## Original Article

# Peripartum cardiomyopathy characteristics and outcome in a tertiary care hospital

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## Abstract

**Objective:** To assess the incidence, risk factors ,maternal and foetal outcome in women with peripartum cardiomyopathy.

**Methods:** A descriptive study was conducted in the department of gynae obstetrics Civil Hospital, and Dow University of Health Sciences, Karachi from Oct, 2003 till Sept, 2007. Thirtytwo patients of any parity and age in their last months of pregnancy or within five months of delivery who met the criteria for diagnosis of peripartum cardiomyopathy were included in the study. Their epidemiologic data, risk factors, NYHA class and pregnancy outcomes were recorded till recovery or discharge. Analysis of results was done using descriptive analysis on SPSS version I5.

**Results:** Thirty two patients presented with PPCM, which was a frequency of 1 per 837 deliveries. The mean age was 32 ± 3 years and the mean parity 3.66 ± 1.5. All patients were obese with mean body weight of 71.91 ± 12.9 kg. The most frequent diagnosis of cardiomyopathy was made in 12 (37.57) Balochi and 7(21.87) mohajir women. Twenty (62.57) presented late in post partum period and 20 (62.58) were in NYHA class IV. Chronic hypertension 10 (31.257), long term tocotysis 6 (18.757), pre-eclampsia 6 (18.757) and multiple pregnancy were main riskfactors.

Eighteen (52.527) women had spontaneous vaginal delivery, 2 had assisted vaginal delivery and 2 had twin vaginal delivery. Ten (31.257) required caesarean section. The main complication was congestive cardiac failure in 20 (62.57) patients and 3 maternal deaths occurred. There were 27 live births and 5 perinatal deaths were recorded.

**Conclusion:** This study showed that peripartum cardiomyopathy is associated with high morbidity and mortality. Multiple risk factors are associated with it, the most important being advancing age, parity, obesity, chronic and gestational hypertension and long term tocolysis (JPMA 60:377; 2010).

## Introduction

Peripartum cardiomyopathy is a disease of unknown cause that affects women of reproductive age. It is a form of dilated cardiomyopathy characterized by deterioration in cardiac function presenting typically as cardiac failure between the last months of pregnancy and up to five months post partum. It is essentially a diagnosis of exclusion and can only be made in the absence of any other demonstrable cause. Peripartum cardiomyopathy involves systolic dysfunction of the heart with a decrease of the left ventricular ejection fraction (EF) and associated congestive cardiac failure and an increased risk of atrial and ventricular dysrrhythmias, thromboembolism and even sudden cardiac death.[1-3] The exact incidence of peripartum cardiomyopathy is unknown. It is estimated to occur in one in 3000 - 4000 pregnancies.[4-6]

Several risk factors are known to predispose a woman for developing peripartum cardiomyopathy. These include advancing maternal age, multiparity, multiple pregnancy, obesity, pregnancies complicated by chronic hypertension, pre-eclampsia gestational hypertension and black-race.[7]

The etiology of peripartum cardiomyopathy is unknown. Proposed causes include myocarditis, abnormal immune response to pregnancy, cardiotropic viruses and other toxins that serve as triggers to immune system dysfunction, micronutrient or trace mineral deficiencies and genetics as possible components in development of peripartum cardiomyopathy.[8-10]

Patients with peripartum cardiomyopathy present with typical signs and symptoms of left ventricular failure like fatigue, dyspnoea, orthopnoea, cough, pedal oedema and chest pain and an increased weight gain in last months of pregnancy.

The majority of cases occur after delivery and in the immediate post partum period.

The diagnosis requires echocardiographic information and rests on the presence of left ventricular systolic impairment. Recommended Echocardiographic criteria include an ejection fraction (EF) < 45% and fractional shortening < 30% with a left ventricular end diastolic measurement of 4.8 cm/m$^2$ of body surface area.[11] Functional atrioventricular regurgitation may also be present secondary to ventricular dilatation. Chest X-ray demonstrates cardiomegaly and pulmonary oedema.

Maternal mortality from peripartum cardiomyopathy in United States has been reported to be 25-50%.[12,13]

Thromboembolism accounts for approximately 30% of these deaths. Normalization of heart size and resolution of congestive heart failure within 6 months after delivery is a good prognostic sign with mortality rare among these patients.[14]

Patients with peripartum cardiomyopathy require counseling concerning the risk of a subsequent pregnancy. Patients without resolution of their cardiomyopathy are at significant risk for death or exacerbation of the disease,[14] and should be advised to avoid pregnancy. However a few studies suggested 20% of patients experienced transient exacerbation during subsequent pregnancy even after complete resolution of cardiac dysfunction.[15] Therefore when patients with previous history of peripartum cardiomyopathy become pregnant they should be cared for in collaboration with a high risk obstetric centre unit. Early detection and treatment is associated with high rates of recovery and decreased morbidity and mortality.

Medical treatment of peripartum cardiomyopathy is similar to treatment of congestive heart failure and includes use of diuretics, Beta blockers, angiotensin converting enzyme inhibitors, and digoxin therapy. After delivery hydralazine and nitrates may replace ACE inhibitors. Anticoagulation is indicated if Ejection Function (EF) is less than 35%. Immunosuppressive therapy can be considered for women with myocarditis.

Vaginal delivery is indicated depending on cardiac status. However caesarean delivery may be required because of inability to tolerate prolonged stress of labour, preferably using continuous epidural anaesthesia. General anaesthesia is used when caesarean section is required due to non reassuring foetal status or acute maternal decompensation.

Follow up after delivery requires frequent echocardiograms and continued medical treatment for at least a year after delivery. This study was conducted to assess the incidence, risk factors and obstetric outcome in patients diagnosed with peripartum cardiomyopathy.

## Patients and Methods

The study was conducted in the department of gynaecology and obstetrics, Dow University of Heath Sciences, Civil Hospital Karachi. It was a descriptive study carried out from October, 2003 till September, 2007. Patients of any parity and age, who were in their last months of pregnancy or within five months of delivery and presented with moderate to severe breathlessness on rest or exertion with palpitations ankle oedema or with signs and symptoms of heart failure were evaluated for peripartum cardiomyopthy. Patients with previous history of cardiac disease including valvular heart disease, cardiac failure due to severe pre-eclampsia, fluid overload and amniotic fluid embolism were excluded .Patients with normal echocardiographic findings were also excluded from the study. Epidemiologic data including age, race and parity along with information on timing of presentation in relation to gestation age, presenting signs and symptoms, risk factors and pregnancy outcomes were recorded on a proforma. Chronic hypertension was taken as elevated blood pressure of $\geq$ 140/90 mm of Hg requiring treatment and pre-eclampsia as blood pressure of > then 140/90 with proteinuria after 20 weeks of pregnancy. Obesity was defined as Body Mass Index (BMI) of > 30. Considering an average weight of 8-12 Kg in pregnancy with no idea in most of the patients of pre-pregnancy weight (24 patients came in the emergency room). BMI and body weight were taken as estimates of obesity in the study patients with a mean body weight of 72 ± 12 kg and BMI of 32. Echo cardiographic criteria used by cardiologists for diagnosis included an ejection fraction of < 45% and fractional shortening of < 30% with left ventricular end diastolic dimension of 4.8cm/$m^2$ or greater at the time of diagnosis.

All the patients were given conventional treatment for cardiac failure including diuretics, digitalis, and antihypertensive drugs like methyldopa, hydralazine and Nifedipine. Five patients required anti dysrrhythmic drugs and ACE inhibitors.

Recovery was assessed by improvement in clinical condition and repeat echocardiography at discharge from hospital. Patients were followed up at one, three and six months after delivery with clinical improvement, requirement of drugs and echo cardiography.

Analysis of results was done using SPSS version I5. Descriptive analysis was used. Age, parity and body weight were analysed by measures of central tendency. For qualitative variables percentages were used.

## Results

During the study period from October, 2003 till September 2007, 26780 deliveries took place at Civil Hospital Karachi Gynae Unit-I. Of these 32 patients fulfilled the criteria for peripartum cardiomypathy, corresponding to a frequency of 1 case per 837 deliveries.

Of the 32 patients, 24 presented in the emergency room and 8 patients came in obstetrics OPD. The mean age was found to be 32 ± 3 years. Twenty three (71.8%) patients were multipara or had more than 3 children. Details of Ethnic class, Gestational age and Functional Class at diagnosis, presence of hypertension, pre eclampsia, tocolysis and multiple pregnancy are shown in Table-1.

The maternal and foetal outcome of the 32 patients studied can be seen in Table-2.

The results proved that older age ( > 32 years age) and multiparity (> 3 children) were closely related with the development of Cardiomyopathy. It was also observed that IUGR

**Table-1: Characteristics of patients with PPCM.**
**n = 32**

| Age (Years) | No | % | Mean |
|---|---|---|---|
| 20 - 30 | 11 | 34.37 | 31.81 ± 3.7 |
| > 30 | 21 | 65.6 | |
| **Parity** | | | |
| 1 | 1 | 3.12 | |
| 2 | 8 | 25 | 3.66 ± 1.52 |
| ? 3 | 23 | 71.87 | |
| **Ethnic Class** | | | |
| Baloch | 12 | 37.5 | |
| Mohajir | 7 | 21.81 | |
| Sindhi | 6 | 18.75 | |
| Punjabi | 5 | 15.62 | |
| Pathan | 2 | 6.52 | |
| **Gestational Age At Diagnosis** | | | |
| Antepartum | 12 | 37.5 | |
| Postpartum | 20 | 62.5 | |
| **Functional Class At Diagnosis** | | | |
| Nyha Class | | | |
| I | 3 | 9.3 | |
| II | 4 | 12.5 | |
| III | 5 | 15.62 | |
| IV | 20 | 62.5 | |
| Body weight in Kg | | | 71.91 ± 12.92 |
| Chronic hypertension | 10 | 31.25 | |
| Pre-eclampsia | 6 | 18.75 | |
| Longterm Tocolysis | 6 | 18.75 | |
| Multiple Pregnancy | 2 | 6.25 | |

**Table-2: Pregnancy outcome of patients with peripartum cardiomyopathy and foetal complications.**
**n = 32**

| Maternal | No | % |
|---|---|---|
| **Mode of delivery** | | |
| SpontaneousVaginalDelivery | 18 | 56.25 |
| Assisted Vaginal Delivery | 2 | 6.25 |
| Twin Vaginal Delivery | 2 | 6.25 |
| Lower Segment Caesarian Section | 10 | 31.25 |
| **Complications** | | |
| Congestive heart failure | 20 | 62.5 |
| Arrhythmias | 4 | 12.5 |
| Thromboembolism | 1 | 3.12 |
| ICU admissions | 14 | 43.75 |
| Recovery | 20 | 62.5 |
| Death | 3 | 9.37 |
| **Foetal** | | |
| Alive | 27 | 84.37 |
| Stillborn | 3 | 9.37 |
| Neonatal Deaths | 2 | 6.25 |
| Intra Uterine Growth Retardation | 10 | 31.25 |
| Neonate ICU Admission | 5 | 15.62 |

was present in 31% of the pregnant women making it an important risk factor. Late presentation caused cardiac decompensation with 20 patients who were placed in NYHA class 1V.

Three maternal deaths occurred with thromboembolism being the cause in one patient. Twenty (62.5%) women developed congestive cardiac failure. Of these 14 required Intensive Care management due to severe cardiac decompensation.

IUGR was encountered in 10 (31.25%) neonates of whom 5 required NICU admissions mainly for prematurity and Respiratory Distress.

Recovery was seen in 20 patients with improvement in cardiac symptoms and signs at discharge from hospital and normal echocardiography at varying periods within 6 months after delivery.

## Discussion

Peripartum cardiomyopathy (PPCM) is a rare but serious form of cardiac failure affecting women in the last months of pregnancy or early puerperium. It remains a significant cause of maternal morbidity and morality. The incidence of PPCM varies worldwide reported prevalence of PPCM in non African countries ranges between 1:3,000 - 1:15,000 live births.[4-6,16] In our institution, a tertiary care referral centre for a large urban and adjoining rural population, the prevalence was 1 per 837 deliveries.

Common reported risk factors for PPCM are advanced maternal age, multiparity, multiple gestations, black race, obesity, malnutrition, gestational hypertension, pre-eclampsia, poor antenatal care, alcohol and tobacco abuse, low socio economic conditions and long term tocolysis as found in various studies.[17-21] In our study the most significant risk factors found were, advancing maternal age, multiparity, Baloch ethnic group, poor antenatal care and late presentation, obesity, chronic hypertension and pre-eclampsia and long term tocolysis.

PPCM has been reported mostly in women older than 30 years.[17,20,21] In our study also the mean age noted was 31.81 ± 3.7 years despite the trend of young age marriages in our society .Only one patient was a primigranda with 23 being para ≥ 3 which indicates multiparity as a major risk factor.[17,20-22] In the USA majority of afflicted Americans are of African-American origin[20-22] though Asians, Hispanic and Caucasian mothers are also affected. In our study majority of the patients (37.5%) were of Baloch ethnic origin although Mohajir's, Sindhi's, Punjabi's and Pathan's were also affected. The reason for the association of PPCM with higher age, parity, multiple gestation and black race is not fully understood.

Pre-eclampsia and chronic hypertension have been associated with a significant number of PPCM cases in various studies.[1,7,23] Our study showed an association of 50%. Similarly, long term tocolysis with oral salbutamol and terbutaline in women with preterm labour especially if combined with antenatal steroid administration for foetal lung maturation is a risk factor. Two patients with multiple pregnancy in our study, received tocolysis combined with antenatal steroids and later developed life threatening cardiomyopathy in late third trimester. Most patients

presented in NYHA class III and IV in our study as is seen in other studies also.[21] Nearly all of our patients were obese with a mean body weight of 71.91 ± 12.92 Kg indicating obesity as a risk factor.[16,23]

We used echocardiography as the diagnostic test in the absence of other causes of heart failure as is evident from other studies that echo cardiography is the most important tool for diagnosing PPCM and assessing the degree of cardiac dysfunction.[11] PPCM during antepartum period demands intensive foetal and maternal monitoring. Treatment is same as for cardiac failure.

In our study 68.75% of patients had vaginal delivery and 31% required caesarean section mainly due to obstetric reasons. A multi disciplinary approach was adopted involving obstetrician, cardiologist, anesthesiologist and perinatologist. Following delivery 43.75% patients needed ICU care under supervision of cardiologists and anesthesiologists. Maternal complications observed were mainly pulmonary oedema and CCF in 62.5% patients and arrhythmias in 12.5%. Three maternal deaths occurred, reasons were thromboembolism leading to pulmonary embolism in one patient and 2 had life threatening pulmonary oedema and cardiac arrest, although mortality rates of upto 50% have been reported in literature.[1,20,24]

Regarding neonatal outcome 27 babies were live born, 5 perinatal deaths occurred. Main cause of perinatal deaths were prematurity and IUGR and associated congestive cardiac failure in mothers.

The prognosis of PPCM varies in literature, but prognosis is currently encouraging with advanced management. In our study recovery as evidenced by improvement in clinical features, discontinuation of antifailure treatment and normalization of echo cardiographic findings at discharge from hospital was observed in 20 patients. Hospital stay varied form 7-30 days. Prognosis is related to left ventricular dysfunction at presentation and recovery as shown in various studies.[16] Recovery mostly occurs in first 2 months but it can take 6-12 months as is evident from our study also.[24]

In conclusion PPCM is a rare but devastating cardiac failure of unknown cause occurring in late pregnancy or early puerperium. All women having clinical features suggestive of PPCM in late pregnancy and early puerperium should be evaluated using echocardiography and modern diagnostic criteria standard management of cardiac failure using a multidisciplinary approach should be started. Patients should be followed up for recovery and those with persistent ventricular dysfunction should be properly counseled for contraception and avoidance of pregnancy. Subsequent future pregnancies should be managed in multi disciplinary units.


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