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Research Article

Association of type ii diabetes mellitus with pulmonary tuberculosis: a clinical and radiological study

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ABSTRACT

Background: The link between diabetes mellitus and tuberculosis has been recognized for centuries. It is only in the later years that the association has been identified. Diabetes mellitus has been reported to modify the presenting features of pulmonary tuberculosis, but there are varying data, particularly regarding the association with lower lung field involvement.
Methods: 229 pulmonary/pleural fluid TB positive patients were tested for presence of type II diabetes. Clinical and radiological tests were done and analyzed for all patients.
Results: 109 of 229 patients were diabetic and more than 50% of them were males. The most common symptoms were loss of appetite and weight, followed by cough and fever. Mixed zone involvement of the lung was a more common presentation than upper or lower zone.
Conclusions: We have tried to highlight the importance of Diabetes mellitus as a potential risk factor for Pulmonary tuberculosis patients, especially in the geographical regions were the two diseases are highly prevalent. More studies need to be performed in a region to establish the association between the two.

Keywords: Diabetes mellitus, Pulmonary tuberculosis, Clinical findings, Radiological study

INTRODUCTION

It is acknowledged that both tuberculosis (TB) and diabetes mellitus (DM) are major global health problems. However, there is little recognition that the rapid escalation of DM in some places may conceivably have as great an impact on TB control as the spread of HIV.[5]

Tuberculosis has already been declared a "global emergency" by the WHO in 1992 as it was recognized as a single global killer, with an estimated one third of the world's population infected with Mycobacterium tuberculosis.[3]

Diabetes mellitus is one of the most common diseases found worldwide. In 1998, World Health Organisation has projected that the prevalence of diabetes among adults worldwide will more than double, from 135 million (4%) to 300 million (5.4%), by the year 2025.[2] The major part of this tremendous increase is estimated to occur in developing countries, like India and China, wherein a 170% increase, from 84 million to 228 million is projected.

Since ancient times, physicians have been aware of the association between tuberculosis and diabetes mellitus: perhaps the earliest to note it was the great Indian

physician Susruta, in 600 A.D, while Avicenna (780-1027 A.D.) had commented that phthisis frequently complicated diabetes. Autopsies in the 18th and 19th centuries were supportive of this association as well, although the tubercle bacilli were not discovered until 1882. The association of the two is more likely to occur amongst patients with poorly controlled diabetes.

Many pathophysiologic explanations have been proposed for this particular disease association, in which cellular immunity is depressed with fewer T lymphocytes in the blood and a diminished capacity for blast transformation. Non-enzymatic glycosylation and autonomic neuropathy are involved in these phenomena, which make diabetic patients more susceptible to infection, especially tuberculosis. Thus multiple tubercular sites on the lungs are the principal observation in tuberculosis patients with and without diabetes. Prognosis is worse when associated with bacterial excretion and thus tuberculosis mortality. Patients with diabetes are more sensitive to this type of infection because of their depressed cellular immunity and cytokine production, related to harmful effect of non-enzymatic glycosylation. These factors suggest the particularity of the epidemiology, pathophysiology and symptoms of diabetes associated with tuberculosis.[6]

Now, with diabetes assuming epidemic proportions in the first quarter of the 21st century, it is imperative to take measures for the prevention and control of this deadly duo.[4]

METHODS

A total of 229 Tuberculosis positive patients attending the Department of Medicine during the period of Aug 2013 to April 2015 at Apollo Institute of Medical Sciences & Research and Mallareddy Medical College for women were selected for this study.

Inclusion & exclusion criteria: Pulmonary/pleural Tuberculosis and age greater than 18 years were included, extra pulmonary tuberculosis (except pleural) and retrospective patients were excluded in the study.

Clinical history like general symptoms (loss of appetite and loss of weight), fever, cough, haemoptysis, and radiological findings (lesions, cavitation, fibrosis and consolidation) were taken.

Two sputum samples with one being morning sample and other being a random sample were collected from all the patients as per the RNTCP guidelines. They were all subjected to Zeihl Neelson's staining for identification of Acid fast bacilli. X-ray chest PA view, Blood samples were collected for fasting blood sugar levels and post prandial sugar levels and Erythrocyte Sedimentation rate. Patients were considered to be diabetic mellitus if they were receiving insulin or any other hypoglycemic agents or if two of their fasting blood sugar levels were more than 140%. Involvement of upper zone of lung was considered to be upper lung field tuberculosis and lower lung field tuberculosis was defined as tuberculosis involving the middle zone and/or lower zone. Cavitation was considered to be present only when its diameter was more than 2 cm.

RESULTS

Of the 229 patients, 109 were found to have type II diabetes mellitus while 120 were non diabetic. Of them, majority were males in both the cases (Figure 1).

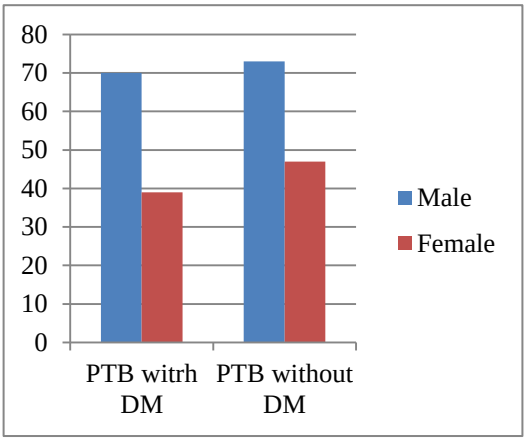

Figure 1: Sexwise distribution of pulmonary tuberculosis with and without Diabetes mellitus.

The most predominant age group was between 35-60 years.

Of the general symptoms observed, 96% of them had loss of appetite and loss of weight while more than half of them had cough with expectoration. Fever and haemoptysis were observed in less than 25% of the patients (Figure 2).

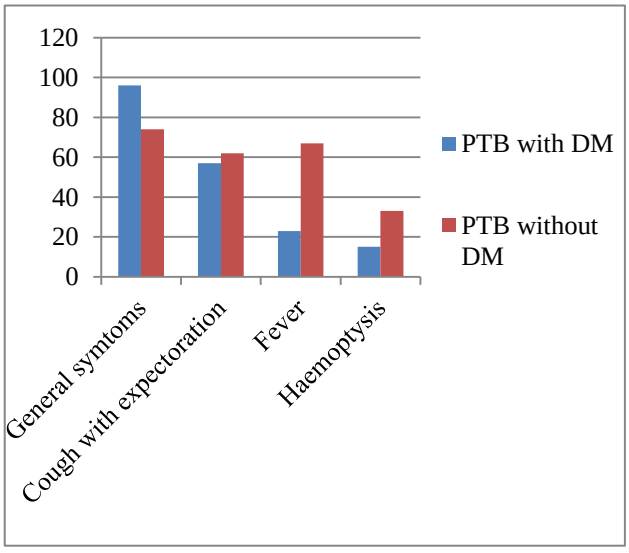

Figure 2: Percentage of clinical findings.

The radiological findings are shown in Table 1. The most common was mixed type of lesion in pulmonary tuberculosis with DM while cavitations were more common in PTB without DM

Table 1: Radiological findings.

Lesions	PTB with DM N=109	PTB without DM N=120
Mixed	68 (64.8%)	33 (27.5%)
Cavitations	56 (51.4%)	40 (33.3%)
Infiltration	52 (47.7%)	34 (28.3%)
Fibrosis	31 (28.4%)	23 (19.2%)
Consolidation	24 (22.1%)	17 (14.2%)

Note: PTB: Pulmonary tuberculosis, DM: Diabetes mellitus

Extensive zone involvement i.e. multi zone or bilateral involvement was seen in most of the cases with diabetes while the most common zone involved with patients without diabetes was the lower zone.

Table 2: Zones involved.

Zones involved	PTB with DM N=109	PTB without DM N=120
Upper zone	70 (64.8%)	57 (47.5%)
Lower zone	37 (33.9%)	61 (50.8%)
Extensive / Multi zone	71 (65.1%)	45 (37.5%)

DISCUSSION

Type 2 diabetes mellitus is seen in a significant proportion of patients with pulmonary tuberculosis. This association is known to be one of the frequent comorbidities.[11,12] Our study revealed a prevalence of 47.6% (109 out of 229) of diabetic patients among the TB positive patients. In similar studies from urban Pondicherry, a very low prevalence of diabetes was observed to be 5.6%, 8.27% and 8.6%, respectively with a prevalence of 5.8% in rural areas of Puducherry,[12-15] while in other studies a hugher prevalence similar to our findings were seen.[16,17]

The predominant gender was male. The same was observed by Bachti Alisjahbana et al., in a study performed in Netherlands and Caron Walker in a study on ethnic groups in England.[7,8] Even amongst the various ethnic groups, the males were found to be predominant.

The most common symptoms were loss of appetite and weight loss among the patients in our study. Incidence of fever was higher in PTB patients without DM than those with DM. Similar results were seen by Bachti Alisjahbana in a similar study, while in contrast in a study in Tanzania, fever was found to be the most common symptom rather than loss of weight and appetite.[9]

Involvement of multi zone was more common followed by upper zone among the patients having tuberculosis with DM in our study, while involvement of lower zone was common among those without diabetes. These findings were corroborated by another study in India by Bhanu Rekha et al.[10]

We had observed presence of cavitations in more than 50% of the cases while Bhanu Rekha et al. observed cavitations in only 19.8% of the patients. In a similar study by Bachti Alisjahbana, 40 % of PTB patients with DM and more than 50 % without DM had cavitations.[7]

Through this study though we have established an association between pulmonary tuberculosis and diabetes mellitus, further research needs to be done to ascertain this, so as to identify the best time for a valid and cost effective screening for diabetes, subsequent changes needed, if any, in the management of both the diseases.

CONCLUSION

Diabetes mellitus has been reported to have effect on the presenting features of pulmonary tuberculosis. There are a few varying data, especially regarding the association with lower lung field involvement. Diabetic patients especially males are more prone to pulmonary tuberculosis with dyspnea, weight loss, hemoptysis and multilobar cavitary lesions in comparison to non-diabetics. This could be due to fact that TB is more invasive in diabetic patients.

We have tried to highlight the importance of Diabetes mellitus as a potential risk factor for pulmonary tuberculosis patients, especially in the geographical regions were the two diseases are highly prevalent. More studies need to be done with the purpose of strengthening the association between these two diseases in different populations so that their treatment and projecting the future of TB becomes easier.

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