# **Original Research Article**

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# A study on prevalence of diabetes mellitus among adult tuberculosis patients in tertiary health care centre, Hyderabad

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#### **ABSTRACT**

**Background:** Tuberculosis is a major public health problem and is among top ten causes of deaths worldwide. People with diabetes are three times at higher risk of getting infected with tuberculosis. Globally 10.4 million TB cases exists of them 10% are linked to diabetes. In India 13% of Tuberculosis cases were diabetic. DM has been reported to modify the clinical features of TB. The objectives were to study the prevalence of diabetes mellitus among adult tuberculosis patients registered in DOTS centre in tertiary health care centre, Hyderabad and to study the clinical profile of tuberculosis in study subjects.

**Methods:** A cross sectional study was conducted in 4 DOTS centres under tertiary health care facility, Hyderabad. Sample size 200 was calculated using formula 4PQ/L<sup>2</sup>. Study subjects were registered adult tuberculosis patients attending DOTS centre and undergoing anti tuberculosis treatment. Data from study subjects was obtained by interview method using semi structured questionnaire consisting of socio-demographic parameters and clinical parameters.

**Results:** Out of 200 patients, the prevalence of DM was found to be 18% (n=36). Increasing age (p<0.000), male sex (p=0.04), low BMI (p=0.02), family history of TB (p=0.017), Sputum positive severity (p=0.0008) are significantly associated with DM-TB comorbidity and clinical manifestations like bilateral involvement (p=0.151), multi lobes (p=0.243), other associated lung diseases (p=0.154), treatment category (p=0.8203) are not significantly associated with DM-TB comorbidity.

Conclusions: Bidirectional screening of TB and DM will detect early and prevent complications of comorbiditiy.

Keywords: Prevalence, Tuberculosis, Diabetes

# **INTRODUCTION**

Tuberculosis is a major public health problem. It is one of the top ten causes of deaths worldwide. People with diabetes are three times at higher risk of getting infected with Tuberculosis compared to people without diabetes. DM has been reported to modify the clinical features of TB.<sup>2</sup> The DM-TB comorbidity not only lengthen the time for sputum culture conversion but confers an increased risk for the development of new and recurrent TB disease, increases the risk of poor Tuberculosis treatment

outcomes.<sup>2,3</sup> People with TB and coexisting diabetes have a four times higher risk of death during TB treatment and higher risk of TB relapse after treatment.<sup>3</sup>

Global incidence of tuberculosis is 10.4 million and about 10% of them are linked to diabetes.<sup>4</sup> In India the incidence rate of TB is 211 per 1 lakh population and about 13% of registered cases were diagnosed to have diabetes, which included 8% already diagnosed and 5% are newly diagnosed.<sup>5</sup> Due to lack of early detection and treatment, complications from TB-diabetes comorbidity

lead to high cost on treatment and out-of-pocket expenditure.

The World Health Organization and the International Union Against Tuberculosis and Lung Disease currently recommend screening all newly diagnosed TB patients for DM and to consider screening for TB in all patients with DM. Early detection can help improve care and control of both diseases. A National TB-diabetes Coordination Committee (NCC) was established to improve networking and strengthening collaboration between RNTCP and NPCDCS programmes. The present study is done to know the burden of DM-TB comorbidity and to strengthen the need for bidirectional screening for early detection and prompt management.

## **Objectives**

- To study the prevalence of diabetes mellitus among adult tuberculosis patients registered in DOTS centre in tertiary health care centre, Hyderabad.
- To study the clinical profile of tuberculosis in study subjects.

# **METHODS**

Study design: Cross sectional study

**Study place:** 4 DOTS centres selected under tertiary health care facility, Hyderabad

Study period: August and September, 2018

**Study subjects:** Registered adult tuberculosis patients attending DOTS centre and on anti-tuberculosis treatment

# Inclusion criteria

Inclusion criteria were both males and females aged between 18-60 yrs; patients with only sputum positive pulmonary tuberculosis are included.

#### Exclusion criteria

Exclusion criteria were TB patients with other comorbidities like chronic liver diseases, chronic kidney diseases, and psychiatric illness; patients who did not give informed consent for participation in the study.

#### Sample size

200 was calculated using formula 4PQ/L<sup>2</sup> where P is Prevalence of DM among TB patients 13%, Q is 87,L is allowable error as 5%.<sup>5</sup>

Adding 10% wastage factor, sample size 200 was obtained.

#### Sampling technique

There are 19 DOTS centres under tertiary health care facility which are broadly categorised into 4 quarters and one DOTS centre was selected randomly from each quarter. 50 tuberculosis patients were studied from each DOTS centre to reach the sample size.

#### Study tool

The study subjects satisfying inclusion criteria are interviewed using semi structured questionnaire consisting of socio-demographic parameters and clinical parameters of the study subjects

# Data analysis

Data was entered and analysed using Microsoft excel 2007.

## **RESULTS**

The mean age of the study subjects was  $37.18\pm12.20$  years. Out of 200 study subjects males and females constituted 69% (138) and 31% (62) respectively. Out of 200 study subjects, patients with both tuberculosis and diabetes were 18% (36) and patients with only tuberculosis were 82% (164). The prevalence of DM among tuberculosis patients was found to be 18% (n=36). The prevalence was found to be more in males when compared to females. The socio-demographic characters of study subjects were mentioned in Table 1.

Family history of tuberculosis among patients with DM+TB comorbidity was present in 4.5% (9) patients whereas among tuberculosis only patients was 7.5% (15). About 16 TB patients with diabetes and 108 TB patients without diabetes were having low BMI (<18.5) and the association was statistically significant (p=0.02) in the present study history of smoking was associated with 14 and 66 patients with DM+TB comorbidity and TB only respectively. The association was not statistically significant (p=0.880).

The distribution of clinical features among study subjects were mentioned in Table 2. Most common presenting symptom among DM+TB comorbidity group was cough (8%) and among tuberculosis only group was fever (63.5%). Bilateral lung involvement was seen in 2% and 3% among DM+TB group and TB only group respectively. Diffuse/total lung involvement was seen in 3% in DM+TB comorbidity and 7% in TB only group. Most common associated lung disease among both study groups was COPD. Patients receiving category I drugs were 71% (142) and category II drugs were 29% (58) of which DM+TB comorbidity constitute 5.5% (11) and TB only group constitute 23.5% (47).

Table 1: Distribution of socio-demographic characters among study subjects.

Socio-demographic	Distribution	TB only	DM+TB	Total (200)
Age	Mean age	35.27±10.62	47.20±12.33	37.18±12.20
		N (%)	N (%)	N (%)
Sex	Male	106 (53)	32 (16)	138 (69)
	Female	58 (29)	4(2)	62 (31)
Religion	Hindu	86 (43)	12 (6)	98 (49)
	Muslim	63 (31.5)	21 (10.5)	84 (42)
	Christian	5 (2.5)	3 (1.5)	18 (9)
Marital status	Married	129 (64.5)	28 (14)	157 (78.5)
	Single/widowed	35 (17.5)	8 (4)	43 (21.5)
Family type	Nuclear	98 (49)	21 (10.5)	119 (59.5)
	Joint/3 Gen	66 (33)	15 (7.5)	81 (40.5)
SEC	Lower class	33 (16.5)	8 (4)	41 (20.5)
	Upper lower	60 (30)	15 (7.5)	75 (37.5)
	Lower middle	52 (26)	9 (4.5)	61 (30.5)
	Upper middle	19 (9)	4 (2)	23 (11.5)

Table 2: Distribution of clinical features among study subjects.

Clinical feature	Distribution	DM+TB (36)	TB only (164)	Total (200)
		N (%)	N (%)	N (%)
Most common presenting symptom	Fever	14 (7)	127 (63.5)	141 (70.5)
	Cough	16 (8)	96 (48)	112 (56)
	SOB	11 (5.5)	77 (38.5)	88 (44)
	Weight loss	10 (5)	43 (21.5)	53 (26.5)
	Hemoptysis	4 (2)	10 (5)	14 (7)
Sputum positivity	1+	15 (7.5)	96 (48)	111 (55.5)
	2+	13 (6.5)	50 (25)	63 (31.5)
	3+	8 (4)	18 (9)	26 (13)
Side involvement	Right	12 (6)	94 (47)	106 (53)
	Left	20 (10)	64 (32)	84 (42)
	Bilateral	4 (2)	6 (3)	10 (5)
Lobes involvement	Upper	10 (5)	48 (24)	58 (29)
	Lower	20 (10)	102 (51)	122 (61)
	Total	6 (3)	14 (7)	20 (10)
Associated lung disease	COPD	7 (3.5)	15 (7.5)	22 (11)
	Bronchiectasis	3 (1.5)	6 (3)	9 (4.5)
	ILD	1 (0.5)	5 (2.5)	6 (3)
	Emphysema	0	4 (2)	4 (2)
ATT treatment	Cat I	25 (12.5)	117 (58.5)	142 (71)
	Cat II	11 (5.5)	47 (23.5)	58 (29)
Category II	Default	6 (3)	24 (12)	30 (15)
	Relapse	3 (1.5)	13 (6.5)	16 (8)
	Failure	2 (1)	10 (5)	12 (6)

**Table 3: Statistical test of significance.** 

Features	TB + DM	TB only	Total	Odds ratio	Chi square	P value
Male sex	32	106	138	0.385	4.21	0.041
BMI (<18.5)	16	108	124	2.41	4.870	0.025
Smoking H/O	14	66	80	1.05	0.022	0.880
Family H/O TB	9	15	24	0.302	5.605	0.017
Sputum +ve severity	24	140	164	2.916	6.993	0.008
Associated lung disease	11	30	41	0.508	2.023	0.154
ATT Cat II	11	47	58	1.095	0.0516	0.820

#### **DISCUSSION**

In the present study the prevalence of diabetes mellitus among tuberculosis patients is 18% (i.e. 36) which is more when compared with the study conducted by Kumar et al. Screening of patients with tuberculosis for diabetes mellitus in India. In the study over 8000 patients with TB who were screened, the overall prevalence of DM was 13%. In a facility based cross-sectional study conducted in Urban Puducherry, the prevalence of diabetes in TB patients was found to be 29%, this percentage was much higher than our study. In another study conducted in Kerala, India which indicates that much higher prevalence of DM (44%) among TB patients. In contrast to the above findings, study done in Nigeria by Oliyanka et al found the prevalence to be 5.7%.

In 2015, Thapa, Barsha et al conducted study on prevalence of diabetes among tuberculosis patients and associated risk Factors in Kathmandu Valley, it was observed that older age was found linked to diabetes. This was similar to that observed in present study where the mean age of diabetic TB patients was 47.2 years while of those non diabetic TB patients was 35.27 years (p<0.0000) (Table 3).

The prevalence of diabetes is more among males 16% (32) than in females 2% (4) tuberculosis patients (p=0.041) which is similar to the findings observed in the study conducted by Ogbera, Kapur et al on clinical profile of diabetes mellitus in tuberculosis. <sup>10</sup> Majority of TB patients (62%) were underweight in our study and has found significant association between BMI and DMTB comorbidty (p=0.025). Similar results were reported by Srilanka study conducted by Umakanth, Maheswaran et al in 2017. <sup>11</sup>

# **CONCLUSION**

The prevalence of DM among TB patients was found to be 18% (n=36). Increasing age (p=0.000), male sex (p=0.04), BMI (p=0.02), family history of TB (p=0.017), Sputum positivity (p=0.0008) are significantly associated with DM-TB comorbidity. Among clinical manifestations involvement of sides (p=0.151), lung lobes (p=0.243), other associated lung diseases (p=0.154) and treatment category (p=0.8203) are not significantly associated with DM-TB patients.

# Recommendations

Diabetes is a common co-morbidity in people with tuberculosis. Screening of all TB patients for DM should be done immediately after the diagnosis of TB and treated effectively. To decrease the burden of DM-TB comorbidity all the public health facilities should be strengthened to conduct bidirectional screening of both diseases and prompt management.

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