

DOI: <http://dx.doi.org/10.18203/2320-1770.ijrcog20202554>

Original Research Article

Chronic rheumatic heart disease and congenital heart disease complicating pregnancy: a study of the cardiac events, the maternal and perinatal outcome during 2011-2013 at tertiary care centre

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Received: 28 May 2020

Accepted: 03 June 2020

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ABSTRACT

Background: Objective of this study was to assess the prevalence of chronic rheumatic heart disease and congenital heart disease complicating pregnancy, study the maternal and perinatal outcome, and indications for termination of pregnancy.

Methods: Preconception counseling, antenatal care by pregnancy heart team as per protocol. One 2nd gravida (G2A1) with 26 weeks gestation, underwent mitral valve replacement during 26th week gestation i/v/o infective endocarditis associated with severe mitral regurgitation.

Results: Authors had CRHD: CHD = 29:21, out of 50 cases, the ratio was 1.3:1 in this study. Atrial septal defect (ASD) was the predominant lesion in this study -29% ASD alone and 9% associated with pulmonary artery hypertension. Eisenmenger's syndrome, was associated with ASD in three and VSD in two. Corrected lesions were 24%. In the rheumatic heart disease, mitral stenosis was the predominant lesion and PBMV was done in four (13.7%) cases. In CRHD cases, surgically corrected by prosthetic heart valve were -11 (37.9%). In CRHD total corrected cases, by prosthetic heart valve and percutaneous balloon mitral valvotomy (PBMV) account for 51.7%. One patient had PBMV procedure during 5th month of present pregnancy i/v/o severe mitral stenosis with mitral valve area -0.8 cm² and another patient had PBMV during her first pregnancy. In this study 42% were in NYHA class I. 14% were in NYHA class IV. CHF was seen in 10%. Termination of pregnancy was necessary in 6 with CHD and 5 with CRHD. There were 39 deliveries with one set of twins. All the babies were alive. Maternal mortality was confirmed in one case with Eisenmenger's syndrome + HELLP syndrome. Live birth rate was higher in cases with NYHA class I/II than in those with NYHA class III/IV (82.8% versus 66.60%).

Conclusions: Management by a pregnancy heart team as per guidelines would reduce mortality.

Keywords: Cardiac events, Chronic rheumatic heart disease, Congenital heart disease, Maternal and perinatal outcome, Pregnancy

INTRODUCTION

Total no of deliveries during the study period, from September 2011 to November 2013 were 1,150. Out of

these, pregnant cardiac patients were 68 and the pregnant patients with congenital and rheumatic heart disease were 50, congenital heart disease - 21, chronic rheumatic heart disease - 29, peripartum cardiomyopathy - 10, complete

heart block in two, arrhythmias in two, pulmonary artery hypertension were four.

In the present study the ratio of rheumatic heart disease to congenital heart disease is 1.3:1. Many of the women with congenital heart disease (CHD) are now reaching the reproductive age due to early recognition and surgical correction in childhood. This is responsible for altered ratio of RHD to CHD. The ratio of rheumatic heart disease to congenital heart disease in authors earlier study was 1.88:1.¹ Pregnancy complicated with heart disease accounts for 0.5-1% of pregnancies in India.² Heart disease complicates 0.5% to 4% of all pregnancies.³

Pre pregnancy risk assessment

It is recommended to perform risk assessment in all women with cardiac diseases of childbearing age and before conception, using the mWHO classification of maternal risk.⁴ 66.5% (133/200) of CRHD were diagnosed during index pregnancy.¹ In India, heart disease is diagnosed mostly in pregnancy for the first time, when increased demands on the heart trigger symptoms and unmask cardiac disease.^{5,6} Pre pregnancy surgical correction when indicated: Intervention is recommended before pregnancy in patients with MS and valve area <1.0 cm².⁷

Termination of pregnancy

A decision regarding termination of pregnancy has to be made based on the severity of the lesion, previous obstetric performance, the chance of the foetus being born with cardiac anomaly.

The indications for termination of pregnancy are: Eisenmenger's syndrome, severe pulmonary arterial hypertension. Marfan's syndrome with aortic root dilatation, dilated cardiomyopathy with left ventricular dysfunction, acute myocardial infarction during pregnancy.

Termination of pregnancy would also be needed in major congenital fetal anomalies. Medical abortion with oral antiprogesterones and vaginally administered prostaglandins is probably contraindicated because the hemodynamic effects (systemic vasodilation with hypotension, increasing cyanosis, heavy bleeding and retention of products with infection) are unpredictable.⁸

The prospective CARPREG study examined the incidence of adverse effects on the neonate, and risk was 18% versus 7% in pregnant women without heart disease.⁹ Advanced functional obstructive lesions: mitral valvular area <2 cm², aortic valvular area <1.5 cm² and blood pressure gradient estimated via Doppler ultrasound in the left ventricular output tract >30 mmHg, cyanosis, anticoagulation therapy. maternal age <20 years or >35, all these are considered risk factors for fetal complications.¹⁰

When a foetal cardiac anomaly is suspected, it is mandatory to obtain the following

Screening for congenital heart disease

Measurement of nuchal fold thickness around the 12th week of pregnancy to screen for chromosome abnormalities also screens for foetal congenital heart disease.¹¹ For major congenital heart disease, a 12-week ultrasound has a sensitivity and specificity of 85 [95% confidence interval (CI) 78-90%] and 99% (95% CI 98-100%), respectively. The incidence of congenital heart disease with normal nuchal fold thickness is about 1/1000.¹²

Full foetal echocardiography

Detailed scanning to identify associated anomalies (digits and bones) family history, maternal medical history: medical disorders, viral illness, or teratogenic medication, foetal karyotype (e.g. deletion in 22q11.2 with conotruncal anomalies), referral to a foetal medicine specialist, paediatric cardiologist, geneticist, and neonatologist, delivery at an institution that can provide neonatal cardiac care would ensure optimum outcome.

Pregnancy heart team

This study was conducted in a hospital with Pregnancy heart team, a tertiary care hospital.⁷ In women with a moderate or high-risk of complications during pregnancy (mWHO II-III, III, and IV), pre-pregnancy counselling and management during pregnancy and around delivery should be conducted in an expert centre by a multidisciplinary team: the pregnancy heart team. It is recommended to manage pregnancy in women with mechanical heart valves in a centre with a pregnancy heart team.

Antenatal care

In the first visit, functional cardiac status should be determined. In our earlier study from a Government hospital, 53.13% were diagnosed in the index pregnancy, (CHD).¹³ Pregnancy was an opportunity for screening cardiac lesions, especially in the economically backward sections, as women would get married by 18 to 22 years. Patients with NYHA class I and II can visit monthly in early pregnancy, weekly in mid trimester, twice weekly thereafter till 38 weeks. They should be admitted at 38 weeks. Patients in New York Heart Association (NYHA) class III and IV should ideally be in the hospital throughout pregnancy.

Infective endocarditis

IE is rare, with an overall annual incidence estimated at 1 per 1000 in patients with congenital heart disease, and between 3 and 12 per 1000 in patients with prosthetic

valves.¹⁴⁻¹⁶ Authors have routinely advocated IE prophylaxis in CHD and CRHD.

Maternal and perinatal prognosis: Maternal mortality is <1% for rheumatic and acyanotic heart disease. Mortality is up to 50% in patients with Eisenmenger's syndrome. The perinatal mortality is 40 per 1000 live births.¹⁷

The maternal mortality was 2/224 (0.9%), in authors previous study.¹ Sawhney reported a maternal mortality rate of 2%, 8 of which occurred in NYHA class III and IV, rheumatic heart disease.¹⁸

METHODS

This is a prospective study done in the department of obstetrics and gynecology, in collaboration with department of cardiology, at CARE institute of medical sciences, Hyderabad, from September 2011 to November 2013. There is a significant decrease in the occurrence of RHD in the last 40 years and a significant increase in the incidence of CHD. Most of the women with CHD are undergoing surgical correction in childhood and achieving pregnancy in good functional status.

All these patients were evaluated for obstetric events like abortions, preterm delivery, antepartum haemorrhage, mode of delivery, (spontaneous vaginal delivery/forceps/caesarean section), maternal morbidity, mortality and for fetal events like prematurity, IUGR, intrauterine foetal death, neonatal death, and perinatal mortality.

Effects of pregnancy on heart disease like worsening of functional cardiac status, congestive heart failure, pulmonary edema, arrhythmias, pulmonary hypertension, infective endocarditis, were also studied.

Inclusion criteria

- Pregnant women booked and un booked cases
- Pregnant women having congenital and rheumatic heart disease
- Pregnant women diagnosed either before or during pregnancy.

Exclusion criteria

- Pregnant women having symptoms and signs diagnosed to be due to physiological, psychological, medical disorders like anaemia.

An informed consent was taken from all pregnant women included in the study.

Patient analysis

At first antenatal visit, detailed history regarding maternal age, parity, gestational age, nature of the underlying cardiac lesion, functional class using the criteria of NYHA was recorded. A note was also made of history of

Rheumatic fever in the childhood or adolescence, functional status before present pregnancy, prior cardiac intervention. A thorough obstetric and cardiac examination.

In addition to the antenatal protocol, urine for culture and sensitivity, TSH, first trimester TIFFA, double screen, second trimester TIFFA, fetal 2D ECHO, obstetrical ultrasonography, CTG and Doppler studies (where indicated) were done. ECG, echocardiography were done to know the type and severity of cardiac lesions.

Management

Injection Benzathine penicillin 1.2 million IU intramuscular injections were given in patients with Rheumatic heart disease. Cardiac complications were treated in conjunction with cardiologist. Prophylactic digitalization was done in patients with tachycardia. Cardiac failure was treated with bed rest, salt restriction, digoxin, diuretics, hydralazine with or without nitrates. Patients with pulmonary edema were treated with propranolol and furosemide. Patients with prosthetic heart valves received heparin in the first trimester, and this was converted to warfarin at 13-36 weeks, again converted to heparin after 36 weeks of gestation.

All women were given antibiotic prophylaxis against infective endocarditis. New-borns of mothers with congenital heart disease were examined for inheritance of heart disease. After delivery patients were encouraged to breastfeed, and early ambulation was advised. Patients were observed for two weeks following delivery for signs of deep vein thrombosis, infective endocarditis and congestive heart failure. Effects of pregnancy on heart disease like worsening of functional cardiac status, congestive heart failure, pulmonary edema, arrhythmias, pulmonary hypertension, infective endocarditis, were also studied. Evaluation of maternal and perinatal outcome was done.

RESULTS

A total of 50 pregnant women with congenital and Rheumatic heart disease were delivered during study period and the outcome was analysed under the following headings.

Table 1: Distribution of cases as per type of cardiac disease.

Type of cardiac disease	No. of cases (n=50)	%
CHD	21	42%
CRHD	29	58%

Distribution of cases as per type of cardiac disease

Authors had CRHD: CHD = 29:21, out of 50 cases. The ratio of rheumatic heart disease to Congenital heart disease was 1.3:1 in this study Table 1.

Age wise distribution

In this study age distribution varied from 20-45 years. 56% patients were in the age group 20-25 years. One patient, primigravida with CRHD (severe mitral stenosis) conceived spontaneously at age of 43 years. She had H/O primary infertility of 22 years Table 2.

Table 2: Age wise distribution.

Age in Years	CHD (n=21)	CRHD (n=29)	%
20-25 years	11	17	56%
26-30 years	7	9	32%
31-35 years	2	1	6%
36-40 years	1	1	4%
41-45 years	0	1	2%

Booked versus unbooked

A total 48% case were unbooked in this study Table 3.

Table 3: Booked versus unbooked.

Booking status	CHD (n=21)	CRHD (n=29)	%
Booked	9	17	52%
Unbooked	12	12	48%

Table 4: Distribution of cases as per gravidity.

Gravidity	CHD (n=21)	CRHD (n=29)	%
Primi	8	12	40%
2 nd	9	11	40%
3 rd	1	5	12%
≥4	3	1	8%

Distribution of cases as per gravidity

In this study 40% were primigravidae, 40% were 2nd gravidae. Two pregnant women with congenital heart disease were 6th gravidae, but both had H/O four abortions with only one live child. One 2nd gravida with congenital heart disease, two 2nd gravidae with chronic rheumatic heart disease were obstetric primies Table 4.

Table 5: Congenital heart disease - type of lesion.

CHD - type of lesion (n=21)	Uncorrected	Corrected	Percentage
ASD	3	3	29%
ASD+PAH	2	-	9%
ASD+VSD	-	1	5%
VSD	1	-	5%
Eisenmenger's	5	-	24%
TOF	2	-	9%
MVP+MR	2	-	9%
TGA	-	1	5%
AS	1	-	5%

Congenital heart disease - type of lesion

Atrial septal defect (ASD) was the predominant lesion in this study -29% ASD alone and 9% associated with pulmonary artery hypertension. Among the five cases of Eisenmenger's syndrome three cases were associated with atrial septal defect, two cases were associated with ventricular septal defect. Corrected lesions were 24% Table 5.

Chronic rheumatic heart disease

Type of lesion, uncorrected/corrected = 14/15. In this study, among the rheumatic heart disease, Mitral stenosis was the predominant lesion and PBMV was done in four (13.7%) cases. In CRHD cases, surgically corrected by prosthetic heart valve were -11 (37.9%). In CRHD total corrected cases i.e., by prosthetic heart valve and Percutaneous balloon mitral valvotomy (PBMV) accounts for 51.7%.

Among the Rheumatic heart disease patients corrected by PBMV one patient underwent this procedure during 5th month of present pregnancy i/v/o severe mitral stenosis with mitral valve area -0.8 cm² and another patient underwent during her first pregnancy Table 6.

Table 6: Chronic rheumatic heart disease type of lesion, uncorrected/corrected 14/15.

CRHD - type of lesion (n=29)	Uncorrected	Corrected	%
MS	6	-	20.6%
MS (post PBMV)	-	4	13.7%
MS+MR	5	-	17.2%
MS+AR	1	-	3.4%
MR	1	-	3.4%
MR+PAH	1	-	3.4%
Prosthetic heart valves			
MVR	-	5	17.2%
MVR+AVR+T V repair	-	2	6.8%
MVR+AV repair	-	2	6.8%
MVR+AVR	-	1	3.4%
AVR	-	1	3.4%

Table 7: NYHA class.

NYHA class	CHD (n=21)	CRHD (n=29)	%
Class I	6	15	42%
Class II	5	9	28%
Class III	4	4	16%
Class IV	6	1	14%

NYHA class

In this study 42% were in NYHA class I. 14% were in NYHA class IV. Among them 12% were having

congenital heart disease and 2% were having rheumatic heart disease. Out of total 7 cases with NYHA class IV, emergency LSCS was done in four cases and MTP was done in three cases.

Among the obstetric risk factor prior LSCS was the predominant risk factor. Some patients had more than one risk factor Table 7.

Obstetric risk factors

Among the obstetric risk factor prior LSCS was the predominant risk factor. Some patients had more than one risk factor Table 8.

Table 8: Obstetric risk factors.

Obstetric risk factors	CHD =21	CRHD =29
Gestational HNT	2	-
Preeclampsia	1	3
HELLP syndrome	1	-
GDM	1	1
Prior LSCS	6	10
Elderly gravida	1	2
PROM	-	4
CPD	1	-
Oligohydromnios	-	2
IUGR	2	6
Twins	1	-
Breech	1	1

Medical complications

Hypothyroidism was the major medical risk factor in this study (14%) Table 9.

Table 9: Medical complications.

Medical complications	CHD (n=21)	CRHD (n=29)	Percentage
Hypothyroid	3	4	14%
Anemia	2	-	4%
I TP	1	-	2%
Asthma	-	1	2%
HCV positive	-	1	2%

Table 12: Termination of pregnancy- in congenital heart disease.

Cardiac lesion	No. of cases	GA at termination	Method used
ASD with severe PAH	1	6 weeks	Suction and evacuation
ASD with severe PAH	1	7 weeks	Suction and evacuation
TOF	1	12 weeks	Suction and evacuation
TOF	1	26 weeks	Emcredil instillation
VSD with severe PAH (Eisenmenger's syndrome)	1	14 weeks	Emcredil instillation
ASD with severe PAH (Eisenmenger's syndrome)	1	20 weeks	Emcredil instillation

Cardiac complications

CHF was the most common cardiac complication seen in 10% Table 10.

Pregnancy outcome

A total 68% pregnancies continued till term, 10% preterm delivery noted in congenital heart disease Table 11.

Table 10: Cardiac complications.

Cardiac complications	CHD (n=21)	CRHD (n=29)	Percentage
CHF	4	1	10%
Pulmonary edema	1	-	2%
Left atrial thrombus	-	1	2%

Table 11: Pregnancy outcome.

Pregnancy outcome	CHD (n=21)	CRHD (n=29)	Percentage
Term	10	24	68%
Preterm	5	-	10%
MTP	6	5	22%

Termination of pregnancy

In congenital heart disease. Out of 6 cases who had MTP in congenital heart disease group 2 cases had tetralogy fallot, 2 cases had ASD with severe PAH and two cases had Eisenmenger's syndrome. In all these cases continuation of pregnancy is high risk for maternal health. One neonate terminated at 26 weeks survived for one day in NICU.

All first trimester terminations were done by suction and evacuation. All second trimester terminations were done by extra amniotic emcredil instillation (ethacridine lactate).

After abortion, authors have done under analgesia, evacuation with ovum forceps, to remove any products and membranes, so that infection would not occur and secondary bleeding can be avoided Table 12.

Termination of pregnancy in rheumatic heart disease

Out of five cases who underwent termination of pregnancy in rheumatic heart disease group one case had

missed abortion, another case conceived immediately after double valve replacement, rest of the three opted for medical termination as cardiologist advised moderate risk for cardiac events Table 13.

Table 13: Termination of pregnancy in rheumatic heart disease.

Cardiac lesion	No. of cases	GA at termination	Method used
MS+MR	1	6 weeks	Suction and evacuation
MS+MR	1	8 weeks	Suction and evacuation
Post MVR	1	8 weeks	Suction and evacuation
Post MVR+ aortic valve repair	1	6 weeks	Suction and evacuation
Post DVR+ tricuspid valve repair	1	6 weeks	Suction and evacuation

Table 14: Mode of delivery.

Mode of delivery	CHD (n=15)	CRHD (n=24)	Percentage
Elective LSCS	8	14	56%
Emergency LSCS	6	8	36%
Vaginal	1	2	8%

Mode of delivery

Table 14 shows 56% underwent elective LSCS, 36% underwent emergency LSCS, 8% vaginal deliveries.

Anesthesia

In one case of Eisenmenger's syndrome emergency LSCS was done under local infiltration. Sedation is used for instillation of extra amniotic ethacridine lactate for inducing second trimester abortion Table 15.

Table 15: Anesthesia.

Anesthesia	CHD (n=21)	CRHD (n=29)
General	6	12
Spinal	10	9
Epidural	-	6
Lignocaine infiltration	1	-
Sedation	3	-

Table 16: Birth weight.

Birth weight	CHD	CRHD	Percentage
1.5-1.9 kgs	2	3	12.5%
2-2.4 kgs	5	3	20%
2.5-2.9 kgs	6	17	57.5%
≥3 kgs	3	1	10%

Birth weight

There were 39 deliveries in this study with one set of twins Table 16.

In this study 32.5% babies had birth weight <2.5 kg.

Perinatal outcome

All the babies were alive in this study (100%). 35% neonates required NICU admission Table 17.

Table 17: Perinatal outcome.

Perinatal outcome	CHD	CRHD	Percentage
Preterm	5	-	12.5%
IUGR	2	6	17.5%
Alive	16	24	100%
NICU	7	7	35%
IUD	-	-	-
Still birth	-	-	-
Neonatal death	-	-	-
Perinatal mortality	-	-	-

Maternal mortality

One case in Congenital heart disease group with Eisenmenger's syndrome + HELLP syndrome, underwent emergency LSCS at 32 weeks gestation.

She left the hospital against medical advice on 2nd post-operative day. On follow up over the phone mortality was recorded Table 18.

Table 18: Maternal mortality.

Maternal mortality	CHD (n=21)	CRHD (n=29)	Percentage
No. of cases	1	-	2%

Obstetric outcome as per NYHA classification in congenital heart disease Table 19.

Obstetric outcome as per NYHA classification in chronic rheumatic heart disease Table 20. Obstetric outcome as per NYHA classification in total study group Table 21.

DISCUSSION

In the present study the ratio of rheumatic heart disease to congenital heart disease is 1.3:1. Many of the women with CHD are now reaching to reproductive age due to early recognition and surgical correction in childhood. This is responsible for altered ratio of RHD to CHD. 88% of the cases in this study were in the age group 21-30 years. Only one patient in rheumatic heart disease group

conceived at an age of 43 years. She had h/o primary infertility of 22 years. In the present study, there was near equal distribution of multigravidae (60%) and primigravidae (40%) which correlates with the studies done by Konar et al and Asghar et al, Table 22.^{6,19} With increasing gravidity, the rate of complications associated with heart disease increases due to indirect association with increasing age, duration of heart disease, progression of disease process.

Table 19: Obstetric outcome as per NYHA classification in congenital heart disease.

Congenital heart disease				
Obstetric outcome	NYHA class I and II (n=11)	Percentage	NYHA class III and IV (n=10)	Percentage
Live births	9/11	81.80%	6/10	60%
IUGR	1/9	11.11%	1/6	16.66%
Preterm	2/11	18.18%	3/10	30%
IUD	-	-	-	-
Neonatal death	-	-	-	-
MTP	2/11	18.18%	4/10	40%
Maternal mortality	-	-	1/10	10%

Table 20: Obstetric outcome as per NYHA classification in chronic rheumatic heart disease.

Chronic rheumatic heart disease				
Obstetric outcome	NYHA class I and II (n=24)	Percentage	NYHA class III and IV (n=5)	Percentage
Live births	20/24	83.33%	4/5	80%
IUGR	5/20	25%	2/4	40%
Preterm	-	-	-	-
IUD	-	-	-	-
Neonatal death	-	-	-	-
MTP	4/24	16.66%	1/5	20%
Maternal mortality	-	-	-	-

Table 21: Obstetric outcome as per NYHA classification in total study group.

Total study group				
Obstetric outcome	NYHA class I and II (n=35)	Percentage	NYHA class III and IV (n=15)	Percentage
Live births	29/35	82.80%	10/15	66.60%
IUGR	6/29	20.60%	3/10	30%
Preterm	2/35	5.70%	3/15	20%
IUD	-	-	-	-
Neonatal death	-	-	-	-
MTP	6/35	17.10%	5/15	33.33%
Maternal mortality	-	-	1/15	6.60%

Table 22: Comparative studies: of ratio: Primi: multi.

Study	Primi (%)	Multi (%)
Konar et al ¹⁹	44.13%	55.87%
Asghar et al ⁶	48%	52%
Tahira et al ²⁰	47.3%	52.7%
Present study	40%	60%

In this study, Mitral stenosis was the predominant valvular lesion (37.9%) in RHD group which correlates with other studies done by Pratibha et al (48.5%), Konar et al (38.5%), Bangal et al (40%) and Waheed et al (40.4%).^{1,17,19,21} This shows that mitral valve is most commonly affected in patients with rheumatic fever.

Table 23: NYHA functional class: class I - II (%): class III - IV (%) comparison with other studies.

STUDY	Class I - II (%)	Class III - IV (%)
Wasim et al ²⁴	57%	43%
Miao et al ²⁵	56%	44%
Present study	70%	30%

In this study, among the CHD group, ASD was the commonest congenital cardiac lesion (48.34%), which correlates with the studies done by Pratibha et al (29.46%), Waheed et al (60%), Arif et al (58.33%), Rana et al (47%).^{13,21-23} In the present study, 35 (70%) cases belonged to NYHA functional class I - II and 15 (30%) cases belonged to Class III-IV and is correlating with the studies done by Wasim et al and Miao et al, Table 23.^{24,25}

Accurate assessment of the individual maternal and foetal risk in pregnant women with heart disease is of fundamental importance for optimal patient care. NYHA functional class is one of the major determinants for fetal maternal outcome, and functional grading should be assessed in each antenatal visit.

Table 24: Maternal mortality in relation to other studies.

Study	Maternal mortality (%)
Asgar et al ⁶	2%
Sameul et al ²⁷	2.7%
Rana et al ²³	1.9%
Present study	2%

Table 25: Maternal and perinatal outcome in CHD - comparative studies.

Name and year	No. of cases	CCF	Preterm	IUGR	Alive	NICU	IUD	NND	MM
Khairy, David W ²⁸ 1998-2004, Boston	90	16.77%	20.8%	8.3%	-	-	2.8%	1.4%	Nil
D Pratibha ¹³ Y Srilakshmi 2003-2007 GMH, Hyderabad	112	0.91%	10%	38.18%	98.18%	40.91%	0.91%	0.91%	1.78%
Present study, 2011- 2013, Hyderabad	21	19.04%	23.80%	13.33%	100%	33.33%	Nil	Ni	4.76%

Table 26: Maternal and perinatal outcome in CRHD - comparative studies.

Name and year	No. of cases	CCF	Preterm	IUGR	Alive	Still birth	IUD	NND	MM
Hameed ²⁹ 2001, California	66	38%	0	LBW-21%		2%	0	0	2%
Pratibha and Kiranmai ¹ 2007, Hyderabad	200	11%	9.35%	9.35%	93.5%	0.98%	3.44%	1.97%	0.89%
Present study, 2011-2013, Hyderabad	29	3.44%	0	25%	100%	0	0	0	0

Table 27: Maternal and perinatal outcome in total study group - comparative studies.

Name and year	No. of cases	CCF	Preterm	IUGR	Still birth	IUD	NND	MM
Farhana Asgar ⁶ , 2005 Pakistan	50	20%	14%	LBW 42.55%	0	0	2%	2%
Hiralal Konar ¹⁹ and Snehamay, 2012, Kolkata	281	7.4%		LBW 42.18%	1.77%	0.71%	2.13%	1.06%
Present study, 2011-2013, Hyderabad	50	10%	10%	20%	0	0	0	2%

In a prospective multicentre study enrolling 562 women with heart disease monitored in 13 Canadian hospitals, by

Siu et al, identified poor functional NYHA class or cyanosis, left ventricular systolic dysfunction, and left

heart obstruction as major determinants for maternal cardiac complications (CARPREG study).²⁶ In this study, 10% of pregnant women developed CHF and 2% developed pulmonary edema. This incidence of cardiac complications are in concurrence with studies by Konar et al (7.4%).¹⁹

CHF can occur at any gestational age during pregnancy particularly at 30-32 weeks when the hemodynamic changes peak. The next danger period is during labour and in immediate postpartum period. Therefore, obstetrician should be vigilant for signs of CHF throughout pregnancy and puerperium.

In the present study, 22% of pregnancies required therapeutic abortion, 10% delivered prematurely, and 68% progressed to term. The pregnancy outcome in this study correlates with the study by Asghar et al.⁶

Rate of caesarean section is high in the present study (92%), vaginal delivery rate is 8%. The high percentage of pregnancies complicated by severe PAH, prior LSCS, prosthetic heart valves with anticoagulants usage and IUGR with altered doppler are the main reasons for increased caesarean rate in this study.

CARE Institute being a tertiary cardiac care centre, the more complicated pool of cases may get admitted.

Obstetric outcome

Live birth rate was higher in cases with NYHA class I/II than in those with NYHA class III/IV (82.8% versus 66.60%). The incidence of therapeutic abortions (33.33% versus 17.10%), IUGR (30% versus 20.60%), preterm birth (20% versus 5.7%), were higher in patients with functional class III/IV than in those with class I/ II. There were no intrauterine deaths, neonatal deaths in both the classes.

Maternal mortality

In the present study out of fifty cases there was one maternal death which contributes to 2%. This is an unbooked case of Eisenmenger's syndrome (VSD with severe PAH) complicated by HELLP syndrome came at 32 weeks of gestational age. Emergency LSCS was done, delivered a live female baby of weight 1.5 kg, shifted to NICU for neonatal care. Patient left the hospital on 2nd post-operative day against medical advice. On follow-up over the phone mortality was recorded. Maternal mortality in relation to other studies is shown in Table 24.

Pregnancy outcome comparative studies shown in Table 25. Maternal and perinatal outcome in CRHD comparative studies Table 26.

Maternal and perinatal outcome in total study group - comparative studies Table 27.

ACKNOWLEDGMENTS

Authors would like to thank medical superintendent of CARE Institute of Medical Sciences for according permission to publish the data.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Devabhaktuni P, Manchala S, Raju SB, Menon R, Sridevi C. Chronic rheumatic heart disease and Congenital heart disease complicating pregnancy: a study of the cardiac events, the maternal and perinatal outcome during 2011-2013 at tertiary care centre. *Int J Reprod Contracept Obstet Gynecol* 2020;9:2736-45.