Original Research Article

Clinical Profile of Patients with Dilated Cardiomyopathy - A Prospective Observational Study

S.R. Rangabashyam[1], K. Kirubhakaran[2], S. Moogaambiga[3], S.P. Avinash Pandi[4], G Anoosh[5], Patel Vishalkumar Amrutbhai[6], Lakhan Parajiya[7]

[1]M.D, Head of the Department, [2,3]MD, Associate Professor, [4, 5, 6, 7]MD, Post Graduate
Department of General Medicine, Vinayaka Mission Kirupananda Variyar Medical College and Hospital, Tamil Nadu, India
[*]Corresponding author email: **rangabashyamsr@yahoo.co.in**

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Abstract

Background: Dilated Cardiomyopathy (DCM) is aserious health issue with high mortality. The present study was undertaken to examine the clinical profile of Dilated Cardiomyopathy.

Materials and methods: The current study was a prospective observational study conducted in Vinayaka Mission's Kirupananda Variyar Medical College and Hospitals, Salem, Tamil Nadu, from July 2019 to July 2020. The total study population was 49 subjects. Patients were evaluated by clinical examination, electrocardiogram, radiological examination, and echocardiogram. (The Echocardiography criteria for decreased systolic function for the Left ventricular ejection fraction was <45%; Global hypokinesia; dilatation of all the heart chambers in the absence of valvular heart disease and congenital heart disease; Left ventricular end-diastolic dimension > 3 cm/ body surface area).

Results: All of the study participants (49/49, 100%) had breathlessness. Majority of them (59.18%) presented with pedal edema as a common sign following hepatomegaly which was found in 17(34.69%) patients. The majority of the subjects had EF in the range between 35-39% with a mean of 34%, and only 22% of patients had EF more than 40%, and 4% of them had EF <25%. In ECG

findings, LAD was seen in 18.75% and RAD in 8.33%.Most of the patients (95.83%) had hypokinetic movements over the global wall of LV.

Conclusion: The study findings conclude that DCM affects the elderly andthe young adult population with male preponderance. The most common symptoms of DCM were breathlessness, pedal edema.

Key words

Dilated cardiomyopathy, Cardiomyopathy, Breathlessness, Pedal edema, Global hypokinesia.

Introduction

As per the American Heart Association (AHA), Cardiomyopathy is defined as a heterogeneous group of diseases of the myocardium where there is inappropriate ventricular dilatation or hypertrophy. In Cardiomyopathy, pathologic and anatomic diagnoses show an association with electrical or muscular dysfunction of the heart [1]. Cardiomyopathy has been segmented into two categories. They are primary (genetic, mixed, or acquired) and secondary. This has resulted in various physical constitutions consisting of hypertrophic, dilated, and restrictive patterns [2]. Among the cardiomyopathies, hypertrophic Cardiomyopathy, dilated Cardiomyopathy (DCM), restrictive cardiomyopathy, arrhythmogenic right ventricular Cardiomyopathy, DCM is the commonly observed [3].

Dilated Cardiomyopathy (DCM) can be defined as a disease of heart muscle distinguished by systolic dysfunction and biventricular dilatation or left ventricular (LV) in the absence of either volume overload or pressure or coronary artery disease adequate to describe the dysfunction [4-6]. The left ventricle in DCM appears more spherical than normal and has a depressed systolic function with raised wall stress. There are chances of developing ventricular arrhythmias and mitral regurgitation. Sporadically development of other rhythm disturbances such as supraventricular Tachycardia, atrioventricular block, and atrial fibrillation creates with or without preexcitation, including Wolf-Parkinson-White syndrome. Patients affected severely present with signs and symptoms of heart failure - breathlessness at rest or with exertion, orthopnoea, early-onset fatigue, diaphoresis, exercise intolerance, abdominal pain, and pallor. Occurrence of Peripheral edema and cachexia is observed late in the course of the disease [7].

Dilated Cardiomyopathies most frequently caused by hypertension and CAD (ischemic cardiomyopathy), although valvular disease, viral myocarditis, and genetic predisposition may also play a major role [1, 8]. As per literature, there is no age limit to DCM occurrence, but it is most common in patients aged 40 to 59 years, while age is considered a critical risk factor for mortality in patients with DCM [1, 2, 5, 9, 10]. Heart failure, thromboembolism, or sudden death are the presenting manifestations of DCM [11]. Majorly (70 %) of heart failure caused by DCM are observed from the loss of the pump due to dilatation. In contrast, there is an occurrence of 30% of sudden cardiac death from arrhythmias [12-14]. HF is a type of clinical syndrome which is found to occur in individuals with acquired or inherited abnormality of cardiac structure and/or function, form a sequence of clinical symptoms (fatigue and dyspnoea) and signs (edema and rales) that cause recurrent hospital stays, quality of life becomes poor, and life expectancy is shortened [15]. A study conducted in Assam found that in most cases, the cause of dilated Cardiomyopathy is idiopathic [16]. Another study's results revealed that the common presenting symptoms include easy fatigability, exertional dyspnoea, and pedal edema [17]. Dilated cardiomyopathy (DCM) remains to be a less reviewed and poorly analyzed group of cardiac-muscle disorders when compared to hypertrophic Cardiomyopathy (HCM). Also, the

diverse clinical heterogeneity among the patients has provided few and isolated similar studies that lack specific information on the clinical profile of DCM and the genetics and epidemiology in India. Hence, the current research was carried out to examine the clinical profile of Dilated Cardiomyopathy.

Materials and methods

This prospective observational study was conducted in Vinayaka Mission's Kirupananda Variyar Medical College and hospitals, Salem, Tamil Nadu, from July 2019 to July 2020. A total of 49 consecutive patients fulfilling the criteria of dilated Cardiomyopathy were studied. The patients were evaluated by clinical examination, electrocardiogram, radiological examination, and echocardiogram. (The criteria of Echocardiography for decreased systolic function for the Left ventricular ejection fraction was <45%; Global hypokinesia; dilatation of all the chambers of the heart in absence of valvular heart disease and congenital heart disease; Left ventricular end-diastolic dimension > 3 cm/ body surface area).

Patients were excluded from the study if they have one or more of the following; systemic hypertension (>160/100 mmHg), evidence of coronary artery diseases, pericardial diseases, congenital heart disease, valvular heart diseases, cor pulmonale, and rapid, sustained supraventricular Tachycardia. Diagnosis of dilated Cardiomyopathy was done if enlarged left ventricle with decreased systolic function as measured by left ventricular ejection fraction characterized dilated Cardiomyopathy. Diastolic dysfunction was classified as 3 grades based on the e/a ratio. Detailed inform consent from the patients and ethical permission from the concerned authorities were obtained from all the participants before the participation in the study.

Statistical Methods

Summary statistics like mean, 95% confidence interval (CI; lower and upper bounds), median, minimum and maximum, and percentage were reported for continuous parameters like age, LVDD, etc., and categorical parameters like ECG findings, Diastolic dysfunction, etc. Data was analyzed by using coGuide software [18].

Results

A total of 49 subjects were included in the final analysis. The mean age was 59.27 ± 8.1 years and the minimum was 43 and the maximum age was 80 years, gender-wise 28(57.14%) were males and 21(42.86%) were females, breathlessness was seen among 49(100%), orthopnea among 15(30.61%), 16(32.65%) patients had paroxysmal nocturnal dyspnea and palpitations chest pain and Palpations for each, majority 29 out of 49 (59.18%) patients had pedal edema followed by 24(48.98%)as basal crept and 23(46.94%) had raised JVP. Hepatomegaly was found in 17(34.69%) patients, 21(42.86%) had Tachycardia, 7(14.29%) had Systolic BP <100mmhg, and MR and TR murmur were in 17(34.69%) and 4(8.16%) patients. The mean Chest CT Ratio was 62.5 ± 6.93 %, ranging from 50 to 70, 7(14.58%) had Pleural effusion and 18(37.50%) had a pulmonary plethora (**Table - 1**).

In ECG findings, the majority (35 out of 48 participants, 72.92%) had normal QRS axis, 15(31.25%) had sinus tachycardia and 11(22.92%) had Ventricular ectopic, 34(70.83%) had normal atrial enlargement, and left atrial enlargement among 11(22.92%) and normal ventricular hypertrophy was found in 35(72.92%) and left ventricular hypertrophy was found 10(20.83%) (**Table - 2**).

The majority of the subjects had EF in the range between 35-39% with a mean of 34% and only 22% of patients had EF more than 40% and 4% of them had EF <25%, most patients had hypokinetic movements over the global wall of LV and only two patients had hypokinetic movements over the lateral wall of the left ventricle. Most patients had hypokinetic movements over the global wall of LV was 46 out of 48 (95.83%) and only 2(4.17%) patients

had hypokinetic movements over the lateral wall of the left ventricle, and 4(8.33%) had pericardial effusion (**Table - 3**).

Table - 1: Summary of baseline parameter (N=49).

Parameter	**Summary**
Age (in years)	59.27 ± 8.1 (Ranged 42 to 80)
Gender	
Male	28(57.14%)
Female	21(42.86%)
Symptoms	
Breathlessness	49(100%)
Orthopnoea	15(30.61%)
Paroxysmal nocturnal dyspnea	16(32.65%)
Chest pain	16(32.65%)
Palpations	16(32.65%)
Signs	
Pedal Edema	29(59.18%)
JVP	23(46.94%)
Basal crepts	24(48.98%)
Hepatomegaly	17(34.69%)
Tachycardia	21(42.86%)
Systolic BP <100 mmhg	7(14.29%)
MR murmur	17(34.69%)
TR murmur	4(8.16%)
X-ray findings	
Chest CT Ratio (in %)	62.5 ± 6.93 (ranged 50 to 70)
Pleural effusion (N=48)	7(14.58%)
Pulmonary plethora (N=48)	18(37.50%)

Discussion

The current study revealed that DCM was commonly observed in young participants as well as older ones. We observed breathlessness followed by pedal edema was present among all the study participants. While comparing to previous studies, the present study had a majority population from a mean age of 59.27 ± 8.1 years. A study done by Halliday BP, et al. obtained similar results of having the median age of52 (inter quartile range: 42–63) years [14]. Indian study by Das, et al., which determined the 31-40-year-old group to be the most common age group showed similar results to our study [19]. DCM, onset usually occurs 30–50 years of age, but it may also occur in the younger population and older individuals [20, 21]. In a study conducted by Puggia I, et al. it was found that among children younger than 18 years of age the annual incidence of DCM was 0.57 cases per 100 000 per year in general [22].

Table - 2: Summary of ECG findings (N=48).

ECG findings	**Summary**
QRS AXIS	
Normal	35(72.92%)
Light axis deviation (LAD)	9(18.75%)
right axis deviation(RAD)	4(8.33%)
ARRYTHMIAS	
Sinus tachycardia	15(31.25%)
Ventricular ectopic	11(22.92%)
Atrial fibrillation	8(16.67%)
Ventricular Tachycardia	5(10.42%)
Supraventricular Tachycardia (SVT)	3(6.25%)
Left bundle branch block (LBBB)	3(6.25%)
Right bundle branch block (RBBB)	2(4.17%)
Atrial enlargement AE	1(2.08%)
Atrial Enlargement	
Normal	34(70.83%)
Left atrial enlargement	11(22.92%)
Right atrial enlargement	3(6.25%)
Ventricular hypertrophy	
Normal	35(72.92%)
Left ventricular hypertrophy	10(20.83%)
Right ventricular hypertrophy	2(4.17%)
Both	1(2.08%)

The present study had 57.14% of males making the male gender dominant among the study participants. This was similar to another study conducted before where authors concluded that DCM is more common in males [17]. Study done by Bruno P, et al. concluded that out of a total

population of 803, 72% were males [23]. By this we conclude that Dilated Cardiomyopathy is observed at all age groups but is more common in the middle-aged and elderly population and the male population is more affected.

Table - 3: Summary of Ejection Fraction detected by Echocardiogram (N=48).

Ejection fraction(EF)	**Summary**
EF%	34.4 ± 6.03 (ranged 20 to 45)
Left ventricular diastolic dysfunction (LVDD) (cm)	5.53 ± 0.74 (ranged 4.40 to 6.60)
Left ventricular systolic dysfunction (LVSD) (cm)	4.46 ± 0.75 (ranged 3 to 5.50)
Mitral regurgitation (MR)	33(68.75%)
Tricuspid regurgitation (TR)	6(12.50%)
Diastolic Dysfunction	
Grade I	27(56.25%)
Grade II	12(25.00%)
Grade III	5(10.42%)
Normal	4(8.33%)
Hypokinetic movements of LV	
Global	46(95.83%)
Lateral wall	2(4.17%)
Pericardial Effusion	4(8.33%)

The present study population showed that 100% of the total population had breathlessness. Our results were in harmony with the results of Nighute S, et al. where they found out of 40 participants with DCM 13 (32.5%) had dyspnea [15]. This study assessed dilated cardiomyopathy patients presenting predominantly with Breathlessness, which frequently was the most common clinical presentation in previous studies [24]. Similarly in a study conducted by Sonowal N, et al. majority presented with dyspnea (70.97%) [16]. The current study results presented 32.65% of PND, chest pain, and palpitations and the majority 59.18% had developed pedal edema. Literature states that classic symptoms of DCM include paroxysmal nocturnal dyspnea (PND) orthopnea, leg swelling, and shortness of breath [16]. Our results matched with a study conducted in a tertiary care teaching institute of North India where they found among 50 patients with DCM 100% of them had dyspnea, palpitation where 56%, PND with 60%, and chest pain was among 40% of the study population [16]. The current study results and previous literature show that breathlessness is the most common symptom of DCM followed by palpitations and PND while pedal edam is majorly observed.

On examination Pansystolic murmur of Mitral Regurgitation at the apex (MR) was prominently observed in 34.69% in the present study. A study conducted by Singh Tomar S, et al. showed 46% of MR [25]. It was 80.0% in a study done by Hoque S, et al. [26]. In the present research left axis deviation (LAD) was 18.75% more than right axis deviation (RAD) which was similar to study by Sonowal N et al. where LDA was 48.39% [16]. The word tachycardia-induced Cardiomyopathy (TIC) is derived from the fact that long- standing Tachycardia is a long-standing tachycardia is a renowned cause of heart failure and left ventricular dysfunction [27]. In our study sinus tachycardia was 31.25%. Similarly previous studies 75% and 40% of subjects had sinus tachycardia [25, 28]. We observed 22.92% of left arterial enlargement. This was in agreement with another research where LAE was 25.81 [29]. Among the ventricular hypertrophy Left ventricular hypertrophy was 20.83% similar to previous research which was 41.94% [29]. Present study hepatomegaly was presented by 34.69% of patients. A study medicine OPD of Padmashree Dr. D. Y. Patil Medical College, Hospital and Research Centre, Pimpri, Pune participants presented with 34.69% of hepatomegaly [15]. Another descriptive cross-sectional hospital record-based study participants presented with 42% of hepatomegaly [30]. Ejection fraction was noted as 34.4% in the present study. In another study, the mean LV ejection fraction was 30.87% [16]. In the current study LVDD and LVSD were

5.53 and 4.46 cm. This was comparable with studies by Sonowal N, et al. (64.54 mm and 56.94 mm), Sanderson, et al. (57 ± 6 and 45 ± 7) [16]. In our study, mitral regurgitation was seen in majority 68.75% of study population as compared to tricuspid regurgitation. This was lower than previous study (96.77%) [29]. Global hypokinesia was observed in the 95.83% of population. Global hypokinesia and dilatation of all four chambers were seen in all the patients [16].

The drawback of this research is that it had a relatively smaller sample size and was conducted at a single centre. We recommend that similar yet a large population-based multi-centre prospective research is required which will be very precise and can detect the intensity of the problem.

Conclusion

From the present study findings, it can be concluded that DCM affects the elderly as well as the young adult population with male preponderance. The most common symptoms of DCM are breathlessness, pedal edema. Other clinical profiles of patients include hepatomegaly, global hypokinesia, and reduced ventricular ejection fraction.

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