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RETROSPECTIVE STUDY OF FETO-MATERNAL OUTCOME OF WOMEN WITH PERIPARTUM CARDIOMYOPATHY.

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ABSTRACT

BACKGROUND:

Peripartum cardiomyopathy (PPCM) is a disorder of pregnancy in which patients present with symptoms of heart failure in last month of pregnancy or within 5months of delivery.In most cases, the presentation of the symptoms is acute and rapid deterioration of the maternal and fetal condition is seen. In the absence of effective diagnostic modalities like 2D echocardiogram, it becomes a diagnosis of exclusion. The objective of this study was to know the incidence and feto-maternal outcome in patients presenting to our hospital with PPCM.

METHODS:

It was a retrospective, observational study conducted over a period of 6months from September 2022- February 2023 at Shridevi institute of medical sciences and research hospital, Tumkur.

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 9, 2024

RESULTS:

Most common age group at the time of presentation was 20-25years(58.33%).Majority of the patients were multigravidas (58.33%) and presented with the complaints of breathlessness of NYHA class 3(33.33%). Eclampsia (33.33%) was the most commonly associated risk factor. There were 2(16.66%) maternal mortalities. There were 3(25%) intrauterine fetal demise (IUFD), 1(8.33%) neonatal mortality and 4(33.33%) newborn intensive care unit (NICU) admissions.

CONCLUSION:

Majority of patients in this study were young primigravidas and most common presentation was breathlessness of NYHA 3 and 4. As PPCM is a disease of exclusion, early suspicion and referral to tertiary care centre which has an obstetrician, cardiologist, critical care unit (CCU) and NICU facilities will yield better maternal and fetal outcome.

Keywords: Pregnancy, Peripartum cardiomyopathy, Left ventricular ejection fraction

INTRODUCTION

Heart disease is known to complicate 1-4% of pregnancies[1]. Normal physiological changes in the cardiovascular system and hyper dynamic circulation make the diagnosis of heart disease by clinical features challenging. The increased cardiac demands during pregnancy and the associated altered physiological milieu predispose new onset heart disease apart from increase morbidity and mortality in women with underlying heart disease.

Peripartum cardiomyopathy (PPCM) is a life threatening disease of late pregnancy and early puerperium. It is seen in patients with previously healthy heart. The incidence of PPCM in India is 1 in 1541 live birth[7]. PPCM onset is the most frequent in the first month postpartum (44%) and at

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 9, 2024

delivery (23%)[2].It is a major cause of heart failure in pregnancy and is characterized by a rapid clinical course with a high rate of relapse in subsequent pregnancies.

The first proposed criteria for PPCM by Demakis and Rahimtoola[3] in 1971-

- Development of cardiac failure in the last month of pregnancy or within 5 months of delivery
- Absence of another aetiology of heart failure (LF)
- The absence of demonstrable heart disease prior to last month of pregnancy.

The first six-month data from the EURO observational Research Registry on PPCM indicated that the total death rate was 6%, and the reported rehospitalisation rate was 10%[4]. The main reported causes of death were progressive heart failure, sudden deaths, arrhythmias (including VT and VF), and embolisation[4]. According to data from the World Health Organisation, PPCM in pregnancy puts a patient at a significantly increased (19–27%) or extremely high (> 40%) risk of severe morbidity and mortality depending on left ventricular ejection fraction (LVEF) (class III 30%–45% or IV LVEF < 30%)[1]

European Society of Cardiology (ESC) defined PPCM as cardiomyopathy with reduced left ventricular ejection fraction (LVEF usually <45%), presenting toward the end of pregnancy or in the months after delivery in a woman without previously known structural heart disease[1]. Diagnosis is certain if LVEF <45% with or without left ventricle and left atrial dilatation with or without secondary mitral regurgitation with or without LV clot[1]. The timing of PPCM is uncertain, though National Heart, Lung, and Blood Institute defined it as idiopathic cardiomyopathy with onset between the last month of pregnancy and five months following delivery, which is not always the case[5].

The pathophysiology of PPCM is not completely understood. Several probable mechanisms have been proposed, including viral myocarditis, nutritional deficiencies, microchimerism, autoimmunity,

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 9, 2024

hemodynamic stresses, vascular dysfunction, hormonal insults, and genetic predisposition[6].Data shows that approximately 60% of PPCM patients seek a gynaecologist's advice before diagnosis by a cardiologist. Unfortunately, only 10% of these women are directly referred for cardiological consultation[2].There is no specific diagnostic test for PPCM. To confirm the diagnosis, other possible causes of heart failure must be excluded. LVEF is considered as a most reliable predictor of adverse events or long-term recovery among PPCM patients.

An accurate rate of the prevalence of PPCM worldwide has not yet been established. The highest prevalence was reported in Haiti at 1:299, and in South Africa at 1:1000. In Caucasians, the prevalence has increased in recent years from 1:1923 in 2004 to 1:1316 in 2011[2].

There is limited literature on incidence, risk factors, maternal and fetal outcome of PPCM in India. This study was done to know the incidence and feto maternal outcome of PPCM in our tertiary care centre.

METHODS

It is a retrospective observational study. This study included all antenatal women belonging to age group of 20 years to 35 years. All of them presented with heart failure in last month of pregnancy till 5 months postpartum, without previously having a heart disease.

Materials for this study were obtained by reviewing the records from the medical records department, OBG department, cardiology department and records of new-born intensive care unit of our hospital over 6 months period from September 2022 to February 2023.

Patients with left ventricular (LV) ejection fraction of <45% and new symptoms of heart failure or LV dysfunction which occurred in the month before or in the five months after delivery were included in the study. Patients with previous history of congenital heart disease and valvular heart

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 9, 2024

disease were excluded. All patients underwent a detailed history, clinical examination, routine haematological and biochemical investigations, electrocardiography and 2D ECHO.

Baseline data included age of the patient, parity, period of gestation, symptoms at the time of presentation, duration of symptoms, NYHA grade, comorbidities, birth weight of the baby, NICU admission and the reason for admission. In case of maternal mortality, the cause of death was noted. Laboratory findings included electrocardiograms (ECG), 2D echocardiogram (2D ECHO), NTPRO-BNP and Troponin I. 2D ECHO was done by intensive cardiologist. An echocardiography was done on admission, before discharge and at follow-up and the LV dimensions were compared. All of them were admitted in CCU and were treated with evidence-based medical therapy for HF, which was appropriate in ante-partum and postpartum settings.

CASES DESCRIPTION:

Among 714 deliveries that occurred during the study period of 6months, 12 patients had PPCM, incidence being 1 in 60 patients. Most of them belonged to the age group of 20-25years (58.33%). 4 patients (33.33%) belonged to the age group of 25-30years and 1(8.33%) belonged to 30-35years. Mean age of presentation was 24.36years.

Among them the number of multigravidas were 7(58.33%) and primigravidas were 5(41.66%). 9(75%) of them presented during the last month of pregnancy, 1(8.33%) presented at 30weeks of gestation and 2(16.66%) presented within 5months after delivery.

Table 1- Age group of the participants

AGE	No. of patients(n=12)	Percentage (%)
20-25years	07	58.33
30-35years	01	8.33

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 9, 2024

25-30years	04	33.33

Table 2 – Parity of the participants

PARITY	No. of patients(n=12)	Percentage (%)
Primigravida	05	41.66
Multigravida	07	58.33

Table 3 – Time of the presentation

TIME OF PRESENTATION	No. of patients(n=12)	Percentage (%)
Antepartum	10	83.33
Postpartum	02	16.66

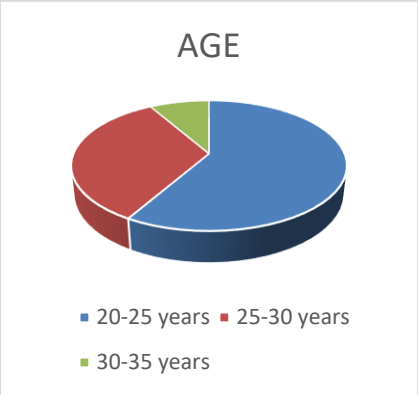


Figure 1- Age group of the participants

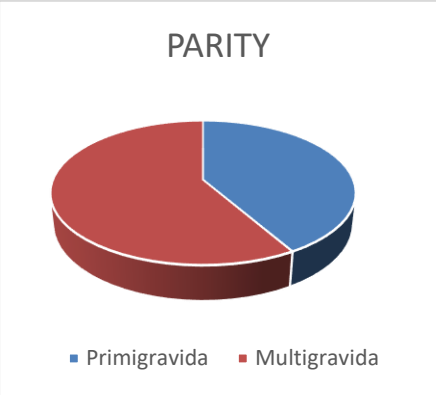


Figure 2- Parity of the participants

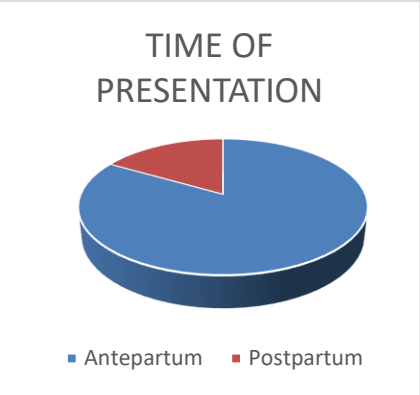


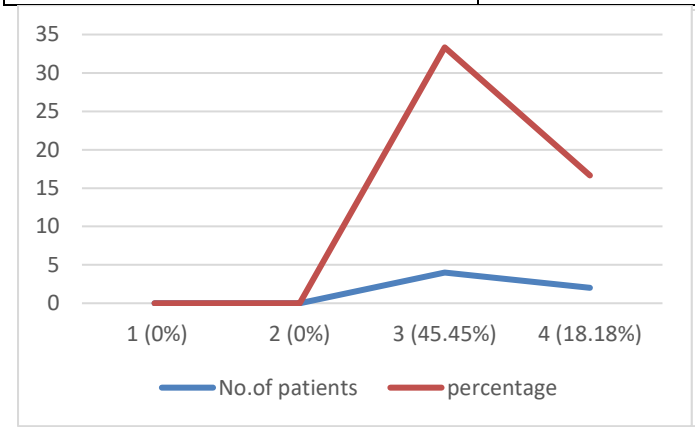
Figure 3 – Time of the presentation

Table -4 Clinical features and Risk factors

NYHA grade	No. of patients(n=12)	PERCENTAGE (%)
1	0	-
2	0	-

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 9, 2024

3	04	33.33
4	02	16.66
RISK FACTORS		
Chronic hypertension	01	8.33
Severe pre eclampsia	02	16.66
Eclampsia	04	33.33



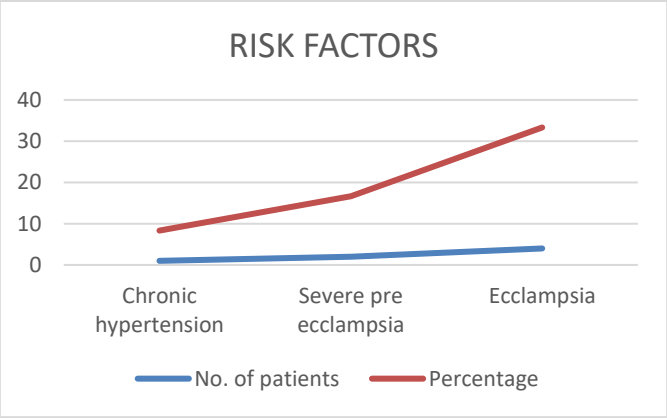


Figure - 4 Clinical features and Risk factors

In this study, most of the patients presented with the complaints of breathing difficulty. Among 6 patients (50%) who had breathing difficulty, 4 (33.33%) of them belonged to NYHA-3 and 2(16.66%) belonged to NYHA-4(Table 4). The risk factors associated with PPCM in the study were chronic hypertension, severe pre eclampsia, eclampsia and multigravida.

1patient (8.33%) had chronic hypertension, 2(16.66%) had severe pre eclampsia, 4(33.33%) of them had eclampsia and 7(58.33%) were multigravida(Table 4).

Table 5- EJECTION FRACTION

EJECTION FRACTION(EF)	No. of patients(n=12)	PERCENTAGE (%)

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 9, 2024

15-25%	05	41.66
26-35%	05	41.66
36-45%	02	16.66

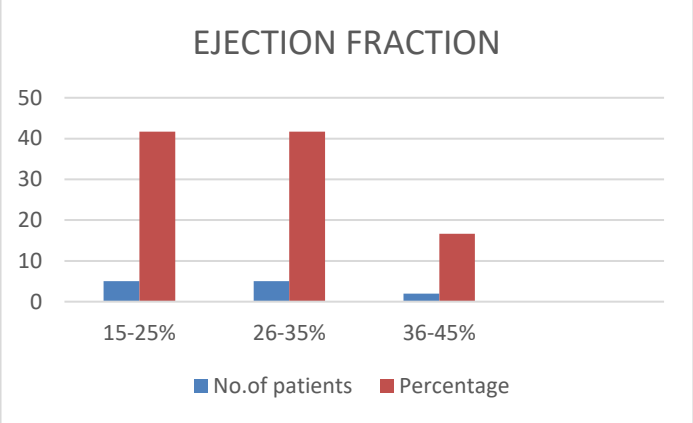


Figure 5- EJECTION FRACTION

Table 6- NTPRO-BNP levels

NTPRO-BNP(pg/ml)	No. of patients(n=12)	PERCENTAGE (%)
<1000	03	25.00
1000-5000	07	58.33
5000-10000	00	-
>10000	02	16.66

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 9, 2024

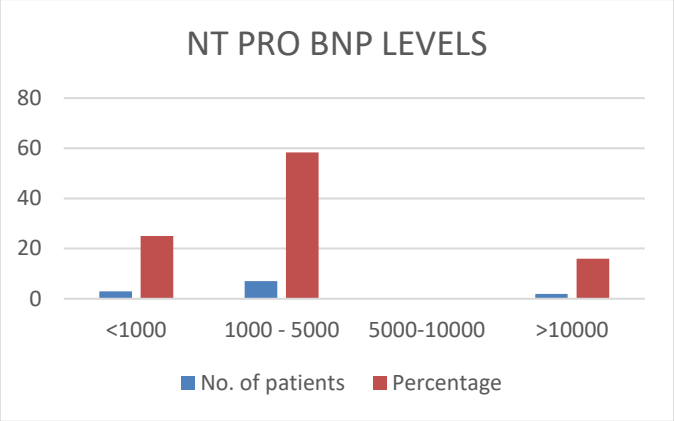


Figure 6- NT PRO BNP LEVELS

Table 5 shows the ejection fraction of the patients in the study.

5 patients (41.66%) had the ejection fraction of 15-25%, 5(41.66%) of them had EF of 26-35% and 2(16.66%) had EF of 36-45%.

Table 6 shows NTPRO-BNP levels in our study.

Most of the patients i.e 7 (58.33%) had NTPRO BNP value between 1000-5000pg/ml. 2(16.66%) of them had NTPRO BNP value of >10000pg/ml and 2(16.66%) of them had value of <1000pg/ml.

Table 7- MATERNAL OUTCOME

Maternal outcome	No. of patients(n=12)	Percentage (%)
Maternal mortality	2	16.66
Reason for mortality		
Ventricular arrthymia and cardiac arrest	1(24years)	8.33
Atrial fibrillation	1(26years)	8.33

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 9, 2024

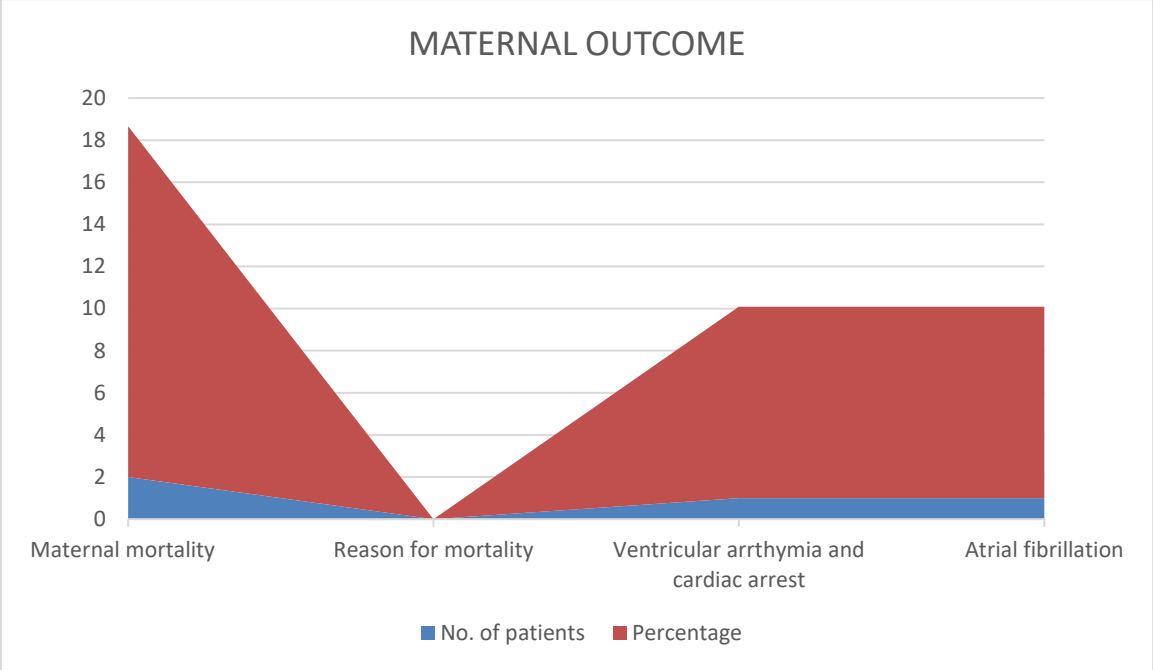


Figure 7- MATERNAL OUTCOME

Table 7 shows the maternal outcome in our study.

Among 11patients, there were 2 maternal mortalities. 1(8.33%) happened during the stay in the hospital due to ventricular tachycardia and cardiac arrest and 1(8.33%) happened after 2months of delivery due to atrial fibrillation.

Table-8 NEONATAL OUTCOME

Neonatal outcome	No. of patients(n=12)	Percentage (%)
Intra uterine fetal demise	3	25.00
Neonatal mortality	1	8.33
NICU admission	4	33.33
Reason for NICU admission		
IUGR	2	16.66

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 9, 2024

Respiratory distress	2	16.66

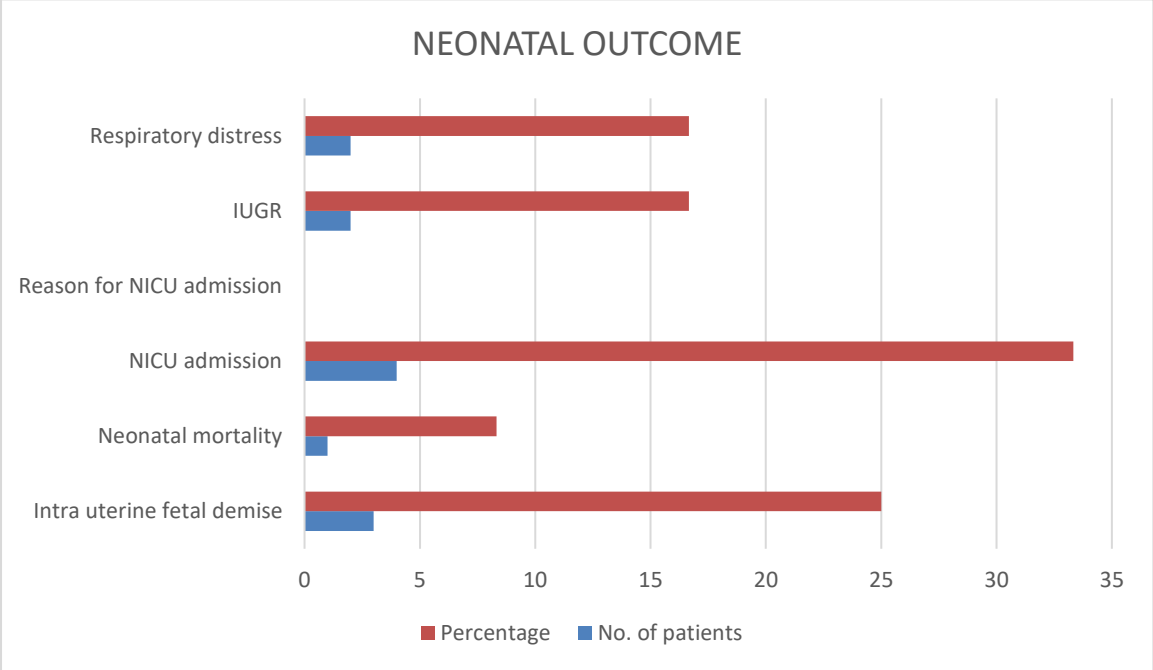


Figure -8 NEONATAL OUTCOME

Neonatal outcome among the patients with PPCM is represented in table-8.

There were 3(25%) IUDs and there was 1(8.33%) neonatal mortality at 6hours after birth due to severe respiratory distress. 4(33.33%) babies were admitted in NICU as 2(16.66%) of them were IUGR and 2(16.66%) had respiratory distress.

DISCUSSION:

According to study conducted by Vinay et al[7] in 2009, the incidence of PPCM is 1 in 1374 live births in south India in comparison to our study the incidence was 1 in 60 live births. The increased incidence is attributed to our hospital being a tertiary referral centre with availability of well equipped cardiology unit. Early referral of these cases to our Cardiology supported High risk Obstetric Unit has aided in prompt diagnosis and care of the patients. The patients were subjected

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 9, 2024

to 2D Echocardiogram which clinched the diagnosis early in the course of the disease and enabled the physicians in instituting treatment which included termination of pregnancy in the 9 antenatal cases.

Majority of the patients in our study were multigravida 7 (58.33%) and most common age group were 20-25years (58.33%). Most of them presented at 38-40weeks of period of gestation (58.33%).

One patient with 30weeks of gestation, presented to our emergency department (EMD) with dyspnoea (SPO2- 56% at room air), tachycardia(Heart rate-155bpm) and tachypnoea (Respiratory rate-50cpm). As patient was in acute pulmonary edema in cardiogenic shock with severe LV dysfunction in cardiopulmonary arrest state, airway was secured and connected to mechanical ventilator. ABG shows severe hypoxia, severe metabolic lactic acidosis secondary to cardiogenic shock with tissue hypo perfusion. Patient developed ventricular tachycardia(VT) with heart rate of 210 requiring DC shock. DC shock of 150J delivered twice. Carotids were not palpable as VT progressed to asystole. CPR was started according to Advanced cardiovascular life support (ACLS) guidelines and Return of spontaneous circulation(ROSC) was attained after 5 minutes. Echo shows severe LV dysfunction with ejection fraction of 15-20%. Though Obstetric USG showed intrauterine fetal demise, a decision to terminate the pregnancy through abdominal route was taken by trans-disciplinary discussion between the departments of cardiology, anaesthesia and Obstetrics. The decision to terminate the pregnancy early aided in the resuscitation of the patient. Post-operatively, patient was admitted in cardiac ICU and treated with diuretics and inotropes. Patient discharged on post-operative day-7 with improved EF of 60% and goal directed medical therapy(GDMT) for heart failure. The case is specially mentioned here as the differential diagnosis of takotsubo cardiomyopathy was entertained in this case as it also causes left

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 9, 2024

ventricular dysfunction in the absence of any demonstrable cause such as obstructive coronary disease or acute plaque rupture. Takotsubo cardiomyopathy will not cause severe LV dysfunction.

Our patient had non specific ECG changes with global hypokinesia with severe LV dysfunction with NT PRO BNP significantly raised significantly which are significant characters of PPCM and recovery of LV function in a short period of time is indicative of PPCM.

33.33% patients in our study presented with breathing difficulty of NYHA-3 and the most common associated risk factor was eclampsia seen in 33.33%. Maximum (41.66%) patients had ejection fraction between 15-25%. There were 2(16.66%) maternal mortalities due to tachyarrhythmias among which 1 was due to ventricular tachycardia and another one was due to atrial fibrillation.

Average age of patients in our study was 24.36 years and mean age was 25.4years, similar to study conducted by Ravikiranet al[8]. Most of the cases in our study were multigravida(58.33%), these results are not in accordance with those of ShwethaAvinash et al[9] in which primigravidae formed the majority with 55.56% (multigravida were 44.44%). Time of presentation was during last month was pregnancy in majority of cases (83.33%), this was similar to study conducted by ShwethaAvinash et al[9].

Patients with PPCM present with wide range of symptoms from mild symptomatic to NYHA class 4. High level of suspicion is needed in making the diagnosis of PPCM as most of the symptoms overlap with normal physiological changes in pregnancy. Most common signs and symptoms at the time of presentation will be pedal edema, new onset breathing difficulty, orthopnea and chronic cough. Patients can even present as ventricular arrhythymias and cardiac arrest. 50% of cases presented with NYHA class 3 & 4. This was similar to study conducted by Sneha Singh et al[10](44.44%).Preferred mode of delivery in such patients is vaginal delivery as the complications are less. In our study, all the patients were delivered by caesarean section due to absolute obstetric indications. Among 9 live births, 4 babies needed NICU admission and recovered well.

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 9, 2024

As PPCM is a complex phenomenon, multidisciplinary care including different specialists, such as cardiologists, obstetricians, anaesthetists with well-equipped CCU and neonatologist is obligatory for a satisfactory outcome. Due to the high volume of cases with PPCM, we advocate screening 2D ECHO for all antenatal women in 3rd trimester in an effort to diagnose underlying cardiac disease before the catastrophic symptomatology present.

CONCLUSION

Management of patients with PPCM needs tertiary care centre in which obstetrician, cardiologist, anaesthetist, ICU, CCU and NICU facilities are available. Early degree of suspicion of the disease in the peripheral hospitals and referral of such patients to higher centre aids in preventing both maternal and fetal mortality and morbidity. Dyspnoea should be considered as a red flag sign in pregnant women and should be evaluated. All the cases were managed in CCU with evidence based medical therapy and it is proven that early aggressive medical management gives good outcome. High rate of relapse of heart failure and increases in mortality associated with subsequent pregnancy in the PPCM population, especially in patients with persistent LV dysfunction entering into the next pregnancy. If pregnancy is desired, patient should wait for at least 5years after EF has normalised. Hence counselling patients with the history of PPCM on the future pregnancies can be extremely important.

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 9, 2024

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 9, 2024

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