Prevalence of Diabetes Mellitus among Pulmonary TB patients in a Tertiary Care Hospital of Ahmedabad City, Gujarat

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Abstract:

Introduction: Diabetes Mellitus and Tuberculosis are two major diseases that often present together and complicate each other at many levels. The epidemic growth of Diabetes Mellitus has occurred in developing countries where Tuberculosis (TB) is highly endemic. As a result, Diabetes Mellitus and TB are increasingly present together. **Objectives:** To estimate the prevalence of diabetes in tuberculosis patients currently on DOTS treatment and to determine the socio-demographic factors associated with it. **Method:** A cross sectional study was carried out among pulmonary TB patients receiving DOTS treatment. Total 340 patients were included using convenient sampling who received treatment between August and October 2018. **Results:** Out of 340 patients, 208 (61%) were males and 132 (39%) were females. The prevalence of diabetes in patients of tuberculosis was found to be 11.5%. Among diabetics, 59% had only diabetes and 41% had other co-morbid disease apart from it. About 56.4% of diabetic TB patients were consuming tobacco. Age, Illiteracy, re-treatment regime were significantly associated with presence of diabetes among TB patients. **Conclusion:** Diabetes was found to be prevalent in 11.5% of the patients of tuberculosis. Diabetes is significantly associated with the severity of TB, old age and literacy of the TB patients in this study.

Key words: Diabetes, DOTS, Prevalence, Tuberculosis.

Introduction:

Tuberculosis is one of the top ten causes of death in the world, and the leading cause from a single infectious agent (above HIV/AIDS).[1] In the incident rate of TB, India is 17th among 22 High Burden Countries. It has the largest number of TB cases in the world (estimated at 2.8 million incident cases per annum) with an incidence rate of 217/100,000 per year for 2015.[2] Globally, 350 million people have Diabetes Mellitus and it is predicted that global prevalence of diabetes will be doubled by 2030. India has the maximum number of diabetics in the world.[3,4] The prevalence of Diabetes Mellitus in adults in India is estimated to be ranging from 5.6 to 12.4%.[5]

Diabetes Mellitus is recognized as an important co-morbidity for the development of TB. Those who have weak immune system such as Diabetes Mellitus, have 2-3 times higher risk of developing TB than those without Diabetes Mellitus.[6-8] This leads to a higher prevalence rate of TB among Diabetes Mellitus patients; the rate of Diabetes Mellitus is also higher among TB patients than in general population. Around 10% cases of Tuberculosis are linked with Diabetes Mellitus.[9] With the increase of Diabetes Mellitus burden globally, concerns have been raised about the emerging co-epidemics of Diabetes

Mellitus and TB, especially in low- and middle-income countries. This study was carried out to estimate the prevalence of diabetes mellitus and to determine the socio-demographic factors associated with it.

Method:

Current cross sectional study was carried out between August 2018 and October 2018 among TB patients attending TB Chest OPD at Designated Microscopic Center (DMC), TB Center, Civil hospital, Ahmedabad. Total 340 sputum smear-positive pulmonary TB patients, registered for treatment under Revised National Tuberculosis Control Program/National Tuberculosis Elimination Programme (RNTCP/NTEP) in TB center who visited the out patient department during that time period were included in the study with consideration of inclusion and exclusion criteria. The permission to carry out the study was taken from the institutional ethics committee.

All registered pulmonary TB patients who gave written consent were included in the study. Patients were excluded from the study if they had any of the following conditions: (1) extra pulmonary TB, (2) malignancies with long-term steroid or cytotoxic drug therapy, (3) connective tissue disorders, (4) chronic renal failure, (5) chronic liver disease[10] These conditions are also immune compromised. So to avoid the confusion of TB developed because of these conditions or treatment of them or DM, to avoid the cofounding effect, we excluded these conditions to know the real association between Diabetes and TB.

A pre-designed, structured questionnaire was used to collect the information regarding sociodemographic profile, history of diabetes etc. After obtaining prior consent from pulmonary TB patients, the interview was conducted. Those patients who themselves reported to be diagnosed and were on treatment for diabetes were considered already having diabetes. Those TB patients who were identified by screening by random blood sugar method and confirmed by fasting and post prandial blood sugar level at the initiation of treatment of TB were considered as the new cases of diabetes.

Data was entered and analyzed by using MS Excel 2010 and Chi square test was applied as a test of significance.

Results:

Out of 340 pulmonary TB patients, 208(61%) were males and 132(39%) were females. Median age of the participants was 40 years (Range: 6-77).Most of the study participants were Hindu and from age group 21- 30 years. The sociodemographic details of the participants is shown in Table 1.

Out of the total 340 tuberculosis patients included in the study, 39 patients were having diabetics and the prevalence of diabetes was found to be 11.5%. Among diabetics, 23 (59%) had only diabetes and 16 (41%) had other co-morbid disease (HIV, Asthma, Hypertension) apart from diabetes. (Figure 1) The mean age of tuberculosis patients having diabetes was 53.84 ± 9.54 years. There was a higher prevalence for diabetes in older population.

Majority of the patients (64%) were receiving treatment as newer cases (known as drug sensitive treatment regimen). (Table 2)

Association of various variables with diabetic status of the TB patients is shown in Table 3. As shown in the table, TB patients of old age (age group 51- 60 years), Illiterate, re-treatment regime were significantly associated with presence of diabetes along with TB.

Out of the 39 diabetic patients, 24(62%) patients did not aware about their diabetes status before the diagnosis of TB (newly detected diabetics) and the remaining 15 (38%) were already diagnosed of having diabetes and on treatment for it. Among 39 diabetic TB patients, 22 TB patients were consuming tobacco, among 22 (56%) consumers, 8 were consuming smokeless tobacco, 4 were smoking bidi/cigarettes and 10 were consuming both.

Discussion:

India is facing dual burden of TB and Diabetes. There have been significant improvement in case

Table 1: Socio-demographic characteristics of TB patients

| Variables	Frequency (n=340)	Percentage (%)
Gender		
Male	208	61%
Female	132	39%
Religion		
Hindu	299	88%
Muslim	36	10.5%
Others	5	1.5%
Age group (completed years)		
≤20	33	9.7%
21-30	79	23.2%
31- 40	54	15.9%
41- 50	74	21.8%
51- 60	59	17.3%
>60	41	12.1%
Education		
Illiterate	72	21%
Primary	67	20%
Secondary	42	12%
Higher Secondary	75	22.5%
Graduate and above	84	24.5%
Occupation		
Job	82	24%
Business	16	5%
Labour	45	13%
Agricultural work	34	10%
Household business	10	3%
Housewife	70	20.5%
Unemployed	39	11.5%
Retired	38	11%
Others	6	2%
Marital Status		
Unmarried	94	27.6%
Married	167	49%
Widow/widower	76	22.4%
Separated/divorced	3	1%

Table 2: Distribution of TB patients according to their treatment regimen

Type of treatment regimen	Frequency (n=340)	Percentage (%)
New cases (drug sensitive)	217	123
Re treatment cases (DR-TB)	64%	36%

Table 3: Association of various variables with diabetic status of TB patients

Variables	Diabetic TB patients (n=39)	Non Diabetic TB patients (n=301)	p value
Gender			
Male	27(12.98%)	181(87.02%)	> 0.05
Female	12(9.10%)	120(90.90%)	
Age (completed years)			
<40 years	4(2.40%)	162(97.60%)	> 0.05
41-50 years	6(8.10%)	68(91.89%)	
51-60 years	19(32.20%)	40(67.80%)	
> 60 years	10(24.40%)	31(75.60%)	
Literacy			
Illiterate	15(20.83%)	57(79.17%)	> 0.05
Literate	24(8.95%)	244 (91.05%)	
Category			
New cases	16(7.37%)	201(92.63%)	> 0.05
Re treatment cases	23 (18.70%)	100 (81.30%)	

Figure 1: Proportion of co-morbid diseases along with Diabetes in TB patients

DM-Diabetes Mallitus, HTN - Hypertension, COPD - Chronic Obstructive Pulmonary Diseases
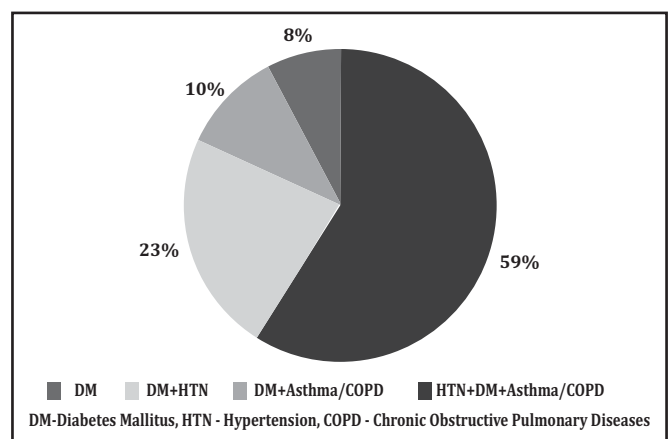
detection and control of TB but prevalence of diabetes is posing an important challenge for TB control.[11] Presence of chronic disease such as diabetes weakens the immune system ultimately posing as a risk factor for new as well as reactivation of old cases of TB. Studies have shown that in India, 15% of pulmonary tuberculosis cases have been estimated to be attributable to DM[12] and screening for DM among TB patients reported a wide range of DM prevalence among TB patients ranging from 1.9% to 35%.[13,14]

Prevalence of diabetes among TB patients was 11.5% in present study. Similar results were there in a study from South Kerala where there was 12.7% diabetes prevalence among TB patients.[15] Almost similar results were reported in other studies done in Bhopal by Vivek Nagar[16]and in Chandigarh by D. Sharma[17] with 11.9% and 13.1% prevalence respectively. On the contrary, the studies carried out by Singla et al.,[18] Raghuram et al.,[19] Balakrishnan et al.[20] and Zhang et al [21] showed the prevalence of diabetes among TB patients to be 25%, 29%,44%, 9.5% respectively. Long term diabetes can impair the immune response for opposing the existing infection of TB. Increasing age was found to be significant risk factor for diabetes in the present study. Similar findings have been reported from India and some other countries.[22-25] This older age predominance may be due to the fact that mostly Diabetes Mellitus is detected in elderly. With the availability of better health care facilities, improved living conditions and changing lifestyles, the prevalence of diabetes is increasing. Routine screening and detection of diabetes may decrease the incidence of TB in diabetics. We found the significant association between low literacy status and diabetic status of TB patients, it could be assumed that due to illiteracy and low education, people remain ignorant about the manifestations and may be because of poor health seeking behaviour do not visit health care facility for screening of the disease. In the current study, re treatment cases were significantly associated with Diabetes which could be due to worsening of the infection and treatment of TB due to diabetes.

More than half of the diabetics (62%) were unaware of their diabetic status at the time of tuberculosis diagnosis. Earlier detection of it might prevent them from getting tuberculosis. Thus, routine and active screening of all patients including those who do not self report the disease is also important.

According to the current study, there were around 42.6% of tobacco users. In another study done in Chandigarh by D. Sharma,[17] 25.5% were tobacco users, study done by Kolappan and Gopi,[26] 58% were smokers. Any type of addiction of tobacco associated with Diabetes leads to increase in the risk of adverse effect associated with TB.

There are few limitations in the study. The status of diabetes was confirmed by TB treatment cards and prescription records. The other limitation was that only those patients who were coming to out-patient department in tertiary care center of Ahmedabad were enrolled in the study. So the results cannot be generalized.

Conclusion:

Prevalence of Diabetes in TB patients has been found 11.5% in the study. Diabetes Mellitus is the most common co morbidity in TB patients. Many diabetic TB patients did not know about their diabetic state at the time of diagnosis of TB. Diabetes is significantly associated with severity of TB (category II), old age and literacy of the TB patients. So, especially in areas having high burden of TB as well as diabetes, bi-directional screening of both diseases would lead to better treatment outcomes.

Declaration:

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Conflict of Interest: Nil

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