

Prevalence of Tuberculosis Among Patients having Diabetes Mellitus - A Cross-Sectional Study

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ABSTRACT

Background: Tuberculosis (TB) is an endemic disease leading to a great proportion of morbidity and mortality among people from 3rd world countries. Diabetes Mellitus (DM) increases the risk of getting TB to diabetics as compared to general population.

Aim: To see or prevalence of TB among patients taking medication for DM.

Methods: This cross-sectional trial was conducted at Medicine department of Div. Head Quarters Teaching Hospital, Mirpur, over a period of 3 months, from January, 2015 to April, 2015. All patients with age of 18-60 years with diagnosis of DM presenting in Diabetes clinic, already taking treatment for it were included in the study. All patients were asked about the symptoms of TB. If TB symptoms were found positive, sputum analysis was done. Three sputum samples (morning-spot) were collected to observe AFB. Data was analyzed by SPSS version 20.

Results: A total of 290 patients were included in the study. The mean age of the patients was found as 45.63 ± 10.33 years. Among these, 172 patients (59.3%) were female. Also 63 patients (21.7%) had type 1 DM while 227 (78.3%) had type 2 DM. When asked about the TB symptoms, they were positive in 32 patients (11.0%) while negative in remaining 258 patients (89%). However, further sputum analysis showed confirmed TB in 12 patients (4.1%) only. After adjustment of confounding factors, age, gender and type of DM were not found having significant role for development of TB among these patients.

Conclusion: Regarding high prevalence of TB among diabetics, as was found in this study, we recommend that regular screening of all diabetics must be done for TB, particularly in our country which is considered endemic for this lethal disease.

Keywords: Diabetes Mellitus; Tuberculosis; Prevalence; Diabetics

INTRODUCTION

Diabetes mellitus (DM) is one of the major diseases in the world affecting approximately 235 million people with a global prevalence of 8.3%¹. It has caused 5.1 million deaths in 2013 in whole of the world. Also about 80% of DM patients belong to low and middle-income countries including Pakistan². Diabetic patients are more susceptible to infections. This can be explained on the basis of increased sugar levels that provide a very favorable environment for the invading microorganisms to grow. Hyperglycemia decreases the ability of many types of immune cells to function properly which leads to infections in these patients³.

Tuberculosis (TB) contributes to co-morbidity in diabetic patients. Studies have shown that most of the TB infections in diabetics go unnoticed as many of the symptoms such as lethargy, weight loss, anorexia are shared by both these conditions⁴. Moreover, patients with diabetes are at a 2-3 times higher risk of contracting tuberculosis than those without diabetes⁵. In a study in Ethiopia, the prevalence of TB in patients with DM was found to be 6.2%⁶. In a study from India, this prevalence was found to be 10%⁷. The combined prevalence rate of diabetes among patients with tuberculosis was 7.20% in a meta-analysis by Chen et al⁸.

The rationale of our study is that TB is mainly disease of third world countries including Pakistan and there are minimal studies in the literature available on the prevalence rate of TB among DM patients in our area of the world, particularly Pakistan, therefore I want to do this study to look for prevalence rate of TB among DM patients in our

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country. Also this study will generate an authentic piece of evidence of this prevalence from our country.

MATERIAL AND METHODS

This cross-sectional study was conducted at Medicine department of Div. Head Quarters Teaching Hospital, Mirpur, over a period of 3 months, from January, 2015 to April, 2015. This study was started after taking consent from Ethical review board of the hospital. Both male and female patients with age of 18-60 years with diagnosis of DM presenting in Diabetes clinic, already taking treatment for it were included in the study. Our exclusion criteria included: Newly diagnosed patients of DM; patients on immuno-suppressive drugs/steroids; and patients on antibiotics for the past 15 days. All patients fulfilling the inclusion and exclusion criteria were enrolled in the study. They were explained about details of the study and informed consent were taken from all patients in the study. All patients were asked about the symptoms of TB symptoms. Based on these symptoms patients were segregated into TB positive and TB negative symptoms. For a patient to have TB positive symptoms he/she should have at least 3 of the following symptoms: Persistent cough for > 2 weeks; Coughing of blood; Fever; Loss of weight; Night sweats; and tiredness. If a patient has 3 or more symptoms, he were considered for Sputum analysis. Three sputum samples (morning-spot) were collected to observe AFB by light microscopy using Ziehl-Neelson (ZN) staining. TB positive were considered if a patient has both of the following: TB symptoms positive and Positive ZN staining in any of samples. TB negative were considered if a patient has any of the following: Negative TB symptoms or Negative ZN staining in all of samples.

Taking estimated population of AJ&K as 10000000, a margin of error of 5% and confidence interval of 99.9%, with estimated prevalence of TB as 7.2%⁸, the sample size calculated was 290 patents.

The collected data were entered and analyzed accordingly using SPSS version 20 through its statistical program. The study variables were analyzed using simple descriptive statistics, calculating mean and standard deviation for numerical values like age. Frequencies and percentages were calculated for qualitative variables like gender, TB positive and TB negative. Data were stratified to control effect modifiers including age and gender and type of diabetes. Post-stratification chi-Table 1: Stratification of Patients to rule out effect modifiers

square test was applied. P-value ≤0.05 were considered as significant.

RESULTS

A total of 290 patients were included in the study. The mean age of the patients was found as 45.63 ± 10.33 years. Also we found that majority of patients in this study (41%) were in the age group of 51-60 years. All the details of age distribution of patients in the study are summarized in figure 1. In this study, 172 patients (59.3%) were female (Figure 2). In this study, 63 patients (21.7%) had type 1 DM while 227 (78.3%) had type 2 DM.

When asked about the TB symptoms, they were positive in 32 patients (11%) while negative in remaining 258 patients (89%). However, further sputum analysis showed confirmed TB in 12 patients (4.1%) only.

Stratification of data was done according to age groups, gender and type of DM. It was found not significant in any of these categories (Table 1).

Fig 1. Age distribution of patients in this study

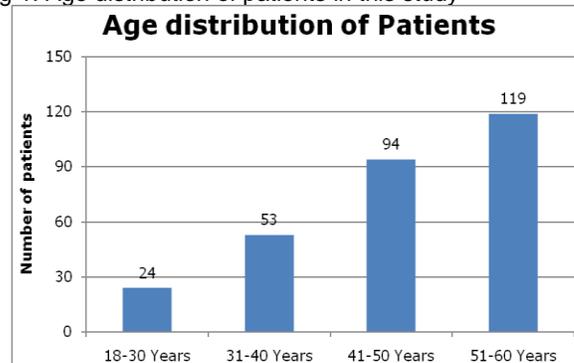
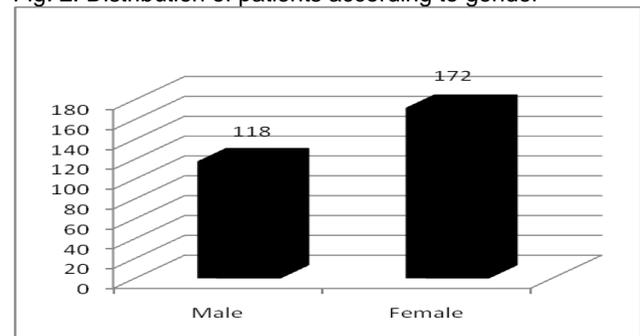


Fig. 2: Distribution of patients according to gender



	Positive TB	Negative TB	P-Value
Age Groups			
18-30 Years	4 (16.66%)	20 (83.33%)	0.64
31-40 Years	7 (13.2%)	46 (86.7%)	
41-50 Years	8 (8.5%)	86 (91.4%)	
51-60 Years	13 (10.9%)	106 (89.1%)	
Gender			
Male	11 (9.3%)	107 (90.6%)	0.44
Female	21 (12.2%)	151 (87.7%)	
Type of DM			
Type 1 DM	7 (11.1%)	56 (88.9%)	0.982
Type 2 DM	25 (11%)	202 (89%)	

DISCUSSION

Despite all the efforts by health organizations, TB is one of the most prevalent diseases and is thought to be infecting one third of the world's populations⁽⁹⁾. In early 20th century, health care professionals tried to find association between TB and DM, although they couldn't find the association whether TB occurs as a result of DM or DM leads to TB¹⁰. Recently some more studies had been conducted on the topic and have identified a positive relation between two entities. Many investigators have raised an issue about the increasing prevalence of DM and TB, particularly third world countries including Pakistan, India and China that are having fastest rise in DM and TB burden¹¹.

In this study, we have found the mean age of patients as 45.63±10.33 years. Also majority of patients (73.4%) in our study belonged to 4th and 5th decade of their lives. In a study by Qayyum et al from Pakistan, the highest prevalence of TB was found maximum in 4th and 5th decade¹². In another study from Australia, authors found that age of the patients did not modify risk of TB among diabetics⁽¹³⁾. Similarly in our study, age was not found increasing risk of TB among patients with DM.

In this study, the prevalence of TB symptoms was found 11% and confirmed TB in 4 among Diabetics. In another study from Pakistan, prevalence was found as 9.5%¹². In a report from Ethiopia, this prevalence was 6.2%⁶, 6% from India¹⁴ and 5.4% from Tanzania¹⁵. In another study from Korea, this prevalence was found as 2.12%¹⁶. This difference among Pakistan and other countries may be due to high prevalence of TB in Subcontinent otherwise.

According to WHO estimation in 2011, the prevalence of TB in general population was found to be 0.39%¹⁷. The high incidence of TB among diabetics, as shown in our study, sows relationship between TB and DM. Multiple studies form animals as well as humans support this idea¹⁸. The pathophysiology behind is higher glycemic indices and poor control leads to low immunity which makes diabetic patients more susceptible to infections including TB. In a systematic review by Christie et al., prevalence of TB among Diabetics was found significantly high and authors confirmed the idea that DM increase risk for TB¹⁹.

On the basis of this study, we conclude that the burden of TB is high in Diabetic patients and we recommend regular screening of diabetic patients for TB, particularly in our population.

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