Original article

Study on prevalence of Diabetes Mellitus in Tuberculosis patients attending a tertiary care hospital in Guntur, Andhra Pradesh

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Abstract:

Introduction: With high rates of diabetes and tuberculosis, India facing a double burden in controlling these two diseases. TB and Diabetes complicate each other posing a threat to the anti-tubercular programme in India.

Objectives: To determine the prevalence of Diabetes mellitus among TB patients and its associated risk factors.

Material & Methods: It was an institutional based cross sectional study done at Government General Hospital, Guntur. All tuberculosis cases as per inclusion criteria were interviewed after obtaining a informed written consent. A total sample size of the study was 252. Fasting blood sugar estimation was done to determine the prevalence of diabetes. Appropriate statistical tests were applied wherever applicable.

Results: Out of the total 252 tubercular patients, the overall prevalence of Diabetes mellitus was found to be 30.6% (n=77), of which 77.8% (n=60) were newly diagnosed cases. Univariate analysis of factors associated with Diabetes among TB patients showed that increasing age, Body Mass Index (BMI), systolic blood pressure and category of TB treatment were significantly associated ($p<0.05$).

Conclusions: Screening of the TB patients for Diabetes would help for its early detection and improve the outcome of both the diseases.

Keywords: Tuberculosis, Diabetes mellitus, Prevalence

Introduction:

Tuberculosis remains a major public health problem. It causes ill health among millions of people each year and ranks as the second leading cause of death from an infectious disease worldwide, after the human immunodeficiency virus (HIV)[1]. India is the largest TB burden country accounting for one fifth of the global incidence. Nearly 40% of Indian population has been infected with tuberculosis bacilli. According to estimates of the World Health Organization (WHO) of TB burden 2012 in India, prevalence rate of TB was 230 per 1 lakh population and incidence was 176 per 1 lakh population [1].

Diabetes Mellitus is an iceberg disease with increasing prevalence and incidence in both developed and developing countries. IDF (International Diabetes Federation) estimated that there are 382 million people worldwide living with Diabetes. In India, 9.1% of the adult population (20-79 years) were estimated to be living with Diabetes in 2013 and India is the largest contributor to regional (South-East Asia) mortality, with 1.1 million deaths attributable to Diabetes in 2013 [2].

India is facing a double burden of both Tuberculosis and Diabetes posing a serious challenge for the health system. Diabetes has been shown to be an independent risk factor for tuberculosis in community based studies from

south India and multiple studies globally. It is suggested that diabetes accounts for 14.8 percent of all tuberculosis and 20.8 percent of smear positive TB [3].

People with weak immune system as in diabetes are at higher risk of progressing from latent to active tuberculosis. The risk is 2-3 times higher than people without diabetes [4]. Among those with active TB, diabetes may adversely affect TB treatment outcomes by delaying the time for microbiological response, reducing the likelihood of favourable outcome and increasing the risk of relapse, death and drug resistance [5].

Aim & Objectives: To determine the prevalence of diabetes mellitus in tuberculosis patients attending a tertiary care hospital in Guntur, Andhra Pradesh.

Material & Methods:

Present study was an institutional based cross sectional study done at Government General Hospital, Guntur. All Tuberculosis cases more than 18 years of age, sputum positive, sputum negative and extra pulmonary cases currently on anti tuberculosis treatment reporting to the Medical out Patient and DOTS centre of the Government General Hospital, Guntur were included in the study. Tuberculosis patients with other co morbid conditions like HIV, chronic liver and kidney disease, malignancies and patients on long term steroids were excluded from the study.

Duration of the study was for six months from May 2014 to October 2014 and total number of patients who had given informed written consent and participated in the study was 252. All the willing participants were interviewed using a pretested questionnaire which was prepared based on the WHO-STEPS questionnaire [6]. Physical parameters like height, weight, body mass index (BMI), waist circumference were recorded [7].

Case definition for diagnosing diabetes was based on diagnostic criteria of a fasting plasma glucose level of ≥ 126 mg/dl or a self reported history of taking anti-diabetic drugs after diagnosis by a medical professional [8]. The participants were asked to come the next day after overnight fasting. The fasting blood glucose levels (FBS) were measured using a standardized glucometer.

Data was entered in Microsoft Excel 2007 and analyzed using EPI INFO version 7. Data was presented in percentages and proportions. Chi-square was applied to find out any significant associations with P value <0.05 considered as significant.

Results:

Demographic characteristics- Out of the total 252 study participants, 170 (67.5%) were males and 82 (32.5%) were females. The mean age for males and females was 41.5± 9.2 and 33.4 ± 13.6 years, respectively. About 86.5% of the study participants were married and one third of the subjects were illiterates. Majority (85.2%) of the females were home makers and males (56.4%) were unskilled and semi skilled workers.

Among the study population (n=252), 198 (78.6%) were sputum positive for Acid fast bacilli (AFB), 42 (16.7%) were sputum negative and 12 (4.7%) cases were extra pulmonary tuberculosis cases. Regarding the categories of treatment, majority 212 (84.2%) were on category 1 and 40 (15.8%) were on category 2.

Table 1: Gender wise distribution of sputum status and treatment category in Tubercular patients

Variable	Category of the variable	Males (n=170)	Females (n=82)	Total (n=252)
Sputum status	Positive	136 (80%)	62 (75.6%)	198 (78.6%)
	Negative	25 (14.7%)	17 (20.8%)	42 (16.7%)
	Extra Pulmonary	09 (5.3%)	03 (3.6%)	12 (4.7%)
Treatment Category	1	145 (85.3%)	67 (81.7%)	212 (84.2%)
	2	25 (14.7%)	15 (18.3%)	40 (15.8%)

Based on the above mentioned diagnostic criteria, the overall prevalence of diabetes among TB patients was found to be 30.6% (n=77). The prevalence was found to be more in males (78%) when compared to females (22%). Out of the 77 patients of diabetes + tuberculosis, 17 (22.2%) were already diagnosed cases of diabetes mellitus and 60 (77.8%) were newly diagnosed. About 12.5% (n=31) had impaired glucose tolerance (FBS between 110-126 mg/dl).

Table 2: Prevalence of Diabetes mellitus among Tubercular patients

Variables	Number (Percentage)
Total no of study participants	252 (100)
Total no of TB patients diagnosed of having Diabetes mellitus (FBS ≥ 126 mg/dl)	77 (30.6)
Newly diagnosed Diabetes cases	60 (77.8)
No of TB patients already diagnosed with diabetes mellitus	17 (22.2)
No of TB patients with impaired glucose tolerance (FBS between 110-126 mg/dl)	31 (12.5)

Out of the 77 tubercular patients with diabetes, 58 (75.3%) patients were males and 19 (24.7%) were females. Among the total 77 diabetic-tubercular patients, 52 (67.5%) were sputum positive and 25 (32.5%) were sputum negative.

Table No 3: Comparison of study characteristics among TB patients with diabetes and non diabetes

	TB + Diabetes	TB & Non diabetes	p value
Age (years)	46.5±10.3	35.8±11.7	<0.001
BMI (kg/m^2)	20.6±4.3	18.2±2.4	<0.001
Waist circumference (cm)			
Men	73.2±9.6	71.3±10.8	0.18
Women	74.8±10.3	73.1±9.4	0.2
Blood Pressure (mm Hg)			
Systolic	108.4±10	116±11	<0.001
Diastolic	74.7±9	75.2±11	0.7
Treatment Category			
1	58	154	0.01
2	19	21	

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Univariate analysis of factors associated with Diabetes among TB patients showed that increasing age, Body Mass Index (BMI), systolic blood pressure and category of TB treatment were significantly associated with diabetes among TB patients ($p<0.05$).

The BMI of the TB patients with diabetes was higher when compared to the TB patients without diabetes (20.6±4.3 vs 18.2±2.4).

Waist circumference also was comparatively more among TB patients with diabetes when compared to non diabetic TB patients but this difference was not statistically significant ($p>0.05$).

Discussion:

The association between Diabetes mellitus and TB is well documented and there is substantial evidence to support the fact that diabetes is an important risk factor for TB [9] and conversely it is also possible that TB can induce glucose intolerance and also deteriorate glycemic control in subjects with diabetes [10].

In the present study, the overall prevalence of Diabetes mellitus among TB patients was found to be 30.6%. Similar results were found in a study done by Bhupendra Kumar et al [11] in a tertiary care hospital in central India where prevalence was 32.2% and in Raghuraman S et al [12] study done in Pondicherry, the prevalence of diabetes in TB patients was found to be 29%.

In contrast to the above findings, another study done in Nigeria by Oliyanka et al [13] found the prevalence to be 5.7% which could be attributed to difference in demographic characteristics.

With regards to the factors associated with diabetes among Tubercular patients, present study found that as in general population, increasing age, higher BMI values and systolic blood pressure were significantly associated whereas waist circumference did not showed any significant correlation. A study done by Viswanathan et al [14] on prevalence of risk factors in TB patients in Tamil Nadu observed that age, BMI, positive family history of DM and sedentary occupation were the common risk factors associated with diabetes among TB patients

Similar study by Raghuraman S et al [12] found that age, family history, and current alcohol consumption were found to be independent risk factors for diabetes in TB patients in the binary logistic regression analysis. BMI, waist circumference, category of treatment and sputum positivity had no significant association.

Conclusions:

Present study found a prevalence of 30.6% diabetes mellitus among Tubercular patients. With demographic transition & triple burden of communicable and non communicable diseases and increasing life expectancy in India with subsequent increase in elderly population, the incidence and prevalence of diabetes will raise rapidly. Routine screening of TB patients with Diabetes would enable to detect at early stages and will help to implement prevention strategies early and effectively. Effective management of both diseases would lead to improve the treatment outcome.

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