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Type 2 Diabetes Mellitus as a Risk factor for Tuberculosis - A Case Study in Private Hospital Set up in Cuddlore District

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ABSTRACT

Background: *Tuberculosis (TB) and Diabetes mellitus (DM) are the important recent upcoming health issues. Tuberculosis is the most common risk factor associated with DM. TB has an especially high prevalence in diabetes patients, in whom it is usually asymptomatic and are more likely to result in drug-resistant tuberculosis TB is also the third cause of death due to non-communicable disease (NCD). TB has been associated with increased rates in DM of which may be partially explained by a blunted T cell–mediated immune response. Infection caused by mycobacterium that usually have the glycolipid lipoarabinomannan (LAM), soluble TB factor and lipo peptid, are recognized by receptors on host cells.* ***Aim of the study:*** *To perform a review to summarize evidence for the impact of tuberculosis on diabetes outcomes.*

The Impact of Diabetes on TB: *The Pathophysiology of tuberculosis is multiple complex. Acquisition of the infection is primarily dependent on exogenous factors however, reactivation of disease is largely under the influence of immune sufficiency .[1]The WHO has identified DM as a global epidemic, Mostly affecting low and middle income countries where 80% of all deaths due to DM, about 10% of global TB cases are linked to diabetes .Simultaneously, TB continues to be a major cause of death worldwide despite the fact that the epidemic appears to be on the verge of declining. The global burden of disease due to DM and TB is immense. in 2010, there were an estimated 285 million people living with DM. In 2011, the International Diabetes Federation (IDF) estimated that about 366 million people worldwide had DM, a number which is expected. To grow to at least 439 million by the year 2030, with approximately 4 million deaths. Eighty percent (80%) of these people live in low and middle income countries where tuberculosis (TB) is highly prevalent. In 2007, there were an estimated 14.4 million people living with TB, 9.2 million new cases and1.7 million deaths (WHO 2009). The risk of progression from exposure to the TB bacilli to the development of active disease is a two-stage process governed by both exogenous and endogenous risk factors. Exogenous factors play a key role in accentuating the progression from exposure to infection among which the bacillary load in the sputum and the proximity of an individual to an infectious TB case are key factors. Similarly endogenous factors lead in progression from infection to active TB disease. The key risk factors are: 1) Factors related to the index case 2) Factors related to the individual 3) Socioeconomic and behavioral factors 4) Demographic (ethnic) factors and 5) Health System Issues*

Key words*: Tuberculosis (TB). Type 2 Diabetes mellitus (DM), Low socio economic status*

INTRODUCTION

CASE REPORT: A 40 year old male, sanitary worker rushed with fever for 3 weeks. His medical history was significant for previous systemic disease. He had no, surgical infection, or heart disease in the Past. He was a smoker and alcoholic. Known case of diabetes for more than 5 years on regular medication

there was no history of promiscuity or drug abuse. The chief complaints were 1. A bad cough that lasts 3 weeks or longer 2. Pain in the chest coughing up blood or sputum (Phlegm from deep inside the lungs) 3. Polyuria 4. Chills 5.Fever 6. Weight loss. 7. Loss appetite. For more than 7 days.

Investigations done For the Patients: Hb was 11 gms/dl, Total count 10300 cells/ mm^3, Differential count was 74% polymorphs, 14% lymphocytes, 7% eosinophils. ESR was 60/85 mm/hr, blood urea 22 mgs%, serum Creatininie 1.1 mgs% with Normal electrolytes. Random blood sugar was around 175 mg/dl. Postprandial blood sugar was around 215. HBA1C was 8.5%. Chest X-Ray PA View showed Infiltrate. Opacification of airspaces within the lung parenchyma, Lucency (darkened area) within the lung parenchyma, with irregular margins that might be surrounded by an area of airspace consolidation by nodular or fibrotic (reticular) densities. The walls surrounding the lucent area can be thick or thin. Calcification can exist around a cavity. Nodules included in this category are those with margins that are indistinct or poorly defined tree-in-bud sign. Enlargement of lymph nodes in both hila with in the mediastinum, with atelectasis or consolidation. Sputum stain for mycobacterium is a laboratory test performed on a sample of the patient's sputum. His clinical diagnosis was confirmed by molecular detection of *Mycobacterium tuberculosis* complex by polymerase chain reaction. The diagnosis was further confirmed by a second polymerase chain reaction test of *Erythematic Nodosum* which tested positive for *Mycobacterium tuberculosis* complex.

Drug of choice for patients after laboratory investigation:

1. Anti –diabetic drugs in combination or insulin dosage as per need
2. Tab Rcinex-E (INH 300 mg+ Rifampicin 450 mg + Ethambutol 800 mg)
3. Tab Pyrazinamide 750 mg
4. Tab Pyridoxine 100 mg

The main adverse effect of Rcinex-E is it induces Peripheral Neuritis. So to decrease adverse effects Pyridoxine is given.

DISCUSSION

Although diabetes as an important risk factor of tuberculosis infection is well documented, Most of the relevant literature is retrospective. A systemic review in 2010 included only 12 studies about active screening for TB in diabetic patients and some of them used non specific methods (such as chest X-ray) to diagnose TB However, screening rate increased with the prevalence of TB in the study region and with the severity of diabetes.[5] From September 2011to March 2012, the TB notification rate rose from 0.31-1.11‰ (each medical center) to 3.52-7.74‰ (average of 5centers for each quarter). In a similar symptom screening project in a tertiary care hospital in south India, 38 of 7,083 diabetic patient already had TB and 12 of 125underwent TB investigation were newly diagnosed TB[6]. The incidence rate increases with HbA1c level and diabetes duration, especially in patients with HbA1c over 9.0% and with diabetes duration over 10 years. A study at Mumbai, tuberculosis was found to be the most common complicating illness (5.9%) in a large cohort of over 8000 patients with diabetes mellitus.[7] in a recent study from the Regional Institute of Medical Sciences, Imphal, and the prevalence of pulmonary tuberculosis in diabetics was found to be 27% by radiological diagnosis and 6% by sputum positivity. Arising prevalence of tuberculosis in diabetes has been seen with age. Mortality rates in these patients are reported to be several times higher than in non-diabetic pulmonary tuberculosis patients[8]. The cause of increased susceptibility are not yet clearly understood. Some believe it to be due to the lowered production of interleukin-1ß and tumor necrosis factor–a by peripheral blood monocytes inpatients with tuberculosis and co-existent diabetes mellitus. Another study in India showed that diabetes accounts for 14.8% of pulmonary tuberculosis and 20.2% of smear-positive TB hile, another study reported this rate as 6.3% [9]. There are many studies which have addressed both diabetes and PTB and introduced diabetes as a risk factor for development of active TB through promoting the progression of latent TB infection to active disease[10].

Limitations of the study: Our study period that covered March 2014 to December 2014. Totally 23 cases as been diagnosed for TB among type 2 diabetes population. It is likely that we under estimated the occurrence of Pulmonary TB in this population. This under estimation may constitute an under-reporting bias and negatively impact the accuracy of the risk factors for TB in this analysis. Larger studies with

more definite endpoints are needed to evaluate the effect of DM on the outcome of TB treatment. The effectiveness of TB preventive therapy may only be answered through a randomized controlled trial.

CONCLUSION

Diabetes is associated with an increased risk of the combined outcomes of treatment failure and death during TB treatment as well as relapse. Considering the increasing disease burden of DM, particularly in areas with highly prevalent TB. TB control programs will need to expand their efforts and focus on treating and monitoring patients with DM and TB disease. Regular follow up and earlier screening will prevent the incidence of disease. Early screening for lower respiratory tract infection before 3 weeks of duration may help to decrease the incidence of disease.

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