Study of screening of ECG and ECHO changes in order to improve the longevity of dilated cardiomyopathy patients

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ABSTRACT

Background: Cardiomyopathy is a disease of myocardium that results in poor myocardial performance and is not caused by disease or malfunction in other cardiac components. Present study was aimed to periodical screening of ECG and ECHO changes in order to improve the longevity of dilated cardiomyopathy patients. **Material and Methods:** Present study was cross sectional study, conducted in patients of age > 18 years, either gender, echocardiography findings suggestive of dilated cardiomyopathy (LV ejection fraction <45%, LV end-diastolic dimension >3 cm/body surface area, LV diastolic dysfunction & Global hypokinesia). **Results:** Among 87 patients, males and females were 56.3 % and 43.7 % respectively. Breathlessness was the commonest symptom noticed (82.8 %) followed by palpitation (62.1 %), cough (62.1 %), PND (55.2 %) & orthopnea (48.3%). Among signs observed, common signs were basal crepitations (87.4 %), raised JVP (73.6 %), pedal edema (67.8 %), hepatomegaly (49.4 %) & LV S3 (49.4 %), Most common type of DCM was ischemic DCM (51.7 %), followed by idiopathic cardiomyopathy (16.1 %), diabetic cardiomyopathy (14.9 %) & alcohol cardiomyopathy (4.6 %). Common ECG findings were sinus tachycardia (51.7%), VPC (26.4%), atrial fibrillation (13.8%), sinus bradycardia (8%) & RBBB (4.6%). The mean LV ejection fraction in our study group was 31.6 ± 7.7 %. The mean LV end diastolic diameter was 6.0 ± 0.8 cm. The mean LV end systolic diameter was 4.9 ± 0.6 cm. Other parameters were MR (73.33 %), TR (10 %), Pericardial Effusion (6.6 %) & LV clot (3.3 %). **Conclusion:** Among dilated cardiomyopathy patients electrocardiographic profile consisted of ventricular ectopics, sinus tachycardia, left bundle branch block, Atrial fibrillation, right bundle branch block, atrial ectopics, ventricular tachycardia and complete heart block. Echocardiographic profile included reduced ejection fraction and global hypokinesia in all the patients.

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Keywords: dilated cardiomyopathy, electrocardiographic profile, echocardiography, ventricular ectopics, bundle branch block

Introduction: Cardiomyopathy is a disease of myocardium that results in poor myocardial performance and is not caused by disease or malfunction in other cardiac components. The direct participation of the cardiac muscle itself is the most prominent feature.[1] The most prevalent type of cardiomyopathy is dilated cardiomyopathy.[1,2] Dilated cardiomyopathy is a common cause of heart failure, accounting for up to 25% of all Congestive cardiac failure cases. The incidence and frequency of heart failure owing to cardiomyopathy appears to be increasing, whether as a result of better detection or some other mechanism.[1,2]

The annual incidence of dilated cardiomyopathy is estimated to be 5 to 8 cases per 100,000 people. Males are three times as likely more than females to develop it. It's also more common among black people. Dilatation, hypertrophy, and restriction are the three functional abnormalities recognized by the most extensively used functional categorization of cardiomyopathy. Ischemic dilated cardiomyopathy is the most frequent kind, followed by diabetes and alcohol-related cardiomyopathies.[3]

Natural history of dilated cardiomyopathy isn't well documented. Many patients have few or no symptoms, and the disease's development is unpredictable. Long-term prognosis is not promising. However, in symptomatic individuals, the course is frequently one of progressive worsening, with up to 50% of heart failure patients succumbing within a year.[4,5,6] Present study was aimed to periodical screening of ECG and ECHO changes in order to improve the longevity of dilated cardiomyopathy patients.

Material And Methods

Present study was cross sectional study, conducted in department of internal medicine, at Govt. Chengalpattu Medical College & Hospital, Chengalpattu, India. Study duration was of 10 months (December 2020 to October 2021). Study approval was obtained from institutional ethical committee.

Inclusion criteria

- Patients of age > 18 years, either gender, echocardiography findings suggestive of dilated cardiomyopathy (LV ejection fraction <45%, LV end-diastolic dimension >3 cm/body surface area, LV diastolic dysfunction & Global hypokinesia), willing to participate in present study.

Exclusion criteria

- Valvular heart disease, Congenital heart disease, Pericardial disease, Corpulmonale with CHF.
- Hypertrophic cardiomyopathy, Restrictive cardiomyopathy
- Patients who are not willing to participate in study.

Study was explained to patients in local language & written consent was taken for participation & study. Data collection form was prepared to note the Name, Age, Sex, Occupation, Address, Complaints, Past Medical History, Smoking, Alcoholism, Drug Intake and other relevant history. A detailed history was obtained from them and symptom analysis was done. A detailed clinical examination was also done. A 12-lead electrocardiogram was obtained, analysed for rhythm disturbances. Echocardiogram was done for all patients. In all patients chamber dimension and EF were measured, and other findings like global hypokinesia, LV dysfunction also noted, patient's hemoglobin, sugar, urea, creatinine, liver parameters are also studied, the clinical profile along with the probable etiology,

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complications, radiological (Chest x ray) and electrocardiographic (2 dimensional transthoracic) findings are summarized and compared with existing data.

Data was entered in Microsoft Excel Spread sheet and analysed. Data analysis was done with the use of standard SPSS software. Descriptive Statistics were used to calculate the frequency, mean and standard deviation. Students'' values were applied for significance. Significance was considered if the 'p' value was below 0.05.

Results

In present study, among 87 patients, males and females were 56.3 % and 43.7 % respectively. The mean ages of them were 58.2±10.6 years and 56.3±11.8 years. The mean ages of between them were not statistically significant (P>0.05). The total mean of them was 57.4 ± 11.1 years with range of 22 to 73 years.

Table 1: Age and gender distribution

Age group (Years)	Males		Females		Total	
	Frequency	**%**	**Frequency**	**%**	**Frequency**	**%**
20-29	1	1.1	2	2.3	3	3.4
30-39	3	3.4	3	3.4	6	6.9
40-49	5	5.7	3	3.4	8	9.2
50-59	10	11.5	9	10.3	19	21.8
60-69	26	29.9	18	20.7	44	50.6
70-79	4	4.6	3	3.4	7	8.0
Total	49	56.3	38	43.7	87	100.0
Mean± SD	58.2±10.6		56.3±11.8		57.4±11.1	
Significance	"t"=0.823, df =85, P=0.413				Range= 22-73 (years)	

Breathlessness was the commonest symptom noticed (82.8 %) followed by palpitation (62.1 %), cough (62.1 %), PND (55.2 %) & orthopnea (48.3%). Among signs observed, common signs were basal crepitations (87.4 %), raised JVP (73.6 %), pedal edema (67.8 %), hepatomegaly (49.4 %) & LV S3 (49.4 %),

Table 2: Clinical features

Clinical features	Frequency	%
Symptoms		
Breathlessness	72	82.8
Palpitation	54	62.1
Cough	54	62.1
PND	48	55.2
Orthopnea	42	48.3
Chest pain	35	40.2
Abdominal Pain	30	34.5
Syncope	16	18.4
Signs		
Basal Crepitations	76	87.4
Raised JVP	64	73.6
Pedal Edema	59	67.8
Hepatomegaly	43	49.4
LV S3	43	49.4

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PSM	41	47.1
SBP<100	28	32.2
RV S3	17	19.5

Majority of the patients were in NYHA class IV (43.7%) and class III (33.3%) while 18.4 % were in NYHA class II.

Table 3: NYHA classification

Grade	Frequency	%	Significance
1	4	4.6	
2	16	18.4	$\chi 2$=30.563 P<0.001
3	29	33.3	
4	38	43.7	

Except IHD, the other histories were statistically significantly differed between DM, CKD and Alcohol. (P<0.001). The IHD was not significantly significant (P>0.05).

Table 4: to their history namely DM, CKD, IHD and alcoholic intake:

Category	Yes and no	Frequency	%	Significance
DM	Yes	26	29.9	$\chi 2$=14.080 P<0.001
	No	61	70.1	
CKD	Yes	5	5.7	$\chi 2$=68.149 P<0.001
	No	82	94.3	
IHD	Yes	43	49.4	$\chi 2$=0.011 P>0.05
	No	44	50.6	
Alcohol	Yes	28	32.2	$\chi 2$=11.046 P<0.001
	No	59	33.3	

In our study the most common type of DCM was ischemic DCM (51.7 %), followed by idiopathic cardiomyopathy (16.1 %), diabetic cardiomyopathy (14.9 %) & alcohol cardiomyopathy (4.6 %).

Table 5: Etiology

Etiology	Frequency	%
Ischemic	45	51.7
Idiopathic	14	16.1
Diabetic	13	14.9
Alcoholic	4	4.6
CKD	3	3.4
Peripartum	2	2.3
Hypothyroidism	1	1.1
Anemia	1	1.1
Beri Beri	1	1.1
Post viral Myocarditis	1	1.1
Scorpion sting	1	1.1
Viral	1	1.1

Common ECG findings were sinus tachycardia (51.7%), VPC (26.4%), atrial fibrillation (13.8%), sinus bradycardia (8%) & RBBB (4.6%). The AF, SB, VPC and RBBB were

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differed significantly (P<0.001).

Table 6: ECG findings

Yes and no	Frequency	%	Significance
ST	45	51.7	$\chi2=0.103$ P>0.05
VPC	23	26.4	$\chi2=19.322$ P<0.001
AF	12	13.8	$\chi2=45.621$ P<0.001
SB	7	8.0	$\chi2=61.253$ P<0.001
RBBB	4	4.6	$\chi2=71.736$ P<0.001

The mean LV ejection fraction in our study group was 31.6 ± 7.7 %. The mean LV end diastolic diameter was 6.0 ± 0.8 cm. The mean LV end systolic diameter was 4.9 ± 0.6 cm. Other parameters were MR (73.33 %), TR (10 %), Pericardial Effusion (6.6 %) & LV clot (3.3 %).

Table 7: 2D ECHO findings

Parameter (mean)	Frequency/ Mean ± SD	%
Clinical features		
LV Ejection fraction (%)	31.6 ± 7.7	
LVEDD (cm)	6.0 ± 0.8	
LVESD (cm)	4.9 ± 0.6	
MR	64	73.33%
TR	9	10%
LV clot	3	3.3%
Pericardial Effusion	6	6.6%

Hemoglobin < 11 gm %, BSL > 200 mg/dl, Urea > 45 mg/dl & Creatinine >1.20 mg/dl were significantly associated with dilated cardiomyopathy.

Table 8: Laboratory parameters

	Frequency	%	Mean ± SD	Significance
Hemoglobin < 11 gm %	64	73.6	9.7 ± 1.2	P<0.001
BSL > 200 mg/dl	31	35.6	255.7 ± 41.2	P < 0.001
Urea > 45	42	48.3	62.3 ± 21.6	P < 0.001

Discussion

Dilated cardiomyopathy is the end result of a number of ischemia, toxic, metabolic, and immunological mechanisms that damage the heart muscle. The initial injury to the myocardium may differ, but the mechanism and clinical presentation are the same in all forms. Congestive heart failure, mainly left ventricular failure, is the most frequent clinical manifestation. The patient can present with symptoms secondary to arrhythmias, stroke (embolic infarction) or sudden death. [4]

The present study aims to evaluate the clinical profile of patients with dilated cardiomyopathy. In our study, dilated cardiomyopathy was predominantly seen in the elderly population. Of the total 87 subjects, males comprised 56.3% and females 43.7%. In males, DCM was most commonly seen in the elderly (mean age 58.2 ± 10.6 years). In females also DCM was predominantly seen in old age (56.3 ± 11.8 years). The underlying etiology varied with the age group.

In study by Ahmad S et al.,[7] the mean age was 52.9 ± 15.1 years in males and

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51.3.9±17.7 years in females. In study by Singh G et al.,[8] the mean age was 64.4 years in males and 55.5 years in females. In a study by Jain A et al.,[9] mean age of presentation was 42.6±9.1 years with males comprising 73.6% and females comprising 26.4% of the study population. Similar findings noted in present study.

Majority of the patients presented with biventricular failure. Exertional dyspnea was the most common symptom being present in all our patients followed by easy fatigability, pedal edema, cough, palpitation and abdominal pain. This presentation is similar to the clinical profile seen in other studies.[7,8,9] In our study up to 40.2% of patients had chest pain. This was high compared to other studies like S. Ahmad et al.,[7] where in chest pain was seen in 29%. This could be due to inclusion of patients with ischemic cardiomyopathy as compared to the other study where it was excluded.

In Jain et al.,[9] 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.

Abnormalities of pulse rate and rhythm were the most consistent physical signs, basal crepitations indicating LV failure were seen in 76(87.4)% of our patients. These findings were similar Ahmad S et al.,[7]

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 45(51.7%) of patients. Atrial fibrillation was found in 12(13.8%), bradycardia was found in 7(8%),VPC was found in 23(26.4%), RBBB was found in 4(4.6%)Other ECG parameters like ventricular ectopics, LBBB, Atrial fibrillation, atrial ectopics were comparable to those in all the other studies.[7,10]

The mean LV ejection fraction in our study group was 31.6 %. This was similar to that in all the other studies on DCM. The mean LV end diastolic diameter was 6.0 cm. The mean LV end systolic diameter was 4.9 cm. These 2 parameters were less compared to those in all the other studies. However fractional shortening was comparable to all the other groups.[7,8,9,10,11] 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%). This was due to large proportion of patients with ischemic dilated cardiomyopathy and severe LV dysfunction compared to non ischemic cardiomyopathy. None of our patients had AR compared to 17.8% of patients in Jain et al.,[9] study. Mitral and tricuspid regurgitation in DCM is secondary to annular ring dilatation. Left ventricular clot was seen in one patient who also had cerebral embolism secondary to AF. Similar findings were noted in other studies.[7,10,11,12]

In present study, 35.6% of patients found to have increased sugar value(>200mg), it signifies the impact of diabetes mellitus in dilated cardiomyopathy and the most acceptable proposal is micro vasculopathy. 39.1% of patients had elevated creatinine levels which includes both AKI and CKD, it implies the cardiorenal syndrome incidence, and screening of both concurrent.

Dilated cardiomyopathy is the most common type of cardiomyopathy and an important cause of congestive heart failure. 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. The common abnormalities on ECG consist of sinus tachycardia, atrial fibrillation and ventricular premature contractions. Echocardiography revealed reduced ejection fraction and global hypokinesia universally. These findings helps in early diagnosis of dilated cardiomyopathy leading to early treatment & preventive measures so as to improve the

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longevity of dilated cardiomyopathy patients.

Conclusion

Among dilated cardiomyopathy patients electrocardiographic profile consisted of ventricular ectopics, sinus tachycardia, left bundle branch block, Atrial fibrillation, right bundle branch block, atrial ectopics, ventricular tachycardia and complete heart block. Echocardiographic profile included reduced ejection fraction and global hypokinesia in all the patients. These findings help in early diagnosis of dilated cardiomyopathy leading to early treatment & preventive measures so as to improve the longevity of dilated cardiomyopathy patients.

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