accounting for 4.6% of mortality. Pulmonary edema was the most common cause of death (3.1%) followed by pulmonary edema.

## Fetal outcome in patients of RHD

**Table 21. Fetal** outcome in patients of RHD

| Outcome | Number | Percentage (%) |
|---|---|---|
| Preterm | 12 | 18.5 |
| IUGR | 7 | 10.8 |
| IUFD | 2 | 3.1 |
| Neonatal mortality | 2 | 3.1 |
| Birth asphyxia | 3 | 4.6 |

Of the 65 babies born 12 (18.5%) were preterm neonates. IUGR was seen in 7 (10.8%) babies, and IUFD was present in 2 cases. There was 2 (3.1%) neonatal mortality.

## Birth weight of babies of rhd patients

**Table 22. Birth weight of babies of RHD patients**

| Birth weight (kilogram) | No. Of babies | Percentage (%) |
|---|---|---|
| <1.5 | 3 | 4.6 |
| 1.5 – 1.9 | 8 | 12.3 |
| 2.0 – 2.4 | 14 | 21.6 |
| 2.5 – 2.9 | 30 | 46.2 |

| | | |
|---|---|---|
| ≥3 | 10 | 15.3 |

Most of the babies (30) had birth weight between 2.5 and 2.9 kilograms.

**Reason for perinatal NICU admission**

**Table 23.** Reason for perinatal NICU admission

| Reason | Number | Percentage (%) |
|---|---|---|
| IUGR | 3 | 4.6 |
| Preterm | 2 | 3.1 |
| Respiratory distress syndrome | 2 | 3.1 |

The total number of NICU admission was 7, most common cause being IUGR in 4.6% cases.

**Contraception**

**Table 24.** Contraception

| Method | No. of patients | Percentage (%) |
|---|---|---|
| LSCS with sterilization | 6 | 9.2 |
| Barrier | 50 | 76.9 |
| IUCD | 0 | 0 |
| DMPA | 6 | 9.2 |

Most of the patients (76.9%) were counseled for barrier method of contraception. DMPA was given in 6 patients and post LSCS sterilisation was done in 6 cases.

**Discussion**

Heart disease is an important risk factor for maternal and neonatal complications in pregnancy. This study reflects the maternal and fetal outcomes in women with RHD treated at RIMS, Ranchi.

The prevalence of heart disease among pregnant women was 1.2% in the present study. **Williams (2005)** reported 1% prevalence of heart disease among pregnant women[6]. **Nagmani et al (2015)** reported 1.2% prevalence of heart disease among pregnant women[7].

**Vidhyadhar B Bangal (2012)** reported 77% prevalence of RHD among heart disease pregnant patients [8].
**SumanPuri (2013)** reported 70.1% prevalence of RHD among heart disease pregnant patients[9].
**Kavya Abhilashi et al (2018)** reported 85.3% prevalence of RHD among heart disease pregnant patients[10]. In the present study RHD constituted 76.5% cases of heart disease among pregnant patients which is similar to above mentioned studies.

**Age distribution of patients.**

Maximum pregnant patients with RHD presented in the age group 21-25 years of age group with mean age being 24.8 years. The lower a country's income category, the younger the median age at presentation. There is a consensus that, younger the age group, the better is the prognosis but it also depends on the functional status.
**Syeda Batool Mazhar et al (2015)** reported the mean age to be 27.5 years.[11]

**Socioeconomic status :**

RHD affects predominantly those living in poverty with inadequate access to health care. The prognosis of the patient with heart disease is influenced by their socio economic status. Comorbid conditions like anemia, infection and heart failure is more in the low socio economic status and these in turn complicate the pregnancy affecting the maternal and fetal outcome in a significant manner.
In present study most of these patients belong to socioeconomic status class IV and V (80%). This is comparable to other studies.
**Vidhyadhar B Bangal et al (2012)** reported most of the pregnant women with heart disease (91%) belonged to low socioeconomic class and were from rural areas[8].

**Gravida.**

Most of the patients (64.6%) were primigravida.
**Mudaliar and Menon (2005)** in their study stated that in patients with RHD, the cardiac condition worsens with time due to progressive nature of organic lesion [12].
In a report published by Lalitha Subramaniam 20.5% patients with heart disease were grand multigravida whereas in present study the grand multigravidda accounted for 3.1% cases and this illustrates the betterment of knowledge regarding pregnancy among the patients with heart disease and increase in awareness about various sterilisation methods limiting the family size.

**Booked or unbooked pregnancy.**
Most of the pregnant patients with RHD (81.5%) were unbooked pregnancy as most of them were from rural background and remote areas with less awareness and paucity of healthcare facilities.

**Type of Valve Lesion in RHD.**
RHD is the result of valvular damage caused by an abnormal immune response to Group A *Streptococcal* infection that causes acute rheumatic fever. Most commonly involved is the mitral valve and RHD is the most common cause of MS. Isolated MS was most common lesion in our study present in 46.2% cases.
**Mahesh Koregol et al (2009)** reported MS in 44.5% cases [13]. Vidhyadhar **B Bangal (2012)** reported MS in 40% cases [8].

**NYHA Functional Class.**
Present study shows that most of the patients (83.1%) belonged to NYHA class I & II.
**H. Sawhney et al (2003)** reported 77.4% patients belonged to NYHA class I & II and 22.6% belonged to NYHA class III & IV[14]. **Kavya Abhilashi et al (2018)** reported 81% patients belonged to NYHA class I & II and 19% belonged to NYHA class III & IV[10].

**Pre existing medical condition in patients with RHD**
Anemia was the most common pre-existing medical condition present in 21.5% cases. 4 patients had severe anemia and were unbooked pregnancy belonging to low socioeconomic class. Anaemia was associated with various complications like preterm delivery, IUGR, etc. Anaemia increases the preload on the heart and worsens the cardiac status.
Thyroid disorders are not uncommon in pregnancy. In our study 6.2% of women had hypothyroidism.

**Pregnancy induced condition in patients with RHD**.
In our study 4 patients (6.1%) had gestational hypertension. The association of pre eclampsia with heart disease had a poor out come due to further complications in blood flow.
1 patient with gestational hypertension had IUD and 1 developed abruption. 3 patients each presented with premature rupture of membrane and gestational diabetes respectively. 2 patients presented with APH of which 1 had abruption and the other had low lying placenta praevia.

**Surgical Correction in patients with RHD.**
Out of 65 patients with RHD 10 patients had already underwent surgical correction of valve lesion prior to pregnancy.
Mitral valvuloplasty was the most common surgery done in 5 patients followed by mitral valve commisurotomy and mitral valve replacement done in 3 and 2 patients respectively.

**Patients on oral anticoagulants**.
Out of 10 patients who had underwent surgical correction 8 were
on oral anticoagulants. Majority of them were on oral warfarin which was electively stopped 12 hours prior to delivery. 2 patients who were not taking anticoagulant were unbooked pregnancy.

**Nature of onset of labour.**
Most of the patient (70%) spontaneously went into labour. For those who didn't go into labour either an emergency or elective caesarean section was donewith a definitive obstetrical indication**.**

**Pregnancy outcome**
Out of all the deliveries conducted 46 patients (70%) had spontaneous onset of labour. Induction was not preferred at our institute. In our study 55.4% patients delivered vaginally and 7.7% were prophylactic outlet forceps delivery. Caesarean section was reserved mainly for obstetric indications and was done in 24(36.9%) cases.
**Syeda Batool Mazhar et al (2015)** reported NVD in 76.2% cases and caesarean section in 9.5% cases[11].
**Pankush Kapoor et al (2016)** reported NVD in 46.8% cases and caesarean in 33% cases[15]. **Kavya Abhilashi et al (2018)** reported LSCS in 78% cases[10].
Fetal distress was the most common cause for emergency LSCS at our institute followed by PROM with oligohydramnios
PAH was the most common indication for elective caesarean section in almost 6% cases followed by Previous caesarean in 4.65 cases.

**Maternal complications associated with RHD.**
Most patients presented with PAH in antennal period followed by arrhythmia and congestive cardiac failure. CCF was the most common complication (15%) that developed in postpartum period followed by pulmonary edema (6%)

**Maternal mortality in patients with RHD.**
In present study there were 3 maternal death accounting for 4.6%.A study of these maternal deaths show that patients with severe mitral stenosis develop life threatening pulmonary edema which needs prompt recognition and multidisciplinary management.
The cause of death in our study was pulmonary edema and CCF.
**H Shawney et al (2003)** reported the maternal mortality to be 2.05%[14]. **Silversides et al (2003)** reported maternal mortality between 5-7%[16].

**Fetal outcome in patients with RHD.**
Of the 65 babies delivered, 12(18.5%) were preterm neonates and 7 (10.8%) were IUGR babies.
**Shawney et al (2003)** reported 12% and 18.2% preterm neonates and IUGR respectively [14]. **Jian Hua et al (2007)** reported 28% and 10.8% preterm neonates and IUGR respectively [17].

**Birth weight of babies with RHD patients.**
25 (38.5%) babies were of low birth weight. LBW incidence has been reported to be high in cardiac mothers. Hemodynamic compromise, placental insufficiency are the reason for LBW.
**Pankush Kapoor et al (2016)** reported low birth weight in 31.9% babies [15]. **Syeda Batool Mazhar and Gul-e-Irum (2015)** reported LBW in 28.6% [11].

**Perinatal mortality in patients with RHD.**
The perinatal mortality in our study was 6%, which is similar to other studies.
**Jian Hua et al (2007)** reported 5% perinatal mortality [17]. **Vidhyadhar B Bangal et al (2012)** reported 4% perinatal mortality [8]. **Ashwini M et al (2014)** reported 6.6% perinatal mortality [18]. **Syeda Batool Mazhar et al (2015)** reported 4.8% perinatal mortality [11].

**Contraception**
Only 33.8% opted for contraception inspite of understanding risks associated with cardiac conditions. The rest patients were counselled to practice barrier method of contraception.

**Summary and conclusion.**
The incidence of heart disease was 1.2% for all deliveries occurring during our study period from July 2019 to October 2020. The incidence of RHD was 76.5%. Maximum number of pregnant patients who presented with RHD were in the age group 21-25years. The mean age of patients was 24.8 years 80% of patients belonged to class IV-V socio-economic status scale. Most of the patients(64.6%) were primigravida. Most of the pregnancies(81.5%) were unbooked. The most common valvular lesion was mitral stenosis (46.2%),among which 10.8% had mild,27.7% had moderate and 7.7% had severe mitral stenosis. 60% of patients belonged to NYHA class II and only 16.9% of them presented with NYHA III-IV symptoms. Anemia was the most common pre-existing medical condition in patients with RHD accounting for 21.5% of women followed by hypothyroidism(6%).
Gestational hypertension was the most common pregnancy induced condition in patients with RHD (6.1%). Only 15.4% (10 out of 65) patients had undergone surgical correction out of which mitral valvuloplasty (7.5%) was the most common procedure being done. Out of 10 patients with RHD who had underwent surgical correction, 8 were on anticoagulants. 24 (36.9%) delivered by Caesarean section and 36 (55.4%) by vaginal route. Out of 65 patients, 46 patients (70%) spontaneously went into labour.
Fetal distress (16.7%) was the most common indication for emergency caesarean section and Pulmonary artery hypertension(6.2%) was the most common cause of elective caesarean section. Pulmonary artery hypertension (6.1%) was the most common antenatal complication the patients presented with.
Among the postpartum complications, congestive cardiac failure was the most common one. There were total of 3 maternal mortality, the cause pulmonary edema being the most common. There were 12 preterm and 7 IUGR babies. Most of the babies had birth weight between 2.5-2.9kgs. 38% babies were low birth weight. IUGR (4.6%) was the most common cause for NICU admission.
Most of the patients (66.2%) were advised barrier contraception.
This study showed that patients of younger age group and belonging to better socio-economic status scale had better outcome with relatively lesser cardiac events.

On the contrary, unbooked cases and those with NYHA II/IV had maximum number of cardiac events including three maternal mortalities.

The mitral valve area was also strongly associated with the risk of maternal events. The correction of high degree stenosis corresponded to pronounced reduction of occurrence of maternal complications during pregnancy and puerperium.

Based on the results and with purpose of reducing the gestational risks, interventional treatment(balloon mitral valvuloplasty and other surgeries) prior to conception should be recommended to patients with severe MS who wish to get pregnant.

Multidisciplinary approach with a team of obstetricians, cardiologist, anaesthetist, neonatologist combined with patient education provides the best opportunity to continue pregnancy with a good maternal and perinatal outcome.

In the future, maternal mortality in RHD patients can be brought down significantly by effective pre-conceptional counselling, prenatal intervention, regular antenatal checkups, postnatal care and effective motivation for contraception.

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## References.

[1]. Carapetis JR, Steer AC, Mulholland EK (2004) The current evidence for the burden of group A streptococcal diseases (WHO/FCH/CAH/05.07). World Health Organization, Geneva.
[2]. 2.CunninghamFG, Leveno J, Bloom SL, and others, editors, William's Obstetrics 23rd edition, Cardiovascular diseases 2010.
[3]. Vera Regitz, Zagrosel et al, Task force on management of CVD during pregnancy of ESC, European heart Journal 2011; 32: 3147-97.
[4]. Liah H, Xu JW, Zhao XD et al, Pregnancy outcomes in women with heart diseases, Chin Med J 2010 Sep: 123(17) 2324-30.
[5]. Moor L, Benjamin EJ, et al Effectiveness based guidelines for the prevention of cardiac disease in women 2011, AHA Circulation 2011; 123:1243-62.
[6]. Williams Textbook of Obstetrics 2005.Cardiovascular Diseases.1017-1023
[7]. Nagamani G, Bhavani K, Vani Isukapalli et al, Int J of Current Med and Applied Sciences, Vol. 6 Issue 1, March: 2015; pp8-12.
[8]. Vidyadhar B Bangal, Rashmi K Singh, Clinical study of heart disease complicating pregnanacy. IOSR J of Pharmacy, Vol.2, issue4, Jul-Aug 2012 pp 25-28
[9]. Suman Puri, Aman Bhatia et al, JK Science, Vol 15, No. 1 Jan-Mar 2013.
[10]. Kavya Abhilashi, Bhawana Tiwary, Archana Sinha, Sneh Kiran, Pammy Parvina and Dipali Prasad. Epidemiology and maternal and fetal outcome of heart disease during pregnancy: A tertiary care center experience. International Journal of Clinical Obstetrics and Gynaecology 2018; 2(5): 128-130
[11]. Syeda Batool Mazhar , Gul-e-Irum Fetomaternal outcome in pregnancy with cardiac disease. J Coll Physicians Surg Pak. 2005 Aug;15(8):476-80.
[12]. Mudaliar and Menons Textbook of Clinical Obstetrics .Diseases of the Cardiovascular System 2005.195-199.
[13]. Mahesh K, Nira Mahale et al, J Turkish-German Gyn Assoc, 2009; 10:30-34.
[14]. H Sawhney , N Aggarwal, V Suri, K Vasishta, Y Sharma, A Grover. Maternal and perinatal outcome in rheumatic heart disease. Int J Gynaecol Obstet. 2003 Jan;80(1):9-14.
[15]. Pankush Kapoor, Raju Agarwal, Uttara A. Kohli, Tony Jose, Sanjay Singh. Evaluation of fetomaternal outcome in pregnancies complicated by heart disease: our experience at a tertiary care centre. *Int J Reprod Contracept Obstet Gynecol. 2016 Jul;5(7):2269-2273*
[16]. Silversides CK ,Colman JM ,Sermer M, Siu SC.Cardiac risk in pregnant women with rheumatic mitral stenosis.Am J Cardiol 2003;91:1382-5
[17]. Jian-Hua Lin , Wan-Wen Ling, A-Juan Liang. Pregnancy outcome in women with rheumatic heart disease. Zhonghua Fu Chan Ke Za Zhi.2007 May;42(5):315-9.
[18]. Ashwini M, Gayatri Devi J, Maternal and fetal oucome in cardiac disease complicating pregnancy at a tertiary centre in rural India, Int J of Biomedical Research 2014 05 (03), 101-06.