



**TYPICAL / ATYPICAL PRESENTATION OF PULMONARY TUBERCULOSIS WITH
DIABETES MELLITUS: A CROSS-SECTIONAL STUDY**

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ABSTRACT

Background and Aim: Increased reactivation of tuberculosis lesions has also been recorded in diabetics. The stress of a severe chronic infection may enhance existing insulin resistance and unmask an underlying β -cell deficiency leading to hyperglycemia; it is therefore possible that the risk of DM is increased among people with TB. The aim of the study was to analyze typical/atypical presentation of pulmonary tuberculosis with diabetes mellitus. **Material and Methods:** A prospective study including 150 microscopically proven cases of sputum smear positive pulmonary tuberculosis. Among these, 75 are diabetic patients with sputum positive tuberculosis and 75 are non-diabetic patients with sputum positive tuberculosis. Pulmonary tuberculosis was diagnosed by detailed history, clinical examination, sputum examination for acid fast bacilli, chest radiography. Diabetes mellitus was diagnosed using the national diabetes data group and WHO diagnostic criteria. **Results:** The majority of the patients in the diabetic group were in the age group more than 40 years, while in the non-diabetic group, majority of the patients were in the age group less than 40 years. There was a preponderance of male in both the groups over the female patients who had tuberculosis. Fever, cough and weakness were the three most common symptoms seen in patients with tuberculosis in both the groups. **Conclusion:** There was a preponderance of male in both the groups over the female patients. There is no significant difference in the symptoms in both the groups.

KEYWORDS: Diabetes mellitus, Gender, Hyperglycemia, Tuberculosis.

INTRODUCTION

Pulmonary TB represents an important worldwide public health problem. Tuberculosis remains a leading cause of death globally. The incidence of tuberculosis (TB) is keenest among patients with vitiated immunity. India is receiving a double epidemic of HIV and Diabetes Mellitus (DM), both of which are strongly consociated with immune suppression.^[1] Although the definite pathophysiological mechanism of the effect of DM as a predisposing risk factor for TB is unknown, some hypotheses are suggested: depressed cellular immunity, dysfunction of alveolar macrophages, low levels of interferon gamma, pulmonary microangiopathy, and micronutrient deficiency.^[2,3]

Tuberculosis remains a major cause of mortality in developing countries, and in these countries, diabetes prevalence is increasing rapidly. With recognition of this explosive increase in number of people diagnosed with DM all over the world, a whole new field of related interaction between DM and pulmonary tuberculosis has been thrown open. Studies have noted that the risk of developing TB was 11 to 18 times greater in Diabetics than in normal population.^[4] Increased reactivation of tuberculosis lesions has also been recorded in diabetics.^[4]

The stress of a severe chronic infection may enhance existing insulin resistance and unmask an underlying β -cell deficiency leading to hyperglycemia; it is therefore possible that the risk of DM is increased among people with TB, especially in the presence of other predisposing factors. Several studies have shown that DM increases the risk of TB and that patients with TB have higher rates of DM. 2–10 Reported estimate rates of DM in patients with TB have been found to be 2.0–4.6 times higher than those in persons without TB or that of the general population.^[5-10]

Not only may this lead to an increase in the TB burden, but patients with dual disease appear to have an increased frequency of adverse TB treatment outcomes, with delayed sputum culture conversion, an increased risk of death during anti-tuberculosis treatment and an increased risk of recurrent disease after successful completion of treatment.^[11] The aim of the study was to analyze typical/atypical presentation of pulmonary tuberculosis with diabetes mellitus.

MATERIAL AND METHODS

This study was carried out during the period of one year. A prospective study including 150 microscopically

proven cases of sputum smear positive pulmonary tuberculosis. Among these, 75 are diabetic patients with sputum positive tuberculosis and 75 are non-diabetic patients with sputum positive tuberculosis. Pulmonary tuberculosis was diagnosed by detailed history, clinical examination, sputum examination for acid fast bacilli, chest radiography. Diabetes mellitus was diagnosed using the national diabetes data group and 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. After taking consent, patients were examined in detail and subjected to relevant laboratory and radiological investigations.

A pro-forma was filled by interviewing the patients and clinical examination was done. Once baseline data from patients is collected, then, subsequent follow up was done. The patients who were willing to participate in the study, who were diabetic with sputum positive pulmonary TB and who have co-morbid conditions such as HTN, IHD, COPD etc, were included in the study. While, unwilling patients, non-cooperative patients, seriously ill patients, known case of HIV/AIDS, patients who are on long term systemic steroid therapy and patients with other nontubercular infectious diseases of lungs and extrapulmonary Tuberculosis were excluded from the study. Simple random sampling was used in the study.

Statistical analysis

The recorded data was compiled and entered in a spreadsheet computer program (Microsoft Excel 2007) and then exported to data editor page of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA). For all tests, confidence level and level of significance were set at 95% and 5% respectively.

RESULTS

It can be clearly seen that patients with tuberculosis in the diabetic group were 3 (2.00%) in the age group 21-30 years, 9 (6.00%) in the age group 31-40 years, 29 (19.03%) in the age group 41-50 years, 21 (14.00%) in the age group 51- 60 years and 13 (8.6%) in the age group more than 60 years. The mean age in diabetic group was 52.24 ± 9.10 years. While in the non-diabetic group, there were 8 (5.3%) in the age group less than or equal to 20 years, 16 (10.6%) in the age group 21-30 years, 18 (12%) in the age group 31-40 years, 13 (10.83%) in the age group 41-40 years, 12 (8%) in the age group 51-60 years, 8 (5.3%) in the age group more than 60 years. The mean age in nondiabetic group was 40.01 ± 14.41 years. Thus, it was observed that the majority of the patients in the diabetic group were in the age group more than 40 years, while in the non-diabetic group, majority of the patients were in the age group less than 40 years.

Table 2 depicts the distribution of tuberculosis patients according to gender in both the diabetic and non-diabetic groups. In the diabetic group, there were 57 (76.00%) male and 18 (24.00%) females, while in the non-diabetic group there were 60 (80.00%) males and 15 (20.00%) females. There was a preponderance of male in both the groups over the female patients who had tuberculosis.

The distribution of tuberculosis patients according to their presenting complaints in both the diabetic and nondiabetic groups has been portrayed in table 3. In the diabetic group, fever was present in 60 (40%), cough in 67 (44.6%), hemoptysis in 8 (5.3%), weakness in 69 (46%), chest pain in 15 (10%) and weight loss in 27 (18%). In the non-diabetic group, fever was present in 58 (38.6%), cough in 68 (45.3%), hemoptysis in 6 (4%), weakness in 62 (41.3%), chest pain in 9 (6%) and weight loss in 41 (27.3%). It was concluded that fever, cough and weakness were the three most common symptoms seen in patients with tuberculosis in both the groups. There were 24 patients who had diabetes for a duration less than or equal to 1 year, 29 who had diabetes for 2-5 years, 9 had diabetes between 6-10 years and 14 had diabetes for more than 10 years duration. The mean duration of diabetes in our study group was found to be 36.90 months.

Table 1: Distribution of patients according to age (n=150).

Age Groups (Years)	Diabetic Group	Non-diabetic Group
≤ 20	0	8 (5.3)
21-30	3 (2)	16 (10.6)
31-40	9 (6)	18 (12)
41-50	29 (19.3)	13 (10.83)
51-60	21 (14)	12 (8)
>60	13 (8.6)	8 (5.3)
Total	75 (100)	75 (100)

Table 2: Distribution of patients according to gender (n=150)

Gender	Diabetic Group N (%)	Non-diabetic Group N (%)
Male	57 (76)	60 (80)
Female	18 (24)	15 (20)
Total	75 (100)	75

Table 3: Distribution of patients according to presenting complaints (n=150)

Presenting Complaints	Diabetic Group N (%)	Non-diabetic Group N (%)
Fever	60 (40)	58 (38.6)
Cough	67 (44.6)	68 (45.3)
Hemoptysis	8 (5.3)	6 (4)
Weakness	69 (46)	62 (41.3)
Chest pain	15 (10)	9 (6)
Weight loss	27 (18)	41 (27.3)

DISCUSSION

In our study, mean age of diabetic group was higher than non-diabetic group, but no significant relationship was seen ($p > 0.05$). This data was supported by other studies like Tatar *et al*, Bacakoglu *et al* and Nissapatorn *et al.*^[12-14] It could be explained by the summation of accumulative effects of age and DM on decreasing the function of immune system. Desmukh reported that majority of cases of tuberculous diabetics belong to the age group of 45 years and above.^[15]

TB and DM are two diseases that are individually relatively common and of immense public health significance globally. Their association and consequences are well established, but some aspects need further research. A particular lacuna noted is the lack of data on the occurrence of DM in TB from developing countries and, in particular, Africa.^[16-19]

Majority of the patients in both TB-DM and TB without DM are males. 76% of the subjects under TB-DM category are males. 24% are females. While TB without DM patient's category comprises about 80% of males and about 20% females. In a study of 2434 cases of pulmonary tuberculosis by Desmukh *et al*, it was reported that 62.9% were males and 37.1% were females. Tripathy *et al* reported that 78% of their patients were males.^[19] The high incidence of disease in males is possibly due to the fact that both tuberculosis and diabetes are more common in males.

In the non-diabetic group, fever was present in 40%, cough in 44.6%, hemoptysis in 5.3%, weakness in 46%, chest pain in 10% and weight loss in 18%. In our study, we observed that there is no difference in the symptomatology between diabetic and nondiabetic patients which was also observed in other studies.^[13,14, 19]

Higher BMI increases the risk of DM; but is known to protect against TB.^[20-22] Additionally, active TB disease and poor DM control both cause weight loss. When complicated with TB comorbidity, the association between DM and BMI is therefore not straightforward. We note in this report that the mean BMI between patients with DM comorbidity and those without DM was comparable. On the other hand, WC or waist-to-hip ratio, a marker of central obesity, is often shown to be more closely associated with DM than a high BMI.^[23]

The argument that testing for DM should be delayed is flawed both from the perspective of TB infection control and type 2 diabetes. Early recognition of hyperglycemia and its management is important. Hyperglycemia has negative consequences for immune responses and infection control.^[23,24] Similarly, glucotoxicity from prolonged hyperglycemia impairs β -cell function and reduces insulin secretion, setting in motion a negative cycle of hyperglycemia begetting hyperglycemia.

There were 24 patients who had diabetes for a duration less than or equal to 1 year, 29 who had diabetes for 2-5 years, 9 had diabetes between 6-10 years and 14 had diabetes for more than 10 years duration.. So, we found that majority of patients have duration of diabetes from 1-5 years. The interval between detection of diabetes and the onset of pulmonary tuberculosis was studied by Tripathy *et al*. They reported that it varied from several months to 15 years, mean interval being about 6 years.^[19,25]

CONCLUSION

There was a preponderance of male in both the groups over the female patients. There is no significant difference in the symptoms in both the groups.

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