ORIGINAL ARTICLE

Frequency of pulmonary tuberculosis in patients presenting with diabetes

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ABSTRACT

INTRODUCTION: Tuberculosis kills 2 million people each year in the world while diabetic patients are prone to tuberculosis. In this study, our objectives were to (1) determine the frequency of pulmonary tuberculosis in patients presenting with diabetes mellitus, and (2) describe demographic features, socioeconomic status, and duration of diabetes in all diabetic patients.

MATERIAL AND METHODS: This cross sectional study was conducted in Department of Medicine and Pulmonology PGMI/LRH, Peshawar. 100 consecutive patients of diabetes mellitus were enrolled. Data was collected by convenient (non-probability) sampling technique. All patients fulfilling the inclusion criteria were further assessed through detailed history of diabetes mellitus, and pulmonary tuberculosis from patients or from their relatives. All patients underwent baseline investigations, including chest x-rays, fasting blood sugar, random blood sugar and sputum smear for AFB analysis.

RESULTS: Out of total 100 patients 62% were males and 38% females. Their age ranged from 15 to 80 years. The duration of diabetes in all patients ranged from 2 to 15 years. Frequency of pulmonary tuberculosis among diabetic patients was 12%. All diabetic patients having pulmonary tuberculosis belonged to low socioeconomic class, and their duration of diabetes was 10 years and above. The duration of diabetes among patients having no history of pulmonary tuberculosis was less than 7 years.

CONCLUSIONS: Frequency of pulmonary tuberculosis in diabetics was 12%. Patients with prolong history of diabetics and low socioeconomic status were more prone to have pulmonary tuberculosis than other socioeconomic groups.

KEY WORDS: Diabetes mellitus, risk factors, pulmonary tuberculosis; socioeconomic status.

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INTRODUCTION

Tuberculosis and diabetes mellitus are diseases that are commonly found together with adverse mutual effects. Tuberculosis is more frequent in diabetics than in non-diabetics, while diabetes appeared to have an induction and aggravating effect on tuberculosis [1]. The prevalence of tuberculosis among diabetics is 2-5 times higher than in the non diabetic population [2]. In a cohort of pulmonary tuberculosis patients it was found that pre-treatment bacillary load was higher in diabetic patients than in non diabetics [3].

An association between tuberculosis and underlying risk factors was evaluated in hospitalized patients it was found that diabetic patients were almost twice as likely to have tuberculosis after adjusting by sex, age, and race/ethnicity [4].

In a local study conducted at Bahawalpur Victoria Hospital, Bahawalpur the prevalence of pulmonary tuberculosis among diabetic patients was 9.5% compared to non-diabetic patients who had prevalence of 2.08% [5].

To our knowledge, only few published Pakistani studies show the prevalence of tuberculosis in diabetic patients that is from 7.5% to 10% higher than in non-diabetic patients while prevalence increased with duration of diabetes [5,6].

Before the advent of anti-tuberculosis chemotherapy and the generalized use of insulin therapy, the incidence and mortality rates of TB among patients with diabetes mellitus were high. In patients whose diabetes is difficult to control, the immune defects are presumably more severe, and pulmonary TB tends to be more aggressive producing cavities and extensive lesions in the lower third of the lungs [7].

If diabetes is a risk factor for TB in this part of the world, this will have important consequences for TB control and patient care, as diabetes co-morbidity is related to a higher TB case fatality rate.

As tuberculosis is very common in this part of the world and patients with diabetes mellitus have high prevalence rate as mentioned above, it will be beneficial to conduct this study, so as to adopt primary preventive measures against pulmonary tuberculosis in diabetic patients in the light of results of this study in our local setup.

OBJECTIVES OF THE STUDY:

The primary objective of the study was to:

1. Determine the frequency of pulmonary tuberculosis in patients presenting with diabetes mellitus.

   And the secondary objective is

2. Describe demographic features, socioeconomic status, and duration of diabetes in All diabetic patients..

MATERIAL AND METHODS

The study was conducted in Medicine and Pulmonology departments of Postgraduate Medical Institute, Lady Reading Hospital, Peshawar, a tertiary care hospital.

Duration of the study was six months from January 2007 to June 2007. A total of 100 consecutive patients of diabetes mellitus were included in the study who presented to this institution, using convenient (non probability) sampling. All admitted patients fulfilling WHO criteria for diabetes mellitus of either sex, aged 15 years and above were included in this study. Criteria for pulmonary tuberculosis were positive sputum smear results for AFB.

STUDY DESIGN: Cross sectional study.

DATA COLLECTION PROCEDURE:

One hundred consecutive patients with diabetes mellitus were enrolled. After taking formal consent, patients fulfilling the inclusion criteria were further assessed through a detailed history, from patient or from the relatives, including personal particulars, demographic features, socioeconomic status, present complaints, past history of pulmonary tuberculosis, diabetes mellitus along with duration and drugs intake.

The patients were declared as diabetic if found to have fasting plasma glucose more than 126 mg/dl, or random plasma glucose more than 200 mg/dl on two separate occasions in asymptomatic patients, or/on one occasion in symptomatic patients, or if the patient gave previous history of diabetes mellitus or use of anti-diabetic drugs. Diagnosis of pulmonary tuberculosis was established by positive sputum smear for Acid fast bacilli (AFB). Socioeconomic status was defined as income per person per month as was categorised as:

1. **Lower class**: income up to Rs. 5000/- per person per month.
2. **Middle class**: Income Rs. 5000/- to 15000/- per person per month.
3. **Upper class**: Income more than Rs. 15000/- per person per month

All patients underwent complete physical examination and baseline investigations including chest x-ray, sputum AFB examination, random blood sugar and fasting blood sugar, lipid profile, blood complete, ECG, were also performed. All information was entered into a proforma.

DATA ANALYSIS PLAN:

All the studied variables that are; marital status, occupation, educational status, socioeconomic status, demographic features, history of fever, weight loss, night sweats, cough, sputum, loss of appetite, hemoptysis, family history of tuberculosis, past history of diabetes mellitus along with duration, past history of pulmonary tuberculosis along with duration, investigations like; chest x-ray, sputum AFB examination results, random blood sugar and fasting blood sugar were analyzed for descriptive statistics and the results were expressed/presented through frequency tables, graphs and charts.

For age, duration of diabetes mellitus, duration of drugs used for diabetes mellitus, random blood sugar, and fasting blood sugar, mean and ± standard deviation was calculated. For sex-wise distribution male to female ratio was calculated. All the study data was analyzed by descriptive analysis and stored in computer program SPSS for windows version 12. Due to the nature of the study design (Cross sectional) no statistical test was applied on the study data.

RESULTS

(Since the total number of patients in this study is 100, only percentages will be mentioned, which are same as number of patients).

A total number of 100 patients with diabetes mellitus were included in this study. Sixty two percent were males and 38% were females. The age of patients ranged from 17 to 80 years, mean age was 50.45 ± S.D 14.00 years (Table No. 1). Fifty four percent patients belonged to low socioeconomic class while remaining 46 (46%) patients belonged to middle socioeconomic class. Patients presented from various cities and districts of the whole province, and tribal areas, with majority (36%) from Peshawar. Regarding occupation, majority (33%) patients were farmers, while virtually all females (36%) were house-women. There were few professionals only (14% teachers). Regarding educational status, majority (78%) were illiterate, 8% each were graduates, and educated up to high school; six percent were postgraduates.

Out of these 100 patients of diabetes mellitus, pulmonary tuberculosis was found in 12% of cases (8 males and 4 females). All these 12 patients were older than 40 years of age. All pulmonary tuberculosis patients were in low socioeconomic status. Fever was the most common symptom in them (in 93%), followed by cough (45%), weight loss (32%), sputum production (29%) and night sweets (15%).

Duration of diabetes mellitus in all patients varied from 2 years to 15 years, with mean of 5.57 ± S.D 2.86 years. All 100 patients with history of diabetes mellitus were using medicines for diabetes mellitus with duration from 2 years to 12 years, with mean of 5.07 ± S.D 2.14 years. The duration of diabetes in the 12 positive cases of pulmonary tuberculosis ranged from 10 to 15 years (mean 12.41 ± 2.15 years). On the other hand in others without pulmonary tuberculosis (88 cases), the duration of diabetes ranged from 2 to 7 years (mean 4.64 ± 1.19 years).

TABLE NO. 1:

AGE DISTRIBUTION OF PATIENTS (n=100)

AGE RANGES (IN YEARS)	NO. OF CASES	PERCENTAGE
15 - 20 years	06	06%
21 - 30 years	03	03%
31 - 40 years	16	16%
41 - 50 years	31	31%
51 - 60 years	25	25%
61 - 70 years	15	15%
71 - 80 years	04	04%
TOTAL	**100**	**100%**

The minimum age was 17 years and maximum age was 80 years.

DISCUSSION

Diabetes mellitus (DM) is a known risk factor for tuberculosis (TB), and with the increasing prevalence of type 2 DM in less developed regions, many patients with TB will have concomitant DM. In an urban setting in Indonesia, 737 patients with pulmonary tuberculosis were screened for DM and were followed up prospectively during TB treatment. Results of the study showed that DM was diagnosed in 14.8% of patients with TB and was associated with older age and a greater body weight [11].

The relationship between diabetes mellitus (DM) and pulmonary tuberculosis has attracted the interest of many clinicians and investigators for a long time. Many studies have shown that the prevalence of tuberculosis among diabetics is 2-5 times higher than in the non-diabetic population. On the other hand, there appears to be little information on whether DM affects the diagnostic finding in tuberculosis [12, 13, 14].

Patients with diabetes mellitus are also at a higher risk of tuberculosis. This has been highlighted by several retrospective and prospective studies. In a study in Mumbai, tuberculosis was found to be the most common complicating illness (5.9%) in a large cohort of over 8000 patients with diabetes mellitus [15].

The frequency of pulmonary tuberculosis in our study is 12%, which is higher than other studies reported from various national and international levels. In few published Pakistani studies the prevalence of tuberculosis was from 7.5% to 10% in diabetic patients, higher than in non-diabetic patients and prevalence increased with duration of diabetes [5,6]. In contrast to our results many international studies have been reported prevalence of tuberculosis from 2 - 5.9% among diabetic patients [12,13,14,15]. While in a study conducted by Alisjahbana B et al [11] reported that prevalence of diabetes mellitus was 14.8% in tuberculous patients.

It has been suggested that diabetes may affect gender predominance in tuberculosis [16]. Since our study had small numbers and the fact that in this province, logistic and socio-

cultural factor prevents females from seeking medical attention, we can not confirm the slight male predominance in our cohort to be due to any particular reason.

In most low-income countries, patients with immunosuppressed conditions (including diabetes) receive care in tertiary health centers (ambulatory or hospitalized) where health professionals are insufficiently trained in the diagnosis and treatment of tuberculosis [7]. In the developing countries limited resources are available for the laboratory diagnosis of tuberculosis. Good history and thorough clinical examination are cost effective measures in the diagnosis of tuberculosis [17]. The positive association between diabetes and tuberculosis has been reported in many studies, especially in populations with low socioeconomic status [8,9,10]. In our study we have found that majority of our diabetic patients having pulmonary tuberculosis were in low socioeconomic group of the society.

The results of this study are also supported by one conducted at Srinagar, Kashmir, in which diabetic patients with infections particularly pulmonary tuberculosis were in older age group (50.5 years versus 46.6 years) and had history of diabetes mellitus of longer duration (6.6 years versus 5.5 years) [18].

CONCLUSIONS

It is concluded from the results of this study that:

- The frequency of pulmonary tuberculosis in diabetic patients was 12% in this cohort.
- Their duration of diabetes mellitus was prolonged (10 years and above).
- Older age group from 40 years and above has increased risk of having diabetes mellitus and tuberculosis.
- Majority of diabetic patients having pulmonary tuberculosis belonged to low socioeconomic group and were also illiterate.
- Screening for DM and subsequent glycemic control may improve outcome of TB treatment.
- Because of frequent co-morbidity, systematic testing for diabetes among TB patients may be recommended, particularly if risk factors are present.
- Longer duration of diabetes mellitus, older age, and low socioeconomic status are risk factors for infection in patients with diabetes mellitus. Pulmonary tuberculosis is of particular concern in our diabetic population.

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