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Frequency Of Left Ventricular Thrombi In Dilated Cardiomyopathy Patients Presenting In Tertiary Care Hospital Of Punjab

Tahira Nazir[1], Tehreem Amjad[2], Madiha Fayyaz[3], Somayya Siddiqa[4], Sobia Naveed[5], Shahroon Zahid[6]

Abstract

Objective: This study has been carried out to determine the frequency of left ventricular thrombi in dilated cardiomyopathy patients presenting in tertiary care hospitals in Punjab.

Methods: This descriptive case series was carried out at Arif Memorial Teaching Hospital Lahore. This study involved 150 children of both genders aged between 4-12 years diagnosed with dilated cardiomyopathy. These children underwent echocardiographic screening for left ventricular thrombi (mass filling the ventricular cavity and distinct from normal endocardium). The frequency of left ventricular thrombi was noted and compared across various subgroups of children based on age, gender and BMI. Written informed consent was obtained from parents of every child.

Results: The mean age of the children was 8.5±2.4 years. There were 98 (65.3%) boys and 52 (34.7%) girls with a male-to-female ratio of 1.9:1. The mean BMI of these children was 26.9±3.0 Kg/m^2 and 29 (19.3%) children were obese. 63 (42.0%) children had left ventricular thrombi. There was no statistically significant difference in the frequency of left ventricular thrombi across various subgroups of children based on age (p-value=0.979), gender (p-value=0.956), and BMI (p-value=0.731).

Conclusion: In the present study, a substantial proportion of children with dilated cardiomyopathy had left ventricular thrombi which due to the associated risk of thromboembolism and CVA warrant routine echocardiographic screening of such children so that timely identification and anticipated management may improve the outcome of children with dilated cardiomyopathy in future pediatric practice.

Keywords: Dilated cardiomyopathy, Left ventricular thrombus, echocardiography

[1] Senior Registrar Paediatrics, Arif Memorial Teaching Hospital Lahore; [2] Consultant Paediatrician Tehsil Headquarters Hospital Burewala; [3] Assistant Professor Paediatrics, RLKU Medical College, Hameed Latif Teaching Hospital Lahore; [4] Assistant Professor Paediatrics, HITEC-IMS Taxilla; [5] Senior Registrar Paediatrics, RLKU Medical College, Hameed Latif Teaching Hospital, Lahore; [6] Medical Officer Paediatrics, HITEC-IMS Taxilla.

Correspondence: Dr. Madiha Fayyaz, Assistant Professor of Paediatrics, RLKU Medical College, Hameed Latif Teaching Hospital, Lahore. **Email:** drmadiha62@gmail.com

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1. Introduction

Cardiomyopathies are defined as diseases of the myocardium with associated structural and functional abnormalities. Knowledge of these pathologies for a long period was not clear in clinical practice due to uncertainties regarding definition, classification and clinical diagnosis. In recent decades, major advances have been made in the assessment of diseases. Progress has also occurred in the management of several types of cardiomyopathy. The prevalence of dilated cardiomyopathy has increased in particular (1/2500 population aged from 4 to 12 years).[1,2,3]

The most common causes of dilated cardiomyopathy were idiopathic origin (47%), myocarditis (12%) and coronary artery disease (11%). The other identifiable causes of dilated cardiomyopathy made up 31% of the total cases.[4,5] Congestive heart failure, cerebrovascular accident, valvular heart disease, abnormal cardiac rhythms and sudden cardiac death are the main complications of dilated cardiomyopathy.[6,7] Left ventricular thrombus (LVT) can cause left ventricular (LV) systolic dysfunction leading to thromboembolic complications. Thrombus formation reflects the presence of factors that represent Virchow's triad in the ventricle.[8] Falk et al. conducted a study and found that the frequency of left ventricular thrombi in patients with dilated cardiomyopathy was 44%.[9] Talle et al. conducted a similar study and found that 39.23% of patients with dilated cardiomyopathy had left ventricular thrombi.[10]

Although the frequency of intraventricular thrombi in dilated cardiomyopathy is significantly high (44%, 39.23%), there is no regional research in this area.[9,10] As these patients in Pakistan remain untreated and only present with complications, there is a need to conduct this study in the local population. This will help to develop protocols for regular screening of these patients.

2. Materials & Methods

The objective of the study was to determine the frequency of left ventricular thrombi in dilated

cardiomyopathy patients presenting in a tertiary care hospital.

It's a descriptive cross-sectional study. The research was conducted in the department of Paediatrics, Arif Memorial Teaching Hospital, Lahore.

A sample size of 150 cases was calculated using the WHO sample size calculator. The confidence interval was 95% and 8.0% margin of error while taking the expected frequency of left ventricular thrombi in patients with dilated cardiomyopathy to be 39.23%.[10]

Patients of either gender with ages in the range of 4-12 years presenting with dilated cardiomyopathy as per operational definition were included in the study and those whose parents signed a written informed consent.

Patients who had myocardial infarction i.e. ST depression or elevation in two consecutive leads on ECG as per clinical record and those with raised TLC count >14,000/mm^3 along with positive Trop-I or Trop-T as per clinical record were suspected to have myocarditis or with renal impairment (serum creatinine >3mg/dl) as per clinical record, were excluded from the study.

The research was conducted after obtaining approval from the ethical review committee of the hospital.150 cases who presented with dilated cardiomyopathy and fulfilled the above criteria were counselled and explained the details of the study. Written informed consent and detailed history were taken from the parents of each patient.

The echocardiographic procedures were performed with a variable 1.7-2.2 MHz transducer to ensure adequate imaging analyses and the presence of left intraventricular thrombi was labelled as per the operational definition. All the data was noted and recorded into the predesigned proforma along with demographic details. All the echos were performed by the same consultant to eliminate bias and confounding variables were controlled by exclusion.

All the collected data was entered and analyzed through SPSS version 21.0.

Data has been stratified for age, gender and BMI. Post-stratification, a chi-square test has been applied to take a *p-value* of ≤0.05 as statistically significant.

3. Results

The age of the children ranged from 4 to 12 years with a mean of 8.5±2.4 years. There were 98 (65.3%) boys and 52 (34.7%) girls with a male-to-female ratio of 1.9:1. The BMI of these children ranged from 22.2 Kg/m2 to 33.4 Kg/m2 with a mean of 26.9±3.0 kg/m2. 29 (19.3%) children were obese as shown in Table 1.

Table 1: Demographic Characteristics of Included Children

Characteristics	Participants n=150
Age (years)	8.5±2.4
• **4-8 year**	76 (50.7%)
• **9-12 year**	74 (49.3%)
Gender	
• **Boys**	98 (65.3%)
• **Girls**	52 (34.7%)
BMI (Kg/m^2)	26.9±3.0
• **Non-Obese**	121 (80.7%)
• **Obese**	29 (19.3%)

63 (42.0%) children had left ventricular thrombi as shown in Figure 1.

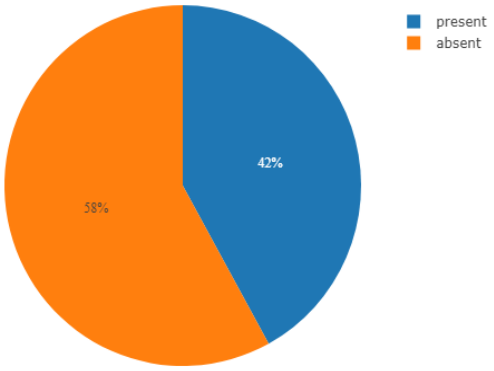

Figure 1: Frequency of Left Ventricular Thrombi among Children presenting with Dilated Cardiomyopathy n=150

There was no statistically significant difference in the frequency of left ventricular thrombi across various subgroups of children based on age (p-value=0.979), gender (p-value=0.956), and BMI (p-value=0.731) as shown in Table 2.

Table 2: Frequency of Left Ventricular Thrombi across various subgroups of children presenting with Dilated Cardiomyopathy n=150

Subgroups	n	Left Ventricular Thrombus n (%)	P-value
Age (years)			
• **4-8 year**	76	32 (42.1%)	0.979
• **9-12 year**	74	31 (41.9%)	
Gender			
• **Boys**	98	41 (41.8%)	0.956
• **Girls**	52	22 (42.3%)	
BMI (Kg/m^2)			
• **Non-Obese**	121	50 (41.3%)	0.731
• **Obese**	29	13 (44.8%)	

4. Discussion

Pediatric cardiomyopathies are a group of myocardial diseases with complex taxonomies. Cardiomyopathy can occur in children at any age, and it is a common cause of heart failure and heart transplantation in children. The incidence of pediatric cardiomyopathy is increasing with time. They may be associated with variable comorbidities, which are most often arrhythmia, heart failure, and sudden death.[1] Dilated cardiomyopathy (DCM) is a clinical diagnosis characterized by left ventricular or biventricular dilation and impaired contraction that is not explained by abnormal loading conditions (for example, hypertension and valvular heart disease) or coronary artery disease.[2] The heterogeneous aetiology and clinical presentation of DCM make a correct and timely diagnosis challenging.[3] The clinical presentation of DCM is generally unrelated to the underlying aetiology and ranges from dyspnea, swollen legs and ankles, fatigue and chest pain caused by reduced oxygen levels reaching the heart to arrhythmia, acute decompensation or cardiogenic shock.[2,3] Dilated left ventricle with wall motion abnormalities leads to turbulent blood flow along with stasis which leads to clot formation.[8,9] Thrombus in the left ventricle is a potential source of thromboembolism with potential risk of CVA and sudden death.[8] Therefore its timely identification and appropriate management is crucial for the better prognosis of such patients. [8,9] However, the data on the frequency of left ventricular thrombus among such children was scarce which necessitated the present study to know the magnitude of the problem in the local population.[9.10] The objective of this study was to determine the frequency of left ventricular thrombi in dilated cardiomyopathy patients presenting in a tertiary care hospital. In the present study, the mean age of the children was 8.5±2.4 years. Our observation is in line with another local study where Khokhar et al. (2019) reported a similar mean age of 7.4±3.1 years among children presenting with dilated cardiomyopathy at the National Institute of Cardiovascular Diseases, Karachi.[11] Similar mean age of 8.3±6 years has been reported by Hirapur et al. (2019) among Indian children.[12] Sahin et al. (2021) in a similar study involving Turkish children with dilated cardiomyopathy reported a comparable mean age of 8.9±5.7 years.[13] A similar mean age of 8.4±2.6 years has been reported among DCM children by Mheen et al. (2019) in the Netherlands.[14] We observed that there was relative male predominance among such children with a male-to-female ratio of 1.9:1. Our observation is in line with another local study where Ilyas et al. (2013) also observed male predominance among such children and reported a male-to-female ratio of 1.9:1 at Muhammadi Hospital International Medical Research Centre, Hayatabad.[15] In another local study conducted at the National Institute of Cardiovascular Diseases, Karachi, Khokhar et al. (2019) reported a male-to-female ratio of 1.3:1.[11] Our observation also matches with that of Hirapur et al. (2019) who reported a male-to-female ratio of 1.5:1 in Indian such children.[12] Sahin et al. (2021) in a similar study involving Turkish children with dilated cardiomyopathy reported a male-to-female ratio of 2.1:1.[13] Our observation is also in line with that of Mheen et al. (2019) who reported a similar male predominance with male to female ratio of 1.8:1 in the Netherlands.[14] In the present study, 42.0% of children with dilated cardiomyopathy had left ventricular thrombi. There was no statistically significant difference in the frequency of left ventricular thrombi across various subgroups of children based on age (p-value=0.979), gender (p-value=0.956), and BMI (p-value=0.731).

Our observation is in line with that of Falk et al. (1992) who reported the frequency of left ventricular thrombi in patients with dilated cardiomyopathy to be 44%.[9] In a more recent study, Talle et al. (2014) reported the frequency of left ventricular thrombi to be 39.2% in line with the present study.[10] The present study is the first of its kind in the local population and adds to the limited already available international research evidence on the topic. In the present study, a substantial proportion of children with dilated cardiomyopathy had left ventricular thrombi which due to the associated risk of thromboembolism and CVA warrant routine echocardiographic screening of such children so that timely identification and anticipated management may improve the outcome of children with dilated cardiomyopathy in future pediatric practice.

The strengths of the present study were its large sample size of 150 cases and strict exclusion criteria. We also stratified the results to address various effect modifiers like age, gender and BMI. A very important limitation of the present study was that we didn't consider the effect of various pharmacological as well as non-pharmacological interventions on left ventricular

thrombus as well as its associated complications which could have helped in the management planning of such children. Such a study is highly recommended in future clinical research.

5. Conclusion

In the present study, a substantial proportion of children with dilated cardiomyopathy had left ventricular thrombi which due to the associated risk of thromboembolism and CVA warrant routine echocardiographic screening of such children so that timely identification and anticipated management may improve the outcome of children with dilated cardiomyopathy in future pediatric practice.

CONFLICTS OF INTEREST- None

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S.N - Critical Review
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