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Research Article

**PULMONARY TUBERCULOSIS IN DIABETES MELLITUS IN
DIABETIC PATIENTS**¹Dr. Tafseer Zahra, ²Dr. Azka Areej, ³Dr. Hira Jamil¹Sargodha Medical College, ²Quaid E Azam Medical College Bahawalpur, ³University Medical and Dental College Faisalabad.**Article Received:** December 2018**Accepted:** February 2019**Published:** March 2019**Abstract:**

Background: The study of diabetic patients, their clinical profile of pulmonary tuberculosis and radiographic patterns of pulmonary tuberculosis in diabetic patients.

Methods: The study included 100 patients that had diabetes mellitus and pulmonary tuberculosis. The range included of both genders who have been admitted to Services Hospital Lahore.

Results: The patients underwent the blood sugar test and the fasting blood sugar value showed definite co-relation with pulmonary tuberculosis. The patients who had fasting blood sugar value between 201 to 300mg/dl were 41% and value between 151-200mg/dl 30% and the remaining 23% of the patients had this value above 300mg/dl. Mean fasting blood sugar value was 234.4mg/dl. Lung lesions were noted in 37% of the cases on right side and left sided lesions were found in 33% of the cases. Upper lobe lesions were noted in 68% and bilateral lesions in 30% of the cases.

Conclusions: Diabetes mellitus when uncontrolled, patients are more prone to develop pulmonary tuberculosis compared to non-diabetics. Sputum examination most of times shows to be positive in diabetics as compared to non-diabetics.

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INTRODUCTION:

The link of Diabetes Mellitus and Tuberculosis is more prominent in developing countries where TB is endemic and the burden of diabetes mellitus is increasing. Tuberculosis (TB) continues to infect the world's population, it causes disease in 8.8 million people per year, and kills 1.6 million of those afflicted. [1] Diabetes mellitus (DM) is expected to rise to a predicted 366 million by 2030 with the greatest increase projected in the developing world. [2] DM increases the risk of active TB with an approximately three-fold risk of developing active TB have been reported. [3]

Tuberculosis supervening on pre-existing diabetes often is devoid of the early warning signs and symptoms. The patient may attribute malaise, loss of appetite and weight loss to an exacerbation of his diabetic state. The patient usually attributes cough with expectoration and fever to frequent respiratory tract infection he is prone to develop.

Eventually, these alterations are attributed to improper control of diabetes mellitus and the onset of tuberculosis is masked long enough for the disease to get established when the florid signs and symptoms become manifest. Similarly, tuberculosis patients attribute their worsening of conditions to diabetes and hence fail to suspect diabetes mellitus.

Tuberculosis should be considered in patients with diabetes who have weight loss, fever, generalised debility that cannot be fully explained by poor diabetic control alone. General or constitutional symptoms are due to liberation of products from diseased foci into the bloodstream and include lassitude and malaise, loss of appetite, loss of weight, anaemia, sweating, tachycardia, pyrexia, digestive disturbances. The other

common symptoms of tuberculosis include cough, hemoptysis, chest pain and dyspnea.

METHODS:

100 patients with diabetes mellitus were included in the study and pulmonary tuberculosis of both genders admitted to Services Hospital Lahore. Period of study was from September 2016-April 2018. Informed consent was obtained from all patients included in the study, the consent was oral. Pulmonary tuberculosis was diagnosed through detailed history, clinical examination, examination of the sputum for acid fast bacilli and chest radiography.

Diabetes mellitus was diagnosed through the WHO diagnostic criteria:

- Symptoms of diabetes are random blood sugar ≥ 11.1 mmol/L (200mg/dl) or Fasting plasma glucose ≥ 7.0 mmol/L (126mg/dl) or
- Two-hour plasma glucose ≥ 11.1 mmol/L (200mg/dl) during an oral glucose tolerance test.

Adult patients who fulfilled the above criteria were included in the study. Adult patients with Diabetes mellitus with pulmonary tuberculosis were included in the study. Diabetic patients with extra pulmonary tuberculosis and pulmonary tuberculosis patients not having diabetes were not included in the study.

RESULTS:

The total number of cases studied were 100. As show in Table 1, number of males in this study group were 72 (72%) and females 28 (28%). Since type I diabetes mellitus (<30yrs) cases were less, patients were divided into 2 groups.

- First group: Age less than or equal to 40 years- 21 patients (21%).
- Second group: Age more than 40 years -79 patients (79%).

Table 1: Sex distribution

Male	Female	Total
72	28	100

Table 2: Duration of diabetes.

Duration (yrs)	Number of patients	Percentage
≤1	8	8
2-5	19	19
6-10	53	53
>10	20	20
Total	100	100

Table 3: Fasting blood sugar in tuberculous diabetics.

Fasting blood sugar (mg/dl)	No. of patients	Percentage
126-150	6	6
151-200	30	30
201-300	41	41
>300	23	23

**Table 4: Post prandial blood sugar values in
Tuberculous diabetics.**

Post prandial blood sugar (mg/dl)	No. of patients	%
200-250	17	17
251-350	38	38
>350	45	45

Table 5: Sputum AFB-results.

Sputum AFB	≤40 Yrs (n = 21)	>40yrs (n =79)
Positive	17 (81%)	41 (52%)
Negative	4 (19%)	38 (48%)

As shown in Table 2, 53% of the patients had a duration of diabetes between 6-10 years and 19% of the patients had a duration of diabetes between 2-5 years and in 8% cases, diabetes duration was less than a year. 20% of the patients had diabetes more than 10 years.

As shown in Table 3, the fasting blood sugar value showed a definite co-relation with pulmonary tuberculosis. 41% of the patients had fasting blood sugar value between 201 to 300mg/dl and 30% had value between 151-200mg/dl and 23% of the patients

had value above 300mg/dl. Mean fasting blood sugar value was 234.4mg/dl.

As shown in Table 4, 45% of the patients had a post prandial blood sugar value above 350mg/dl, 38% had values between 251-350 mg/dl and only 17% of the patients had value between 200-250mg/dl. Mean post prandial blood sugar value in the study group was 341.5mg/dl.

As shown in Table 5, sputum AFB was demonstrated in 81% of cases ≤40 yrs and in 52% of cases >40 yrs.

Table 6: Side of lesion (right/left/bilateral).

Side	≤ 40		> 40 yrs		Total
	Male	Female	Male	Female	
Involved					
Left	2	2	24	5	33
Right	4	5	21	7	37
Bilateral	5	4	15	6	30

Table 7: Lower lung field tuberculosis.

Age	≤ 40	> 40	P value
	(n = 21)	(n = 79)	
No. of patients	3	29	P <0.05 (Sig.)

Shown in Table 6, the right side of lung lesions were noted in 37% of the cases and left sided lesions in 33% of the cases. Upper lobe lesions were noted in

68% of the cases and bilateral lesion in 30% of the study group.

As shown in Table 7, lower lung field lesions were noted in 32% of the cases. Of these 3 cases were

observed in age group ≤ 40 years and 29 cases above age of 40 years.

DISCUSSION:

A clinical and radiological evaluation of 100 cases of pulmonary tuberculosis with diabetes mellitus was done. The high incidence of tuberculosis in diabetic patients, suggest a significant association between these two diseases. [4,5]⁵

Sex distribution:

In our study 72% of the patients were male and 28% were female. The ratio was 2.6:1, other studies have shown that, the prevalence as well as incidence of tuberculosis is higher among males than among females, the ratio varying from 3:1 to 5:1.

In a study of 2434 cases of pulmonary tuberculosis, it was reported that 62.9% were males and 37.1% were females. Among the 138 cases of diabetes with pulmonary tuberculosis, 72.4% were males and 27.53% were females. [6] Patel JC showed a similar ratio of male: female. In the 179 cases he studied, 76% were males and 24% were females. [7] Morris and others also in their study observed that male population outnumbered the females. [8] Another study reported that 78% of their patients were males. [9]

An increased incidence of the disease in males as compared to females was found in the study and this study also noted the same. The study concludes the fact that both tuberculosis and diabetes are more common in males.

Duration of diabetes:

The study of the duration of diabetes in relation to the onset of tuberculosis showed that in most cases, diabetes mellitus was diagnosed before the development of tuberculosis. [10]

Prior to the onset of tuberculosis, 53% patients had duration of diabetes between 6-10 years, 19% of the patients had duration of diabetes between 2-5 years and 8% of the patients less than 1yr and 20% of the patients had diabetes more than 10 years. The average duration of diabetes in this study was 6.6 years with standard deviation ± 3.4 . A study reported that it varied from several months to 15 years, mean interval being about 6 years. [9,11] In another study, diabetes was detected before tuberculosis in 70% of cases. 32% of patients had diabetes for 1-5 years, 32% had it for 6-10 years and 20% more than 10 yrs. [12]

The significance of diabetes lies in the duration of the disease that there is an increased opportunity for infections if the disease's duration is increased. The results of this study are comparable with many other studies. Some studies have reported that there is no correlation between the duration of diabetes and the development of pulmonary tuberculosis. [6,13]

Fasting and post prandial blood sugar in tuberculous diabetics:

The fasting blood sugar value of 200-300mg% was noted in 41% of the patients and values above 300mg% were noted in 23% of the cases. Mean FBS was 234.4 with a standard deviation of ± 64.5 .

The blood sugar post prandial value at 2 hours happened to be above 350mg% in 45% of patients. The mean of PPBS was 341.5. This showed that in most of the cases blood sugar was not controlled.

In a study it was evident that high incidence of pulmonary tuberculosis was associated with severe hyperglycemia.¹³ Another study also had a similar observation.⁶ A study which included 180 cases of diabetics, daily dose of more than 100 units of insulin was needed in 88.7% of tuberculous diabetics and in 25.2% of non-tuberculous diabetics.¹³ The finding in this study is consistent with the proposal that there is correlation between infection and plasma glucose levels. [14]

Sputum examination:

There were 81% of patients < 40 years and 52% of the patients > 40 years were sputum positive for acid fast bacilli. P value was 0.02 which is significant in that sputum positivity is more in patients aged < 40 years. In patients > 40 years, cavitation and fibrosis were more compared to < 40 years patients. Cavitory lesions though maintain high bacterial population, less smear positivity is noted in diabetes. This may be related to muscle weakness due to uncontrolled hyperglycaemia and less effective expectoration. [15] In our study we found that patients > 40 years, sputum positivity was less, and the results are comparable to other studies.

Radiological examination:

The examination of chest radiograph revealed that 70% of the patients had unilateral lesions and 30% of the patients had bilateral lesions. In both these group, predominant lesions were noted in the upper zone.

In our study, was noted that 37% had right sided lesion and left side in 33%. The rest of the lesions in patients were bilateral. Lower lung field involvement was found in 32% patients, more common in age groups > 40 years, that is 29 out of 79 cases. In a study, it was found tuberculous diabetics lower lung field tuberculosis was significant in females, also in patients

who were older than 40 years. [16,17] In a study done by Ravindran P and others, the lower lung field tuberculosis among diabetic tuberculous patients was 13.81%. [18]

In this study, we found that the involvement of lower lung field was found more in patients aged >40 years. It was also found that female gender had it more and results are compatible with other studies. Lower lung field involvement is an atypical presentation of pulmonary tuberculosis that often confuses the diagnosis. Lower lung field tuberculosis is more common in female gender and is defined as tuberculous disease. Below is an imaginary line traced across the hila and including the parahilar region on a standard PA chest radio-graph.

CONCLUSION:

The Peak incidence of the disease was noted in the age groups of 40-49 and 60-69. Male preponderance was also noted and there was a relationship between the duration of diabetes mellitus and the development of pulmonary tuberculosis, and it was found to be linear. The major number of patients included in the study had a blood sugar level that was poorly controlled, it suggests that severe hyperglycemia is associated with development of pulmonary tuberculosis. Sputum positivity was more in patients who aged ≤ 40 years. Cavitation and fibrosis were more common in patients aged greater than 40 years. Lung field tuberculosis that was associated with lower field was found common in patients aged >40 years and in most common in the female gender.

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