



Original Research Article

CLINICO-SOCIAL FACTORS ASSOCIATED WITH TUBERCULOSIS AND DIABETES MELLITUS COMORBIDITY IN SOUTH INDIA – A CASE- CONTROL STUDY

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ABSTRACT

Background: Despite control strategies, tuberculosis remains a significant public health problem in many countries. Along with effective control measures currently available, it is essential to identify and target the risk factors of developing active TB to tackle the heavy burden of the disease. This study aims to find out the association of clinical and social factors with Tuberculosis and Diabetes mellitus co-morbidity.

Materials and Methods: A case-control study was done to assess the association of clinical and social factors with Tuberculosis and Diabetes mellitus co-morbidity. The study was done from a parent study conducted in South India to study the prevalence of diabetes mellitus among registered tuberculosis patients. Those patients diagnosed with both tuberculosis and diabetes mellitus were taken as cases, and those patients with tuberculosis without diabetes mellitus were taken as controls. Cases and controls were above the age of 15 years. The calculated sample size was 115:345, as there were only 92 cases in the parent study. All were taken. Social factors like age, gender, occupation, and socio-economic status, as well as clinical factors like various symptoms, symptom score, type of tuberculosis, category, and treatment outcome, were studied in this study. Data was coded in Excel and analyzed using SPSS version 16. Chi-square analysis was done to find out the association and odd's ratio.

Results: There was a significant difference in age between cases and controls. All symptoms are significantly higher (Chi-square 27.6p-0.0001) among those who have tuberculosis and diabetes co-morbidity when considering each symptom separately. Extrapulmonary tuberculosis was found more among controls. In this study, it was found that relapse and treatment after default were significantly higher among cases(Chi square 23.4 p-0.000034).

Conclusion: A significant difference was found among TB patients with DM as co-morbidity when compared with patients without DM. Uncontrolled diabetes will be one challenge for TB elimination. Hence, periodic screening is necessary to find out DM and the proper measures to be followed to control.

Keywords: Diabetes co-morbidity, Symptom score, treatment outcome.

INTRODUCTION

Tuberculosis (TB) is the second leading cause of death from an infectious disease next to Human Immuno-deficiency Virus (HIV) infection.^[1] Despite

control strategies, tuberculosis remains a significant public health problem in many countries. Along with effective control measures currently available, it is essential to identify and target the risk factors of developing active TB to tackle the heavy burden of

the disease. Diabetes mellitus (DM) is a clinically and genetically heterogeneous group of disorders with one common feature, i.e., abnormally high levels of glucose in the blood either due to insulin deficiency or resistance of the body's cells to the action of insulin. DM reduces immunity and has long-term complications that affect all vital organs of the body. It was a well-known risk factor for TB in the past, but this was largely forgotten during the second half of the 20th century because of widely available treatments for both diseases.^[2,3] According to a recent meta-analysis, people with diabetes have three times the risk of contracting TB as compared to non-diabetics,^[7] and studies report the fraction of TB cases attributable to diabetes to be between 15% and 25%.^[8] The biological basis for the association between both diseases is that diabetes decreases the immune response, which in turn facilitates TB infection and progression to symptomatic disease. Active detection of diabetes amongst TB patients may provide an opportunity to identify previously undiagnosed diabetes, offer optimum diabetic care and, improve the outcomes of TB treatment and prevent the relapse of TB. The studies in this area are limited. Hence, this study aims to find out the association of clinical and social factors with Tuberculosis and Diabetes mellitus co-morbidity.

MATERIAL AND METHODS

A case-control study was done to assess the association of clinical and social factors with Tuberculosis and Diabetes mellitus co-morbidity. The study was done from a parent study conducted in South India to study the prevalence of diabetes mellitus among registered tuberculosis patients. This was conducted in three primary health centres (PHC) - Handignoor, Vantamuri, Kinaye and three urban health centres (UHC)- Ram Nagar, Asok Nagar, Rukmini Nagar, which are the field practice areas of the Department of Community Medicine, Jawaharlal Nehru Medical College, Belgaum and in RNTCP unit, Government District Hospital Belgaum. RNTCP registers maintained at the Primary Health Centres, Urban Health Centres and Government District Hospital were used to identify tuberculosis patients. Those patients diagnosed with both tuberculosis and diabetes mellitus were taken as cases, and those patients with tuberculosis without diabetes mellitus were taken as controls. Cases and controls were above the age of 15 years. Since the association of social factors was studied, no matching was done in this study. Screening for diabetes was done by estimating the fasting blood glucose (FBS) using a capillary method and a glucometer and strips. Those showing an FBS value of ≥ 110 were subjected to an Oral Glucose Tolerance Test (OGTT). Diagnosis of diabetes was made based on WHO criteria 77 (2 hr plasma glucose ≥ 200 mg/dl after 75 grams of oral glucose load). Pregnant women to exclude possible

gestational diabetes mellitus. The sample size was calculated using Open epi the difference in the proportion of diabetes and TB co-morbidity among normal and obese patients from the study by Rajaa, Yuvaraj Krishnamoorthy et al,^[5] assuming 80% power and 95% Confidence Interval and case-control as 1:3. Calculated sample size was 115:345, as there were only 92 cases in the parent study all were taken.

Social factors like age, gender, occupation, and socio-economic status, as well as clinical factors like various symptoms, symptom score, type of tuberculosis, category, and treatment outcome, were studied in this study. Data was coded in Excel and analyzed using SPSS version 16. A chi-square analysis was done to find out the association and odd ratio.

RESULTS

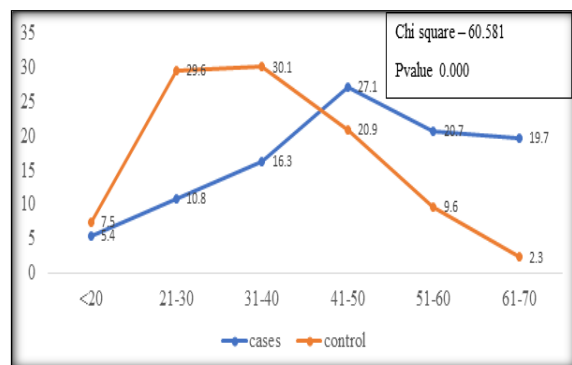


Figure 1: Comparison of different age groups in cases and controls

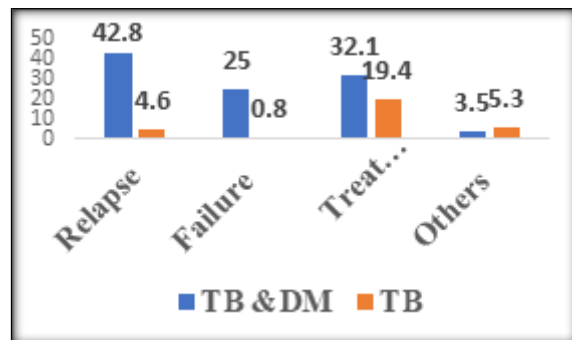


Figure 2: Type of category based on treatment in cases and control

A total of 92 cases and 345 controls were studied. There was a significant difference in age between cases and controls. The proportion of cases was above 30 years, and that of controls was below 30 years, which was statistically significant, as shown in Figure 1. Males were significantly higher among cases (chi-square 4.291; p-0.038). A significant difference was found in different occupations. Results are given in Table No. 1. There is a significantly higher proportion of semi-skilled and unskilled workers among patients with TB and DM co-morbidity (p-0.044).

Clinical symptomatology

All symptoms are significantly higher among those who have tuberculosis and diabetes co-morbidity when each symptom is considered separately. (Table no 2.) However, in tuberculosis, most of the persons present with more than one symptom. Hence, the symptom score was also considered in this study. It

was found that cases had fewer symptoms when compared with controls. Patients with TB and DM co-morbidity had significantly less number of symptoms. Extra pulmonary tuberculosis was found more among controls. (Table no 3). In this study, it was found that relapse and treatment after default were significantly higher among cases.

Table 1: Difference in other social factors in cases and control

Variable	Tuberculosis with DM Number 92 (%)	Tuberculosis without DM Number 345 (%)	Chi square pvalue
Age			
<20	5(5.4)	26(7.5)	60.581 p-0.000
21-30	10(10.8)	102(29.6)	
31-40	15(16.3)	104(30.1)	
41-50	25(27.1)	72(20.9)	
51-60	19(20.7)	33(9.6)	
61-70	18(19.7)	8(2.3)	
Gender			
Male	69(75)	219(63.4)	4.291 p-0.038
Female	23(25)	126(36.6)	
Occupation			
Professional	2(2.1)	0	12.961 p-0.044
Semi Professional	5(5.4)	8(2.3)	
Clerk	9(9.8)	26(7.5)	
Skilled	12(13.1)	48(13.8)	
Semi-skilled	19(20.7)	82(23.7)	
Unskilled	25(27.2)	64(18.8)	
Unemployed	2(2.1)	16(4.6)	
House wife	18(19.6)	101(29.3)	
Socioeconomic status			
I	1(1.1)	1(0.3)	7.421 p-0.06
II	12(13)	20(5.8)	
III	16(17.4)	82(23.7)	
IV	30(32.6)	112(32.5)	
V	33(35.9)	130(37.7)	

Table 2: Clinical symptoms in both the cases and control

Symptom	Tuberculosis		Chi square value pvalue
	With DM No(%)	Without DM No(%)	
Cough			
Present	85(92.4)	288(83.5)	4.61 p-0.032
Absent	7(7.6)	57(16.5)	
Fever			
Present	92(100)	301(87.2)	13.047 p-0.001
Absent	0	44(12.8)	
Hemoptysis			
Present	73(79.4)	220(63.7)	7.98 p-0.005
Absent	19(20.6)	125(36.3)	
Dyspnoea			
Present	47(51.1)	116(33.6)	9.47 p-0.002
Absent	45(48.9)	229(66.4)	
Night sweats			
Present	83(90.2)	258(74.7)	10.09 p-0.01
Absent	9(9.8)	87(25.3)	
Weight loss			
Present	65(70.6)	210(60.9)	2.98 p-0.084
Absent	27(29.4)	135(39.1)	
Loss of appetite			
Present	50(50.3)	268(77.6)	23.672 p-0.001
Absent	42(45.7)	77(22.4)	

Table 3: Other clinical profile among cases and control

Clinical variable	Tuberculosis		Chi square value pvalue
	With DM No (%) N-92	Without DM No (%) N 345	
Symptom score			
<4	152(44.05)	13(14.13)	27.68 p-0.0001
≥4	193(65.90)	79(85.87)	

Type of TB			
Pulmonary	83(90.2)	285(82.6)	3.162
Extra pulmonary	9(9.8)	60(17.4)	p-0.025
Sputum result			
Negative	13(14.1)	82(23.4)	
1+	8(8.6)	50(14.6)	26.580
2+	16(17.3)	92(26.8)	p-0.001
3+	53(57.6)	100(28.9)	
Scanty	2(2.2)	21(6.3)	
Category			
New	64(69.6)	253(73.3)	0.518
Old	28(30.4)	92(26.7)	p-0.47

DISCUSSION

In this study, an advanced age group was found among cases compared with controls (p 0.00), similar to a study conducted in Kerala in 2011. It was found that among those patients with TB-DM co-morbidity, the majority were in the age group of ≥ 45 years (75%). In a study by Rajaa S et al.^[5] also, there were more elderly among TB -DM co-morbidity. In this study, it was observed that the male-to-female ratio in the TB group was 1.74:1, whereas in the TB-DM group, it was 3:1; i.e., males were more affected in the TB-DM group. The findings were comparable with a study done in South India (Rajaa et al.), where the male-to-female ratio among TB-DM patients was 3.1:1 as compared to 1.53:1 among TB patients. Similarly, a study done in Bengaluru reported a higher proportion of males in the TB DM population.^[6] A Higher proportion of low socio-economic status was found among cases in the present study. Men were more likely to develop TB-DM co-morbidity compared to women, according to a systematic review by Mahteme Haile Workneh et al,^[7] according to which twenty-two studies reported that older age increased the risk of TB-DM co-morbidity. Urban residence and educational level beyond primary schooling were associated factors for TB-DM comorbid conditions.^[2] All symptoms associated with tuberculosis were significantly higher among patients with TB-DM co-morbidity except in the case of weight loss. According to Xunliang Tong et al,^[8] the TB-DM group had higher symptoms. Sputum smear positivity is lower among TB DM co-morbidity except in 3+ smears. Kelly E Dooley and Richard E Chaisson reported that active tuberculosis was found to be significantly higher in patients with diabetes mellitus.^[9] In a study by Anthonia Okeoghene Ogbera et al,^[10] published in 2015, showed a higher sputum positivity in Tb DM co-morbidity. Overall symptom scores were significantly high in patients with diabetes, which could be an indication of active tuberculosis among them. Kishore Shettihalli Gudegowda et al. reported a lower cure rate, and the incidence of death and failure was higher among patients with TB and DM.^[6] Comparable results were found in this study.

A significantly high level of treatment failure and default was found in the present study.

CONCLUSION

A significant difference was found in symptomatology, age of occurrence, gender and treatment outcome of Tuberculosis in patients who had diabetes mellitus as a co-morbidity. This will be a significant challenge in treating TB and, thus, elimination. This signifies the active control of diabetes and dietary management so that the immunity of the persons won't be compromised, which could be why TB control is affected. Regular screening should be done to detect diabetes early and manage it properly.

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