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Original Article

Analysis of One Hundred Cases of Idiopathic Dilated Cardiomyopathy (IDCM) in a Tertiary Care Hospital of Bangladesh

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ABSTRACT

Background: Idiopathic dilated cardiomyopathy is marked by enlarged ventricles and reduced contractility, frequently showing symptoms of heart failure or arrhythmias. Approximately 50% of cases possess a genetic factor. Diagnosis depends on clinical evaluation, ECG, and echocardiography, whereas treatment involves medications, devices, and lifestyle modifications. In Bangladesh, individuals generally arrive with late-stage illness, yet information on result is sparse. This research seeks to assess the clinical, ECG, and echocardiographic characteristics of 100 Idiopathic DCM patients in a tertiary medical facility **Methods & Materials:** This retrospective cross-sectional study included 100 Idiopathic DCM patients at Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders (BIRDEM) General Hospital (2012–2024). Demographic, clinical, and risk factor data were collected, and echocardiography assessed LV and RV function, chamber sizes, valvular regurgitation, and regional wall motion abnormalities. Chest X-ray and ECG findings were also recorded. Data were analyzed using descriptive statistics and summarized in tables and figures. **Results:** Among 100 patients with Idiopathic DCM 64% were male, mostly 40–60 years. Common comorbidities were diabetes (87%), IHD (74%), hypertension (72%), and smoking (44%). CXR showed cardiomegaly (94%), pulmonary congestion (92%), and pleural effusion (76%). ECG abnormalities included sinus tachycardia (68%), ventricular ectopics (58%), LBBB (18%), and LVH (41%). Echocardiography revealed reduced LVEF (20–39%), ventricular dilation, left atrial enlargement, valvular regurgitation (mitral 93%, tricuspid 77%), RV dysfunction (86%) and diastolic dysfunction (82%), indicating widespread structural and functional cardiac impairment. **Conclusion:** Idiopathic DCM in Bangladeshi patients mainly affects males 40–60 years, LV enlargement, reduced EF, frequent mitral/tricuspid regurgitation, with high RV dysfunction and diastolic dysfunction highlighting advanced cardiac remodeling and the value of echocardiography for assessment and monitoring.

Keywords: *Idiopathic DCM, Echocardiographic Analysis, Regurgitation.*

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INTRODUCTION

Idiopathic dilated cardiomyopathy is characterized by the enlargement and diminished contraction of one or both ventricles without discernible causes like coronary artery disease (CAD), valvular issues, congenital defects, or pericardial conditions. Patients often show symptoms of heart failure, arrhythmias, or experience sudden cardiac death [1,2]. 30–50% of idiopathic dilated cardiomyopathy instances are hereditary, showing considerable genetic influence [3]. Familial dilated cardiomyopathy (FDC) arises when idiopathic dilated cardiomyopathy (IDC) influences two or more closely related individuals within a family, or if a first-degree relative of an IDC patient experiences sudden unexplained death before the age of 35[4]. It is a prevalent reason for heart failure, with an estimated occurrence of roughly 1:250–400 to 1:2500 in the population and an annual incidence of 5–7 cases per 100,000 people. Nonetheless, accurately assessing the true prevalence is challenging and could be greater in developing countries due to underdiagnosis, partial disease penetrance, and delayed onset of disease [5-7].

Idiopathic dilated cardiomyopathy is a multifactorial condition, often associated with genetic mutations (e.g., TTN, LMNA, MYH7), viral myocarditis, toxins such as alcohol or anthracyclines, metabolic or endocrine disorders, autoimmune processes, and sometimes peripartum cardiomyopathy [8,9]. It is identified via clinical assessment, echocardiography, and ruling out alternative causes. Cardiac MRI can identify fibrosis, genetic testing is applied in familial instances, and biopsy is designated for suspected myocarditis or infiltrative conditions [10,11]. Histological analysis of hearts from individuals with IDCM reveals localized interstitial fibrosis, degenerated cardiac muscle cells, and enlarged heart chambers as the key pathological alterations [12].

In Idiopathic dilated cardiomyopathy, the ECG displays sinus tachycardia, atrial fibrillation, LBBB, and non-specific ST-T alterations, while echocardiography indicates left ventricular enlargement, decreased ejection fraction, global hypokinesia, and functional mitral regurgitation [13,14,15]. Management of idiopathic dilated cardiomyopathy (IDCM) primarily involves handling heart failure through medication (ACE inhibitors/ARNI, beta-blockers, diuretics, mineralocorticoid antagonists), device therapies (ICD, CRT), advanced procedures (LVAD, transplantation), and lifestyle modifications [16].

A global study found that among patients with idiopathic DCM, modern treatments resulted in enhanced LVEF, functional status, and peak oxygen consumption over one year, showing a higher transplant-free survival rate than historical data, suggesting improved outcomes with current management approaches [17]. A significant U.S. study utilizing electronic health records discovered that idiopathic DCM accounts for almost 50% of all DCM cases, emphasizing the considerable clinical impact of the condition [18].

Research conducted in a tertiary hospital in Bangladesh concerning patients with idiopathic dilated cardiomyopathy indicated a higher prevalence of males, with the majority showing symptoms of heart failure like breathlessness and edema.

Echocardiography showed significant left ventricular dilation, reduced systolic function, and frequent regurgitation of the mitral or tricuspid valves, indicating advanced disease at the time of presentation [19]. Banerjee et al. (2010) examined patients with idiopathic dilated cardiomyopathy at Dhaka Medical College Hospital. Many showed signs of heart failure such as shortness of breath and exhaustion. The ECG displayed arrhythmias and conduction delays, whereas the echocardiogram indicated LV enlargement, reduced systolic function, and valve regurgitation, signifying advanced disease upon presentation [20].

In Bangladesh, research on idiopathic dilated cardiomyopathy remains limited, and most studies are single-center with sparse data on clinical characteristics, ECG and echocardiographic findings, or disease severity. Given that patients often present with advanced disease, there is a need for a comprehensive evaluation of Idiopathic DCM cases in local tertiary care settings. Therefore, this study aims to analyze the demographic profile, clinical presentation, ECG abnormalities, and echocardiographic features of 100 patients with idiopathic dilated cardiomyopathy attending a tertiary hospital in Bangladesh, providing a detailed overview of disease patterns and severity in this population.

METHODS & MATERIALS

Study Design:

This was a retrospective cross-sectional study conducted at Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders (BIRDEM) General Hospital, Bangladesh, analyzing echocardiographic features of patients diagnosed with idiopathic dilated cardiomyopathy between 2012 and 2024.

Study Population:

Patients with a confirmed diagnosis of idiopathic dilated cardiomyopathy attending BIRDEM Hospital during the study period were included. A total of 100 participants were enrolled. Inclusion criteria included documented left ventricular dilation with reduced systolic function and evidence of ischemic heart disease, either by history of myocardial infarction, coronary angiography, or non-invasive ischemic testing. Patients with congenital heart disease or non-ischemic cardiomyopathy were excluded.

Data Collection:

Clinical records were reviewed to collect demographic information (age, gender), risk factors (diabetes mellitus, hypertension, smoking, known heart disease), and relevant clinical data.

Echocardiographic Assessment:

Transthoracic echocardiography was performed using a commercially available system (Vivd E, 95 GE Healthcare ,Herten, Norway), according to standard guidelines to evaluate:

- Left ventricular function and dimensions (LVEF, LVIDd, LVIDs)
- Right ventricular dimensions and function (RVIDd, presence of RV dysfunction)
- Left atrial size
- Valvular abnormalities (mitral, tricuspid, aortic, pulmonary regurgitation)
- Regional wall motion abnormalities (RWMA)
- Diastolic Dysfunction

Chest X-ray and electrocardiography (ECG)

Chest X-ray findings and electrocardiography (ECG) were also recorded to assess structural and electrical cardiac changes.

Data Analysis:

Data were analyzed using descriptive statistics. Continuous variables were presented as mean ± SD or median (IQR), and categorical variables as frequency and percentage. Age- and gender-wise distributions, as well as echocardiographic parameters, were summarized in tables. Graphical representations included figures for year-wise trends, prevalence of RV dysfunction, and valvular regurgitation distribution.

RESULTS

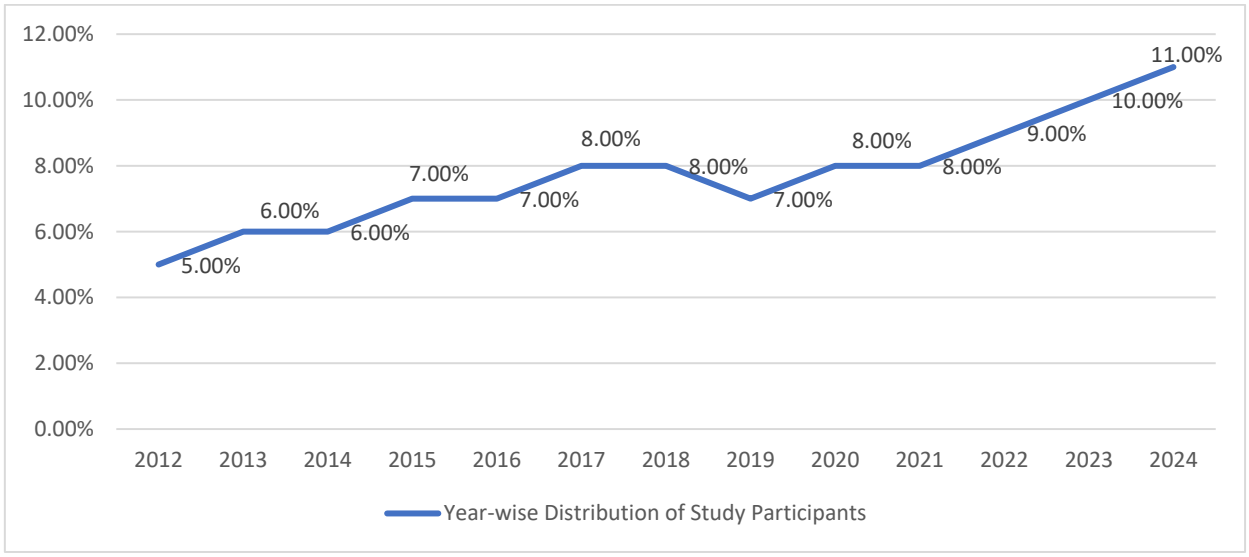

Figure 1 Year wise distribution of study participants at BIRDEM Hospital.

Figure 1 illustrates the year-wise distribution of study participants at BIRDEM General Hospital from 2012 to 2024. The number of participants gradually increased over the study period, from 5 (5.0%) in 2012 to 11 (11.0%) in 2024, reflecting a rising patient enrollment over time. The largest contributions were observed in the later years, particularly 2023 (10.0%) and 2024 (11.0%), indicating either increased case detection, higher referral rates, or improved record-keeping in recent years. Overall, the data suggest a consistent upward trend in the number of participants included in the study over the 13-year period.

Table I shows the majority of study participants were aged 40–60 years (51%), followed by 60–80 years (35%). Males predominated in all age groups, comprising 64% of the total sample, while females accounted for 36%. The data indicate a male-predominant population, with the highest representation in the 40–60 years age group.

Table I
Age and Gender Distribution of Study Participants (*n* = 100).

Age (years)	Male (n, %)	Female (n, %)	Total (n, %)
20–40	5 (7.8)	6 (16.7)	11 (11.0)
40–60	32 (50.0)	19 (52.8)	51 (51.0)
60–80	25 (39.1)	10 (27.8)	35 (35.0)
>80	2 (3.1)	1 (2.8)	3 (3.0)
Total	64 (100)	36 (100)	100 (100)

Table II presents the year-wise distribution of study participants according to key risk factors at BIRDEM Hospital from 2012 to 2024 (n = 100). Over the 13-year period, the number of participants with diabetes mellitus (DM) increased from 4 in 2012 to 10 in 2024, with a total of 87 cases. Hypertension (HTN) cases fluctuated annually but totaled 72 participants, rising to 9 in 2024. Participants with known ischemic heart disease (IHD) increased from 3 in 2012 to 9 in 2024, totaling 74 cases. Smoking prevalence showed a gradual rise from 1 participant in 2012 to 6 in 2024, with a total of 44 participants. Overall, DM was the most prevalent risk factor, followed by IHD, HTN, and smoking. The data indicate an increasing trend in all risk factors over the study period.

Table II
Year-wise Distribution of Study Participants According to Risk Factors at BIRDEM Hospital (2012–2024) (*n*=100).

Year	DM	HTN	Known IHD	Smoker
2012	4	4	3	1
2013	5	3	4	2
2014	5	6	4	2
2015	6	5	5	3
2016	6	4	5	3
2017	7	5	6	3
2018	7	8	6	4
2019	6	4	5	4
2020	7	6	6	3
2021	7	4	6	4
2022	8	8	7	4
2023	9	6	8	5
2024	10	9	9	6
Total	87	72	74	44

Table III presents Chest X-ray and ECG showed significant cardiac abnormalities: CXR showing cardiomegaly (94%), pulmonary congestion (92%), and pleural effusion (76%). ECG revealed QRS axis deviations (left 42%, right 23%), common arrhythmias including sinus tachycardia (68%), atrial fibrillation (43%), and ventricular ectopics (58%), along with conduction defects (LBBB 18%, RBBB 24%), ST–T changes (67%), atrial enlargement, and left ventricular hypertrophy (41%), reflecting extensive remodeling, impaired function, and high arrhythmic risk.

Table III
Chest X-Ray (CXR) and ECG Findings of the Study Participants (*n* = 100).

Variable	Category	Percentage (%)
Chest x-ray findings		
Cardiomegaly	Present	94
	50–60%	46
	60–70%	27
	>70%	21
	Absent	6
Pulmonary Congestion	Present	92
	Absent	8
Pleural Effusion	Present	76
	Absent	24
ECG findings		
QRS Axis	Normal	35
	Left axis deviation	42
	Right axis deviation	23
Arrhythmias	Sinus tachycardia	68
	Atrial ectopics	38
	Atrial fibrillation	43
	Supraventricular tachycardia (SVT)	27
	Ventricular ectopics	58
	Ventricular tachycardia	11
	Complete heart block	5
Conduction Defects	Left bundle branch block (LBBB)	18
	Right bundle branch block (RBBB)	24
ST–T Changes	Present	67
Atrial Enlargement	Left atrial enlargement (LAE)	37
	Right atrial enlargement (RAE)	23
Ventricular Hypertrophy	Left ventricular hypertrophy (LVH)	41
	Right ventricular hypertrophy (RVH)	11
	Both ventricles	6

Table IV shows that the majority of participants had moderate to severe left ventricular systolic dysfunction, with most having an ejection fraction between 20–39%, while a smaller proportion had EF <20%. Reduced ejection fraction was more frequent among males and participants aged ≥50 years. Left atrial enlargement (≥4.0 cm) and increased RVIDd, LVIDd, and LVIDs were observed in most patients, indicating significant biventricular dilatation. Overall, these findings reflect advanced structural and functional cardiac remodeling in idiopathic dilated cardiomyopathy.

Table IV
Distribution of Left Ventricular Ejection Fraction (LVEF) and Echocardiographic Parameters Among Study Participants (*n* = 100).

Parameter	Category	Male n = 64 (%)	Female n = 36 (%)	<50 Years n = 28 (%)	≥50 Years n = 72 (%)
Ejection Fraction (%)	<20	6 (9.4)	4 (11.1)	3 (10.7)	7 (9.7)
	20–29	29 (45.3)	15 (41.7)	10 (35.7)	34 (47.2)
	30–39	25 (39.1)	14 (38.9)	11 (39.3)	28 (38.9)
	40–45	4 (6.2)	3 (8.3)	4 (14.3)	3 (4.2)
Left Atrial Size (cm)	<4.0	23 (35.9)	17 (47.2)	11 (39.3)	29 (40.3)
	≥4.0	41 (64.1)	19 (52.8)	17 (60.7)	43 (59.7)
RVIDd (cm)	<3.0	13 (20.3)	10 (27.8)	6 (21.4)	17 (23.6)
	≥3.0	51 (79.7)	26 (72.2)	22 (78.6)	55 (76.4)
LVIDd (cm)	<5.6	5 (7.8)	7 (19.4)	4 (14.3)	8 (11.1)
	≥5.6	59 (92.2)	29 (80.6)	24 (85.7)	64 (88.9)
LVIDs (cm)	<4.0	3 (4.7)	5 (13.9)	2 (7.1)	6 (8.3)
	≥4.0	61 (95.3)	31 (86.1)	26 (92.9)	66 (91.7)
Diastolic Dysfunction	Yes	173(26.1)	399(60.2)	173(26.1)	399(60.2)
	No	16(2.4)	75(11.3)	16(2.4)	75(11.3)

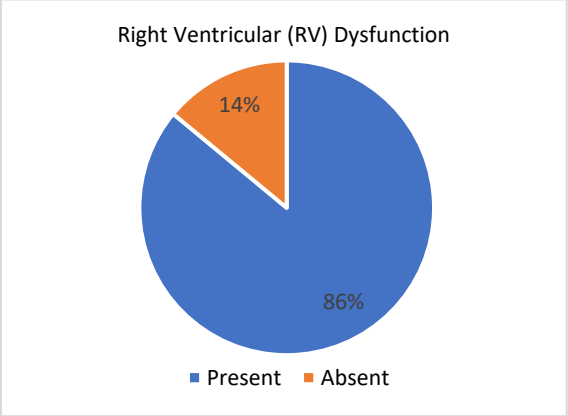

Figure 2 Prevalence of Right Ventricular Dysfunction in Patients with Dilated Cardiomyopathy (*n*=100).

Figure 2 shows that RV dysfunction was present in 86% of patients, indicating a high prevalence of right ventricular involvement in dilated cardiomyopathy.

Table V shows that mitral regurgitation was the most prevalent valvular abnormality among patients with idiopathic dilated cardiomyopathy, affecting over 90% of participants across all sex and age groups. Tricuspid regurgitation was also common, present in approximately three-quarters of patients, indicating frequent right-sided valve involvement. In contrast, aortic regurgitation was observed in about one-third of cases, while pulmonary regurgitation affected less than half of the study population. Overall, the distribution of valvular regurgitation was comparable between males and females and across age groups, reflecting the diffuse valvular involvement characteristic of advanced dilated cardiomyopathy.

Table V
Distribution of Valvular Regurgitation in Patients with Idiopathic Dilated Cardiomyopathy (IDCM) (*n* = 100).

Parameter	Category	Male n (%)	Female n (%)	<50 Years n (%)	≥50 Years n (%)
Mitral Regurgitation	Present	60 (93.8)	33 (91.7)	25 (89.3)	68 (94.4)
	Absent	4 (6.2)	3 (8.3)	3 (10.7)	4 (5.6)
Tricuspid Regurgitation	Present	50 (78.1)	27 (75.0)	21 (75.0)	56 (77.8)
	Absent	14 (21.9)	9 (25.0)	7 (25.0)	16 (22.2)
Aortic Regurgitation	Present	21 (32.8)	12 (33.3)	9 (32.1)	24 (33.3)
	Absent	43 (67.2)	24 (66.7)	19 (67.9)	48 (66.7)
Pulmonary Regurgitation	Present	27 (42.2)	17 (47.2)	12 (42.9)	32 (44.4)
	Absent	37 (57.8)	19 (52.8)	16 (57.1)	40 (55.6)

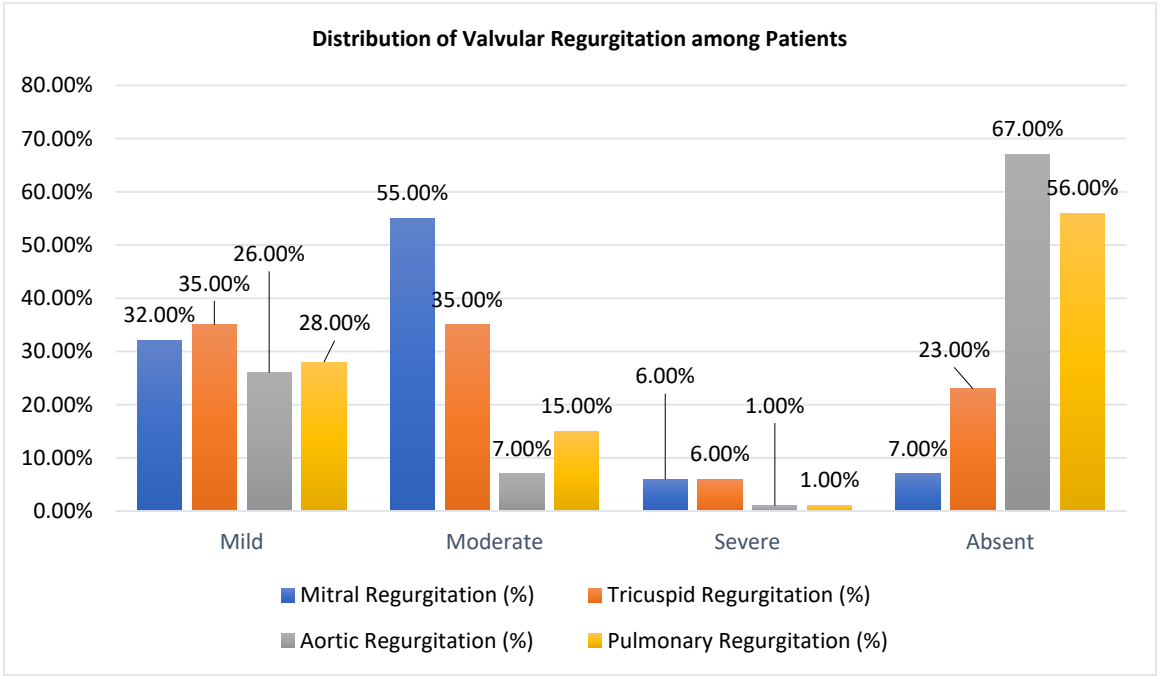

Figure 3 Distribution of Valvular Regurgitation among Patients with Idiopathic Dilated Cardiomyopathy (IDCM) (*n* = 100)

Figure 3 show the overall distribution and severity of valvular regurgitation among patients with idiopathic dilated cardiomyopathy. Mitral regurgitation was the most prevalent abnormality, present in 93% of participants, with the majority exhibiting moderate severity (55%), followed by mild regurgitation (32%). Tricuspid regurgitation was also common, affecting 77% of patients, predominantly in mild and moderate forms (35% each), indicating frequent right-sided valvular involvement. In contrast, aortic regurgitation was less frequent, observed in 33% of participants and largely mild in severity (26%), with only 1% showing severe regurgitation. Pulmonary regurgitation was present in 44% of patients, mostly mild (28%), while moderate and severe forms were uncommon.

DISCUSSION

The present study demonstrates a gradual increase in the number of patients diagnosed with idiopathic dilated cardiomyopathy at BIRDEM Hospital over a 13-year period, rising from 5 (5.0%) in 2012 to 11 (11.0%) in 2024. This upward trend likely reflects improvements in diagnostic modalities, particularly wider availability of echocardiography, enhanced clinician awareness, and increased referral to tertiary care centers. Comparable temporal trends have been reported in other registries, where later cohorts demonstrated a higher proportion of elderly patients, earlier detection, and improved disease recognition [21].

In this study, idiopathic dilated cardiomyopathy predominantly affected individuals aged 40–60 years (51%), followed by those aged 60–80 years (35%), with a marked male predominance (64%) across all age groups. This demographic distribution is consistent with prior studies reporting peak disease occurrence in middle-aged populations and male predominance, likely reflecting higher exposure to cardiovascular risk factors such as diabetes mellitus, heart disease, and smoking [13].

Among comorbidities, diabetes mellitus was the most prevalent (87%), followed by ischemic heart disease (74%), hypertension (72%), and smoking (44%). The rising prevalence of these risk factors over the study period underscores their cumulative contribution to myocardial dysfunction and adverse cardiac remodeling. Notably, diabetes and hypertension were disproportionately high compared with national population-based estimates, emphasizing the cardiometabolic burden in patients with ischemic cardiomyopathy in Bangladesh [22,23].

Chest radiography revealed cardiomegaly in 94% of patients, with 48% showing moderate (50–70% cardiothoracic ratio) and 21% severe enlargement (>70%). Pulmonary congestion was observed in 92% and pleural effusion in 76% of participants.

ECG abnormalities were common, with Arrhythmia including ventricular ectopics (58%), atrial fibrillation (43%), Atrail ectopics(38%) and conduction defects (LBBB 18%, RBBB 24%), reflecting advanced electrical remodeling.

Echocardiography demonstrated that most patients had moderately reduced LVEF (20–39%), with severely reduced EF (<20%) being less frequent. Structural remodeling, including left atrial enlargement (≥4.0 cm), and biventricular dilation (RVIDd, LVIDd, LVIDs ≥ normal range), was more prevalent among males and participants aged ≥50 years. These findings are consistent with previous studies reporting significant age- and sex-related differences in cardiac remodeling [24,25].

Valvular regurgitation was highly prevalent, with mitral regurgitation affecting 93%, followed by tricuspid regurgitation (77%), pulmonary regurgitation (44%), and aortic regurgitation (33%). Mitral and tricuspid regurgitation predominantly showed mild to moderate severity, while severe regurgitation was rare. The high prevalence of functional mitral and tricuspid regurgitation reflects ventricular dilatation and altered valvular geometry rather than primary valvular disease, indicating advanced biventricular remodeling, particularly in older patients and females [26].

Right ventricular dysfunction was observed in 86% of participants, indicating extensive biventricular involvement. This prevalence exceeds prior reports, where RV dysfunction was identified in 30–60% of dilated cardiomyopathy patients [27], and likely reflects advanced disease at presentation or improved echocardiographic recognition. Diastolic dysfunction was very common, showing notable impairment in LV relaxation and elevated filling pressure, likely linked to aging and myocardial remodeling.

Overall, the study highlights the advanced structural, functional, and electrical remodeling in idiopathic dilated cardiomyopathy in this tertiary care cohort. The findings underscore the need for early detection, aggressive management of comorbidities, and careful monitoring of biventricular function to improve outcomes in this high-risk population.

LIMITATIONS

This study has several important limitations. First this study was conducted in a single tertiary care hospital (BIRDEM), the findings may not be fully generalizable to the broader Bangladeshi population. Second, there may be inter-observer variation in taking different echo measurement. Finally multicenter and longitudinal studies are needed to confirm these findings.

CONCLUSION

In Bangladeshi patients, Idiopathic dilated cardiomyopathy predominantly affects males aged 40–60 years. CXR showing cardiomegaly, pulmonary congestion, and pleural effusion. ECG revealed QRS axis deviations (left 42%, right 23%), common arrhythmias including sinus tachycardia, atrial fibrillation, and ventricular ectopics, along with conduction defects (LBBB 18%, RBBB 24%), ST–T changes (67%). Echocardiography findings were atrial enlargement, left ventricular hypertrophy (41%), LV enlargement, reduced EF, RV dysfunction, Diastolic Dysfunction and frequent moderate mitral and tricuspid regurgitation indicating advanced biventricular involvement and structural remodeling. Echocardiography effectively assesses these changes, emphasizing early detection and monitoring to guide management and limit disease progression.

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