

STUDY ON CLINICAL AND RADIOLOGICAL PRESENTATION OF PULMONARY TUBERCULOSIS IN DIABETIC PATIENTS IN A TERTIARY CARE HOSPITAL

C. Babu Anand¹, A. Vinoth²

¹Associate Professor, Department of General Medicine, Thanjavur Medical College, Thanjavur, Tamilnadu.

²Assistant Professor, Department of General Medicine, Thanjavur Medical College, Thanjavur, Tamilnadu.

ABSTRACT

BACKGROUND

Diabetes mellitus has been reported to modify the presenting features of pulmonary tuberculosis. In recent decades, with the increasing prevalence of tuberculosis in diabetes mellitus cases in the world, the relationship is re-emerging as a significant public health problem. Improved understanding of the bidirectional relationship of the two diseases is necessary for proper planning and collaboration to reduce the dual burden of diabetes and TB.

MATERIALS AND METHODS

The study was conducted at Thanjavur Medical College Hospital during the time period January 2017 to August 2017. It is a prospective study. 60 cases of diabetes mellitus with pulmonary tuberculosis were studied. Their clinical profile and chest radiograph results were analysed.

RESULTS

The predominant clinical symptoms noted were anorexia (82%), cough (80%) and fever (60%). 56% of male patients were smokers. Average duration of diabetes was 68 years. The average fasting and postprandial blood sugar values in the study group was 238.5 and 340.0 mg/dL, respectively. 100% of the patients were sputum positive for AFB. Out of these, 45% of cases were high sputum positivity (3+). Cavitory lesions (52%) were the most common type of lesion noted in both age group patients followed by fibrosis (33%) and infiltration (25%). Lower lung field involvement was noted in 32% of patients and was more common in patients greater than 40 years.

CONCLUSION

Severe hyperglycaemia appears to be a contributory factor to the development of pulmonary tuberculosis in diabetics. This has potentially serious implications for tuberculosis control and it must become a priority to initiate focused and coordinated action like case finding, treatment of latent tuberculosis and efforts to diagnose, detect and treat DM may have a beneficial impact on TB control.

KEYWORDS

Diabetes, Pulmonary Tuberculosis.

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BACKGROUND

Diabetes is a major metabolic disorder that adversely affect the treatment outcomes and progression of tuberculosis. In areas where tuberculosis prevalence is high where the morbidities due to diabetes will complicate care and control of tuberculosis. These signifies the importance of adequate glycaemic control in limiting the spread of tuberculosis. Diabetes weakens the patient's natural resistance to tuberculosis by altering the cell-mediated immunity causing renal dysfunction, macro and micronutrient deficiency and

pulmonary microvascular changes, all of which collectively increase the risk of development of TB.

DM alters the humoral and cell-mediated immunity by multiple mechanisms mainly by altered cytokine response.¹ The mechanisms by which diabetes mellitus alter the treatment response in pulmonary TB include abnormal drug absorption and drug metabolism by autonomic dysfunction, which delays proper time-dependent microbial killing, which decreases better outcome and increase the frequency of relapse and mortality.² Drug-resistant tuberculosis is more prevalent among patients with diabetes.

Vice versa, like any other chronic infective process, tuberculosis will also lead to the onset of diabetes and adversely affect the proper glycaemic control in patients with pre-existing diabetes.

Drug interactions are more common among diabetes patients with tuberculosis. It can occur in both directions, i.e. TB drugs can affect the absorption and action of oral antidiabetic drugs and also oral antidiabetics decrease the

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Corresponding Author:

Dr. A. Vinoth,

*Assistant Professor, Department of General Medicine,
Thanjavur Medical College, Thanjavur, Tamilnadu.*

E-mail: vinothphysician@gmail.com

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effect of certain anti-TB medications. For example, impaired glycaemic control seen after rifampicin use as a result of interaction with oral antidiabetic agents.³ Improper diabetic control finally leads to renal damage and increased propensity for drug overdose. Hepatic damage seen after antitubercular treatment is more prevalent among diabetic, which eventually results in bad treatment results.⁴

The approximate TB burden in diabetes was 9%. The incidence of tuberculosis in patients with diabetes ranges from 2-9%. The early detection of the disease combination is rare. In most instances, the higher number of cases show advanced tuberculosis and highly impaired glycaemic status. A study conducted recently in the RIMS, Imphal, shows the tuberculosis burden among diabetes where about 28% by radiological measures and 7% by sputum AFB. TB infection in diabetes has shown an increasing trend with age. The mortality and morbidity results from tuberculous activity is very high in diabetes compared to pulmonary tuberculosis patients without diabetes.

Deshmukh PA studied 2450 cases of pulmonary tuberculosis, it showed that 63% were males and 37% were females and 40% were in the age group 45 years and above. There were 140 cases of diabetes, 100 were males and 40 were females. Prevalence in males was 6.5% and in females 4.2%. Majority of the cases of diabetes belong to the age group 45 years and above (82.6%).⁵

Patel JC et al conducted a study in 4349 cases of diabetes studied between 1967 and 1974, 179 cases were found to have pulmonary tuberculosis. 135 cases were males and 44 were females. Maximum cases occurred in age groups of 50-60 years.⁶ A study was conducted by Research Committee of the Tuberculosis Association of India conducted in 7 centers in India, which includes around 950 pulmonary tuberculosis patients and 10% had diabetes. Of the 600 patients in the age group less than 40 years, 30 had diabetes mellitus (5%). Of the 350 patients belonging to greater than 40 years, 65 had diabetes mellitus (19%). The overall rate was males 10% against 9% in females.⁷

Two recent reports from South India showed a high prevalence of diabetes in people with TB registered under the Revised National Tuberculosis Control Programme (RNTCP). Additionally, there is evidence that insulin dependence as a marker for severity of disease and poor glycaemic control predicts increased TB risk.

MATERIALS AND METHODS

The study was conducted at Thanjavur Medical College Hospital during the time period January 2017 to August 2017. It is a prospective study.

Sample size- 60.

Source of data- Patients with diabetes mellitus and pulmonary tuberculosis of both sexes admitted to General Medicine Ward who satisfied the inclusion criteria.

Method of Collection of Data

1. Pulmonary tuberculosis was diagnosed by -
 - Adult patients who satisfied the above criteria were examined in detail and subjected to relevant laboratory and radiological investigations.
 - Detailed history.
 - Clinical examination.
 - Sputum examination for acid-fast bacilli.
 - Chest radiography.
2. Diabetes mellitus was diagnosed by -
 - WHO Diagnostic Criteria-
 - Symptom of diabetes plus random blood sugar ≥ 11.1 mmol/L (200 mg/dL) (or), Fasting plasma glucose ≥ 7.0 mmol/L (126 mg/dL) (or), Two-hour plasma glucose ≥ 11.1 mmol/L (200 mg/dL) during an oral glucose tolerance test.

Clinical Profile

- Age and sex distribution.
- Symptoms.
- Duration of diabetes mellitus.
- Incidence of smoking.
- Fasting and postprandial blood sugar.
- Sputum AFB and radiological presentation.

Inclusion Criteria

All diabetic adult patients >18 years admitted to the hospital with sputum-positive tuberculosis.

Exclusion Criteria

1. Age <18 years.
2. Diabetic patients with sputum negative and MDR-TB.
3. Pulmonary tuberculosis patients not having diabetes.

Investigations

1. Fasting blood sugar.
2. Postprandial blood sugar.
3. Sputum AFB.
4. Chest x-ray.

RESULTS

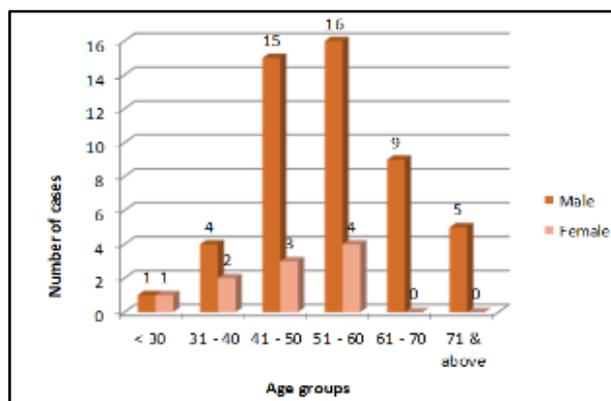


Chart 1. Age-Sex Distribution

The above chart shows the age-wise distribution of patients. The maximum incidence of pulmonary tuberculosis was reported above the age of 40 years. The peak incidence of pulmonary tuberculosis was reported in the age group of 41-50 and 51-60 years.

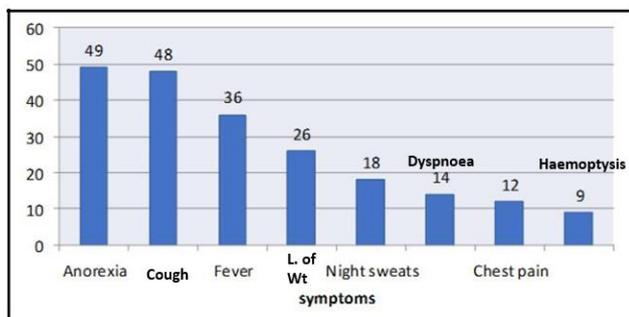


Chart 2. Symptomatic Distribution

Chart 2 shows the most common symptoms noted were anorexia (81.7%), cough (80%), followed by fever (60%). Other symptoms noted were haemoptysis (15%), loss of weight (43.3%), dyspnoea (23.3%), chest pain (20%) and night sweats (30%).

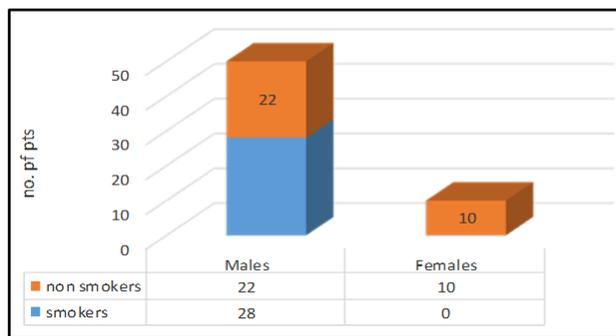


Chart 3. Incidence of Smoking

Out of 60 patients, 28 were smokers. All smokers were men. 56% of the men are smokers.

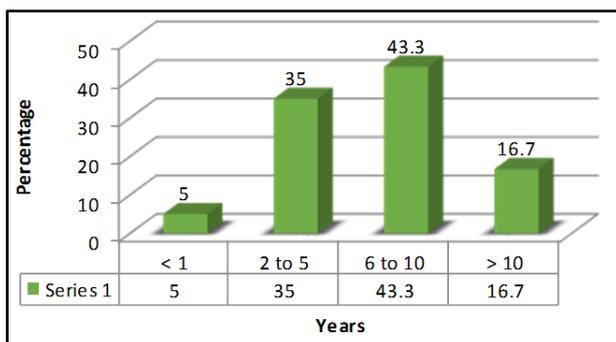


Chart 4. Duration of Diabetes

Most of the TB patients (43.3%) were having diabetes for a duration of more than 5 years.

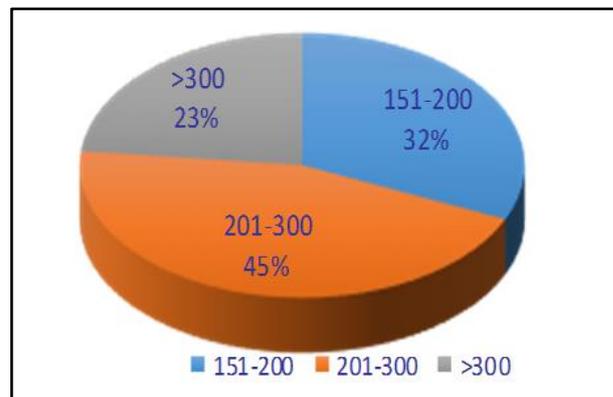


Chart 5. Relationship with FBS

From Chart 5, the fasting blood sugar value showed a definite correlation with pulmonary tuberculosis. 45% of the patients had fasting blood sugar value between 201 to 300 mg/dL and 32% had value between 151-200 mg/dL and 23% of the patients had value above 300 mg/dL. Mean fasting blood sugar value was 238.5 mg/dL.

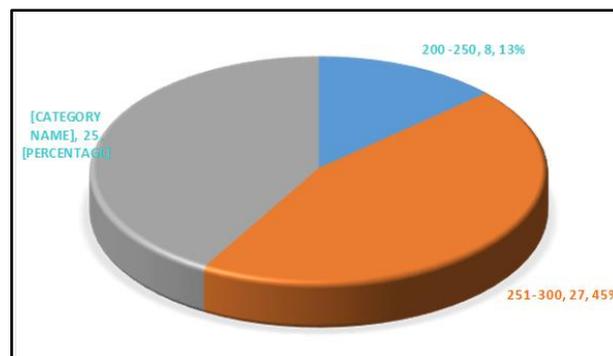


Chart 6. Relationship with PPBS

Chart 6 shows 32% of the patients had a postprandial blood sugar value above 350 mg/dL, 45% had values between 251-350 mg/dL and only 13% of the patients had value between 200-250 mg/dL. Mean postprandial blood sugar value in the study group was 340.0 mg/dL.

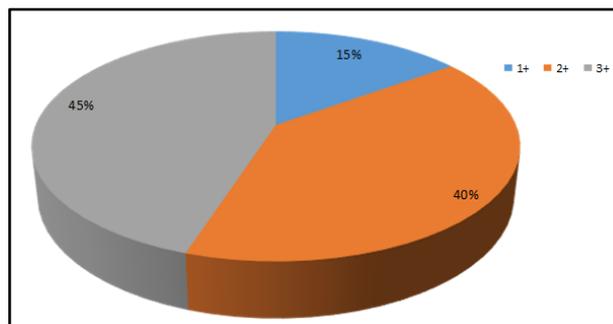


Chart 7. Sputum Positivity

Chart 7 shows 45% of the diabetic TB patients were having high sputum positivity 3+. 40% have 2+ positivity and 15% have 1+ positivity.

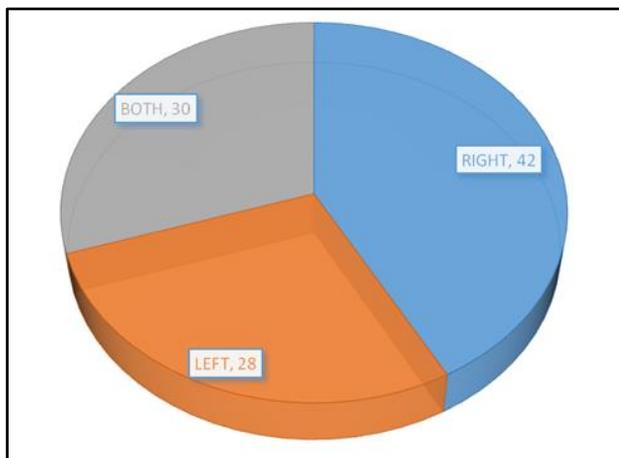


Chart 8. Side of the Lesion

From chart 8, right-sided lung lesions were noted in 42% of the cases and left-sided lesions in 27% of the cases and bilateral lesion in 30% of the study group.

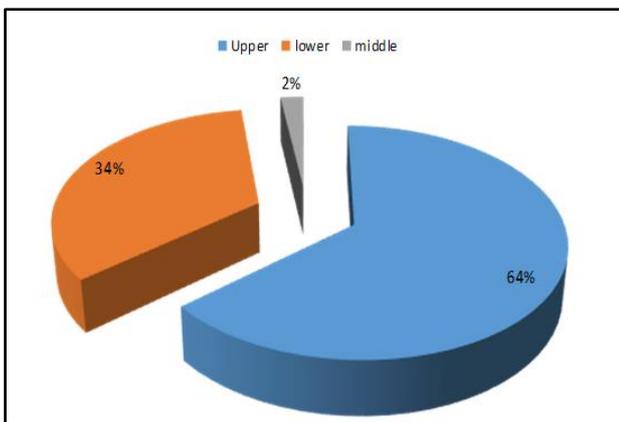


Chart 9. Lung Field Involvement

From Chart 9, most of the lesions are present in the upper lobes (64%), followed by lower (34%) and then by middle zone (2%).

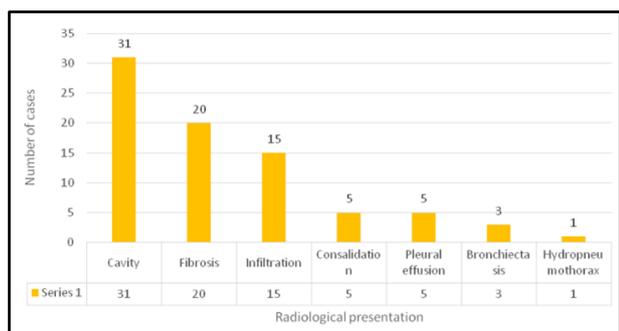


Chart 10. Radiological Features

From Chart 10, it is known that chest x-ray showed cavitory lesion in 52%, fibrosis in 33% and infiltrative in 25% of the patients. Other lesions noted are consolidation (8%), pleural effusion (8%), hydropneumothorax (1.7%) and bronchiectasis (5%).

DISCUSSION

A clinical and radiological evaluation of 60 cases of pulmonary tuberculosis with diabetes mellitus was done. The high incidence of tuberculosis in diabetic patients reported by western and Indian workers suggest a significant association between these two diseases.^{8,9} In our study, the total number of males were 83.3% and females were 16.7%. The male-to-female ratio was 5:1 (Chart 1).

In the present study, the maximum incidence of pulmonary tuberculosis was noted above the age of 40 years. The peak incidence was in the age group of 41-50 and 51-60 years (Chart 1). Preponderance among those above 40 years in age was also reported by Deshmukh et al (1966),⁵ Brij Kishore et al (1973)¹⁰ and Nihalani et al (1978).¹¹

The predominant symptoms noted in our study was anorexia (81.7%), cough (80%) and fever (60%) (Chart 2). Our study showed that 56% of the males were smokers and smoking maybe a contributing factor for developing tuberculosis in these patients (Chart 3). 35% patients had duration of diabetes between 2-5 yrs. 5% of the patients had duration of diabetes less than 1 year and 43% of the patients between 6-10 yrs. (Chart 4). The average duration of diabetes in this study was 6.8 years. The interval between detection of diabetes and the onset of pulmonary tuberculosis was studied by Tripathy and others. They reported that it varied from several months to 15 years, mean interval being about 6 yrs.¹² The duration of diabetes is significant, because there is an increased opportunity for infections with increased duration of diabetes. The result of the present study is comparable to other studies.

The fasting blood sugar value showed a definite correlation with pulmonary tuberculosis. 45% of the patients had fasting blood sugar value between 201 to 300 mg/dL and 32% had value between 151-200 mg/dL and 23% of the patients had value above 300 mg/dL. Mean fasting blood sugar value was 238.5 mg/dL (Chart 5). 42% of the patients had a postprandial blood sugar value above 350 mg/dL, 45% had values between 251-350 mg/dL and only 13% of the patients had value between 200-250 mg/dL. Mean postprandial blood sugar value in the study group was 340.0 mg/dL (Chart 6). This showed that in most of the cases blood sugar was not controlled. In a study done by Sachdeva AK and others, it was showed that high incidence of pulmonary tuberculosis was associated with severe hyperglycaemia.¹³

45% of cases were high-sputum positivity (3+) (Chart 7). In our study, 64% of the patients showed radiological features suggestive of upper lobe involvement and 34% had lower lung field tuberculosis (Chart 9). Also, right-sided lung lesions were noted in 42% of the cases and left-sided lesions in 27% and 31% had bilateral tuberculosis (Chart 8). Chest x-ray showed cavitory lesions in 52%, fibrosis in 33% of the patients and infiltrative lesion in 25% of the patients. Other lesions noted are consolidation (8%), pleural effusion (8%), hydropneumothorax (1.7%) and bronchiectasis (5%) (Chart 10). Cavitory lesions (52%) were the most common type of

lesions noted followed by fibrosis (33%) and infiltration (25%).

The main inference of our study was diabetes had a significant impact on treatment and control of tuberculosis in patients with diabetes.

CONCLUSION

Severe hyperglycaemia appears to be a contributory factor to the development of pulmonary tuberculosis in diabetics. This has potentially serious implications for tuberculosis control and it must become a priority to initiate focused and coordinated action like case finding, treatment of latent tuberculosis and efforts to diagnose, detect and treat DM may have a beneficial impact on TB control.

Limitations

1. The present study was done in a tertiary hospital, in an urban setting and hence the results cannot be generalised to the population at large.
2. The study has been primarily cross sectional in nature.
3. The sample population was small in number.
4. Treatment outcomes and MDR cases were not studied.

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