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Original Article

To evaluate the changes of pulmonary tuberculosis in diabetes and non-diabetes using CT as diagnostic modality.

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Abstract

Background & Methods: The aim of the study is to evaluate the changes of pulmonary tuberculosis in diabetes and non-diabetes using CT as diagnostic modality. Observation was made based on clinical history and CT chest findings of the patient.

Results: In the present study, Mediastinal Lymphadenopathy is not significantly associated with pulmonary tuberculosis (diabetic as well as non-diabetic) population (p=0.6451). Mediastinal Lymphadenopathy was more common in diabetic tuberculosis affected patients.

Conclusion: Diabetic patients with tuberculosis have a higher prevalence of Non segmental consolidation, Cavitatory lesions, Miliary TB and Mediastinal lymphadenopathy within a tuberculous lesion and more often occurrence in lower lobe than non-diabetic patients with TB. Each TB patient should be routinely be screened for diabetes and good diabetes control can improve the management of tuberculosis.

Keywords: pulmonary tuberculosis. Diabetes, CT & modality.

Study Design: Cross-sectional Study.

Introduction

DM is a metabolic disorder involving carbohydrate, protein and fat metabolism resulting from absolute or relative insulin deficiency and resulting in chronic hyperglycemia manifesting with its microvascular and macrovascular complications. In fact, diabetes can have a long variable asymptomatic period of 5 years to 15 years and may be diagnosed for the first time because of its comorbidities or complications.[1]

ISSN: 0975-3583, 0976-2833 VOL16, ISSUE01, 2025

The long-term effects of diabetes include damage, dysfunction and failure of various other organs which includes progressive development of retinopathy with potential blindness, nephropathy that may lead to renal failure, neuropathy with risk of foot ulcers, amputation, Charcot joints and features of autonomic dysfunction including sexual dysfunction[2]. People with diabetes are at increased risk of macrovascular complications like cardiovascular, peripheral vascular and cerebrovascular diseases.
Multi-detector Computed Tomography (MDCT) can acquire high resolution and isotropic volume data which can be interpreted using various 3D image post processing techniques, which is ideal for optimal assessment of PTB manifestations, which may be missed out in a plain radiograph[3].

Chest computed tomography (CT) is an important diagnostic tool for TB. [4] The primary signs on CT are local patchy opacities, consolidation, proliferative lesions, tuberculous spheres, tuberculomas, disseminated endobronchial lesions, sclerotic calcifications, and linear opacities. In addition, TB can be classified as mild, moderate, or severe based on chest CT imaging classification criteria [5-7].
The purpose of this study is to comprehensively evaluate and compare MDCT chest findings in pulmonary TB (PTB) patients with and without DM, in India, where both the conditions are much more common than the rest of the world.

Material and Methods

Present study was conducted for 01 year on 140 cases. A cross sectional study consisting of adult patients with clinical and microbiological diagnosis of pulmonary tuberculosis who are referred to Department of Radiodiagnosis. 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.

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.

EXCLUSION CRITERIA:

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

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Result

Table 1: Age Group Distribution

	Non Diabetic	**Diabetic**
30-40	**2(2.86)**	**4(5.72)**
41-50	**16(22.86)**	**18(25.72)**
51-60	**19(27.15)**	**15(21.43)**
61-70	**18(25.72)**	**20(28.58)**
71-80	**9(12.86)**	**9(12.86)**
>80	**6(8.58)**	**4(5.72)**
Total	**70(100)**	**70(100)**
P= 0.6610		

In the present study, age group distribution was categorised into six groups as followings: 30-40 years, 41-50 years , 51-60 years, 61-70 years, 71-80 years and >80 years.

Among diabetic patients, 5.72% were 30-40 years, 25.72% were 41-50 years, 21.43% were 51-60 years, 28.58% were 61-70 years , 12.86% were 71-80 years and 5.72% were >80 years. 61-70 years age group was more common observed during the study.

Among Non-diabetic patients, 2.86% were 30-40 years, 22.86% were 41-50 years, 27.15% were 51-60 years, 25.72% were 61-70 years , 12.86% were 71-80 years and 8.58% were >80 years.

Table 2: Haemoptysis

	Non Diabetic	**Diabetic**	**p-value**
No	**46(65.72)**	**12(17.15)**	0.03601
Yes	**24(34.29)**	**58(82.86)**	
Total	**70(100)**	**70(100)**	

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In the present study, Haemoptysis was significantly associated with pulmonary tuberculosis in diabetic population as compared to non-diabetics. (p=0.03601). Haemoptysis was more commonly observed in diabetic tuberculosis patients.

Table 3: Side

	Non Diabetic	**Diabetic**	**p-value**
Right	30(42.86)	51(72.86)	0.04801
Left	27(38.58)	19(27.15)	0.1500
Bilateral	28(40)	49(70)	<0.0001

In the present study, involvement of right lung has significant association in diabetic affected pulmonary tuberculosis patient as compared to non-diabetic affected pulmonary tuberculosis patient. (p=<0.0001)

In the present study, involvement of left side is not significantly associated in diabetic affected pulmonary tuberculosis patient as compare to non-diabetic affected pulmonary tuberculosis patient. (p=0.1500)

In the present study, involvement of bilateral lung has significant association in diabetic affected pulmonary tuberculosis patient as compared to non-diabetic affected pulmonary tuberculosis patient. (p=<0.0001)

Table 4: Cavitatory lesions

	Non Diabetic	**Diabetic**	**p-value**
No	**45(64.29)**	**32(45.71)**	**0.04271**
Yes	**25(35.71)**	**38(54.28)**	
Total	**70(100)**	**70(100)**	

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In the present study, Cavitatory lesions were significantly associated with pulmonary tuberculosis in diabetic population as compared to non-diabetics (p=0.04271). Cavitatory lesions were more commonly observed in diabetic tuberculosis affected patients.

Table 5: Mediastinal Lymphadenopathy

	Non Diabetic	Diabetic	p-value
No	39(55.72)	38(54.29)	0.6451
Yes	31(44.29)	32(45.72)	
Total	70(100)	70(100)	

In the present study, Mediastinal Lymphadenopathy is not significantly associated with pulmonary tuberculosis (diabetic as well as non-diabetic) population (p=0.6451). Mediastinal Lymphadenopathy was more common in diabetic tuberculosis affected patients.

Discussion

Several studies suggested that pulmonary TB in diabetic patients may be more likely to present atypical patterns and distributions in radiologic images. In our study, the most common isolated atypical location was the right middle lobe. Pulmonary TB with isolated atypical location was identified in 8.9% of patients in the TB with DM group and 3.2% in the control group; however, these differences did not reach statistical significance[8]. In previous studies, the prevalence of pulmonary TB solely in the lower lung zone was reported to range from 5% to 20%. Also DM was thought to be the only significant condition to predispose disease of the lower lung zone in a previous study; however, we found no statistically significant differences in the feature of isolated atypical location involvement between diabetics and nondiabetics.

The frequency of atypical location involvement with or without the typical location was similar between the two groups (58.9% vs. 58.5%). Previous studies documented 23%–48% of lower lung field involvement. Atypical location of TB on imaging can lead to a misdiagnosis. In fact, patients with the lower lung field TB have often been misdiagnosed as cases of pneumonia, carcinoma, or lung abscess. Familiarity with the atypical locations of pulmonary TB is crucial to avoid delayed diagnosis and provide an appropriate treatment of TB[9].

Bilateral lung involvement was observed in 62.4% of patients in the TB with DM group and 41% of patients in the control group. This CT finding was significantly more frequent in TB patients with DM than without DM (OR, 2.39). Several previous studies documented that 18%–47% of patients showed bilateral involvement of pulmonary TB in DM patients, in contrast to our study[10]. The reason for this discrepancy may be that previous studies were based on chest

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radiography findings, rather than CT findings. CT is a more sensitive modality to identify subtle lung parenchymal abnormalities[11].

In adult patients, pulmonary TB is the most frequent form of postprimary or reinfection TB. Immune deficiency is a risk factor for secondary TB. Diabetes makes the diagnosis and treatment of TB more complicated. In addition, the risk of TB activation is raised[12]. This is mostly because inadequate glycemic management impairs the immune system and alters the alveolar macrophages' defenses. In addition, interactions between anti-TB and anti-diabetic drugs make glycemic management challenging.

Conclusion

Diabetic patients with tuberculosis have a higher prevalence of Non segmental consolidation, Cavitatory lesions, Miliary TB and Mediastinal lymphadenopathy within a tuberculous lesion and more often occurrence in lower lobe than non-diabetic patients with TB. Each TB patient should be routinely be screened for diabetes and good diabetes control can improve the management of tuberculosis. 45.72% had upper lobe, 44.29% had middle lobe and 92.86% had lower lobe observed among diabetic tuberculosis patients.

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