A STUDY ON PREVALENCE OF DIABETES AND PRE-DIABETES IN A NEWLY DIAGNOSED TUBERCULOSIS PATIENTS

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ABSTRACT

BACKGROUND

India is a country with high prevalence of both Diabetes Mellitus and Tuberculosis. In view of the increased prevalence of Diabetes among tuberculosis patients, Diabetes is considered as a risk factor for TB. In addition to this Diabetes influences, the presentation and treatment outcome of Tuberculosis patient. A good control of Diabetes is essential for a better treatment outcome in TB patients.

The aim of this study is to study the prevalence of Diabetes and Pre-Diabetes among newly diagnosed TB patients and to study the impact of Diabetes on tuberculosis presentation among the same group of patients.

MATERIALS AND METHODS

132 patients who were diagnosed as TB positive were screened for Diabetes by history of Diabetes, FBS, OGTT and by HbA1C, based on which they were classified into 3 groups namely Non-Diabetic (Non-DMTB), Pre-Diabetic (Pre-DMTB) and Diabetic (DMTB). The prevalence of DM and Pre-DM were calculated. Parameters like Age, Sex, family history of DM, presentation as Pulmonary TB, High Sputum Positivity (3+) and Radiological presentation are compared among the 3 groups.

RESULTS

The prevalence of diabetes and pre-diabetes among TB patients were 38.6% and 18.9% respectively. The male:female ratio is significantly high in diabetic and pre-diabetic TB patients when compared with non-diabetic TB patients (80.4:19.6, 88:12 vs. 51.8:48.2). The mean age is significantly high in both DMTB and Pre-DMTB patients (52.92, 45.4 vs. 35.33). Family history of DM is significantly high among DMTB patients. DMTB patients presents predominantly with pulmonary tuberculosis and high sputum positivity (3+). The radiological presentation in DM TB patients are as increased presentation of bilateral disease and cavity formation.

CONCLUSION

There is a high prevalence of DM and pre-DM among newly diagnosed TB patients. Male sex, increasing age and family history of DM are risk factors. The radiological presentation also differ in tuberculosis patients with diabetes.

KEYWORDS

Diabetes Mellitus, Pre-Diabetes, Pulmonary Tuberculosis, Sputum Positivity.

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BACKGROUND

People with a weak immune system as a result of chronic diseases such as diabetes are at a higher risk of progressing from latent to active TB. People with diabetes have a higher risk of TB compared to people without diabetes. Early detection can help improve care and control of both diabetes and tuberculosis. WHO and International Union against TB and Lung disease recommends all people with TB should be screened for diabetes and Screening for TB in people with diabetes should be considered, particularly in settings with high TB prevalence. People with diabetes who are diagnosed with TB have a higher risk of death during TB treatment and of TB relapse after treatment. WHO recommended treatments should be rigorously implemented for people with

TB/diabetes. Diabetes is complicated by the presence of infectious diseases including TB. It is important that proper care for diabetes is provided to those that are suffering from TB/diabetes. This study aims at screening for the prevalence of DM among newly diagnosed TB patients.

MATERIALS AND METHODS

The patients of age group between 15 and 85 years who are diagnosed to have Tuberculosis in The Department of Thoracic Medicine, Chengalpattu Medical College, during the period from October 2013 to September 2014 were included in the study. Patients who were already known cases of TB, defaulters, failures and relapses after ATT are not included in the study. Patients who are terminally ill, HIV positive patients and patients who are not willing to give consent are not included in the study.

After obtaining the informed consent from the patients they were asked for history of Diabetes Mellitus, family history of DM among family members (father, mother and siblings). Their glycaemic status was tested using their FBS and an OGTT using 75 gm glucose. Their HbA1C was also tested by HPLC method.

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The following were considered as Diabetic Patients

1. Patients who are already diagnosed as DM who are on treatment for it.
2. FBS > 125 mg%.
3. 2 hrs. post glucose plasma glucose > 199 mg%.
4. HbA1C > 6.4%.

The Diagnosis of Pre-Diabetes was Made on the following Criteria

1. FBS $\geq$ 100 mg% and < 126 mg% - IFG.
2. 2 hrs. post glucose plasma glucose > 140 mg% and < 200 mg%.
3. HbA1C > 5.8% to 6.4%.

The TB patients are classified as diabetic, pre-diabetic and non-diabetic groups and the parameters are compared. The mean value of each parameter among the diabetic and pre-diabetic groups are compared with that of non-diabetic group using Chi square test and tested for statistical significance.

RESULTS

Of the total 132 eligible patients who were included in the study, 51 were diabetic, 25 were pre-diabetic and 56 were non-diabetic.

	Total	Diabetic	Pre-Diabetic	Non-Diabetic
Number of Patients	132	51	25	56
Male	92	41	22	29
Female	40	10	3	27
Age range (yrs.)	14-71	25-70	19-71	14-65
Pulmonary TB	96	41	20	35
Sputum 3 +	18	13	2	3
Sputum 2 +	24	9	5	10
Sputum 1 +	30	13	11	6
Sputum Scanty	09	3	1	5
Sputum Negative	15	3	1	11
Extra Pulmonary	36	10	5	21
Pleural Effusion	23	5	3	15
Right Sided	19	5	3	11
Left Sided	04	0	0	4
Abdominal TB	04	3	1	0
Mastitis	01	1	0	0
Skeletal TB	01	0	1	0
Lymphadenopathy	07	1	0	6

Table 1. Patient Profile

	Diabetic	Non-Diabetic	P Value
Male : Female	80.4 : 19.6	51.8 : 48.2	0.0018
Mean Age	52.92 $\pm$ 10.7	35.33 $\pm$ 14.29	0.0001
Positive Family H/O	54.9%	1.8%	0
Pulmonary TB	80.4%	62.5%	0.0415
High Positive Sputum	30.9%	8.8%	0.018
Bilateral Involvement	29/51	15/56	0.0015
Lower zone involvement	6/51	6/56	0.86
Cavity formation	9/51	3/56	0.044
Military mottling	5/51	1/56	0.071

Table 2. Diabetic Vs. Non-Diabetic TB Patients

	Pre-Diabetic	Non-Diabetic	P Value
Male : Female	88 : 12	51.8 : 48.2	0.0018
Mean age	45.4 $\pm$ 16.8	35.33 $\pm$ 14.29	0.0069
Positive family H/O	12%	1.8%	0.63
Pulmonary TB	80%	62.5%	0.12
High positive sputum	13.3%	8.8%	0.063
Bilateral involvement	13/25	15/56	0.02
Lower zone involvement	2/25	6/56	0.7052
Cavity formation	5/25	3/56	0.4130
Military mottling	1/25	1/56	0.55

Table 3. Pre-Diabetes Vs. Non-Diabetes**DISCUSSION****Prevalence****Diabetes Mellitus (DM)**

The prevalence of DM among the newly diagnosed TB patients in our study was 38.6%. Of this, 25.75% were previously known cases of DM and about 12.75% of patients were newly diagnosed DM. This prevalence is very high when compared with the 13% of the nationwide pilot project.¹ The prevalence of DM among TB patients in various other studies conducted in various other parts of India are -

Studies	Prevalence
Viswanathan et al ²	25.3%
Balakrishnan et al ³	44%
Nair et al ⁴	32.4%
Mansuri et al ⁵	15.3%
Sounderajan et al ⁶	29%

Pre-Diabetes (Pre-DM)

The prevalence of Pre-DM among the newly diagnosed TB patients in our study was 18.9%. Of this 1.5% were IFG, 3.8% were IGT and 13.6% were both IFG and IGT. The prevalence of Pre-DM among the TB patients in the study by Viswanathan et al² in the same geographical area was 24.5%.

Sex

The male-to-female ratio in the DMTB patients was 80.4:19.6. This was significantly high (P = 0.0018) when compared with the Non-DM TB patients ratio of 51.8:48.2.

The ratio in pre-DM TB patients 88:12 was also significantly high (P = 0.0018) when compared with the non-diabetic TB patients.

The prevalence among the males was significantly higher (44.56%) when compared with that of the females (25%). This is similar to the studies conducted by Viswanathan et al² and Balakrishnan et al.³

Age

The mean age of the DM TB patients in our study was 52.92 years and the mean age of the pre-DM TB patients was 45.4 yrs. Both are significantly high (P = 0.0001 and 0.0069 respectively) when compared with that of the non-DM TB patients.

The mean age of DMTB patients in study by Viswanathan et al² was 49.3 yrs. and by Mansuri et al⁵ was 46.8 yrs. In both the studies, the age of DMTB patients was significantly high when compared with that of Non-DMTB patients.

Age > 50 yrs. is a risk factor for DM among TB patients in Balakrishnan et al³ and Nair et al.⁴ In our study about 76.47% of DMTB patients were of age > 50 yrs.

Family History of DM

The history of DM among one or more family members (father, mother or siblings) is significantly high among the DMTB patients (54.9%; $p = 0$) in the studies by Viswanathan et al² and Sounderajan et al⁶ have confirmed that family history as a risk factor for DM among TB patients. The family history of DM is not significantly high among pre-DMTB patients ($P = 0.63$).

Pulmonary Vs. Extrapulmonary TB Patients

There is an increased presentation of pulmonary TB among the DMTB patients when compared with non-DMTB patients (80.4% Vs. 62.5%; $P = 0.0415$). There is no such statistically significant increased presentation of pulmonary TB in the Pre-DMTB group of patients ($P = 0.12$).

High Positive Sputum

The pulmonary TB patients were classified as,

1. High Sputum positivity – Sputum 3+.
 2. Low sputum positivity – Sputum 2+, 1+ Scanty, negative.
- The DMTB patients have significantly high ($p = 0.018$) presentation of high sputum positivity (30.9%) when compared with the Non-DMTB patients. There is no such significant ($P = 0.63$) high sputum positivity among the pre-DMTB patients. The study by Singla et al⁷ have also shown an increased presentation of (65.2%) high sputum positivity among the DMTB patients.

Radiological Presentation

The DMTB patients and Pre-DMTB patients have a significantly high bilateral lung involvement when compared with non-DMTB patients ($P = 0.0015$, 0.02 respectively). The DMTB patients have more tendency to form cavity when compared with non-DMTB patients. The 3 groups does not show any difference on lower zone involvement. Military mottling though more common among the DMTB and Pre-DMTB patients does not attain statistical significance.

Study by Tartar et al⁸ also showed an increased tendency of DMTB patients to form cavity. Study by Qazi M. A., Sharif N., Warraich M. M. et al⁹ also showed increased cavity formation, bilateral involvement and atypical location. These findings were consistent with those of Zuber et al.¹⁰ These findings were similar to Shaikh et al,¹¹ while Saulat et al¹² and Bacakoglu et al¹³ found higher number of patients affected with cavitary lung involvement.

CONCLUSION

The prevalence of diabetes and pre-diabetes among the newly diagnosed DM patients are 38.6% and 18.9% respectively.

Male sex and age are risk factors for diabetes among TB patients. Family history of diabetes is also a risk factor for diabetes. Diabetic TB patients have significantly high pulmonary involvement, bacillary load, bilateral involvement and cavity formation. Lower zone involvement and cavity military mottling does not show any significant difference.

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