ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

Peripartum Cardiomyopathy; Understanding and Improving Outcomes-A Systematic Review

Shakirat Ganiyu MD[1], Taiwo Akeem Lawal[2], Sarah Petrie MD[3]

1. Department of Internal Medicine, The University of Texas Rio Grande Valley Knapp Medical Centre, Weslaco Texas, United States. Faculty ofClinical and Veterinary Medicine, Department of Surgical Sciences, The University of Edinburg, Scotland, United Kingdom.

2. Faculty of Surgery, Department of Paediatric Surgery, The University College Hospital, Ibadan, Oyo State, Nigeria.

3. Faculty of Clinical and Veterinary Medicine, Department of Surgical Sciences, The University of Edinburg, Scotland, United Kingdom.

Corresponding Author: Shakirat Ganiyu Contact:Shakirat.ganiyu@utrgv.edu

Abstract

Background: Peripartum cardiomyopathy (PPCM) presents a significant global health challenge, contributing substantially to maternal morbidity and mortality worldwide. Despite ongoing research efforts, the multifaceted nature of PPCM, encompassing genetic, environmental, and clinical factors, necessitates a comprehensive understanding to improve patient outcomes effectively.

Aims: This systematic review aims to synthesise current knowledge on PPCM aetiology, risk factors, diagnosis, therapeutic interventions, and prognostic indicators, highlighting recent advancements and potential avenues for future research and clinical management. By addressing key aspects such as genetic predispositions, environmental influences, diagnostic strategies, therapeutic modalities, and global disparities, this review seeks to provide insights that can inform interdisciplinary approaches and ultimately enhance the care and outcomes of affected patients on a global scale.

Methodology: Narrative, qualitative systematic review of current literature

Results: This systematic review delved into the multifaceted landscape of PPCM, revealing genetic, environmental, and clinical intricacies. Key findings included the identification of TTN truncating mutations as a significant genetic predisposition, prompting personalised medical interventions. Environmental factors, such as PM2.5 exposure, intersected with clinical dynamics, highlighting the need for interdisciplinary cooperation in healthcare and environmental policy. Additionally, studies emphasised the importance of timely diagnosis, global disparities in PPCM incidence, and the potential for personalised treatments like bromocriptine and targeted genetic therapies.

Conclusion: This review illuminated the complexity of peripartum cardiomyopathy and provides a roadmap for future research and clinical management, advocating for holistic approaches to improve patient outcomes.

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

Introduction:

Peripartum cardiomyopathy (PPCM) affects women globally and is a substantial risk factor for maternal morbidity and mortality (Sliwa et al., 2020). Peripartum cardiomyopathy is the primary factor contributing to mortality in the late postpartum period (Goland et al., 2013). In 1971, Demakis et al. created the basic norms for identifying PPCM based on three specific criteria including (1) development of heart failure in the last month of pregnancy or within the first 5 postpartum months, (2) absence of a determinable aetiology for the cardiac failure, and (3) absence of demonstrable heart disease prior to the last month of pregnancy. It is clear that one of the criteria specifically defined the time frame for diagnosing PPCM, which is limited to the period from the last month of pregnancy to the first five months after giving birth. Over time, the definition of PPCM has evolved and expanded to improve the accuracy of diagnosis. Peripartum cardiomyopathy as defined by the working group on PPCM within the European Society of Cardiology (ESC) (Silwa et al., 2010), is a form of idiopathic cardiomyopathy that presents as heart failure caused by impaired left ventricular systolic function during the later stages of pregnancy or in the months after giving birth. Significantly, this definition highlights the need to rule out other potential causes of heart failure, making PPCM a condition that is only diagnosed when all other possibilities have been excluded. In this refined definition, it is important to note that the left ventricle's size may not show enlargement, but the ejection fraction consistently remains below 45%, emphasising the main pathological characteristic of PPCM. This modern explanation offers a more thorough comprehension of PPCM, recognising its subtle manifestation and emphasising the significance of ruling out other causes before assigning heart failure to this ailment. The ongoing development of the PPCM definition demonstrates the medical community's dedication to improving diagnostic criteria for greater precision and clarity in clinical practice.

The epidemiology of PPCM has been recorded in numerous nations and localities, and there are varying rates of its occurrence (Kolte et al., 2014;Mielniczuk et al., 2006). Nigeria had the highest incidence (1 in 102 deliveries) while Japan had the lowest (1 in 15,533 births) in the literature. In various reports from the United States, the incidence was greater in African Americans than in other races, and it was also high in African nations and in Haiti, indicating that the risk for PPCM is highest in the black race (Isogai et al., 2019). Peripartum cardiomyopathy is a subtype of dilated cardiomyopathy that is often diagnosed towards the end of pregnancy or shortly afterwards (Chinweuba et al., 2020). It can appear as a decrease in

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

ejection fraction (Bello et al., 2015; Gutierrez-Abarca et al., 2021). The lack of pre-existing structural heart disease complicates the diagnosis, adding to morbidity and death (Sliwa et al., 2010). This condition is differentiated by the abrupt development of left ventricular (LV) systolic dysfunction and dilatation in previously healthy women, generally around the end of pregnancy and lasting up to five months after birth. The disorder is characterised by various problems and unfavourable outcomes, most of which arise early in its progression (Sliwa et al., 2010",")Bauersachs et al., 2019). The outcomes of PPCM remain very variable and appear to range greatly among nations and races. While around 50% of women recover LV function within six months of diagnosis, there appear to be significant disparities in the rate of recovery between ethnicities and origins (Sliwa et al., 2020;Jha et al., 2021).

As mentioned earlier, PPCM is still poorly understood despite its clinical significance, with no precise diagnostic biomarkers or disease-specific therapeutics. There is also a suggestion that having a genetic tendency may indicate a negative outlook for PPCM (Van et al., 2014"," Haghikia et al., 2013"," Ware et al., 2016). Conventional drugs employed for the treatment of PPCM encompass the typical pharmaceuticals utilised for managing other forms of systolic heart failure which include loop diuretics, beta-blockers, ACE/ARBs and hydralazine/isosorbide dinitrate (Davis et al., 2020). However, some medications such as ACE inhibitors, ARBs, and the anticoagulant warfarin are advised to be avoided during pregnancy since they might cause birth defects (Silwa et al., 2010; Davis et al., 2020). A cutting-edge study conducted by Hilfiker-Kleiner et al. 2008 revealed the potential of using a medication called bromocriptine, which inhibits prolactin secretion, as a targeted therapy option for PPCM. That study provided evidence that oxidative stress, which leads to the production of a cardiotoxic 16kD variant of the hormone prolactin, plays a crucial role in the development of PPCM. This discovery prompted several studies to evaluate bromocriptine's efficacy as a treatment drug for PPCM. The studies have demonstrated favourable results when using bromocriptine in individuals with PPCM. The ESC recommendations have recently advised the use of bromocriptine in both short-term and long-term treatment regimens, with the specific regimen determined by the severity of the condition encompassing patients' symptomatology and Left Ventricular Ejection Fraction (LVEF) (Regitz-Zagrosek et al., 2018). However, the American College of Cardiology (ACC) does not currently endorse the use of bromocriptine as a recommended therapy for PPCM in its guidelines (Davis et al., 2020). There have also been questions about the safety of using bromocriptine in patients with PPCM (Fett., 2018). Furthermore, because PPCM has several causes, it has been suggested that bromocriptine

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

therapy may not have the same level of effectiveness in all patients with PPCM (Tremblay-Gravel et al., 2018).

Given the significant impact of PPCM on maternal health across the world, understanding its possible aetiology, pathophysiology, epidemiological features, evolving evidence, and therapies is crucial to determining how this knowledge can be channelled to improve maternal outcomes in PPCM. As a result, comprehensive research on PPCM is appropriate and has the potential to improve the overall quality of treatment for affected patients. When considering possible advantages in improving maternity care outcomes on a larger scale, studying PPCM in depth becomes even more reasonable. This approach is consistent with the urgent need to develop evidence-based therapies and policies to address the issues posed by PPCM in a variety of groups (Sliwa et al., 2020).

Rationale:

The necessity to study PPCM stems from its potentially lethal repercussions as well as present knowledge gaps. With no known definite aetiology, a scarcity of diagnostic biomarkers," a lack of expert consensus on PPCM-targeted therapeutic options," and relatively sub-optimal outcomes, a thorough review of the current research is essential. Because knowledge is dispersed across multiple studies, a complete synthesis is required to guide future research and perhaps improve outcomes for impacted individuals.

Research question:

What is the current state of knowledge on PPCM and how can the knowledge be used to enhance patient outcomes?

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

Aim:

This systematic review will investigate risk factors, possible aetiology, epidemiology, diagnostic criteria, treatment options, and their influence on patient outcomes to integrate current information on PPCM. The study aims to highlight gaps in existing knowledge by giving a complete overview, laying the groundwork for future research and potential advances in understanding, diagnosis, and treatment.

Objectives:

- Analyse and synthesise the body of research on peripartum cardiomyopathy including risk factors, epidemiological factors, such as incidence, prevalence, mortality rate, morbidity rate, diagnostic standards, and available treatments.
- Evaluate how the understanding of these factors can be geared to improving outcomes in peripartum cardiomyopathy.

Methodology

Search Strategy

On February 17, 2024, online databases were searched for publications on PPCM from 2014 to 2024, using the following search strategy: PubMed: ((("peripartum cardiomyopathy"[MeSH Terms]) AND ("risk factors"[MeSH Terms] OR "Peripartum Cardiomyopathy"[All Fields])) AND ("epidemiology"[MeSH Terms] OR "Peripartum Cardiomyopathy"[All Fields]) AND ("therapies"[MeSH Terms] OR "Antenatal cardiomyopathy"[All Fields])) NOT ("review"[Publication Type] OR "case reports"[Publication Type]) AND English[Language]; Web of Science: ("peripartum cardiomyopathy" AND "etiology" AND treatment AND "outcomes") AND DOCUMENT TYPES: (Article) AND LANGUAGE: (English); Scopus: (TITLE-ABS-KEY("postpartum cardiomyopathy" AND "pathophysiology" AND treatment AND "outcomes") AND LANGUAGE(English)) AND DOCTYPE(ar) AND (LIMIT-TO(EXACTKEYWORD, "Human"))”)”, Google scholar: Peripartum cardiomyopathy, predisposing factors, epidemiology, therapeutic options and outcomes. This search resulted in

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

a total of 990 articles. This all-inclusive strategy sought to incorporate a range of viewpoints, guaranteeing a thorough assessment of all aspects of PPCM.

Inclusion criteria:

- Studies in which a thorough overview of PPCM was given, including risk factors, epidemiology, diagnostic standards, and available treatment options in relation to outcome, among other parameters.
- This review included articles published between the years 2014 and 2024.
- Research papers released in English language to ensure uniformity in linguistic analysis and information retrieval.
- Studies that were primary reports and not meta-analyses or systematic reviews

Exclusion criteria:

- Any publication that lacked relevance or significance to the study topics was excluded.
- Research with inadequate data or inadequate reporting impedes the process of deriving significant insights and was thus excluded.
- Research that included patients with congenital heart disease or other acquired heart diseases that were not primarily PPCM.
- Papers not available in the English language were excluded due to translation concerns.
- Partially pertinent articles that included only a small portion of the source content were also excluded.
- Animal research

Data Collection

Following the identification of potentially relevant papers via PubMed, Google Scholar, Scopus, and Web of Science searches, tables were created on an Excel document. The information gathered from the pooled study was subsequently reviewed for relevance to the topic of interest.

Article Screening

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

A total of 990 articles obtained from the various databases were screened by evaluating the abstract, title, and full-text reads. Duplicates and articles not meeting the predesigned criteria were removed. Following a comprehensive review, 15 papers were chosen for further assessment.

Risk of bias

Two investigators evaluated the risk of bias, using the Newcastle-Ottawa questionnaire for the observational studies. We only included studies that had scores of seven and above in the Newcastle-Ottawa questionnaire for this systematic review as shown in Table 1 below.

Table 1: Included article eligibility screening scores using the Newcastle Ottawa questionnaire.

Author	**Is the case definition adequate?**	**Representativeness of the cases**	**Selection of controls**	**Definition of controls**	**Comparability of cases and controls based on the design or analysis**	**Ascertainment of exposure**	**Same method of ascertainment for cases and controls**	**Non-response rate**	**Quality score**
Goli et al., 2021 **Genetic and Phenotypic Landscape of Peripartum Cardiomyopathy**	1	1	1	1	1	1	1	0	7
Douglass et al., 2021	1	1	1	1	1	1	1	0	7

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

Peripartum cardiomyopathy and the possible role of air pollution									
Kim et al., 2020 **Clinical characteristics and long-term outcomes of peripartum takotsubo cardiomyopathy and peripartum cardiomyopathy**	1	1	1	1	2	1	1	0	8
Lewey et al., 2020 **Importance of Early Diagnosis in Peripartum Cardiomyopathy**	1	1	1	1	1	1	1	0	7
Jackson et al., 2023 **A 20-year population study of peripartum cardiomyopathy**	1	1	1	1	1	1	1	0	7
Karaye et al., 2020 **Incidence, clinical characteristics, and risk factors of peripartum cardiomyopathy in Nigeria: results from the PEACE Registry**	1	1	1	1	1	1	1	0	7
Yang et al., 2020 **Clinical features differentiating Takotsubo cardiomyopathy in the**	1	1	1	1	1	1	1	0	7

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

peripartum period from peripartum cardiomyopathy									
Tak et al., 2020 **Prognostic nutritional index as a novel marker for prediction of prognosis in patients with peripartum cardiomyopathy**	1	1	1	1	1	1	1	1	8
Blauwet et al., 2019 **Predictors of outcome in 176 South African patients with peripartum cardiomyopathy**	1	1	1	1	1	1	1	1	8
Salim et al., 2021 **Peripartum Cardiomyopathy: A Case Series**	1	1	1	1	1	1	1	0	7
Biteker et al., 2020	1	1	1	1	1	1	1	1	8

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

Predictors of early and delayed recovery in peripartum cardiomyopathy: a prospective study of 52 Patients									
Moulding et al., 2019 **Long-term follow-up in peripartum cardiomyopathy patients with contemporary treatment: low mortality, high cardiac recovery, but significant cardiovascular comorbidities**	1	1	1	1	1	1	1	1	8
Azad et al., 2023 **Peripartum cardiomyopathy delivery hospitalization and postpartum readmission**	1	1	1	1	1	1	1	0	7

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

trends, risk factors, and outcomes									
Sliwa et al., 2020 **Clinical presentation, management, and 6-month outcomes in women with peripartum cardiomyopathy: an ESC EORP registry**	1	1	1	1	1	1	1	1	8
Choi et al., 2020 **Pre-pregnancy Obesity and the Risk of Peripartum Cardiomyopathy**		**1**	**1**	**1**	**1**	**1**	**1**	**1**	**8**

Data extraction

Data from 15 publications were evaluated for this review. Emphasis was placed on obtaining information regarding study procedures, sample sizes, statistical analysis, and major findings. Following that, a full synthesis of the retrieved data was performed, with a focus on subgroup analysis to discover trends among distinct demographic groups. This sophisticated approach

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

sought to emphasise any differences in the epidemiology, and predisposing factors including hormonal, inflammatory, and genetic variables that contribute to PPCM among populations as well as different therapeutic options and how the understanding of these variables could be directed at improving patient outcomes. This comprehensive examination guaranteed that the review was founded on solid facts, adding to the credibility and validity of the results. The inclusion of articles from Google Scholar, Scopus, Web of Science, and PubMed helped broaden and deepen the scope of this peripartum cardiomyopathy systematic review.

Results

By doing a thorough search, we obtained 300 records from Google Scholar, 599 records from PubMed, 60 records from Web of Science, and 31 records from Scopus. This gave us a total of 990 publications. A thorough curation procedure was carried out, in which duplicate entries were promptly detected and eliminated, resulting in a streamlined dataset consisting of 497 distinct records. Following this, a comprehensive screening process was put in place to evaluate the suitability of these records, eliminating 290 studies that did not fulfil the predetermined criteria for inclusion. Afterward, the 207 remaining records were subjected to a thorough assessment of complete articles to see if they were suitable for inclusion in the review. Unfortunately, 137 reports could not be recovered, resulting in 70 research articles remaining for further evaluation, and 55 reports were excluded because of lack of full-text access and not fitting the inclusion criteria”.”After a thorough evaluation, 15 papers were considered appropriate for the final review, with each study providing unique insights into the subject area being investigated.

Figure 1: A detailed flow chart diagram of study selection according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

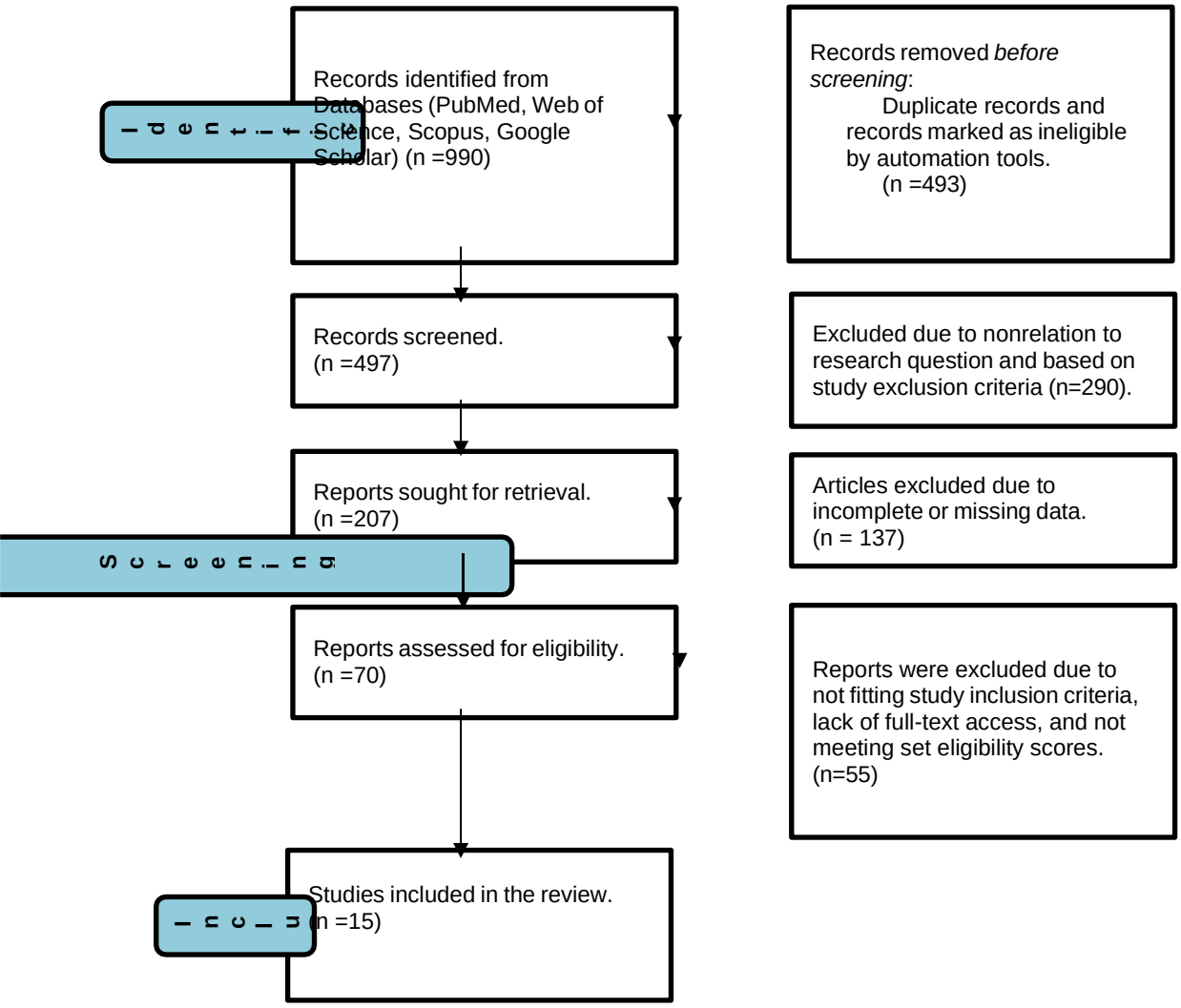

Table 2: Study Characteristics

S.no	Authors, Year, Title	Study design	Sample	Intervention/ any specific implication	Outcome	Summary of findings and conclusion
1	Goli et al., 2021 **Genetic and Phenotypic Landscape of Peripartum Cardiomyopathy**	Retrospective cohort	469	PPCM may benefit from gene-specific therapy for dilated cardiomyopathy, according to a study that employs next-generation sequencing to discover genetic differences in 67 genes. The study emphasises genetic testing in PPCM to strengthen connections and genetic	PPCM women had 10.4% TTN truncating mutations, compared to 9.4% in the reference population. Truncating variants occur in FLNC, DSP, and BAG3 genes. TTN-truncating mutations lowered left ventricular ejection fraction in women. Clinical recovery, preeclampsia prevalence, and postpartum presentation are similar.	Heart failure risk is a substantial risk factor for PPCM, indicating genetic commonality with non ischaemic dilated cardiomyopathy. The study found that gene-specific treatment for dilated cardiomyopathy may help PPCM, thus genetic testing should follow suit. The findings emphasise the relevance of genotype/phenotype connections in PPCM and have major implications for genetic counselling.

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

				counselling.		
2	Douglass et al., 2021 **Peripartum cardiomyopathy and the possible role of air pollution**	Case-control study	15 cases of PPCM 866 women	To accurately assess the relationship between PM2.5 exposure and PPCM, further monitoring, specifically PM2.5 air monitoring, was needed. Since rural monitoring systems are poor, greater funding and a more accurate method are needed.	The main outcomes of interest were the incidence of postpartum cardiomyopathy (PPCM), clinical features, presentation, recovery of cardiac function (left ventricular ejection fraction ≥50%), rates of recurrence in subsequent pregnancies, and complications like death, transplant, or implantation of ventricular assist device.	PM2.5 exposure must be monitored more, especially in rural areas, to properly understand the relationship between PM2.5 and PPCM. The study found that the existing monitoring method may not properly protect pregnant women from air pollution, especially particulate matter pollution. The conclusion emphasises the need for more funding to create and deploy a scientifically based monitoring system and how the U.S. Environmental Protection Agency (EPA) may be unable to protect public health from air pollution without these changes.
3	Kim et al., 2020 **Clinical characteristics and long-term outcomes of peripartum takotsubo cardiomyopathy and peripartum cardiomyopathy**	Retrospective observational	31	It looked at peripartum TCM and PPCM results and clinical trajectory within the framework of modern supportive care.	A three-year follow-up of the maternal near-miss death, full recovery, residual left ventricular dysfunction, mortality rate, and significant adverse clinical events were among the outcomes that were examined.	Compared to PPCM (57.1%, P = 0.030), peripartum Takotsubo cardiomyopathy (TCM) (100.0%) exhibited a greater maternal near-miss fatality rate. 23.8% of peripartum PCM patients had prolonged left ventricular dysfunction, whereas all TCM patients healed. Peripartum TCM had no deaths or heart transplants, whereas PPCM had one. After three years, significant adverse clinical events were similar (PPCM: 26.3% vs. TCM: 33.3%, P = 0.750). Despite the prevalence of peripartum TCM, patients getting contemporary supportive care for both PPCM and TCM had low mortality and good long-term outcomes.
4	Lewey et al., 2020 **Importance of Early Diagnosis in Peripartum Cardiomyopathy**	Retrospective cohort study	220	According to the study, early detection and monitoring of PPCM may improve results, particularly in underprivileged and at-risk groups.	One of the primary goals of the research is to evaluate how well individuals with PPCM regain their left ventricular ejection fraction (LVEF). The rates of LVEF recovery are examined in connection to the presence of HDP, the time of diagnosis, and race in this study.	In peripartum cardiomyopathy (PPCM), patients with hypertensive disorders of pregnancy (HDP) were diagnosed earlier, especially in nonblack patients. The study found similar rates of left ventricular ejection fraction (LVEF) recovery in PPCM patients with and without HDP. However, delayed diagnosis after 1 month postpartum was associated with lower LVEF recovery. The research emphasised the strong predictive value of LVEF at diagnosis for subsequent recovery, irrespective of HDP presence. While HDP did not

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

						significantly impact LVEF recovery in the diverse PPCM cohort, early diagnosis emerged as a critical factor for better outcomes.
5	Jackson et al., 2023 **A 20-year population study of peripartum cardiomyopathy**	Retrospective observational study	women in Scotland between 1998 and 2017 with PPCM. Ten controls are matched to each instance.	It draws attention to risk variables linked to PPCM and emphasises the necessity of using a low threshold when examining women who may be at risk. It follows that healthcare providers need to be watchful when it comes to spotting and handling PPCM instances.	Multiple gestations, obesity, and prenatal hypertension raise the risk of preterm birth (PPCM), which affects 1 in 4950 newborns. Over 8.3 years, 75% of PPCM women readmitted and 8% died. PPCM mortality and rehospitalization are 12- and 3-fold greater than controls. Mechanical circulatory aid, heart transplantation, and all-cause mortality happened 14% of the time. 76% of patients repaired their left ventricle, however, 13% had systolic dysfunction.	In Scotland, PPCM affects 1 in 4950 women throughout pregnancy. Significant morbidity and death are linked to the illness in both mothers and children. The necessity for early evaluation in women who are at risk is highlighted by the risk factors that have been found, including obesity and gestational hypertensive disorders. The research recommends long-term follow-up despite the patient's seeming improvement because there is a chance that their LV function may worsen in the future. In managing PPCM patients, the study highlights the need for increased awareness and alertness.
6	Karaye et al., 2020 **Incidence, clinical characteristics, and risk factors of peripartum cardiomyopathy in Nigeria: results from the PEACE Registry**	Descriptive observational.	406 PPCM cases and 99 controls.	The findings suggest that underweight, unemployment, low education, and pre-eclampsia are independent risk factors for postpartum cardiomyopathy. This data can improve population-level risk assessment and PPCM management in Nigeria.	distinct Nigerian regions had distinct incidence rates and sickness burdens, Underweight, unemployment, lack of formal education, and pre-eclampsia were independent risk factors for postpartum cardiomyopathy, according to regression models. Some Nigerian tribes and practices were unrelated to PPCM.	the highest PPCM incidence was found. Being underweight, having pre-eclampsia, and being unemployed or uneducated were independent risk factors for PPCM. According to the study, addressing these risk factors may help control PPCM in the general population. Several Nigerian traditional behaviours and the Hausa-Fulani ethnic group were unrelated to peripartum cardiomyopathy (PPCM), providing distinct viewpoints on this ailment.
7	Yang et al., 2020 **Clinical features differentiating Takotsubo cardiomyopathy**	Retrospective cohort	37: 21 in PPCM group and 16 in PTCM	The study suggests that because PTCM and PPCM have similar clinical symptoms, it is important to differentiate between them. It follows that whereas the initial LV dysfunction in both cases is identical, the	The left ventricular ejection fraction recovery was the main outcome that was evaluated. According to the abstract, only 30% of patients with PPCM showed full recovery of LV ejection fraction at the 1-month follow-up, in contrast to all patients with PTCM who	The study discovered that while both PTCM and PPCM showed signs of acute heart failure and a reduced left ventricular ejection fraction throughout the peripartum phase, PTCM had a better prognosis for left ventricular recovery than PPCM. It was also observed that the incidence of PTCM was far greater than anticipated. Even though acute

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

	in the peripartum period from peripartum cardiomyopathy		group	prognosis for LV recovery is better in PTCM than in PPCM.	exhibited complete recovery. Based on a 12-month follow-up, only 10 PPCM patients had fully recovered their LV ejection fraction.	left ventricular dysfunction is comparable in these two situations, the finding highlights how crucial it is for doctors to distinguish between them.
8	Tak et al., 2020 **Prognostic nutritional index as a novel marker for prediction of prognosis in patients with peripartum cardiomyopathy**	Observational cohort	92	The Prognostic Nutritional Index (PNI) for PPCM patients is computed and assessed in this study. The study examined PNI's predictive power in assessing nutritional status and cardiovascular outcomes. PNI, a simple nutritional evaluation tool, maybe a unique predictor of bad outcomes in PPCM patients.	The study's composite adverse cardiac events, which include cardiac death and hospitalisation for worsening heart failure (HF), were designated as the main outcome. Heart failure, hospitalisation for worsening heart failure, and chronic left ventricular (LV) systolic dysfunction were among the secondary outcomes.	The lower PNI group had a higher primary composite endpoint, the study found. PNI predicted the major composite endpoint independently after controlling for other risk factors. Secondary outcomes associated with PNI included persistent LV systolic dysfunction and cardiac death. In PPCM patients, PNI nutritional status appears to be a distinct predictor of poorer cardiovascular outcomes. The odds ratio of PNI as an independent predictor of the primary composite endpoint was 0.805, with a 95% confidence interval of 0.729–0.888 and a P-value of less than 0.001.
9	Blauwet et al., 2019 **Predictors of outcome in 176 South African patients with peripartum cardiomyopathy**	Cohort	176	Clinical evaluation, echocardiography, and lab results were obtained at baseline and six months. PPCM patients with lower BMI, total cholesterol, and baseline left ventricular end-systolic dimension (LVESD) may have worse results, according to the research. More likely LV recovery is associated with older age and lower baseline LVESD.	A poor result was defined as the combined endpoint of mortality, left ventricular ejection fraction (LVEF) < 35%, or continuing to be in New York Heart Association (NYHA) functional class III/IV at the 6-month mark. This was the primary outcome measure. LVEF ≥55% at 6 months was considered complete LV recovery.	For 45 patients (26%), poor outcomes were defined as death, LVEF < 35%, or NYHA functional class III/IV at 6 months. In multiple logistic regression analysis, lower BMI, total cholesterol, and LVESD at baseline were independent predictors of poor outcome after controlling for age, LVEF, systolic blood pressure, and NYHA functional class. At six months, 30 (21%) of 141 survivors with echocardiographic follow-up had LV function recovered.
10	Salim et al., 2021 **Peripartum Cardiomyopathy: A Case**	Retrospective analysis	20 cases	Intervention includes PPCM treatment. Antepartum patients received bed rest, loop diuretics, digitalis, selective beta-blockers, vitamin B	Clinical improvement in left ventricular function and chronic cardiomyopathy six months after presentation are assessed. Intrauterine growth retardation and mother mortality in live infants	In the study, breathlessness was most common. Patients averaged 25 years old, and 80% were diagnosed postpartum. A majority of ECGs showed sinus tachycardia (80%) and bibasal lung base crepitations (95%). Every patient had global left

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

	Series			complex, and anticoagulants if needed. Postpartum, ARBs or ACEIs were given.	result.	ventricular hypokinesia and a 35.2% mean LVEF. 45% of patients had normal left ventricular function and 70% improved clinically after antepartum and postpartum therapy. Interestingly, 30% of women died and 5% developed chronic cardiomyopathy at six months. Pathogenesis, research methods, and therapy of peripartum cardiomyopathy are explored in the study's conclusion.
11	Biteker et al., 2020 **Predictors of early and delayed recovery in peripartum cardiomyopathy: a prospective study of 52 Patients**	Prospective study	52	Transthoracic echocardiography was performed on the patients, and measures of C-reactive protein and B-type natriuretic peptide (BNP) were taken upon admission and every three months. The relationship between early recovery and bromocriptine treatment was also investigated in this study.	The results covered three categories: delayed recovery (defined as recovery taking longer than six months), early recovery (defined as remission of heart failure at six months after diagnosis), and persistent left ventricular dysfunction (PLVD), defined as an ejection fraction of less than 50% after follow-up.	58% recovered, 19.2% died, and 23.1% had persistent left ventricular dysfunction. Initial BNP and CRP levels were similar for completely recovered and non-recovered patients. Smaller left ventricle end-systolic dimensions and a higher baseline LVEF were connected to complete recovery. Complete recovery was linked to reduced BNP and CRP at follow-up. Nonrecovery is associated with higher BNP and CRP levels at 3 and 6 months, demonstrating the importance of frequent assessments. Bromocriptine therapy predicts early recovery. The continuation of higher CRP and BNP levels at follow-up suggested a delayed response or nonrecovery, emphasizing the need for continuing monitoring.
12	Moulding et al., 2019 **Long-term follow-up in peripartum cardiomyopathy patients with contemporary treatment: low mortality, high cardiac recovery, but significa**	Retrospective cohort study	66 PPCM patients	Standard heart failure treatment was administered to the patients, which included mineralocorticoid receptor antagonists, angiotensin-converting enzyme inhibitors/blockers of the angiotensin receptor, and/or beta-blockers. Anticoagulation and dopamine D2 receptor agonists, namely bromocriptine, were used to treat 86% of the patients.	The study identified three categories: remission at six months, delayed recovery (>6 months), and persistent left ventricular dysfunction (PLVD, ejection fraction <50%). After one year, mean LVEF rose to 50 ± 11%, and after five years, it reached 54 ± 7%, with 72% of patients achieving full cardiac recovery. At 5 years, 17% of patients developed arrhythmias (ventricular tachycardia, paroxysmal supraventricular tachycardia, or ventricular fibrillation) and 20% had arterial hypertension, despite good recovery rates.	The PPCM collective had a high and constant long-term recovery rate with little mortality at 5 years using dopamine D2 receptor agonists, anticoagulation, and standard heart failure treatment. However, arrhythmias (17%) and chronic or de novo hypertension (20%) were notable. At 5 years, 70% of heart failure patients still used medication. The study found that dopamine D2 receptor agonists, anticoagulation, and heart failure medicines assist PPCM patients in recovering fully and sustainably. The low mortality rate and high occurrence of cardiovascular issues including arrhythmias and hypertension indicate the need for ongoing treatment and monitoring in this patient population.

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

	nt cardiovascular comorbidities					
13	Azad et al., 2023 **Peripartum cardiomyopathy delivery hospitalization and postpartum readmission trends, risk factors, and outcome**	Retrospective cohort	9,210 records from hospitals	-	The results of peripartum cardiomyopathy were evaluated in the research both during hospital stays for birth and five months after release. Preeclampsia, multiple gestations, chronic hypertension, and maternal age were among the factors that were investigated. Risks for serious consequences, such as postpartum fatalities, cardiac arrest/ventricular fibrillation, instances requiring extracorporeal membrane oxygenation, and cardiogenic shock, were also examined.	An elevated risk of peripartum cardiomyopathy during hospital stays for deliveries was found in the study, and this risk was significantly correlated with chronic hypertension, multiple gestations, preeclampsia, and advanced maternal age. These variables were also associated with postpartum readmissions, which in turn was connected to catastrophic cardiac outcomes and postpartum fatalities. Better results from peripartum cardiomyopathy can only be achieved by understanding and addressing these risk factors, as the data clearly show.
14	Sliwa et al., 2020 **Clinical presentation, management, and 6-month outcomes in women with peripartum cardiomyopathy: an ESC EORP registry**	EURObservational Research Programme	739 women from 49 countries,	15% of instances involved the use of bromocriptine, with notable geographical heterogeneity. The study brought attention to variations in the use of this intervention by location. This suggests that different treatment modalities may be used depending on a patient's location and access to healthcare resources.	Participating 739 women from 49 nations had a mean age of 31 ± 6 years. In the first month following delivery, 67% of patients reported substantial symptoms, with LVEF ≤35% being a crucial outcome. 15% of instances noted bromocriptine use. Europe had 4% six-month mortality and the Middle East 10%. Heart failure caused 42% of fatalities and unexpected events 30%. 10% needed re-admission, mostly for heart failure, and 7% suffered thromboembolic events. Regional differences in cardiac recovery (LVEF > 50%) occurred in 46% of patients. Neonatal fatalities were 5%, with 2% in Europe and 9% in the Middle East.	The study found that although peripartum cardiomyopathy is a worldwide condition, each area has a different clinical manifestation and course of the disease. About half of the females recovered from myocardial infarction. Significant maternal and newborn morbidity and death were linked to PPCM, according to the research. The results highlight how crucial it is to identify regional variations in PPCM and modify therapies appropriately.
15	Choi et al., 2020 **Pre-pregnancy Obesity and the Risk of**	Population-based retrospective cohort study	2,548,380 women	The results implicate that there is a link between pre-pregnancy obesity and a higher incidence of peripartum cardiomyopathy.	The study evaluated the incidence of peripartum cardiomyopathy and computed odds ratios to investigate the relationship between pre-pregnancy BMI categories and the risk of peripartum cardiomyopathy,	an overall peripartum cardiomyopathy hospitalization rate of 1.3 per 10,000 live newborns. Unadjusted odds ratios showed that overweight (OR 1.32) and obese (OR 2.03) women had greater risks than those with normal pre-pregnancy BMI. Even after

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

	Peripartum Cardiomyopathy				the outcome was the occurrence of peripartum cardiomyopathy during hospital admissions.	modifications, overweight and obese women had higher risks (OR 1.26 and 1.38, respectively). An increasing dose-response connection with obesity showed the importance of BMI throughout pregnancy. The study found that obesity before pregnancy increases the incidence of peripartum cardiomyopathy, emphasizing the need for BMI awareness for the mother's health, especially in late postpartum.

Within the comprehensive scope of our systematic review, a multitude of findings from a collective body of research emerged, each contributing a distinct aspect to our understanding of PPCM. Goli et al. (2021) presented a detailed account of the 10.4% occurrence of TTN truncating mutations in the genetic makeup, emphasising the intricate connection between genetics and heart failure in women with PPCM. This finding not only uncovers a genetic inclination that is passed down through generations but also allows for the utilisation of personalised medical interventions tailored specifically to the distinct genetic characteristics of affected individuals. Douglass et al. (2021) provided a comprehensive analysis of the ecological impact of PM2.5 exposure, offering insights into the intricate ecosystem dynamics. Their findings have broader implications that extend beyond the clinical context and need the coordination of healthcare practices and environmental policy.

Kim et al. (2020) and Lewey et al. (2019) initiated clinical comparisons and guided the relationship between maternal outcomes and hypertensive disorders of pregnancy. In their study, Kim et al. (2020) conducted a comparison between peripartum Takotsubo cardiomyopathy (PTCM) and PPCM, uncovering distinct findings and outcomes. This differentiation necessitated a re-evaluation of treatment frameworks in consideration of the diverse phenotypes encompassed within the broader classification of peripartum cardiomyopathies. Lewey et al. (2019) conducted a study on the timing of PPCM diagnoses associated with hypertensive disorders of pregnancy. They emphasise the importance of early

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

diagnosis for improved outcomes and advocate for heightened clinical awareness during the postpartum period.

Jackson et al. (2023) provided a comprehensive view by giving an epidemiological analysis that emphasised risk factors such as obesity and gestational hypertension disorders. Their extended perspective encouraged us to examine the PPCM spectrum, emphasising the necessity of continuous long-term monitoring in addition to immediate clinical treatment. Karaye et al. (2020) provided information on the frequency and severity of PPCM in different regions of Nigeria, taking us to several specific geographical areas. Through this approach, the authors constructed an intricate narrative that combines sociodemographic factors with the clinical account to offer a more profound understanding of regional disparities. Yang et al. (2020) presented compelling evidence for differentiating between PPCM and PTCM based on the intricate array of clinical features. Their analysis of the prognosis emphasised the need for tailored therapeutic approaches for each variance, while also managing the intricate aspects of clinical practice. Tak et al. (2020) introduced a new aspect to the PPCM narrative by using the Prognostic Nutritional Index (PNI) to incorporate nutritional status. Their pioneering study illuminated the correlation between nutrition and cardiovascular outcomes, potentially revolutionising risk assessment and intervention methods.

Blauwet et al. (2019) and Moulding et al. (2019) carefully analysed factors that indicated negative results and patterns of improvement, respectively, which intersected with these thematic threads. This clinical study examined a wide range of factors that influenced the prognosis of PPCM, creating a complex and interrelated picture of clinical variables. The study conducted by Salim et al. (2021) added to the existing body of knowledge on PPCM by analysing clinical features and outcomes, therefore contributing to the ongoing understanding of this condition. Their insights covered a wide range of clinical topics and provided a detailed analysis of pathophysiology, new investigative methods, and revised care procedures.

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

Blauwet et al. (2019) and Moulding et al. (2019) thoroughly examined the causes that led to negative outcomes and recovery paths by exploring these thematic threads. This involved the articulation of several elements that influenced the prognosis of PPCM, creating a complex and interrelated picture of clinical variables. Salim et al. (2021) have joined this group and have contributed to the growing body of knowledge on PPCM by compiling a collection of clinical features and outcomes. Their perspectives encompassed the entire spectrum of clinical aspects and provided a comprehensive examination of pathophysiology, innovative research methodologies, and up-to-date treatment guidelines.

These studies converged cohesively to unveil an intricate network of interconnected factors influencing PPCM. The comprehensive review enhanced our comprehension of PPCM and also proposed novel avenues for targeted therapies and personalised therapy, akin to an intricate artwork. As we investigated this extensive landscape, it became evident that understanding the complexities of PPCM required not just clinical proficiency but also a comprehensive perspective that takes into account genetics, environment, food, and regional differences.

Discussion

Through a systematic analysis of several research, we can untangle the complex clinical entity known as PPCM and explore a multitude of themes that each adds to our understanding of this complex phenomenon. The diverse range of insights obtained not only summarises the existing body of knowledge but also presents new directions for investigation and action. In the field of PPCM, the genetic discoveries—explained by Goli et al. (2021)—reflect a strong need for a personalised medical strategy. The discovery of TTN truncating variants supports a genetic inclination and raises questions about gene-specific treatment strategies. The way that genetics interact in the PPCM story expands the possibilities for precision medicine and encourages doctors to learn more about each patient's unique genetic profile to customise treatments for the best results.

In contrast, Douglass et al.'s ecological painting from 2021 causes us to look beyond the person and includes environmental factors—specifically, exposure to PM2.5—into the intricate story

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

of PM2.5 pollution. The relationship between maternal outcomes and environmental health raises important concerns regarding how effective the current monitoring systems are. This puts us in a situation where environmental laws and healthcare policies collide, indicating the necessity for multidisciplinary cooperation to reduce the environmental concerns related to PPCM. The clinical juxtaposition presented by Kim et al. (2020) offers a lens into the heterogeneous spectrum of peripartum cardiomyopathies. The distinctions between PPCM and peripartum Takotsubo cardiomyopathy (PTCM) not only underscore the need for precise diagnostic criteria but also prompt a reconsideration of therapeutic strategies tailored to the distinct phenotypes. The nuanced exploration of maternal near-miss deaths, recovery rates, and long-term outcomes contributes to a more comprehensive clinical landscape.

Hypertensive disorders of pregnancy , dissected by Lewey et al. (2019), weave into the temporal dynamics of PPCM diagnosis. The early diagnosis and subsequent improved outcomes spotlight the critical role of antepartum and postpartum monitoring. This emphasises not only the clinical urgency in managing PPCM but also the potential impact of timely interventions in averting adverse outcomes. The epidemiological panorama crafted by Jackson et al. (2023) casts a broad net, capturing the intricate relationship between demographic factors and PPCM. The identification of risk factors, particularly obesity and gestational hypertensive disorders, necessitates a revaluation of antenatal care strategies. The longitudinal perspective offered by Jackson et al. not only guides clinical management but also underscores the importance of sustained long-term monitoring to detect potential declines in left ventricular function.

Geographical nuances, as explored by Karaye et al. (2020), unfolded a regional tapestry of PPCM incidence and risk factors. The identification of sociodemographic determinants provides a roadmap for targeted interventions, emphasising the need for region-specific public health strategies. This regional variation accentuates the heterogeneity in PPCM epidemiology, urging a contextualised approach to healthcare delivery. Differentiating between PPCM and peripartum Takotsubo cardiomyopathy (PTCM), as emphasised by Yang et al. (2020), extends beyond clinical nuances. The more favourable prognosis for left ventricular recovery in PTCM challenges conventional diagnostic paradigms, requiring clinicians to tread cautiously in distinguishing between these closely related conditions. The recognition of distinct prognoses prompts a revaluation of therapeutic interventions and long-term management.

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

The introduction of the Prognostic Nutritional Index (PNI) by Tak et al. (2020) introduces a novel dimension to the discussion, intertwining nutritional status with PPCM outcomes. The independent association of PNI with adverse cardiovascular outcomes opens avenues for nutritional interventions in the clinical realm. This prompts contemplation on the role of nutritional assessments in risk stratification and personalised care for PPCM patients. Predictors of poor outcomes, dissected by Blauwet et al. (2019), interlace clinical variables in a symphony of complexity. The integration of age, NYHA functional class, left ventricular ejection fraction, and systolic blood pressure as independent predictors requires a holistic approach to risk assessment.

The identification of factors influencing recovery trajectories, as explored by Moulding et al. (2019), underscores the dynamic nature of PPCM outcomes. The stable long-term recovery rates juxtaposed with persisting cardiovascular issues highlight the need for ongoing monitoring and personalised management strategies. Salim et al. (2021), in weaving together clinical characteristics and outcomes, contributed to a comprehensive view of PPCM. The exploration of pathophysiology, emerging investigative modalities, and updated management protocols added depth to the clinical narrative. The rich tapestry painted by Salim et al. not only contributes to the understanding of PPCM but also set the stage for future research directions.

On a global stage, Azad et al. (2023) and Sliwa et al. (2020) orchestrated a symphony of regional disparities and worldwide impact. Azad et al. (2023) illuminated risk factors during deliveries, offering a blueprint for targeted interventions. Sliwa et al. (2020), in emphasising regional variations in myocardial recovery rates, underscored the need for a nuanced understanding of global PPCM epidemiology. This global perspective not only broadens our understanding of PPCM but also underscores the importance of tailoring interventions to diverse regional contexts. As we navigate through these varied themes, the discussion converges on the complexity inherent in PPCM. The interplay of genetics, environment, clinical phenotypes, and global nuances urges a multidimensional perspective. PPCM, rather than a singular entity, unfolds as a mosaic of interconnected factors, each contributing to the overall clinical tapestry. The systematic review not only provides a snapshot of the current state of knowledge but also acts as a compass pointing toward unexplored territories in the realm of PPCM research and clinical management.

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

The integration of our systematic review, along with insights obtained from other systematic reviews, enhances the understanding of peripartum cardiomyopathy (PPCM) and reveals a complex narrative that explains the various factors that influence its occurrence, development, and outcomes worldwide. Hoevelmann et al. (2022) presented a detailed viewpoint that highlights substantial variations in the 6- and 12-month progress of PPCM results worldwide. The larger context aligns well with the genetic predisposition reported by Goli et al. (2021) and the environmental subtleties emphasised by Douglass et al. (2021), particularly the influence of PM2.5 exposure. The discussion goes beyond just acknowledging risk factors and instead explores the complex interplay of genetic and environmental variables that influence the development of PPCM.

The discourse emphasises the strong correlation between guideline-directed heart failure treatment and beneficial outcomes. Hoevelmann et al. (2022) demonstrated the intricate relationship between beta-blockers, angiotensin-converting enzyme inhibitors/angiotensin receptor blockers, and bromocriptine/cabergoline, which work together harmoniously to reduce overall mortality and improve left ventricular recovery. This orchestration demonstrates both the potential usefulness of gene-specific treatment methods mentioned by Goli et al. (2021) and the detailed coordination of pharmacotherapeutic measures in addressing the difficulties of PPCM. Sliwa et al. (2021) and Hoes et al. (2022) provided a comprehensive global perspective, highlighting the urgent need for timely cardiac investigations and specialised treatment in cases of peripartum cardiomyopathy (PPCM). They also emphasise the significant impact of PPCM on maternal mortality rates and the crucial importance of myocardial recovery. The resonances echo across the larger symphony, aligning the global story with our systematic review's focus on risk factors, diverse presentations, and the necessity of long-term surveillance.

Davis et al. (2020) and Iorgoveanu et al. (2021) offer a detailed analysis of the diagnostic difficulties caused by PPCM's resemblance to typical pregnant symptoms, as well as the range of possible outcomes, from full recovery to ongoing heart failure. This complex depiction, embedded within the broader storyline, intimately emphasises the necessity for refined professional expertise and tailored solutions. Tak et al.'s (2020) development of the PNI in the field of PPCM research has the potential to revolutionise risk assessment paradigms. It stands out as a significant contribution that resonates throughout the debate. This new viewpoint

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

presents a unique aspect, showcasing the ever-changing field of PPCM research and the continuous effort to develop creative methods for assessing risk.

Peripartum cardiomyopathy (PPCM) is influenced by several risk factors, such as advanced maternal age, hypertension, genetic susceptibility, and complex interactions with sociodemographic variables. Significantly, both poverty and lack of a formal education independently heighten the level of risk. Emphasis is placed on clinical datasets and experimental research to enhance understanding of diagnostic and treatment strategies. Therapeutic modalities like bromocriptine show potential for personalised treatments. Genetic contributions, namely titin truncating mutations, offered precise insights into illnesses. The patient's prognosis is intricate, with a notable cardiac recovery rate of 72% after five years. Global disparities are evident when considering the varying incidence rates throughout different regions, namely in Europe, Africa, Asia-Pacific, and the Middle East. Unemployment and a lack of formal education are two sociodemographic traits that are independently associated with poverty and malnourished individuals as risk factors. Treatment options such as bromocriptine and extracorporeal life support provide interesting avenues for therapy. Collectively, this data offers a distinct depiction of the intricate landscape of PPCM, highlighting its diverse nature, challenges in diagnosis, and the imperative need for personalised, interdisciplinary treatment. This comprehensive study of PPCM thoroughly investigates the complex interaction between genetics, environment, clinical characteristics, and global inequalities, leading to a reassessment of diagnostic and treatment approaches. It promotes a comprehensive viewpoint, creating opportunities for individualised healthcare and location-specific medical methods. Positioned as a fundamental component, it directs future research toward a detailed understanding of PPCM. The integration of results from simultaneous systematic studies addresses complex global factors, genetic variations, treatment harmonies, delicate diagnostic aspects, and novel risk assessment frameworks. The importance of continuous interdisciplinary research is highlighted by this shared story, as it helps to unravel the complexity of PPCM and contributes to breakthroughs in our knowledge and management of the condition.

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

Significance and Contribution

The systematic review delves into the intricate landscape of peripartum cardiomyopathy, unveiling genetic, environmental, and clinical nuances. It not only guides current clinical practices but also identifies crucial knowledge gaps for future exploration, especially in the realm of public health. The review's significance extends beyond peripartum cardiomyopathy, offering insights into maternal health, cardiovascular diseases, and personalised medicine. Beyond a mere summary, our work aims to catalyse new research by bridging diverse perspectives, potentially leading to innovative diagnostic tools and personalised therapeutic approaches for peripartum cardiomyopathy and related conditions.

Ethical considerations

Throughout this systematic review, the highest ethical standards were adhered to. Adherence to ethical rules, honesty in reporting, and rigorous acknowledgment of prior researchers' intellectual contributions were ensured. The knowledge synthesised was ensured as not only scientifically rigorous but also morally sound by adhering to the ethical norms regulating human research.

Strength and Limitations

This systematic review offered a comprehensive synthesis of existing literature regarding an in-depth understanding of the risk factors, aetiology, and evolving treatment approaches to PPCM and how this knowledge could be used to improve outcomes in PPCM. The strengths lie in its rigorous methodology, which involved systematically searching, selecting, and appraising relevant studies. This systematic review ensured inclusivity and minimised bias by encompassing a wide range of articles meeting predetermined criteria. Through meticulous data analysis and interpretation, the systematic reviews provided robust evidence to inform future research and interventions. Additionally, the review's systematic approach enhanced

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

reproducibility and transparency, promoting confidence in its findings. Despite the strengths, there are some limitations worth mentioning. Firstly, the small sample size comprising only 15 articles limited the findings' internal validity. Additionally, including articles primarily conducted in English excluded potentially valuable insights from sources in other languages, thus limiting the review's scope and potentially introducing bias. Study heterogeneity, encompassing differences in study designs, settings, and populations, posed challenges to synthesising data and generalising findings across diverse populations. Furthermore, challenges in assessing the quality of evidence, such as variability in outcome measures and inadequate control for confounding variables, might impact the validity of conclusions drawn. These limitations underscored the importance of considering sample characteristics and settings when interpreting and applying evidence from systematic reviews in this context.

Conclusion

Our systematic review delved into the intricate realm of peripartum cardiomyopathy, meticulously examining its risk factors, diagnostic standards, and treatment landscape. By establishing a comprehensive foundation, the study not only sheds light on the current state of knowledge but also catalyses future breakthroughs in understanding, diagnosis, and therapy. The exploration of epidemiological parameters, including incidence, prevalence, death rate, and morbidity rate, enriches our comprehension of peripartum cardiomyopathy. The integration of research results not only provides valuable perspectives for enhancing patient outcomes but also charts a course for future investigations in this domain. In essence, this review contributes to the ongoing narrative of PPCM, offering a roadmap for continued advancements and emphasising the critical need for holistic approaches in improving patient outcomes.

References

1. Azad, H., Wen, T., Bello, N. A., Booker, W. A., Purisch, S., D'Alton, M. E., & Friedman, A. M. (2023). Peripartum cardiomyopathy delivery hospitalization and

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

postpartum readmission trends, risk factors, and outcomes. Pregnancy Hypertension, 34, 116-123.

2. Bauersachs, J., König, T., van der Meer, P., Petrie, M. C., Hilfiker-Kleiner, D., Mbakwem, A., ... & Sliwa, K. (2019). 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, 21(7), 827-843.
3. Biteker, M., Özlek, B., Özlek, E., Cil, C., Çelik, O., Doğan, V., & Başaran, Ö. (2020). Predictors of early and delayed recovery in peripartum cardiomyopathy: a prospective study of 52 patients. The Journal of Maternal-Fetal & Neonatal Medicine, 33(3), 390-397.
4. Blauwet, L. A., Libhaber, E., Forster, O., Tibazarwa, K., Mebazaa, A., Hilfiker-Kleiner, D., & Sliwa, K. (2012). Predictors of outcome in 176 South African patients with peripartum cardiomyopathy. Heart.
5. Cho, S. H., Leonard, S. A., Lyndon, A., Main, E. K., Abrams, B., Hameed, A. B., & Carmichael, S. L. (2020). Pre-pregnancy obesity and the risk of peripartum cardiomyopathy. American journal of perinatology, 38(12), 1289-1296.
6. Davis, M. B., Arany, Z., McNamara, D. M., Goland, S., & Elkayam, U. (2020). Peripartum cardiomyopathy: JACC state-of-the-art review. Journal of the American College of Cardiology, 75(2), 207-221.
7. Davis, M. B., Arany, Z., McNamara, D. M., Goland, S., & Elkayam, U. (2020). Peripartum Cardiomyopathy: JACC State-of-the-Art Review. Journal of the American College of Cardiology, 75(2), 207–221. https://doi.org/10.1016/j.jacc.2019.11.014
8. Demakis, J. G., Rahimtoola, S. H., Sutton, G. C., Meadows, W. R., Szanto, P. B., Tobin, J. R., & Gunnar, R. M. (1971). The natural course of peripartum cardiomyopathy. Circulation, 44(6),1053–1061. https://doi.org/10.1161/01.cir.44.6.1053
9. Douglass, E. J. (2021). Peripartum Cardiomyopathy and the possible role for air pollution (Doctoral dissertation, Johns Hopkins University).
10. Fett J. D. (2018). More studies are still needed on the use of bromocriptine in the treatment of peripartum cardiomyopathy. European Heart Journal, 39(43), 3904. https://doi.org/10.1093/eurheartj/ehy598
11. Goli, R., Li, J., Brandimarto, J., Levine, L. D., Riis, V., McAfee, Q., ... & Arany, Z. (2021). Genetic and phenotypic landscape of peripartum cardiomyopathy. Circulation, 143(19), 1852-1862.

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

12. Haghikia, A., Podewski, E., Libhaber, E., Labidi, S., Fischer, D., Roentgen, P., Tsikas, D., Jordan, J., Lichtinghagen, R., von Kaisenberg, C. S., Struman, I., Bovy, N., Sliwa, K., Bauersachs, J., & Hilfiker-Kleiner, D. (2013). Phenotyping and outcome on contemporary management in a German cohort of patients with peripartum cardiomyopathy. Basic research in cardiology, 108(4), 366. https://doi.org/10.1007/s00395-013-0366-9
13. Hilfiker-Kleiner, D., Sliwa, K., & Drexler, H. (2008). Peripartum cardiomyopathy: recent insights in its pathophysiology. Trends in cardiovascular medicine, 18(5), 173–179. https://doi.org/10.1016/j.tcm.2008.05.002
14. Hoes, M. F., Arany, Z., Bauersachs, J., Hilfiker-Kleiner, D., Petrie, M. C., Sliwa, K., & van der Meer, P. (2022). Pathophysiology and risk factors of peripartum cardiomyopathy. Nature Reviews Cardiology, 19(8), 555-565.
15. Hoevelmann, J., Engel, M. E., Muller, E., Hohlfeld, A., Böhm, M., Sliwa, K., & Viljoen, C. (2022). A global perspective on the management and outcomes of peripartum cardiomyopathy: A systematic review and meta-analysis. European Journal of Heart Failure, 24(9), 1719-1736.
16. Iorgoveanu, C., Zaghloul, A., & Ashwath, M. (2021). Peripartum cardiomyopathy: a review. Heart failure reviews, 26(6), 1287-1296.
17. Isogai, T., & Kamiya, C. A. (2019). Worldwide incidence of peripartum cardiomyopathy and overall maternal mortality. International heart journal, 60(3), 503-511.
18. Jackson, A. M., Macartney, M., Brooksbank, K., Brown, C., Dawson, D., Francis, M., ... & Petrie, M. C. (2023). A 20-year population study of peripartum cardiomyopathy. European Heart Journal, 44(48), 5128-5141.
19. Jha, N., & Jha, A. K. (2021). Peripartum cardiomyopathy. Heart Failure Reviews, 26, 781-797.
20. Karaye, K. M., Ishaq, N. A., Sa'idu, H., Balarabe, S. A., Talle, M. A., Isa, M. S., & PEACE Registry Investigators. (2020). Incidence, clinical characteristics, and risk factors of peripartum cardiomyopathy in Nigeria: results from the PEACE Registry. ESC heart failure, 7(1), 236-244.
21. Kim, D. Y., Kim, S. R., Park, S. J., Seo, J. H., Kim, E. K., Yang, J. H., & Park, S. W. (2020). Clinical characteristics and long-term outcomes of peripartum takotsubo cardiomyopathy and peripartum cardiomyopathy. ESC Heart Failure, 7(6), 3644-3652.

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

22. Kolte, D., Khera, S., Aronow, W. S., Palaniswamy, C., Mujib, M., Ahn, C., Jain, D., Gass, A., Ahmed, A., Panza, J. A., & Fonarow, G. C. (2014). Temporal trends in incidence and outcomes of peripartum cardiomyopathy in the United States: a nationwide population-based study. Journal of the American Heart Association, 3(3), e001056. https://doi.org/10.1161/JAHA.114.001056
23. Lewey, J., Levine, L. D., Elovitz, M. A., Irizarry, O. C., & Arany, Z. (2020). Importance of early diagnosis in peripartum cardiomyopathy. Hypertension, 75(1), 91-97.
24. Mielniczuk, L. M., Williams, K., Davis, D. R., Tang, A. S., Lemery, R., Green, M. S., Gollob, M. H., Haddad, H., & Birnie, D. H. (2006). Frequency of peripartum cardiomyopathy. The American journal of cardiology, 97(12), 1765–1768. https://doi.org/10.1016/j.amjcard.2006.01.039
25. Moulig, V., Pfeffer, T. J., Ricke-Hoch, M., Schlothauer, S., Koenig, T., Schwab, J., ... & Bauersachs, J. (2019). Long-term follow-up in peripartum cardiomyopathy patients with contemporary treatment: low mortality, high cardiac recovery, but significant cardiovascular co-morbidities. European journal of heart failure, 21(12), 1534-1542.
26. Regitz-Zagrosek, V., Roos-Hesselink, J. W., Bauersachs, J., Blomström-Lundqvist, C., Cífková, R., De Bonis, M., Iung, B., Johnson, M. R., Kintscher, U., Kranke, P., Lang, I. M., Morais, J., Pieper, P. G., Presbitero, P., Price, S., Rosano, G. M. C., Seeland, U., Simoncini, T., Swan, L., Warnes, C. A., … ESC Scientific Document Group (2018). 2018 ESC Guidelines for the management of cardiovascular diseases during pregnancy. European heart journal, 39(34), 3165–3241. https://doi.org/10.1093/eurheartj/ehy340
27. Salim, M. A., Rahman, M. W., Adhikary, D. K., Arzu, J., Hoque, M. H., Joarder, A. I., & Mahmood, M. (2021). Peripartum Cardiomyopathy: A Case Series. University Heart Journal, 17(1), 71-75.
28. Sliwa, K., Bauersachs, J., Arany, Z., Spracklen, T. F., & Hilfiker-Kleiner, D. (2021). Peripartum cardiomyopathy: from genetics to management. European Heart Journal, 42(32), 3094-3102.
29. Sliwa, K., Hilfiker-Kleiner, D., Petrie, M. C., Mebazaa, A., Pieske, B., Buchmann, E., Regitz-Zagrosek, V., Schaufelberger, M., Tavazzi, L., van Veldhuisen, D. J., Watkins, H., Shah, A. J., Seferovic, P. M., Elkayam, U., Pankuweit, S., Papp, Z., Mouquet, F., McMurray, J. J., & Heart Failure Association of the European Society of Cardiology Working Group on Peripartum Cardiomyopathy (2010). Current state of knowledge on aetiology, diagnosis, management, and therapy of peripartum cardiomyopathy: a position statement from the Heart Failure Association of the European Society of

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 07, 2024

Cardiology Working Group on peripartum cardiomyopathy. European journal of heart failure, 12(8), 767–778. https://doi.org/10.1093/eurjhf/hfq120

30. Sliwa, K., Hilfiker-Kleiner, D., Petrie, M. C., Mebazaa, A., Pieske, B., Buchmann, E., ... & McMurray, J. J. (2010). Current state of knowledge on etiology, diagnosis, management, and therapy of peripartum cardiomyopathy: a position statement from the Heart Failure Association of the European Society of Cardiology Working Group on peripartum cardiomyopathy. European journal of heart failure, 12(8), 767-778.
31. Sliwa, K., Petrie, M. C., van der Meer, P., Mebazaa, A., Hilfiker-Kleiner, D., Jackson, A. M., ... & Bauersachs, J. (2020). Clinical presentation, management, and 6-month outcomes in women with peripartum cardiomyopathy: an ESC EORP registry. European Heart Journal, 41(39), 3787-3797.
32. Sliwa, K., Petrie, M. C., van der Meer, P., Mebazaa, A., Hilfiker-Kleiner, D., Jackson, A. M., ... & Bauersachs, J. (2020). Clinical presentation, management, and 6-month outcomes in women with peripartum cardiomyopathy: an ESC EORP registry. European heart journal, 41(39), 3787-3797.
33. Tak, B. T., Cay, S., Pamukcu, H. E., Ekizler, F. A., Kafes, H., Cetin, E. H. O., ... & Aras, D. (2020). Prognostic nutritional index as a novel marker for prognosis prediction in patients with peripartum cardiomyopathy. *Medicine*, *99*(11).
34. Tremblay-Gravel, M., Marquis-Gravel, G., Avram, R., Desplantie, O., Ducharme, A., Bibas, L., Pacheco, C., Couture, E., Simard, F., Poulin, A., Malhamé, I., Tran, D., Rey, E., Tournoux, F., Harvey, L., Sénéchal, M., Bélisle, P., Descarries, L., Farand, P., Pranno, N., … BRO-HF investigators (2019). The effect of bromocriptine on left ventricular functional recovery in peripartum cardiomyopathy: insights from the BRO-HF retrospective cohort study. ESC heart failure, 6(1), 27–36. https://doi.org/10.1002/ehf2.12376

(Word Count: 9610 including all tables and excluding abstract)