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Study of Dilated Cardiomyopathy in Correlation with Electrocardiography and chocardiography in Patients less than 40 Years Age

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***Abstract*---**Background: DCM is a disease of the heart muscle, primarily affecting the left ventricle and characterized by ventricular dilatation, impaired systolic function, and reduced myocardial contractility. The present study was conducted to study the electrocardiographic and echocardiographic findings in patients with dilated cardiomyopathy in patients less than 40 years in Varun Arjun Medical College, Banthra, Shahjahanpur over 2 years. Material and methods: The present study was performed in 100 patients (50 males and 50 females) of dilated cardiomyopathy over 2 years. Diagnosis of dilated cardiomyopathy was done by echocardiography. After selection of patients, detail history and complete clinical examination was carried out. ECG and Echocardiography was done among all these patients using standard techniques. Results: The axis was normal in majority (85%). Left axis deviation was seen in 9% and right axis deviation in 6%. The most common abnormality was ventricular ectopics seen in 43% of patients. Sinus tachycardia and left bundle branch blocks were seen in 40% of subjects. Non specific ST-T changes were seen in 27% whereas atrial fibrillation was present in 12%. LVH was seen in 20% and left atrial enlargement in 14% of subjects. The left ventricular ejection fraction was less than 20% in 6% of patients. Conclusion: The present study concluded that the electrocardiography revealed that the most common abnormality was ventricular ectopics seen in 43% of patients. ECHO findings in

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patients revealed a dilated LV cavity with low ejection fraction and Mitral regurgitation were present in 74% of patients.

***Keywords*---**Dilated cardiomyopathy, tricuspid regurgitation, mitral regurgitation, Electrocardiography and Echocardiography.

Introduction

Cardiomyopathy is a disease of the heart muscle that leads to deterioration of myocardial function.[1] According to the World Health Organization (WHO) and American Heart Association (AHA) cardiomyopathy is categorized as dilated cardiomyopathy (DCM), hypertrophic cardiomyopathy (HCM), restrictive cardiomyopathy (RCM) obliterative cardiomyopathy (OCM) and arrhythmogenic right ventricular cardiomyopathy (ARVC).[2-3]Dilated cardiomyopathy (DCM) is a non-ischaemic heart muscle disease with structural and functional myocardial abnormalities. The clinical picture of DCM is defined by left or biventricular dilatation and systolic dysfunction in the absence of coronary artery disease, hypertension, valvular disease or congenital heart disease.[4] The American Heart Association classifies DCM as genetic, mixed or acquired, whereas the European Society of Cardiology (ESC) groups cardiomyopathy into familial (that is, genetic) or nonfamilial (that is, nongenetic) forms.[5,6] The WHO defines DCM as a serious cardiac disorder in which structural or functional abnormalities of the heart muscle can lead to substantial morbidity and mortality owing to complications such as heart failure and arrhythmia.[7] Dilated cardiomyopathy is an important cause of heart failure and accounts for upto 25% of all cases of CHF.[8] 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. 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.[9]Electrocardiogram and Echocardiography are essential tools for the evaluation of patients with DCM. The prevalence of electrocardiographic abnormalities in DCM is high, averaging 83%. Cardiac arrhythmias and ECG abnormalities are an important cause of decompensation to heart failure in patients with DCM in addition to increased morbidity, for instance, cardio-embolic stroke in atrial fibrillation and the presence of left ventricular thrombus.[10] 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 100 patientsof dilated cardiomyopathy. Patients who were presenting with signs and symptoms of congestive cardiac failure, asymptomatic patients having unexplained cardiomegaly on chest X-ray and abnormal ECG changes were included in the study. Diagnosis of dilated cardiomyopathy was done by echocardiography. Patients who were 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&echocardiography), congenital heart disease(by echocardiography) and pericardial disease (by echocardiography) were excluded from the study. 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 hepatomegaly. Routine laboratory investigations such as BSL profile, Liver function tests, Renal function tests, Serum calcium and phosphorus, and serum cholesterol were done. 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 of this ratio with ventricular dilatation and ejection fraction103. ST segment and T wave abnormalities were noted. 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 intracavitatory clots were looked for.

Results

The present study was conducted among 100 patients with dilated cardiomyopathy who were less than 40 years.

Table 1: ECG Features in Dilated cardiomyopathy patients

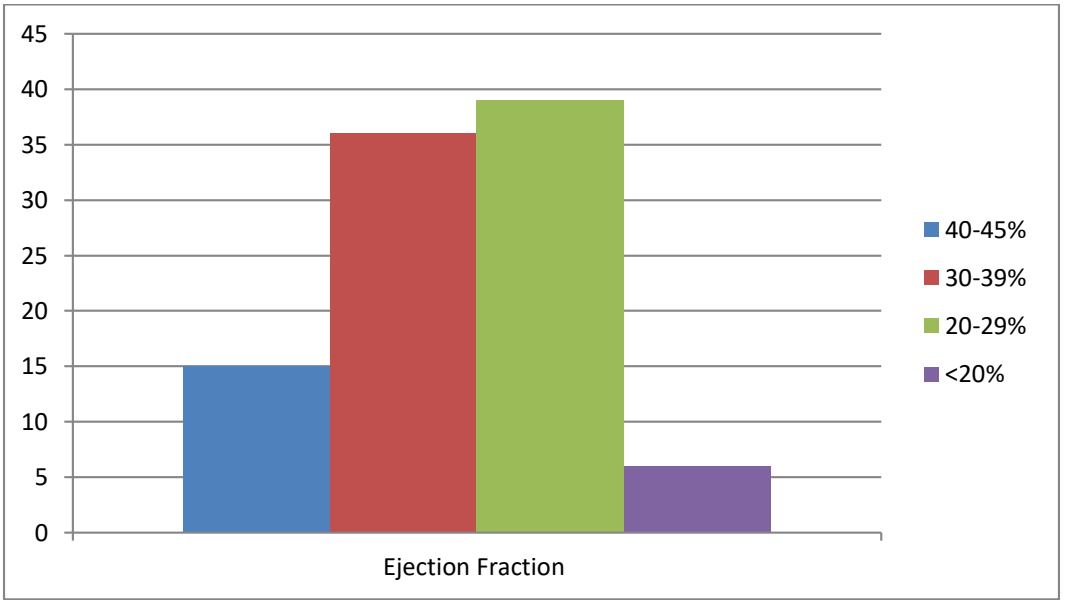
Parameters		%
QRS axis	Normal	85
	Left axis	9
	Right axis deviation	6
Arrhythmias	Sinus tachycardia	40
	Atrial ectopics	10
	Atrial fibrillation	12
	SVT	6
	Ventricular ectopics	43
	Ventricular tachycardia	3
	Complete heart block	3
	Left bundle branch block	40
	Right bundle branch block	12
ST-T changes		27
Atrial enlargement	LAE	14
	RAE	5
Ventricular hypertrophy	LVH	20
	RVH	5
	Both	4

The axis was normal in majority (85%). Left axis deviation was seen in 9% and right axis deviation in 6%. The most common abnormality was ventricular ectopics seen in 43% of patients. Sinus tachycardia and left bundle branch blocks were seen in 40% of subjects. Non specific ST-T changes were seen in 27% whereas atrial fibrillation was present in 12%. LVH was seen in 20% and left atrial enlargement in 14% of subjects.

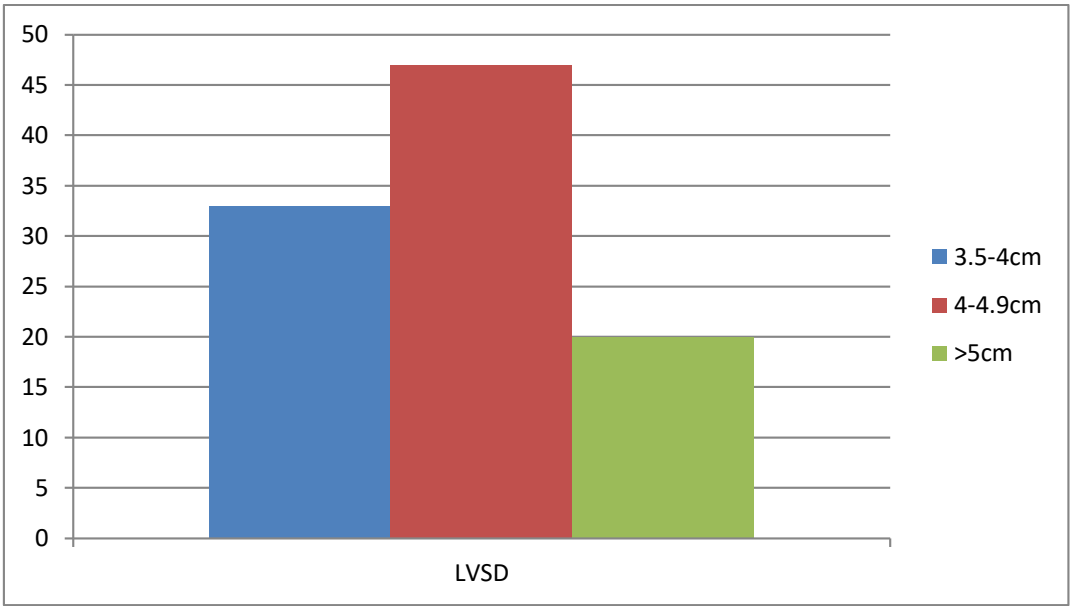
Table 2: Echocardiographic Profile

Parameters	Range	%
Ejection Fraction	40-45%	15
	30-39%	36

	20-29%	39
	<20%	6
LVEDD	4.5-4.9 cm	13
	5.0-5.9 cm	34
	>6 cm	53
LVSD	3.5-4 cm	33
	4-4.9 cm	47
	>5 cm	20
Mitral regurgitation		74
Tricuspid regurgitation		11
Pericardial effusion		6



Graph 1: Ejection fraction



Graph 2: LVSD

The left ventricular ejection fraction was less than 20% in 6% of patients. It was between 20-29% in 39%, between 30-39% in 36% of patients and between 40-45% in 15% of patients. The LV end diastolic diameter was >6 cm in majority i.e. 53% of subjects. The LV end systolic diameter was between 4-4.9 cm, with majority of patients 47%. 74% had mitral regurgitation, 11% had tricuspid regurgitation and pericardial effusion was seen in 6% of patients.

Discussion

DCM, the most common form of cardiomyopathy is characterized by ventricular chamber enlargement and systolic dysfunction. DCM leads to progressive heart failure and a decline in LV contractile function, ventricular and supraventricular arrhythmias, conduction system abnormalities, thromboembolism, and sudden or heart failure-related death.[10]DCM is a common and largely irreversible form of heart muscle disease with an estimated prevalence of 1:2500 persons and is the third most common cause of heart failure and the most frequent indication of heart transplantation.[11]

The axis was normal in majority (85%). Left axis deviation was seen in 9% and right axis deviation in 6%. The most common abnormality was ventricular ectopics seen in 43% of patients. Sinus tachycardia and left bundle branch blocks were seen in 40% of subjects. Non specific ST-T changes were seen in 27% whereas atrial fibrillation was present in 12%. LVH was seen in 20% and left atrial enlargement in 14% of subjects. The left ventricular ejection fraction was less than 20% in 6% of patients. It was between 20-29% in 39%, between 30-39% in 36% of patients and between 40-45% in 15% of patients. The LV end diastolic diameter was >6 cm in majority i.e. 53% of subjects. The LV and systolic diameter was between 4-4.9 cm, with majority of patients 47%. 74% had mitral

regurgitation, 11% had tricuspid regurgitation and pericardial effusion was seen in 6% of patients.

Barman RN et al found that the Sinus tachycardia, non specific ST-T change, LVH, non progression of R in v1-v5 were common ECG abnormalities. The study concluded that ECG may be normal in patients with DCM though sinus tachycardia and non specific ST-T abnormalities were common.[12] Sreeramulu Vet al revealed by electrocardiograph that severe LV systolic dysfunction was very common among dilated cardiomyopathy patients.[10]

Saxena NKet al found that both males and females were affected but and 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.The study concluded that ECHO findings in patients revealed a dilated LV cavity with low ejection fraction. Mitral regurgitation were seen in 73.3% of patients.[13] Roberts *et al* have reported left axis deviation in 43% and right axis deviation in 7% of patients.[14] Wilensky *et al*[10] have found that range of QRS axis was from -130^0 to $+130^0$ and mean QRS axis was -21^0.

Werner *et al*[15] found the presence of MR in most of the patients with dilated cardiomyopathy. Karl *et al* found that MR was present in 89% of the patients.[17] Bahl *et al* in their study of LV diastolic dysfunction in patients of idiopathic dilated cardiomyopathy that patients with advanced disease demonstrate a restrictive pattern on pulse Doppler echocardiography.[18]

Conclusion

The present study concluded that the electrocardiography revealed that the most common abnormality was ventricular ectopics seen in 43% of patients. ECHO findings in patients revealed a dilated LV cavity with low ejection fraction and Mitral regurgitation were present in 74% of patients.

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