ORIGINAL ARTICLE

Diabetes Mellitus Among Tuberculosis Patients in A Rural Population of Jammu - A Community Based Observational Study

JK SCIENCE

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Abstract

To determine the existence of diabetes mellitus in patients with tuberculosis and to study the effect of coexistent diabetes mellitus on tuberculosis outcome under programmatic conditions. Out of 280 tuberculosis cases registered, 183(65.3%) were males & 97 (34.6%) were females. Approximately two third (58%) of the patients were in the age group of 31 - 60 years. Majority of the patients (61.7%) belonged to lower and lower middle socio-economic class. 69% of the registered patients were sputum positive. Sputum positivity was found to be higher among males. 23 patients (8.2%) were found to be diabetic comprising of 15 males and 8 females. The outcome of tuberculosis did not differ significantly in patients having coexistent diabetes mellitus.8.2% of the tuberculosis patients had coexistent diabetes mellitus. The effect of coexistent diabetes mellitus on tuberculosis outcome under programmatic conditions was not found to be significant.

Key Words

Diabetes, Tuberculosis, Co-existence, Community Based Study

Introduction

Tuberculosis (TB) has affected mankind since ages. Epidemiological behavior of the TB has changed owing to advances in diagnostic and therapeutic modalities, more so in last few decades. Further, emergence of HIV and life style disorders particularly diabetes mellitus have posed new challenges and are likely to have profound impact on its epidemiological behavior in future as well. Globally, 9.2 million new tuberculosis cases occurred in 2008 of which 4.1 million were sputum smear positive. Estimated 1.7 million people estimated die of this disease every year (1). Diabetes Mellitus (DM) is one of the important morbidity known to affect the outcome of TB. The situation is likely to deteriorate further as DM has reached epidemic proportions in most developing countries including India which carry the maximum burden of TB (2, 3). The rising prevalence of diabetes in tuberculosis in endemic areas may adversely affect tuberculosis control (4). Thus speeding up the diagnostic, curative and preventive services are required to address DM and other risk factors that increase the individual's susceptibility for TBs (5). DM being one such possible retarding factor justifies the need for the current study.

Material and Method

The present study was conducted in block R. S Pura, which was the field practice area of the Department of Community Medicine Government Medical College Jammu. All the patients registered in tuberculosis unit during the two year period (2009-2010) were enrolled and analyzed. Pregnant women and children less then15 years were excluded from the study. The subjects thus enrolled were explained the purpose of the study and were requested to participate. An informed consent was also obtained from the subjects assuring them that the information obtained from them should be kept private and confidential. The requisite information from the patients was collected on predesigned and pretested proformae. All the persons included in the study were subjected to general physical examination, systemic examination and 2 ml venous blood sample was drawn in fluoridated tubes for estimation of random blood glucose levels. The blood samples were immediately centrifuged to separate plasma and transported same day to the department of biochemistry, Government Medical College Jammu for analysis as per the standardized procedure by glucose Oxidase - peroxidase method (GOD - POD

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Vol. 14 No. 4, Oct -December 2012



Method). The subjects with already diagnosed diabetes mellitus on treatment were confirmed by the records and they were not subjected to any blood glucose estimation and included as such in the study. In subjects, where blood glucose levels fall in borderline as per the WHO criteria of hyperglycemia for any patient, Oral Glucose Tolerance Test (OGTT) (6) was performed to confirm the diagnosis of diabetes mellitus on a day convenient to the patient. The outcome of tuberculosis was recorded in each such case till the end of study.

The data was analyzed with the help of computer software MS Excel for windows. Categorical variables reported as proportions whereas quantitative variables were expressed as mean and standard deviation. Data was cross-classified according to selected sociodemographic characteristics viz a viz coexistence of tuberculosis and diabetes mellitus.

Result

The present study has enrolled 280 cases of tuberculosis registered with tuberculosis unit. Among these 183(65.3%) were males & 97 (34.6%) were females, suggesting that tuberculosis was found to be more common in males as compared to females with male to female ratio being 1.8: 1. Approximately two third (58%) of the patients were in the age group of 31-60 years. As evident from the table 1, there is decrease in the number of tuberculosis cases with increasing age. The mean age of female was lower $(37.12\pm16.8 \text{ years})$ as compared to males $(43.10 \pm 16.4 \text{ years})$ for both the years under study. Out of 280 patients, majority of the tuberculosis patients (195) were sputum smear positive and rest of them were registered as relapse, extra-pulmonary, treatment after default and failure. Sputum positivity and patients with relapse were found to be higher among males for both the years under study. On the contrary, extra-pulmonary tuberculosis was found more commonly among females.

Majority (88%) of the population under study comprised of Hindu community and approximately 2/3rd of them belonged to lower and lower middle socioeconomic class ie: 35.7% and 26% respectively. BMI of tuberculosis patients was assessed by criteria laid down by WHO and it was found that majority (238, = 85%) of tuberculosis patients had BMI within normal range of between (18.5- 24.99), only 15 (5.3%) were found under weight (<18.5). The blood glucose levels on random blood glucose testing of all registered tuberculosis patients followed by oral glucose tolerance test on subjects showing blood glucose levels in borderline range, showed that vast majority (n=242; 86%) of patients had normal blood glucose levels. Only 23 patients (8.2%) were found to be diabetic, another 15 (5.3%) patients had impaired glucose levels. A mean random blood glucose level of 238.7 \pm 39.8 mg/dl was revealed for the tuberculosis patients with coexistent diabetes. For patients with impaired glucose levels, mean blood glucose level was found to be 146.8 \pm 4.67 mg/dl. Rest of the patients had normal mean blood glucose levels of 120 \pm 13.7 mg/dl. Among the 280 tuberculosis patients studied for the period

Table. 1 Age & Sex Wise Distribution of TB Patients

Age	Male N (%)	Female	Total
		N (%)	N(%)
16-30 yrs	39 (213)	34(35)	73(26)
31-45 yrs	67 (36.6)	37(38.1)	104(37)
46-60 yrs	46 (25.1)	14(14.4)	60(21)
61-75 yrs	26 (14.2)	10	36 (13)
		(10.3)	
Above 75	5 (2.7)	2 (2.6)	7 (3.0)
yrs			
Total	183 (100.0)	97 (100)	280
			(100.0)

2009-10, 23(8.2%) had diabetes mellitus with males outnumbering females (1.8:1). As shown in table 3, nearly half of the patients with coexistent diabetes mellitus (n=12; 52.1%) were in the age group 46-60 years with mean age 50.1 \pm 14.4 years.The patients of tuberculosis with coexistent diabetes mellitus belonged middle socioeconomic class and nearly 2/3 rd (65.2%) patients with coexistent diabetes mellitus had normal BMI. Nearly one fourth were (26%) underweight. Two females registered were found to be over-weight. None of the patient had BMI > 30.

The outcome of tuberculosis patients alone as well as with coexistent diabetes mellitus is depicted in table 3 and 4respectively, table 4 details that approximately 83% of patient with tuberculosis had favorable outcome (52.8% were cured and 30% completed treatment). 17 and 18 each patient were defaulted and died respectively during the course of treatment. Further 9 patients recorded as transfer out, whereas 6 patients failed to treatment, and table 5 showing that 82.8% patients with coexistent diabetes mellitus had favorable outcome, ie: 52.3% were cured and 30.5% treated completely, however 2 patient each failed to treatment and died during the course of treatment.

Discussion

The present study enrolled 280 patients of tuberculosis registered with Tuberculosis Unit (TU) R S Pura for the period 2009-2010. The study comprised of 183 males and 97 females patients with registered tuberculosis out

Outcome of TB	Male	Female	Total
<u>patients</u>	<u>N (%)</u>	<u>N (%)</u>	N(%)
Cureu	101 (55.1)	47 (48.3)	140 (32.0)
Treatment	45 (24.5)	37 (38.3)	84 (30.0)
c om ple ted			
Failure	3 (1.7)	3 (3.0)	6 (2.2)
Died	15 (8 3)	3 (3 (1)	18 (6 5)
Dicu	15 (0.5)	5 (5.0)	10 (0.5)
Defaulter	12 (6.5)	5 (5.2)	17 (6.0)
Transfer out	7 (3.8)	2 (2.0)	9 (3.2)
Total	183 (100 0)	07	280 (100 0)
Total	185 (100.0)	(100.0)	280 (100.0)

Table. 3 Outcome of Tuberculosis Patients Registered inTuberculosis Unit

of which 15 males & 8 females had coexistent diabetes mellitus. Conflicting data exists regarding co existence of tuberculosis and diabetes mellitus. Several studies have documented the association of diabetes mellitus and pulmonary tuberculosis (6-8). There is irrefutable evidence that the patients with diabetes mellitus run 2-4 times increased risk of developing pulmonary tuberculosis(2, 9) but conclusive evidence evades the reverse association though some studies have shown increased prevalence of DM in patients with pulmonary tuberculosis (7,10). The probable reasons for conflict outlined in literature relate to different criteria used by workers over time to diagnose both conditions, non representativeness of patients studied both in terms of number and selection criteria and different settings (11).

Tuberculosis alone and tuberculosis coexistent with DM was observed to be more common among males registered for both the years. The male preponderance was also associated with higher mean age (43.1 for males & 37.1 for females) in tuberculosis patients alone and (54 years for males &49 years for females) in tuberculosis patients with coexistent diabetes mellitus. This observation finds consistency with results reported by other workers across different settings employing different methodologies (12-15). This difference in the disease prevalence in males and females may or may not have direct biological basis, though fear and stigma associated with tuberculosis may account for under-notification in case of females as much as less tendency on their part to seek health care (16,17). Although we observed a decline in the number of tuberculosis patients with the increasing age, the reverse was found true for patients

Table . 2 Age & sex	Wise Distribution	of TB	with DM
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Age	Male N (%)	Female N (%)	Total N (%)
31-45yrs	4(26.6)	3(37.5)	7 (30.4)
46-60yrs	9(60.0)	3(37.5)	(30.4)
Above 61yrs [*]	2(13.3)	2(25)	4(17.3)
Total	15(100)	8(100)	23(100)

 Table. 3 Outcome of Tuberculosis Patients with DM

 Registered in tuberculosis Unit

Out come*	Male N (%)	Female N (%)	Total N (%)
Cured	7 (46.7)	5 (62.5)	12 (52.3)
Treatment completed	5 (33.4)	2 (25.0)	7 (30.5)
Failure	1 (6.6)	1 (12.5)	2 (8.6)
Died	2 (13.3)	0 (0.0)	2 (8.6)
Total	15(100.0)	8 (100.0)	23 (100.0)

of coexistent TB & DM. Socioeconomic status is particularly one such variable affecting the prevalence of tuberculosis. Approximately two-third of patients in our study also belonged to lower & lower middle class families. The reasons for increased prevalence are built upon the lower immunity due to complex interplay of malnutrition, poverty, inaccessibility to health care facilities, Ignorance and lack of awareness about the consequences of the disease (18,19).

Relationship of BMI with TB and DM has been studied by many workers. No significant conclusions though can be drawn from the available literature. Some workers have reported higher prevalence of coexistent DM and TB with higher BMI and vice-versa. (20, 21). We also found no association of BMI with TB and coexistent DM in our study. The difference in conclusions might have to do with socioeconomic differentials in patients studied in different setting. We employed WHO criteria to assess the diabetes mellitus and RNTCP guidelines for classifying patients with tuberculosis. The blood glucose levels of 22(7.8%) tuberculosis patients were found in the diabetic range and impaired blood glucose levels were detected in 15 (5.3%) patients with tuberculosis. Though the results were found to be consistent with those reported by other workers (20), (22) direct comparisons are not valid for the reasons detailed above. A well planned large scale observational study or meta-analysis has the potential to settle the issue.

The basic premise for conducting the present study was lack of definitive evidence regarding outcome of patients with tuberculosis and coexistent diabetes mellitus. The outcome of the tuberculosis with coexistent diabetes mellitus has so far been documented scarcely (23), (17). Contradictory evidence is available at present reported regarding the adverse effects of diabetes on the treatment outcome of tuberculosis patients with some investigators reporting an increased rate of failures, deaths, defaults and relapse (24,25) whereas others refuting it (26-28). The outcome of all the tuberculosis patients alone and with coexistent diabetes was recorded till the end of study. We have not observed any gross difference in outcome of patients with tuberculosis and coexistent diabetes mellitus as compared to that reported by others. It is heartening to observe that the figures for relapse, failure and defaulters do not seem to be higher among patients with coexistent diabetes, though definitive conclusions cannot be drawn on the basis of small number of patients studied for recording outcome.

Conclusion

A total of 280 tuberculosis patients were studied for coexistence of diabetes mellitus.23/280 i.e. 8.2% were found diabetic &15 (5.3%) patients had impaired glucose levels on random blood sugar testing. No gross difference in the outcome of tuberculosis was seen in patients with coexistent tuberculosis and diabetes as compared to tuberculosis alone.

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