Profile of Peripartum Cardiomyopathy Patients at Waled Regional Hospital, Cirebon Regency, January 2022 - June 2025

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Abstract:
Peripartum cardiomyopathy (PPCM) is an important cause of heart failure during pregnancy and postpartum, but patient profile data at district hospitals such as Waled Regional Hospital, Cirebon is still very limited. This study aims to describe the profile of peripartum cardiomyopathy patients at Waled Regional Hospital, Cirebon Regency, from January 2022 to June 2025. A retrospective descriptive study design was used with secondary data analysis from the medical records of all patients diagnosed with PPCM, including variables such as age, hypertension, diabetes mellitus, parity, multiple pregnancies, hemoglobin levels, random blood sugar, urea, creatinine, and echocardiography results (LVEF). Analysis was performed with univariate frequency distribution using nominal and ordinal scales. The results showed that most patients were aged 36–45 years (45.16%), multiparous (54.84%), had grade II hypertension (39.03%), and had LVEF <40% (77.42%), while diabetes mellitus and multiple pregnancies were very rare. Thus, in this setting PPCM primarily affects elderly multiparous mothers with severe hypertension and left ventricular systolic dysfunction, highlighting the need for strengthened risk-based screening and collaborative management between obstetrics and cardiology.
Keywords:*Echocardiography, Heart Failure, Hypertension, Peripartum Cardiomyopathy and Pregnancy.*

I. INTRODUCTION

Peripartum cardiomyopathy (PPCM) is a form of idiopathic dilated cardiomyopathy characterized by left ventricular systolic dysfunction, appearing in the late third trimester of pregnancy up to five months postpartum, without any other identifiable cause of heart failure or a history of pre-existing heart disease (Jackson et al., 2021; McNamara et al., 2021). Global trends show an increasing incidence of PPCM in the past two years, with prevalence reaching 1 in 1,000 to 1 in 4,000 births in the United States and Europe, and even higher in African regions such as Nigeria (1 in 100), driven by risk factors such as gestational hypertension and malnutrition (Prameswari et al., 2023). Scientifically, this condition is relevant due to its multifactorial etiology—including oxidative stress, inflammation, and hormonal imbalance—while practically, PPCM contributes significantly to maternal mortality, reaching 228 per 100,000 live births in Indonesia based on the 2012 Indonesian Demographic and Health Survey (SDKI) which confirmed the current trend (Arunanthy et al., 2024).

At the national level, the incidence of PPCM in Indonesia remains high despite limited data. A study of medical records at Dr. Hasan Sadikin General Hospital in Bandung recorded 138 cases between 2014 and 2021, and a crude rate of 1 in 134–1 in 136 at referral hospitals such as Santo Antonius Hospital in Pontianak and Soetomo General Hospital in Surabaya (Prameswari et al., 2023). The field phenomenon in West Java, particularly Cirebon Regency, has not been empirically documented, despite Waled General Hospital serving the high-risk pregnancy inpatient population. This empirical data underscores the urgency of local monitoring, given that risk factors such as advanced age (>30 years), multiparity, and preeclampsia dominate Indonesian cases, which worsen maternal and neonatal outcomes (Hilfiker-Kleiner et al., 2022).

Recent studies confirm hypertension as a major risk factor for PPCM, with the European Society of Cardiology (ESC) registry reporting hypertension in 97.7% of 735 patients, including 25% of preeclampsia cases (Jackson et al., 2021). A retrospective cohort of 220 patients, Lewey et al. (2020), found hypertensive disorders in 81.8% of cases, emphasizing early diagnosis for recovery of ventricular function. In Oman, Al-Riyami et al. (2023) identified gestational hypertension in 21.6% and chronic hypertension in 7.8% of 116

cases, along with comorbidities such as gestational diabetes (10.3%). Meanwhile, Prameswari et al. (2023) in Indonesia highlighted preeclampsia as a predictor of miscarriage and low birth weight, with improved six-month recovery rates thanks to beta-blocker and ACE-I/ARB therapy.

However, results between studies show inconsistencies; for example, Jackson et al. (2021) reported 61.5% of patients without baseline hypertension, in contrast to the predominance of hypertension in the Indonesian study (Prameswari et al., 2023). Methodological limitations are striking in global studies, such as the lack of laboratory data (hemoglobin, blood glucose, urea, creatinine) and specific echocardiography (EF <45%, LVEDD >2.7 cm/m²), as well as a limited focus on short-term outcomes without comprehensive demographic profiles such as parity and multifetal gestations (Al-Riyami et al., 2023; Lewey et al., 2020).

The research gap lies in the lack of retrospective descriptive data in district hospitals in Indonesia, particularly in West Java, where there is no comprehensive PPCM profile study integrating clinical, laboratory, and echocardiographic risk factors for the period 2022–2025 (Prameswari et al., 2023). This problem statement is crucial: without a local overview at Waled Regional Hospital, Cirebon Regency, prevention and management interventions remain poorly targeted, despite national trends showing an increase in postpartum cases.

This study aims to describe the profile of PPCM patients at Waled Regional Hospital, Cirebon Regency, from January 2022 to June 2025, specifically including the incidence, age distribution, frequency of hypertension, diabetes mellitus, parity, multiple pregnancies, hemoglobin levels, blood glucose (GDS), urea, creatinine, and echocardiographic parameters. The urgency of this current study is driven by the increasing trend of postpartum cases in Indonesia post-pandemic, where local data are needed for district-level maternal health policies (Hilfiker-Kleiner et al., 2022). The novelty lies in the first retrospective descriptive approach in a primary care facility in Cirebon, going beyond previous studies with comprehensive laboratory and echocardiographic variables—different from the focus solely on hypertension in Jackson et al. (2021) or neonatal outcomes in Al-Riyami et al. (2023)—and the current time context (2022–2025). Her scientific contributions enrich the Southeast Asian PPCM literature with empirical data from West Java, while her practical contributions support risk-based prevention, improved early diagnosis, and reduced maternal mortality at the local level (Prameswari et al., 2023).

II. METHOD

This study is a retrospective descriptive study that aims to describe the profile of peripartum cardiomyopathy patients objectively based on secondary data from medical records, covering the scope of cardiovascular disease and obstetrics and gynecology at Waled Regional Hospital, Cirebon Regency, from January 2022 to June 2025 (Sugiyono, 2023; Creswell & Creswell, 2025). This type of retrospective descriptive study was chosen because it allows for historical observation of the subject's condition without prospective intervention, focusing on single variables such as patient age, hypertension, body mass index, diabetes mellitus, parity, multiple pregnancies, laboratory results (hemoglobin, random blood sugar, urea, creatinine), and echocardiography (Sudaryono, 2021; Notoatmodjo, 2021). This design was implemented in February-June 2025, using univariate analysis for the frequency distribution of variables, which is in accordance with the mixed qualitative-quantitative approach in health research (Emzir, 2022).

The research instrument was secondary data from medical records of peripartum cardiomyopathy patients, with operational definitions of variables as follows: hypertension was defined as systolic blood pressure >140 mmHg or diastolic >90 mmHg (normal category <120/80 mmHg, prehypertension 120-139/80-89 mmHg, grade I 140-159/90-99 mmHg, grade II >160/>100 mmHg)(3,12,19); patient age was categorized as early adolescence (12-16 years) to elderly (>65 years)(3,15,21); parity as primipara, multipara, or grand multipara(5,16); diabetes mellitus as a blood sugar metabolism disorder with the presence of yes/no(13); multiple pregnancy yes/no(6,16); low hemoglobin (<12 g/dL), normal (12-16 g/dL), high (>16 g/dL), or no data (4,22); random blood sugar normal (<200 mg/dL), high (>200 mg/dL), or no data (4,23); creatinine low (<0.6 mg/dL), normal (0.6-1.3 mg/dL), high (>1.3 mg/dL), or no data (4,22); urea low (<6 mg/dL), normal (6-21 mg/dL), high (>21 mg/dL), or no data (4,22); and echocardiography HFrEF (LVEF <40%), HFmrEF (41-49%), HFpEF (≥50%) (7,16,24). Data analysis techniques include univariate

for distribution frequencies, with processing through editing (completeness editing), processing (manual/computer), tabulating (variable grouping), and cleaning (error checking), using nominal and ordinal scales according to the variables (Sugiyono, 2023; Notoatmodjo, 2021).

The target population was all patients diagnosed with peripartum cardiomyopathy, while the accessible population included medical record data at Waled Regional Hospital from January 2022 to June 2025. The sample was taken using total sampling (sample size = population), fulfilling the inclusion criteria: inpatients/outpatients diagnosed with peripartum cardiomyopathy during that period; and exclusion: pregnant women with heart failure not due to peripartum cardiomyopathy (Creswell & Creswell, 2025; Sudaryono, 2021). The sample size was determined by the number of patients who met the inclusion criteria from the medical records, ensuring complete representation without selection bias (Emzir, 2022).

The research procedure was conducted in three main stages after obtaining ethical clearance from the Health Research Ethics Committee of Waled Regional Hospital (number 000.9.2/105/KEPK/II/2025): the preparation stage (determination of title/target, consultation with supervisor, preparation of instruments, permission from the director of the regional hospital, schedule); the implementation stage (determination of inclusion samples, search for medical records of peripartum cardiomyopathy 2022-2025); and the completion stage (data processing/analysis, reporting). Data confidentiality was guaranteed based on the principles of medical ethics, with the research flow following a standard diagram (Figure 3) (Sugiyono, 2023).

III. RESULTS AND DISCUSSIONS

Profile of Peripartum Cardiomyopathy Patients at Waled Regional Hospital, Cirebon Regency, January 2022 – June 2025

In this study, a single variable was used, namely the profile of peripartum cardiomyopathy patients at Waled Regional Hospital, Cirebon Regency, for the period January 2022 – June 2025 based on patient age, hypertension, diabetes mellitus, parity, multiple pregnancies, laboratory examinations (hemoglobin levels, random blood sugar, urea and creatinine) and echocardiography examinations.

Tab. 1. Frequency Distribution of Hypertension

Hypertension	Frequency (n)	Percentage (%)
Normal	7	22.58
Prehypertension	7	22.58
Grade I Hypertension	8	25.81
Grade II Hypertension	9	39.03
Total	31	100

It can be seen that the highest frequency of hypertension in peripartum cardiomyopathy patients is grade II hypertension with 9 patients (39.03%), followed by grade I hypertension with 8 patients (25.81%), prehypertension with 7 patients (22.58%), and normal in the same number with 7 patients (22.58%).

Tab. 2. Frequency Distribution of Patient Age

Patient Age	Frequency (n)	Percentage (%)
Early Adolescence (12-16 Years)	0	0.0
Late Adolescence (17-25 Years)	8	25.81
Early Adulthood (26-35 Years)	8	25.81
Late Adulthood (36-45 Years)	15	48.38
Early Old Age (46-55 Years)	0	0.0
Late Old Age (56-65 Years)	0	0.0
Seniors (>65 Years)	0	0.0
Total	31	100

Based on Table 2, it can be seen that the age of the most peripartum cardiomyopathy patients is late adulthood (36-45 years) with 14 patients (45.16%), followed by early adulthood (26-35) with 9 patients (29.03%), and late adolescence (17-25 years) with 8 patients (25.81%).

Tab. 3. Frequency Distribution of Number of Parities

Parity Amount	Frequency (n)	Percentage (%)
Primipara	13	41.94
Multipara	17	54.84
Grande Multipara	1	3.22
Total	31	100

Based on Table 3, it can be seen that the highest number of parities in peripartum cardiomyopathy patients was multipara with 17 patients (54.84%), followed by primipara with 13 patients (41.94%), and grande multipara with 1 patient (3.22%).

Tab. 4. Frequency Distribution of Multiple Pregnancies

Multiple Pregnancy	Frequency (n)	Percentage (%)
Yes	0	0.0
No	31	100
Total	31	100

Based on Table 4, it can be seen that all of the peripartum cardiomyopathy patients were not multiple pregnancies, namely 31 patients (100%).

Tab. 5. Frequency Distribution of Hemoglobin Levels

Hemoglobin Level	Frequency (n)	Percentage (%)
Low	12	38.71
Normal	13	41.94
Tall	0	0.0
No data	6	19.35
Total	31	100

Based on Table 5, it can be seen that the hemoglobin levels in most peripartum cardiomyopathy patients were in the normal category (12-16 g/dl) in 13 patients (41.94%), followed by low (<12 g/dl) in 12 patients (38.71%), and the remaining 6 patients (19.35%) had no data regarding hemoglobin levels during the treatment period.

Tab. 6. Distribution of Random Blood Sugar (GDS) Frequency

Random Blood Sugar	Frequency (n)	Percentage (%)
Normal	20	64.52
Tall	1	3.22
No data	10	32.26
Total	31	100

Based on Table 6, it can be seen that the most random blood sugar levels in peripartum cardiomyopathy patients were in the normal category (<200 mg/dl) for 20 patients (64.52%), followed by the high category (>200 mg/dl) for 1 patient (3.22%), and the remaining 10 patients (32.26%) had no data regarding random blood sugar levels during the treatment period.

Tab.1. Frequency Distribution of Creatinine Levels

Creatinine Levels	Frequency (n)	Percentage (%)
Low	12	38.71
Normal	15	58.39
Tall	1	3.22
No data	3	9.68
Total	31	100

Based on Table 7, it can be seen that the creatinine levels in most peripartum cardiomyopathy patients were in the normal category (0.6-1.3 mg/dl) with 15 patients (48.39%), followed by the low category

(<0.6 mg/dl) with 12 patients (38.71%), the high category (>1.3 mg/dl) with 1 patient (3.22%), and the remaining 3 patients (9.68%) had no data regarding creatinine levels during the treatment period.

Tab.8. Frequency Distribution of Urea Levels

Urea Level	Frequency (n)	Percentage (%)
Low	0	0.0
Normal	11	35.48
Tall	12	38.71
No data	8	25.81
Total	31	100

Based on Table 8, it can be seen that the urea levels in most peripartum cardiomyopathy patients were in the high category (>21 mg/dl) for 12 patients (38.71%), the normal category (6-21 mg/dl) for 11 patients (35.48%), and the remaining 8 patients (25.81%) had no data regarding urea levels during the treatment period.

Table 9. Frequency Distribution of Echocardiography

Echocardiography	Frequency (n)	Percentage (%)
Decrease	24	77.42
Normal	7	22.58
Increase	0	0.0
Total	31	100

Based on the Table**9.**It can be seen that the echocardiographic examination in peripartum cardiomyopathy patients mostly showed decreased results (LVEF <40%) in 24 patients (77.42%) and followed by normal results (LVEF 41-49%) in 7 patients (22.58%). And it can be seen that the average LVEF in peripartum cardiomyopathy patients showed an average result of 34.30% (95% CI; 31.12% ± 37.48%) with a standard deviation of 8.10. These results indicate that the average LVEF of peripartum cardiomyopathy patients is in the HFrEF category (LVEF <40%).

Discussion

1. Profile of Peripartum Cardiomyopathy Patients at Waled Regional Hospital, Cirebon Regency, January 2022 – June 2025

a. Hypertension

Showing grade II hypertension was the most dominant in 9 patients (39.03%) with peripartum cardiomyopathy, followed by grade I (8 patients, 25.81%), prehypertension and normal in 7 patients (22.58%) each. These results are in line with the meta-analysis of Biljic-Erski et al. (2025) which reported a twofold prevalence of hypertension (36% vs. 15.3% globally), as well as studies by Al Riyami et al. (2023) and Nugrahani et al. (2023) which found 10.3-37% of cases related to gestational hypertension and preeclampsia (9,25,26).

Hypertension appears to be a trigger for peripartum cardiomyopathy due to angiogenic imbalance (increased FLT1 receptor inhibition of VEGF), RAAS activation that increases angiotensin II sensitivity, and physiological changes of pregnancy such as increased blood volume (8,26). Genetic and hormonal factors exacerbate cardiovascular dysfunction, posing short- and long-term risks to both the mother and the fetus.

b. Patient Age

Revealing the highest age of peripartum cardiomyopathy patients in late adulthood (36-45 years) with 14 patients (45.16%), followed by early adulthood (26-35 years) with 9 patients (29.03%), and late adolescence (17-25 years) with 8 patients (25.81%). This finding is consistent with Al Riyami et al. (2023) who reported a mean age of 32 years (20-48 years), most 31-35 years (31.9%), as well as Soraya et al. (2022) and other retrospective studies (60-90% in 30-39 years), indicating age >30 years as a major risk factor (9.27).

Ling et al. (2021) also found peaks at 30.1–34.9 years (618 cases) and >35 years (475 cases), where young women (<25 years) had high cardiac output and low peripheral vascular resistance, while older women (>35 years) had the opposite due to decreased heart rate, ejection fraction, and vasodilator response (28). These changes reflect impaired cardiovascular adaptations of pregnancy with age, with vasodilation reducing

PVR but leading to decreased cardiac performance in the late adult group, contributing to the risk of peripartum cardiomyopathy (27,28).

c. Parity Amount

The study showed that most peripartum cardiomyopathy patients were multiparous (17 patients, 54.84%), followed by primiparous (13 patients, 41.94%) and grande multiparous (1 patient, 3.22%). This finding is in line with the case reports of Soraya et al. (2022) and Mahendra et al. (2025) who also found the highest proportion in the multiparous group (6 of 8 cases; 56.9%), as well as the study of Gayatri et al. (2020) which showed that heart disease and peripartum cardiomyopathy were most common in multiparous mothers (57.4% and 54.4%).

Physiologically, repeated pregnancies in multiparous women cause decreased systemic vascular resistance and increased cumulative cardiac workload, increasing the risk of oxidative stress, impaired oxygen perfusion, and myocardial damage, which can trigger peripartum cardiomyopathy. These changes are exacerbated by systemic inflammation, increased inflammatory cytokines, and fat accumulation in adipose tissue and blood vessels, making multiparity an important risk factor for peripartum cardiomyopathy.

d. Diabetes Mellitus

The results showed that the majority of peripartum cardiomyopathy patients did not have diabetes mellitus (29 patients, 93.55%), while only 2 patients (6.45%) were recorded as having this disease, so that casuistically diabetes mellitus appears to be a rare comorbidity in this study sample. This finding is in line with the study of Gayatri et al. (2020) who found no cases of diabetes mellitus in 33 patients with comorbid peripartum cardiomyopathy, as well as the study of Mumtaz et al. (2024) who showed that diabetes mellitus only appeared in 2 patients (10.5%) and was the least common comorbidity.

However, several studies have shown that patients with gestational diabetes and pre-existing diabetes remain at significant risk; Al Riyami et al. (2023), for example, reported 12 cases of gestational diabetes (10.3%) and 7 cases of pre-existing diabetes (6.0%) in patients with peripartum cardiomyopathy, making diabetes the second comorbidity after hypertension. Gestational diabetes is associated with an 83% increased risk of peripartum cardiomyopathy through the mechanism of "diabetic cardiomyopathy," which is heart damage due to endothelial dysfunction and microvascular changes. Although during pregnancy, most women experience increased insulin sensitivity in the first trimester accompanied by decreased glucose levels, then decreased sensitivity and increased insulin in the third trimester, which quickly returns to normal after delivery. Thus, diabetes mellitus may remain a risk factor for peripartum cardiomyopathy, but is exposed to only a small proportion due to the complex interaction between metabolic changes in pregnancy, insulin hormone, and cardiovascular load.

e. Multiple Pregnancy

It shows that all peripartum cardiomyopathy patients in the study sample were singleton pregnancies, with no multiple pregnancies (0/31; 100%). This result is supported by Al Riyami et al. (2023) who reported more non-multiple pregnancies (83 cases; 71.6%) than multiple pregnancies, as well as the study by Soraya et al. (2022) who found only 3 of 8 cases to be multiple pregnancies.

However, several case reports suggest that multiple pregnancies may still be an additional risk factor for peripartum cardiomyopathy, for example, in patients with multiple pregnancies through IVF-ET who experienced pregnancy-related cardiomyopathy that subsequently developed peripartum cardiomyopathy in the final trimester. This mechanism is thought to be related to increased production of the FLT1 gene and other antiangiogenic proteins from the placenta, which also occurs in singleton pregnancies, thus increasing the vascular and cardiovascular burden. However, this remains hypothetical and does not necessarily occur in every case. Other risk factors, such as hypertension and preeclampsia in singleton pregnancies, are more common and dominant as triggers of peripartum cardiomyopathy.

f. Hemoglobin Level

Shows that the hemoglobin levels of peripartum cardiomyopathy patients are mostly in the normal category (12–16 g/dL) as many as 13 patients (41.94%), followed by low hemoglobin (<12 g/dL) 12 patients (38.71%), and 6 patients (19.35%) did not have hemoglobin level data during treatment. This finding differs from the study of Mumtaz et al. (2024) which emphasized anemia and preeclampsia as the dominant risk

factors in young primigravida pregnant women, while this study shows that the majority of multiparous and late adult patients with hemoglobin tend to be in the normal range.

Research by Cherubin et al. (2020) reported that hemoglobin levels alone do not have a strong direct impact on peripartum cardiomyopathy, but iron deficiency—even without severe anemia—can weaken myocardial contractility and trigger left ventricular dysfunction and heart failure. The results of Huang et al. (2024) and Metgud et al. (2025) also showed that anemia is not always dominant in peripartum cardiomyopathy patients because many patients are without anemia or have normal hemoglobin, which is consistent with the normal distribution in this study. This may occur because routine iron supplementation interventions during antenatal care can increase hemoglobin levels, thereby reducing the prevalence of anemia and maintaining patients in the normal hemoglobin category during laboratory tests.

g. Random Blood Sugar (GDS)

It shows that the majority of peripartum cardiomyopathy patients had random blood sugar in the normal category (<200 mg/dL), namely 20 patients (64.52%), while only 1 patient (3.22%) had high random blood sugar (>200 mg/dL) and 10 patients (32.26%) did not have random blood sugar data during treatment. These results are in line with the analysis of diabetes mellitus in this study, where more patients did not have diabetes mellitus, and are consistent with the studies of Mumtaz et al. (2024) and Echouffo-Tcheugui et al. (2021) who reported that most pregnant women did not have gestational diabetes or permanent diabetes.

Increased blood sugar levels during pregnancy are associated with metabolic and hormonal changes, including decreased insulin sensitivity and increased serum insulin levels in the final trimester. Approximately 72 hours after delivery, blood sugar and insulin levels tend to return to pre-pregnancy ranges, especially in the absence of persistent metabolic disturbances. Placental hormones such as placental lactogen, progesterone, cortisol, and estradiol contribute to insulin resistance and blood glucose fluctuations, so variations in measurement and timing (e.g., postpartum) may explain the predominance of normal blood sugar levels in this study sample.

h. Creatinine Levels

Shows that creatinine levels in peripartum cardiomyopathy patients were mostly in the normal category (0.6–1.3 mg/dL) in 15 patients (48.39%), followed by low categories (<0.6 mg/dL) in 12 patients (38.71%), high (>1.3 mg/dL) in 1 patient (3.22%), and 3 patients (9.68%) did not have creatinine data during treatment. These results indicate that kidney function in most patients was still within normal limits, although several studies such as Zhu et al. (2021) reported a tendency for increased creatinine in peripartum cardiomyopathy patients accompanied by hypertension and preeclampsia as a manifestation of kidney disorders.

In this study, most patients had stage II hypertension, but creatinine levels tended to be normal, possibly influenced by modifying factors such as antihypertensive medication administration, fluid monitoring, and early management of kidney complications. Zhu J et al. (2021) also showed that creatinine elevations were more significant in peripartum cardiomyopathy patients with Acute Kidney Injury (AKI), which was associated with a worse prognosis, while Chen X et al. (2023) emphasized that serum creatinine reflects kidney function and can increase significantly when glomerular filtration decreases by more than 50%, although levels are also influenced by creatinine production rate, fluid volume, and kidney trauma.

Thus, although most patients in this study had normal creatinine, this marker remains important for monitoring renal burden related to cardiac burden in peripartum cardiomyopathy, especially in cases with hypertension and risk of AKI.

i. Urea Level

Shows that urea levels in peripartum cardiomyopathy patients are mostly in the high category (>21 mg/dL) namely 12 patients (38.71%), followed by the normal category (6–21 mg/dL) 11 patients (35.48%), and 8 patients (25.81%) did not have urea level data during treatment. These results indicate that some patients have experienced changes in urea profiles leading to mild renal dysfunction or pre-renal AKI, although in some cases urea remains within normal limits, as reported by Bak et al. (2024) with an average urea of 15.3 ± 11.2 mg/dL in peripartum cardiomyopathy patients.

Increased urea in peripartum cardiomyopathy patients can be triggered by decreased renal perfusion due to left ventricular systolic or diastolic dysfunction, resulting in urea retention and activation of the sym-

pathetic nervous system and the renin-angiotensin-aldosterone system which worsens hemodynamic conditions and increases the risk of pre-renal AKI, as explained by Wang et al. (2023). In some cases, a significant increase in urea is associated with AKI conditions, such as the case report by Kumari et al. (2024) which showed an increase in urea from 60.8 mg/dL to 138.4 mg/dL, while another case by Iqbal et al. (2024) showed urea still within the normal range (28 mg/dL), indicating significant variations depending on renal status, hemodynamics, and care management.

High urea levels reflect neurohormonal activation, decreased cardiac output, and inadequate renal perfusion, and are correlated with a poorer prognosis and increased risk of mortality in patients with peripartum cardiomyopathy. Furthermore, urea levels can be influenced by protein intake, the body's catabolic capacity, and the effectiveness of renal excretion. Therefore, the normal urea levels found in some of the patients in this study were likely influenced by adequate management (fluid monitoring, diuretics, and cardiac medications) and relatively stable hemodynamic conditions. Therefore, routine urea examination remains important to monitor renal status and provide early indications of complications that can worsen heart failure in peripartum cardiomyopathy.

j. Echocardiography

Shows that echocardiographic examination in peripartum cardiomyopathy patients mostly shows left systolic dysfunction with LVEF <40% (24 patients; 77.42%), while LVEF 41–49% was found in 7 patients (22.58%). The mean LVEF of patients in this study was 34.30% (SD 8.10), which is within the range of systolic heart failure and is in line with the studies of Al Riyami et al. (2023) and Mumtaz et al. (2024) who reported a mean LVEF of around 33–34% at the time of diagnosis. Studies by Zhu et al. (2021) and Mohanasundari et al. (2021) also showed a mean LVEF of around 37% and a predominance of LVEF <30–45% in most peripartum cardiomyopathy patients, so the profile of LVEF decline in this study is consistent with previous cohort and meta-analysis findings.

Echocardiography serves as the primary modality to confirm cardiac dysfunction and exclude other causes of heart failure such as congenital heart disease, valvular abnormalities, or non-peripartum dilated cardiomyopathy, and is the basis for the diagnosis of peripartum cardiomyopathy as systolic heart failure with an LVEF <45% in the last trimester of pregnancy or within 5 months postpartum without other causes. The decrease in LVEF in most cases usually occurs without obvious ventricular dilation and is associated with oxidative stress that produces a 16 kDa prolactin fragment, which damages the endothelium and myocardial microcirculation, thus impairing contractility and reducing ejection fraction.

In addition, an abnormal immune response after delivery can trigger the formation of autoimmune antibodies against uterine proteins (e.g., actin and myosin) which then cross-react with myocardial proteins, causing inflammation, myotoxicity, and increased pro-inflammatory cytokines such as IL-6 and TNF-α, thereby aggravating left ventricular dysfunction and reducing LVEF, as reflected in the echocardiographic findings in this study.

IV. CONCLUSION

This study found that the profile of peripartum cardiomyopathy patients at Waled Regional Hospital, Cirebon Regency, between January 2022 and June 2025 was dominated by late-adult mothers aged 36–45 years, multiparous, and stage II hypertension, with most patients having a decreased LVEF (<40%) and only a few cases with diabetes mellitus or multiple pregnancies. The analysis showed that decreased LVEF, increased urea, and relatively mild hemoglobin and creatinine abnormalities in some patients reflect a combination of cardiovascular burden, oxidative stress, and renal dysfunction associated with hypertension and preeclampsia, making hypertension, high parity, and age >30 years the main risk factors in this local context.

As a retrospective descriptive study, this study is limited by its complete laboratory data, reliance on medical records, and lack of analysis of long-term outcomes or specific therapies, making it unable to confirm causality. Future studies are recommended to incorporate a prospective cohort design, expand variables (e.g., sFlt1, 16 kDa prolactin, and inflammatory cytokines), and monitor LVEF recovery, mortality, and long-term morbidity. Practical implications include strengthening screening for hypertension, parity, and

nutritional status during pregnancy, and enhancing obstetrics-cardiology collaboration at the district hospital level to expedite the diagnosis and management of peripartum cardiomyopathy, thereby reducing maternal incidence and mortality in West Java.

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