



Original Article

Short Term Outcome of Patients with Peripartum Cardiomyopathy

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ABSTRACT

Peripartum cardiomyopathy (PPCM) is a life threatening heart disease which develops towards the end of the pregnancy or in the months following delivery in previously healthy women in terms of cardiac disease. A descriptive longitudinal study was conducted in the department of Cardiology of Jalalabad Ragib-Rabeya Medical College Hospital, Sylhet, Bangladesh during the period from July 2016 to June 2018 with an aim to find out the short term outcome of patients with PPCM. A total of 32 purposively selected patients with peripartum cardiomyopathy were included in the study. The results showed that, the mean age with standard deviation (SD) of the patients was 26.4±4.7 years. Mean body mass index (BMI) was 20±1.8 kg/m². Mean baseline ejection fraction (EF₁) with SD was 35.7±5.3%. The study revealed that, 5 (15.6%) patients with peripartum cardiomyopathy died in the course of treatment. Mean follow up (after one month) ejection fraction (EF₂) with SD was 42.7±11.3%. Paired t-test revealed that, difference between EF₁ and EF₂ is highly significant (p<0.0001). Mitral regurgitation (MR) was present in 20 (62.5%) patient in the baseline echocardiogram and a significant improvement of severity of MR was observed in follow up (P<0.0001). The outcome of PPCM varied widely, ranging from complete recovery to death.

Keywords: Peripartum cardiomyopathy, Dilated cardiomyopathy.

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INTRODUCTION

Pregnancy is a critical period in a woman's life in which heart and other organs encounter significant haemodynamic and immunologic changes that in certain cases can become problematic. Peripartum cardiomyopathy is a disease of unknown etiology in which left ventricular (LV) dysfunction occurs during the last trimester of pregnancy or early puerperium¹. It

is rare but potentially life threatening condition of pregnant women of childbearing age. It is important for cardiologists and obstetrician to have enough knowledge, in this regard, in order to timely diagnose and manage such patients. Peripartum cardiomyopathy is a relatively rare condition. It has an incidence of 1:1.500 to 1:4000 live births². In the United States, the prevalence is estimated to be 1 case per 1300-15000 live births². An incidence of one case per 1374 live births has been reported from a tertiary care hospital from South India³. The disease appears to be more common in African American women. The rate varies

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in other populations; in South Africa reported incidence is higher i.e. 1 in 1000 live births⁴. A much higher incidence of 1 in 300 live births has been reported in Haiti⁵ and an extremely high rate of 1% has been reported in Nigeria⁶. The higher prevalence in developing countries may be attributed to environmental, ecological, and cultural puerperal and post puerperal practices besides diagnostic criteria and reporting standards.

It was first described in the 18th century but was recognized as a separate clinical entity in 1930. In 1971 Demakis et al. described 27 patients who presented during the puerperium with cardiomegaly, abnormal electrocardiographic findings, and congestive heart failure, and named the syndrome peripartum cardiomyopathy⁷. The strongest risk factor for PPCM appears to be African-American ethnicity⁸. The incidence of peripartum cardiomyopathy has been found to be greater in multiparous women and in those with advanced maternal age^{9,10}. Gestational hypertension, pre-eclampsia and multifetal pregnancy also has a higher incidence¹¹. Other reported risk factors include smoking, obesity, maternal cocaine and alcohol abuse and long term tocolytic therapy¹².

Echocardiogram is considered to be the mainstay of diagnosing PPCM. The following echocardiographic criteria is recommended: left ventricular ejection fraction less than 45%, fractional shortening of less than 30% on an M-mode scan, or both, and a left ventricular end diastolic dimension of more than 2.7 cm/m² of body surface area¹³. Other helpful investigations for diagnosis include electrocardiogram (ECG), chest X-ray, N-terminal pro brain-type natriuretic peptide (N-T Pro BNP), cardiac magnetic resonance imaging (CMRI) etc. Prognosis of PPCM patients is variable with high mortality rate. Few case studies have been done on this topic and only one major study has been carried out in Bangladesh in BSMMU on the prognosis of PPCM patients¹⁴. The aim of our study is to observe the short term outcome of PPCM patients admitted in a tertiary medical college hospital.

MATERIALS AND METHODS

This descriptive longitudinal study was conducted in the department of Cardiology of Jalalabad Ragib-Rabeya Medical College Hospital, Sylhet, Bangladesh during the period of July 2016 to June 2018. A total of 32 purposively selected patients with peripartum cardiomyopathy were included in the study. Patients

with previous heart failure, known case of valvular or congenital heart disease, cardiomyopathy and those who missed the follow up without death were not included in the study. A case record form was used for collection of data. History was taken after admission of the patients by face to face interview. Necessary clinical and investigation findings including echocardiography were recorded. Patients were managed accordingly following recent heart failure management protocol. Maternal complications and morbidity were recorded. The patients were followed up after one month of admission and necessary clinical and investigation findings regarding outcome were recorded. Data were inputted in SPSS 20 version and then checked and cleaned. Univariate analysis was done to find out the frequencies regarding outcome. Paired t-test, chi-square test and Fisher's exact test were performed to find out the significance of difference between different baseline and follow up parameters under study. Confidentiality of data was maintained all through. No physical or psychological risk was associated with the study.

RESULTS

The result showed that, maximum (65.6%) patients with cardiomyopathy were in the age group of 20-29 years and less than one third (31.3%) were in 30-39 years. Mean age with SD was 26.4±4.7 years (Table-I). Most of the patients (87.5%) had normal body mass index (BMI) while only (12.5%) patients were underweight. There were no overweight patients in the study group. Mean BMI with SD was 20±1.8 kg/m² (Table-II). Most of the patients (78.1%) had para 0-2 while (12.5%) had para 3-4 and (9.4%) had para 5-6. Most of the patients with cardiomyopathy (62.5%) were gravid for either 1st or 2nd time and more than one fifth (21.9%) were gravid for 3rd - 4th time (Table-III).

Table-I: Age group of patients with peripartum cardiomyopathy (n=32).

Age (In years)	Frequency	Percentage
<20	1	3.1
20-29	21	65.6
30-39	10	31.3
Total	32	100

*Mean=26.4 years; SD=4.7 years.

Table-II: BMI of the patients with peripartum cardiomyopathy (n=32).

BMI (kg/m ²)	Frequency	Percentage
Underweight (<18.5)	4	12.5
Normal (18.5-24.99)	28	87.5
Total	32	100

*Mean=20 kg/m²; SD=1.8 kg/m²

Table-III: Parity and gravida of the patients with peripartum cardiomyopathy (n=32).

Variable	Category	Frequency	Percentage
Parity	0 - 2	25	78.1
	3 - 4	4	12.5
	5 - 6	3	9.4
Gravida	1 st -2 nd	20	62.5
	3 rd -4 th	7	21.9
	5 th - 6 th	3	9.4
	>6 th	2	6.3

Regarding co-morbidities it was found that, only 3 (9.4%) patients with PPCM had diabetes mellitus and 17 (53.1%) patients were hypertensive. Pre-eclampsia was found in 12 (37.5%) of the patients while eclampsia was found in 3 (9.4%) of the patients (Table-IV). It was found that left atrial diameter (LAD) of maximum patients (28, 87.5%) in baseline echocardiogram was within normal limit while in 4 (12.5%) patients it was dilated. Mean baseline left atrial diameter (LAD₁) was 35.2 mm with a SD of ±6 mm. After one month left atrial diameter (LAD₂) of maximum patients (21, 77.8%) was within normal limit while that of the rest 6 (22.2%) of the patients was dilated. Mean LAD₂ was 34.3 mm with a SD of ±6.8 mm. Minimum LAD₁ was 24 mm and maximum LAD₁ was 45 mm. On the other hand minimum LAD₂ was 22 and maximum LAD₂ was 42 mm. Paired t test showed no statistically significant difference between LAD in baseline and follow up echocardiogram of the patients with peripartum cardiomyopathy (p>0.05) (Table-V). Regarding left ventricular internal diameter in diastole LVID (d)₁ in baseline echocardiogram it was revealed that, in 8 (25%) patients it was dilated. Mean LVID (d)₁ with SD was 51.7±5.8 mm (Range 40-63 mm). Regarding left ventricular internal diameter in diastole

LVID (d)₂ in follow up echocardiogram it was revealed that in 8 (29.6%) patients it was dilated. Mean LVID (d)₂ with SD was 50.9±7.5 mm (Range 40-65 mm). (p>0.05) (Table-VI). Mitral regurgitation was present in 20 (62.5%) patients while it was absent in 12 (37.5%) patients (Figure-1). Among the patients with MR in baseline echocardiogram maximum (14, 70%) had grade 1 MR while 5 (25%) patients had grade 2 MR and 1 (5%) patient had grade 3 MR. Mitral regurgitation was present in 6 (22.2%) patients in follow up echocardiogram after one month while in most of the patient (21, 77.8%) it was absent (Figure-2). In follow up echocardiogram 5 (83.3%) patients had grade 1 mitral regurgitation and only 1 (16.7%) patient had grade 2 mitral regurgitation.

Table IV: Presence of co-morbidities in patients with peripartum cardiomyopathy (n=32).

Co-morbidities	Frequency	Percentage
Diabetes mellitus	3	9.4
Hypertension	17	53.1
Pre-eclampsia	12	37.5
Eclampsia	3	9.4
Anaemia	18	56.3

Table-V: Comparison of LAD in baseline and follow up echocardiogram (n=32).

LAD	Frequency	Minimum	Maximum	Mean	SD
Baseline	32	24	45	35.22	5.97
LAD (LAD ₁)					
Follow-up	27	22	42	34.26	6.78
LAD (LAD ₂)					

p>0.05

Table-VI: LVID(d)₁ and LVID(d)₂ in the patients with peripartum cardiomyopathy (n=32).

LAD	Frequency	Minimum	Maximum	Mean	SD
Baseline	32	40	63	51.69	5.76
LVID (d) ₁					
Follow-up	27	40	63	50.85	7.53
LVID (d) ₂					

p>0.05

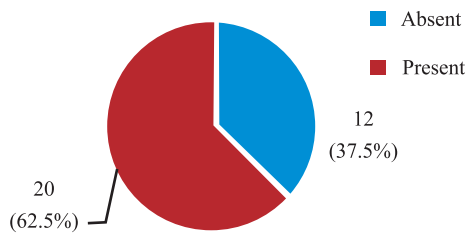


Figure-1: Pie chart showing mitral regurgitation (MR₁) in baseline echocardiogram (n=32).

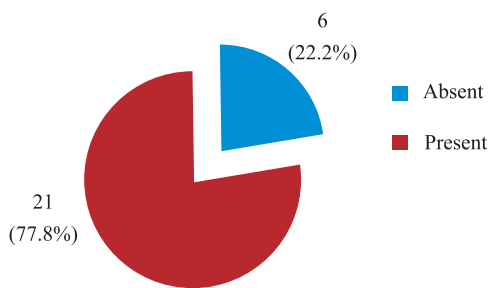


Figure-2: Pie chart showing mitral regurgitation (MR₂) in follow up echocardiogram (n=27).

Among the patients with peripartum cardiomyopathy in 9 patients mitral regurgitation was not found either in baseline or in follow up echocardiogram. Grade 1 MR was present in 12 patients in baseline echocardiogram. After one month 11 of them did not have any MR while remaining 1 remained unchanged. Grade 2 MR was present in 5 patients in baseline echocardiogram. After one month 4 of them regressed to MR grade 1 and remaining one had no MR. One patient having grade 3 MR in baseline echocardiogram was found having grade 2 MR after one month. Fisher exact test revealed statistically significant differences in mitral regurgitation of baseline and follow up echocardiogram (Table VII). In the baseline echocardiogram, it was

observed that in 25 (78.1%) patients ejection fraction was moderately and in 7 (21.9%) patients it was severely reduced. Mean ejection fraction was $35.7 \pm 5.3\%$. Echocardiogram after one month revealed that in 12 (44.4%) patients' ejection fraction was either normal or mildly reduced. However, ejection fraction of 9 (28.1%) patients was moderately and that of 6 (18.8%) patients was severely reduced. Mean ejection fraction was $42.7 \pm 11.3\%$. Follow up echocardiogram of 5 patients could not be performed due to their death in the course of treatment. Among the 21 patients having moderately reduced ejection fraction in baseline echocardiogram 3 converted to normal, 8 to mild reduction and 3 progressed to severe reduction while in 7 patients the EF remained unchanged. Among the patients having severe LV dysfunction in baseline echocardiogram 1 improved to normal, 2 improved to moderate dysfunction and 3 remained unchanged. Paired t-test revealed that difference between EF₁ and EF₂ was highly significant statistically ($p < 0.0001$) (Table VIII). Twenty two patients with moderate LV dysfunction in the baseline echocardiogram survived and the rest 3 (12%) died in the course of treatment. It was also revealed that among the 7 patients with severe LV dysfunction in the baseline echocardiogram 2 (28.6%) patients died (Table IX). In our study, thrombo-embolic manifestation was noted in 2 (6.25%) patients and LV thrombus was noted in 1 (3.12%) patient. Among the 32 patients in our study group a total of 5 (15.63) patients died within one month of follow up period. Among them 3 patient died before discharge during the course of treatment, 1 patient died after discharge at home and the remaining one patient died after re-admission in the hospital.

Table-VII: Comparison of MR in baseline and follow up echocardiogram of patients with peripartum cardiomyopathy (n=27).

MR ₁	MR ₂		Total	
	Absent	Grade 1		Grade 2
Absent	9	0	0	9
Grade 1	11	1	0	12
Grade 2	1	4	0	5
Grade 3	0	0	1	1
Total	21	5	1	27

$p < 0.0001$

Table- VIII: Comparison between baseline (EF_1) and Follow up (EF_2) ejection fraction ($n=27$).

EF_1 (%)	EE_2 (%)				Total
	Normal (55% and above)	Mild dysfunction (45-54%)	Moderate dysfunction (31-44%)	Severe dysfunction (0-30%)	
Moderate dysfunction (31-44%)	3	8	7	3	21
Severe dysfunction (0-30%)	0	1	2	3	6
Total	3	9	9	6	27

$p < 0.0001$

Table-IX: Baseline Ejection fraction (EF_1) and mortality of patients with peripartum cardiomyopathy ($n=32$).

EF_1 (%)	Mortality of Patients		Total
	Survival	Death	
Moderate dysfunction (31-44%)	22	3 (12%)	25
Severe dysfunction (0-30%)	5	2 (28.6%)	7
Total	27	5 (15.6%)	32

DISCUSSION

The study was conducted among 32 patients of peripartum cardiomyopathy in the department of Cardiology in Jalalabad Ragib-Rabeya Medical College Hospital, Sylhet, Bangladesh. Mean age of the patients was 26.4 ± 4.7 years and most of the patients were in the age group of 20-29 years. A study conducted in Dhaka, Bangladesh also showed that most of the patients of their study group were in the same age group¹⁴. Other studies in Pakistan and India also found the similar mean age of the patients^{15,16}. Although multiparity was considered as a risk factor of PPCM, a study in Pakistan showed most of the patients were primigravidas and 2nd gravidas (73.2%). In this regard our study shows similar results (62.5%)¹⁷. Most of the patients (87.5%) had normal BMI while 12.5% patients were underweight. None of the patients in our study group was overweight. In contrast a study in Pakistan showed that most of the patients were obese with a mean body weight of 71.91 ± 12.92 kg¹⁸. Regarding co-morbidities it was found that, 9.4% patients with PPCM had diabetes mellitus and 53.1% patients were known hypertensives. Pre-eclampsia was found in 37.5% of the patients while eclampsia was found in 9.4% of the patients. Anemia was found in 56.25% of the patient. Different studies carried out in

neighbouring countries in Southeast Asia, it was found to be 8.6%, 31.5%, 18.75-22.9%, 38.39% and 69% respectively^{14,15,18,19}. These findings had led to the concept of a shared pathogenesis between PE and PPCM²⁰.

Left atrial dilatation was present in 12.5% of the patients in our study while another study in Bangladesh found all their patients to be having a dilated LA (100%)¹⁴. PPCM patients rarely present with thromboembolic complications. According to different studies the rate of thromboembolism in PPCM patients can be as low as 3.12% to as high as 16.67%^{14,15,18,19}. In this study the result was similar with a rate of 6.25%. The mean LVIDD of our patient group was 51.69 ± 5.76 mm which was smaller than that found in another study in Pakistan¹⁵. The mean LVIDD of the follow-up group in our study was 50.85 ± 7.53 mm ($P = NS$).

Mitral regurgitation was present in 62.5% patients in our study group in baseline echocardiogram among which 70% had grade 1 MR while 25% patients had grade 2 MR and 5% patients had grade 3 MR but in the follow-up echocardiogram after one month MR was present in only 22.2% of the patients among them 83.3% had grade I MR and only 16.7% patients had grade 2 MR. Follow-up echocardiogram showed

significant improvement of the patients with marked regression of MR ($P < 0.0001$).

PPCM resembled dilated cardiomyopathy (DCM) but the left ventricle might not always be dilated. The ejection fraction was nearly always reduced below 45%²¹. In different studies in Pakistan, Singapore and USA the mean EF was found to be $21.74 \pm 7.455\%$, $29 \pm 8.5\%$ and $28 \pm 9.9\%$ respectively. In contrast, the mean EF was found to be higher in our study population ($35.7 \pm 5.3\%$)^{22,23}. During the course of treatment 5 patients in our study died (15.63%) which was similar to another study in Bangladesh with a death rate of 13%¹⁴. It was seen that, maternal mortality in PPCM varied widely in different studies ranging from 9.37% to 36%^{18,24,25,26,27,28}. Mortality rate seemed to be higher in patients with severe left ventricular dysfunction in baseline echocardiogram (2 out of 7, 28.6%) compared to patients who only had moderate left ventricular dysfunction (3 out of 25, 12%). PPCM was associated with increased rate of mortality and morbidity which was directly related to recovery of ejection fraction. Earlier diagnosis, coupled with modern management of heart failure was likely to have an important influence on the mortality associated with PPCM^{29,30,31}.

CONCLUSION

The outcome of PPCM patients varies widely ranging from complete recovery to death. Earlier diagnosis and proper management is necessary to reduce morbidity and mortality associated with PPCM. Further studies are required to establish the criteria for identification of high risk PPCM patients.

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