ORIGINAL ARTICLE

Corelation of Tuberculosis & Diabetes: A Descriptive Study in Pakistan

Jeando Khan Daidano[*], Abdul Rahim Solangi[**], Noor Nabi Sial[*], Rafique Ahmed Memon[***]

ABSTRACT

Objective: To analyze the correlation between diabetes and tuberculosis in our setup.

Study Design: Observational, descriptive study.

Place & Duration: Department of Medicine, Peoples University of Medical and Health Sciences, Nawabshah, from 1st January to 31st December 2012.

Material & Methods: This study was conducted on 100 consecutive patients with concomitant diabetes and tuberculosis getting admitted to Department of Medicine. They were diagnosed based on history, clinical manifestations, laboratory and radiological findings. All adult patients of 18 years or more with newly diagnosed pulmonary TB concomitant with DM were consecutively screened and 100 patients were enrolled for this study.

Results: We had a study group between 18-70 years of 62 male and 38 female patients, 30 of them had type-1 and 70 were those with type-2 diabetes mellitus. All of the patients were positive for acid-fast bacilli and had relatively increased random glucose level. Moreover, their erythrocyte sedimentation was markedly raised and 22 of them had bilateral and 50 patients had right lung involvement.

Conclusion: Diabetic patients are at risk for developing respiratory tract infections and since diabetes is increasing in Pakistan, there is more chance of rise in its burden and concomitant infections particularly with tuberculosis. Such patients should undergo regular screening to avoid disease severity and simultaneous public health burden.

Keywords: Diabetes, Tuberculosis, Chest X-Ray, Acid Fast Bacilli.

INTRODUCTION:

Globally, tuberculosis (TB) remains leading bacterial disease for deaths. In 2009, 1.7 million deaths and 9 million newly diagnosed cases of tuberculosis were reported[1]. Diabetic individuals are at increased risk of infection acquisition, specifically with tuberculosis. Frequency of tuberculosis cases in diabetics is reported four fold to that of non-diabetics[2].

* *Assistant Professor; Depart: of Medicine, Uint-III PUMHSW Nawabshah , Sindh, Pakistan.*

** *Associate Professor, Depart: of Medicine, Uint-III PUMHSW Nawabshah , Sindh, Pakistan.*

* *Assistant Professor, Depart: of Medicine, Uint-III PUMHSW Nawabshah , Sindh, Pakistan.*

*** *Professor, Department Of Medicine, Uint-III PUMHSW Nawabshah, Sindh, Pakistan.*

Correspondence to:

Dr. Jeando Khan

Assistant Professor, Department of Medicine Unit-III PUMHSW, Nawabshah, Sindh, Pakistan.

Email: jeandokhan@ymail.com

Worldwide prevalence of diabetes, a global health problem, is 4% whereas in Pakistan it accounts for 4.5-11%. For this, Pakistan stands 6th amongst the diabetic victim countries[3]. These two diseases affect each other in context to treatment, diagnosis and clinical picture[3,4]. In fact, in diabetic individuals the relative risk to develop pulmonary tuberculosis is five times higher[5]. Therefore, diabetes mellitus (DM) stays a well established risk factor for developing tuberculosis[5,6].

TB is more common in elderly diabetics (i.e. those with non-Insulin dependent diabetes mellitus) with more favorable course and disease outcome which may be correlated with early diagnosis of TB[7-9]. Individuals with uncontrolled DM are prone to have associated TB and during relapse resistant strains are more commonly encountered in such patients[10].

TB has more destructive course and increased mortality in individuals with poorly controlled DM accompanied by increased glycosylated hemoglobin (HbA1C) levels[10,11]. Moreover, individuals with poor glycemic control have more complications than those with good control[12,13].

DM is also considered an independent risk factor for developing lower respiratory infections[14]. Significantly increased contribution to morbidity and mortality is from Streptococcus, Hemophilus influenza and Legionella infections in DM[10]. There are atypical radiographic findings in individuals with concomitant DM and pulmonary TB[8,9]. This study was aimed to analyze the correlation between diabetes and tuberculosis. It will highlight how the negligence can lead to increase of these diseases in this region.

MATERIAL & METHODS:

This study was conducted at Peoples University of Medical and Health Sciences Nawabshah during the period of January 2012 to December 2012 on patients attending outpatient department and or getting admitted to Department of Medicine. An informed consent was taken from all the patients for participating in the study after approval of Ethical Review Committee. All adult patients of 18 years or more with newly diagnosed pulmonary TB concomitant with DM were consecutively screened and 100 patients were selected for this study.

Although history and clinical examination were undertaken and the patients were investigated with routine laboratory investigations as per need including Complete Blood Picture, Random and Fasting Blood Sugar, Sputum for Acid Fast Bacilli (AFB) test, Chest X-ray. Moreover, the data was analyzed on SPSS-20 and the results were tabulated.

RESULTS:

In our study, patients belong to an age group of 18-70 years (48.7±10.2 years). There were 68% male and 32% female patients. The patients from rural areas were 79% while there were 21% urban residents. Moreover, 22% patients had type-I DM and 78% were those with type-II DM. Table: 1

In terms of clinical features, patients presented with cough (51%), fever (85%), chest pain (40%), night sweats (60%), hemoptysis (20%), shortness of breath (17%) and weight loss (66%). Table: 2 In 78 patients, fasting blood sugar ranged between 80-402 mg/dl (212.8±76.9 mg/dl). HbA1C ranged between 6-19.5% (9.8±3.2%). Diagnosis was further supported by the laboratory test for positivity of Acid-Fast Bacilli (AFB). Moreover, sputum of 86% patients was positive for AFB while only 14% of them had positive culture for tuberculous bacilli. Table: 3
On chest radiograph, we found right lung involvement in 50% patients, left in 28% and bilateral lesion in 22% patients. Moreover, we had upper lobe involvement in 40% diabetics with concomitant TB, 49% in lower, 11% in middle lobe. Table: 4

Table-1: Demographic Information of the Patients

Variables	Findings
Age group	18-70 years 48.7±10.2years
Gender	Male: 68 Female: 32
Area of living	Rural: 79 Urban: 21
Diabetes types	Type-I: 24 Type-II: 76

Table-1: Clinical Features of the Patients.

Features	Findings
Fever	85%
Cough	51%
Chest pain	40%
Hemoptysis	20%
Night sweats	60%
Weight loss	66%
Shortness of breath	17%

DISCUSSION:

The burden of DM is increasing in Pakistan and the relationship between DM and pulmonary TB is very old[3]. DM may predispose an

individual to pulmonary TB reactivation or it may be caused by pulmonary TB as a consequence of insulin resistance[3,15].

In this study, majority of the patients were above 40 years age (68%). Similar findings were noticed in previous literature[3,16]. Moreover, we had a male predominance in our study (68%), this finding was supported by many studies conducted in the past[2,3,19-18]. In terms of area of living, 79% patients were from rural areas in this study. However, there were conflicting results in the literature available with few studies reporting majority of population from rural areas[3] whereas some with a major portion of sample from urban areas[5,17].

Major proportion (78%) of the patients had type-II DM in this study. Similar were the findings in previous studies[3,16]. Moreover, Clinical presentation of the patients in this study was in parallel with previous studies[2,5]. In diabetic individuals, increased incidence of pulmonary TB is attributed to defective immune cell function and host defenses predominantly involving cell-mediated immunity. Mycobacterium infection in DM exacerbates CD4/CD8 T-cell, monocyte-macrophage and cytokine alteration. CD4 and CD8 subset balance plays a vital role in host defense modulation against mycobacterium with profound influence of PTB rate of regression[19].

In patients with TB, prevalence of glucose tolerance test ranges from 2-41%[15]. Moreover, individuals with uncontrolled DM are more susceptible to pulmonary TB development[14,20]. According to a WHO report on TB presented in 1997, 0.21 million new cases of TB occur every year in Pakistan[13]. It is expected that by 2025, there will be 14.5 million diabetic patients in Pakistan, ranking it 4th amongst the diabetic victim countries[2]. The patients in our study had poor glycemic control with FBG level 212.8±76.9 mg/dl (78% had FBG level > 120 mg/dl). Moreover, HbA1C level in patients was 9.8±3.2% (76% patients with HbA1C level > 8%). These findings were supported by Nakamato [21] and Tamura et al[16].

From radiological perspective, apical involvement is common in non-diabetic individuals with pulmonary TB[22,23]. Moreover, radiological findings are more pronounced in those with DM[11]. Majority of the patients in this study had right lung affected (50%) in contrast to left (28%) and bilateral (22%) lung involvement. These results were consistent with those of Qazi et al[3] and Zuber et al[24]. With respect to lobes, lower lobe involvement was present in 49% patients proceeded by upper (40%) and middle (11%). These findings were similar to that of Perez et al[25] and Qazi et al[3].

CONCLUSION:

Diabetes is getting more prevalence in Pakistan and since it leads to immunocompromise, individuals are more prone to develop respiratory tract infections particularly tuberculosis with it. These individuals have low living standards which lead to infections. Moreover, these two diseases are highly inter-related and their prevalence increases public health burden in Pakistan. Moreover, diabetes is a well established risk factor for developing tuberculosis. There is a great need in this region for proper screening of diabetic individuals in context to respiratory infections particularly tuberculosis so that the increasing number of such cases could be reduced.

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