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## Original Research Article

## Cardiac diseases in pregnancy leading to maternal mortality

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## ABSTRACT

**Objectives:** 1) To correlate age and gravida; 2) To correlate gross and histopathological findings of heart; 3) To evaluate postpartum complications and neonatal condition in maternal autopsies due to cardiac disease.

**Materials and Methods:** This is 3 years retrospective study in a tertiary care hospital from 1<sup>st</sup> January 2015 to 31<sup>st</sup> December 2017. Total 1895 autopsies were performed by pathology department in these 3 years, out of which 158 (10.76%) maternal mortality autopsies were performed. Of which 17 (8.33%) maternal mortality autopsies due to cardiac diseases in pregnancy. The gross specimen of heart and formalin fixed paraffin embedded sections were stained with Haematoxylin and Eosin were reviewed for histopathological examination.

**Results:** 35.29% maternal mortality occurred due to chronic rheumatic heart disease. 29.40% maternal mortality occurred due to dilated cardiomyopathy. 23.52% maternal mortality occurred due to ventricular failure. 11.76% maternal mortality occurred due to myocarditis. Most common age group involved was between 21-30 years, mainly seen in multigravida in 13 (76.47%) cases with postpartum complications. Most common presenting complaint was breathlessness in 17 (100%) followed fever with chills in 8 (52.94%) cases. Out of 17 cases, 14 (82.35%) cases delivered normal vaginally and 12 (70.58%) cases had live baby. On gross examination of heart, it was moderate to markedly enlarged due to ventricular dilation with marked hypertrophy of left ventricular wall. On microscopic examination, myocardial muscle fibre hypertrophy with disarray of myofibers, valvulitis, myocarditis and subendocardial fibrosis seen.

**Conclusion:** Pregnancy in women with heart disease is associated with high morbidity & mortality rates. So they should receive appropriate antenatal counselling & care. Proper evaluation of maternal prognosis is required prior to conception in women with heart disease. So adequate clinical follow up during pregnancy is needed for proper outcome in these patients.

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## 1. Introduction

About 287000 maternal deaths occur each year worldwide.<sup>1</sup> Cardiac disease is one of the important causes of maternal mortality and morbidity both in antepartum and postpartum period.<sup>2,3</sup> The overall incidence of heart disease in pregnancy is < 1%.<sup>4</sup>

The circulatory changes of pregnancy in the presence of maternal heart disease may result in adverse consequences, even death of mother or fetus.<sup>2,5,6</sup> The major alteration in pregnancy include a 30-50% increase in both cardiac output and blood volume, in addition to decreased blood pressure. In cardiac pregnant patient, these modifications may lead to clinical decompensation, exposing these women to potentially life threatening situation.

Cardiac disease in pregnancy is divided into congenital and acquired. The acquired group includes RHD, cardiomyopathy and ischemic heart disease. Of these,

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in developing countries rheumatic heart disease is the commonest type, whereas cardiomyopathy and congenital heart disease one more common in developed countries.<sup>3</sup>

## 2. Materials and Methods

This is a 3 years retrospective study in a tertiary care hospital from 1<sup>st</sup> January 2015 to 31<sup>st</sup> December 2017. Total 1895 autopsies were performed by pathology department, out of which 158 were maternal mortality autopsies. Of which 17 deaths were due to cardiac diseases in pregnancy. That means 10.76% maternal mortality occurred of which 8.33% maternal mortality due to cardiac diseases in pregnancy (Table 1).

The gross specimen of heart and formalin fixed paraffin embedded sections were stained with haematoxylin and eosin were reviewed for histopathological examination. Special stains [GMS, AFB, PAS] were studied wherever required.

**Table 1:** Record of autopsies in last 3 years

Record of autopsies in last 3 years	No of cases	Percentage
Total autopsies	1895	100%
Maternal mortality autopsies	158	10.76%
Maternal mortality autopsies due to cardiac diseases in pregnancy	17	8.33%

## 3. Results

### 3.1. Distribution of maternal mortality autopsies due to cardiac diseases in pregnancy

In the present study, maternal mortality autopsies due to cardiac disease in pregnancy were 17 (8.33%). Of this, 6 (35.29%) maternal mortality occurred due to chronic rheumatic heart disease [RHD]. 5 (29.40%) maternal mortality occurred due to dilated cardiomyopathy. 4 (23.52%) & 2 (11.76%) were due to ventricular failure [VF] & myocarditis respectively (Table 2).

**Table 2:** Distribution of maternal mortality autopsies due to cardiac diseases in pregnancy

Distribution of maternal mortality autopsies due to cardiac diseases in pregnancy	No of cases	Percentage
Rheumatic heart disease (RHD)	6	35.29%
Cardiomyopathy	5	29.40%
Ventricular failure (VF)	4	23.52%
Myocarditis	2	11.76%

### 3.2. Age group distribution in maternal autopsies due to cardiac diseases

In this study, most common age group of the maternal deaths due to cardiac diseases in pregnancy was between 21-30 years in 58.8% cases (10 cases). Most of Rheumatic heart disease cases occurred between 21-30 years and dilated cardiomyopathy was seen below 20 years of age, followed by between 21-30 years. Most of the cases of ventricular failure and myocarditis were between 21-30 years (Table 3).

### 3.3. Clinical presentation distribution in maternal autopsies due to cardiac diseases

In our study, most common presenting complaints in maternal mortality autopsies due to cardiac diseases in pregnancy were breathlessness in 17 (100%) cases followed fever with chills in 8 (47.06%) cases. Other complaints were dyspnoea on exertion, oedema of feet, cough with expectoration, abdominal pain, palpitation (Table 4).

### 3.4. Gravida distribution in maternal autopsies due to cardiac diseases

Most of the cases of cardiac disease in pregnancy leading to maternal mortality were seen in multigravida in 13 (76.47%) cases with postpartum complications (Table 5).

### 3.5. Type of delivery in maternal autopsies due to cardiac diseases

In the present study, in 14 (82.35%) cases of maternal mortality autopsies due to cardiac disease in pregnancy, pregnant women delivered normal vaginally, 1 (5.88%) case had underwent lower segment caesarean section & in 2 (11.76%) cases miscarriage seen (Table 6).

### 3.6. Neonatal condition in maternal autopsies due to cardiac diseases

Out of 17 cases of maternal mortality autopsies due to cardiac disease in pregnancy, 12(70.59%) cases had live baby and in 5 (29.41%) cases intra uterine fetal death (IUFD) seen (Table 7).

Out of 6 cases of RHD, in 4 cases death due to CCF, in 1 case fibrocasseous TB & intrapulmonary haemorrhage and in other case acute renal failure in H1N1 positive infection. In 3 cases of DCM death due to postpartum DCM & in 2 cases peripartum DCM associated with bronchopneumonia & pulmonary oedema. In all 4 cases of VF, death due to VF associated with severe anaemia in 2 cases, with DCM in 1 case & IHD in other case. In myocarditis, 1 case of ARDS with ARF & another case of giant cell myocarditis with interstitial pneumonia.

**Table 3:** Age group distribution

Age group distribution	RHD No of cases	DCM No of cases	VF No of cases	Myocarditis No of cases	Total no of cases	Percentage
≤ 20 years	1	4	1	0	6	35.29%
21-30 years	5	1	2	2	10	58.82%
≥ 31 years	0	0	1	0	1	5.88%

**Table 4:** Clinical presentation distribution

Clinical presentation distribution	RHD No of cases	DCM No of cases	VF No of cases	Myocarditis No of cases	Total no of cases	Percent age
Breathlessness	6	5	4	2	17	100%
Fever with chills	5	3	0	0	8	47.06%
Dyspnea on exertion	6	0	0	0	6	35.29%
Oedema of feet	3	0	0	0	3	17.64%
Abdominal Pain	0	2	0	0	2	11.76%
Cough with expectoration	0	2	0	0	2	11.76%
Palpitation	1	0	0	1	2	11.76%

**Table 5:** Gravida distribution

Gravida distribution	RHD No of cases	DCM No of cases	VF No of cases	Myocarditis No of cases	Total no of cases	Percentage
Primigravida	2	0	2	0	4	23.53%
Multigravida	4	5	2	2	13	76.47%

**Table 6:** Type of delivery

Type of delivery	RHD No of cases	DCM No of cases	VF No of cases	Myocarditis No of cases	Total no of cases	Percentage
Normal vaginal delivery	6	4	4	0	14	82.35%
LSCS	0	1	0	0	1	5.88%
Miscarriage	0	0	0	2	2	11.76%

**Table 7:** Neonatal condition

Neonatal condition	RHD No of cases	DCM No of cases	VF No of cases	Myocarditis No of cases	Total no of cases	Percentage
Live baby	5	4	3	0	12	70.59%
IUFD	1	1	1	2	5	29.41%

### 3.7. Gross & microscopic findings

On gross examination of heart, it was moderate to markedly enlarged due to ventricular dilation in 12(70.58%) cases with marked hypertrophy of left ventricular wall in 6(35.29%) of cases.

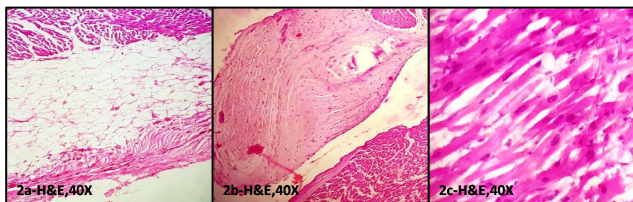
On microscopic examination, myocardial muscle fibre hypertrophy with disarray of myofibers seen in 8(47.05%) cases, valvulitis in 1 (5.88%) case, myocarditis in 5(29.41%) and subendocardial fibrosis in 4 (23.52%) cases.

### 4. Discussion

In the present study, out of 17 cases of maternal mortality autopsies due to cardiac diseases in pregnancy, 35.29% cases (6 cases) were of rheumatic heart disease followed by 29.40% cases (5 cases) of cardiomyopathy, which is comparable with Pujitha KS et al.<sup>7</sup> & WS Avilla et al.<sup>8</sup> studies but showing higher percentage of RHD & lower percentage of cardiomyopathy in Pujitha KS et al.<sup>7</sup> study and lower percentage of RHD & cardiomyopathy in WS Avilla et al.<sup>8</sup> study.



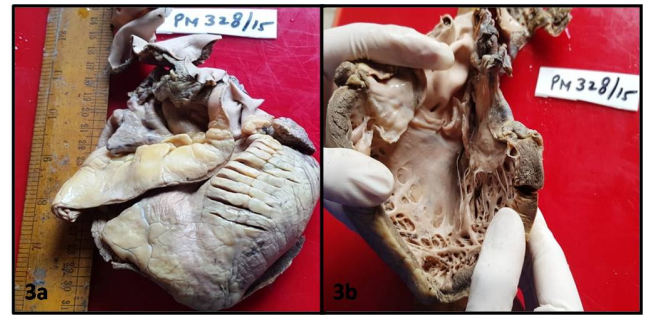
**Fig. 1:** Gross findings of heart in rheumatic heart disease: **a:** Showing enlarge heart, globular in shape & apex at centre. Epicardium shows pericarditis with fibrinous grayish white exudate & congestion on heart. **b:** Showing mitral valve stenosis with narrowing of opening (fish mouth) and shortening & thickening of chordae tendinae. **c:** Showing left ventricular hypertrophy with papillary muscle hypertrophy & shortening of chordae tendinae. **d:** On cut open, showing slightly dilated left ventricle & mitral valve is replaced by artificial valve which is 3 cm circular, plastic with stainless steel border



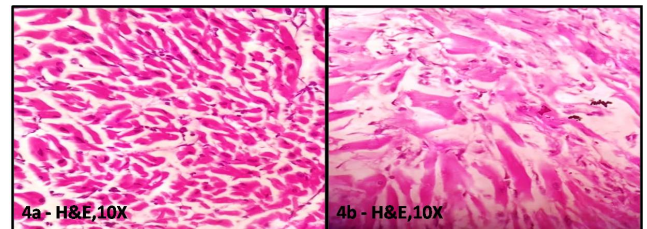
**Fig. 2:** Microscopic findings of heart in rheumatic heart disease; **a:** Showing fibrous thickening of epicardium with mixed inflammatory infiltrate & increased epicardial fat. **b:** Showing chronic healed valvulitis. **c:** Showing hypertrophy of myofibers with box shaped nuclei

In our study, most common age group involved was 21-30 years in 58.8% cases (10 cases) which is in concordance with Pujitha KS et al.<sup>7</sup> study but it is showing, 21-25 years is the commonest age group in 50% cases. The commonest presenting complaints in this study were breathlessness in 100% cases, fever with chills in 52.94% cases followed by dyspnoea on exertion and oedema which is similar to Pujitha KS et al.<sup>7</sup> study.

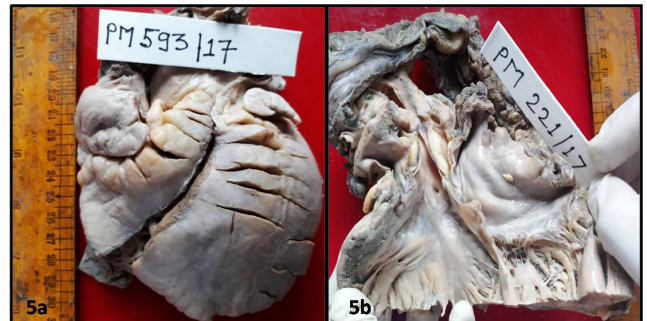
In the present study, most of the cases of maternal mortality autopsies due to cardiac diseases in pregnancy were seen in multigravida in 76.47% cases, which is in discordance with Pujitha KS et al.<sup>7</sup> study.



**Fig. 3:** Gross findings of heart in dilated cardiomyopathy; **a:** Showing markedly enlarged heart due to 4 chamber dilation with focal areas of congestion; **b:** Showing moderately enlarged heart with left ventricular dilation



**Fig. 4:** Microscopic findings of heart in dilated cardiomyopathy **a:** Showing disarray of myofibers; **b:** Showing disarray of myofibers with hypertrophy of myofibers & lymphoplasmacytic infiltrate in interstitium



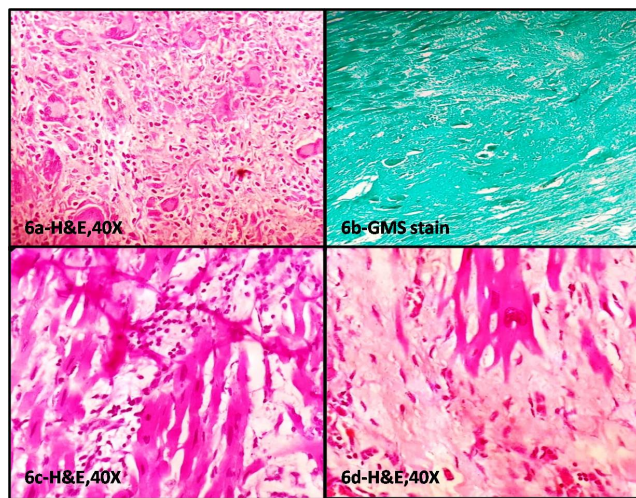
**Fig. 5:** Gross findings of heart in ventricular failure and myocarditis; **a:** Showing markedly enlarged heart due to left ventricular dilation; **b:** Showing grayish white fibrotic thickening of right & left ventricle involving interventricular septum with areas of congestion & hypertrophy of papillary muscle

In our study, 82.35% (14 cases) cases of maternal mortality autopsies due to cardiac diseases in pregnancy delivered normal vaginally, which is in concordance with Pujitha KS et al.<sup>7</sup> study.

In this study, congestive cardiac failure seen in 47.05% cases, pulmonary oedema and anaemia seen in 11.76% cases, which are in discordance with Pujitha KS et al.<sup>7</sup> study, showing lower percentage of CCF, pulmonary oedema and higher percentage of anaemia (Table 8).

**Table 8:** Comparison of findings between present study and other studies

	<b>In our study (2015-2017) 17 cases</b>	<b>Pujitha KS et al<sup>7</sup> (2017) 32 cases</b>	<b>WS Avilla et al<sup>8</sup> 235 cases</b>
RHD	35.29% (6 cases)	62.6%	21.4% (119 cases)
Cardiomyopathy	29.40% (5 cases)	15.6%	10%
Age group	21-30 years (58.8%, 10 cases)	21-25years (50%)	
Most common Complaint	Breathlessness (100%), Fever with chills (52.94%) f/b DOE, oedema	Breathlessness, Pedal oedema, Murmur	
Gravida	Multigravida (76.47%)	Primigravida (50%)	
Normal vaginal Delivery	82.35%	81.25%	
CCF	47.05%	9%	
Pulmonary Oedema	11.76%	4.5%	
Anemia	11.76%	45.6%	



**Fig. 6:** Microscopic findings of heart in myocarditis; **a:** Myocardium showing destruction of myofibers with diffuse mixed inflammatory infiltrate (lymphocytes, plasma cells, histiocytes) & many multinucleated giant cells with areas of fibrosis; **b:** Showing special stain-GMS negative for fungi; **c:** Shows lymphocytic myocarditis; **d:** Showing hypertrophy of myofibers with fibrosis

**5. Conclusion**

Pregnancy in women with heart disease is associated with high morbidity and mortality rates. So appropriate antenatal counselling, care and adequate clinical follow up during pregnancy is needed for proper outcome of pregnant female with cardiac disease.

**6. Source of Funding**

None.

**7. Conflict of Interest**

None.

**References**

1. Campanharo FF, Cecatti JG, Haddad SM, Parpinelli MA, Born D, Costa ML, et al. The Impact of Cardiac Diseases during Pregnancy on Severe Maternal Morbidity and Mortality in Brazil. *PLOS ONE*. 2015;10(12):e0144385. doi:10.1371/journal.pone.0144385.
2. Abhilashi K, Tiwary B, Sinha A, Kiran S, Parvina P, Prasad D. Epidemiology and maternal and fetal outcome of heart disease during pregnancy: A tertiary care centre experience. *Int J Clin Obstet Gynaecol*. 2018;2(5):128–30.
3. Salam S, Mushtaq S, ud Din KM, Gul I, Ali A. Maternal and fetal outcome in pregnancy with heart disease in tertiary care hospital in India. *Int J Reprod Contracept Obstet Gynecol*. 2017;6(9):3947–51. doi:10.18203/2320-1770.ijrcog20174041.
4. Bhatla N, Lal S, Behera G, Kriplani A, Agarwal N. Cardiac disease in pregnancy. *Int J Gynecol Obstet*. 2003;82(2):153–9.
5. Siu SC, Colman JM, Sorensen S, Smallhorn JF, Farine D, Amankwah KS, et al. Adverse Neonatal and Cardiac Outcomes Are More Common in Pregnant Women With Cardiac Disease. *Circulation*. 2002;105(18):2179–84. doi:10.1161/01.cir.0000015699.48605.08.
6. Kosuru LP, Kumari KA. Clinical study of maternal and perinatal outcome in heart disease complicating pregnancy at tertiary referral centre of Telangana State. *Int J Gynaecol*. 2018;8(2):46–54.
7. Pujitha KS, Sheela SR, Jyothi NS. A study of maternal and fetal outcome in cardiac disease in pregnancy at tertiary care center. *Int J Reprod Contracept Obstet Gynecol*. 2017;6(11):5095–8. doi:10.18203/2320-1770.ijrcog20175031.
8. Avila WS, Rossi EG, Ramires JAF, Grinberg M, Bortolotto MRL, Zugaib M, et al. Pregnancy in patients with heart disease: Experience with 1,000 cases. *Clin Cardiol*. 2003;26(3):135–42. doi:10.1002/clc.4960260308.

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