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A Study of Clinical Profile of Dilated Cardiomyopathy in Co-Relation with ECG and Echocardiography

[1]Dr.VisalakshiBoyilla, [2]Dr.Rithin Reddy Mogarala
[1]*Assistant Professor, Department of General Medicine, Sri Venkateswara Medical College, Tirupati.*
[2]*House surgeon, S.V.Medical College, Tirupati.*
Corresponding author: Dr.Rithin Reddy Mogarala

Abstract
Introduction: *Dilated cardiomyopathy is an important cause of congestive heart failure and accounts for up to 25% of all cases of CHF. The incidence of DCM appears to be increasing and is associated with significant morbidity and mortality.****Objective:*** *To study the clinical, electrocardiographic and echocardiograph profile of patients with DCM.****Methods:*** *A total of 60 patients who were admitted to Sri VenkateswaraRamnarainRuia Government General Hospitaland fulfilled the inclusion/exclusion criteria were evaluated by history, physical examination, ECG and echocardiography.****Results:*** *Majority of the patients were above the age of 60 years of which males comprised 56.66% and females comprised 43.33%. The most common type of DCM was ischaemic (66.6%) followed by diabetic (23.3%), peri-partum (16%), idiopathic (13%) and alcoholic (6.6%). Majority of our patients were in NYHA class IV (46.6%).Coronary angiography of 20 patients who had Ischemic dilated cardiomyopathy showed significant coronary artery disease, 13 had triple vessel disease, 5 patients had double vessel disease and one had single vessel disease.****Conclusion****: Dilated cardiomyopathy was more common in elderly males. Biventricular failure was the most common clinical presentation. Ischemic cardiomyopathy was the most common sub type and most of the patients were in NYHA class IV.*

Keywords*: Dilated cardiomyopathy, clinical profile, electrocardiogram, and echocardiography.*

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I. Introduction

Cardiomyopathy is a disorder of the heart muscle that causes abnormal myocardial performance and is not the result of disease or dysfunction of other cardiac structures. The dominant feature is a direct involvement of the heart muscle itself. They are distinctive because they are not the result of pericardial, valvular, hypertensive or congenital diseases[1].

The most widely used functional classification of cardiomyopathy recognizes 3 disturbances of function- dilatation, hypertrophy and restriction. Dilated cardiomyopathy is the most common variety of cardiomyopathy. The incidence of DCM is reported to be 5 to 8 cases per 100,000 populations per year. It occurs 3 times more frequently in males as compared to females. It is also more common in black[2].

The prevalence of heart failure is about 1 to 1.5% of the adult population. The mortality and morbidity remain high (median survival of 1.7 years for men and 3.2 years for women). Dilated cardiomyopathy is an important cause of heart failure and accounts for up to 25% of all cases of CHF. Whether the result of improved recognition or of other factors, the incidence and prevalence of heart failure due to cardiomyopathy appears to be increasing. Cardiomyopathies are a heterogeneous group of diseases, but they are now classified under a new WHO/ISFC classification system. Current diagnosis and treatment of dilated Cardiomyopathies varies somewhat among the various types, but the cornerstone of medical management is similar in most cases.

Dilated cardiomyopathy is the most common form of cardiomyopathy comprising over 90% of the cases. The most common dilated cardiomyopathy is the ischemic dilated cardiomyopathy followed by idiopathic / familial, diabetic, alcohol and peri-partum cardiomyopathy[3].With the rapid advancement in molecular genetics and uncovering of underlying etiologies, DCM is being recognized as a specific diagnosis and not one of exclusion.The most common clinical presentation is congestive heart failure, usually left ventricular failure. The patient can also present with symptoms secondary to arrhythmias, stroke (embolic infarction) or sudden death[4].

Exact epidemiological data on dilated cardiomyopathy in India are lacking. Given the high prevalence of chronic heart failure in the country and the increasing use of echocardiography, the incidence of dilated cardiomyopathy is increasing. In the US, the vast majority of the cases of Heart Failure are caused by cardiomyopathy. Dilated cardiomyopathy is the most common indication for cardiac transplantation in the west[5,6,7]. In view of the high prevalence of chronic heart failure and underlying dilated cardiomyopathy and the

lack of data on DCM, this study was undertaken with an objective to determine the clinical profile of patients with dilated cardiomyopathy and to study the electrocardiographic and echocardiographic profile of these patients.

II. Material & Methods

Source of data: Patients admitted with symptoms and signs of heart failure (Clinically suspected and echocardiography proven) in Sri VenkateswaraRamnarainRuia Government General Hospital, Tirupati over a period from November 2017 to January 2019.

Sample size: 60 patients with dilated cardiomyopathy admitted in Sri VenkateswaraRamnarainRuia Government General Hospital, Tirupati.

Study subjects: All patients who fulfilled the inclusion criteria

Study design: Prospective study.

Inclusion criteria:

A. Clinical criteria: Patients with symptoms and signs of heart failure
B. ECHO criteria:
1. Left ventricular ejection. fraction< 45%.
2. Left ventricular end diastolic dimension > 3 cm / body surface area.
3. Global hypokinesia.
4. Dilatation of all the chambers of heart.

Exclusion criteria:Valvular heart disease& Congenital heart disease

A total of 60 patients were studied thorough clinical evaluation and appropriate investigations like echocardiography, chest radiography and electrocardiography. CAG was done for suggested cases of ischemic patients. Other relevant investigations pertinent to certain cases like ischemic cardiomyopathy, diabetic cardiomyopathy, alcohol cardiomyopathy, etc included coronary angiography, Random blood glucose, liver function tests, etc.

The clinical evaluation included symptoms and signs of heart failure. The symptom profile included dyspnoea, palpitation, PND, orthopnoea, pedal edema, chest pain, cough, easy fatigability, etc. Physical examination included signs like basal crepitations, JVP, hepatomegaly, pedal edema, S3, murmurs, etc.

These patients were subjected to echocardiography, ECG and chest radiography. The echocardiographic criteria were based on the recommendations of the American society of echocardiography and American heart association.

The diagnosis of ischemic cardiomyopathy was based on either past history of myocardial infarction or ECG Suggestive of MI were subjected to coronary angiogram.

Peripartum cardiomyopathy was diagnosed based on the criteria laid down by Demakis and colleagues which include:

- Development of cardiac failure in the last month of pregnancy or within 5 months of delivery.
- Absence of recognizable heart disease prior to the last month of pregnancy.
- Left ventricular systolicdysfunction demonstrated by classical echocardiographic criteria
- Absence of other causes of heart failure.

The diagnosis of diabetic cardiomyopathy was made in patients with long standing (>10 years) diabetes mellitus and in whom no other cause was obvious. Similarly patients with echocardiography proven dilated cardiomyopathy with history of long term (> 10 years) alcohol intake in whom no other causes were found were included as alcoholic cardiomyopathy. Patients in whom no obvious cause was found were categorized as idiopathic DCM.

Statistical analysis: Data entry and analysis was done using Microsoft excel 2010 version. Data was presented in proportions and percentages.Descriptive statistics was expressed as mean (± SD).

III. Results

Majority of the patients were above the age of 60 years of which males comprised 56.7% and females comprising 43.3%. Among males the majority of cases were above the age of 60 years whereas in females there was clustering of cases among young adults and middle aged population.All the patients presented with exertional dyspnoea. Easy fatigability was seen in 83.3% of subjects constituting the second most common symptom followed by pedal edema in 70% of patients. History of cough were seen in 60% of subjects followed by palpitation (56.6%) orthopnoea (53.3%), PND (46.7%) chest pain (40%), abdominal pain (16.6%) and syncope (16.6%).

Physical signs: Basal crepitations were seen in almost 93.3% of the subjects. Pedal edema was present in 76.6% Raised JVP was seen in 73.3% and hepatomegaly in 23.3%. Apical pansystolic murmur was present in 46.6% with LVS3 seen in 46.6%. Pansystolic murmur in tricuspid are (TR) was seen in 3.3% while RVS3 was seen in 10% of our patients. Systolic blood pressure <10 mmHg was been in 26.6%.Tachycardia was seen in

46.6%, Ectopicbeats in 26.6% and atrial fibrillation in 6.6% of patients. Bradycardia in 3.3% and Pulsus alternans were seen in 1.6 % of subjects.

Electrocardiographic profile:

The electrocardiographic profile included abnormalities of rate, rhythm, axis and chamber enlargement. The most common abnormality was ventricular ectopics seen in 46.6% of patients. Sinus tachycardia and left bundle branch blocks were seen in 40% of subjects. Right bundle branch block was observed in 13.3%. Non-specific ST-T changes were seen in 26.6%, LVH was seen in 20% and left atrial enlargement in13.3% of subjects. Complete heart block was seen in only two patients (3.3%). The axis was normal in majority. Left axis deviation was seen in 13.3% and right axis deviation in 6.6%.

Chest Radiography:

Cardiomegaly was seen in all the patients on chest radiograph. The cardio thoracic ratio was more than 0.7 in 13.3%, between 0.6 to 0.7 (moderate) in 40% and mild cardiomegaly i.e. between 0.5 to 0.6 in 46.6% of subjects. Pulmonary plethora was seen in 53.3% while pleural effusion was seen in 20 % of patients.

Echocardiographic Profile:

The mean LV ejection fraction was 30.87 %. The left ventricular ejection fraction was less than 20% in 6.6% of patients. It was between 20-29% in 40 %, between 30-39% in 36.6% of patients and between 40 to 45% in 16.6% of patients. The mean LV end diastolic diameter was 5.86 cm with majority i.e. 53.3% of subjects having LV end diastolic diameter more than 6 cm. The mean LV end systolic diameter was 4.75 cm, with majority of patients (46.6%) having end systolic diameter more than 5 cm. Global hypokinesia and dilatation of all 4 chambers were seen in all the patients. In our study 73.3% had mitral regurgitation, 10% had tricuspid regurgitation and pericardial effusion was seen in 6% of patients.

Majority of the patients were in NYHA class III (33%) and class IV (46%). Biventricular failure was seen in 80% of patients isolated LV failure was seen in 16.6% and RV failure in 3.3%.

Table No 1: Echocardiographic Profile

Ejection Fraction(EF)	**Range**	**Number**	**Percentage**
	40-45%	10	16.6
	30-39%	22	36.6
	20-29%	24	40
	<20%	4	6.6
LVEDD	4.5-4.9 cm	8	13.3
	5.0-5.9	20	33.3
	>6 cm	32	53.3
LVSD	3.5-4cm	12	20
	4-4.9cm	20	33.3
	>5cm	28	46.6
Mitral regurgitation		42	73.3
Tricuspidregurgitation		6	10
Pericardial effusion		4	6.6

Etiological distribution:

The most common type of dilated cardiomyopathy was ischemic dilated cardiomyopathy comprising 33.3% of all cardiomyopathies followed by diabetic cardiomyopathy (18.3%) and peripartum cardiomyopathy (15.3%).Idiopathic DCM was seen in 13.3% of subjects while alcoholic cardiomyopathy was seen in10.0 and HIV associated cardiomyopathy 6.6%.

Table no2: Etiological distribution

Cardiomyopathy	**Number**	**Percentage**
Ischemic	20	33.3
Idiopathic	8	13.3
Diabetic	11	18.4
Peripartum	9	15.0
Alcoholic	6	10.0
HIV associated	4	6.7
Miscellaneous	2	3.3

Angiographic profile in ischemic cardiomyopathy

Coronary angiography was done in all the patients with ischemic cardiomyopathy. Of the 20 patients studied 6 had history of previous myocardial infarction. Thirteen patients showed triple vessel disease, five patients had double vessel disease and one had single vessel disease.

IV. Discussion

The present study aims to evaluate the clinical profile of patients with dilated cardiomyopathy. Of the total 60 subjects, males comprised 56.6% and females 43.3%. In males, DCM was most commonly seen in the elderly (mean age 56.88 ± 15.99 years). In females DCM waspredominantly seen in middle age (41.15 ± 20.19 years).In one study the mean age was 52.9 ± 15.1 years in males and 51.3.9 ± 17.7 years in females. In another study the mean age was 64.4 years in males and 55.5 years in females. In a study done in 2004, the mean age of presentation did 42.6 ± 9.1 years with males comprise 73.6% and females comprising 26.4% of the study population.[8,9,10]

Electrocardiographic profile:The QRS axis was normal in 80% of our subjects with left axis deviation in 13.6% and right axis deviation in 6.6% which were in concordance with all the other studies[8].

Sinus tachycardia was the most consistent finding in the S. Ahmad et al study being found in up to 69% of patients. Our study showed sinus tachycardia in 40% of patients. Other ECG parameters like ventricular ectopics, LBBB, Atrial fibrillation, atrial ectopics were more common comparable to those in all the other studies. However RBBB, complete heart block and SVT were less commonly present in our study as compared to other studies. LVH was also less common, present in 20% ascompared to 30 to 40% in other studies Non-specific ST-T changes were seen in 26% of cases, similar to that in other studies [8].

Echocardiographic profile: The mean LV ejection fraction in our study group was 30.87%. This was similar to that in all the other studies on DCM. The mean LV end diastolic diameter was 5.86 cm. These 2 parameters were less compared to those in all the other studies[8,9]. However fractional shortening was comparable to all the other groups. Pericardial effusion seen in 6.6% in our study.

Chest radiograph: Chest radiograph was abnormal in all thecases showing varying degree of cardiomegaly with cardiothoracic ratio varying between 0.5 to 0.75. This was similar to the study done by Masssuini et al [11] wherein cardiomegaly was present in all cases with cardiothoracic ratio between 0.51 to 0.80. 20% of our patients had pleural effusion compared to 46% in the Massumi et al study and 10% in Ahmad et al group[8].

Etiological profile:

Etiological profile in our study the most common type of DCM was ischemic DCM being present in 33.3% of our patients, followed by diabetic cardiomyopathy seen in 23.3%. Peripartum cardiomyopathy was the third most common type seen in 16.6% of patients while idiopathic and alcohol cardiomyopathy was seen in 13.3% and 6.6% respectively. The miscellaneous group included 2 patients; one with chronic renal failure on haemodialysis and cardiomyopathy secondary to anaemia and minerals deficiencies. The other patient has polymyositis associated with DCM. DCM is known to occur in up to 50 % of patients with polymyositis.

Ischemic cardiomyopathy was not included in most studies on dilated cardiomyopathy due to the controversy in defining the term "Ischemic cardiomyopathy". In Jain et al study ischemic cardiomyopathy comprised 37% of cases followed by idiopathic dilated cardiomyopathy seen in 30% of patients. The incidence of idiopathic DCM in their study was much higher compared to our study. Other sub groups of DCM were comparable to our study.

Coronary angiography was done in all the patients with ischaemic cardiomyopathy. Of the 20 patients studied 6 had history of previous myocardial infarction. All the 20 patients had significant narrowing of epicardial coronaries (i.e. > 70% of lumen). Thirteen patients showed triple vessel disease, five patients had double vessel disease and one had single vessel disease. The echocardiography of all the patients showed global hypokinesia with reduced ejection fraction.

V. Conclusions

Dilated cardiomyopathy is the most common type of cardiomyopathy and an important cause of congestive heart failure. Dilated cardiomyopathy is common in the elderly and middle aged population. It is more common in males.The most common clinical presentation is biventricular failure followed by left ventricular failure. The most common type is ischemic cardiomyopathy followed by diabetic, peripartum, idiopathic and alcoholic cardiomyopathy.Chest radiograph showed cardiomegaly in most patients. The common abnormalities on ECG consist of sinus tachycardia, atrial fibrillation and left bundle branch block.Echocardiography revealed reduced ejection fraction and global hypokinesia universally. Mitral regurgitation and pericardial effusion were present in significant number of patients. Ejection fraction correlated well with NYHA class.

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