Volume 3, Issue 4, 2025

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

MATERNAL OUTCOMES IN PATIENTS WITH PERIPARTUM CARDIOMYOPATHY

Dr. Ayesha Khan[*1], Dr. Sania Tanveer Khattak[2], Dr. Waleed Rawan[*3], Dr. Rameen[4], Dr. Umer Dawar[5]

*[1]PGR Gynae & Obstetrics, Department of Gynae & Obstetrics, Saidu Group of Teaching Hospital (SGTH), Swat

[2]Professor and Head of Department, Gynae & Obstetrics, Saidu Group of Teaching Hospital (SGTH), Swat

*[3]Resident Cardiologist, Saidu Group of Teaching Hospital (SGTH), Swat

[4]House Officer, Department of Gynae & Obstetrics, Prime Hospital, Peshawar

[5]PGR Internal Medicine, MTI/Khyber Teaching Hospital (KTH), Peshawar

[*1]ashhkcd1996@gmail.com, [2]drsaniakhattak@gmail.com, [*3]waleedrawan32@gmail.com, [4]rameenkhan52104@gmail.com, [5]umerdawar741@gmail.com

DOI: https://doi.org/10.5281/zenodo.18936684

Keywords

Peripartum cardiomyopathy, maternal, postpartum blood, cesarean delivery.

Article History

Received: 10th May 2025

Accepted: 25th May 2025

Published: 3rd June 2025

Corresponding Author: *

Dr. Ayesha Khan

Dr. Waleed Rawan

Abstract

Background:

Peripartum cardiomyopathy (PPCM) is a cardiac failure of the left ventricular systolic dysfunction and is a rare disease which occurs during the last month of pregnancy or within the five months after birth. It is linked with high maternal morbidity and unfavorable obstetric consequences.

Methodology:

This was a descriptive study, which was carried out in the Department of Obstetrics and Gynaecology, Saidu Group of Teaching Hospital, Swat, between 7th February 2025 and 8th May 2025. Non-probability consecutive sampling was used to include 136 patients aged between 18 and 40 years with a gestational age of 32 weeks and diagnosed with PPCM (LVEF 45 per cent on echocardiography). Information on the demographic and maternal care outcome factors such as mode of delivery, postpartum haemorrhage (PPH), rehospitalization and in-hospital mortality were registered. Analysis of data was done through SPSS version 25 using both descriptive and inferential statistics.

Results:

The average patient age was 30.6±5.1. The most frequent mode of delivery was Cesarean section (65.4%), postpartum hemorrhage (25.7%) and rehospitalization (15.4%). Deaths at the hospital were 4.4 percent in patients. Mothers who had increased maternal age and body mass index significantly predicted post partum hemorrhage ($p < 0.05$).

Conclusion:

Peripartum cardiomyopathy is significant to maternal complications, especially surgical delivery and postpartum bleeding. The identification and management of maternal conditions should be done in an early stage and in a multidisciplinary manner to enhance better outcomes of mothers.

INTRODUCTION

Peripartum cardiomyopathy (PPCM) is an uncommon yet possibly fatal type of idiopathic cardiomyopathy that develops in the final month of pregnancy or first five months of the postpartum period. It is a condition that is

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

typified by left ventricular systolic dysfunction causing symptomatic and signaling heart failure in women with no prior known structural heart disease. Diagnosis is usually made in case the echocardiography indicates a left ventricular ejection fraction (LVEF) of 45% or less during the specified peripartum period. PPCM is a serious cause of morbidity and mortality at the maternal level in most countries of the world despite being rare because of its unpredictable clinical process and the possibility of serious cardiac events [1,2].

The estimated incidence of PPCM in the whole world is quite diverse with the incidence estimated at about 0.05 to 0.1 of all live births. Nonetheless, the burden of disease is significantly greater in third world countries than in the first world countries. Poorer outcomes in low resource settings are caused by socioeconomic differences, late detection, insufficient access to the specialized care of heart diseases, and insufficient antenatal monitoring. Researchers have also shown that PPCM is very prevalent in some racial groups, especially black women in the United States where its prevalence is said to be above five times greater than that of non-black women [3].

Numerous maternal and obstetric conditions have been revealed as possible causes of the presentation of PPCM. These are hypertensive disorders of pregnancy like preeclampsia and eclampsia, persistent hypertension, diabetes mellitus, older age of the maternal, multiparty, smoking, and multiple gestations. These risk factors interact with hormonal, inflammatory, and vascular processes to be believed to cause myocardial injury and ventricular dysfunction. Although, research has been done, the pathophysiological mechanism of PPCM has not been fully realized [4].

There are also some recent evidence of a potential genetic predisposition to PPCM. A proportion of cases of dilated cardiomyopathy have been associated with mutations that implicate the disease thereby implying that PPCM could be a manifestation of a genetic predisposition exacerbated by pregnancy. To some degree, this genetic factor can describe the differences in the severity of the disease and the remission process in affected women [5].

PPCM clinical course is very unpredictable. Other patients do regain normal left ventricular function months of diagnosis, but others develop chronic ventricular dysfunction and chronic heart failure or end-stage cardiomyopathy. In extreme situations, patients might need to undergo more complicated treatment methods like mechanical circulatory support using left ventricular assist devices or even heart transplantation. Even in patients who seem to have come out of their clinical condition, persistent abnormalities of cardiac structure and functioning such as impaired global longitudinal strain and arterial stiffness have been reported [6].

There are also a number of adverse obstetric and maternal outcomes in relation to PPCM. PPCM often necessitates operative delivery as a result of hemodynamic instability or obstetric findings in women. Affected populations have been reported to have increased rates of cesarean section, postpartum hemorrhage and extended hospitalization. In other instances, issues to do with heart failure can require intensive care admission or hi-tech cardiac procedures in the peripartum phase [1,7].

Even though more sophisticated diagnostic and treatment approaches have been developed, PPCM still remains the great challenge to clinicians because of its unpredictable course and possible severe maternal complications. Early diagnosis, close observation and multidisciplinary care with the involvement of obstetricians and cardiologists plays a significant role in enhancing maternal outcomes. Nonetheless, few studies have been conducted on the trend of maternal outcomes related to PPCM in most developing nations [4,8].

There is limited information on maternal outcomes in patients with PPCM in Pakistan and other similar healthcare facilities. The relevance of local epidemiological data lies in the ability to comprehend the burden of disease, define the complications related to it, and make clinical management plans. Thus, the possibility of studying the local populations can also allow clinicians to counsel their patients better, predict complications and optimize treatment in high-risk pregnancies with PPCM.

Objective

To determine the frequency of maternal outcomes in patients with peripartum cardiomyopathy.

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

METHODOLOGY

Study Design and Setting

The descriptive research was carried out in the department of obstetrics and gynaecology, Saidu group of teaching hospital, Saidu Sharif, Swat. The aim of the study was to show the prevalence of maternal outcomes among patients who presented themselves to the hospital with peripartum cardiomyopathy.

Study Duration

The research took place within three months between 7th February 2025 and 8th May 2025.

Sample Size and Sampling Technique.

The WHO sample size calculator was used to compute the sample size by putting the expected rate of postpartum hemorrhage among patients with peripartum cardiomyopathy as 27.3%; a margin of error of 7.5 percent and a confidence threshold of 95 percent. On the basis of these assumptions, 136 patients were taken as the required sample size. Eligible participants were recruited by using non-probability consecutive sampling method.

Study Population

The study included pregnant women who were admitted to the Department of Obstetrics and Gynaecology and diagnosed with peripartum cardiomyopathy. Included were patients aged 18 to 40 years of gestational age of 32 weeks or greater, parity up to four and a diagnosis of peripartum cardiomyopathy that was confirmed by echocardiography with a left ventricular ejection fraction of 45 or less in the last month of pregnancy or within five months of childbirth. The study excluded patients who have multiple pregnancies, placenta previa, a history of low left ventricular ejection fraction prior to pregnancy, valvular heart disease, septicemia, endocrine, autoimmune diseases, or human immunodeficiency virus infection.

Data Collection Procedure

Patients who met the eligibility criteria were recruited in the indoor department of Obstetrics and Gynaecology, after receiving the consent of the hospital research review board. The purpose of the study, benefits and possible risks were discussed with all participants who provide informed consent. Baseline demographic and clinical data such as age, gestational age, parity, body mass index, residence, education, profession, and socioeconomic status were posted using a specially designed proforma. Each patient was provided with a detailed obstetrical history and a medical history and a thorough physical examination including general physical examination, abdominal examination, and pelvic examination.

The entire process of handling all patients was based on the standard hospital protocol of high-risk pregnancies. The patients were given the opportunity to go as far as possible and spontaneously labor and labor development was tracked with the help of a partogram. Instrumental delivery was done whenever necessary based on obstetric guidelines and the cesarean section was done in instances where the woman was not in a position to deliver through the vagina at will or when there were obstetric indications. Each patient had the mode of delivery. The incidence of postpartum bleeding was determined by measuring blood lost during delivery by the help of a 500 ml kidney tray. The discharge status of every patient was also documented to find out the in-hospital mortality. The duration of follow-up was 12 weeks after delivery, which was done through outpatient visits and the patients who could not visit the clinic were contacted over the telephone. Rehospitalization was defined as any 24 hour or longer hospital admission within 12 weeks following childbirth or diagnosis of peripartum cardiomyopathy.

Data Analysis

All the data obtained was keyed into and analyzed in the SPSS version 25. Mean ± Standard deviation after measuring normality by determining the Shapiro-Wilk test, or median with interquartile range were used to express such quantitative variables because they included age, gestational age, blood loss, and body mass index. In qualitative variables such as residence, education, profession, socioeconomic status and maternal outcomes, the frequencies and percentages were provided. Maternal outcomes were strata in terms of age, gestational age and body mass index in order to balance the effect modifiers. Wherever necessary, post-stratification chi-square test or Fisher exact test

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

was used and p-value of 0.05 or less was taken as significant.

RESULTS

A total of 136 patients diagnosed with peripartum cardiomyopathy were included in the study. The mean age of the participants was 30.6 ± 5.1 years, while the mean gestational age at presentation was 35.2 ± 2.1 weeks. The average body mass index (BMI) was 27.4 ± 3.6 kg/m². Most participants were multiparous and a considerable proportion belonged to rural areas. Detailed demographic and baseline clinical characteristics of the participants are presented in **Table 1**.

Table 1: Baseline Demographic and Clinical Characteristics of Patients (n = 136)

Variable	Mean ± SD / Frequency (n)	Percentage (%)
Age (years)	30.6 ± 5.1	—
Gestational age (weeks)	35.2 ± 2.1	—
BMI (kg/m²)	27.4 ± 3.6	—
Parity		
Primiparous	38	27.9
Multiparous (2–4)	98	72.1
Residence		
Rural	82	60.3
Urban	54	39.7
Education		
No formal education	44	32.4
Primary/Secondary	59	43.4
Higher education	33	24.3
Socioeconomic status		
Low	71	52.2
Middle	46	33.8
High	19	14.0

Maternal outcomes among patients with peripartum cardiomyopathy were evaluated during hospital stay and during the 12-week follow-up period. Cesarean section was the most common mode of delivery, while postpartum hemorrhage and rehospitalization were also observed in a notable proportion of patients. In-hospital mortality was relatively low in this cohort. The distribution of maternal outcomes is summarized in **Table 2**.

Table 2: Maternal Outcomes in Patients with Peripartum Cardiomyopathy (n = 136)

Maternal Outcome	Frequency (n)	Percentage (%)
Mode of Delivery		
Normal vaginal delivery	47	34.6
Cesarean section	89	65.4
Postpartum hemorrhage	35	25.7
Re-hospitalization within 12 weeks	21	15.4
In-hospital mortality	6	4.4

Further analysis was performed to assess the relationship between maternal age groups and adverse maternal outcomes. Stratification revealed that patients aged ≥30 years had a relatively higher proportion of cesarean deliveries and postpartum hemorrhage compared with younger patients; however, only postpartum hemorrhage showed a statistically significant association with increasing maternal age ($p < 0.05$). These findings are presented in **Table 3**.

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

Table 3: Association of Maternal Age with Maternal Outcomes

Age Group (years)	Cesarean Section n (%)	Postpartum Hemorrhage n (%)	Rehospitalization n (%)	In-hospital Mortality n (%)	p-value
<30 (n=58)	33 (56.9)	10 (17.2)	7 (12.1)	2 (3.4)	
≥30 (n=78)	56 (71.8)	25 (32.1)	14 (17.9)	4 (5.1)	
Chi-square / Fisher test					**0.041**

Similarly, maternal outcomes were stratified according to body mass index categories. Patients with higher BMI demonstrated a greater frequency of cesarean delivery and postpartum hemorrhage. The association between BMI and postpartum hemorrhage reached statistical significance (p = 0.03), whereas other outcomes did not show statistically significant associations. Detailed inferential analysis is provided in **Table 4**.

Table 4: Association of Body Mass Index with Maternal Outcomes

BMI Category (kg/m²)	Cesarean Section n (%)	Postpartum Hemorrhage n (%)	Rehospitalization n (%)	In-hospital Mortality n (%)	p-value
<25 (n=39)	21 (53.8)	6 (15.4)	4 (10.3)	1 (2.6)	
25–29.9 (n=58)	38 (65.5)	14 (24.1)	9 (15.5)	2 (3.4)	
≥30 (n=39)	30 (76.9)	15 (38.5)	8 (20.5)	3 (7.7)	
Chi-square test					**0.030**

The overall distribution of major maternal outcomes is illustrated in **Figure 1**, highlighting the relative proportion of cesarean delivery, postpartum hemorrhage, rehospitalization, and in-hospital mortality among patients with peripartum cardiomyopathy.

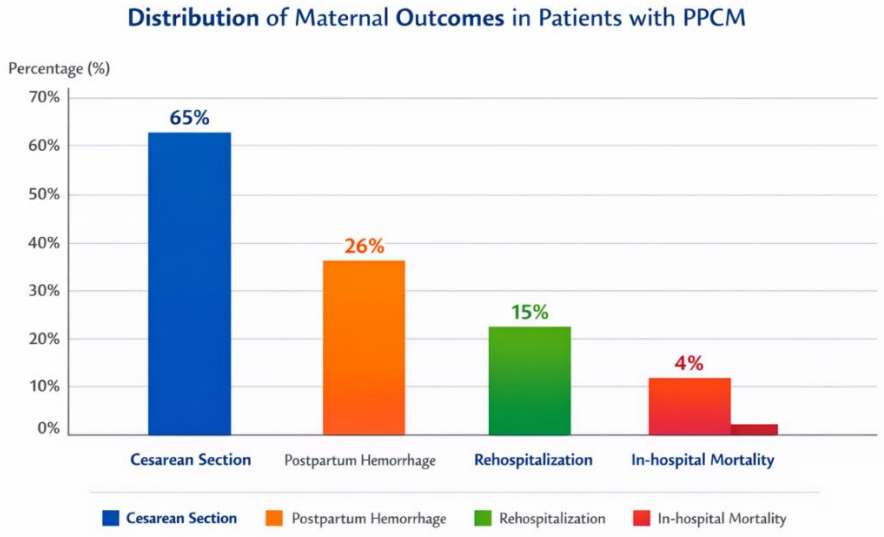

Figure 1: Distribution of Major Maternal Outcomes in Patients with PPCM

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

DISCUSSION

Peripartum cardiomyopathy (PPCM) is a rare but possibly fatal variant of cardiomyopathy that is experienced during the late pregnancy or the initial postpartum stage. It continues to play a critical role in maternal morbidity as well as maternal mortality in the world especially in developing states where late diagnosis and access to further specialized care may exacerbate conditions. The current study compared the maternal outcomes of women with PPCM and revealed that the burden of obstetric and heart complications was significant during the peripartum period. These results point to an early diagnosis and multi-disciplinary approach as a way of enhancing the maternal prognosis [9].

The average maternal age of the patients in the current study was around the beginning of the thirty years, as had been reported in the earlier researches that PPCM occurs most frequently among women aged between 25 and 35 years. The elderly maternal age has been proposed as a risk factor in the onset of PPCM since it exposes the heart to more stress and the prevalence of comorbidity. Some epidemiological research studies have also found that women older than 30 years are at a higher risk of having some cardiac complication during pregnancy, such as PPCM [10,11].

As noted in the present research, cesarean birth was the most common form of delivery in PPCM patients. This finding is in line with the already published literature, and it suggests that women with PPCM tend to deliver operatively due to hemodynamic instability, obstetric reasons or due to the need to prevent the effects of the stress of the long labor. Research has also been done in developed and developing environments with a variation of 55-70 percent in cesarean delivery rates among the women affected by PPCM. It normally involves multidisciplinary decision-making in which obstetricians and cardiologists are involved in deciding the safest mode of delivery of these high-risk patients [12,13].

Another maternal complication that was significant among the study population was postpartum hemorrhage (PPH). The incidence rate of PPH in the study is similar to the results of other studies on the subject whereby PPCM patients were more prone to hemorrhagic complications. The physiological causes might involve dysfunction of hemodynamic stability, anticoagulant treatment in some patients and uterine atony due to long or difficult labor. Close intrapartum observation and immediate intervention of obstetric bleeding is thus important in this category of patients in order to minimize maternal morbidity [14].

A proportion of the patients in this study observed postpartum period also experienced the phenomenon of Rehospitalization. This observation is indicative of the current threat of heart failure exacerbation during the early postpartum state in women with PPCM. It has been shown by previous research that cardiac decompensation is especially susceptible to cardiac decompensation during the postpartum period as a result of fluid redistribution and elevated circulatory requirements. Close follow-ups and proper heart failure care are thus suggested in the initial months of delivery to avoid clinical downhill and hospital readmissions [15,16].

There were also statistically significant relationships between some maternal attributes and adverse outcomes in the present study. The maternal age and body mass index were related to an increased rate of postpartum hemorrhage as well as operative birth. It has been identified that obesity is a significant cardiovascular risk factor and can potentially increase hemodynamic stress periconceptually. Moreover, metabolic and inflammatory processes linked to enhanced adiposity could be the factors that could worsen the state of cardiac recovery and augment obstetric difficulties in PPCM patients [17].

Even though the in-hospital mortality rate was fairly low in this group, even a percentage of deaths shows that PPCM is a serious condition. The previous literature has registered variable death rates based on the area and access to high-level cardiac services. In developed countries, the rates of mortality are usually lower because most people are diagnosed earlier and access specialized treatment, whereas in low and middle-income countries mortality rates are rather high. Early systems of diagnosis, echocardiographic and multidisciplinary intervention are significant factors contributing to minimizing mortality related to this condition [18,19].

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

All in all the results of the current study agree with the literature in the international community that PPCM is correlated with a range of maternal complications such as operative delivery, postpartum hemorrhage, readmission, and in some cases death. These results indicate the need to detect early, closely monitor antenatal care, and collaboratively treat obstetricians, cardiologists, and critical care experts. Complexity Complications and outcomes Maternity complications can be reduced by enhancing maternal healthcare services and increasing awareness among clinicians [20].

Limitations: This research was limited in a number of ways. One, it was conducted in one tertiary care hospital, and this could be insufficient to apply the results in other healthcare environments. Second, due to the relatively small sample size and the rather limited time of the study, it might be possible that the less prevalent complications have remained unnoticed. Third, any cardiac outcome longer than 12 weeks was not tailored. It is suggested that future multicenter research should be conducted on larger sample sizes with prolonged periods of follow-up in order to be able to gain knowledge of the long-term maternal and cardiac outcomes of peripartum cardiomyopathy.

CONCLUSION

Peripartum cardiomyopathy is a cause of severe maternal morbidity during late pregnancy phase and postpartum. The results of this research established that women who had PPCM often had adverse maternal events where cesarean section was the most prevalent method of delivery, postpartum bleeding and readmission after delivery were the second and third most frequent events during the postpartum period whereas in-hospital mortality was quite low. The maternal age and the high body mass index were identified to be related with the risk of some complications. These results underscore the need to diagnose, monitor, and treat patients with PPCM at an early stage and consider the use of a multidisciplinary approach to enhance maternal outcomes so that severe complications can be avoided.

REFERENCES

Eggleton EJ, McMurrugh KJ, Aiken CE. Perinatal outcomes in pregnancies complicated by maternal cardiomyopathy: a systematic review and meta-analysis. American Journal of Obstetrics and Gynecology. 2023 Mar 1;228(3):283-91.

Eggleton EJ, McMurrugh KJ, Aiken CE. Maternal pregnancy outcomes in women with cardiomyopathy: a systematic review and meta-analysis. American Journal of Obstetrics and Gynecology. 2022 Oct 1;227(4):582-92.

Kim DY, Kim SR, Park SJ, Seo JH, Kim EK, Yang JH, Chang SA, Choi JO, Lee SC, Park SW. Clinical characteristics and long-term outcomes of peripartum takotsubo cardiomyopathy and peripartum cardiomyopathy. ESC Heart Failure. 2020 Dec;7(6):3644-52.

Honigberg MC, Givertz MM. Peripartum cardiomyopathy. Bmj. 2019 Jan 30;364.

Pachariyanon P, Bogabathina H, Jaisingh K, Modi M, Modi K. Long-term outcomes of women with peripartum cardiomyopathy having subsequent pregnancies. Journal of the American College of Cardiology. 2023 Jul 4;82(1):16-26.

Hoevelmann J, Engel ME, Muller E, Hohlfeld A, Boehm M, Sliwa K, Viljoen C. A global perspective on the management and outcomes of peripartum cardiomyopathy: a systematic review and meta-analysis. European Journal of Heart Failure. 2022 Sep;24(9):1719-36.

Mahowald MK, Basu N, Subramaniam L, Scott R, Davis MB. Long-term outcomes in peripartum cardiomyopathy. The Open Cardiovascular Medicine Journal. 2019 Mar 26;13(1).

Sliwa K, Bauersachs J, Arany Z, Spracklen TF, Hilfiker-Kleiner D. Peripartum cardiomyopathy: from genetics to management. European Heart Journal. 2021 Aug 21;42(32):3094-102.

Farrell AS, Kuller JA, Goldstein SA, Dotters-Katz SK. Peripartum cardiomyopathy. Obstetrical & Gynecological Survey. 2021 Aug 1;76(8):485-92.

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

Jha N, Jha AK. Peripartum cardiomyopathy. Heart Failure Reviews. 2021 Jul;26(4):781-97.

Sliwa K, Petrie MC, van der Meer P, Mebazaa A, Hilfiker-Kleiner D, Jackson AM, Maggioni AP, Laroche C, Regitz-Zagrosek V, Schaufelberger M, Tavazzi L. Clinical presentation, management, and 6-month outcomes in women with peripartum cardiomyopathy: an ESC EORP registry. European heart journal. 2020 Oct 14;41(39):3787-97.

Iorgoveanu C, Zaghloul A, Ashwath M. Peripartum cardiomyopathy: a review. Heart failure reviews. 2021 Nov;26(6):1287-96.

Kiran GR, RajKumar C, Chandrasekhar P. Clinical and echocardiographic predictors of outcomes in patients with peripartum cardiomyopathy: A single centre, six month follow-up study. Indian Heart Journal. 2021 May 1;73(3):319-24.

Bauersachs J, König T, van der Meer P, Petrie MC, Hilfiker-Kleiner D, Mbakwem A, Hamdan R, Jackson AM, Forsyth P, de Boer RA, Mueller C. Pathophysiology, diagnosis and management of peripartum cardiomyopathy: a position statement from the Heart Failure Association of the European Society of Cardiology Study Group on peripartum cardiomyopathy. European journal of heart failure. 2019 Jul;21(7):827-43.

Isogai T, Kamiya CA. Worldwide incidence of peripartum cardiomyopathy and overall maternal mortality. International heart journal. 2019 May 30;60(3):503-11.

Davis MB, Arany Z, McNamara DM, Goland S, Elkayam U. Peripartum cardiomyopathy: JACC state-of-the-art review. Journal of the American College of Cardiology. 2020 Jan 21;75(2):207-21.

Hoes MF, Arany Z, Bauersachs J, Hilfiker-Kleiner D, Petrie MC, Sliwa K, van der Meer P. Pathophysiology and risk factors of peripartum cardiomyopathy. Nature Reviews Cardiology. 2022 Aug;19(8):555-65.

Jackson AM, Macartney M, Brooksbank K, Brown C, Dawson D, Francis M, Japp A, Lennie V, Leslie SJ, Martin T, Neary P. A 20-year population study of peripartum cardiomyopathy. European heart journal. 2023 Dec 21;44(48):5128-41.

Olanipekun T, Abe T, Effoe V, Egbuche O, Mather P, Echols M, Adedinsewo D. Racial and ethnic disparities in the trends and outcomes of cardiogenic shock complicating peripartum cardiomyopathy. JAMA Network Open. 2022 Jul 5;5(7):e2220937.

Karaye KM, Sa'idu H, Balarabe SA, Ishaq NA, Adamu UG, Mohammed IY, Oboirien I, Umuerri EM, Mankwe AC, Shidali VY, Njoku P. Clinical features and outcomes of peripartum cardiomyopathy in Nigeria. Journal of the American College of Cardiology. 2020 Nov 17;76(20):2352-64.