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Assessment of Abnormality Patterns and Complications Amongst COPD patients by ECG/2D ECHO/Lipid Profile Findings: A Prospective Observational Study

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ABSTRACT

Background: There are a substantial proportion of deaths in patients with COPD as a result of cardiovascular complications & recent large epidemiological studies reveal increased cardiovascular mortality, in COPD patients, particularly in those younger than 65years. The present study was conducted
1.To study the clinical profile(exposure history and investigations) of cardiovascular dysfunction in case of COPD by studying the ECG, 2D Echo, Lipid Profile & the extent of its complications.
2. To study association between cardiovascular dysfunction and COPD severity grading.
3. To estimate parameter values of Lipid Profile in COPD patients.

Material and Methods: This study was prospective observational study conducted among 61 COPD patients who attended outpatient department of pulmonary medicine of THRC & affiliated health posts of medical college in Navi Mumbai over the period of one year from Jan 2015 to Dec 2015. Patients were subject to- ECG, Lipid Profile, 2D Echo and according to the above test results the patterns of cardio-vascular dysfunction in COPD patients were analysed. Data was analysed by using statistical package SPSS 16.

Results: In this study, out of 61 COPD patients, 40 (65.6%) had normal ECG findings and 7 (11.5%) had incomplete RBBB, LBBB & Incomplete RBBB respectively. Whereas 22(36.1%) had normal 2D-ECHO finding and 26(42.6%) had Concentric Cardiomyopathy. In Pre Predicted Percentage of

FEV1, 19 patients were Moderate (50 to 80 % predicted), 26 patients were severe (30 to 50 % predicted), 16 were very severe (< 30 % predicted). In Post Predicted Percentage of FEV1, 12 were transferred in Moderate grade, 8 from severe and 4 from very severe grade respectively. And out of 16 was very severe grade in pre predicted percentage, 4 were converted in to moderate & 3 were in to severe grade. No significant association found between ECG & 2D-ECHO with Pre Predicted Percentage of FEV1.

Conclusion: Our study concluded that there was no significant association found between ECG & 2D-ECHO with Pre Predicted Percentage of FEV1.

Keywords: COPD, ECG, 2D-ECHO, Cardiomyopathy.

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INTRODUCTION

There are a substantial proportion of deaths in patients with COPD as a result of Cardio Vascular Complications & recent large epidemiological studies revealed increased cardiovascular mortality particularly in patients younger than 65 years with COPD.[1,2] Cardiovascular sequelae of chronic obstructive pulmonary disease have been recognized for decades.[3] The spectrum of these include-1) Right Ventricular Dysfunction. 2) Pulmonary Hypertension 3) Coronary Artery disease 4) Dysarrhythmias.[4] Pulmonary Vascular Disease associated with COPD increases morbidity and worsens survival.[3,5,6] Patients with

COPD also carry an increased risk of mortality due to arrhythmia, myocardial infarction or congestive heart failure compared with those who do not.[6,4,7] Because cardiac abnormalities clearly contribute to overall morbidity associated with COPD, an understanding of their role & potential for treatment is vital.[8,9] The present study was conducted

1. To study the clinical profile(exposure history and investigations) of cardiovascular dysfunction in case of COPD by studying the ECG, 2D Echo, Lipid Profile & the extent of its complications.

2. To study association between cardiovascular dysfunction and COPD severity grading.
3. To estimate parameter values of Lipid Profile in COPD patients.

MATERIALS & METHODS

This study was prospective observational study conducted among 61 COPD patients who attended outpatient department of pulmonary medicine of THRC & affiliated health posts of medical college in Navi Mumbai over the period of one year from Jan 2015 to Dec 2015.

Sample was selected by convenient sampling. Patients in the age group of 32-80 years, who were already diagnosed with COPD based on Gold Criteria were included in the study. Apart from critical condition patients, no other exclusion criteria was applied. Baseline measurements were performed by- Blood Investigation-

Lipid profile: To analyse dyslipidemias in cases of COPD, ECG: to analyse the ischemic change/ hypertrophies (RV /LV) / dysarrhythmias in patients of COPD, 2 D Echo: 2 D Echo used as a screening for pulmonary hypertension & other cardiac abnormalities in relation with IHD. In that to analyse for LVEF / RWMA / Right Ventricular dysfunction.

Before the commencement of the study, written informed consent was taken from all patients. Patients were subject to- ECG, Lipid Profile, 2D Echo and according to the above test results the patterns of cardio-vascular dysfunction in COPD patients were analysed. Data was analysed by using statistical package SPSS 16. For quantitative variables descriptive statistics were calculated (Mean& SD) for qualitative variables proportion and percentage values were calculated. The association of risk factors with outcome of COPD were checked by using Chi-Square test at 5 % level of significance.

Table 1: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Age	61	32.00	80.00	57.4590	9.13341
Smoking Duration	40	5.00	60.00	19.7000	14.87762
Exposure Duration	21	4.00	40.00	19.1429	12.97030
Occupation Exposure Duration	22	11.00	20.00	16.1364	4.34572
Biomass Fuel exposure duration	9	4.00	20.00	15.4444	6.06447
HR	61	70.00	90.00	80.2787	5.24446
SBP	61	90.00	165.00	126.8033	13.46455
DBP	61	60.00	94.00	79.7049	7.10714
RR	61	18.00	28.00	22.7541	2.50769
PR	61	70.00	90.00	84.1311	3.81871
LDL	61	100.00	170.00	133.4754	21.59368
HDL	61	19.20	54.00	41.1148	6.31009
Triglycerides	61	62.80	209.00	140.8410	35.53495
Cholesterol	61	148.00	218.00	187.7295	16.49512
VLDL	61	11.00	39.50	23.8393	7.08123
Ratio Cholesterol HDL	61	3.48	8.15	4.6825	.87692

Table 2: Morbidity pattern amongst COPD Patients

Morbidity	Present (%)	Absent (%)	Not Known (%)	Total (%)
Hypertension	14(23)	47(77)	00(00)	61(100)
Diabetes	10(16.4)	51(83.6)	00(00)	61(100)
Ischemic Heart disease	07(11.5)	54(88.5)	00 (00)	61(100)
History of COPD Exacerbation	08(13.1)	19(31.1)	34(56.7)	61(100)

Table 3: ECG & 2D-ECHO Findings amongst COPD Patients.

ECG Findings	No. of Patients (%)	2D-ECHO Findings	No. of Patients (%)
Normal	**40 (65.6)**	Normal	22(36.1)
LBBB +	**7 (11.5)**	Restrictive Cardiomyopathy	6 (9.8)
Incomplete RBBB	**7 (11.5)**	Dilated Cardiomyopathy	7 (11.5)
RBBB +	**7 (11.5)**	Concentric Cardiomyopathy	26 (42.6)
Total	**61 (100)**	Total	61 (100)

Table 4: Pre Predicted Percentage of FEV1 Vs Post Predicted Percentage of FEV1

Pre Predicted Percentage of FEV1		Post Predicted Percentage of FEV1			Total
		Moderate (50 to 80 % predicted)	Severe (30 to 50 % predicted)	Very Severe (< 30 % predicted)	
Moderate (50 to 80 % predicted)	No of patients	19	0	0	19
	% within pre	100.0%	.0%	.0%	100.0%
	% within post	61.3%	.0%	.0%	31.1%
	Residual	9.3	-6.5	-2.8	
Severe (30 to 50 % predicted)	No of patients	8	18	0	26
	% within pre	30.8%	69.2%	.0%	100.0%
	% within post	25.8%	85.7%	.0%	42.6%
	Residual	-5.2	9.0	-3.8	
Very Severe (< 30 % predicted)	No of patients	4	3	9	16
	% within pre	25.0%	18.8%	56.2%	100.0%
	% within post	12.9%	14.3%	100.0%	26.2%
	Residual	-4.1	-2.5	6.6	
Total	No of patients	31	21	9	61
	% within pre	50.8%	34.4%	14.8%	100.0%
	% within post	100.0%	100.0%	100.0%	100.0%

Table 5: ECG Finding vs Pre Predicted Percentage of FEV1

ECG Finding		Pre Predicted Percentage of FEV1		Total
		Moderate	Severe + very severe	
Normal	Count	12	28	40
	% within ECG finding	30.0%	70.0%	100.0%
	% within Pre Predicted Percentage of FEV1	63.2%	66.7%	65.6%
	Residual	-.5	.5	
Abnormal	Count	7	14	21
	% within ECG finding	33.3%	66.7%	100.0%
	% within Pre Predicted Percentage of FEV1	36.8%	33.3%	34.4%
	Residual	.5	-.5	
Total	Count	19	42	61
	% within ECG finding	31.1%	68.9%	100.0%
	% within Pre Predicted Percentage of FEV1	100.0%	100.0%	100.0%

Pearson Chi-Square - 0.71 with Degree of Freedom (df) – 1, P value 0.789

Table 6: 2 D ECHO Finding Vs Pre Predicted Percentage of FEV1

2 D ECHO Finding		Pre Predicted Percentage of FEV1		Total
		Moderate	Severe + very severe	
Normal	Count	9	13	22
	% within 2 D ECHO Finding	40.9%	59.1%	100.0%
	% within Pre Predicted Percentage of FEV1	47.4%	31.0%	36.1%
	Residual	2.1	-2.1	
Abnormal	Count	10	29	39
	% within 2 D ECHO Finding	25.6%	74.4%	100.0%
	% within Pre Predicted Percentage of FEV1	52.6%	69.0%	63.9%
	Residual	-2.1	2.1	
Total	Count	19	42	61
	% within 2 D ECHO Finding	31.1%	68.9%	100.0%
	% within Pre Predicted Percentage of FEV1	100.0%	100.0%	100.0%

Pearson Chi-Square – 1.529 with Degree of Freedom (df)-1, P value 0.789

RESULTS

In this study Table 1 depicts that 61 COPD patients involved in study from age 32-80 yrs with mean age 57. Out of which 40 were smoker with mean duration of smoking about 19.70 years. Out of 61, 22 patients had history of occupation exposure & 9 had history of exposure to Biomass Fuel. Mean of Heart rate, systolic & diastolic BP, Respiratory rate, Pulse rate were within normal limit. Also mean of all lipid parameters were within normal limit or upper limit.

Table 2 shows that out of 61 patients of COPD, 14 (23%) were diabetic, 10 (16.4%) were hypertensive, 07(11.5%) had of ischemic heart disease and 08(13.1%) had history of COPD exacerbation.

Table 3 shows ECG & 2D-ECHO finding amongst COPD patients, where 40 (65.6%) had Normal ECG finding and 7(11.5%) had incomplete RBBB, LBBB & Incomplete RBBB respectively. Whereas 22(36.1%) had normal 2D-ECHO finding and 26 (42.6%) had Concentric Cardiomyopathy.

Table 4 shows that out of 61, in Pre Predicted Percentage of FEV1, 19 patients were in Moderate (50 to 80 % predicted), 26 patients were in Severe (30 to 50 % predicted), 16 in Very Severe (< 30 % predicted). In Post Predicted Percentage of FEV1, 12 were transferred in Moderate grade, 8 from severe and 4 from very severe grade respectively. And out of 16 in very severe grade in pre predicted percentage, 4 were converter in to moderate & 3 were in to severe grade.

Table No. 5 shows the association between ECG and Pre Predicted Percentage of FEV1 in which, Out of 61, 40 patients had normal ECG, 21 had abnormal ECG, and in Pre Predicted Percentage of FEV1 19 belongs to moderate grade and 42 belongs to Severe and very severe grade group. In relation between ECG and Pre Predicted Percentage of FEV1, Pearson Chi-Square was 0.71 with Degree of Freedom (df)-1, P value 0.789 which is not significant it means there were no significant association between ECG and Pre Predicted Percentage of FEV1.

Table 6 depicts the association between 2D-ECHO and Pre Predicted Percentage of FEV1 in which, out of 61, 22 patients had normal 2D-ECHO, 39 had abnormal 2D- ECHO, and in Pre Predicted Percentage of FEV1 19 belongs to moderate grade and 42 belongs to Severe and very severe grade group. In relation between ECG and Pre Predicted Percentage of FEV1, Pearson Chi-Square was 1.529 with Degree of Freedom (df)-1, P value 0.789 which is not significant it means there were no significant association between 2D-ECHO and Pre Predicted Percentage of FEV1.

DISCUSSION

Chronic obstructive pulmonary disease (COPD), defined by GOLD as a preventable and treatable disease with some significant extrapulmonary effects, is a very common clinical entity in clinical practice. COPD is a leading cause of death and disability worldwide. According to World Bank data it is expected to move from its status in 2000 as the 4th and 12th most frequent cause of mortality and morbidity, respectively, to the 3rd and 5th leading cause of mortality and morbidity, respectively, in 2020.[10,11]

Pan and colleagues in 2015 investigated older Chinese patients with COPD. A total of 1625 candidates aged more than 50 years were included, and 23.5% had evidence of carotid plaque. The mean IMT of carotid arteries was higher in patients with COPD than those without COPD (0.82±0.29 vs. 0.76±0.31 mm, P=0.02). They found that patients in the lowest FEV1% had increased risk of thickened IMT and carotid plaques, and also, patients in the lowest tertile of FVC% had increased risk of thickened IMT.[12]

A study done by Kim and colleagues in 2011, 126 patients (42 COPD and 84 non-COPD) were enrolled. Carotid IMT and CRP of the COPD group were found to be significantly higher than in the non-COPD group (P<0.05). FEV1/FVC ratio and FEV1 low levels were significantly correlated with higher CRP and IMT (P<0.05); however, there was no correlation between the IMT and CRP (P=0.152).[13]

Jatav VS et al found that the most common echocardiographic finding was cor pulmonale, which was present in 62% of cases, other echocardiographic findings were PAH in 44% cases, RA/RV dilatation (43%), RVH (42%), LVDD (46%), RVSD (14%) and LVH in 11% of cases. Echocardiographic signs of RV dysfunction observed are PAH, cor pulmonale and RVSD which are correlated with the severity of the disease (p<0.05).[14]

Rao and colleagues in 2015, pulmonary function parameters including FEV1, FEV1/FVC ratio, and lipid profile were studied in 100 patients with COPD and 40 nonsmokers healthy participants. The study found that patients with COPD had significantly higher low-density lipoprotein cholesterol levels when compared with controls (P<0.005). However, triglyceride levels were not significantly elevated in patients with COPD when compared with the control group.[15]

CONCLUSION

Our study concluded that there was no significant association found between ECG & 2D-ECHO with Pre Predicted Percentage of FEV1.

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