

A STUDY OF TUBERCULOSIS IN PATIENTS WITH DIABETES MELLITUS

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ABSTRACT:

Background: The present study was carried out to describe the clinical profile of tuberculosis in cases with type 2 diabetes mellitus

Methods- After obtaining the consent, a detailed investigation reports were collected from the study population like CBC, ESR, FBS, PPBS, HBA1C, HIV, Chest x-ray and Sputum for acid-fast bacilli, sputum culture and sensitivity, tissue for biopsy. Histopathological, Hematological and Radiological data were assessed and recorded. Sampling method was purposive sampling method and sample size was 106. Data were analyzed using SPSS (Version 19). Descriptive statistics, Chi-square test, and independent sample t-test were done appropriately. p-value <0.05 was considered statistically significant.

Conclusion

In this study, the common presenting complaints noticed were fever (82%) and cough (78%) and 13% of the participants had a history of contact with TB cases and 1.6% of the cases were HIV status positive.

The prevalence of Tuberculosis among cases with diabetes mellitus in this study was 24.1%. Among all the tuberculosis cases, 77.4% were pulmonary tuberculosis cases and 22.6% were extra-pulmonary tuberculosis cases.

Significant associations were noted between socio-economic status, duration of symptoms suggestive of tuberculosis, the habit of smoking, history of contact with TB case, history of COPD, history of HIV with the presence of tuberculosis.

BACKGROUND

Tuberculosis (TB) is an infectious disease that poses a major public health threat all over the world. It is caused by Mycobacterium tuberculosis which affects almost all parts of the body with predominantly affecting the lungs and causes pulmonary tuberculosis (PTB). Even though the causative organism was discovered more than a century ago and highly effective drugs and vaccines are available, TB remains a global public health problem. Although the disease is preventable and curable, the association of other diseases and the emergence of extensively drug resistant and multiple drug-resistant TB pose additional challenges to effective TB control^{1,2}.

Diabetes mellitus (DM) is a metabolic disorder with elevated levels of blood sugar due to insufficient insulin production or failure of cells to respond to insulin³. The classic symptoms of a high blood sugar level are frequent urination, increased thirst, and hunger. In 2030, the global population of people with diabetes is expected to reach 439 million⁴.

DM is becoming more common around the world, particularly in developing countries where tuberculosis is most prevalent⁵. *M. tuberculosis* infects nearly one-third of the world's population, and about 10% of those infected are at risk of developing an active form of the disease during their lifetime, depending on how the epidemiological triad interacts^{6,7}. It was estimated that 8.6 million people worldwide contracted tuberculosis (TB), with 1.3 million dying as a result of the disease⁸. India has the most TB cases, with an estimated 2 million cases per year⁹.

According to available data, 95 percent of TB patients live in low- and middle income countries and more than 70 percent of DM patients live in the same countries, particularly in Southeast Asia¹⁰. According to a recent national study published by the Indian Council of Medical Research, India has 62.4 million people with type 2 diabetes and 77 million people with prediabetes. By 2030, these figures are expected to rise to 101 million people^{11,12}.

According to a study conducted in India, diabetes was responsible for 14.8 percent of PTB and 20.2 percent of smear-positive TB¹³. Patients with TB who were screened for diabetes had a high prevalence of diabetes ranging from 1.9 percent to 35 percent, according to a systematic review of screenings conducted in multiple settings¹⁴. Diabetes and tuberculosis can exacerbate each other on a variety of levels. Diabetes may harm TB treatment outcomes in those with active TB by delaying the time for microbiological response, lowering the likelihood of a favorable outcome, and increasing the risk of relapse, death, and drug resistance. Diabetes screening in TB patients will not only ensure early case detection but also better diabetes management¹⁵.

METHODS :

Study Design:

This study was conducted as a cross-sectional study, to find out the clinical profile of tuberculosis in patients with diabetes mellitus.

Study Area:

This study was conducted in the department of General Medicine, PES Institute of Medical Sciences & Research (PESIMSR), a tertiary care teaching hospital located in Kuppam, Andhra Pradesh.

Study Population:

Patients with Diabetes Mellitus having Tuberculosis, during the study period were included in the study.

Study period:

The study was conducted from January 2020 to July 2021.

Inclusion criteria:

- Patients aged more than 18 years
- Patients of both sexes
- Patients with DM diagnosed with Tuberculosis

Exclusion criteria:

- Patients who were severely ill to participate in the study
- Patients who refused consent to participate

Sample size:

Based on literature considering the prevalence of TB among Diabetes cases as 24.5% with the power of 95% and level of significance of 5% and 7% absolute precision, the calculated sample size was 106

RESULTS:

In this study, the prevalence of Tuberculosis among DM cases was found to be 24.1%

Table 1: Prevalence of TB among DM cases

Parameter	frequency	percentage
Total cases included with DM	440	100
Cases with TB	106	24.1
Prevalence of Tb among suspected cases with DM		24.1

Among the cases with TB and DM, 77.4% of them were diagnosed to have Pulmonary TB and 22.6% of the cases were diagnosed with Extra pulmonary TB

Table -2: Type of TB among the study patients

Type of TB among the study patients	Type of TB Frequency Percentage	percentage
Pulmonary TB	82	77.4
Extrapulmonary TB	24	22.6
	106	100

The difference in mean FBS value among cases with DM and TB and DM cases without TB was known to be statistically significant with a p-value of 0.0003

Table 3 : Difference in mean FBS among cases with DM and TB and cases with no TB

Parameter	TB Present	TB Absent	P-value
Mean FBS (mg/dl)	165.3 ± 42.6	146.3 ± 47.8	0.0003*

*Significant

Similarly, the difference in mean PPBS value among cases with DM and TB and DM cases without TB was known to be statistically significant with a p-value of 0.0143.

Table 4 : Difference in mean PPBS among cases with DM and TB and cases with no TB

Parameter	TB Present	TB Absent	P-value
Mean PPBS (mg/dl)	263.5 ± 67.6	241.8 ± 82.4	0.0143*

*Significant

The mean HbA1c among TB cases was 7.2 ± 0.3% and the mean HbA1c among non-TB cases were 7.1 ± 0.3. The mean HbA1c difference among TB patients and non-TB patients was significant with a p-value of 0.0029.

Table 5: Difference in mean HbA1c among cases with DM and TB and cases with no TB

Parameter	TB Present	TB Absent	P-value
Mean HbA1c (%)	7.2 ± 0.3	7.1 ± 0.3	0.0029*

*Significant

ESR was elevated in 23% of the cases with DM and TB and ESR was normal among 1.1% of the cases with DM and TB. Among cases without TB, ESR was elevated in 5.2% of the cases and normal among 70.7% of the cases. The difference in ESR among cases with TB and no TB was significant in this current study (p-value < 0.0001).

Table 6 : ESR among the study participants

ESR	TB Present	TB Absent	Total	P-value
Abnormal	101 (23)	23 (5.2)	124 (28.2)	<0.0001*
Total	106 (24.1)	334 (75.9)	440 (100)	

*Significant

Mean ADA among cases with PTB was found to be 57.8 ± 21.6 U/L.

Table 7: Mean ADA among cases with PTB

Parameter	Mean	SD
Mean ADA among cases with PTB	57.8	21.6

Radiological findings of PTB cases showed mid-zone involvement among 41.5% of the cases, lower zone involvement among 31.7% of the cases. One or more lung zones were affected in 18.3% of patients and the upper zone was involved in 8.5% of the PTB cases.

Table 8: Involvement of lung zones based on radiology

Radiological findings of PTB	Frequency	Percentage
Upper zone	07	8.5
Middle zone	34	41.5
Lower zone	26	31.7
More than one zone involved	15	18.3
Total	82	100

Based on the HIV status among 1.6% of the participants with HIV, 1.4% of the participants had DM associated with Tuberculosis and 0.2% of the participants were negative for TB. The p-value was found to be significant which shows there was a difference among cases with TB and no TB based on the HIV status (p-value =0.0012).

Table 9: HIV status Vs TB among DM cases

History of HIV	TB Present	TB Absent	Total	P-value
Present	06 (1.4)	01 (0.2)	07 (1.6)	0.0012*
Absent	100 (22.7)	333 (75.7)	433 (98.4)	
Total	106 (24.1)	334 (75.9)	440 (100)	

*Significant

DISCUSSION:

The prevalence of Tuberculosis among cases with diabetes mellitus in this study was 24.1%. 77.4% of them were diagnosed to have Pulmonary TB and 22.6% of the cases were diagnosed with Extra pulmonary TB.

Regarding the types of Extra pulmonary TB, the most commonly found one was TB lymphadenitis among 70.8% of the cases, Abdominal TB was seen in 16.7% of the cases, and CNS and Spinal TB were seen among 8.3% and 4.2% of the cases respectively.

Among patients with TB, 40.5%, 29.7%, and 26.9% of the cases presented with Weight loss, cough and fever respectively. Likewise, among participants without TB, 73.1%, 70.3%, and 59.5% of the patients presented with fever, cough, and weight loss respectively.

Based on the HIV status among 1.6% of the participants with HIV, 1.4% of the participants had DM associated with Tuberculosis and 0.2% of the participants were negative for TB. The p-value was found to be significant which shows there was a difference among cases with TB and no TB based on the HIV status (p-value =0.0012).

The difference in mean FBS value among cases with DM and TB and DM cases without TB was known to be statistically significant with a p-value of 0.0003 similarly, the difference in mean PPBS value among cases with DM and TB and DM cases without TB was known to be statistically significant with a p-value of 0.0143.

The mean HbA1c among TB cases was $7.2\pm 0.3\%$ and the mean HbA1c among non-TB cases was 7.1 ± 0.3 . The mean HbA1c difference among TB patients and non-TB patients was significant with a p-value of 0.0029.

ESR was elevated in 23% of the cases with DM and TB and ESR was normal among 1.1% of the cases with DM and TB. Among cases without TB, ESR was elevated in 5.2% of the cases and normal among 70.7% of the cases. The difference in ESR among cases with TB and no TB was significant in this current study (p-value = <0.0001).

Mean ADA among cases with PTB was found to be 57.8 ± 21.6 U/L

On assessing the Radiological findings of PTB cases 38.7% of cases had Pleural effusion, 34.9% of the cases had Opacities, 21.7% of the patients were diagnosed to have cavities and 10.4% of the patients were found with Fibrosis.

Radiological findings of PTB cases showed mid-zone involvement among 41.5% of the cases, lower zone involvement among 31.7% of the cases. One or more lung zones were affected in 18.3% of patients and the upper zone was involved in 8.5% of the PTB cases.

CONCLUSION:

In this study, the common presenting complaints noticed were fever (82%) and cough (78%) and 13% of the participants had a history of contact with TB cases and 1.6% of the cases were HIV status positive.

The prevalence of Tuberculosis among cases with diabetes mellitus in this study was 24.1%. Among all the tuberculosis cases, 77.4% were pulmonary tuberculosis cases and 22.6% were extra-pulmonary tuberculosis cases.

Significant associations were noted between socio-economic status, duration of symptoms suggestive of tuberculosis, the habit of smoking, history of contact with TB case, history of HIV with the presence of tuberculosis.

Also, mean differences in fasting and postprandial blood sugar levels, erythrocyte sedimentation rate levels among the diabetes mellitus cases with tuberculosis and non-tuberculosis cases were found to be significant.

However, age, gender, duration of diabetes mellitus, medications of diabetes mellitus was not significantly associated with the presence of tuberculosis among the cases with diabetes mellitus with this high burden of tuberculosis among the cases with diabetes mellitus, all diabetes mellitus cases with symptoms suggestive of tuberculosis should be screened for the same.

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