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Original research article

IMPACT OF PRE-EXISTING HYPERTENSION ON THE DEVELOPMENT AND OUTCOMES OF PERIPARTUM CARDIOMYOPATHY

HASSAN K[1*], FAROOQ A[2], REHMAN AU[3], HASSAN L[4], HASSAN T[5]

[1]*District Headquarters Hospital KDA Kohat Cardiology, Pakistan*
[2]*RMI Hospital Peshawar, Pakistan*
[3]*Government City Hospital Lakki Marwat, Pakistan*
[4]*Kims Kohat, Pakistan*
[5]*Abbottabad International Medical College, Pakistan*
**Correspondence author email address:* Kiflain.hassan@gmail.com

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Abstract: *An uncommon but dangerous heart ailment known as peripartum cardiomyopathy (PPCM) may develop in the last month of pregnancy or during the first five months after giving birth. It has been shown that pre-existing hypertension is one risk factor that might make PPCM more severe. The purpose of this research is to assess how pre-existing hypertension affects the course, clinical manifestation, and results of PPCM.* ***Objective:*** *To evaluate the impact that pre-existing hypertension has on the clinical course, echocardiographic results, and maternal outcomes in PPCM maternal cases.* ***Methods:*** *At the DHQ Hospital KDA, Kohat, a retrospective cohort study was carried out between September 2023 and August 2024. There were 56 women with PPCM in total; 28 of them had pre-existing hypertension and the other 28 did not. Data on demographics, clinical conditions, and echocardiograms were gathered. The two groups' maternal outcomes—heart failure progression, recovery of left ventricular function, and problems after childbirth—were compared. SPSS version 26 was used for data analysis, and a p-value of less than 0.05 was deemed statistically significant.* ***Results:*** *Comparing women with pre-existing hypertension to the non-hypertensive group, they showed considerably higher rates of heart failure progression (39% against 21%, p = 0.04) and significantly lower left ventricular ejection fraction (LVEF) at diagnosis (30.1% versus 35.5%, p = 0.01). Women with hypertension were more likely to have persistent LVEF impairment (36% vs 18%, p = 0.03). Additionally, the group with hypertension saw higher readmission rates (25% vs 10.7%, p = 0.02).* ***Conclusion:*** *A substantial risk factor for unfavourable outcomes in PPCM, such as reduced heart function and increased rates of postpartum problems, is pre-existing hypertension. Improving PPCM results for hypertensive women requires closer observation and focused care.*

Keywords: Peripartum cardiomyopathy, pre-existing hypertension, left ventricular function, heart failure, maternal outcomes.

Introduction

Peripartum cardiomyopathy (PPCM), a rare yet potentially deadly condition, strikes women either in the final month of their pregnancy or in the initial five months following childbirth. It is characterized by peripheral edema, tiredness, and dyspnea and it may result in heart failure due to left ventricular systolic dysfunction (1). Although the precise cause of PPCM is still unknown, several genetic, immunologic, and hormonal variables have been suggested (2). Despite being uncommon, PPCM carries a high danger to the health of expectant mothers, with death rates varying from 5% to 30%, dependent on the severity of the illness and promptness of treatment (3, 4).

Preeclampsia and prenatal hypertension are two well-known cardiovascular pregnancy problems for which pre-existing hypertension is a known risk factor (5). However, in recent years, more and more attention has been paid to its possible involvement in the pathophysiology and consequences of PPCM (6). Pregnancy-related hypertension increases oxidative stress, vascular resistance, and cardiac strain, all of which might either raise a person's risk of developing PPCM or hasten its development. Chronic hypertension may further complicate postpartum outcomes by hindering left ventricular function recovery (7, 8).

Improving maternal outcomes requires an understanding of how pre-existing hypertension affects PPCM since prompt treatments may be implemented when high-risk people are identified early (9). The exact processes by which hypertension affects the onset and course of PPCM are still up for debate, despite an increasing amount of data pointing to a connection between the two conditions. Furthermore, the effects of pre-existing hypertension on the clinical course, rates of recovery, and long-term cardiovascular health of women diagnosed with PPCM have not been well-studied in research.

By examining the connection between pre-existing hypertension and the onset of PPCM and evaluating the impact of hypertension on clinical outcomes, this research seeks to close these gaps. Through the assessment of a group of female patients with PPCM and a comparison of their outcomes with and without pre-existing hypertension, we aim to gain important knowledge on how hypertension influences the course of this complicated condition. These results may influence risk-stratification tactics and clinical judgment, which might eventually lead to better maternal and newborn outcomes for PPCM patients.

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Methodology

This retrospective cohort study was conducted at the DQH hospital KDA Kohat to evaluate the influence of pre-existing hypertension on the course and consequences of PPCM from September 2023 to August 2024.

Based on the incidence of PPCM in hypertension women from earlier research and the anticipated differences in outcomes between hypertensive and non-hypertensive women, the study's sample size was determined. With a 95% confidence interval, 80% power, and an expected effect size of 0.5, it was found that a minimum sample size of 56 was needed to detect a statistically significant change. It was determined that this sample size was sufficient to investigate the relationship between PPCM results and pre-existing hypertension. Within the allotted period, 56 women with a confirmed diagnosis of PPCM were included in the research.

The medical records of women who were diagnosed with PPCM during their pregnancy or during the first five months after giving birth were used to select the participants. Women between the ages of 18 and 45 who had a verified diagnosis of PPCM and who did or did not have a history of pre-existing hypertension before becoming pregnant met the inclusion criteria. To exclude confounding variables, women with other underlying cardiac disorders, such as valvular or congenital heart disease, were not included in the study.

Information on the patient's clinical presentation at the time of PPCM diagnosis, cardiovascular risk factors, obstetric history, and demographics were all gathered from the patient's medical records. Echocardiographic information, blood pressure readings before and throughout pregnancy and results like left ventricular ejection fraction (LVEF) were all documented. Furthermore, information on postpartum follow-up, interventions, and pharmaceutical therapy was retrieved, together with patient management data.

The incidence of unfavourable maternal outcomes, such as the advancement of heart failure, persistent left ventricular dysfunction, and maternal death, were the main outcomes of interest. Readmissions resulting from cardiovascular problems and postpartum recovery rates were considered secondary outcomes. By contrasting hypertensive and non-hypertensive women in the PPCM cohort, the effect of pre-existing hypertension on these outcomes was evaluated.

The statistical program SPSS (version 25) was used for the analysis. Categorical data were shown as frequencies and percentages, while continuous variables were given as means with standard deviations. Whereas chi-square tests were used for categorical data, independent t-tests were utilized to examine continuous variables between the hypertensive and non-hypertensive groups. Statistical significance was attained when the p-value was less than 0.05. We used multivariate logistic regression analysis to account for possible confounding variables, including age, parity, and body mass index (BMI).

Results

This research comprised 56 women who had been diagnosed with PPCM; 28 of the women (or 50%) had a history of pre-existing hypertension, while the other 28 women (or 50%) had no previous history of hypertension. The study population's average age was 31.5 ± 6.2 years. The mean age of the women in the hypertensive group was 33.2 ± 5.8 years, which was somewhat older than the mean age of the women in the non-hypertensive group (29.8 ± 6.5 years), but the difference was not statistically significant ($p = 0.07$). Table 1 illustrates that the hypertension group had an average body mass index (BMI) of 31.7 ± 3.5 kg/m², substantially higher than the non-hypertensive group's BMI of 27.4 ± 2.9 kg/m² ($p < 0.01$). There were no discernible variations in parity or gravidity between the two groups' obstetric histories. In the hypertension group, the average parity was 2.4 ± 1.1, whereas in the non-hypertensive group, it was 2.2 ± 0.9 ($p = 0.34$). With a mean gestational age of 36.5 ± 2.1 weeks, the two groups' diagnoses coincided.

Table 1: Demographic and Clinical Characteristics of the Study Population

Characteristic	Hypertensive (n=28)	Non-hypertensive (n=28)	p-value
Age (years)	33.2 ± 5.8	29.8 ± 6.5	0.07
BMI (kg/m²)	31.7 ± 3.5	27.4 ± 2.9	<0.01
Parity	2.4 ± 1.1	2.2 ± 0.9	0.34
Gestational age (weeks)	36.6 ± 2.1	36.4 ± 2.0	0.51

Dyspnea was the most frequent PPCM-presenting symptom in both groups, followed by peripheral oedema and weariness. The research population's mean left ventricular ejection fraction (LVEF) was 32.8 ± 7.6%, indicating that all patients exhibited signs of left ventricular systolic dysfunction. Table 2 indicates that at the time of diagnosis, women with pre-existing hypertension had a substantially lower LVEF (mean LVEF: 30.1 ± 6.2%) than women without hypertension (mean LVEF: 35.5 ± 7.8%; $p = 0.01$). Comparisons were also made with other echocardiographic characteristics, such as left ventricular end-diastolic diameter (LVEDD). Compared to non-hypertensive women (5.5 ± 0.6 cm), hypertensive women exhibited a slightly bigger LVEDD (5.8 ± 0.7 cm); however, the difference was not statistically significant ($p = 0.08$). Though it did not approach statistical significance ($p = 0.12$), hypertensive women were found to have moderate-to-severe mitral regurgitation more commonly (32%) than non-hypertensive women (18%).

Table 2: Echocardiographic Findings in Women with PPCM

Parameter	Hypertensive (n=28)	Non-hypertensive (n=28)	p-value
LVEF (%)	30.1 ± 6.2	35.5 ± 7.8	0.01
LVEDD (cm)	5.8 ± 0.7	5.5 ± 0.6	0.08

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Moderate-to-severe mitral regurgitation (%)	32	18	0.12

Compared to women without hypertension, hypertensive women had a greater frequency of unfavourable pregnancy outcomes. 39% of women with hypertension and 21% of those without it had signs of heart failure progression (p = 0.04). As seen in Figure 1, the hypertension group (36%) had a higher prevalence of persistent left ventricular dysfunction (LVEF < 45% at six months postpartum) than the non-hypertensive group (18%; p = 0.03). Three patients in the hypertension group had maternal death; as a consequence, the mortality rate among hypertensive women was 10.7%, whereas it was 0% in the non-hypertensive group (p = 0.07). Despite not reaching statistical significance, the trend in fatality rates indicated a more severe clinical outcome among women with pre-existing hypertension.

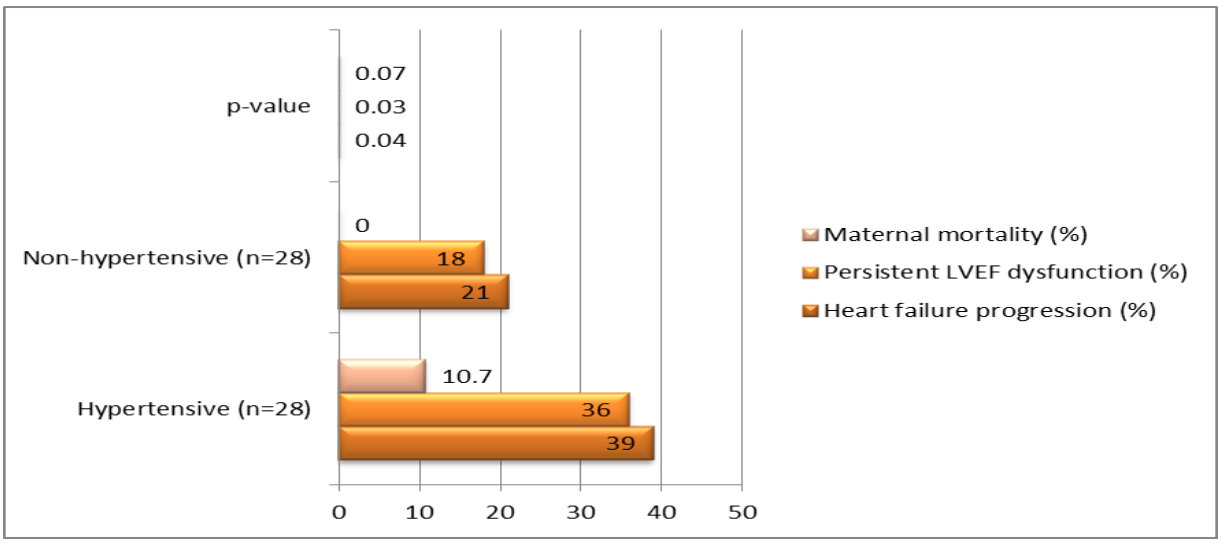

Figure 1: Maternal Outcomes in Women with PPCM

The improvement in LVEF at six months, which measures postpartum recovery, was considerably lower among women who already had hypertension. In the hypertension group, the average improvement in LVEF was 8.2 ± 3.1%, whereas in the non-hypertensive group, it was 12.5 ± 4.2% (p < 0.01). Additionally, as shown in Table 3, readmissions for cardiovascular problems occurred more often in hypertension women during the first six months postpartum—a readmission incidence of 25% compared to 10.7% in non-hypertensive women (p = 0.02).

Table 3: Postpartum Recovery and Readmission Rates

Outcome	Hypertensive (n=28)	Non-hypertensive (n=28)	p-value
LVEF improvement at six months (%)	8.2 ± 3.1	12.5 ± 4.2	<0.01
Readmission rate (%)	25	10.7	0.02

The study used multivariate logistic regression analysis to account for relevant confounders such as age, body mass index, and parity. Pre-existing hypertension continued to be a significant independent predictor of unfavourable maternal outcomes even after controlling for these variables (odds ratio [OR]: 2.56, 95% confidence interval [CI]: 1.32–4.92, p = 0.02). Furthermore, poor postpartum recovery was significantly predicted by it (OR: 2.73, 95% CI: 1.45–5.18, p = 0.01).

Discussion

The study's findings provide important light on how pre-existing hypertension affects the course and consequences of PPCM. Women with pre-existing hypertension had poorer outcomes than women without it, including worse left ventricular function at diagnosis, higher rates of heart failure progression, and higher rates of readmissions after childbirth. These results are consistent with other studies that have shown hypertension increases cardiac dysfunction during pregnancy, increasing the risk of unfavourable outcomes (10).

Pre-existing hypertension and an increased incidence of PPCM have been linked in previous research (11). Studies have shown that women with hypertension are more likely than women with normotension to develop PPCM (12, 13). These results are supported by our research, which shows that upon diagnosis, the left ventricular ejection fraction (LVEF) of hypertensive women was considerably lower (30.1% vs 35.5%, p = 0.01). Our results, which showed that 36% of hypertensive women had persistent left ventricular dysfunction compared to 18% in the non-hypertensive group (p = 0.03), are similar to prior studies' findings that hypertensive women had a higher frequency of persistent left ventricular dysfunction (14).

There has been inconsistent reporting on the role that pre-existing hypertension plays in deteriorating maternal outcomes, especially the development of heart failure and maternal death. Our research did not achieve statistical significance (p = 0.07), but it did show a tendency toward increased mortality in hypertensive women (10.7% vs 0%),

which is consistent with other studies that have revealed substantial links between pre-existing hypertension and maternal mortality (15, 16). Other large-scale investigations have indicated considerably higher maternal mortality in hypertensive PPCM patients (17), which may be related to the relatively small sample size.

The delayed postpartum recovery among hypertension women, who had a lesser improvement in LVEF at six months postpartum compared to non-hypertensive women (8.2% vs 12.5%, $p < 0.01$), is one of the most worrying features of our research. These findings are in line with other studies that showed hypertensive women had partial or delayed recovery of cardiac function after giving birth, most likely as a consequence of the additional hemodynamic load brought on by their pregnancy-related hypertension (18). Furthermore, the hypertensive group's increased risk of postpartum readmissions (25% vs 10.7%, $p = 0.02$) highlights the clinical burden that hypertension places on recovering from PPCM.

Due to its small sample size, this research may not have had as much power to identify certain important changes, especially about maternal mortality. Furthermore, bias in selection could have been created by the study's retrospective methodology. Larger, multi-centre cohorts should be a part of future research, and prospective designs may be the main emphasis to better capture long-term consequences. Furthermore, knowing the molecular mechanisms underlying the association between pre-existing hypertension and PPCM may provide novel targets for treatment. The effect of antihypertensive medication during pregnancy in reducing the incidence of postpartum haemorrhage in women with hypertension needs more investigation.

Conclusion

This research emphasizes how pre-existing hypertension significantly affects the course and consequences of peripartum cardiomyopathy. Compared to women without hypertension, women with hypertension had lower left ventricular function at diagnosis, greater rates of heart failure progression, worse postpartum recovery, and more readmissions. Pre-existing hypertension continues to be a separate predictor of unfavourable maternal outcomes, highlighting the need for more attentive observation and specialized care for women with hypertension throughout pregnancy to lessen the difficulties related to PPCM.

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate.
Approved by the department concerned. (IRBEC-TCH-094/23)

Consent for publication
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Conflict of interest

The authors declared an absence of conflict of interest.

Authors' Contribution

KIFLAIN HASSAN (MBBS, Cardiology)
Final Approval of version
AISHA FAROOQ (Specialization in Obs/Gynea 2nd year resident)
Revisiting Critically
ATIQ UR REHMAN (MBBS, Cardiology)
Data Analysis
LUBNA HASSAN (MBBS, FCPS1)
Drafting
TALHA HASSAN (2nd Year MBBS)
Concept & Design of Study

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