

## PERIPARTUM CARDIOMYOPATHY - AN IN-HOSPITAL STUDY

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### Contribution

MUH conceived the idea and designed the study. BS, BR, and CH did data collection and manuscript writing. MUH did final review. All authors contributed equally to the submitted manuscript.

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### ABSTRACT

**Objectives:** To determine the association of different associated risk factors in our own population.

**Methodology:** This cross-sectional was conducted in the Cardiology Department of Hayatabad Medical Complex Peshawar from January 2016 to November 2018. Those patients who presented with Peripartum Cardiomyopathy at any stage were included in the study after an informed consent. Patient detail history was obtained. Echocardiography was used as a confirmatory investigation. Other baseline investigation including: full blood count (FBC) with ESR, renal function tests (RFTs), and liver function tests (LFTs) were performed to look for any other precipitating factors. All those patients were excluded from our study in which any other causative factor for Cardiomyopathy was identified.

**Results:** Total 60 patients of PPCM were seen during the study period. Mean age was  $30.08 \pm 5.42$  years and age ranged from 20 to 45 years. About 70% patients were above the age of 25 years. Patients with more than three issues were 75%, 21% of patients belonged to low socioeconomic stratum of the population. Hypertension was found in 11.7% and diabetes in 15% of cases. About 25% of patients had twin pregnancy ( $p=0.001$ ). Among these patients 21.7% were in NYHA class IV.

**Conclusion:** Multiparity, multiple pregnancy, advance age and low socioeconomic condition were the main associated factors in our study.

**Key Words:** Pregnancy, Peripartum Cardiomyopathy (PCM), Heart Failure (HF). Ejection fraction (EF). DM. Hypertension (HTN).

## INTRODUCTION

Peripartum cardiomyopathy is one of the dreaded complications of pregnancy.<sup>1,2</sup> It is the diagnosis of exclusion.<sup>3,4</sup> It is defined as the left ventricular dysfunction demonstrated by echocardiography with EF < 45 % and with or without LV end-diastolic dimension >2.7 cm/m<sup>2</sup> body surface area that can arise in the last trimester of pregnancy or up to 5 months after delivery in the absence of any cardiac anomaly before pregnancies.<sup>5</sup> Though more than half of the patient who suffered, recovers from the disability within the first six months of the disease with supportive management, still there is a big junk of patients who needs life time care for their disease and symptoms.<sup>6,7</sup> The reported mortality rates in women with PPCM vary widely (range from 6% to 28%).<sup>8-10</sup> Those who recover are advised strongly against pregnancy forever.<sup>11</sup> The exact cause of the disease still needs to be determined. However there are some risk factors associated with this disabling condition.<sup>12</sup> The treatment of the condition is just supportive, with a new hope of improvement with bromocriptine.<sup>13,14</sup> Some patient populations are identified to be at increased risk for the developing of this condition. These include female with multiparity, multiple pregnancies, advanced age, selenium deficiency, preeclampsia, eclampsia and pregnancy induce hypertension, malnutrition, smoking, alcoholism, obesity, African-American descent, premature delivery medications.<sup>12</sup> We conducted a study at cardiology department Hayat Abad Medical Complex, Peshawar Pakistan to study the risk factors of the peripartum cardiomyopathy in our population.

## METHODOLOGY

It was a cross-sectional study. The study was conducted at cardiology department at Hayat Abad Medical Complex, Peshawar Pakistan from January 2016 to November 2018. Approval was obtained from the ethical committee. We included patients who fulfilled the criteria for Peripartum Cardiomyopathy. Our study population included patients from Khyber Pakhtunkhwa (KPK), federally administered tribal areas (FATA) of Pakistan and Afghanistan..

After an informed consent a detail history was acquired from patients. Base line characteristics including age of the patients, ethnicity, age at first pregnancy, numbers of pregnancy, twins or multiple babies, gestation duration, prematurity of pregnancy, lactation status and any medication or complication during pregnancy or parturition was noted. All these characteristics were tabulated. Patient baseline investigation including Full Blood Count (FBC) Renal Function Tests (RFTs) Liver Function Test (LFTs) and cardiac enzyme requested. Electrocardiography (ECG) and echocardiography performed. Echocardiography was used as a confirmative test to diagnose the condition on the basis of the criteria shown in table 1.

All the data was analyzed on SPSS version 22 for mean, mode and frequency. Chi square test was used to calculate the significance of any variable. P-value of 0.05 was taken as statistically significant in our study.

Socioeconomic class	Total score
I	Upper 26-29
II	Upper middle 16-25
III	Lower middle 11-15
IV	Upper lower 5-10
V	Lower <5

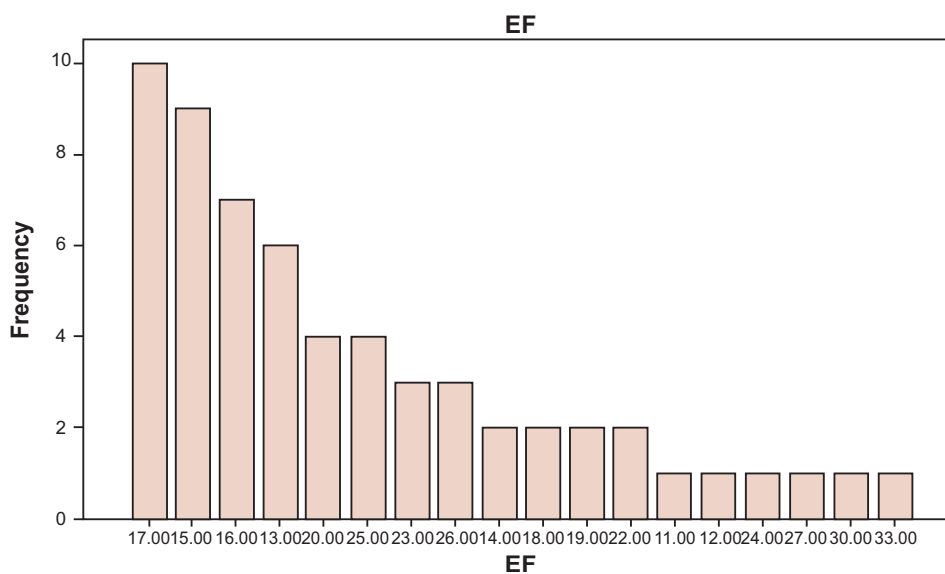
## RESULTS

We identified total 60 patients during our study period from December 2014 to June 2018. The base line characteristics are tabulated in table 1. Patient ages in our study range from 20 to 45 ± 5.42 years. About 90% of the patients are of or above the age of 25 years. There were 77% Pakistani patients. The rest were from Afghanistan. All the patients were Pakhtoons. 87% patients were from low middle socioeconomic regions. About 86.7% of patients were multipara. About 7 (11.7%) of patients were hypertensive before pregnancy (p < 0.001). Diabetes mellitus was found in about 9 (15%) of patients (p < 0.001). Both these co-morbidity showed strong correlation with peripartum cardiomyopathy in our study. Multiparity was a significant variable in our study. About 89% of patient had more than one issue. About 6 (10%) of patient suffered from pre-eclampsia during their pregnancies (p < 0.001). The EF remained significantly low during the study period. About 95% patient had their EF below 25%. The EF in the study population is shown in table 1. Most patients presented with dilated LV. The cumulative percentages of these patients were 76.5%. Almost all patients presented with the symptoms of heart failure. The time of presentation was variable. About 20 (33.3%) patients were not able to recall the exact time period since the symptoms started. They were just able to recall that with the last five or seven months since their last or 2nd last delivery. The time of presentation after symptoms is presented in pie chart in figure 1. New York Heart Association Classification (NYHA) Functional class I symptoms patients were 15 (25 %) in our study. NYHA Functional class II patients were 20 (33.3 %). The percentage of NYHA class III and class IV patients remained 12 (20%) and 13 (21.7 %) respectively. Class I, II and III patients responded to therapy. Though all patients who responded positively to the primary heart failure treatment and bromocriptine, failed to reverse their Cardiomyopathy but they improved symptomatically. Bromocriptine was administered in 5mg twice daily dose to 13 (21.7%) patients. Rest of the patients presented very late when already they were not feeding their babies. Anemia with hemoglobin (Hb) below 12 g/dl (gram per deciliter) was found in 11 (33.3%) patients and received oral iron. About 7 (11.7%) patients with Hb level below 10g/dl and received intravenous iron therapy with good results. About 7 (11.6%) of patient were in hypotension and were in need of inotropic support. Among these 5 (8.3%) were on dual inotropic support. We lost one patient out of those five patients who were on dual support. The overall mortality in our study remain 1.7% with a P value of <0.001. Patients who were lost due to any reason in the follow up remain very significant. There were 12 (20%) of patients who were not traceable after the 1st or 2nd visit to our out patients department.

**Table 1: Base Line Characteristic of Patients (n = 60)**

Variables	Frequency n (%)	P-Value
Age	20 to 45 ± 5.42 years	
Low socio-economic status	15	
Middle socio-economic status	45	
Patients from Pakistan	48	
Patients from Afghanistan	12	
Hypertension	07 (11.7%)	<0.001
Diabetes mellitus	09 (15%)	<0.001
Parity	1 to 10±2.199	
Twins (in no. of cases)	15 (25%)	0.001
Anemia	11 (33.3%)	
Severe Anemia	7 (11.7%)	<0.001
Pre-eclampsia	6 (10%)	<0.001
NYHA I	15 (25%)	
NTHA II	20 (33.3%)	
NYHA III	12 (20%)	
NYHA IV	13 (21%)	
Symptoms (average time of onset)		
Ejection Fraction	11 to 33±4.847	
Left Ventricle End Dimension	2.80 to 7.50 cm/m2	
Death	1(1.7%)	

**Figure 1: Ejection Fraction (EF %) Of The Study Population**



## DISCUSSION

PMC is an idiopathic dilated Cardiomyopathy that present in women during the last month of pregnancy or the first five month after delivery.<sup>5</sup> The incidence and prevalence keep on increasing trend for the last few decades all over the world.<sup>15</sup> The trend may be the same in our population as well. As our study is a single center observation from Pashtun populated areas from Pakistan and Afghanistan, mostly patients were from Pakistan. The study was conducted in small sample. We do not have any access to the data in other hospital even in our own region. Moreover we neither have any proper record of the previous time nor do we have the total birth record of the patient from our own hospital, therefore, the incidence and prevalence even at our own hospital cannot be calculated.

However in our study we can easily conclude that the morbidity keeps on increasing with advancing ages. 90% of our patients were above the age of 25 years. This increasing trend is seen both in Pakistani and Afghani women. It is the same trend of this condition which is observed by other investigators.<sup>16</sup> In a nationwide population-based study from United State the same rising trend was noted with increasing maternal ages. The same trend was reported by the Hilfiker-Kleiner D et.al. According to them this cardiovascular disease affects around 4% of all pregnancies in Western industrialized countries with increasing tendencies.<sup>16</sup>

Most of the patients were from lower and middle socioeconomic strata of population define on Modified Kuppuswamy scale (proposed updating for January 2017).<sup>17</sup> It is one of the robust parameter in our study. Multiparity and poverty is associated in many areas and have been observed keenly by many investigators.<sup>18-20</sup> Multiparity by itself has a strong relation with peripartum cardiomyopathy. It is very significant statistically in our study. The same is reported by other investigators as well. Multiparity not only increase the incidence of peripartum Cardiomyopathy but it also increase the chances of fetal mortality.<sup>21,22</sup>

Apart from these factors, hypertension and diabetes remain significant in our study. Hypertension was reported 42.8% from Japan and about 65% from United States of America (USA).<sup>24</sup> In the same study from USA 13.9% patient suffered from pre-eclampsia. A meta-analysis suggests the prevalence of pre-eclampsia and other forms of hypertension in pregnancies is significantly higher in PPCM patients than the general population. This suggests a strong relationship between hypertension in pregnancy and PPCM and, thus, supports some theories that point out the similarities of pathogenesis between hypertension in pregnancy, especially pre-eclampsia, with PPCM.<sup>25,26</sup> About 9% of our study population were diabetic which was statistically significant. A study conducted in more than 300000 pregnant ladies in Canada, it was concluded that the incidence of PPCM was higher in pregnancies in women with pre-existing DM (1/613 birth events) and gestational DM (1/1751 birth events) versus those with neither (1/2550 birth events). Also it was noted that patient with diabetes and PPCM confronted with more complications.<sup>27</sup>

Twin pregnancy with larger gestational weight gain (GWG) is suggested to have a higher risk of peripartum cardiomyopathy

(PPCM).<sup>28</sup> In another observation: Twin pregnancies are observed in 13% of patients with peripartum cardiomyopathy, which is significantly higher than the 1% to 2% rate noted among healthy women.<sup>29</sup> We observe a very significant correlation in our study with twin pregnancy. We found 25% of our patient having twin pregnancies in our study population.

Similar to other studies, we observed a higher incidence of PPCM in women with known risk factors such as chronic hypertension, eclampsia diabetes mellitus and twin pregnancies. The reported mortality rates for PPCM varied widely in more recent studies, as reported by Govindasamy P, et al.<sup>20</sup> The documented mortality in our study is 1.7% which is also comparable to studies from other centers.<sup>31,32</sup> If we compare our study to the observation of other investigators, our data has the same trend of risk factors and complication.

## LIMITATION

The present study is from a single center and limited to the patient reporting to hospital or admitted for failure, therefore cannot represent the national trend of the disease and associated risk factors. Our study is also limited by the lack of sophisticated laboratory investigation and genetic analysis which needs further research in the field to determine further association of this nightmare in pregnancy. Mostly patient comes when they are having moderate to severe symptoms but without proper medical record of their previous and present pregnancies.

## CONCLUSION

Multiparity, multiple pregnancy, advance age and low socioeconomic condition were the main associated factors in our study. The incidence of PPCM increased in all women  $\geq$  25 years of age.

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