

**Original Research Article****A Cross Sectional Study on X-Ray Pattern of Patients of Pulmonary Tuberculosis with Diabetes Mellitus in a Tertiary Care Hospital in Tripura**

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Ph: +91- 8420532336 (M), Email: drsukant@gmail.com**Abstract****Background:** *Diabetes prevalence has increased worldwide as a result of population ageing, urbanisation, changes in diet and reduced physical activity patterns resulting in increasing obesity. The prevalence of TB-DM is higher in low- and middle-income countries where TB and DM are most prevalent.***Methodology:** *In this cross sectional hospital based observational study, 60 X-rays has been studied who had pulmonary tuberculosis and diabetes mellitus both.***Results:** *The X-ray pattern of TB patients who are suffering from diabetes mellitus are cavitory lesion 25(41.66%), infiltration in 15(25%), consolidation 11 (18.3%), non-homogenous opacity found in 8(13.3%) and miliary shadow found in 1(1.6%) patients. 20(33%) patients had the X-Ray abnormality involving only single zone. About 15(25%) patients had abnormality in 2 zone. Nine (15%) patients had x-ray abnormality in 3 zones. Four (6.6%) patients had abnormal x-ray in 4 zones. Eight patients had bilateral extensive involvement of lung affecting all six zones. The involvement of lung by cavity was more significantly associated with the young group (<50 years) compare to the elderly age group (p value <0.001). The non-homogenous opacity was significantly found in younger age group (p=0.05). However, infiltration (p=0.08), consolidation (p=0.18) and miliary TB (p=0.43) was not significantly associated with any age group.***Conclusion:** *In this study it is found that there is a significant association between the elderly age group patients and the development of lower lung field tuberculosis (p<0.001).***Keywords:** *Pulmonary Tuberculosis, Diabetes Mellitus, X-ray pattern.*

Introduction

India continues to be the highest TB burden country in the world in terms of incidence.¹ Mortality due to TB is the third leading cause of years of life lost in the country. The estimated incidence is 2.8 million cases. Almost 40% of the population of India are infected with tuberculosis. They will develop TB diseases when their immunity is suppressed. Among the medical conditions which cause immunosuppression, diabetes is one of them.² There is a statistically proven strong association of Tuberculosis among diabetic patients.^[3, 4, 5] The magnitude is as high as two to five folds.^{6,7} In some studies it is found that the prevalence of diabetes in TB patients is as high as 29%.⁸ The control of tuberculosis is challenging because of the expected rise in number of diabetic patients by 2030.⁹ The effect of diabetes on tuberculosis is grave. Diabetic patients are in increased risk of developing TB. X-ray is widely available in hospitals. So x-ray finding should be studied in a scientific way for better understanding of the TB. The pattern of X-ray involvement in TB diabetic patients carries a great importance. The X-ray pattern of tuberculosis is studied extensively, but the x-ray pattern of TB patients with diabetes mellitus has not been widely studied. The limited number of studies shows the predominance of lower lung field tuberculosis while other studies did not find any difference with the patients with Tuberculosis alone.^{10, 11} As the scientists are now predicting of an explosion of numbers of diabetic patients by 2030, India has to be ready to combat the large number of TB patients which is expected to increase simultaneously.⁹ The existing health care facility should be improved. The level of awareness should be increased. Case detection may be increased by doing a chest x-ray which is easily available in hospitals.

Materials and Methods

Study Design: Cross sectional observational study

Study Area: Department of Chest Medicine, TMC & DR BRAM Teaching Hospital, Hapania, Agartala.

Study Population: Patient attending outdoor as well as indoor, Dept.of Chest Medicine, TMC & DR BRAM Teaching Hospital, Hapania, Agartala.

Study Period: November 2016 to December 2017

Sample Size: 60 cases

Parameter Used:

- Chest X ray PA View digital.
- Sputum ZN stain
- Blood sugar- fasting and post-prandial

Study Technique: For this study the inclusion criteria is patient's age more than 18 years and a patient who was diagnosed with Pulmonary Tuberculosis with diabetes mellitus. Exclusion criteria were patients having human immunodeficiency virus (HIV) infection, involved site is other than lungs, previous history of pulmonary tuberculosis, pregnancy, active haemoptysis, previous history of lung resection surgery. Pulmonary tuberculosis was confirmed by the presence of Acid fast bacilli in sputum smear microscopy. The ZN staining technique and the reporting of sputum reports were done according to RNTCP guideline. Diabetes mellitus was diagnosed by blood test. Patient's blood sample were collected and sent for fasting blood sugar and post-prandial blood sugar. American diabetic association guideline is followed for confirmation of the diagnosis of diabetes. All the patients who were diagnosed with both tuberculosis and Diabetes are taken as a subject for this study. All the subjects were then advised to do a Chest X-ray PA view (digital). The findings of the x-rays were noted.

Statistical Analysis: The data collected are then tabulated in MS-Excel. Fisher's exact test was used to determined p value with 95% confidence interval.

Results

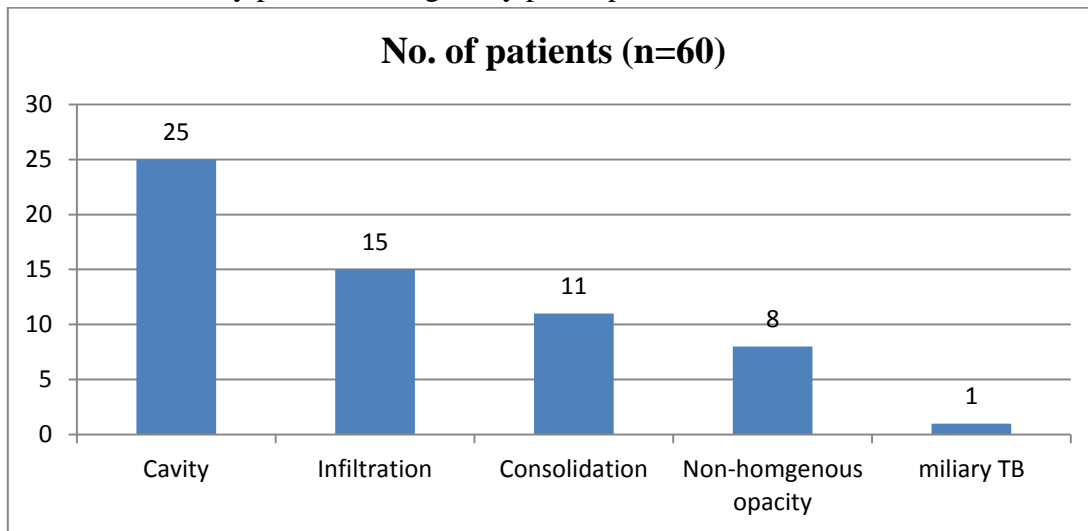
Table 1: Result of X-ray pattern in TB patients with diabetes mellitus and the concerned p value

	Total	%	<50 YRS (N=26)	>50 YRS (N=34)	P
Cavity	25	41.66	18	7	<0.001
Infiltration	15	25	9	6	0.08
Consolidation	11	18.33	7	4	0.18
Non-homogenous opacity	8	13.33	6	2	0.05
Military TB	1	1.66	1	0	0.43
LLFTB	40	66.67%	10	30	<0.001

A total of 60 patients participated in this study. Out of this, males are 40 (66.6%) and 20 (33.3%) female. The X-ray pattern of TB patients who are suffering from diabetes mellitus are cavitory

lesion 25 (41.66%), infiltration in 15 (25%), consolidation 11 (18.3%), non-homogenous opacity found in 8 (13.3%) and military shadow found in 1 (1.6%) patients [Table 2].

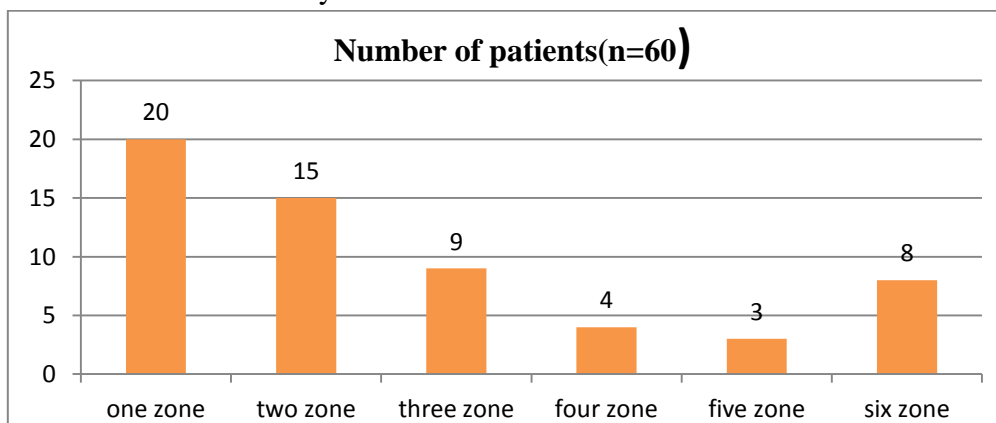
Table 2: Distribution of X-ray pattern among study participants



Twenty six patients had the age below 50 years of age and 34 patients had the age more than 50 years. Table 3 shows the number of zones affected by tuberculosis in chest X-ray. About 20 (33%) patients had the X-Ray abnormality involving only single zone. About 15 patients had

abnormality in 2 zone. 9 patients had x-ray abnormality in 3 zones. Four patients had abnormal X-ray in 4 zones. 3 patients had abnormality in 5 zones. Eight patients had bilateral extensive involvement of lung affecting all six zones.

Table 3: The distribution of abnormality in different zones



A total of 40 patients had tuberculosis involved the lower lung field, while 20 patients had tuberculosis involved upper lung field. The

involvement of lung by cavity was more significantly associated with the young group (<50 years) compare to the elderly age group (p

value <0.001). The non-homogenous opacity was significantly found in younger age group (p=0.05). However, infiltration (p=0.08),

consolidation (p=0.18) and miliary TB (p=0.43) was not significantly associated with any age group (Table 4).

Table 4: The distribution of cavity among study participants

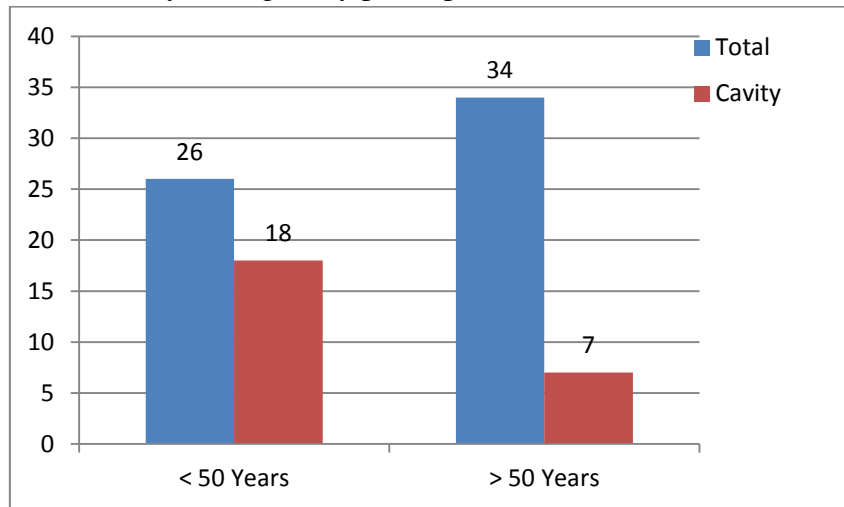
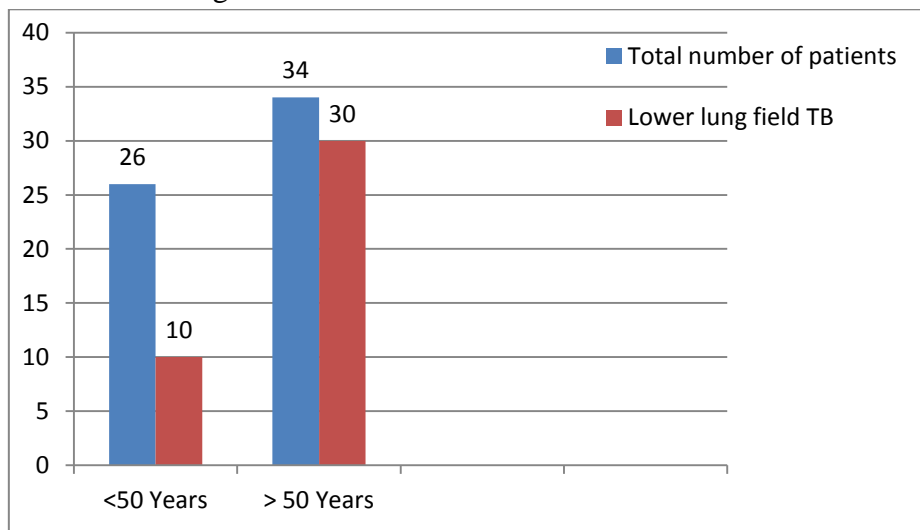


Table 5 denotes that there is a significant association between the elderly age group patients

and the development of Lower lung field tuberculosis (p<0.001).

Table 5: Distribution of lower lung field tuberculosis



Discussion

In this study, it is found that, most of the study population are male (66.67%). Most of the study population aged more than 50years of age. The x-ray pattern of the TB patients with diabetes mellitus showed that, most of the patients (66.6%) presented with a cavitory lesion. Another study done by Kouism Hatim et al. found that 53% patients presented with cavitory lesion who had TB and diabetes together.¹² Another study done by Chaya BE found that 38% of the patients having a cavitory lesion in their chest x-ray.¹³ Similar study done by Mara Philina Pablo-villamor found that

28% of the TB patients with diabetes mellitus presented with cavitory lesion in chest X-Ray.¹⁴ In a study done by Anand K Patel, ten patients out of the 50 had cavitory disease. Cavitory lesions were more frequently confined to lower lung field (80%).¹⁵ Ibrahim kareem khalil in his study found that 60% of the patients are having cavitory lesion in X-ray.¹⁶

In this study 25% of the patients had infiltration in the x-ray. This result is corroborating with the report of the study done by Mara Philina Pablo-villamor who found 28% are presented with infiltration.¹³ Chaya BE also found a similar report

of 20% patients presented with infiltration in the chest X-ray. The result of consolidation (15%), non-homogenous opacity (13.3%) and miliary shadow (1.6%) are all corroborating with earlier studies.^{17, 18}

In this present study it was found that 66% of the patients had lower lung field tuberculosis. A similar study done by Anand K Patel also found that there was a higher involvement of lower lung field (84%) as compared to upper lung field (16%).¹⁵ Perez –guzman et al. Also found that patients with TB and diabetes have high proportion of lower lung lesions.¹⁹ In another study done by Kouismi Hatim¹², found that Involvement of basal segments of the lower lobes and cavitation occurred more frequently in TB patients with diabetes. Ibrahim Kareem Khalil in his study found that, 32% of the patients are having lower lung field tuberculosis.¹⁶

In this study it was found that there is a significant association between the elderly age group (<50 years) and the development of lower lung field tuberculosis. There are other studies conducted in different part of the world favouring the occurrence of tuberculosis in the lower lung field of the diabetes patients.^[19, 20, 21] The occurrence of consolidation, infiltration and miliary TB was not significantly associated with any gender or different age group.

It can be concluded that, the pattern of x-ray change in TB patients with diabetes mellitus can be different from normal TB patients. Nissapatorn et al found no differences in the radiological presentations among 1,651 patients with diabetes.²² A preponderance of cavitary and lower-zone disease have, however, been found in another study in diabetes.²³ Ikezoe et al. reported that 44% small cavities within tuberculosis lesions in diabetics.²⁴ With increasing patient age, basal distribution of disease and other atypical presentations may increase.¹⁹

As a traditional teaching, TB affects the upper lobe. A treating physician always searches for the typical upper lobe cavitary lesion for the diagnosis of TB. The atypical presentation in diabetic

patient overlooked as a case of pneumonia or malignancy. So a lower lobe predominant lesion like cavity, infiltration or non-homogenous opacity should be dealt carefully. When suspected for TB, their sputum microscopy or molecular method should be applied to confirm the diagnosis of TB. An early case detection by X-ray may be rewarded by proper control of TB. A strict glyceimic control ensures a better outcome.

There is still uncertainty as to whether DM affects clinical presentation of TB as more studies showed that there is no significant association as shown in this study. Although this study demonstrates the feasibility of screening for DM among patients with PTB, a multi-center study with a larger sample size must be conducted to more accurately measure the true prevalence of DM among patients with PTB and its implications on PTB treatment and outcomes

Conclusion

This study revealed that diabetes modifies the clinical and radiological picture of pulmonary tuberculosis. Diabetic patients are at higher risk of recurrence and extensive pulmonary involvement. Tuberculosis is associated with poor glyceimic control. Diabetes changes the male: female ratio toward the side of male predominance. Lower lung field involvement is more common in diabetics who had pulmonary tuberculosis.

The atypical radiological images like lower lobe involvement, fanning out from hilum or pneumonia like picture could mask the diagnosis of tuberculosis in diabetic patients, making the clinician think of diagnostic possibilities other than tuberculosis, with a consequent delay in the administration of proper treatment, causing far advanced or disseminated TB. Patients with TB and diabetes usually have uncontrolled diabetes. In patients of TB, diabetes may get enmasked because of the stress and infection and patients started on ATT with rifampicin containing regimens may, require increased doses of oral hypoglycemics.

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