

A Study to Assess Prevalence and Clinical Profile of Diabetic Pulmonary Tuberculosis Patients Treated Under RNTCP



Medical Science

KEYWORDS : Diabetes; Tuberculosis; Clinical Profile.

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ABSTRACT

INTRODUCTION:- Tuberculosis has been a major cause of suffering and death since time immemorial. Thought to be one of the oldest human diseases, the history of tuberculosis is at least as old as the mankind. People with diabetes have 2-3 times higher risk of TB compared to people without diabetes. About 10% of TB cases globally are linked to diabetes. Management of Tuberculosis becomes a bit difficult with diabetes as a comorbid condition as poor glycemic control. Hence therefore we have planned this study to assess prevalence and clinical profile of diabetic pulmonary tuberculosis patients treated under RNTCP.

AIMS and OBJECTIVES:- 1. To find out Prevalence of Diabetes mellitus among Tuberculosis patients registered under RNTCP.
2. To Assess Clinical Profile of Diabetic Pulmonary Tuberculosis Patients Treated Under RNTCP.

MATERIALS AND METHODS: This study was conducted in The Department of Respiratory Medicine, JLN Medical College, Ajmer from 1st January 2012 to 31st December 2012.

RESULTS:- Most of the patients were between 31 to 60 years (75.01%) and maximum (39.30%) in 41 to 50 years. There is an overall male predominance with male female ratio 2.1:1. The prevalence of diabetes mellitus among patients of tuberculosis was 7.356. Type-2 diabetes mellitus was present in 94.05% patients. No clear association between duration of diabetes and radiological extent of disease was present.

INTRODUCTION

Tuberculosis has been a major cause of suffering and death since time immemorial. Thought to be one of the oldest human diseases, the history of tuberculosis is at least as old as the mankind¹. In 1993 WHO declared Tuberculosis is a global emergency, saying the disease will claim more than 30 million lives in the next decade unless action is taken now. Manager WHO Tuberculosis program, Arati Kochi, state that Tuberculosis today is greater killer, and it is out of control in many parts of world. The disease preventable and treatable has been grossly neglected and no country immune to it^{2,3}. According to WHO Global TB Report 2012 Indian led the largest number of tuberculosis cases (about 2-2.5 million)³. People with a weak immune system, as a result of chronic diseases such as diabetes, are at an increased risk of progressing from latent to active TB. People with diabetes have 2-3 times higher risk of TB compared to people without diabetes. About 10% of TB cases globally are linked to diabetes⁴. In sep. 2011, WHO estimated that 350 million people were living with diabetes. Diabetes prevalence is similar in both high and low income countries and over 80% of deaths occur in low and middle income countries. It is predicted that global diabetes prevalence will increase by 50% by 2030⁵ and 80% of prevalent cases will occur in the developing world⁶. Lately World Health Organisation also recognised this potential time bomb and accordingly has published a vision document to undertake future research in this direction to have sufficient data base to formulate effective strategies to check this seemingly contains booming large catastrophic on mankind³. There is insufficient data in Rajasthan on this subject hence therefore we have planned this study to assess prevalence and clinical profile of diabetic pulmonary tuberculosis patients treated under RNTCP.

AIMS AND OBJECTIVE

1. To find out Prevalence of Diabetes mellitus among Tuberculosis patients registered under RNTCP.
2. To Assess Clinical Profile of Diabetic Pulmonary Tuberculosis Patients Treated Under RNTCP.

MATERIAL AND METHODS

This study was conducted in The Department of Respiratory Medicine, JLN Medical College, Ajmer from 1st January 2012 to 31st December 2012.

All Diabetic Patients registered under all categories of RNTCP - Category-I, Category-II and DOTS plus (Category IV) were included in this study who were admitted in the department.

Diagnosis of Tuberculosis was based upon demonstration of Acid Fast Bacilli in sputum microscopy, Mycobacterial culture, Fine Needle Aspiration Cytology, Bronchoscopic brushings or lavage. Patients with radiologic features suggestive of tuberculosis in case of abdominal tuberculosis or Bone tuberculosis (USG, CT, or X-ray of Bone, Barium study) have been considered as a case of tuberculosis.

Fasting and 2 hour post-parandial blood glucose have been measured in all patients. In known diabetic patients, an additional HbA1c were measured. Glucose tolerance test would do to diagnose latent diabetics and pre diabetics.

All these patients have been followed up at the time of RNTCP protocol with fasting blood sugar, HbA_{1c}. Sputum examination and Radiographic examinations were done as per RNTCP protocols.

The clinical and radiological assessment were regularly assessed and recorded till the completion of intensive phase.

Mycobacterial Culture and Sensitivity done by Line Probe Assay and on Lowenstein Jensen media at State Tuberculosis and Demonstration Centre (IRL) Ajmer.

Statistical assessment done by "PRIMER STATISTICAL SOFTWARE VERSION-6".

RESULTS

Table 1 shows Age and Sex distribution in case and control group. From above table it is clear that majority of cases (n=63, 75.01%) were between 31 to 60 years of age, the maximum number 33(39.30%) being in the age 41 to 50 years in study population. In case group male 57 (67.90%) seen more frequently in as compared to female 27 (32.10%) and in control group male 60 (74.07%) were more than female 21 (25.93%) which were almost same in both group. Mean age in case group is 49.33 years and in control group 40 years. Male to Female ratio was 2.1:1 in case group and in control group 2.85:1.

79 (94.05%) cases were type 2 Diabetes Mellitus and only 5 (5.95%) cases were type 1 Diabetes Mellitus. (Table 2)

84 Diabetic patients, 23 (27.38%) patients are newly diagnosed cases of Diabetes Mellitus and remaining 61 (72.62%) patients were previously known cases of Diabetes Mellitus who had tuberculosis.(Table 3), almost similar proportion of pulmonary and extra pulmonary tuberculosis in case and control group. P value by Fisher's exact test is >0.05 which is statistically not significant. (Table 4)

In type 1 Diabetes Mellitus 3 (75%) cases were smear positive and 1(25%) case was smear negative and in type 2 Diabetes Mellitus 46 (65.71%) cases were smear positive and 24 (34.29%) were smear negative. Smear status at the time of diagnosis was not statistically significant (P value, >0.05). (Table 5)

In case group and control group cough, expectoration and breathlessness were present in 77(95.06), 72(88.88%), 74(91.35%) and 72(89%), 66(81.48%), 62(76.54%) respectively. Haemoptysis and chest pain are less common in case group 12(14.81%) and 23(28.39%) respectively. (Table 6)

The typical symptoms of Polyurea and Polydipsia were present in almost one third of cases in case (DM-TB) group which suggest that these are not always the symptoms suggestive of Diabetes Mellitus in Tuberculosis patients. Weight loss was more commonly observed in control group (n=53, 65.43%) than in case group (n=36, 42.86%). (Table 7)

Only 1 patient had Ketoacidosis like complication in case group otherwise in control and case group no co-morbid condition were observed. (Table 8)

Above table shows comparisons radiological pattern in type 1 and type 2 Diabetes Mellitus. Almost similar proportion of cavity lesions were found in 3(60%) patients of type 1 Diabetes Mellitus and 45(59%) patients of type 2 Diabetes Mellitus. Inhomogenous opacities were found in 2(40%) and 42(55.70%) patients of type 1 and type 2 Diabetes Mellitus respectively. In type 1 and type 2 Diabetes Mellitus radiological pattern of lesions are almost same and are not statistically significantly (p value = >0.05). (Table 9)

DISCUSSION

The present case control study was carried out in the Department of Respiratory Medicine, JLN Medical College, Ajmer. 165 cases were treated both in case group (DM-TB) and control group (TB without DM). Their demographic profile, sputum smears at time of diagnosis and follow-up along with skiagram chest, other relative haematological and biochemistry investigations along with HB1c.

About 10% of TB cases globally are linked to diabetes. People with diabetes have a 2-3 times increased risks of TB compare to people without Diabetes. Weak immune systems, as a result of chronic diseases such as diabetes, are at a higher risk of progressing from latent to active TB. A large proportion of people

with diabetes as well as TB is not diagnosed, or is diagnosed too late. Early detection can help improve care and control of both¹.The most recent estimates of the global burden of diabetes mellitus (DM) come from the 2011 Diabetes Atlas of the International Diabetes Federation. Diabetes has been shown to be an independent risk factor for tuberculosis in community based study from South India and multiple studies globally⁶. Mona Bashar et al (1987-1997), in their study of 50 cases suggested that Diabetic are more susceptible to have a more aggressive course of tuberculosis diseases possibly due to impaired GI drug absorption even in the absence of clinalical gastroparesis. Most of the patients were between 31 to 60 years (75.01%) and maximum (39.30%) in 41 to 50 years. There is an overall male predominance with male female ratio 2.1:1. The prevalence of diabetes mellitus among patients of tuberculosis was 7.356. Type-2 diabetes mellitus was present in 94.05% patients.

Deshmukh P. A. et al (1984) suggested that prevalence of diabetes was 5.6% (n138) in 2434 cases of pulmonary tuberculosis and it increase with age⁷. Ponce de leon et al suggested in his study from march 1995 to march 2003 at Mexico suggested that in 581 patients with mycobacterium tuberculosis were diagnosed with culture and fingerprint, in which 29.6% diagnosed previously were with Diabetes, the estimated prevalence of diabetes in the study area was 5.3% and the rate of tuberculosis was increase 6.8 fold (95% CI 5.7-8.2, P<0.0001)⁸.In the present study 88.10% of the patients were having pulmonary tuberculosis (new=52.38%, relapse=14.29%, multidrug-resistant=21.43%) and rest 11.90% cases were extra-pulmonary tuberculosis (pleural effusion=8.33%, Lymphadenopathy=1.19, Pyopneumothorax=1.19%, pericardial effusion=1.19%). A study by Catherine R Stevenson et al (2007) showed that in India 18.4%(12.5% to 29.9%) of people with pulmonary TB (both smear positive and smear negative) have diabetes, and that in smear positive group diabetes prevalence is 23.5%(12.1% to 44%)⁹. Mullen and Higgins (1961) observed 4.2% prevalence of diabetes in 118 tuberculosis patients in a tuberculosis sanatorium in Alberta, Canada¹⁰. Blum and Atagun (1963) reported 3.84% prevalence of diabetes in 2342 tuberculosis patients from January 1953 to December 1960 at Baltimore city hospital¹⁰. According to WHO about 10% of TB cases globally are linked to diabetes⁴. According to TB India 2012 diabetes accounts for 14.8% of all tuberculosis and 20.8% of smear-positive TB⁵. Maria Eugenia Jimenez Corona et al (2012) observed in his study of patients with tuberculosis in Southern Mexico from 1995 to 2010 showed the prevalence of DM among 1262 patients with pulmonary TB was 29.63% (n=374)¹¹.

Nissapatorn V et al observed in his study from January 2001 to December 2002 showed that TB-DM patients had a higher ratio of male to female (69.3% v/s 30.7% respectively) than TB group(65% v/s 35% respectively). Qazi M. A. et al reported in this study at B. V. Hospital Bahawalpur from January 2004 to December 2006 in 150 pt's with DM [both type 1(11.33% pt's) and type 2(88.67% pt's)] and PTB. In this study 105 were male (70%) and 45 females (30%) and mean age 49.81 (18 to 75) years. The common respiratory symptoms were Cough (95.06%), Expectoration (88.88%), and Breathlessness (91.35%). Fever (76.19%), Weight loss (42.86%), Decrease Appetite (42.86%), Weakness (33.33%), Polyurea (33.33%) and Polydipsia (34.52%) were the other common constitutional symptoms. Qazi M. A. et al reported diagnosis on the basis of AFB staining was in 90% pt's with symptoms as follows Fever 150(100%), Cough 150(100%), productive cough 71(47.3%), dry cough 79(52.7%), weight loss 105(70%), haemoptysis 29(19.3%), Breathlessness 22(14.7%) and Mantoux test was positive in 110 pt's(73.33%) . All pt's had chest x-ray. Out of 150 films, in 84(56%) right lung was involved, in 39(26%) left lung and bilateral lesion found in 27(18%).¹² At the time of diagnosis 66.22% patients (n=49) were sputum positive and 33.78% patients (n=25) were sputum negative. After the

completion of intensive phase 62.16% patients (n=46) had smear converted and 5.41% patients (n=4) remain sputum positive. 32.43% patients (n=24) were those who were either expired, not completed intensive phase, had interrupted treatment or could not be traced. The radiographic pattern was statistically not significant in type 1 and type 2 diabetes mellitus (p=>0.05).Perez-Guzman C et al (2001) observed in this study that TBDM pt's developed cavitations more than TB pt's (82% v/s 59%). Cavitations more often in lower lung fields in TBDM compare to TB group (29% v/s 3%). More multiple cavities were seen in TBDM pt's than TB pt's (25% v/s 2%)¹³.

Conclusion:

Diabetes and tuberculosis are complementary to each other. Present study has shown diabetic people are more prone to develop tuberculosis along with its complications. This descriptive study directs more multi centric studies with larger sample size to validate these findings and to come out with newer data pool on tuberculosis with diabetes.

TABLES

Table No. 1

Age & sex distribution among case group (DM-TB) and control group (TB)

Age in years	Case group n=84			Control group n=81		
	Male n (%)	Female n (%)	Total	Male n (%)	Female n (%)	Total
Upto 20	1 (1.19%)	1 (1.19%)	2 (2.38%)	3 (3.70%)	6 (7.41%)	9 (11.11%)
21-30	3 (3.57%)	1 (1.19%)	4 (4.76%)	10 (12.35%)	6 (7.41%)	16 (19.76%)
31-40	11 (13.10%)	3 (3.57%)	14 (16.67%)	13 (16.05%)	6 (7.41%)	19 (23.46%)
41-50	22 (26.20%)	11 (13.10%)	33 (39.30%)	20 (24.70%)	2 (2.46%)	22 (27.16%)
51-60	7 (8.33%)	9 (10.71%)	16 (19.04%)	6 (7.41%)	1 (1.23%)	7 (8.64%)
61-70	9 (10.71%)	1 (1.19%)	10 (11.90%)	7 (8.64%)	0	7 (8.64%)
>70	4 (4.76%)	1 (1.19%)	5 (5.95%)	1 (1.23%)	0	1 (1.23%)
Total	57(67.90%)	27 (32.10%)	84(100%)	60 (74.07%)	21 (25.93%)	81(100%)

Table No. 2

Distribution of types of Diabetes Mellitus among case group (DM-TB)

Type of Diabetes Mellitus	Total no. of cases, n=81	%
Type 1 Diabetes Mellitus	5	5.95 %
Type 2 Diabetes Mellitus	79	94.05 %
Total	84	100

Table No. 3

Newly diagnosed versus known case of Diabetes mellitus

Type of diagnosis Diabetes Mellitus	N	%
Newly diagnosed Diabetes Mellitus	23	27.38%
Known case of Diabetes Mellitus	61	72.62%
Total	84	100 %

Table No. 4

Type of tuberculosis among case group (DM-TB) and control group (TB)

Type of tuberculosis	Case group n =84	Control group n =81	p value
Pulmonary tuberculosis	Newly diagnosed	44 (52.38%)	44 (54.32%)
	Relapse	12 (14.29%)	12 (14.81%)
	Multidrug-resistant	18 (21.43%)	15 (18.52%)
	Total	74 (88.10%)	71 (87.65%)
Extra pulmonary tuberculosis	10 (11.90%)	10 (12.35%)	>0.05
Total	84	81	

Table No. 5

Type of Diabetes Mellitus and smear status at the time of diagnosis in pulmonary tuberculosis

Smear status at time of diagnosis	Type 1 Diabetes Mellitus	Type 2 Diabetes Mellitus	Total	P value
Smear positive (n=46)	3 (75%)	46 (65.71%)	49 (66.22%)	>0.05
Smear negative (n=25)	1 (25%)	24 (34.29%)	25 (33.78%)	
Total	4	70	74	

Table No. 6

Respiratory Symptoms comparison in case group (DM-TB) and control group (TB)

Symptoms	Case group n (%)	Control group n (%)
Cough	77 (91.66%)	72 (89%)
Expectoration	72 (85.71%)	66 (81.48%)
Breathlessness	74 (88.09%)	62 (76.54%)
Chest pain	23 (27.38%)	40 (49.38%)
Haemoptysis	12 (14.28%)	22 (27.16%)

Table No. 7

Other constitutional symptoms comparison in case group (DM-TB) and control group (TB)

Symptoms	Case group n=84	Control group n=81
Fever	64 (76.19%)	69 (85.18%)
Weight loss	36 (42.86%)	53 (65.43%)
Polyurea	28 (33.33%)	3 (3.70%)
Polydypsia	29 (34.52%)	3 (3.70%)
Polyphagia	6 (7.14%)	0
Appetite decrease	36 (42.86%)	70 (86.42%)
Oral thrush	2 (2.38%)	0
Sore throat	1 (1.19%)	0
Numbness of feet	1 (1.19%)	0
Weakness	28 (33.33%)	33 (40.74%)
Burning micturition	0	0
Joint pain	0	0
Constipation	0	0

Table No. 8

Associated co-morbid conditions in case group (DM-TB) and control group (TB)

Co-morbid conditions	Case group n=84	Control group n=81
Renal failure	0	0
Neuropathy	0	0
Ophthalmologic complication	0	0
Ketoacidosis	1	0
Cardiovascular complication	0	0
HIV	0	0

Table No. 9
Type of Diabetes Mellitus and radiographic patterns

Radiological pattern	Type 1 Diabetes Mellitus n=5	Type 2 Diabetes Mellitus n=79	p value
Cavitary disease	3 (60%)	45 (56.96%)	>0.05
In-homogenous opacities	2 (40%)	42 (53.16%)	>0.05
Pleural effusion	0 (0%)	7 (8.86%)	>0.05
Lymphadenopathy (Hilar/Mediastinal/Cervical)	0 (0%)	1 (1.26%)	>0.05
Pyo/hydro-pneumothorax	0 (0%)	1 (1.26%)	>0.05
Pericardial effusion	0 (0%)	1 (1.26%)	>0.05
Combinations	4 (80%)	57 (72.15%)	>0.05

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