Indian Journal of Basic & Applied Medical Research; March 2013: Issue-6, Vol.-2, P. 527-530

"Diagnosis of severity of COPD on the basis of electrocardiogram"

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Abstract:

Introduction: One of the major cause of morbidity and mortality in India especially in rural areas is COPD (Chronic obstructive pulmonary disease). Diagnostics test for COPD is spirometry FEV_1/FVC <0.7 and FEV_1% Of Expected <80%. Spirometry is costly and is not readily available in rural settings whereas ECG is easily available, affordable, does not require patient's conscious effort. This study was done to correlate significant ECG finding such as P pulmonale (peaked p wave in lead II) with the severity of COPD, to make the diagnosis of COPD easy.

Methods: The present study consisted of 40 diagnosed patients of COPD on the basis of spirometry (FEV_1/FVC) and 20 control cases. We did Chest X Ray PA view, spirometry and Standard 12 lead ECG. ECG was analysed for P Pulmonale, RVH, RBBB and LVH .

Observation: Mean FEV_1/FVC ratio for cases was 54.35 ± 9.90, mean FEV_1 was 42.74. 55% patient were having severe airflow obstruction and out of these 86.36% have significant ECG changes. The Control group was not having any significant changes in ECG.

Result: In present study changes in ECG were correlated with severe obstruction. In none of patients with non severe COPD, P-pulmonale was present. So, there are chances of false negative but not of false positives in detecting COPD cases by ECG. If P pulmonale is present it can be concluded that COPD is severe and patient may be managed accordingly even if spirometry is not available.

Keywords: COPD, Spirometry, ECG

INTRODUCTION:

COPD (Chronic obstructive pulmonary disease) is a major cause of morbidity and mortality in India especially in rural areas. COPD is the 5th leading cause of death worldwide.[1,2] COPD represents a substantial economic and social burden throughout the world. Clinical features of COPD are cough, sputum production, dyspnea, chest pain especially if an exposure to risk factor is present. It primarily affects the late adulthood age group. [3,4] COPD is commonly underdiagnosed and untreated condition which has a comparatively simple and effective management. COPD is quite prevalent in Western Uttar Pradesh due to small cottage industries of bidi production, another contributing factor is large portion of population living in rural area having little or no awareness. COPD causes hypoxia in lungs triggering the pulmonary vasoconstriction which leads to increase in pulmonary vascular resistance finally involving the heart and causes right sided cardiac complications which can be evidenced by ECG. The patients with COPD are unable to perform physical activity and suffer from poor quality of life. [5] Smoking cessation for 20 years almost completely reduce the risk of COPD due to smoking [6].

Diagnostics test for COPD is spirometry FEV_1/FVC <0.7 and FEV_1% Of Expected <80%. Spirometry is costly and is not readily available in rural settings and technique to perform spirometry involves a lot of patient's conscious effort & understanding and does affect the results to a certain extent. Whereas ECG is easily available, affordable,

does not require patient's conscious effort.

Symptoms with which COPD patients may present such as dyspnea, chest pain can be because of cardiac pathology thus ECG is a must in COPD patients. Considering all the facts, this study was done to correlate significant ECG finding such as P pulmonale (peaked p wave in lead II) with the severity of COPD, to make it easily diagnosed in small setup and effectively managed according to the severity of the disease.

MATERIAL AND METHODS: COPD diagnosis was made as per guidelines by American Thoracic Society.[7] After applying the above mentioned criteria 40 patients were selected by random sampling method from O.P.D. TMMC &RC, Moradabad from May 2012 to September 2012**.** Control group consisted of 20 non smoker healthy persons. Written consent was taken from both cases and control.

INCLUSION CRITERIA: According to Global Initiative for Chronic Lung Disease (GOLD) [8] guidelines, patients having chronic cough, sputum production, dyspnea and /or history of exposure to risk factor were screened and diagnosis was confirmed by spirometry i.e. the value of FEV_1/FVC was taken <0.7 and FEV_1 <80% of predicted value after post bronchodilator inhalation.Only male smokers were considered as smoking is major risk factor and prevalent in males in rural India.

EXCLUSION CRITERIA: Patients with hypertension, diabetes mellitus, congenital heart disease, pulmonary TB, bronchiectasis, asthma, kyphosis, and scoliosis were excluded.

INVESTIGATIONS: Chest X Ray PA view was done to detect features of emphysema and chronic bronchitis as per criteria Simons criteria [9]. Cardiomegaly was also looked for. Spirometry was done on computerized spirometer (Medispiro Digital Spirometry System) for MS Windows (9x) as per ATS guidelines. Best of three attempts was selected and analysed as per GOLD staging. Standard 12 lead ECG was done for all cases and controls. ECG was analysed for P Pulmonale, RVH, RBBB and LVH . Smoking index was also calculated. Range of smoking index was 250 to 800.

RESULTS :

The present study consisted of 40 diagnosed patients of COPD on the basis of spirometry (FEV_1/FVC) and 20 control cases. All the patients were selected on the inclusion criteria mentioned in the materials and methods. 80% of the patients were Muslim and 20% were Hindu. Almost all patients belonged to the low socio economic status. All of the patients belonged to rural area. Mean age of the patients was 60.12 years with a standard deviation of 6.09. Cough with expectoration was found in all patients, breathlessness was present in 95% of cases , clubbing in 3 patients, pedal edema in 8 cases .Smoking index ranged from 250 to 800.

Mean FEV_1/FVC ratio for cases was 54.35 ± 9.90, mean FEV_1 was 42.74. Out of the 40 documented cases 22 patients (55%) were having severe airflow obstruction, there was no significant relation between severity of airflow and smoking index. Out of the 22 patients having severe airflow obstruction, 19 patients were having significant changes in their ECG, 18 of these patients were having peaked p wave (>2.5mm in lead II) and one was having findings of RBBB. Overall there were 3 cases of LVH, but none of these patients were having severe obstruction. No significant ST-T changes were recorded in any of the patients. The Control group was not having any significant changes in ECG. The correlation coefficient between FEV1 and presence of peaked P wave was found -0.71342. Sensitivity of P pulmonale for severe

COPD was 86.36%, Specificity 100%, positive predictive value 100%, negative predictive value 85.7%, Accuracy 92.5%.Statistical calculations was done by Microsoft excel and Medcal.

Discussion:

Among 40 patients with COPD enrolled in the present study, mean age of patients was 60.12 years. The prevalence was higher among Muslims, belonging to lower socio-economic status, as Muslim population is dominant in this part of the state. All of the patients were smokers. In the present study, peaked P-wave i.e. amplitude more than 2.5 mm, was recorded in 45 % of the cases with COPD. In Spodicks [10] series, 13.9% of COPD patients had P-wave equal or greater than 2.5mm. Carid and Wilcken[11] - found incidence of P-pulmonale in 15.5% of their COPD patients, while Scott et al [12] and Pinto et al [13]recorded same incidence of 32.7% in their studies.

Our findings are in concordance with Rachaiah. [14] Agrawal et al have also showed diagnostic value of ECG in COPD. [15] In present study changes in ECG were correlated with severe obstruction as out of 22 patients with severe COPD, 19 had changes in ECG in form of P-pulmonale. In none of patients with non severe COPD, P-pulmonale was present. So, there are chances of false negative but not of false positives in detecting COPD cases by ECG. If P pulmonale is present it can be concluded that COPD is severe and patient may be managed accordingly even if spirometry is not available. If P pulmonale is present, patients may be started on both inhaled corticosteroids as well as on inhaled long acting β_2 agonist. In many hospitals in India ECG facilities are available but spirometry is not available, especially in rural areas which contribute a large portion of population in India. ECG does not require cooperation from patient, unlike spirometry. In India it is often difficult for patients to understand how to perform spirometry. Even after repeated attempts they are not able to do it and this can lead to wrong diagnosis. Often in the setting of ICU or in case of severe COPD, ECG may be performed but not spirometry.

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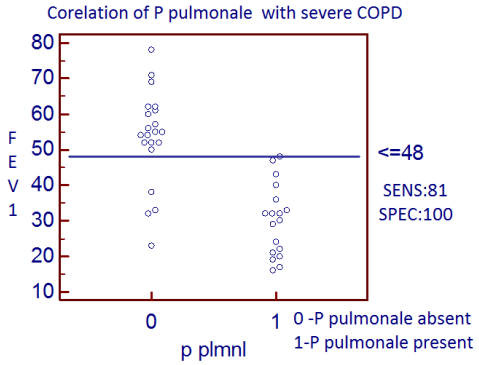
Table 1



Date of Submission: 22 December 2012
Date of Provisional acceptance: 08 January 2013
Date of Final acceptance: 16 February 2013
Date of Publication: 05 March 2013
Source of Support: Nil Conflict of Interest: Nil