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**Original Research Article**

# Evaluation of tuberculosis associated chronic pulmonary disease at community health care: a case control study

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## ABSTRACT

**Background:** Chronic obstructive pulmonary disease (COPD) is known to occur in patients with previous history of pulmonary TB. It is still not very well known if there is any difference of clinical presentation between smoking related COPD or/and TB associated COPD.
**Methods:** The present case control study was conducted at CHC Katra, Department of Medicine, over a period of 6 months from August 2018 to February 2018, on 100 patients; 50 suffering from COPD and 50 healthy individuals. Detailed clinical history for duration of symptoms, previous hospitalizations, and exposure to smoking along with the history of TB and ATT courses was recorded.
**Results:** History of TB was found in 17 patients among cases and 7 patients among controls. In TB associated COPD, the pack years of smoking in case of smokers was 22.4±19.2. 44% (15/34) having exposure to smoking had history of TB. Mean age of patients exposed to smoking was (53.3±7.4) and that of non-smokers (60.1±8.2). A positive correlation with age, BMI, and duration of symptoms was found. Our results showed that almost one-third of COPD patients (34%) had history of TB. TB-associated COPD patients had similar symptoms in our study except for high frequency of hemoptysis.
**Conclusions:** A detailed population survey is needed on COPD patients with history of TB. A larger group study among never-smokers is also needed. Finally, it is concluded that the case burden of TB associated COPD is real, huge and an urgent policy decision in this regard is mandated.

**Keywords:** Chronic obstructive pulmonary disease, Tuberculosis, Smoking, Hemoptysis

## INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is estimated to have a disease burden of 210 million people worldwide. It is currently fourth leading cause of death (5.1%) globally as and is projected to occupy the third position (8.6%) in 2030.[1] COPD, apart from tobacco smoking, has been known to occur in patients with previous history of pulmonary tuberculosis TB. It is one of the major preventable chronic respiratory diseases (CRD) and its phenotype has been variably termed as post tubercular obstructive airway disease or TB-associated COPD.[2] In COPD the person feels difficulty in breathing the air out of the lungs, making him/her to work harder to breathe and remove the air. This further leads to shortness of breath and the individual starts feeling tired very quickly. Survey based results and lung function tests have often shown that a considerable number of TB patients tend to develop TB associated COPD or post tubercular airway disease.[3] There are very lesser number of studies done on the TB associated COPD in the present geographical location. It is also not very well known if there is any difference of clinical presentation between smoking related COPD or/and TB associated COPD.[4] It is important to know this difference for formulating the approach of disease management, hence very important.

For this very reason and for ascertaining other related factors, the present study was designed to conduct a case control research on the prevalence of TB associated COPD among the total COPD patients and the major objective of the study was to measure the association of TB with COPD.

## METHODS

The present observational case control study was conducted at CHC Katra, Department of Medicine, over a period of 6 months from August 2018 to February 2018, after the due approval of ethical committee. A total of 100 patients were included in the study. Out of this 50 were selected on the basis of random sampling technique, out of those diagnosed for suffering from COPD, and 50 healthy randomly selected individuals were taken as control group. Patients with other pulmonary disorders such as interstitial lung disease, lung cancer, unstable angina, congestive heart failure, obstructive sleep apnea, acute exacerbation and myocardial infarction in the recent past up to 4 weeks, were excluded from the study. An informed consent was obtained from study subjects. Detailed clinical history for duration of symptoms, previous hospitalizations, exposure to smoking along with the history of TB and ATT courses was recorded, and requisite medical examination was done thoroughly. Post-bronchodilator forced expiratory volume in 1 second (FEV1) and forced vital capacity (FVC) was recorded and categorized as per recent guidelines. Oxygen saturation level was checked, BMI was calculated and routine chest X-ray (postero-anterior view) was also carried out.

Data was analysed and statistical calculations were carried out using SPSS version 19.0. Mean±SD, range, median etc. was found out to appropriately represent the data. P value of <0.05 was considered significant.

## RESULTS

Males were found to be more affected by COPD as compared to females. 68% among cases and 22% among controls had history of ≥10 years of smoking. Younger females were found to be more affected as compared to COPD patients in higher age groups. Symptoms were more or less similar among patients with TB associated COPD and the rest of COPD, however, patients with TB had to undergo more frequent hospitalization and a higher incidence of hemoptysis. It was observed that most of the patients had taken only single course of ATT, and the median time elapsed was 4 years with a range of 1 to 25 years, among TB associated cases. Duration of dyspnea, number of exacerbations, age and BMI had a positive correlation with number of previous hospitalizations among TB associated COPD patients (Table 1).

The history of TB was found in 17 patients among cases and 7 patients among controls. The odds ratio for having history of TB among COPD cases was 3.16 (p=0.024) (Table 2).

**Table 1: Baseline features of cases and controls (n=100).**

| Parameters | Cases | Controls | Total | Chi square | P value |
|---|---|---|---|---|---|
| **Gender** | | | | | |
| Male | 36 | 32 | 68 | 7.69 | 0.00560 |
| Female | 16 | 16 | 32 | | |
| **Age (Mean±SD)** | 56.5±7.8 | 59.0±10.5 | | | |
| **Body mass index (BMI)** | | | | | |
| <21 | 12 | 24 | 36 | 13.52 | 0.00020 |
| ≥21 | 38 | 26 | 64 | | |

p<0.05-significant; p<0.005- Very significant.

**Table 2: Distribution of patients with respect to history of TB and exposure to smoking.**

| Parameters | Cases | | Controls | | P value |
|---|---|---|---|---|---|
| **History of TB** | 17 | | 7 | | 0.024 |
| **No history of TB** | 33 | | 43 | | |
| **History and exposure to smoking** | | | | | |
| Exposure to chulha smoke | 7 | 34 | 3 | 11 | 0.011 |
| Smoker | 27 | | 8 | | |
| Non-smoker | 16 | 16 | 39 | 39 | |

Odds ratio for previous of CBT cases having the history of TB: 3.164.

In TB associated COPD, the pack years of smoking in case of smokers was 22.4±19.2. 44% (15/34) cases having exposure to smoking or chulha smoke also had the history of TB. However mean age of patients exposed to smoking was lower than that of non-smokers, but oxygen saturation, FEV1 and FVC did not show any significant correlation with recent smoking history of COPD patients. Grades of airway obstruction in both and cases and controls were found similar (Table 3).

**Table 3: Important parameters of smokers.**

| Parameters | Mean±SD | |
|---|---|---|
| | COPD exposed to smoking | COPD non-smokers |
| **Age (years)** | 53.3±7.4 | 60.1±8.2 |
| **Pack years of smoking in case of smokers** | 22.4±19.2 | 21.7±12.6 |
| **Percentage oxygen saturation** | 94.7±3.1 | 95.2±3.4 |
| **Percentage predicted FEV1** | 45.1±18.5 | 46.7±16.8 |
| **Percentage predicted FVC** | 56.9±16.3 | 56.8±16.5 |

## DISCUSSION

A close and measurable association of TB with COPD will lend new dimensions and insight into the daily burden of COPD encountered in a routine OPD. It is often suggested that adequate TB control might reduce the prevalence of TB-associated COPD. COPD can be seen resurfacing after a variable period of occurrence of TB, ranging from first instance of TB diagnosis to several years post treatment.[5] Bronchodilators and ATT are administered if airflow hindrance is seen.[6] Evaluating COPD patients with history of TB in a retrospective study design, similar to ours, is found important to evaluate further.

A residual chronic or recurrent inflammation that affects the lung compliance, leading to obstruction of airway, narrowing of bronchiolar system, leads to accelerated emphysematous and peribronchial fibrosis.[7,8] A positive correlation with age, BMI, and duration of symptoms was found in this study similar to the findings of Huber et al.[9]

Among the patients studied having history of hospitalization, a significant difference was observed between the status of smokers and non-smokers among COPD patients, which was similar to the results obtained by Ramakrishna et al, however, among never smokers, our study could not find and evaluate sufficient data matrix for associating it with tuberculosis in the development of COPD.[10] This can also be partly because of the fact that we studied patients who had enrolled for hospitalization with the symptoms of COPD, there were more chances of them having previous history of TB.

TB associated COPD is a younger disease as per the studies involved. Among the patients suffering with TB, an increased risk of contacting COPD is there.[11] All the TB associated patients had all the symptoms except that they were of higher frequency of hemoptysis.

Our results showed that almost one-third of COPD patients (34%) had history of TB. It was seen that patients with TB-associated COPD, although younger in age, had similar tendencies. As grades of airway obstruction in both and cases and controls/ smokers and non-smokers were found similar, it can be proposed that more parameters can be included into the study design to establish a causative relation between TB and development of COPD. However, in studies conducted by Willcox et al and Plit et al airflow obstruction was clearly seen among previously treated TB patients.[6,12]

In one of the largest population-based Platino studies, airflow obstruction was seen in 30.7% patients with previous TB as compared to 13.9% among those without a history.[13]

A study conducted by Aggarwal et al in 2017 also evaluated TB-associated COPD among COPD patients at a tertiary care level in a case-control study design, found similar and significant number of patients (32.4%) in the COPD group having history of TB and established it as a distinct clinical entity.[2] Our study also found a significant relation of severity of COPD with the history of TB, quite similar to other such studies in this regard.[2]

Comparisons to smoking-related COPD could not be defined in our study, but TB-associated COPD patients were found younger in age as compared to other COPD which is likely due to the fact that TB is a disease of young adults as compared to smoking-related COPD which is uncommon in this age group.[14] Furthermore, TB-associated COPD patients had similar symptoms in our study except for high frequency of hemoptysis.

As this was a case-control study, the limitation of this study has been found to be its restrictive inclusion criteria, which can be increased in future studies to ascertain clear and causal association of TB with COPD. Moreover, the effects of confounding factors, like tobacco consumption, could not be excluded in our study.

## CONCLUSION

It is apparent from this study that TB associated COPD is a different entity altogether. A detailed population survey is needed on COPD patients with history of TB. A larger group study among never-smokers is also needed.

Finally, it is concluded that the case burden of TB associated COPD is real, huge and an urgent policy decision in this regard is mandated.

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