SHORT ARTICLE

Factors associated with Diabetes Mellitus among Tuberculosis Patients attending Tertiary Care Hospital in Delhi, India

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Abstract

Background: Worldwide increasing prevalence of DM may counteract the positive effects of improved curative services for TB. **Aims & Objectives:** To identify factors associated with Diabetes Mellitus among Tuberculosis Patients attending Tertiary Care Hospital in Delhi. **Material & Methods:** This study was conducted among 220 TB patients. **Results:** It was found that 16% were co-morbid. Among co-morbid patients, the age distribution skewed towards higher age groups as compared with only TB patients. Co-morbidity was higher among females (64%) as compared to males (36%). Higher percentage among Co-morbid patients (78%) belonged to lower socio-economic class compared to TB patients (58%). Statistically significant association of comorbidity was found with physical activity, dietary habits and tobacco/alcohol consumption. However, only one third of patients who were aware about DM, knew that diabetic patients are more prone to acquire TB infection. Among co-morbid cases, only 50% were aware that uncontrolled DM delays the cure of TB. Findings also suggested that the sputum conversion rate among the co-morbid patients was low compared with the only TB patients. **Conclusion:** The study concludes that counseling of patient with DM against higher risk of contracting TB and TB patients against delayed cure should be made as a part of national strategy to manage DM-TB comorbidity.

Introduction

The world is experiencing an increase in the incidence and prevalence of diabetes mellitus (DM) (1,2). Especially type 2 DM (T2DM) is emerging as most common predisposing factors for the development of active tuberculosis (TB) (3,4). India is one of the six countries projected to have the greatest DM burdens by the year 2035 (5). India accounts for the largest number of people (50.8 million) suffering from diabetes, followed by China (43.2 million) (6). Nearly 5 million people are estimated to die globally from DM each year (7).

According to International Diabetic Federation Report, 2013, India's diabetes numbers are expected to cross the 100 million mark by 2030. Globally an estimated 15–25% of annual incident TB cases are attributable to DM (8,9).

A systematic review found that DM may delay sputum conversion, increases the risk of treatment

failure in non-drug resistant cases, death and relapse among patients with TB (10,11).

India has the highest TB burden and second highest DM burden in the world (12,13). Further 77 million people are at higher risk of becoming diabetic (14,15). In India, 15% of pulmonary tuberculosis (PTB) cases have been estimated to be attributable to DM (16).

Aims & Objectives

To identify factors associated with Diabetes Mellitus among Tuberculosis Patients attending Tertiary Care Hospital in Delhi.

Material & Methods

Study Type: The study is observation cum-descriptive type. **Study Population:** TB patients attending a tertiary hospital. **Study Area:** This study was conducted at the TB clinic in the Lok Nayak Jay Prakash (LNJP) Hospital, a tertiary care hospital in Delhi. **Study Duration:** Data was collected during May to July 2015. **Sample Size:** Total 220 TB patients on DOTS were included in the study. **Ethical clearance** was taken from the Institutional Review Board (IRB) of NIHFW.

The inclusion criteria were: (1) Patient between the age group 15-75 years who attended TB clinic on OPD basis to get DOTS from the clinic, registered in first quarter of year 2015 (1st January to 31st March 2015) and completed their intensive phase of DOTS at the time of data collection; (2) Patient diagnosed with new pulmonary and extra pulmonary tuberculosis; 3. Patient's voluntarily participation. **Exclusion criteria** were: (1) Transfer-in patients; (2) Patients who were on treatment after default; (3) Retreatment cases, MDR-TB and XDR-TB patients.

Data Collection Strategy: TB patients were interviewed with a pre-tested interview schedule. The random blood sugar values were taken from secondary data in hospital records with approval of the In-charge. **Data Analysis:** The data analyzed using SPSS software version 21.0. The association was tested using the Pearson`s Chi square test or the Fischer`s Exact test. The Logistic Regression analysis is also used to find out odds of risk associated.

Results

Treatment Practices among Co-Morbid Patients: In our study, 16% of patients were co-morbid. Among these co-morbid patients, 86% of patients were taking treatment for Diabetes Mellitus. It was found that 80% of co-morbid patients regularly measure their blood glucose level from nearby laboratory and rests of them do self-assessment by Glucometer. The study revealed, approximately 85% of co-morbid patients were having their blood glucose level under controlled range.

Socio-economic Profile of Patients: In our study sample, majority (68.5%) fall under the age group 15-30 years but age distribution of co-morbid patient's status was skewed towards higher age groups. More females (64%) had co-morbidity than males (36%). In co-morbid category, more patients belonged to Muslim religion (53%) as compared to Hindu (47%).Also, higher percentage in SC/ST (27.8%) were co-morbid compared to TB patients (20%). Maximum patients were living in houses comprising one to two rooms, and having a family of 5-6 members indicating overcrowding. Also, 78% of Co-morbid patients and 58% of only TB patients belonged to lower/ upper lower socio-economic class according to Kuppuswamy's Socio-economic status scale.

Behavioral Profile of Patients

a) Physical Activity

The percentage of co-morbid patients with regular physical activity for at-least 30 minutes were higher (55.6%) than only TB patients (45.7%). Reasons given by co-morbid patients and TB patients were that enough physical activity in the work (16.7%) and (30%), respectively. There was higher ignorance about physical work among co-morbid patients (27.8%) than TB patients (24.5%). A statistically significant association (p<.05) was found in physical activity with age, level of education, socio-economic status, residence and caste.

It was found that among comorbid patients, 80-85% of the patients knew that physical activity helps to improves cardio-respiratory functioning and muscular fitness; and 36-45 % of the patients knew that physical activity prevents overweight/ obesity & improves metabolism, prevents chronic diseases. Statistically significant association (p<.05) was found regarding awareness of benefits of doing regular physical activity with gender, level of education, SES and residence.

b) Dietary Habits of Patients

Majority of the patients (85%) found to be non-vegetarian, albeit more in co-morbid patients (100%) compared to only TB patients (82%). Higher percentage among co-morbid patients (83%) and lower percent of (38%) TB patients replied that unhealthy diet may leads to Diabetes. There was low awareness about heart problem (33%) and 19%

respectively among comorbid patients and TB patients. Statistically significant association (p<.05) was found in awareness regarding harmful effects of unhealthy diet with gender, caste, level of educational, residence and SES. Further analysis found that that 65% of TB patients and 86% of co-morbid patients were aware about high sugar intake in diet is a predisposing factor of DM. 8.7% of TB patients and 55.6% of comorbid patients were aware about fried/oily food should be avoided. There was statistically significant association (p<.05) in awareness regarding Diet (to be avoided in DM) with gender, caste, level of education, SES and residence. Majority of TB patients (approx. 79%) and co-morbid patients (81%) prefers to eat fruits and vegetables or simple home cooked food. Only 4 to 5% of study sample responded for eating sweets and 14 to 17% replied for eating junk food.

c) Tobacco or Alcohol Consumption

It was found that among TB patients 22.3% were consuming only tobacco and 16.8% taking alcohol or both. In the co-morbid category of patient, all 7 were currently consuming alcohol and tobacco, both.

Statistically significant association (p<.05) was found in tobacco/ alcohol consumption with gender, level of education, SES and caste.

Logistic Regression Analysis

Logistic regression analysis indicates that odds of awareness about DM and its complications among patients belonging to Hindu religion was more than 8 times higher than the patients belong to Muslim religion. The patients belong to OBC and SC/ST category were having lower odds of awareness about DM compared to general category patients.

The odds of awareness about DM was 71 percent higher among the unemployed patients compared to skilled/unskilled workers. Patients with middle school education had higher odds of awareness about health complications, such as heart and blood vessel disease, Neuropathy/Nephropathy /Retinopathy, Foot damage/ Poor healing etc. Patients residing in urban area had higher odds of awareness of DM (OR=1.48) but patients residing urban slums had higher odds of knowing complication due to DM, may be more health education activities in slums. Those who were aware of HIV, their odds of awareness on DM were more than 6 times higher compared to those who were not aware of HIV(OR=6.47). Patients suffering from DM were 3 times more likelihood of knowing complications.

Discussion

Studies conducted elsewhere found that the DM is the second most important risk factor for TB in developing countries (17). In our study, age of TB and Co-morbid patients are similar to findings of Robin Wood et al who described that from 15 years to 30 years, the curve of TB prevalence exponentially rises (18). Similar to the present study, poor awareness about risk factors and complications were reported by M. Deepa et al in their study conducted in four regions of India (19). Retrospective studies suggest that diabetes conferred a 3·9 times increased risk of treatment failure in patients receiving directly observed short-course therapy (20). Study by Jane Murray Cramm (21) revealed more physical inactivity among less-educated people. This may be due to the laborious occupation, and higher physical activity in their daily job routine.

Conclusion

Current study results showed statistically significant association of physical activity with age groups, level of education, socio-economic status, residence and caste. To tackle this dual burden of disease, a collaborative framework has been launched by the WHO and the International Union Against Tuberculosis and Lung Disease (The Union), which emphasizes the need to establish collaborative mechanisms between national TB programmes (NTPs) and diabetes organizations and the bi-directional screening of TB and DM (22).

Recommendation

Findings of the study are useful to manage delayed treatment response among TB patients and making DM patients aware of higher risk of TB through counseling and health education programmes under National Health Mission (NHM).

Limitation of the study

Study Limitation: The data may not represent to all DM-TB Co-morbid patients in Delhi as only one government run TB Clinic in old Delhi area was identified for the study.

Relevance of the study

Study findings are relevant for developing strategies for managing DM-TB under NPCDCS framework.

Authors Contribution

The first author has prepared manuscript of the study. The second author has interviewed TB patients, prepared data file and generated tables.

The third author has applied logistic regression analysis.

Acknowledgement

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Tables

TABLE 1 DISTRIBUTION OF PATIENTS BY THEIR HABIT OF TOBACCO OR ALCOHOL CONSUMPTION

Cases	Patients consuming						Patients not consuming	
	Only Tobacco		Only Alcohol		Both			
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
All TB patients (N=220)	41	18.6	11	5.0	38	17.3	130	59.1
Co-morbid patients (N=36)	0	0	6	16.7	7	19.4	23	63.9
Only TB patients (N=184)	41	22.3	5	2.7	31	16.8	107	58.2

TABLE 2 LOGISTIC REGRESSION ON AWARENESS OF DM AND COMPLICATIONS DUE TO DM

Variables	Categories	Sig.	Exp(B)	Variables	Categories	Sig.	Exp(B)
Religion of patients	Muslim			Religion of patient	Muslim		
	Hindu	0.007	8.433**		Hindu	0.030	8.938*
Caste of patient	General	0.062		caste of patient	general	0.292	
	OBC	0.895	0.906		OBC	0.146	3.489
	SC/ST	0.020	0.165*		SC/ST	0.310	2.227
Sex of patient	Female			Sex of patient	Female		
	Male	0.004	0.189**		Male	0.046	0.187*
Occupation	Skilled/unskilled workers			Occupation	Skilled/unskilled		
	Unemployed	0.362	1.717		Unemployed	0.996	0.000
Education	Illiterate	0.033		Education	High school and above	0.323	
	Primary school	0.045	0.252*		Middle school	0.860	1.131
	Middle school	0.066	0.214		Primary school	0.969	0.955
	High school and above	0.831	0.816		Illiterate	0.145	0.228
Marital status	Widow	0.943					
	Married	0.998	0.000				
	Unmarried	0.998	0.000				
Place of residence	Urban slums			Place of residence	Urban slums		
	Urban	0.566	1.482		Urban	0.781	0.805
Aware about HIV	No			Suffering from DM	No		
	Yes	0.005	6.472**		Yes	0.085	3.551

Note:* p<.05, ** p<.01