Prevalence of Diabetes among Tuberculosis Patients at Urban Health Centre, Ahmedabad

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Abstract

Background: When chronic non-communicable diseases proliferate faster than infectious diseases recede, previously uncommon disease interactions can take on population health significance. Recent systematic reviews suggest that Type 2 diabetes mellitus (T2DM) increases the individual risk of *Mycobacterium tuberculosis* (TB) disease.

Materials and Methods: This facility-based cross section study was undertaken in urban health centre Ahmedabad providing directly observed therapy short course therapy for TB patients in Ahmedabad. 85 TB cases of sputum positive, sputum negative, new cases, re-treatment cases, extra-pulmonary cases, multi-drug resistant, and extensive drug resistant registered under Revised National TB Control Program are included in this study. All of these were screened for diabetes.

Results: Out of total 85 patients, 59% were male and 41% were female. Their mean age was found to be 37.50 ± 16.16 years. The mean age of TB was found to be 47 ± 16 among diabetes patients. Frequency of diabetic among TB patients was 15.3%. Out of 85 TB patients most of the patients were belongs to Category I 55 patients. It was found that there was no any significant difference for DM as a comorbid condition with TB between male and female.

Conclusions: The prevalence of diabetes among TB patients in this present study was found 15.29% among them 8.23% were known DM cases and 7.06% were newly diagnosed cases. Age of the patients having diabetes was found to be significantly high.

Key words: Diabetes mellitus, Risk factors, Tuberculosis

INTRODUCTION

Tuberculosis (TB) is present in India since 1500 BC Rig-Veda described disease as "King of diseases."[1] India is the second most population country in the world. Though India is the second most population country in the world, one-fourth of global incident TB cases occur in India annually. In 2012, out of the estimated global annual incidence of 8.6 million TB cases, 2.3 million were estimated to have occurred in India.[2] India account for 26% of all new cases of TB in the world annually. At the same time, India dealing with the highest burden of TB in the world.[3] Incidence of TB was found to be 176/1 lack person in 2012 in India.

Prevalence of TB was found to be 230/1 lack population in 2012 in India. The mortality was found to be 22/1 lack population. Prevalence of diabetes was found to be 7.1% in India in the adult population.[2] The number of people in the world with diabetes is projected to increase to 366 million by 2030 with the fastest increase in low- to middle-income countries.[4] Criteria for diagnosis of diabetes is fasting blood sugar level should be >125 mg/dl and 2 h post-glucose load should be >200 mg/dl. There are some reasons or can say associated factors that may lead to development of TB among diabetes patients that are people with diabetes have a weak immune system as a result of chronic disease so they are of higher risk of development of disease from latent infection.[5,6] Based on WHO report people with diabetes have 2-3 times higher chance of developing TB compare to non-diabetic people. There are 25-75% chances of development of pneumonia among diabetes patients.[7] which may predispose to TB. About 10% of TB patient are directly linked to diabetes. People with diabetes which are diagnosed during TB or who are already diagnosed as diabetes have higher chances of death during treatment and

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higher chance of relapse after completion of treatment so screening should be must both in TB patient and diabetes patient *viz.*, this is required because diabetics have higher chances of TB. Further diabetes is complicated by any infection including TB, so to prevent such complication screening should be done. A large proportion of people are diagnosed during or late of treatment, early detection can help to control and prevent future complications. Avicenna in 980-1027 AD had first reported the association between diabetes mellitus (DM) and TB. After that so many studies had been conducted to identify the various factors and comorbidity. India is a developing country, the link of DM and TB is more prominent in developing countries where TB is endemic and the prevalence of DM is rising. There are many studies that suggest diabetes as a risk factor for the TB, but the exact biological process is unknown. The strength of any association between diabetes, dysglycemia, and risk of TB remains debated.[8] A study conducted in Hong Kong and several other small observational studies found that diabetes is associated with increased risk of TB.[9,10]

Aim

To know the prevalence of diabetes among pulmonary and extrapulmonary TB patients in Category I, Category II, multi-drug resistant (MDR) and extensive drug resistant (XDR) patients.

Objectives

- To know the association between TB and risk of diabetes
- To know the frequency of diabetes among TB patients.

MATERIALS AND METHODS

This facility based cross section study was undertaken in urban health center Ahmedabad providing directly observed therapy shortcourse therapy for TB patients in Ahmedabad. 85 TB cases of sputum positive, sputum negative, new cases, re-treatment cases, extra-pulmonary cases, MDR and XDR registered under Revised National TB Control Program are included in this study. Criteria for diagnosis of diabetes was considered as fasting blood sugar level >125 mg/dl and 2 h post-glucose load >200 mg/dl or a self-reported history of diabetes and he/she is on anti-diabetic drugs after diagnosis by a physician. All TB cases were interviewed. Data entry was done in Microsoft Excel 2007 and analyzed under Epi info 7.

RESULTS

In the present study, we had included 85 TB patients among them 35 were female and 50 were male. Out of 85 TB patients, most of the patients were belongs to Category I

55 patients followed by 15, 13, and 02 of Category II, MDR and XDR respectively. Out of 85 TB patients most 74 were sputum positive followed by 09 and 02 of extra-pulmonary TB and sputum negative TB. Out of 85 TB patients 13 were having DM as comorbid condition (Table 1).

In the present study, we have tried to find out the distribution and it's risk factors in TB patients. It was found that there was no any significant difference for DM as a comorbid condition with TB between male and female. The mean age of TB was found to be 47 ± 16 among diabetes patients compared to 37 ± 16 among TB patients, this may be due to late exposure of diabetes after the age of 40 years. Out of 13 TB with diabetes patients 53.8% were having abdominal obesity compare to 15.3% among 85 TB patients, which was highly significant. Among diabetes with TB patients 15.4% were smokers compare to 22.3% smokers in TB which was statistically insignificant. However, when we have taken drinking as risk factor out of 13 patients of diabetes with TB 69.2% were drinkers compare to 37.6% among 85 TB patients, which was found to be significant. When we have taken family history, overweight, Category II, sputum positive at the initiation of treatment as a risk factor in diabetes with TB patients compare to TB patients it was found to be insignificant.

In the present study, we have found that among Category I patients of diabetes with TB 15.39% belongs to Type 1 diabetes and 84.61% were of Type 2 diabetes. Among MDR patients with diabetes all were belongs to Type 2 diabetes.

In the present study, we found that 84.7% patients were having TB without diabetes and 7% were TB with diabetes diagnosed during treatment and were unaware of diabetes before it. Whereas 8.23% were TB with history and disease present before starting treatment (Table 2).

DISCUSSION

Prevalence of the diabetes among TB patients in the present study was found to be 15.29% among them 8.23% were known cases of DM and 7.06% were newly diagnosed cases (Figure 1 and 2). Age of the patients having diabetes was found to be significantly high compare to patients of TB. Older age group from 40 years and above has increased the risk of having DM and TB. The prevalence of diabetes among TB patients was found to be more among females compare to males. The majority of DM cases were found in Category I TB patients (92.30%) among them T2DM was more common that was 84.61%. In the similar study, which was conducted in urban areas of Indonesia among 737 patients revealed the prevalence of diabetes 14.8%

Table 1: Gender wise distribution of the TB patients according to category, sputum status and diabetes status

Variable	Category of the variable	Females	Males	Total
		N=35	*N*=50	*N*=85
Age groups in years	≤10	03	00	03
	11-20	06	06	12
	21-30	08	15	23
	31-40	07	08	15
	41-50	08	10	18
	51-60	01	05	06
	>60	02	06	08
Treatment category	I	26	29	55
	II	05	10	15
	MDR	06	07	13
	XDR	01	01	02
Sputum status at initiation of treatment	Positive	32	42	74
	Negative	01	01	02
	Extra pulmonary	04	05	09
Diabetes status	DM+TB patients	08	05	13
	Non DM+TB patients	27	45	72

TB: Tuberculosis, MDR: Multi-drug resistant XDR: Extensive drug resistant, DM: Diabetes mellitus

Table 2: Distribution of diabetes and its risk factors in TB patients

Variable	Total *N*=85	DM+TB patients *N*=13	Frequency (%)	*P* value
Male gender	50	5	10	0.167
Mean age**	37.50±16.16	46.84±16.31	-	0.001
Family history	17	02	11.76	0.348
Current smokers	19	02	10.52	0.284
Current drinkers**	32	09	28.12	0.015
Overweight	08	03	37.50	0.073
Abdominal obesity** (high WHR)	13	07	53.84	0.001
Category II (retreatment cases)	31	02	6.45	0.066
Sputum positive at the initiation of treatment	74	12	16.21	0.294

p value < 0.05 indicate significant, *p* value < 0.001 indicate highly significant,
p value > 0.05 indicate insignificant, WHR: Waist to hip ratio, DM: Diabetes mellitus, TB: Tuberculosis, N: Number

among TB patients, which was much similar to this study and was also associated with older age.[11] Alisjahbana *et al.* in their study found the prevalence of diabetes 14.8% among TB patients.[11] In the study carried out in Kerala by Balakrishnan *et al.* among 552 TB patients found the prevalence of diabetes 44%. Out of them 23% had previously known DM and 21% were newly diagnosed. Which was much higher almost thrice the prevalence compare to present study. The study also revealed that prevalence was higher among males compare to females, but in present study females were more affected then males.[12] Another study conducted by Raghuraman *et al.* found that the prevalence of diabetes 29% in TB patients.
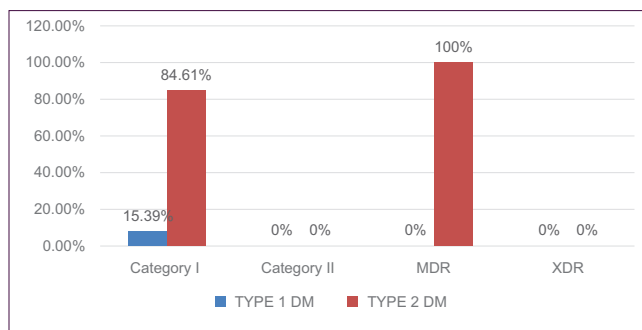

Figure 1: Distribution of diabetes among different categories of tuberculosis (*N* = 13)
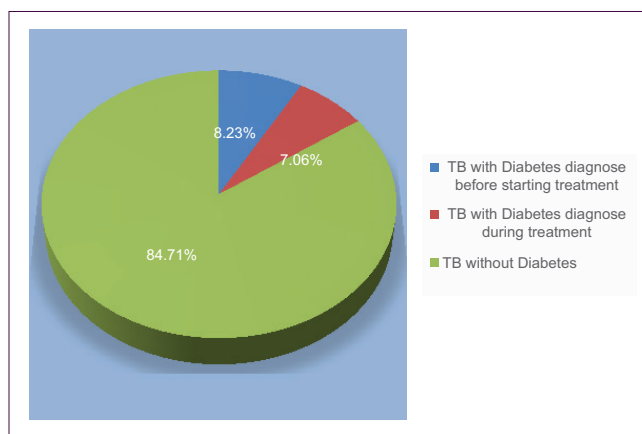

Figure 2: Treatment of diagnosis of diabetes among tuberculosis patients

Out of them known diabetics were 20.7% and new diabetes were 8.3% which was almost double the prevalence compare to present study. The study also suggest diabetes was significantly associated with older age and consumption of alcohol, which was similar to this study.[13] In the present study, we found the prevalence of diabetes 15.29% among TB patient compared to 7.1% among general population, so prevalence of diabetes among TB patient was found to be almost double from general population. On the other hand, studies conducted by Bacakoglu *et al.*,[14] Baldé *et al.*[15] and Banerjee and Banerjee[16] found that TB among diabetics is 2-5 times higher than in the non-diabetic population. Hence, this indicate a positive association between TB and diabetes.

CONCLUSIONS

In this study, we found the high prevalence of diabetes among the TB patients compare to general population suggest that screening of diabetes among TB is necessary and should be performed during the diagnosis of TB. Prevalence of diabetes among TB was found higher among females compare to males and age of the patients having diabetes was found to be significantly high compare to

patients of TB. Family history, overweight, Category II, sputum positive at the initiation of treatment as a risk factor in diabetes with TB patients compare to TB patients was found to be insignificant. Central obesity was found almost thrice among diabetes with TB patients compare to TB patients. Smoking as a risk factor among diabetes with TB patients compare to smoking in TB was found to be statistically insignificant. However, when we have taken drinking as a risk factor for diabetes with TB patients compare to drinking among TB patients, it was found to be significant.

RECOMMENDATIONS

- As diabetes and TB are co-morbid conditions, routine screening of TB patients for diabetes should be carried out in all the health centers
- The linkage between diabetes and TB should be carried out for early detection of both conditions
- As in the present study, abdominal obesity was significantly high among TB patients having DM. Hence, intervention should be directed toward the primary preventive measures.

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