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Examination of Risk Factors and Postpartum Cardiomyopathy in Hospital Outcomes in a Tertiary Level Hospital in Bangladesh

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Abstract

Background: Postpartum cardiomyopathy is an unusual type of heart failure during pregnancy that can result in significant maternal mortality in underdeveloped nations. The risk factors and in-hospital outcomes of this illness are still poorly known. *Objective:* To find out the risk factors and postpartum cardiomyopathy in hospital outcomes in a tertiary level hospital in Bangladesh. *Materials and Methods:* This descriptive study was conducted from January 1st 2022 to Dec 30th 2022 in the Department of Cardiology, Northeast Medical College, Sylhet, Bangladesh. PPCM was diagnosed as left ventricular ejection fraction (LVEF) ≤ 45% toward the end of pregnancy or within 05 months after delivery by standard Echocardiographic evaluation. In this study 77 cases of PPCM enrolled, excluding other causes of heart failure. *Results:* The mean age was found 27.0±5.83 years. Majority (45.45%) patients were diabetes mellitus followed by 26 (33.7%) hypertension, 33 (42.86%) obesity, 29 (37.66%) anemia, 16 (20.78%) pre-eclampsia and 14 (18.18%) dyslipidemia. Total 24(31.17%) were dead, 4(5.19%) were complete recovery, 12(15.58%) were partial recovery and 37(48.05%) were still suffering from heart failure. *Conclusion:* Diabetes, hypertension, obesity, anemia, pre-eclampsia, and dyslipidemia were all found as risk factors for postpartum cardiomyopathy in this study.
Keyword: Postpartum cardiomyopathy, Pre-eclampsia, Myocarditis, risk factors.

INTRODUCTION

Postpartum cardiomyopathy (PPCM) is an idiopathic life-threatening condition occurring towards the end of pregnancy or in the first few months following delivery that might affect the maternal and neonatal outcomes [1]. Postpartum cardiomyopathy (PPCM) is a rare form of heart failure that presents in late pregnancy or early in the postpartum period [2].

The epidemiology of postpartum cardiomyopathy has been reported in various countries and areas, and the incidence of postpartum cardiomyopathy differed among these reports. PPCM involves systolic dysfunction of the heart with a decrease of LVEF and associated congestive cardiac failure and an increased risk of atrial and ventricular dysrhythmias, thromboembolism and even sudden cardiac death [3].

The most common complication noted in our study was pulmonary edema. However, a recent study showed that thromboembolism was the most common severe complication of PPCM, affecting 6.6% of PPCM in the United States; a similar rate (6.8%) has been reported recently in the EU Observational Research Program worldwide registry [4].

A multidisciplinary approach is required to manage PPCM involving high-risk obstetrics, cardiology, neonatology, and intensive care. According to the European Society of Cardiology (ESC), therapies for patients with acute PPCM have been proposed under the BROAD label: bromocriptine, oral heart failure therapies, anticoagulants, vaso-relaxing agents such as nitrate and hydralazine, and diuretics [5].

Peripartum cardiomyopathy (PPCM) is a multifactorial disease. Although the specific aetiology and pathogenesis of PPCM are unknown, several hypotheses have been proposed, including selenium deficiency [6].

Several factors are associated with the development of PPCM, including hypertensive disorders

of pregnancy, multi-parity, and genetics, emphasizing its pathophysiological heterogeneit [7].

Study have suggested that the disorder is triggered by hormones that emanate from the pituitary and placenta during the peripartum period, synergizing, in ways still poorly understood, with intrinsic cardiac factors that render some women susceptible to these hormonal imbalances. Together, these studies of pregnancy hormones have suggested a vasculohormonal model of the pathogenesis of peripartum cardiomyopathy, whereby imbalances in peripartum hormones cause cardiovascular dysfunction and consequent heart failure in susceptible women [8].

MATERIALS AND METHODS

This descriptive study was conducted from January 1st 2022 to Dec 30th 2022 in the Department of Cardiology, Northeast Medical College, Sylhet, Bangladesh. Hospital ethical committee approved study protocol. Postpartum cardiomyopathy was diagnosed as given in the introduction. Patients of any age fulfilling the above diagnostic criteria were enrolled in the study. Patients with previous history of cardiac disease including valvular heart disease, congenital heart diseases, cardiomyopathies of any cause and pulmonary artery hypertension either primary or secondary, cardiac failure due to severe preeclampsia, fluid overload and amniotic fluid embolism were excluded. Patients with normal echocardiograpic findings were also excluded from the study. Informed written consent was obtained from each patient. Permanent residential address and telephone number was obtained from every patients to ensure effective follow up. Every patient is given a computer ID to ensure data retrieval. During evaluation of patients, risk factors responsible for PPCM including age, race, parity, twin pregnancy, obesity, chronic hypertension, preeclampsia and malnutrition were noted. Chronic hypertension was taken as elevated blood pressure of > 140/90 mm of Hg on three occasions and pre-eclampsia as blood pressure of > 140/90 with proteinuria after 20 weeks of pregnancy.

Obesity was defined as Body Mass Index (BMI) of > 30. Considering an average weight gain of 8-12 Kg in pregnancy with no idea in most of the patients of prepregnancy weight, BMI was taken as estimates of obesity in the study patients. Presenting clinical features including antepartum or postpartum status, dyspnea, cough, hemoptysis and fatigue were noted. ECG features like sinus tachycardia, left ventricular hypertrophy, repolarization changes, premature ventricular contractions, T wave inversion, low voltage QRS and left bundle branch block were recorded. Echocardiograpic features like chamber dilation, ejection fraction, mitral regurgitation, pulmonary artery hypertension and left ventricular thrombus were recorded. Chamber size was measured using two dimensional (2-D) short axis views and applying M-Mode. Left ventricular diastolic dimension greater than 5.5 cm was taken as chamber dilation. Ejection Fraction was measured with Simpson's method and considered low when less than 45 and normal when greater than 55. Patients were treated on standard lines for heart failure according to the current 2010 ESC guidelines for HF and monitored for complications including cardiogenic shock, pulmonary edema, thromboembolism, ventricular tachycardias, atrial fibrillation and cardiopulmonary arrest. Complications were managed on standard lines and need for ICU care was assessed. Candidacy for ICD, CRT, LV assist device and cardiac transplant was assessed using current European guidelines. Patients who died during hospitalization were recorded. Patients, once stabilized, were discharged on standard medical therapy and scheduled for follow up at 1, 3, 6 and 12 months. If patients needed rehospitalization she was admitted with same ID to ensure correct number of hospitalizations. At the expected date of follow up, telephone reminder was given to patients or her relatives about follow up. AT follow up it was confirmed that patient is alive and her NYHA class was noted. ECG and echocardiography were performed and parameters noted. Recovery was assessed by improvement in functional class of dyspnea and ejection fraction on repeat echocardiogram. During follow up particular attention was focused on the occurrence of subsequent pregnancies. Patients were followed for eighteen months and pregnancy screening was done with ß- HCG pregnancy test.

RESULTS

Table 1: Baseline characteristics of the study population (n=77)

	Mean±SD
Age (years)	27.0±5.83
BMI (kg/m^2)	26.4±6.21
SBP (mmHg)	123.4±24.6
DBP (mmHg)	85.27±19.3
Monthly family income (Taka)	15076.2±973.8
Parity (number)	3.7±1.5

Mean age was found 27.0±5.83 years, BMI was 26.4±6.21 kg/m^2, SBP was 123.4±24.6 mmHg, DBP was 85.27±19.3 mmHg, monthly family income was 15076.2±973.8 taka and parity was 3.7±1.5.

Table 2: Risk factors of the study population (n=77)

Risk factors	Frequency	Percentage
Diabetes mellitus	35	45.45
Hypertension	26	33.77
Obesity	33	42.86
Anemia	29	37.66
Pre-eclampsia	16	20.78
Dyslipidemia	14	18.18

Majority (45.45%) patients were diabetes mellitus followed by 26 (33.7%) hypertension, 33 (42.86%) obesity, 29 (37.66%) anemia, 16 (20.78%) pre-eclampsia and 14 (18.18%) dyslipidemia.

Table 3: Clinical presentation, mode of delivery and baby condition of the study population (n=77)

	Frequency	Percentage
NYHA class		
Class II	20	25.97
Class III	24	31.17
Class IV	33	42.86
Chest pain	49	63.64
Palpitation	35	45.45
Cough	33	42.86
Fatigue	38	49.35
Ante partum presentation	24	31.17
Postpartum presentation	58	75.32
Mode of delivery		
Normal vaginal delivery	24	31.17
Caesarian section	53	68.83
Baby condition		
Alive	69	89.61
Death	8	10.39

Majority (42.86%) patients were in NYHA class IV, 49(63.64%) were chest pain, 35(45.45%) were palpitation, 33(42.86%) were cough, 38(49.35%) were fatigue and 58(75.32%) were postpartum presentation. Sixty-nine (89.61%) babies had caesarian section and 8(10.39%) were death.

Table 4: Complication of the study population (n=77)

Complication	Frequency	Percentage
Ventricular tachycardia	12	15.58
Atrial fibrillation	10	12.99
Cardiopulmonary arrest	7	9.09
Pulmonary edema	9	11.69
Cardiogenic shock	10	12.99
Pericardial effusion	6	7.79
Thromboembolism	8	10.39
Need for intensive care unit	13	16.88

Regarding complications 13(16.88%) patients needed for intensive care unit, 12(15.58%) were ventricular tachycardia, 10(12.99%) were atrial fibrillation, 10(12.99%) were cardiogenic shock and 9(11.69%) were pulmonary edema.

Table 5: Outcome at hospital of the study population (n=77)

Outcome at hospital	Frequency	Percentage
Hospital death at first admission	11	14.29
Discharge with stable heart failure	66	85.71
Hospital stay (mean ±SD days)	6.41±3.17	
At 3 months (n=55)		
Ejection fraction (%) (mean ±SD)	48.9±13.6	
Deaths	7	9.09

Outcome at hospital	Frequency	Percentage
Recovery	21	27.27
Heart failure	49	63.64
At 6 months (n=50)		
Ejection fraction (%) (mean ±SD)	52.1±13.4	
Deaths	6	7.79
Recovery	19	24.68
Heart failure	52	67.53
Total		
Complete recovery	4	5.19
Partial recovery	12	15.58
Patients left with disabling heart failure	37	48.05
Total death	24	31.17

Hospital death at first admission were 11(14.29%), discharge with stable heart failure were 66(85.71%) and mean hospital stay was 6.41±3.17 days. At 3 month, 7 (9.09%) patients were dead, 21(27.27%) were recovery and 49(63.64%) were heart failure. At 6 month, 6(7.79%) patients were dead, 19(24.68%) were recovery and 52(67.53%) were heart failure. Total 24(31.17%) were dead, 4(5.19%) were complete recovery, 12(15.58%) were partial recovery and 37(48.05%) were still suffering from heart failure.

DISCUSSION

In present study observed that the mean age was found 26.0±6.4 years, BMI was 21.6±4.0 kg/m², SBP was 118.4±24.6 mmHg, DBP was 86.2±18.7 mmHg, monthly family income was 10076.2±986.2 taka and parity was 3.2±1.3. Similar observation was found Shah *et al.,* [9] they reported the mean age was 30.94±6.63 years. Patients from 18-30 years were 28(45.9) while patients above 30 years were 33 (54.1%). Jackson *et al.,* [7] reported that the mean age of women with PPCM in Scotland at delivery was 31.9 years. The incidence of PPCM per 10 000 deliveries was higher in women >32 years than in those aged ≤32 years. It is well established that maternal age of 30 years or more is a well-described independent risk factor for PPCM [10]. In Al Riyami *et al.,* [1] study, most patients with PPCM were above 30 years of age, and commonly multiparous.

In current study showed that the majority (45.45%) patients were diabetes mellitus followed by 26 (33.7%) hypertension, 33 (42.86%) obesity, 29 (37.66%) anemia, 16 (20.78%) pre-eclampsia and 14 (18.18%) dyslipidemia. According to Jackson *et al.,* [7] obesity (35%) and a history of smoking (41%), hypertension (17%), and diabetes (9%), are the most common risk factors for PPCM. Common reported risk factors for PPCM are gestational hypertension, preeclampsia, poor antenatal care, alcohol and tobacco abuse, low socioeconomic conditions and long term tocolysis as found in various studies [11,12]. Preeclampsia and chronic hypertension have been associated with a significant number of PPCM cases in another Elkayam *et al.,* [13] study. Shah *et al.,* [9] reported risk factors were chronic hypertension 19 (31.1%), preeclampsia 12 (19.7%), multiple pregnancy 5(8.2%), long term tocolysis 13 (21.3%) and anemia 21(34.4%).

In this study showed that the majority (42.86%) patients were in NYHA class IV, 49(63.64%) were chest pain, 35(45.45%) were palpitation, 33(42.86%) were cough, 38(49.35%) were fatigue and 58(75.32%) were postpartum presentation. Sixty-nine (89.61%) babies had caesarian section and 8(10.39%) were death. Shah *et al.,* [9] reported majority of patients presented with dyspnea and were in NYHA class III 18(29.5%) &IV 35(57.5%). Other presenting complaints were chest pain 36(59%), palpitation 27(44.3%), cough 27(44.3%) and fatigue 30(49.2%). Al Riyami *et al.,* [1] reported that the most common reported symptom was palpitations in 20 (17.2%), orthopnea in 19 (16.4%), chest pain and cough in 15 (12.9%) patients each, paroxysmal nocturnal dyspnea in nine (7.8%). Similar observation was found Hossain *et al.,* [14] study they reported clinical presentations of the patient's; majority presented with NYHA class IV SOB 29(46.0%), NYHA class III 21(33.3%), chest pain 38(60.3%), palpitation 27(42.9%), cough 26(41.3%), fatigue 29(46.0%) and antepartum presentation were 18(28.6%) and postpartum were 45(71.4%). Induction of labor needed in 15(23.80%) patients; caesarian section needed 46(73.0%) normal delivery was 17(27.0%). Alive baby was 56(88.9%) and 7(11.1%) were death.

In present study showed that regarding complications 13(16.88%) patients needed for intensive care unit, 12(15.58%) were ventricular tachycardia, 10(12.99%) were atrial fibrillation, 10(12.99%) were cardiogenic shock and 9(11.69%) were pulmonary edema. Hossain *et al.,* [14] admission ECG in this study was sinus tachycardia 51(81.0%), sinus bradycardia was 5(7.93%), left ventricular hypertrophy 12(19.0%), Ventricular ectopics 28(44.4%), Ventricular Tachycardia was 16(25.39%) and Atrial fibrillation was 19(30.2%) but in most studies, sinus tachycardia (68.4%), left ventricular hypertrophy (78.8%) and T wave inversion (47.3%) were more frequent findings [9,15,16].

In this study observed that hospital death at first admission were 11(14.29%), discharge with stable heart

failure were 66(85.71%) and mean hospital stay was 6.41±3.17 days. At 3 month, 7 (9.09%) patients were dead, 21(27.27%) were recovery and 49(63.64%) were heart failure. At 6 month, 6(7.79%) patients were dead, 19(24.68%) were recovery and 52(67.53%) were heart failure. Total 24(31.17%) were dead, 4(5.19%) were complete recovery, 12(15.58%) were partial recovery and 37(48.05%) were still suffering from heart failure. Hossain *et al.,* [14] found in hospital death were 8(12.7%), discharge with stable heart failure were 55(87.3%) and mean hospital stay was 6±2.4 days. In study of Fatema *et al.,* [17] maternal mortality was 8 (13%) and Shah *et al.,* [9] mean hospital stay was 6.62±2.31 days and in hospital death were 9(14.8%).

CONCLUSION

This study concluded that diabetes mellitus, hypertension, obesity, anemia, pre-eclampsia, and dyslipidemia were all identified as risk factors for peripartum cardiomyopathy in this investigation. All women with clinical symptoms suggestive of heart failure in the peripartum period should be investigated using echocardiography and other diagnostic tools. A multicenter community-based study was needed to determine the incidence and prevalence of PPCM in our population in order to prevent and control this condition.

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