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Original Research Article

Comparison of CT chest findings in pulmonary tuberculosis among diabetic and non-diabetic patients

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Abstract

Background & Methods: The aim of the study is to Compare of CT chest findings in pulmonary tuberculosis among diabetic and non-diabetic patients. Informed consent from all the patients will be taken before inclusion in the study followed by computed tomography providing descriptive analysis of radiological findings of PTB in patients with and without DM.

Results: Non-segmental Consolidation was significantly associated with pulmonary tuberculosis in diabetic population as compared to non diabetics (p=0.007). Non-segmental Consolidation was more commonly observed in diabetic tuberculosis affected patients. Miliary TB was significantly associated with pulmonary tuberculosis in diabetic population as compared to non diabetics (p=0.0324). Miliary TB was more commonly observed in diabetic tuberculosis affected patients.

Conclusion: Diabetes has a negative impact on treatment outcome and the resolution of lesions on CT in diabetic patients is slower than that in non-diabetic patients. CT manifestations of tuberculosis in diabetic patients differ from those in non-diabetic patients. Diabetic patients with tuberculosis have a higher prevalence of Non segmental consolidation & Miliary TB. In the present study, Non segmental consolidation, Cavitatory lesions, Miliary TB and Mediastinal lymphadenopathy were more significantly prevalent among diabetic patients compared to non diabetic patients.

Keywords: CT, chest, tuberculosis, diabetic and non-diabetic.

Study Design: Cross sectional Comparative Study.

1. INTRODUCTION

Tuberculosis (TB) is a major challenge among infectious diseases. According to WHO, 10.6 million people fell ill with TB worldwide, including 5.8 million men, 3.5 million women and 1.3 million children. Among these population, 1.3 million people died from TB in 2022 (including 167 000 people with HIV). Worldwide, TB is the second leading infectious killer after COVID-19 (above HIV and AIDS) [1]. Diabetes mellitus (DM) is another major public health problem. Global diabetes prevalence is projected to increase from 387 million in 2014

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to 592 million in 2035.[2] The heightened prevalence of pulmonary tuberculosis among individuals with diabetes is widely recognized. [3] Recent meta-analysis findings indicate that those with diabetes have a three-fold greater susceptibility to developing TB compared to those without diabetes.[4] Consequently, DM is a widely recognized condition that increases the risk of TB and can impact how the disease manifests and how patients respond to therapy.[5]

Several research have shown that individuals with both pulmonary tuberculosis (PTB) and DM) have a greater occurrence of cavitation compared to PTB patients without DM, [6] however other investigations have found no such association. Multiple research have indicated that patients with both PTB and DM have a higher prevalence of lower-lung involvement compared to PTB patients without DM. However, conflicting findings have been reported by other investigations. Several writers have observed that individuals with both PTB and DM tend to have a more widespread or diffuse form of PTB compared to those without DM. [7] However, there are conflicting reports from other authors who did not find this association. Studies have shown varying outcomes regarding the influence of DM on the radiographic manifestations of PTB. [9] Meanwhile, multiple research have indicated that the glycemic control status of patients with DM has an impact on this disparity.

All the studies that observed no disparity in PTB cavitation between patients with and without DM were conducted using plain radiographs. However, during the routine examination of a chest CT, it was observed that cavitation appeared to be more prevalent in PTB patients with uncontrolled DM compared to those without DM, which aligns with the findings of previous studies. [10] Furthermore, it is not unusual to observe the simultaneous involvement of a medium-sized airway in PTB patients with uncontrolled DM.

Active PTB typically presents with two primary forms of airway involvement that may be visualized on CT scans. These include endobronchial TB, which primarily affects the larger airways,[11] and centrilobular nodules accompanied by caseous material filling the bronchioles, resembling tree-in-bud patterns. Furthermore, there is a CT characteristic called cylindrical bronchiectasis, which is linked to ongoing inflammation and specific erosive or aneurysmal alterations. This suggests that a medium-sized airway (located beyond the segmental bronchi) is affected, and it may be accompanied by the presence of the feeding bronchus sign. The feeding bronchus sign is a radiological observation on a CT scan that indicates a connection between a hollow and an enlarged airway.[12] Thus, we postulated that an increased occurrence of cavitation in PTB with DM may be associated with a higher prevalence of medium-sized bronchial involvement.

2. MATERIAL AND METHODS

A cross sectional study consisting of adult patients with clinical and microbiological diagnosis of pulmonary tuberculosis that was referred to Department of Radiodiagnosis G.R.M.C. and J.A. Hospital Gwalior. To describe the pulmonary tuberculosis among diabetic as well as non-diabetic patients based on computed tomography.

INCLUSION CRITERIA –

- Referred to Radiodiagnosis Department for assessment of pulmonary tuberculosis
- Patients having Ayushman Card or those who can bear the cost.
- Patients above 30 years of age.

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EXCLUSION CRITERIA –

- Patients not giving consent.
- Patients coinfected with HIV/AIDS or other underlying diseases or treatment causing immunosuppression (excluding DM).

Radiation dose of 1 HRCT varies from 1 mSv to 5 mSv.

3. RESULT

Table 1: Overall mean Age

	Min	Max	Mean	S.D
Age (yr)	35	85	59.41	11.629
Fasting blood glucose (mg/dl)	66	221	124.21	35.987

In the present study, overall mean age was 59.41 ± 11.63 years.
In the present study, overall mean fasting blood glucose was 124.21± 35.99 mg/dl.

Table 2: Sputum Production

	Non Diabetic	**Diabetic**	**p-value**
No	**9(12.86)**	**33(47.15)**	**<0.0001**
Yes	**61(87.15)**	**37(52.86)**	
Total	**70(100)**	**70(100)**	

In the present study, Sputum Production was significantly associated with pulmonary tuberculosis in diabetic population as compared to non diabetics (p=<0.0001). Sputum Production was more commonly observed in diabetic tuberculosis patients.

Table 3: Chest Pain

	Non Diabetic	**Diabetic**	**p-value**
No	**49(70)**	**12(17.15)**	**<0.0001**
Yes	**21(30)**	**58(82.86)**	
Total	**70(100)**	**70(100)**	

In the present study, Chest Pain was significantly associated with pulmonary tuberculosis in diabetic population as compared to non diabetics. (p=<0.0001). Chest Pain was more commonly observed in diabetic tuberculosis patients

Table 4: Non- segmental Consolidation

	Non Diabetic	**Diabetic**	**p-value**
No	**31(44.29)**	**16(22.86)**	**0.007**
Yes	**39(55.72)**	**54(77.15)**	
Total	**70(100)**	**70(100)**	

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In the present study, Non-segmental Consolidation was significantly associated with pulmonary tuberculosis in diabetic population as compared to non diabetics (p=0.007). Non-segmental Consolidation was more commonly observed in diabetic tuberculosis affected patients.

Table 5: Miliary TB

	Non Diabetic	Diabetic	p-value
No	**12(61.43)**	**23(60)**	**0.0324**
Yes	**47(38.58)**	**58(40)**	
Total	**70(100)**	**70(100)**	

In the present study, Miliary TB was significantly associated with pulmonary tuberculosis in diabetic population as compared to non diabetics (p=0.0324). Miliary TB was more commonly observed in diabetic tuberculosis affected patients.

4. DISCUSSION

In this regard, the information offered by CT is crucial for both diagnosis and therapeutic management. we aimed to provide information regarding the clinical and radiographic manifestations of this association. Radiological images of pulmonary tuberculosis have been described as atypical or unusual among diabetic patients, mainly to indicate the locations of lesions other than the common upper lung regions observed in reactivated tuberculosis. For instances, an increased occurrence of lower lung field involvement in diabetic patients has been reported by some researchers, along with a higher occurrence of multilobar involvement. [13] Additionally, it has also been described that some radiological signs of pulmonary tuberculosis are different among diabetic patients, such as a higher detection rate of cavitary lesions, but no radiological differences between diabetic and non-diabetic patients with TB in some other reports. [14-15]. Thus, whether diabetic subjects have a radiologically atypical signs of TB are still controversial.

So, a present study wants to compare diabetic as well as non-diabetic patients among pulmonary TB affected patients. We were prospectively enrolled 140 pulmonary tuberculosis patients comprise with diabetic as well as non-diabetic patients.

In the present study, overall mean age of the study was 59.41 ± 11.63 years. No significant mean difference was observed in age among diabetic (58.63 ± 11.41) as well as non-diabetic patients(60.2 ± 11.71). Among non-diabetic patients, 51-60 years age group was more common whereas 61-70 years of age group was more common in diabetic patients. According to kumar S. et al. study, 55-64 years age group was more common in diabetic tuberculosis patients whereas 65-74 years of age group was more common in non diabetic tuberculosis patients.[16]

Among diabetic pulmonary TB patients,92.86% had cough,52.86% had sputum production,82.86% had hemoptysis, 80% had dyspnea, 82.86% had chest pain and 81.43% had night sweat observed during the study.

In the present study, 77.15% had Non segmental consolidation among diabetic pulmonary TB whereas 55.72% had Non segmental consolidation among non diabetic pulmonary TB

In the present study, 40% had Miliary TB among diabetic pulmonary TB whereas 38.58% had miliary TB among non diabetic pulmonary TB.

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5. CONCLUSION

Diabetes has a negative impact on treatment outcome and the resolution of lesions on CT in diabetic patients is slower than that in non-diabetic patients. CT manifestations of tuberculosis in diabetic patients differ from those in non-diabetic patients. Diabetic patients with tuberculosis have a higher prevalence of Non segmental consolidation & Miliary TB. In the present study, Non segmental consolidation, Cavitatory lesions, Miliary TB and Mediastinal lymphadenopathy were more significantly prevalent among diabetic patients compared to non diabetic patients.

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