CLINICAL PRACTICE ARTICLE

Post-Tuberculous Chronic Obstructive Pulmonary Disease

Inam Muhammad Baig[1], Waseem Saeed[2] and Kanwal Fatima Khalil[2]

ABSTRACT

Objective: To determine the frequency of chronic obstructive pulmonary disease (COPD) as a sequel of treated pulmonary tuberculosis.

Study Design: A case series.

Place and Duration of Study: Department of Pulmonology, Military Hospital, Rawalpindi, from April to November 2007.

Methodology: Forty seven adults, previously treated for pulmonary tuberculosis and presenting subsequently with chronic exertional dyspnoea for which no other alternate cause was found were included. Those having a probability of re-activated TB, having history of current or previous smoking or occupational exposure, asthmatics and cases of interstitial lung disease and ischemic heart disease were excluded. Pre- and post-dilator FVC, FEV1 and FEV1/FVC were recorded in each case through simple spirometry on Spirolab-II – MIR S/N 507213. Stage and pattern of COPD was recorded.

Results: There were 76.5% (n=36) males. Mean age was 56.4 and 44.2 years in males and females respectively. Twenty six (55.3%) were found to have an obstructive ventilatory defect of different degrees: severe/stage III in 69.2% (n=18), moderate/stage II in 23.0 % (n=6) and mild/stage I in 5.9% (n=2). Fourteen (29.7%) were found to have a restrictive pattern and 7 (14.8%) revealed a mixed obstructive and restrictive pattern.

Conclusion: Chronic obstructive pulmonary disease can occur as one of the chronic complications of pulmonary tuberculosis and the obstructive ventilatory defect appears more common among various pulmonary function derangements.

Key words: *Tuberculosis. COPD. Pulmonary function tests. Restrictive ventilatory defect. Obstructive pulmonary ventilatory defect.*

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) and tuberculosis are among the world's first ten most prevalent diseases, the main burden of the later being in the developing countries, in the form of pulmonary tuberculosis. In the global burden of disease, COPD and tuberculosis have been ranked as sixth and eighth respectively, in terms of disability and death in low and middle income communities world wide.[1] However, the impact of pulmonary tuberculosis on the prevalence of COPD has often remained neglected.[2] Pulmonary functional impairment as a complication of tuberculosis manifests in various patterns but mainly as airflow limitation.[3]

Chronic obstructive airways disease as a complication of pulmonary tuberculosis has been re-studied recently in many regions of the globe.[2-4] In the executive summary of the 2006 update of the Global initiative for chronic obstructive lung disease (GOLD) guidelines,[5] the role of tuberculosis in the development of chronic airways obstruction has been recognized. According to the GOLD Workshop summary, chronic bronchitis or bronchiolitis and emphysema can occur as complications of pulmonary tuberculosis.[6] A study performed to assess the impact of pulmonary tuberculosis on the prevalence of COPD, found that the prevalence of COPD increased from 3.7-5% by including participants with past history of TB treatment.[7]

Pakistan is one of the 22 countries in the world that accounts for 80% of TB cases according to World Health Organization.[8] In Pakistan, post-tuberculosis respiratory morbidity is common and constitutes a significant sub-group of chronic lung disease patients presenting to medical out patients. Recognizing this respiratory disorder and assessing its severity would rationalize its management and could minimize the frequency of un-necessary treatment given to patients on the presumption of active or reactivated tuberculosis.[9]

The objective of this study was to determine the occurrence of post-tuberculous COPD in the local setting.

METHODOLOGY

It was a descriptive study carried out at the Department of Pulmonology, Military Hospital, Rawalpindi, from April to November 2007.

The inclusion criteria were adults aged 18-65 years, who had a definite past history of pulmonary tuberculosis, had received complete anti-tuberculosis therapy course and then presented with chronic exertional dyspnoea with or without cough. Only those were included who

[1] *Department of Medicine, Combined Military Hospital, Multan Cantt.*

[2] *Department of Pulmonology and Critical Care, Military Hospital, Rawalpindi.*

Correspondence: *Dr. Inam Muhammad Baig, Classified Medical Specialist and Pulmonologist, Combined Military Hospital, Multan Cantt.*
E-mail: inammbaig@yahoo.com

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had radiological evidence of very typical post-TB lesions in the form of scarring, fibrosis, cavitations, emphysema and other destructive lung changes in their latest chest radiographs. It was otherwise difficult to ascertain their past diagnosis by any laboratory records. Presence of any clinical feature leading to a probability of active disease meant exclusion. Other conditions considered for exclusion in this study were history of current or previous smoking, history of occupational exposure, diagnosed cases of asthma and COPD, ischaemic heart disease, interstitial lung disease, bilateral extensive bronchiectasis, severe anemia and renal failure. Those showing more than 12% reversibility in the post-dilator FEV1 were also excluded.

Patients meeting the criteria were interviewed after their consent and data were recorded on pre-designed forms as case number, age, gender and timing of the anti-TB treatment. Patients were then called for spirometry on Spirolab-II-MIR S/N 507213 according to convenience without any pre-medication. The technique was explained and actual measurements were done after subjects became familiar with a correct technique. Three attempts were recorded and only considered if the variation between two best reading was less than 5%. Spirometric values were recoded as FVC, FEV1 and FEV1/FVC. Those not meeting the American Thoracic Society Criteria for quality for spirometry and those showing significant post dilator reversibility (more than 12%) were excluded. The subjects showing an obstructive ventilatory defect were then classified as mild, moderate and severe according to the GOLD guidelines.[10]

Data was analyzed using SPSS version 10. Descriptive statistics were used to describe the data i.e. mean and standard deviation for numeric variables and frequency along with percentages for categoric variables.

RESULTS

During the study period a total of 92 individuals having a past history of being treated for pulmonary tuberculosis and presenting with chronic dyspnoea were interviewed. Fifty-four subjects fulfilling all the inclusion/exclusion criteria underwent spirometry. Three were excluded as their post-dilator reversibility was significant (more than 12%) although they had no previous history of asthma and four were excluded due to sub-optimal spirometric technique.

Forty-seven individuals were finally considered in the study. 76.5% (n=36) were males. The age in males ranged between 24 and 65 years with a mean of 56.4 years. In females, it ranged between 33 and 59 years with a mean of 44.2 years. Among those 55.3% (n=26) were found to have an obstructive ventilatory defect of different degrees: severe/stage-III in 69.2% (n=18), moderate/stage-II in 23.0% (n=6) and mild/stage-I in 5.9% (n=2). Fourteen (29.9%) were found to have a restrictive pattern in their spirometry and 7 (14.8%) revealed a mixed obstructive and restrictive pattern. In those showing irreversible airflow obstruction, 15 (57.6%) had been treated between 10 and 15 years ago, 30.7% (n=8) had been treated in less than 10 years and 11.3% (n=3) had a history of receiving treatment more than 15 years before.

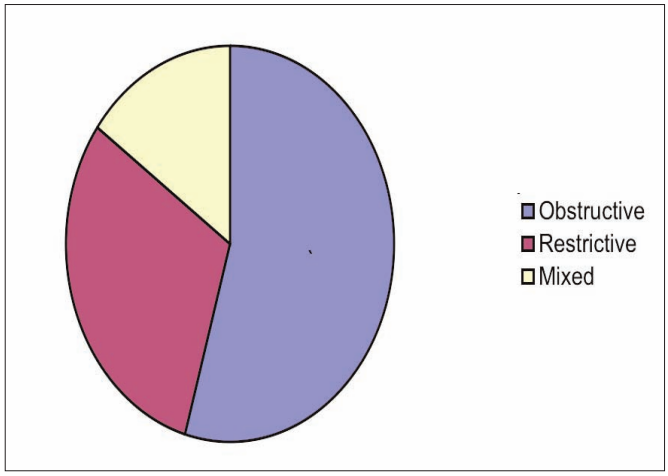

Figure 1: Patterns of pulmonary function impairment.

DISCUSSION

This study found that 55.3% of treated pulmonary tuberculosis patients presenting with dyspnoea, had an obstructive ventilatory defect. Previous studies had also revealed that an obstructive pattern of pulmonary functional impairment following treated pulmonary tuberculosis was more common.[11,12,13] PLATINO study, a recent large study, found that FEV1 is reduced compared to FVC in most cases.[14] However, another previous study had found after 15 years' follow-up of 40 patients that there was a higher yearly decline in FVC compared to FEV1.[15] An inverse relation ship between FEV1 and the extent of the disease on the original chest radiograph in treated pulmonary TB has been documented.[16]

This study also found that 65% of those patients showing an obstructive ventilatory defect had been treated more than 10 years earlier. An earlier study revealed that the obstructive changes become pro-nounced after 10 years of follow-up in treated cases and co-related with the residual scarring on chest radiograph regardless of the findings on original chest radiographs.[16]

PLATINO study, a latest large population based multi-centre study, carried out in 5 Latin American countries (n=5,571 participants) included subjects on the criteria of a past diagnosis of pulmonary tuberculosis by a physician and performed spirometry in the field. This study had a small sample size and was hospital based. It included only those presenting to the hospital with dyspnoea. Along with exclusion of other possible

confounding factors, smokers and subjects with more than 65 years were also excluded as an earlier study had revealed that the severity of obstructive airway disease changes in subjects treated for tuberculosis with advancing age and number of cigarettes smoked.[17]

Only those subjects who previously received a full course of anti-tuberculosis treatment, had a chest radiograph evidence of scarring or destructive changes and who had no features of active disease were included to clearly differentiate it from active endobronchial tuberculosis which may also present with dyspnoea and wheezing as a main feature.[18]

The limitations of this study, need to be mentioned. Due to the high prevalence and incidence of pulmonary tuberculosis in this region, a large sample was expected however, due to many exclusion criteria, the sample size finally remained small. Being a hospital based study only those subjects presenting with dyspnoea were interviewed, it would not represent the over all prevalence of post-TB COPD, which is possible by population based studies. Since it was carried out in a military set-up, with a male majority, the ratio of male to female may actually be different in community setting.

CONCLUSION

Chronic functional effects of extensive post-tuberculous lung scarring manifested mainly as a COPD like syndrome, which showed same patterns of pulmonary function abnormalities on spirometry. In view of the fact that smokers and other possible causes had been excluded, this study finds pulmonary tuberculosis as an independent etiological factor for chronic obstructive pulmonary disease.

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