Clinical Profile and Outcome of Dilated Cardiomyopathy Children in Banten District Hospital: Retrospective Data of Limited Resources

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Abstract

Pediatric dilated cardiomyopathy (DCM) is a rare and serious disorder, characterized by left or bilateral ventricular dilatation with impaired systolic function, often leading to heart failure. This retrospective study, conducted at Banten District Hospital in Indonesia, aimed to explore the clinical profile, outcomes, and associated factors in pediatric DCM patients from June 2022 to October 2025. A total of 35 children aged 27 days to 18 years were included. Common comorbidities included rheumatic heart disease, congenital heart disease, tuberculosis, myocarditis, and anemia. The study found a significant relationship between malnutrition and adverse outcomes, with 85.7% of patients surviving, while 14.3% died. The most common ejection fraction (EF) score was moderately reduced (30-40%). These findings underline the importance of addressing underlying comorbid conditions such as rheumatic heart disease and nutritional deficiencies. The study calls for a comprehensive approach to managing pediatric DCM, including early detection and treatment of comorbidities, to improve survival outcomes in resource-limited environments.

Keywords: *Pediatric dilated cardiomyopathy; comorbidities; survival outcomes; malnutrition and resource-limited settings.*

I. INTRODUCTION

Pediatric dilated cardiomyopathy (DCM) is a rare but serious disorder characterized by dilatation of the left or both ventricles with impaired systolic function, often presenting as heart failure in affected children [1], [2]. The condition carries significant morbidity and mortality, and prognosis often remains unfavorable despite available therapies [2]. Globally, heart failure including pediatric forms exhibits considerable variation in prevalence, incidence, and outcomes across regions, reflecting differences in etiology, access to care, and health system capacity [3]. In resource-constrained environments, factors such as delayed presentation, limited diagnostic capabilities (notably access to echocardiography), restricted pharmacologic options, and a lack of advanced therapies (including transplantation and durable devices) significantly impact outcomes for children with DCM and other heart failure etiologies [4], [5].Indonesia provides a relevant context for examining pediatric DCM within limited-resource healthcare settings. Recent studies have highlighted the challenges of delivering advanced pediatric care in Indonesia, where elevated mortality risks arise from systemic bottlenecks and delays in care [6]. These challenges underscore the necessity for localized data on pediatric DCM at district-level facilities, where most children in low- and middle-income countries (LMICs) first seek care, enabling evidence-based triage, resource allocation, and management strategies.Emerging evidence suggests that risk stratification may improve care in resource-limited settings.

Prognostic markers of systemic inflammation, such as the neutrophil-to-lymphocyte ratio (NLR) and systemic inflammatory index (SII), have been associated with mortality risk in pediatric DCM, serving as low-cost adjuncts to traditional clinical assessments where access to advanced testing is limited [7]. Furthermore, validated risk scores for inpatient pediatric mortality have been shown to assist in clinical decision-making and prioritization in resource-constrained wards, including district hospitals in LMICs [8]. Together, these insights emphasize the importance of local clinical profiling to inform patient- and system-level responses where resources are scarce.Against this backdrop, the present study from Bantén District Hospital in Indonesia aims to elucidate the clinical profile and outcomes of children with DCM treated in a

district-level, resource-limited setting. By employing a retrospective data approach, this work seeks to (i) characterize presenting features, etiologies, and management patterns, (ii) describe short-term outcomes, and (iii) identify potential factors associated with adverse outcomes that could guide targeted interventions and health system strengthening. In doing so, the study aligns with broader efforts to document pediatric heart failure-related morbidity and mortality in resource-limited contexts and to translate these insights into practical strategies for improving care for vulnerable children.

II. METHODS

A retrospective study was conducted at Banten District Hospital, Banten, from June 22, 2022, to October 22, 2025, to analyze children aged 27 days to 18 years diagnosed with cardiomyopathy. The study focused on patients with dilated cardiomyopathy (DCM) who were either hospitalized or treated as outpatients and had undergone echocardiography at the hospital. Inclusion criteria for the study encompassed all DCM patients who met the aforementioned conditions. Data collected at baseline included demographic information such as age and nutritional status, as well as clinical details like symptoms, comorbid diagnoses, and the percentage of ejection fraction (EF) as determined by echocardiography. The study also tracked patient outcomes, including survival and mortality. Patients with incomplete medical records were excluded from the study to ensure data accuracy and reliability. The data was then analyzed using chi-square tests in SPSS to identify significant associations between various clinical variables and patient outcomes [9], [10]. This study aims to better understand the factors influencing survival in pediatric patients with DCM and provide valuable insights for clinical decision-making in managing such cases.

III. RESULT AND DISCUSSION

Table 1. Respondent Characteristics

Characteristics	Frequency (N)	Percentage (%)
Gender		
Female	18	51.4
Male	17	48.6
Age		
< 1 Years Old	1	2.9
1-6 Years Old	14	40
7-12 Years Old	11	31.4
13-18 Years Old	9	25.7
Nutritional Status		
Severely Under Nourished	4	11.4
Undernourished	15	42.9
Well Nourished	13	37.1
Over Weight	3	8.6
Symptomps		
Dyspnoe	16	45.7
Oedema	16	45.7
Chest Pain	1	2.9
Convulsions	2	5.7
Comorbid Diagnosis		
Rheumatic Heart Disease	13	37.1
Congenital Heart Disease	3	8.6
Tuberculosis of Lung	5	14.3
Myocarditis	7	20
Anaemia	7	20
Ef Score		
Normal > 55%	3	8.6
Mildly Reduced 40-55%	10	28.6
Moderately Reduced 30-40%	14	40
Severly Reduced <30%	8	22.9
Outcome		
Survive	30	85.7
Death	5	14.3

The study included 35 pediatric patients with dilated cardiomyopathy (DCM) treated at Banten District Hospital, with a nearly balanced gender distribution (51.4% female, 48.6% male). The ages ranged from under 1 year (2.9%) to 13-18 years (25.7%), with the majority being between 1-6 years (40%) and 7-12 years (31.4%). Nutritional status varied, with 11.4% severely undernourished, 42.9% undernourished, 37.1% well-nourished, and 8.6% overweight. Common symptoms included dyspnea and edema (45.7% each), while chest pain, convulsions, and other symptoms were less frequent. Comorbid conditions included rheumatic heart disease (37.1%), congenital heart disease (8.6%), tuberculosis (14.3%), myocarditis (20%), and anemia (20%). Ejection fraction (EF) scores indicated varying severity: 8.6% had a normal EF (>55%), 28.6% had a mildly reduced EF (40-55%), 40% had a moderately reduced EF (30-40%), and 22.9% had a severely reduced EF (<30%). In terms of outcomes, 85.7% survived, while 14.3% died. This data provides valuable insights into the clinical profile, nutritional status, symptoms, comorbidities, EF scores, and survival outcomes of children with DCM in a resource-limited setting.

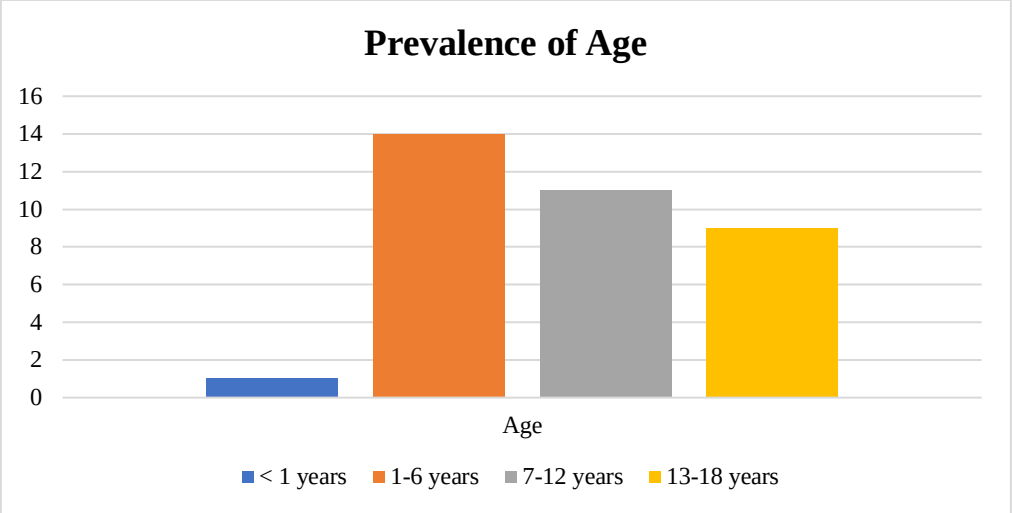

Fig 1. Prevalence Age of Pediatric DCM

The figure illustrates the distribution of pediatric dilated cardiomyopathy (DCM) cases across different age groups. The highest prevalence was observed in the 1-6 years age group, represented by the orange bar, with approximately 14 cases. The 7-12 years age group, shown in gray, had the second-highest prevalence, with around 11 cases. The 13-18 years group, indicated by the yellow bar, had 9 cases, while the <1 year age group, depicted by the blue bar, had the lowest prevalence, with only 1 case. This data highlights that DCM is most commonly diagnosed in children aged 1-6 years, followed by those in the 7-12 years range, with fewer cases in older and younger age groups.

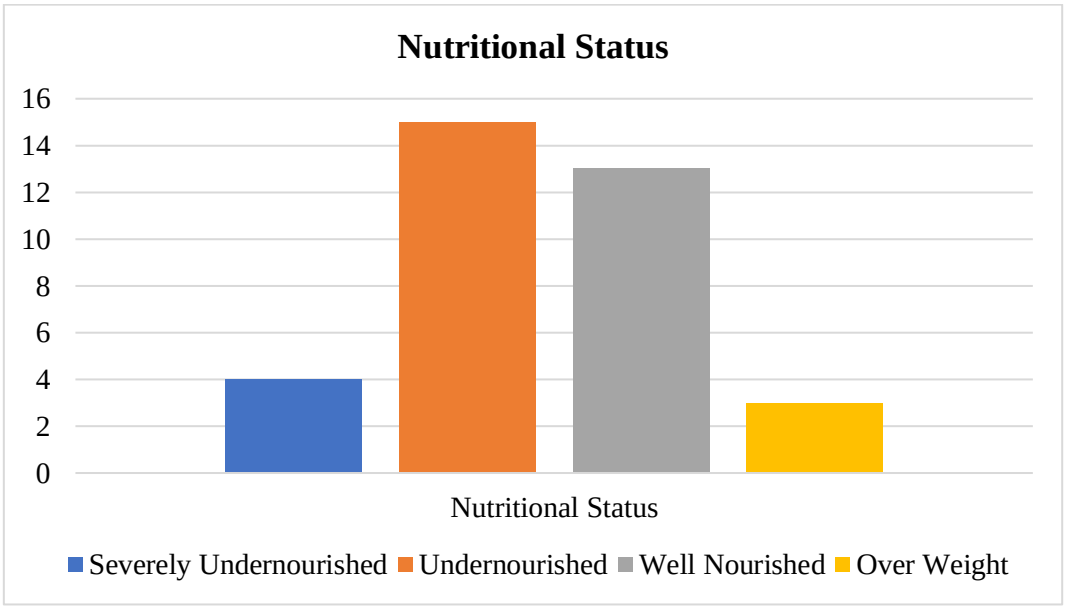

Fig 2. Nutritional Status of Pediatric DCM

Figure 2 shows the nutritional status distribution among pediatric patients with dilated cardiomyopathy (DCM). The majority of patients were undernourished, with around 14 cases, represented by the orange bar. This was followed by the well-nourished group, which had 13 cases, shown by the gray bar. There were 4 cases of severely undernourished patients (blue bar) and 3 overweight patients (yellow bar). These findings highlight that most of the children in the study had either undernourishment or were well-nourished, with fewer cases of severe undernourishment or being overweight.

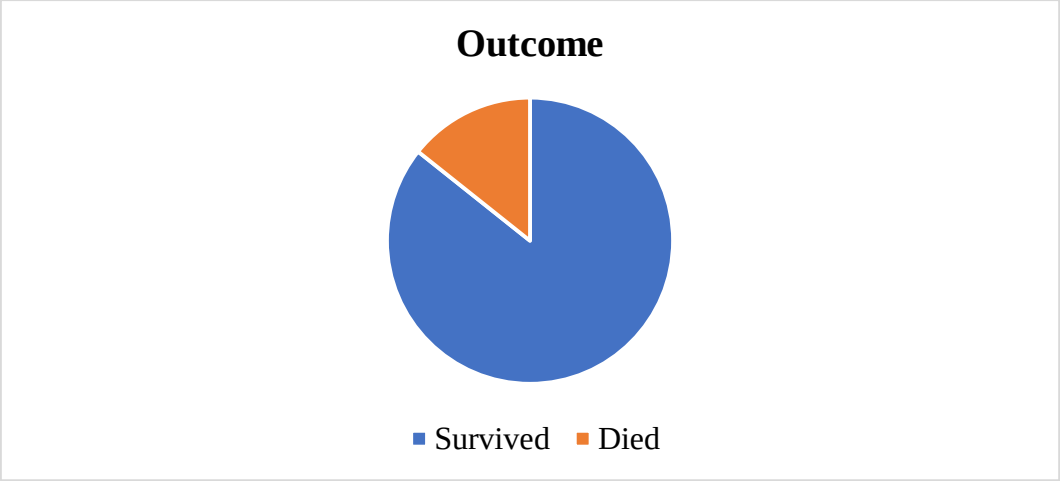

Fig 3. Percentage Outcome of Pediatric DCM

Figure 3 illustrates the outcomes of pediatric patients with DCM. A large proportion, 85.7%, survived, as shown by the blue portion of the pie chart, while 14.3% of the patients, represented by the orange portion, did not survive. This outcome highlights a relatively high survival rate among the patients, despite the challenges posed by the disease and the resource-limited setting.

Discussion

Dilated cardiomyopathy (DCM) in children has a range of causes that can affect ventricular function to varying degrees. The prevalence of pediatric DCM is reported to be 0.57–1.13 cases per 100,000 individuals, accounting for approximately 50% of all pediatric cardiomyopathies. In this study, the pediatric patients were aged between 27 days and 17 years, with a mean age of 6.8 years. This finding is consistent with the National Australian Childhood Cardiomyopathy Study (NACCS), a population-based cohort study that included children younger than 10 years at diagnosis. Additionally, our study found that pediatric DCM occurred more frequently in girls (18, 51.4%) compared to boys (17, 48.6%). This contrasts with other research, which reported that males are more affected by DCM (1.32 per 100,000) than females (0.92 per 100,000) (Rath & Weintraub, 2021).Common etiologies of DCM include inborn errors of metabolism, syndromic causes, myocarditis, and familial cardiomyopathy. Inflammation, toxicities, or inherited pathogenic variants may also contribute to DCM development. The pathogenesis of pediatric DCM is diverse, ranging from genetic predispositions that lead to primary disease, to secondary DCM caused by inflammatory and metabolic derangements. In our study, patients with DCM had comorbid diagnoses, including rheumatic heart disease (13, 37.1%), congenital heart disease (3, 8.6%), tuberculosis (5, 14.3%), myocarditis (7, 20%), and anemia (7, 20%) [11].Rheumatic heart disease, a major contributor to heart valve abnormalities, often results from a history of acute rheumatic fever.

The presence of valve malfunctions due to rheumatic heart disease can lead to heart failure, either through pressure overload (such as aortic valve stenosis or pulmonary stenosis) or volume overload (increased blood volume to the left ventricle). The end result of this malfunction is congestive heart failure [12]. In our study, 13 patients (37.1%) had rheumatic heart disease, underlining the importance of managing valve dysfunction in the context of pediatric DCM. Congenital heart disease can also trigger DCM. In this study, all cases of congenital heart disease were diagnosed with tetralogy of Fallot (TOF). Heart failure in TOF can be attributed to several factors, including TOF with pulmonary atresia and large systemic arterial collaterals, accessory tricuspid valve tissue causing partial obstruction of the ventricular septal defect (VSD), and systemic hypertension or aortic stenosis. In contrast, our study found that all TOF patients were

diagnosed with DCM [13]. This finding underscores the significance of congenital heart defects as a contributing factor in pediatric DCM. Furthermore, tuberculosis was present in 5 patients (14.3%) in our study. The cardiovascular structures most affected by tuberculosis are the pericardium, myocardium, and aorta. The most common associated pathological entities include pericarditis, myocarditis, and coronary artery disease (López-López et al., 2021).

The association between tuberculosis and DCM is significant, particularly in resource-limited settings, where chronic infection can exacerbate heart failure.Anemia, specifically iron deficiency anemia, was also a comorbidity in DCM patients, found in 7 patients (20%) in our study. Iron deficiency anemia has been implicated in the development of secondary cardiomyopathy, though its exact pathogenesis remains unclear [14]. Anemia may exacerbate the progression of heart failure, contributing to ventricular dysfunction and increasing the morbidity associated with DCM.This study demonstrates a substantial burden of rheumatic heart disease, congenital heart disease, tuberculosis, myocarditis, and anemia among children diagnosed with DCM. This profile differs from cohorts in high-income settings, where idiopathic or genetically mediated cardiomyopathies are more common, and secondary forms related to infectious or rheumatic diseases are less frequent. The difference suggests that, in resource-limited environments, ventricular dysfunction often results from a “multi-hit” exposure: chronic volume or pressure overload in congenital and rheumatic lesions, persistent systemic inflammation, recurrent infections such as tuberculosis, and reduced oxygen-carrying capacity in anemia. These factors contribute to the development of DCM, particularly in environments with limited access to early diagnosis and treatment.This pattern aligns with evidence that cardiovascular morbidity is socially patterned.

A study reported a higher prevalence of heart disease among individuals with lower educational attainment, underscoring the contribution of socioeconomic disadvantage to cardiovascular risk profiles [15]. Countries with lower sociodemographic index values experience disproportionately higher cardiovascular disease prevalence in younger age groups, particularly for conditions such as rheumatic heart disease, cardiomyopathy, and myocarditis [16]. These findings suggest that the comorbidity pattern observed in our cohort is context-specific, reflecting an environment where poverty, high infectious and rheumatic disease burdens, delayed diagnosis, and suboptimal chronic disease control intersect.Effective management of pediatric DCM should extend beyond pharmacological heart failure therapy. It must also include the detection and treatment of rheumatic valve disease, uncorrected congenital lesions, chronic infections, and anemia. A comprehensive approach that addresses these broader health issues will improve outcomes for children with DCM in resource-limited environments.The severity of DCM can be assessed through ejection fraction (EF) scores on echocardiography. In our study, the most common EF category was moderately reduced (30-40%), with 14 patients (40%) falling into this group. The outcome at the time of hospitalization or outpatient follow-up revealed that 30 patients (85.7%) survived, while 5 (14.3%) died. Death was most common in the 1-6 years age group (4, 28.6%). Although the difference in mortality between EF categories did not reach statistical significance, non-survivors tended to be in the severely reduced EF group.

This pattern is consistent with data showing that adverse ventricular remodeling and loss of contractile function are closely linked to myocardial fibrosis and poorer clinical status in DCM [17].Malnutrition also played a significant role in patient outcomes. According to the Pediatric Cardiomyopathy Registry, 24% of children with DCM are malnourished [18]. In our study, the nutritional status distribution was as follows: 4 patients (11.4%) were severely undernourished, 15 (42.9%) were undernourished, 13 (37.1%) were well-nourished, and 3 (8.6%) were overweight. A Pearson correlation analysis revealed a significant association between nutritional status and patient outcomes (correlation = 0.002). Severe undernutrition was predominant among non-survivors, suggesting that malnutrition impairs physiological resilience, particularly in the context of advanced cardiac dysfunction and infection. Malnutrition-related cardiomyopathy is associated with frailty, reduced functional capacity, and prolonged hospitalization, further highlighting its role as a marker of vulnerability [19].Recent evidence suggests that structured nutritional screening and early intervention should be integral components of DCM management, particularly in resource-limited settings.

The association between nutritional status and survival in this cohort reinforces the need for targeted support in pediatric DCM management, especially in environments where access to advanced therapies is limited.Other variables, such as sex, age category, individual comorbidities, presenting symptoms, and EF strata, did not show statistically significant associations with in-hospital mortality in this analysis. These findings should be considered exploratory and hypothesis-generating, rather than definitive, due to the small sample size and the heterogeneous underlying etiologies. However, the trend toward higher mortality in patients with severe systolic dysfunction, undernutrition, and comorbid disease aligns with more comprehensive prognostic models for pediatric DCM [2], [20].Emerging data on inflammatory markers, such as the neutrophil-to-lymphocyte ratio and systemic inflammatory index, may offer additional tools for risk stratification in pediatric DCM [7]. These low-cost indices could complement traditional clinical and echocardiographic markers in resource-limited environments. Although these markers were not systematically analyzed in our study, the high prevalence of chronic infection, anemia, and systemic inflammation in our cohort underscores the potential role of inflammation in modulating risk and highlights an area for future research.

IV. CONCLUSION AND SUGGESTIONS

This study highlights the significant burden of pediatric dilated cardiomyopathy (DCM) in a resource-limited setting, emphasizing the importance of addressing the broader health challenges faced by children with this condition. The findings reveal that comorbidities such as rheumatic heart disease, congenital heart defects, tuberculosis, myocarditis, and anemia significantly impact DCM outcomes in children. Nutritional status, particularly severe undernutrition, emerged as a key determinant of survival, underscoring the need for structured nutritional screening and early interventions. While the study provides important insights into DCM in a low-resource setting, further research is needed to refine prognostic models and evaluate the role of emerging inflammatory markers in risk stratification. Additionally, a comprehensive management strategy that includes early detection and treatment of underlying comorbid conditions, along with pharmacological therapy, should be prioritized in resource-limited environments to improve outcomes for pediatric DCM patients.

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