

Prevalence of TB associated chronic obstructive pulmonary disease in patients with COPD attending at tertiary care hospital in Ahmedabad: A case control study

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Abstract:

Background: Apart from tobacco smoke, COPD has been known to occur in patients with previous pulmonary TB. Present study was performed with an aim to conduct a study to discover out the hospital based prevalence of TB-associated COPD among COPD patients and to assess its distinguishing features in Ahmedabad, Gujarat, India.

Present study was conducted at the Department of Tuberculosis and Reparatory Medicine, in a tertiary care hospital over a period of 7 months. Seventy-four consecutive patients of stable COPD attending chest OPD were enrolled as cases. An equivalent number of healthy subjects with comparable age and gender distribution were taken as controls. Specific points such as number of anti-tubercular treatment (ATT) courses, total duration of treatment, time elapsed since completion of treatment and their final outcome were recorded. The prevalence of TB-associated COPD group was calculated, and its different parameters were compared with rest of COPD patients.

Results: Median duration of onset of symptoms was 4.1 years. The unadjusted odds ratio for previous TB in the COPD group in comparison to controls was 3.95. Most of the patients 21/24 had taken a single course of ATT. TB-associated COPD patients were significantly younger in age as compared to the rest of COPD patients ($P \leq 0.05$) with more proportion of females. On multivariate analysis, duration of dyspnea retained positive correlation with hospitalizations after adjusting for pack years, age, and BMI.

Conclusions: TB-associated COPD constitutes a substantial proportion of COPD in a hospital setting. It is a distinct clinical entity different from a larger smoking related COPD and hence may require different management.

Keywords: COPD; Odds ratio; Prevalence; TB.

Introduction:

In chronic obstructive pulmonary disease (COPD) the person feels difficulty in breathing the air out of the lungs. Thus the person has to work harder to breathe and remove the air; this can lead to breathe shortness and the individual starts feeling tired [1]. Smoking and tobacco can be considered as the mainstay for the COPD. Some research shows the association of pulmonary tuberculosis (TB) with COPD [2,3]. This association of pulmonary TB with COPD is termed as post tubercular obstructive airway disease or TB-associated COPD. Tuberculosis and chronic obstructive pulmonary disease are the ones who affect the lungs and are considered as major reason for the worldwide mortality and morbidity. There is a complex interrelationship between tuberculosis and chronic obstructive pulmonary disease. On the basis of lung function tests and survey based results it was found out that a good number of TB patients do develop TB associated COPD or post tubercular airway disease [4-8].

In the world, India stands as the highest affected rate of TB burden and hence there are more chances of getting significant burden in the TB associated COPD. India is found to be placed in the second position after China in the mortality and morbidity cases due to obstructive airway diseases. Hence we can say that there is growing population of patients with COPD

patients in Indian population [9]. There are very few studies done on the TB associate COPD in the present geographical location [10,11]. It is still not know whether there is any difference of clinical presentation between smoking related COPD and TB associated chronic pulmonary disease. This difference is necessary, to know the different approach of management [12]. Hence the aim of the present study was to evaluate the case control research on the prevalence of TB associated COPD among the total COPD patients.

Materials and Methods:

The present case control study was conducted over a period of 7 months post ethical committee clearance at the Department of Tuberculosis and Reparatory Medicine of the GMERS Medical College and Hospital, Gandhinagar, India. Total of 148 patients were included in the study. An informed consent was obtained from study subjects. Out of them 74 were diagnosed as suffering from COPD and rest 74 were taken as control group. Patients were explained about the methodology in the study and written informed consent was taken from all the included individuals.

Patients with other pulmonary disorders such as interstitial lung disease, lung cancer, unstable angina, congestive heart failure, obstructive sleep apnea, acute exacerbation and recent myocardial infarction in the

past period of 4 weeks were excluded from the study. Detailed history was recorded and medical examination was done thoroughly. During recording of history we had emphasized on duration and type of symptoms, history of previous hospitalization for same reason, occupational exposure to smoke and dust and history of tobacco smoke exposure. The history of previous hospitalization for the same reason or any history of previous TB was obtained and confirmed through patients itself and/or by checking the previous medical records. We recorded following points such as: number of anti-tubercular treatment courses taken, total duration of the treatment, time since completion of the treatment and the final prognosis. As per the recent ATS guidelines [13] using RMS Helios 401 PC-based Spirometer, we performed the routine spirometry. As per the Gold guidelines, we characterized patients into four stages of airflow limitations was recorded for forced vital capacity (FVC), FEV1/FVC and post bronchodilator forced expiratory volume in 1s [14]. Body mass index (BMI), room air oxygen saturation level and routine X-ray chest (CXR) posteroanterior view was recorded. If the symptoms of chronic obstructive pulmonary disease followed after the periods of pulmonary TB, patients were labeled as TB associated COPD. We calculated the prevalence of the TB associated COPD and its parameters were compared with the rest of the COPD patients.

Statistical Analysis: After the collection of data, we performed the stats analysis with the help of SPSS version 16 (SPSS Inc. Chicago, IL, USA). The assessment of the normality was done with the help of Kolmogorov- Smirnov test. Stats analysis for descriptive analysis was calculated.

Results:

In the comparison of the gender, males were found to be more as compared to females having suffered from chronic obstructive patients. When the history of smoking tobacco was assessed we found that 64 patients that are 86.5% gave history of more than 10 years of smoking. Remaining 19 still had the current habit of tobacco smoking [Table 1]. The symptoms were shown in the onset from 2 months to 25 years with average period of 4 years. History of exacerbation was found in 23 patients. The positive history of previous hospitalization was found in 35 patients.

The history of TB was found in 24 patients in study group and 8 patients in control group. The odds ratios were found to be 3.96 for previous symptoms of tuberculosis in COPD patients. Most of the patients had taken the single course of ATT. In TB associated COPD the median time elapsed since the treatment completion was 4 years. Females were found to be more affected in TB associated COPD at younger age as compared to rest of COPD patients. Patients with TB associated COPD and rest of COPD had similar

symptoms except that for frequent hospitalization and high incidence of hemoptysis. Pack years of smoking were less although airflow limitation was similar to other COPD patients.

In the patients with TB associated COPD, number of previous hospitalization showed a positive correlation with duration of dyspnea, duration of dyspnea, BMI, Age and number of exacerbations in the last year. However, on multivariate analysis, duration of dyspnea retained positive correlation with hospitalizations ($r = 0.82$; $P = 0.022$) after adjusting for pack years, age, and BMI. On the contrary, FEV1 did not have shown correlation with any of the parameters.

Table 1: Baseline features of COPD patients (n=74)

Patient parameter	Value
Age (years), mean±SD	60.2±8.9
Male: female	8:1 (%)
BMI (mean±SD)	19.56±5.02
Number of smokers (%)	86.5
Median pack years (range)	30.0 (0-120)
Exposure to chulha smoke (percentage patients)	19
Percentage oxygen saturation (mean±SD)	94±2.2
Percentage predicted FEV1 (mean±SD)	46.7±17.7
Percentage predicted FVC (mean±SD)	58.3±18.2

Discussion:

The present study was undertaken to find out the prevalence of the hospital based TB associated COPD and to evaluate the characteristic identification features. Of the total patients included in the study group, almost 32.4% had copd along with association of symptoms of tuberculosis in the past. The patients with TB associated COPD were of younger age, had less tobacco pack/year of smoking and had similar grades of airway obstruction when compared with smoking related COPD. This showed that there is strong association between TB and development of COPD.

Most of the published data earlier, for the association between the TB and COPD was derived from the previous research done in the previously treated tuberculosis patients. In the cross sectional study that was hospital based, the airflow obstruction was found in range of 11%-58% [16] and in cohort study of previously treated TB patients the range was found to be 28%-70% [4,15]. In the PLATINO studies; one of the largest population based, the airflow obstruction was seen 13.9% among those without history of TB and in 30.7% patients with history of TB [7].

To contrast the above, a case control design at a tertiary care level was evaluated for TB associated COPD in the COPD. No other Indian study with a

similar design was seen in the previous published literature.

In the study done in chronic obstructive pulmonary disease in never smokers, authors did not find any association of tuberculosis in the development of COPD.

In the population based study done on patients with negative smoking history, there was no association found by the authors in between the association of tuberculosis and in development of chronic obstructive pulmonary diseases [6]. A total of 5.3% chronic obstructive pulmonary disease had the previous history of tuberculosis, which is much significantly lower than in our study. The reason for lower ratios might be the previous study was done in the patient with negative smoking history that excludes the major causative factor of COPD and TB [17,18]. In our study patients who already enrolled for the hospitalization with the symptoms of COPD were included and hence there are more chances of having previous tuberculosis history. Another study from India which included the patients with heavy smokers showed 57% patients affected with TB along with symptoms of COPD [19].

There are different mechanisms which have been proposed for the development of chronic obstructive pulmonary disease in TB patients. There is residual chronic or recurrent inflammation that affects the lung compliance which leads to airway obstruction, narrowing of bronchiolar system and lastly leads to bronchiolitis obliterans that results from accelerated emphysematous and peribronchial fibrosis [16,20]. Due to increased activity of matrix metalloproteinase enzyme which is precipitated by TB there is destruction of pulmonary extracellular matrix this exists as the common link of pathogenesis for association of TB with COPD [21].

In the patients suffering from TB, with the delay in the anti tuberculin therapy, increase in extension of the TB and in increase in the number of TB episodes [22] there is increase risk of patients get infected with COPD [23]. Similar results were obtained in the Korean study with lower FEV1 in tuberculosis patients with minimal CXR changes [24]. Moreover we did not include the patients with mixed restriction and obstruction; they are likely to be present with CXR changes.

If the inclusion of such patients was done there might be increased in prevalence of TB associated COPD. In the present study, the tuberculosis associated chronic obstructive pulmonary disease was younger as compared to the other copd patients. This may be attributed to the fact that tuberculosis is the disease of younger age group as compared to the chronic obstructive pulmonary disease; uncommon in the younger age [12]. All the TB associated patients had all the symptoms similar except with the high frequency of hemoptysis. The results can be said to be in accordance

of the Korean study, which showed no difference in with and without association of the tuberculosis [25].

In the present study, we did not find any correlation between the FEV1 and the duration of the symptoms in TB associated COPD patients. Another interesting finding was the increased number of hospitalization that showed the positive correlation with BMI, age and duration of symptoms. This result was in contrast with the previous Korean study [25].

Our present is one of the studies to show the real picture of TB of COPD that can be encountered in the routine OPD. This might be helpful in early diagnosis and aid in reducing the incidences of TB associated COPD. However as this was a case control study we could not confirm the casual association between Tuberculosis and copd. The chances of patients suffering from TB to get the symptoms of COPD increase with the time period of diagnosis of TB and can be seen in the viable period after the occurrence of the TB [2]. Moreover it is seen that the air flow limitation can be resolved with the administration of bronchodilators and ATT [15]. Hence we cannot get the true picture of the TB association with COPD. Hence like the retrospective study design, it is better to evaluate the COPD patients with the previous episodes of TB.

Conclusions:

TB associated COPD is a total different entity and so require different management. As our country is a high TB burden country, there is need to conduct different population surveys on COPD patients and also large scale studies should be planned to find out the course and burden of the TB associated COPD.

Conflicts of interest: None declared

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