

Research Article**A Study of Electrocardiographic Changes in Chronic Obstructive Pulmonary Disease****Sandeep Krishna Nalabothu^{1*}, Leela Krishna Kaku²**¹Assistant Professor, Department of Pulmonary Medicine, Mamata Medical College, Khammam, Telangana, Pin code: 507002, India²Assistant Professor, Department of General Medicine, Kamineni Institute of Medical Sciences, Sreepuram, Narketpally, Nalgonda District, Telangana, India***Corresponding author**

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Abstract: Chronic Obstructive Pulmonary Disease (COPD) is a common global problem and most common medical problem carrying significant morbidity and mortality. Electrocardiography (ECG) carries information about cardiac disease and prognosis. So, the present study was undertaken with a view to assess ECG changes in patients with COPD. The observational study was carried out in the department of Pulmonary Medicine and General medicine, Mahatma Gandhi Medical College and Research Institute, Pillayarkuppum, Puducherry, India. Among 50 patients with COPD, ECG was done and the findings are noted. Out of 50 patients included in the study, right axis deviation is seen in 14 cases (28%), R/S ratio less than 1 in V6 is seen in 11 cases (22%), R/S ratio greater than 1 in V1 is seen in 8 cases (16%), P-pulmonale is seen in 10 cases (20%), ST segment depression in lead II, III, aVF is seen in 4 cases (8%), T wave inversion in leads V1-V3 is seen in 9 cases (18%), Right Bundle Branch Block (RBBB) is seen in 3 cases (6%), lead I sign is seen in 1 case (2%), ventricular ectopics were seen in 2 cases (4%), Multifocal atrial tachycardia is seen in 1 case (2%), SI, SII, SIII pattern is seen in 1 case (2%). In the present study, ECG abnormalities suggestive of Right Ventricular Hypertrophy (RVH) were found in more than half of the patients included in study.**Keywords:** COPD, ECG, P pulmonale, Right axis deviation, RVH.

INTRODUCTION

COPD is a common, preventable lung disorder characterized by progressive, poorly reversible airflow limitation often with systemic manifestations, in response to tobacco smoke that has great implications on global health [1]. Now COPD is the fourth leading cause of death worldwide and by the year 2020 it will be the third leading cause of death and fifth leading cause of DALY's lost worldwide (Disability Adjusted Life Years) [2, 3].

Respiratory and Cardiovascular Systems are so intimately related that changes in one sooner or later may cause changes in the other. Patients suffering from COPD are at increased risk of cardiovascular morbidity and mortality [4]. They are more prone to develop ischemic heart disease, cardiac arrhythmias, and heart failure [5]. These changes in the cardiovascular system may be detected by ECG, which is simple, inexpensive investigation available in peripheral centres. So, the present study was undertaken with a view to assess ECG changes in patients with COPD.

METHODOLOGY

The study was carried out in the department of Pulmonary Medicine and general medicine, Mahatma Gandhi Medical College and Research Institute, Pillayarkuppum, Puducherry, India after the clearance of the Institutional Human Ethical committee (IHEC). This is a prospective, longitudinal study that involves humans.

Inclusion criteria

- Patients with primary diagnosis of COPD

Exclusion criteria

- Patients having active pulmonary tuberculosis, structural heart disease and hypertension were excluded from the study.
- Patients with Reversible Airway Obstruction (>12% Change in FEV1).
- Patients not willing to participate in the study.
- Patients with contraindications for spirometry.

All the patients who satisfy inclusion criteria attending both pulmonary medicine and general medicine clinics from December 2012 to July 2014

were included in the study. Before initiation of the study voluntary consent was obtained from each subject. ECG was done and the changes were noted.

SPSS version 19.0 (IBM SPSS, US) was used to analyze the data. The quantitative variables have been described as mean ± SD or Frequency analysis with numbers and percentage.

RESULTS

Out of 50 patients included in the study, right axis deviation is seen in 14 cases (28%), R/S ratio

less than 1 in V6 is seen in 11 cases (22%), R/S ratio greater than 1 in V1 is seen in 8 cases (16%), P-pulmonale is seen in 10 cases (20%), ST segment depression in lead II, III, aVF is seen in 4 cases (8%), T wave inversion in leads V1-V3 is seen in 9 cases (18%), Right Bundle Branch Block (RBBB) is seen in 3 cases (6%), lead I sign is seen in 1 case (2%), ventricular ectopics were seen in 2 cases (4%), Multifocal atrial tachycardia is seen in 1 case (2%), SI, SII, SIII pattern is seen in 1 case (2%) (Table 1).

Table 1: ECG Changes

Sl. No.	ECG Changes	Frequency	Percentage (%)
1.	Right axis deviation	14	28%
2.	R/S ratio less than 1 in V6	11	22%
3.	R/S ratio greater than 1 in V1	8	16%
4.	P-pulmonale	10	20%
5.	ST segment depression II,III,aVF	4	8%
6.	T wave inversion in V1-V3	9	18%
7.	Right Bundle Branch Block (RBBB)	3	6%
8.	lead I sign	1	2%
9.	Ventricular ectopics	2	4%
10.	Multifocal atrial tachycardia	1	2%
11.	SI, SII, SIII pattern	1	2%

Table 2: Sex Distribution

Sl. No.	Sex	Total	Percentage (%)
1.	Male	37	74%
2.	Female	13	26%

DISCUSSION

The study was carried out in the department of Pulmonary Medicine, Mahatma Gandhi Medical College & Research Institute (MGMC&RI), Pillayarkuppum, Puducherry after the clearance of the Institutional Human Ethical committee (IHEC). This study was carried out from December 2013 to July 2014. Through this study, an attempt was made to study ECG changes in COPD patients.

In our study the male to female ratio is 2.84: 1 (Table 2), comparable to studies conducted by Malik SK *et al.* [6] and Jindal SK *et al.* [7]. Out of 50 patients with COPD, ECG evidence of Right Ventricular Hypertrophy (RVH) was found in 28 cases include, right axis deviation in 14 cases (28%), R/S ratio <1 in 11 cases (22%), R/S ratio >1 in 8 cases (16%), P-pulmonale in 10 cases (20%), ST segment depression in leads II, III, aVF in 4 cases (8%), T wave inversion in leads V1-V3 in 9 cases (18%), lead I sign in 1 case (2%) and SI, SII, SIII pattern in 1 case (2%). More than or equal to two criteria are required for the diagnosis of RVH. Similar ECG changes are reported in other studies also [8, 9]. Among these SI, SII, SIII pattern and right axis deviation are negative prognostic predictors for survival as described by Kok Jensen A *et al.* [10] and Incalzi *et al.* RA [11]. When ECG abnormalities are present it is helpful to establish

diagnosis of RVH but diagnosis cannot be ruled out in absence of ECG abnormalities as described by Al-Numanik K *et al.* [12]. The remaining signs were less consistently associated with poor survival. The main limitations of this study are the limited sample size and use of data from only one center.

CONCLUSION

In the present study, ECG abnormalities suggestive of Right Ventricular Hypertrophy (RVH) were found in more than half of the patients included in study. It can be used routinely in COPD patients as a screening tool, as it is simple, inexpensive investigation available in peripheral centres. However, whenever clinically required, echocardiographic measurement of Pulmonary Artery Systolic Pressure (PASP) and Tricuspid regurgitation jet is advised.

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