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Cardiac Disorders Complicating Pregnancy

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Abstract

Background: Cardiac disorders complicate 1 to 4% of pregnancies. Women with cardiac disorders have a risk during pregnancy, labor, postpartum. It is essential to prevent cardiac disorders, if not prevent, diagnose and provide timely appropriate management to prevent deaths.

Objective: To know the trends of frequency and disorders of fetomaternal outcome in women with cardiac disorders complicating pregnancy in limited resource settings.

Material and Methods: Analysis of case records of women with cardiac disorders managed from 1987 and 2016 was done. During this study period, 79868 women delivered, 576 women with cardiac disorders were hospitalized in the Obstetrics department. The analysis was done after getting information related to objectives.

Results: Of 576 women who were admitted with cardiac disorders, 56 had an abortion, 20 were lost to follow up. The fetomaternal outcome of 500 cases was analyzed. 376 (75.2%) women had normal delivery, 72 (14.4%) instrumental and 52 (10.4%) women underwent Caesarean Sections (CSs). Perinatal Mortality Rate (PMR) was 40.9 and 16 (2.87%) of 556 women died, contributing to 9.5% indirect maternal mortality during the period of analysis. However, the outcome has been improving over the years.

Conclusion: Pregnancy in women with heart disease is associated with significant cardiac and neonatal morbidity. Over the years, it has been found that pregnancy complicated by heart disease can result in a favorable outcome for both mother and fetus, provided meticulous care is taken before and during pregnancy, labor and postpartum period with appropriate therapy.

Keywords: Cardiac disorders; Maternal; Pregnancy; Postpartum

Abbreviations:

CS: Caesarean Section; PMR: Perinatal Mortality Rate; WHO: World Health Organization; RHD: Rheumatic Heart Disease; CHD: Congenital Heart Disease

Background

WHO reported that cardiac disorders used to be leading causes of maternal mortality globally, but the situation has changed because of reduction in the occurrence of the disorders, early diagnosis, and better management strategies [1]. However, in low-income countries, Rheumatic Heart Disease (RHD) continues to be one of the most serious disorders during pregnancy, with the risk of the unfavorable maternal-fetal/neonatal outcome, a challenge to the woman, obstetrician, pediatrician and physician [2]. Also, better diagnostic modalities and management are enabling more girls with Congenital Heart Diseases (CHDs) survive, increasing the number of pregnant women with CHDs, with their risks. Because of symptoms such as, breathlessness or signs such as, an ejection systolic murmur which suggests heart disease, may be present in up to 90% of the pregnant women as a consequence of the physiological changes induced by pregnancy itself, there are problems in diagnosis as well as management of cardiac disorders.

Objective

We endeavored to analyze the case records of women with cardiac disorders during pregnancy, labor and postpartum to know the trends and fetomaternal outcome of such women in low resource settings, so as to know the challenges.

Material and Methods

Analysis of case records of pregnant, postpartum women with cardiac disorders managed from 1987 to 2016 at a rural tertiary referral medical institute of India was done. Consent for academic use without identification of the case was there. In everyday practice, women who reported to outpatient with cardiac disorders were evaluated by the senior obstetrician as well as a physician. Considering the parity, gestation at first visit and disease status, appropriate counseling was done about the continuation or termination of pregnancy with concurrent contraception/sterilization (Table 1).

Table 1: Age and parity in rheumatic and congenital heart disease.

Disease		Age	GI	G2-G4	Total
MS	278	<20 yrs	18	14	32
		20-24 yrs	80	62	142
		25-29 yrs	36	52	88
		30-34 yrs	-	8+8*	16
					278
MR	78	<20 yrs	04	-	04
		20-24 yrs	10	28	38
		25-29 yrs	12	20	32
		30-34 yrs	-	2+2*	4
					78
MS + MR	76	<20 yrs	12	18	30
		20-24 yrs	12	14	26
		25-29 yrs	10	10	20
					76
Atrial Septal Defect	34	20-24 yrs	04	06	10
		25-29 yrs	08	16	24
Ventricular Septal Defect	12	20-24 yrs	04	02	06
		25-29 yrs	04	-	04
		30-34 yrs	-	02	02
					12
Fallot's Tetralogy	05	20-24 yrs	-	05	05
Eisenmenger Syndrome	08	20-24 yrs	04	04	08
Cardiomyopathy	08	20-24 yrs	03	03	06
		25-29 yrs	02	-	02
					08
Complete Heart Block	01	25-29 yrs	01	-	01
Total	500		224	276	500

MS: Mitral Stenosis; **MR:** Mitral Regurgitation; *>G4

The detailed clinical examination was done at follow up, for evidence of respiratory, lower genital and urinary tract infection for therapy as per the need. Women were advised additional

rest with regular antenatal advice. They were hospitalized, with or without symptoms either for initial assessment or if they came from far off places, if they reported in an emergency or if any deterioration of cardiac status was observed and also near the expected date of delivery depending on the distance from the hospital and possibility of availability of transport in an emergency. They were carefully monitored intrapartum/postpartum and prophylactic antibiotics were given. Vaginal delivery was aimed at and CS was performed only for definitive obstetric indication. Use of vacuum or outlet forceps to curtail the second stage of labor and bearing down efforts was liberal. Frusemide 20-40 mg was usually given intravenously immediately after the delivery of the baby. Ergometrine was avoided. Women were counseled for contraception and if willing, sterilization was done either concurrently with CS or on 6th or 7th postpartum day of vaginal delivery. Women with two live births were always counseled to have sterilization if they had risky cardiac disorder even after one baby sterilization was advised in consultation with a physician.

Results

During the analysis period, from 1987 to 2016, there were 79868 births and 576 women with cardiac disorders were managed, incidence 0.56% of births. Over the years the incidence of heart disease with pregnancy has been declining with 0.62% in Block A (1987-1991), 0.56% in Block B (1992-1996), 0.48% in Block C (1997-2001), 0.46% in Block D (2002-2006), 0.43% in Block E (2007-2011) and 0.42% in Block F (2012-2016) significant change (p -value<0.05). Of 576 cases 466 (80.9%) were of RHD, 95 (16.45%) CHDs, 12 (2.08%) had cardiomyopathy and one woman had complete heart block. In Block A, there were 88.1% cases with RHD disease, in B 85%, C 82.1%, D 82.6%, in E 80% and 79.2% in Block F, highly significant decrease in RHD, p -value (<0.0001). Cases of pregnancy with CHD increased, 11.9% in Block A, 15% in Block B, 17.9% in Block C, 18.7% in Block D, 19.09% in Block E and 20.02% in Block F, change highly significant p -value (<0.0001). So overall there was an increasing trend of a congenital and decreasing trend in cases with RHD. Most cases were diagnosed in antenatal outpatient, however, some did present as emergency cases either during pregnancy or labor and some even in the postnatal period. Quite a few women (11.36%) did not know about their disease before reporting to the hospital. Overall 56 women had either spontaneous or induced abortions, 20 were lost to follow up. So fetomaternal outcome could be analyzed for 500 cases (434 RHD, 59 CHD, and 07 cardiomyopathies). Of the 500 women, 140 (28%) had reported between 25-28 weeks, 200 (40.0%) between 29-37 weeks and 160 (32%) had reported after 38 weeks pregnancy or intrapartum or postpartum. Overall three seventy-six (75.2%) of 500 women had normal delivery, 72 (14.4%) instrumental vaginal delivery and 52 (10.4%) women underwent CS. CS rate was significantly lower than overall CSR (p -value<0.001) and instrumental vaginal delivery much higher than overall during the same period due to obvious reasons. 27 (51.9%) of all who had CS also, had concurrent sterilization. Of the 500 mothers, 62 (12.4%) had preterm births and the rest (87.60%) term, similar to overall cases but Small for Gestational

Age (SGA) babies (44%) were significantly more than overall 30% (p-value<0.05) cases (Table 2).

Table 2: Clinical presentation of women who died.

No	Gestation	Age	Parity	Presentation	Diagnosis
C1	20 weeks	18 yrs	Primi	Breathlessness with palpitations	Rheumatic mitral stenosis with atrial fibrillation
C2	32 weeks	22 yrs	Primi	Pain abdomen with breathlessness	Rheumatic mitral stenosis with pulmonary embolism with cardiac failure
C3	38 weeks	25 yrs	G ₂ P ₁ L ₁	Hypertension with pain abdomen and breathlessness	CCF with respiratory failure
C4	40 weeks	25 yrs	G ₂ P ₁ L ₁	Easy fatiguability, breathlessness, and tachypnoea with previous CS in labor	Cardiomyopathy with cardiac failure
C5	PNC day 1	24 yrs	Primi	Presented in an emergency at 32 weeks, had assisted vaginal delivery at 38 wks.	Eisenmenger's complex with cardiac failure
C6	26 weeks	24 yrs	Primi	Pain abdomen with breathlessness with palpitations	
					Rheumatic mitral stenosis with pulmonary embolism with cardiac failure
C7	32 weeks	26 yrs	G ₂ P ₁ L ₁	Easy fatiguability, breathlessness, and tachypnoea with previous CS in labor	Cardiomyopathy with cardiac failure
C8	30 weeks	24 yrs	Primi	Pain abdomen with breathlessness with palpitations	Rheumatic mitral stenosis with pulmonary embolism with cardiac failure sss
C9	32 weeks	28 yrs	G ₂ P ₁ L ₁	Hypertension with pain abdomen and breathlessness	CCF with respiratory failure
C10	28 weeks	32 yrs	Primi	Pain abdomen with breathlessness with palpitations with easy fatiguability	Rheumatic mitral stenosis with pulmonary embolism with cardiac failure sss
C11	26 weeks	24 yrs	Primi	Pain abdomen with breathlessness	Rheumatic mitral stenosis with pulmonary embolism with cardiac failure
C12	24 weeks	28 yrs	Primi	Pain abdomen with breathlessness with palpitations with easy fatiguability	Rheumatic mitral stenosis with pulmonary embolism with cardiac failure
C13	32 weeks	26 yrs	Primi	Pain abdomen with breathlessness	CCF with respiratory failure
C14	34 weeks	24 yrs	Primi	Hypertension with pain abdomen and breathlessness	Rheumatic mitral stenosis with pulmonary embolism with cardiac failure sss
C15	P1L1, PNC day 7	30 yrs	PNC	Pain abdomen with breathlessness with palpitations with easy fatiguability	CCF with respiratory failure
C16	32 weeks	25 yrs	Primi	Easy fatiguability with breathlessness	Rheumatic mitral stenosis with pulmonary embolism with cardiac failure

Overall 60 babies of 500 were lost. PMR in women with heart disease was 120. The overall PMR in Block A was 100.76, in Block B, 66.4, in Block C it was 70.9, in Block D, 68, in Block E, 50 in Block F, 49.5 and PMR during the same period in women with heart disease were 156.2, 83.3, 62.5, 42.9, 44.5 and 40.9 significantly decreasing trend over the years, more so in cases with cardiac disorders.

Out of the total 576 cases of RHD 35 had a spontaneous abortion and 15 underwent induced abortion 11 of them had concurrent sterilization also. Overall 12 women had presented at 24 weeks gestation with intrauterine death. Out of 434 cases of RHD, 145 had presented postnatally after vaginal births (42 for tubectomy, and 20 with postpartum fever and 83 for other things). Overall total 112 (22.4%) women underwent sterilization.

Out of total 556 women (20 lost to follow), 16 (2.87%) women died contributing to 9.5% of indirect maternal mortality. During the period of analysis, the overall Maternal Mortality Ratio (MMR) due to all causes was 906.2 in Block A, 536 in Block B and 424 in Block C, 407 in Block D, 406 in Block E, 400 in Block F and 399 in Block G and cardiac disorders contributed to 188.4, 150.4, 99.9, 89.3, 66.4, 52.4 and 45.3 with significantly decreasing trends over the years (**Table 3**).

Table 3: Trends in heart disease.

Duration	The incidence of heart disease (%)	Rheumatic heart disease (%)	Congenital heart disease (%)
1987-1991	0.62	88.1	11.6
1992-1996	0.56	85.0	15.0
1997-2001	0.48	82.1	17.9
2002-2006	0.46	82.6	18.7
2007-2011	0.43	80	19.09
2012-2016	0.42	79.2	20.02

Discussion

Pregnancy in women with heart disease is associated with significant cardiac and neonatal morbidity. The probability of maternal cardiac or neonatal events needs to be predicted from baseline characteristics of the mothers. But the impact of cardiac disorders on maternal and PMR continues to be high 13% to 32% [3]. In the present analysis, it was revealed that the frequency of RHD with pregnancy decreased and CHD with pregnancy increased. 2 of 16 women who died, had tight mitral stenosis, pulmonary edema, and 13 women had pulmonary congestion, congestive cardiac failure, and dysrhythmia, mainly atrial fibrillation. Overall, if failure does not occur during pregnancy, these women need to be monitored very carefully during and after labor for intra and postpartum failure. A vaginal delivery usually carries less risk of complications, so is recommended. In the present analysis CS rate in women with cardiac disorders was much lower (10%) compared to overall CS rate during the period of analysis (30%), maybe because CS is seriously avoided unless there is an absolute indication for CS in view of risks of surgery in women with cardiac disorders. In developed countries, CHD is the most common cause of cardiac diseases, accounting for 89% cases whereas RHD constitutes the major cause in developing countries [4]. In the present analysis, the case fatality was 3%; however, the maternal outcome has been improving over the years. Koonin, et al. [5] reported 5.6% pregnancy-related deaths in the United States from 1987 to 1990 and in the United Kingdom from 1994 to 1996, cardiac diseases accounted for 38% indirect maternal deaths [6].

Perinatal outcome is also adversely affected in CHD. Prematurity, dysmaturity and fetal growth restriction are commonly encountered. In the present analysis, 60 babies, out of 500 were lost, PMR 120. Overall 12 women had presented with intrauterine death, 6 of them had tight loops of cord around the neck and in the other 6, no cause was evident. 18

babies were fresh stillborn, 5 due to cord prolapse and other 13 were very preterm with very low birth weights at birth, gestation 28-32 weeks (weight<1.5 kgs) with asphyxia. 30 neonatal deaths occurred, 12 due to prematurity with respiratory distress syndrome, 2 small for date babies later had disseminated intravascular coagulopathy and intraventricular hemorrhage and other had birth asphyxia with meconium aspiration syndrome. In women with heart disease baby dying of cord, prolapse is a real tragedy. None of the babies had evidence of CHD at birth.

The policy has been to recommend against pregnancy or to offer abortion to women with failure and those with pulmonary hypertension but sometimes compliance issues are there. Motherhood is a strong emotion that women risk their lives. A case of Eisenmenger complex was advised against pregnancy [7] but in spite of being told about the risk after first birth, and two abortions, still, she had third and died. Another woman with Eisenmenger complex who died postpartum was advised against pregnancy. Generally, only first-trimester induced abortion is advocated. In the present analysis, it was revealed that some women underwent induced abortion in the second trimester either because their cardiac status did not permit the continuation of pregnancy or they had two children and were hemodynamically stable and desired abortion with concurrent sterilization. All did well.

Cardiac disease with pregnancy continues to be a problem in resource-poor settings. It is believed that pregnancy complicated by heart disease should result in a favorable outcome for both mother and fetus, provided meticulous care is taken before and during pregnancy, labor and postpartum period with appropriate therapy [8]. There is a need to refine the risk stratification of women with heart disease so that they can receive appropriate counseling and care. Poor maternal functional class or cyanosis, myocardial infarction, left heart obstruction, prior arrhythmia, and prior cardiac events were predictive of maternal complications in the study [9]. Understandably the outcome is bad when the diagnosis itself is delayed. More than two-thirds of the women in the present analysis were diagnosed in the index pregnancy and had reported for the first time in the third trimester. Some reported even postnatal. 42% of women had mitral stenosis who have a high risk of pulmonary edema. RHD still constituted one of the potentially serious risks during pregnancy [10]. So, potentially preventable mortality continues. However, even with resource constraints case fatality and the perinatal outcome could be improved as was visible with trends in the present analysis [11-14].

Pre-pregnancy diagnosis, meticulous care during pregnancy, labor and postpartum are essential as women with cardiac disorders can become fatal for the mother and baby.

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Conflict of Interest

There is no conflict of interest.

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