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# Study of risk factors for pulmonary tuberculosis among diabetes mellitus patients

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**KEYWORDS**

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**Abstract** People with diabetes mellitus (DM) are at high risk of developing tuberculosis (TB) than those without. People with diabetes are more likely to fail treatment and to die during treatment compared to those without diabetes.

*Aim of the work:* The aim of the current study was to study the risk factors for pulmonary tuberculosis among diabetic patients in comparison to patients with DM alone.

*Methods:* 160 patients were grouped into two groups, the first group, 80 patients (DM-TB) group, and the second group, 80 patients, diabetics with chest diseases other than TB. All patients were subjected to meticulous history taking, clinical examination, radiological examination, and laboratory investigations. All data were statistically analyzed.

*Results:* In this study the mean age of the DM-TB group was 52.90 ± 11.12 years and 54.57 ± 9.84 years for DM group. There was no statistically significant difference in gender, smoking, and DM treatment compliance between the two groups. There was a highly statistically significant difference in body mass index (BMI), Hashish, Banjo and Tramadol addiction, poor glycemic control, lower hemoglobin levels, platelet count, erythrocyte sedimentation rate and lower serum protein and albumin. Bilateral affection was found in 45% and 21.5% in lower lobe in DM-TB.

*Conclusion:* From the current work it could be concluded that the factors determinant of pulmonary tuberculosis among diabetics are weight loss, decreased BMI, drug addiction, uncontrolled diabetes, higher rates of HbA1c, increased insulin requirements, anemia, higher ESR, higher platelet count and decreased serum proteins and albumin.

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## Introduction

Tuberculosis is an infectious bacterial disease caused by Mycobacterium tuberculosis, it is transmitted from person to person via droplets from people with active respiratory disease [10]. Approximately 9.4 million new cases and 1.7 million deaths were encountered per year worldwide [23]. More than

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350 million people have diabetes, prevalence is similar in both low- and middle-income countries [32].

People with diabetes are at a higher risk of developing tuberculosis (TB) than those without diabetes. The association between diabetes and tuberculosis in developed countries was around 2.5 times more likely to develop tuberculosis. These findings were also true of developing regions where the prevalence of diabetes was twice as high in people with tuberculosis than in people without tuberculosis [12].

Not only does diabetes contribute to a person's risk of developing tuberculosis, but it also makes it more difficult to treat those who have both diseases. People with diabetes are more likely to fail treatment and more likely to die during treatment compared to those without diabetes [3].

## Aim of the work

To study the risk factors for pulmonary tuberculosis among diabetic patients in comparison to patients with DM alone.

## Subjects and methods

This study was conducted on two groups of diabetic patients. The first group (DM-TB group) was (80 patients) of newly diagnosed active pulmonary tuberculosis and diabetes, while the second group (DM group) was also (80 patients) of diabetics with chest diseases other than TB. The two groups were compared as regards factors determining the development of pulmonary tuberculosis among diabetic patients.

Patients were considered to be diabetic if they had a previous history of DM and were receiving antidiabetic therapy or were later found to have fasting plasma glucose $\geqslant$7.0 mmol/l (126 mg/dl). Or with a glucose tolerance test, two hours after the oral dose of plasma glucose 11.1 mmol/l (200 mg dl) [31]. Glycated hemoglobin (HbA1c) of greater than 6.5% is another method of diagnosis, also random blood sugar of greater than $\geqslant$11.1 mmol/l (200 mg/dl) in association with typical symptoms [31].

As regards (DM-TB) group: patients were considered tuberculosis if at least two initial sputum smears positive for AFB (acid fast bacilli); or one sputum examination positive for AFB & radiographic abnormalities consistent with active pulmonary tuberculosis; or one sputum positive for AFB & culture positive for M.tuberculosis, and considered a new case if patient has never had treatment for tuberculosis or who has taken antituberculosis drugs for less than one month [31].

All patients were subjected to:

1- meticulous history taking with special attention to personal history (age, gender, cigarette smoking, drug addiction, family history for TB and DM), history of present illness, history of co-morbid diseases, and history of diabetes mellitus (type, duration, medication and treatment compliance, and complications),
2- complete clinical examination,
3- radiological examination,
4- laboratory investigations (complete blood picture, erythrocyte sedimentation rate, fasting and post prandial blood sugar, HbA1c, liver function tests, total proteins, renal function tests, and sputum examination (direct smear 3 sputum samples), HIV test (rapid test).

Data were statistically analyzed (descriptive and analytical statistics).

## Results

The results are shown in Tables 1 – 18.

## Discussion

The epidemic growth of DM especially occurs in developing countries, where TB is highly endemic. As a result, DM and TB will increasingly present together [24]. People with diabetes are at higher risk of developing tuberculosis (TB) than those without diabetes [32]. The present study is a two group study. First group included 80 patients diagnosed as diabetes Mellitus and Tuberculosis (DM-TB) group and the second group included 80 patients diagnosed as diabetes only (with other chest diseases rather than TB) from June of 2014 to May of 2015. All of them were admitted in Abbasia chest hospital. All patients were subjected to full history, full clinical examination, routine laboratory investigation and chest X-ray.

As regards demographic data of the cases (Table 1), the mean age of the DM-TB group was 52.90 ± 11.12 years, while the mean age of DM group was 54.57 ± 9.84 years with $p$ value = .32, there was no statistically significant difference in age between the two groups.

In the current study the mean age of (DM-TB) group was around fifties. This matches the results of [22] who found that DM-TB patients' mean age was 53 years vs non-DM TB patients 44 years (in his study on 581 patients in Mexico), similarly [18] reported that the mean age of DM-TB patients was 51.5 years vs. 37.5 years in non-DM TB patients (in his study on 1651 patients in Malaysia). DM-TB patients are usually 10–20 years older than TB patients without DM, as type 2 DM (which is more prevalent) is often associated with older age.

It was noticed that there was male predominance in the current study (Table 2). In DM-TB there were 56 males vs. 24 females and in DM group there were 55 males vs. 25 females ($p$ value = 0.86), so there was no statistically significant difference in gender between the two groups. A male predominance in DM-TB group was also mentioned in the study by [18] in Malaysia with 69.3% males among DM-TB patients, also [27] in Saudi Arabia on 187 DM-TB patients and males represent 75.9% of the studied cases. The rate of TB is higher among men than women, beginning in the young adult years and persisting throughout life. This is a longstanding observation thought to reflect more frequent tuberculosis exposure in the community among men than women [6].

Body mass index (BMI) was highly statistically significantly different between the two groups (Table 3), as the mean BMI in DM-TB group was 21.33 ± 4.14 kg/m$^2$ vs. 26.62 ± 5.34 kg/m$^2$ in DM group, and $p$ value < 0.01. similarly, [1] reported that the mean BMI of DM-TB patients was 21.1 kg/m$^2$, also [19] found that BM-TB patients' mean BMI was 22.4 ± 4.9 kg/m$^2$. Lower BMI may be associated with anorexia and consumption caused by tuberculosis infection.

In the current study, as shown in (Table 4), DM-TB group had 33 smokers and 15 ex-smokers, while in DM group there were 22 smokers and 25 ex-smokers. There was no statistically significant difference in smoking between the two groups

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