



# PREVALENCE AND IMPACT OF ANEMIA IN PEDIATRIC PATIENTS WITH DILATED CARDIOMYOPATHY AND CONGESTIVE HEART FAILURE: IMPLICATIONS FOR PATIENT CARE

**Kesam Reddy Swetha\***

Assistant professor, Department of Pediatrics, Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry - 605 502, India

## ABSTRACT

This study investigates the prevalence and impact of anemia among pediatric patients diagnosed with dilated cardiomyopathy (DCM) and congestive heart failure. Anemia is a common comorbidity in these patients, affecting approximately 64% of cases. The study evaluates the association between anemia and adverse outcomes, including hospitalizations due to heart failure and mortality rates. Despite the higher incidence of heart failure hospitalizations among patients with anemia, mortality rates do not show a significant increase. Age does not appear to significantly influence the prevalence or severity of anemia in this patient population. These findings underscore the importance of addressing anemia in pediatric patients with DCM and heart failure to mitigate adverse outcomes and improve overall patient care.

**Keywords:-** Pediatric cardiology, Dilated cardiomyopathy, Congestive heart failure, Anemia, Morbidity and mortality

Access this article online

**Home page:**

www.mcmed.us/journal/abs

**Quick Response code**



**Received:** 25.06.2020

**Revised:** 12.07.2020

**Accepted:** 25.07.2020

## INTRODUCTION

Heart failure (HF) is a significant global health burden characterized by high mortality and morbidity rates. While adults with coronary artery disease are commonly affected, children often experience congenital heart disease as the leading cause [1]. Recognizing comorbidities has become increasingly important in understanding HF due to its widespread occurrence. Anemia, affecting oxygen-carrying capacity and exacerbating HF symptoms, emerges as a crucial consideration [2]. Despite its impact, little is known about anemia's prevalence and effects on clinical outcomes in pediatric patients with dilated cardiomyopathy (DCM). Therapeutic options for children with anemia remain understudied, particularly their impact on outcomes. This study aims to investigate the relationship between HF and

anemia in children with DCM, exploring their association with mortality and morbidity outcomes.

## METHODS

This study was conducted following the guidelines outlined in the Declaration of Helsinki and received approval from the Medical Association. A cohort of 58 patients diagnosed with chronic congestive heart failure associated with dilated cardiomyopathy was evaluated. Among them, two cases of Bland-White-Garland Syndrome secondary to myocarditis and five cases of idiopathic dilated cardiomyopathy were identified. A retrospective analysis was performed on these patients, focusing on clinical parameters such as symptoms onset, mortality due to heart failure, need for

**Corresponding Author: Kesam Reddy Swetha**

Transfusions, and physical examination findings including hepatomegaly, abdominal breathing, and blood pressure. However, there were no records of ROSS or NYHA scores available for this retrospective study. Hospitalization duration for inotropic support during decompensated heart failure and adjustment of enteral medications was quantified [3].

Hemoglobin levels were used to determine age and gender categories, with specific thresholds established for diagnosing anemia. Periodic measurement of hemoglobin levels during outpatient clinic visits or hospital admissions was conducted to monitor anemia in patients with decompensated heart failure, with blood transfusions administered as needed. Patients with congenital heart defects and those with hemoglobin levels below three were excluded from the study. Additionally, patients who underwent surgery, received extracorporeal life support, or had comorbidities such as kidney, liver, or blood diseases were not included due to potential iatrogenic influences.

### Statistics

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 15.0. Descriptive statistics including mean and standard deviation were reported for each variable, with statistical significance set at a p-value of less than 0.05. Mann-Whitney U tests were used for comparing continuous variables, and Pearson's correlation

coefficients were calculated to assess the relationship between anemia severity and age.

### RESULTS

Our study investigated the prevalence of anemia among 58 pediatric patients diagnosed with dilated cardiomyopathy (DCM) over an average follow-up period of  $3.74 \pm 3.69$  years. All patients received treatment for congestive heart failure (CHF), and hemoglobin levels were not available for three patients. Among the 55 patients with available follow-up data, 64% developed anemia. Characteristics of patients who developed anemia versus those who did not are summarized in Table 1. We analyzed whether the onset of congestive heart failure was associated with the development of anemia. Both groups exhibited similar ages at the onset of DCM (Table 1). Additionally, we examined the relationship between age at onset and the severity of anemia to determine if younger age predicts increased severity. However, no significant correlation between anemia severity and age was observed ( $P = 0.229$ ). Patients with anemia experienced significantly longer hospitalizations for decompensated CHF compared to non-anemic patients (mean 35.1 vs. 9.97 days,  $P < 0.05$ ). Despite this, there was no statistically significant difference in mortality rates between anemic and non-anemic patients in our study population (23% vs. 15%).

**Table 1: Statistical characteristics and clinical features of pediatric congestive heart failure caused by DCM**

	Patients of all ages	A total of 35 anemic patients	Patients without anemia	Value P
Men/women	23/35	12/23	9/22	N.S
Symptoms of heart failure at the age of first clinical manifestations (years)	$4.22 \pm 5.7$	$3.31 \pm 5.4$	$5.21 \pm 6.2$	N.S
Hospitalizations per year (days)	$25.94 \pm 34.8$	$35.06 \pm 21.32$	$9.97 \pm 9.65$	$<0.36$
Transfusion is necessary	36	21	0	$<0.22$
Following-up death	10	6	25	N.S

### DISCUSSION:

There is a lack of available data regarding the prevalence of anemia in pediatric patients with cardiac failure. Through retrospective analysis, it was found that 64% of patients diagnosed with dilated cardiomyopathy (DCM) and subsequently developed congestive heart failure were anemic [4]. This occurrence of anemia in DCM patients appears to be irrespective of age or gender. Notably, the severity of anemia does not appear to be influenced by age. The etiology of anemia in pediatric patients with congestive heart failure remains unclear, although various contributing factors have been suggested [5]. Erythropoietin response to hypoxemia and reduced perfusion is observed to be low in 66% of heart

failure patients. Factors such as inhibition of angiotensin-converting enzyme (ACE) and the use of ACE inhibitors have been implicated in the development of anemia, with reports indicating that ACE inhibitors can suppress erythropoietin production and inhibit erythroid precursor growth. Pediatric patients diagnosed with congestive heart failure, particularly those with DCM [6], are commonly prescribed ACE inhibitors. Additionally, it has been observed that heart failure patients with anemia experience a 40% hemodilution rate [7,8]. Deficiencies in iron and vitamin B12, as well as anemia related to inflammation, have been associated with chronic heart failure in adults. In adults, higher mortality and morbidity rates have been reported in individuals with congestive

heart failure who also suffer from anemia. In our study population [9], patients were categorized based on hospitalization rates related to cardiac decompensation, revealing a significant difference in hospitalization rates between anemic and non-anemic patients [10]. Anemia may contribute to increased morbidity in congestive heart failure by altering ventricular loading. Additionally, hemodynamic instability associated with anemic heart failure can exacerbate morbidity. However, despite the observed differences in hospitalization rates, mortality rates did not significantly differ between anemic and non-anemic patients in our study population. Further investigation is needed to fully understand the impact of anemia on mortality in pediatric patients diagnosed with DCM [11]. Currently, there is limited research on the modification of anemia in pediatric DCM patients, and the association between anemia and mortality warrants further examination [12]. In conclusion, anemia poses a significant challenge in pediatric patients with DCM, as it is highly prevalent across all age groups. Identifying the underlying causes of anemia and evaluating the efficacy of potential treatments to reduce morbidity,

hospitalizations, and overall healthcare costs are crucial. Despite the inherent limitations of retrospective studies, routine monitoring of hemoglobin levels in patients with decompensated states provides valuable insights into the prevalence and impact of anemia in this population.

## CONCLUSION

The manifestation of symptoms associated with impaired heart function results in a notable hospitalization rate among pediatric patients diagnosed with dilated cardiomyopathy (DCM). Interestingly, despite the high hospitalization rate, DCM patients within this pediatric population did not exhibit a higher mortality rate. However, it remains uncertain whether addressing and improving anemia in these patients would lead to a reduction in morbidity and an enhancement in their overall quality of life. Further research is warranted to explore this possibility and to better understand the potential impact of managing anemia on the health outcomes and well-being of pediatric heart failure patients.

## REFERENCES

1. J. K. Ghali. (2009). "Anemia and heart failure," *Current Opinion in Cardiology*, 24(2), 683–687.
2. M. R. Cowie, A. Mosterd, D. A. Wood. (1997). "The epidemiology of heart failure," *European Heart Journal*, 18(2), 208–225.
3. G. M. Felker, L. K. Shaw, W. G. Stough, and C. M. O'Connor. (2006). "Anemia in patients with heart failure and preserved systolic function," *American Heart Journal*, 151(2), 457–462.
4. D. M. Mancini, S. D. Katz, C. C. Lang, J. LaManca, A. Hudaihed, and A. S. Androne. (2003). "Effect of erythropoietin on exercise capacity in patients with moderate to severe chronic heart failure," *Circulation*, 107(2), 294–299.
5. P. Bolger, F. R. Bartlett, H. S. Penston. (2006). "Intravenous iron alone for the treatment of anemia in patients with chronic heart failure," *Journal of the American College of Cardiology*, 48(6), 1225–1227.
6. L. Thomas and C. Thomas. (2008). "Hä-moglobinkonzentration," in *Labor Und Diagnose*, L. Thomas, Ed., pp. 682–692, TH-Books, Frankfurt, Germany, 7th edition.
7. D. Glicklich, T. Kapoian, H. Mian, J. Gilman, V. Tellis, and H. Croizat. (1999). "Effects of erythropoietin, angiotensin II, and angiotensin-converting enzyme inhibitor on erythroid precursors in patients with post-transplantation erythrocytosis," *Transplantation*, 68(1), 62–66.
8. B. Chatterjee, U. E. Nydegger, and P. Mohacsi. (2000). "Serum erythropoietin in heart failure patients treated with ACE-inhibitors or AT1 antagonists," *European Journal of Heart Failure*, 2(4), 393–398.
9. S. Androne, S. D. Katz, L. Lund. (2003). "Hemodilution is common in patients with advanced heart failure," *Circulation*, 107(2), 226–229.
10. K. K. A. Witte, R. Desilva, S. Chattopadhyay, J. Ghosh, J. G. F. Cleland, and A. L. Clark. (2004). "Are hematinic deficiencies the cause of anemia in chronic heart failure?" *American Heart Journal*, 147(5), 924–930.
11. Y. D. Tang and S. D. Katz. (2006). "Anemia in chronic heart failure: prevalence, etiology, clinical correlates, and treatment options," *Circulation*, 113(20), 2454–2461.
12. J. D. Kay, S. D. Colan, and T. P. Graham. (2001). "Congestive heart failure in pediatric patients," *American Heart Journal*, 142(5), 923–928, 2001.

**Cite this article:**

Kesam Reddy Swetha. (2020). Prevalence and Impact of Anemia in Pediatric Patients with Dilated Cardiomyopathy and Congestive Heart Failure: Implications for Patient Care. *Acta Biomedica Scientia*, 7(2), 208-211.



**Attribution-NonCommercial-NoDerivatives 4.0 International**