

Study of Dilated Cardiomyopathy in Correlation with Electrocardiography and Echocardiography in Patients less than 40 Years Age, in Bareilly

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ABSTRACT

Introduction: Dilated cardiomyopathy (DCM) is a syndrome characterized by cardiac enlargement and impaired systolic function of one or both ventricles. Due to increased awareness of this condition along with improvement in diagnostic techniques, dilated cardiomyopathy is being recognized as a significant cause of morbidity and mortality. The current study aimed at understanding DCM in correlation with electrocardiographic and echocardiographic less than 40 year patients.

Material and Methods: A total of 60 patients (30 males and 30 females) of dilated cardiomyopathy were studied. ECG and 2D Echocardiography was done among all these patients using standard techniques. Diagnosis of dilated cardiomyopathy done by echocardiography.

Results: Both males and females were affected but middle aged male population were found to be predominantly affected. Ventricular ectopics, Sinus tachycardia, Left and right bundle branch block and ST-T changes were common ECG abnormalities.

Conclusion: The ECHO findings in patients revealed a dilated LV cavity with low ejection fraction. Mitral regurgitation were seen in 73.3% of patients.

Keywords: Dilated Cardiomyopathy, Electrocardiography, 2D Echo, Ventricular Ectopics.

INTRODUCTION

Cardiomyopathy is a primary disorder of the heart muscle that causes abnormal myocardial performance and is not the result of disease or dysfunction of other cardiac structures, systemic arterial hypertension and valvular stenosis or regurgitation.¹ The most widely used functional classification of cardiomyopathy as per WHO⁷ and AHA recognizes 3 disturbances of function^{2,3} dilatation, hypertrophy and restriction. The prevalence of heart failure is about 1 to 1.5% of the adult population. Dilated cardiomyopathy is an important cause of heart failure and accounts for upto 25% of all cases of CHF.⁴ The incidence of DCM is reported to be 5 to 8 cases per 1,00,000 population per year. It occurs 3 times more frequently in males as compared to females. It is also more common in blacks. 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 and alcohol cardiomyopathy, but in age less than 40 years was most commonly due to idiopathic followed by alcohol, in a study done by Rana

and group.⁸ The annual mortality rate for a typical patient of DCM with heart failure is about 11 to 13 percent. Given the high prevalence of chronic heart failure in the country and the increasing use of echocardiography, the incidence of dilated cardiomyopathy is increasing. The present study was therefore undertaken to study the electrocardiographic and echocardiographic findings in patients with dilated cardiomyopathy in patients less than 40 years.

MATERIAL AND METHODS

The present study was performed in 60 patients of dilated cardiomyopathy either admitted in Rohilkhand hospital or attending cardiology clinic. 30 patients were male and 30 were female. Patients were selected from those presenting with signs and symptoms of congestive cardiac failure, asymptomatic patients having unexplained cardiomegaly on chest X-ray and abnormal ECG changes. Diagnosis of dilated cardiomyopathy was done by echocardiography.¹ Patients were excluded from the study with signs and symptoms of congestive cardiac failure with cardiomegaly on chest X-ray due to other diseases like coronary artery disease (past history of myocardial infarction, significant Q wave in ECG, scars or akinetic segment on ECHO), rheumatic valvular heart disease (by history reechocardiography), congenital heart disease (by echocardiography) and pericardial disease (by echocardiography). After selection of patients, detail history was obtained from each patients. Each patient was specifically asked about dyspnoea, palpitation, fatigability, sweating, swelling over feet, abdominal pain, syncope, and chest pain.

Patient was asked regarding the major illness like Hypertension, Diabetes Mellitus, Myocardial Infarction, Renal disease, COPD. Family history suggestive of dilated cardiomyopathy was asked. Complete clinical examination was carried out. On physical examination, special attention was given to presence of raised JVP, edema, gallop rhythm, systolic murmur, respiratory rate and congestive

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hepatomegaly. Routine laboratory investigations such as BSL profile, Liver function tests, Renal function tests, Serum calcium and phosphorus, and serum cholesterol were done.

Electrocardiography (ECG)

Standard 12 lead electrocardiograms were recorded as 25 mm per second and 1 mV per cm standardization. Rate, rhythm, P-R interval, QRS interval, QTc interval were measured. QRS axis was determined in frontal plane. Axis directed to the region between 0 counter clockwise to 90 was taken as left axis deviation. P wave abnormalities were noted. Left atrial enlargement was defined as P terminal force in V1 equal to more negative than -0.04 mm sec or notched P wave with duration of 0.12 second or more. Right atrial enlargement was the presence of peaked P wave with a height of 2.5 mm or more in a lead II, III, and avF. Biatrial enlargement was defined as presence of large diphasic P wave in lead V1 with the initial positive component reading greater than 1.5 mm and the terminal negative component reading 1 mm in amplitude and 0.04 sec. in duration. Left ventricular hypertrophy was defined as per Sokolows criteria^{103,104} as R-wave in V5 or V6 + S-wave in V1 >35 mm. ratio of R wave in V6 and maximum R wave in leads I, II, III (RV6/R max.) was calculated to find out the correlation the correlation of this ratio with ventricular dilatation and ejection fraction¹⁰³. ST segment and T wave abnormalities were noted.

Echocardiography

Comprehensive M-mode, two dimensional and Doppler

echocardiographic examinations were performed in all patients. Various measurements were done using long axis, short axis, two chamber and four chamber views. Measurements of left ventricular end diastolic diameter in (LVEDD),

Left ventricular systolic diameter (LVSD), Ejection fraction (EF), Mitral Regurgitation (MR), Tricuspid Regurgitation (TR), Pericardial Effusion. Patients having left ventricular dilatation and ejection fraction less than 40 per cent were diagnosed as dilated cardiomyopathy and included in the study. Patients looked for scar and akinetic segments and such patients were excluded from study. Valvular regurgitations were semi-quantitatively assessed with colour flow Doppler echocardiography. Other features like diastolic dysfunction, pulmonary hypertension, pericardial effusion and intracavitary clots were looked for.

RESULTS

In present study dilated cardiomyopathy was more common in the middle age, most common in fourth decade. Males were affected more commonly than female (M: F ratio - 1:1) (Table 1).

The electrocardiographic profile (Table 2) included abnormalities of rate, rhythm, axis and chamber enlargement. The most common abnormality was ventricular ectopics seen in 45% 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% LVH was seen in 20% and left atrial enlargement in 13.3% of subjects. Complete heart block was seen in only 1 patient (3.1%). The axis was normal in majority. Left axis deviation was seen in 13.3% and right axis deviation in 6.6%. The mean LV ejection fraction was 30.87%. The left ventricular ejection fraction was less than 20% in 6% of patients. It was between 20-29% in 40%, between 30-39% in 35% of patients and between 40-45% in 15.2% of patients

Age	Male	(%)	Female	(%)	Total (%)
1-10	0	0	0	0	0
10-20	12	20	8	13.33	20 (33.33)
20-30	6	10	14	24.33	20 (33.33)
30-40	12	20	8	13.33	20 (33.33)
Total	30	50	30	50	60 (100)

Table-1: Demographic Profile

Parameters		n	%
QRS axis	Normal	48	80
	Left axis	8	13.3
	Right axis deviation	4	6.6
Arrhythmias	Sinus tachycardia	24	40
	Atrial ectopics	6	10
	Atrial fibrillation	8	13.3
	SVT	4	6.6
	Ventricular ectopics	28	45
	Ventricular tachycardia	2	3.3
	Complete heart block	2	3.1
	Left bundle branch block	24	40
	Right bundle branch block	8	13.3
ST-T changes		16	26.6
Atrial enlargement	LAE	8	13.3
	RAE	4	6.6
Ventricular hypertrophy	LVH	12	20
	RVH	4	6.6
	Both	2	3.3

Table-2: ECG Features in Dilated cardiomyopathy patients (n=60)

Parameters	Range	n	%
Ejection Fraction	40-45%	10	15.2
	30-39%	22	35
	20-29%	24	40
	<20%	4	6.6
LVEDD	4.5-4.9 cm	8	13.3
	5.0-5.9 cm	20	33.3
	>6 cm	32	53.3
LVSD	3.5-4 cm	12	20
	4-4.9 cm	20	33.3
	>5 cm	28	46.6
Mitral regurgitation		42	73.3
Tricuspid regurgitation		6	10
Pericardial effusion		4	6.6

Table-3: Echocardiographic Profile

Parameter (mean)	Present study	Rana et al ²⁰¹⁴
L V ejection fraction (mean)	34.36	30.5
L VSED (cm)	5.42	64.5
L VSED (cm)	4.47	58.0
MR	72.33%	63.6%
TR	10%	26.3%
L V clot	3.3%	3.6%
Pericardial effusion	6.6%	4%

Table-4: Echocardiographic profile in different studies.

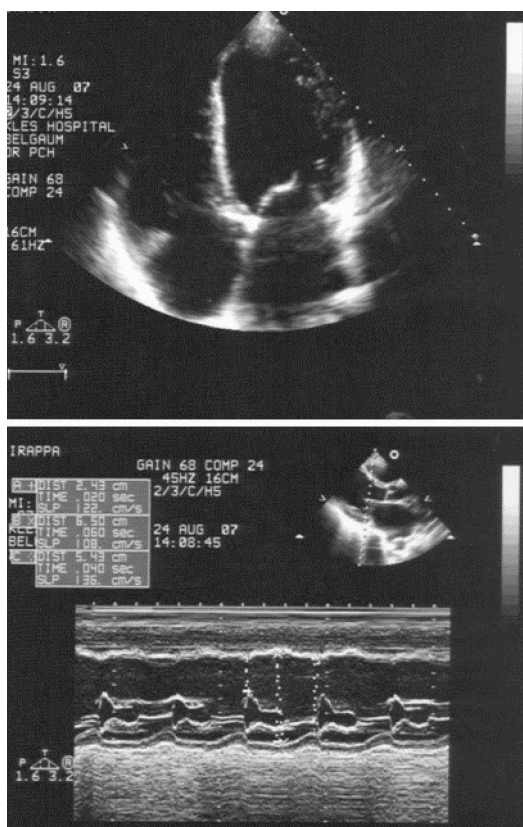


Figure 1 and 2: M mode echocardiography in dilated cardiomyopathy

(Table 3).

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 and 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 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 (31%) and IV (46%) group.

Etiological Distribution

The most common type of dilated cardiomyopathy was Peripartum dilated cardiomyopathy comprising 33.3% of all cardiomyopathies followed by Alcoholic cardiomyopathy (23.3%) and Thyroid cardiomyopathy (16.6%). Idiopathic DCM was seen in 13.3% of subjects while Ischemic cardiomyopathy was seen 6.6%. Miscellaneous group included 2 each of-SLE and chronic renal failure.

DISCUSSION

The present study aims to evaluate the clinical profile of patients with dilated cardiomyopathy in less than 40 years of age. Of the total 60 subjects, males comprised 50% and females 50%. In males, DCM was most commonly seen in the (mean age 28.88 ± 4.99 years). In females DCM was predominantly seen in age (22.15 ± 3.19 years). Peripartum dilated cardiomyopathy and thyroid was the most common subtype in females while idiopathic and alcohol cardiomyopathy were the etiologies in males. In one study conducted by Rana and group in central Gujarat comprised of males 56.66% and females 43.33% and 2/3rd population was between the age group 20-30 years.

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 commonest symptom noticed in all patients. PND was seen in 36 patients (60%).

Tachycardia was seen in 46.6% of patients. Bradycardia was seen in one patient secondary to complete heart block. Atrial fibrillation was seen in 13.3% of patients. Missed beats were present in 53.3% of patients. Pulsus alternans was present in only one patient with severe heart failure secondary to idiopathic DCM.

In our study upto 40% of patients had chest pain. This was similar compared to other studies like Rana et al 2014,⁸ where in chest pain was seen in 41.66%.

In addition syncope was observed in upto 16.6% of our patients, whereas in other studies syncope was seen 3.3% (Rana et al).^{2014,8} Of the 5 patients with syncope in our study 2 had peripartum DCM with low LV ejection fraction of which one had complete heart block.

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. Sinus tachycardia was the most consistent finding in the Rana et al⁸ study being found in upto 63.33% of patients. Our study showed sinus tachycardia in 40% of patients. However RBBB, complete heart block and

SVT were more commonly present in our study as compared to other studies.

LVH was less commonly seen in our study being present in 20% as compared 30 to 40% in other studies. Non specific ST-T changes were seen in 26% of cases, similar to that in other studies.

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 5.42 cm. The mean LV and systolic diameter was 4.47 cm (Table 4).

Mitral regurgitation was seen in 73.33% of our patients comparable to that in other study groups. Mitral regurgitation (73.33%) was more commonly seen compared to tricuspid regurgitation (10%). None of our patients had AR compared to 17.8% of patients in Jain et al study (figure 1 and 2).

Chest radiograph: Chest radiograph was abnormal in all the cases showing varying degree of cardiomegaly with cardiothoracic ratio varying between 0.5 to 0.75. This was similar to the study done by Massumi et al⁹ 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 study⁹ and 10% in Rana et al⁸ group. Pulmonary plethora was seen in 53% as compared to 72% in Massumi et al group and 76.3% in the Rana et al⁸ group.

Etiological profile: In our study the most common type of DCM was peripartum DCM being present in 33.3% of our patients, followed by alcohol cardiomyopathy seen in 23.3% thyroid cardiomyopathy was the third most common type seen in 16.6% of patients while idiopathic and ischemic cardiomyopathy were seen in 13.3% and 6.6% respectively. Ischemic cardiomyopathy was not included in most studies on dilated cardiomyopathy due to lack of such cases in age less than 40 years of age. In Rana et al study idiopathic cardiomyopathy comprised 30% of cases followed by alcohol dilated cardiomyopathy seen in 23.33% of patients. Coronary angiography was done in all the patients with ischemic cardiomyopathy. Of the 4 patients studied 3 had history of previous myocardial infarction. All the 4 patients had significant narrowing of epicardial coronaries (i.e. \geq 70% of lumen). 2 patients had double vessel disease, three showed triple vessel disease and one had single vessel disease. The echocardiography of all the patients showed global hypokinesia with reduced ejection fraction.

In our study 33.3% of patients had anemia, most of the patients had mild anemia (i.e. Hb between 8.5 – 11 gm%). In a study done by A. Justin et al anemia was found in 27% of patients with congestive heart failure. The prevalence of anemia in our study is similar. Anemia is known to be associated with adverse outcome in patients with heart failure.

CONCLUSION

A study of 60 cases of dilated cardiomyopathy was done from June, 2017 to July, 2017 who were admitted to RMCH, Barielly. The conclusions of the study were 1) Dilated

cardiomyopathy is equal in incidence in age groups 10-20, 20-30, 30-40 aged population and the etiology varies with age in the age group less than 40 years of age. 2) Dilated cardiomyopathy of equal incidence in male and female. 3) Biventricular failure was the most common clinical presentation (80%) followed by left heart failure (16.6%) and then right heart failure (3.3%). 4) The most common type was peripartum variety followed by alcohol, thyroid, idiopathic and ischemic cardiomyopathy. 5) The electrocardiographic profile consisted of ventricular ectopics, sinus tachycardia, left bundle branch block, atrial fibrillation, right bundle branch block, atrial ectopics, SVT, ventricular tachycardia and complete heart block. LVH was present in 20% of cases. 6) Echocardiographic profile included reduced ejection fraction and global hypokinesia in all the patients. There was varying degree of left ventricular dilatation. Mitral regurgitation was seen in significant number of patients (73.3%). Pericardial effusion was seen 6% of our patients. 7) Most of the patients were in NYHA class IV (46%) and class III (33%).

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