Print ISSN: 2321-6379
Online ISSN: 2321-595X
DOI: 10.17354/ijss/2018/49

Original Article

A Clinical Study Of Dilated Cardiomyopathy With Correlation to Electrocardiography and Echocardiography: A Cross Sectional Study

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Abstract

Introduction: Cardiomyopathy is a primary disorder of the heart muscle with abnormal myocardial performance. It is an important cause of heart failure and accounts for up to 25% of all cases of heart failure. In view of the high prevalence of chronic heart failure due to underlying dilated cardiomyopathy (DCM) and the lack of data on DCM, this study was undertaken.

Materials and Methods: 1-year cross-sectional study was conducted on 30 cases of DCM from medical ward of Rajendra Institute of Medical Sciences, Ranchi. Cases were selected as per laid down inclusion and exclusion criteria and were evaluated clinically, hematologically, biochemically and by chest X-ray, electrocardiograph, and echocardiography.

Result: Majority of the patients was above the age of 60 years of with male to female ratio 1.3:1. Most common presentations were dyspnea, easy fatigability, and pedal edema. Other common presentations were a history of paroxysmal nocturnal dyspnea, cough, palpitation (56.6%) orthopnea (53.3%), chest pain (40%), abdominal pain (33.3%), and syncope (16.6%). Ectopic beats were seen in 53.3%, tachycardia in 46.6%, and atrial fibrillation in 13.3% of patients. Left bundle branch block was seen in 40% of subjects. Cardiomegaly was seen in all the patients on chest radiograph. The most common type of DCM was ischemic DCM comprising 33.3% of all cardiomyopathies followed by diabetic cardiomyopathy (23.3%) and peripartum cardiomyopathy (16.6%).

Conclusion: DCM is an important cause of heart failure affecting all age group and both sexes. It is commonly associated with ischemia DCM and commonly present as a biventricular failure.

Key words: Cardiomyopathy, Diabetic cardiomyopathy, Dilated cardiomyopathy, Ischemic cardiomyopathy

INTRODUCTION

Cardiomyopathy is a primary disorder of the heart muscle that causes abnormal myocardial performance and is not the result of disease dysfunction of other cardiac structures. It is distinctive because it is not the result of pericardial, valvular, hypertensive of congenital diseases.[1]

Access this article online

www.ijss-sn.com

Month of Submission : 12-2017
Month of Peer Review : 01-2018
Month of Acceptance : 01-2018
Month of Publishing : 02-2018

Dilated cardiomyopathy (DCM) represents the final common pathway produced by a variety of ischemic, toxic, metabolic, and immunological mechanisms damaging the heart muscle. DCM is an important cause of heart failure and accounts for up to 25% of all cases of heart failure. The incidence of DCM is reported to be 5–8 cases per 100,000 population per year. It occurs 3 times more frequently in males as compared to females. It is also more common in blacks.[2] The most common clinical presentation is heart failure, usually left ventricular (LV) failure. The patient can also present with symptoms secondary to arrhythmias, stroke, or sudden death.[3]

In view of the high prevalence of chronic heart failure due to underlying DCM and the lack of data on DCM, this study was undertaken.

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Aims and Objectives

1. To study the clinical profile of patients with DCM.
2. To study the electrocardiographic and echocardiographic profile of these patients.

MATERIALS AND METHODS

A total of 30 cases of DCM were selected as per inclusion and exclusion criteria from medical ward of Rajendra Institute of Medical Sciences, Ranchi.

Study Design

This was a 1-year cross-sectional study.

Inclusion Criteria

Clinical criteria

Patients with symptoms and signs of heart failure were included in this study.

Echocardiography criteria

- LV ejection fraction <45%
- LV end-diastolic dimension >3 cm/body surface area
- Global hypokinesia
- Dilatation of all the chamber of heart were included in this study.

Exclusion Criteria

- Valvular heart disease
- Congenital heart disease.

A total of 30 patients were selected as per inclusion and exclusion criteria. Selected patients were evaluated clinically. Investigations done were complete blood count, random blood sugar, liver function test, kidney function test, thyroid function test, echocardiogram (ECG), Chest X-ray, echocardiography, and other relevant investigations pertinent to certain cases such as ischemic cardiomyopathy, diabetic cardiomyopathy, and alcoholic cardiomyopathy included coronary angiography and hemoglobin A1C.

OBSERVATIONS AND RESULTS

Demographic Profile [Table 1]

Majority of the patients were above the age of 60 years of which males comprised 56.60% and females comprising 43.25%. 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. Some female cases were below the age of 19 years.

Symptom Profile [Table 2]

All the patients presented with exertional dyspnea. 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 paroxysmal nocturnal dyspnea (PND) and cough was seen in 60% of subjects followed by palpitation (56.6%) orthopnea (53.3%), chest pain (40%), abdominal pain (33.3%), and syncope (16.6%).

Physical Signs [Table 3]

Basal crepitations were seen in 93.33% of the subjects. Pedal edema was present in 76.6%. Apical pansystolic murmur was present in 46.6% with LV systolic3 seen 46.6%. Pansystolic murmur in tricuspid area was seen in 10% while right ventricular (RV) S3 was seen 20% of our patients. Systolic blood pressure <100 mmHg was seen in 26.6% and one patient had stroke.

Abnormalities of Peripheral Pulse [Table 4]

Abnormalities of peripheral pulse included tachycardia, bradycardia, ectopic beats, atrial fibrillation, and pulsus alternans, ectopic beats were seen in 53.3%, tachycardia in 46.6%, and atrial fibrillation in 13.3% of patients. Bradycardia and pulsus alternans were seen in 3.3% of subjects.

Electrocardiographic Profile [Table 5]

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% whereas atrial fibrillation was present in 13.3. LV hypertrophy was seen in 20% and left atrial enlargement in 13.3% of subjects. Complete heart block was seen in only 1 patient (3.3%). The axis was normal in majority. Left axis deviation was seen in 13.3% and right axis deviation in 6.6%.

Chest Radiographic Profile [Table 6]

Cardiomegaly was seen in all the patients on chest radiograph. The cardiothoracic ratio was more than 0.7 in 13.3%, between 0.6 and 0.7 (moderate) in 40% and mild cardiomegaly, i.e. between 0.5 and 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 [Table 7]

The mean LV ejection fraction was 30.87%. The LV ejection fraction was <20% in 6% of patients. It was between 20 and 29% in 40%, between 30 and 39% in 36.6% of patients, and between 40 and 45% in 16.6% of patients. The mean LV end-diastolic diameter was 5.86 cm with majority, i.e., 53% 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 (66%) having end systolic diameter more than 5 cm. Global hypokinesia and dilatation of all four 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.

Table 1: Demographic profile

Age group (years)	*n* (%)		
	Male	Female	Total
1–19	0 (0)	2 (6.65)	2 (6.65)
20–30	3 (10)	3 (10)	6 (20)
40–59	4 (13.3)	4 (13.3)	8 (26.6)
>60	10 (33.3)	4 (13.3)	14 (46.66)
Total	17 (56.33)	13 (43.25)	30 (100)

Table 2: Symptom profile

Symptoms	*n* (%)
Dyspnea	30 (100)
Palpitation	17 (56.6)
PND	18 (60)
Orthopnea	16 (53.3)
Chest pain	12 (40)
Pedal edema	21 (70)
Cough	18 (60)
Abdominal pain	10 (33.3)
Easy fatigability	25 (83.3)
Syncope	5 (16.6)
Asymptomatic	None (0)
Miscellaneous	7 (23.3)

PND: Paroxysmal nocturnal dyspnea

Table 3: Physical signs

Signs	*n* (%)
Basal crepitations	28 (93.33)
Raised JVP	22 (73.3)
Hepatomegaly	14 (46.6)
Pedeal edema	23 (76.6)
LV S3	14 (46.6)
RV S3	6 (20)
Pan systolic murmur at apex (MR)	14 (46.6)
Pan systolic murmur in tricuspid area (TR)	3 (10)
SBP<100 mgHg	8 (26.6)
Focal neurological deficit	1 (3.3)

JVP: Jugular venous pressure, SBP: Systolic blood pressure, LV: Left ventricular, RV: Right ventricular

Table 4: Abnormalities of peripheral pulse

Pulse	*n* (%)
Tachycardia	14 (46.6)
Bradycardia	1 (3.3)
Atrial fibrillation	4 (13.3)
Ectopic beats	16 (53.3)
Pulsusalternans	1 (3.3)

NYHA Class [Table 8]

Majority of the patients were in NYHA Class III (33%) and Class IV (46%) group.

Heart Failure [Table 9]

Biventricular failure was seen in 80% of patients isolated LV failure was seen in 16.6% and RV failure in 3.3%.

Table 5: Electrocardiographic profile

Parameters	*n* (%)
QRS axis	
Normal	24 (80)
Left axis deviation	4 (13.8)
Right axis deviation	2 (6.6)
Arrhythmias	
Sinus tachycardia	12 (40)
Atrial ectopics	3 (10)
Atrial fibrillation	4 (13.3)
SVT	2 (6.6)
Ventricular ectopics	14 (46.6)
Ventricular tachycardia	1 (3.3)
Complete heart block	1 (3.3)
Left bundle branch block	12 (40)
Right bundle branch block	4 (13.3)
ST-T changes	8 (26.6)
Atrial enlargement	
LAE	4 (13.3)
RAE	2 (6.6)
Ventricular hypertrophy	
LVH	6 (20)
RVH	2 (6.6)
Both	1 (3.3)

SVT: Supraventricular tachycardia, LAE: Left atrial enlargement, RAE: Right atrial enlargement, LVH: Left ventricular hypertrophy, RVH: Right ventricular hypertrophy

Table 6: Chest radiographic profile

Cardiothoracic ratio (%)	*n* (%)
50–60	14 (46.6)
60–70	12 (40)
>70	4 (13.3)
Pleural effusion	6 (20)
Pulmonary plethora	16 (53.3)

Table 7: Echocardiographic profile

Parameter	Range (%)	*n* (%)
Ejection fraction	40–45	5 (16.6)
	30–39	11 (36.6)
	20–29	12 (40)
	< 20	2 (6.6)
LVEDD	4.5–49 cm	4 (13.3)
	5.0–5.9 cm	10 (33.3)
	> 6 cm	16 (53.3)
LVSD	3.5–4.0 cm	6 (20)
	4.0–4.9 cm	10 (33.33)
	> 5 cm	14 (46.6)
MR		21 (73.3)
TR		3 (10)
Pericardial effusion		2 (6.6)

MR: Mitral regurgitation, TR: Tricuspid regurgitation, LVEDD: Left ventricular end - diastolic diameter; LVESD: Left ventricular end - systolic diameter

Etiological distribution [Table 10]

The most common type of DCM was ischemic DCM comprising 33.3% of all cardiomyopathies followed by diabetic cardiomyopathy (23.3%) and peripartum cardiomyopathy (16.6%). Idiopathic DCM was seen in 13.3% of subjects while alcoholic cardiomyopathy was

Table 8: NYHA class

NYHA class	*n* (%)
Class I	1 (3.3)
Class II	5 (16.6)
Class III	10 (33.3)
Class IV	14 (46.6)

NYHA: New York Heart Association

Table 9: Heart failure

Compartment involved	*n* (%)
LVF	5 (16.6)
RVF	1 (3.3)
Biventricular	24 (80)

LVF: Left ventricular failure, RVF: Right ventricular failure

Table 10: Etiological distribution

Cardiomyopathy	*n* (%)
Ischemic	10 (33.3)
Idiopathic	4 (13.3)
Diabetic	7 (23.3)
Peripartum	5 (16.6)
Alcoholic	2 (6.6)
Miscellaneous	2 (6.6)

seen in 6.6%. Miscellaneous group included 1 case each of β-thalassemia intermedia and polymyositis.

DISCUSSION

The present study 30 patients were evaluated, and their clinical profile, electrocardiographic, echocardiographic profile and the incidence of DCM in relation to other types of cardiomyopathies in patients admitted in RIMS Ranchi recorded.

In our study, DCM was predominantly seen in the elderly population. Of the total 30 subjects, males comprised 56.6% and females 43.25% in males, DCM was most commonly seen in the elderly (mean age 56.88 ± 15.99 years). In females DCM was predominantly seen middle age (41.15 ± 20.19 years). In our study, the mean age was 52.9 ± 15.1 years in males and 51.3.9 ± 17.7 years in females.[4] In another study, the mean age was 64.4 years in males and 55.5 years in females.[5]

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 β-thalassemia intermedia on long-term blood transfusion patient has polymyositis associated with DCM. DCM is known to occur in up to 50% of patients with polymyositis. Hazebroek *et al.*[6] worked on DCM and stated that in up to 50% cases, exact cause remains initially unknown; this condition is called idiopathic DCM. Improved diagnostic methods most notably the advancement in molecular and immunohistological biopsy techniques and genetic research have endorsed a new era in the diagnosis and classification of a patient with idiopathic DCM. These insights have led to novel etiology based treatment strategies and improved outcomes.

The most common presentation in our study was biventricular failure which was seen in 80% of cases. Isolated LV failure was seen in 16.6% of patients, most of these were ischemic DCM. Predominant RV failure was seen in one patient with alcohol cardiomyopathy. Majority of the patients were in NYHA Class IV (46.6%) and Class III (33.3%) while 16.6% were in NYHA Class II> Breathlessness was the most common symptom noticed in all patients. PND was seen in 18 patients (60%) while orthopnea was present in 16 patients (53.3%).

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. Sinus tachycardia was the most consistent finding in the Ahmad *et al.* study being found in up to 69% of patients.[4] Our study showed sinus tachycardia in 40% of patients. Other ECG parameters such as ventricular ectopic, LBBB, Atrial fibrillation, and atrial ectopic were comparable to those in all the other studies (Rihal *et al.*, 2005).[7]

CONCLUSION

Dilate cardiomyopathy is an important cause of heart failure affecting all age group and both sexes but predominantly in an elderly male. It is commonly associated with ischemia DCM and diabetes mellitus. It commonly presents as a biventricular failure with III or IV NYHA class, sinus tachycardia and low ejection fraction echocardiographically.

List of abbreviation

ECG: Electrocardiography
DCM: Dilated cardiomyopathy
PND: Paroxymal nocturnal dyspneoa
LV: Left Venntricle
RBS: Random blood sugar
RV: Right ventricle

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How to cite this article: Saha KK, Kumar A, Sneha K, Kumar P, Mishra AK, Tiwari MK, Roshan R. A Clinical Study Of Dilated Cardiomyopathy With Correlation to Electrocardiography and Echocardiography: A Cross Sectional Study. Int J Sci Stud 2018;5(11):91-95.

Source of Support: Nil, **Conflict of Interest:** None declared.