DOI: 10.14260/jemds/2014/3026

ORIGINAL ARTICLE

PREVALENCE OF DIABETES MELLITUS IN TUBERCULOSIS PATIENT: A TERTIARY CARE CENTRE STUDY FROM CENTRAL INDIA

Bhupendra Kumar Ratre[1], Arun Kumar Shrivastava[2], Narmada Prasad Patel[3], Roopesh Jain[4], Pranav Raghuvanshi[5], D. P. Singh[6], Umesh Patel[7]

HOW TO CITE THIS ARTICLE:
Bhupendra Kumar Ratre, Arun Kumar Shrivastava, Narmada Prasad Patel, Roopesh Jain, Pranav Raghuvanshi, D. P. Singh, Umesh Patel. "Prevalence of Diabetes Mellitus in Tuberculosis Patient: A Tertiary Care Centre Study from Central India". Journal of Evolution of Medical and Dental Sciences 2014; Vol. 3, Issue 29, July 21; Page: 8155-8161, DOI: 10.14260/jemds/2014/3026

ABSTRACT: INTRODUCTION: The coexistence of diabetes and tuberculosis is common and challenge to the community. Diabetes predisposes to tuberculosis and treatment often become complicated. Though the prevalence of tuberculosis is decreasing due to success of combination chemotherapy but coexistence of diabetes with tuberculosis poses a threat to success of anti-tubercular program. India has huge burden of the both diabetes and tuberculosis. We did a prospective study to know the prevalence of diabetes in tuberculosis patients in a tertiary care hospital. **MATERIAL AND METHOD**: We recruited the patient with tuberculosis in department of general medicine and department of TB and Chest. We screened them for diabetes with fasting blood sugar. **RESULTS:** Out of total 419 patients who were included in the study 135 patients were found to be diabetic. A prevalence of 32.2% was found in the study. **CONCLUSION:** The prevalence of diabetes in tuberculosis is very high as compared to that of general population. We recommend that the entire tubercular patients should be screened for diabetes and vice versa at the time of diagnosis, and effective management of both diseases will leads to improve treatment outcome.

KEYWORDS: Diabetes Mellitus, Tuberculosis, Fasting Blood Sugar (FBS), Anti-Tubercular Treatment (ATT), Sputum.

INTRODUCTION: The association of diabetes mellitus and tuberculosis is known since ages. Both the disease present challenge to community due to associated morbidity and mortality. Indian subcontinent contribute big share to the total prevalence of both the diseases globally. The tuberculosis control program has been able to achieve good cure rates in tuberculosis patients without any co morbid conditions.

Diabetes mellitus in tuberculosis present tough challenge to the success of anti-tubercular therapy and overall cure rates. The incidence and prevalence of diabetes is increasing explosively in Southeast Asian countries. So it is expected that population with diabetes and tuberculosis will increase.

Approximately 95% of tubercular patients and 70% of diabetic patients are living in low and middle socio-economic population all over the world[1, 2]. India is currently hosting huge disease burden of tuberculosis and diabetes mellitus both. Worldwide 33% of population is infected with tubercular bacteria, 8.6 million peoples developed tuberculosis, and 1.3 million people die annually because of this.[3]

In India 3.1 million persons are diagnosed to have tuberculosis with mortality rate of 0.32 million per year.[4] Globally India constitute 20 -25 % cases of all tubercular patients.[4] India is having the second large population of diabetic patients in the world.

DOI: 10.14260/jemds/2014/3026

Approximately 65.1 million adults are suffering from diabetes mellitus age 20 years and above, giving prevalence of 9.09% and 21.5 million persons were having impaired glucose tolerance.[5]

Diabetes produces an immune-compromised state and diabetic patients are more prone for acquired infections. Previous studies have shown that diabetic patients are three times more prone to develop tuberculosis.[6, 7] Treatment response of ATT is also varied in diabetic patients in the form of delayed treatment response, treatment failure, relapses, drug resistance and more numbers of death.[8]

Anti-tubercular drugs also decrease the effectiveness and concentration of anti-diabetic drugs and make blood sugar control difficult.[9]

WHO and the International Union against Tuberculosis and Lung Disease (IUALTD) have jointly published guidelines for joint management of tuberculosis and diabetes mellitus and it recommend simultaneous screening for tuberculosis and diabetes mellitus.[10]

The present study we plan to estimate the prevalence of diabetes in Tubercular patients who presented to our institute for management of Tuberculosis.

MATERIAL AND METHODS:

Study Design, Period, Patient: We conducted a prospective observational study in our institute in Department of General Medicine and Department of TB and Chest.

Patient's age 15 years and more who diagnosed as tubercular case and was registered with our institute DOTS centre from January 2012 to January 2014 were included in the study. All the confirmed cases were started on Anti- Tubercular drugs according to Revised National Tuberculosis Control Program (RNTCP).[11]

All the patients to whom anti tubercular drug were started; fasting blood glucose test (FBS) (after 8 hour fasting) was done. If FBS was <110mg%, we consider them as non-diabetic patients. If fasting blood glucose was >126mg% we considered them as diabetic patients and included in study. Patients whose FBS was between 110 and 126 mg%, they were considered as having impaired glucose tolerance and was not considered as diabetic.[12]

We followed the guidelines for diagnosis for diabetes given by WHO and International Diabetic Federation (IDF).[12] Patients who were already diagnosed as a case of diabetes mellitus and diagnosed to have new onset tuberculosis were also included in the study.

Tubercular patients with other co morbid conditions like HIV, chronic kidney disease, chronic liver disease, chronic alcoholism, malignancies and patients on long term steroids were excluded from study.

RESULTS: Over 419 patients were diagnosed as tubercular patients during study period, 271 patients were male (64.67%) and 148 were females (35.33%). Most number of patients was from young age groups i.e. from 15-40 years.

Age group	Males n=271(%)	Females n=148(%)	Total n=419 (%)
15-20	43(15.8)	34(22.9)	77(18.3)
21-30	62(22.8)	50(33.7)	112(26.7)
31-40	55(20.3)	25(16.9)	80(19.0)
41-50	42(15.5)	12(8.1)	54(12.8)
51-60	34(12.5)	9(6.0)	43(10.2)
>60	35(12.9)	18(12.1)	53(12.6)

Table 1: Age and Gender Wise Distribution of Tubercular Patients

DOI: 10.14260/jemds/2014/3026

Out of 271 male patients, 148 (54.6%) were sputum positive for AFB, 67 (24.7%) were sputum negative and rest 56 (20.6%) were case of extra pulmonary tuberculosis. In female group out of 148 patients 53 (35.8%) were sputum positive for AFB, 49 (33.1%) were sputum negative and rest 46 (31.0%) were extra pulmonary tuberculosis. In both male and female group most common extra-pulmonary tuberculosis was pleural effusion.

Out of 419 patients 300(71.6%) were started on treatment category – I and 119 (28.4%) were started on category – II.

Sputum status	**Males n=271**	**Females n=148**	**Total n=**419
Sputum +ve	148 (54.6)	53(35.8)	201(47.9)
Sputum –ve	67(24.7)	49(33.1)	116(27.6)
Extra pulmonary	56(20.6)	46(31.0)	102(24.3)
Treatment category			
Category- 1	190(70.1)	110(74.4)	300(71.6)
Category-2	81(29.9)	38(25.6)	119(28.4)

Table 2: Sputum Status and Treatment Category in Tubercular Patients

Out of 419 Patients 63 patients (15%) was already diagnosed case of diabetes mellitus as they were taking either OHAs or insulin, so no further screening was done in these patients. Rest 356(85%) patients were screened with FBS, Out of 356 patients 72 (17.18%) patients were having FBS >126 mg%, and diagnosed as case of diabetes mellitus. 80 (19%) patients were having FBS between 110- 126mg%, and considered as having impaired glucose tolerance. Out of 419 tubercular patients diagnosed case of tuberculosis (old + new) were 135(32.2%).

Particulars	**Values**
Total no of patient	419 (100)
No. of tubercular patient already diagnosed with diabetes mellitus	63 (15)
No. of tubercular patients screened with FBS	356 (85)
No. of patients with FBS > 126mg%	72 (17.18)
No. of patient with FBS between 110-126mg%	80 (19)
No. of patients with known + newly diagnosed diabetes mellitus	135 (32.2) Males- 96 (71.11) Females-39(28.88)

Table 3: Screening Tubercular Patients for Diabetes Mellitus

Out of 135 patients of diabetes + tuberculosis 96 (77.11%) patients were male and 39(28.88%) patients were females. Out of 96 diabetic – tubercular males 67(69.49%) were sputum positive while out of 39 females 22(56.41%) were sputum positive.

DOI: 10.14260/jemds/2014/3026

	Male n=96	Female n=39	Total n=135
Sputum +ve	67(69.49)	22(56.41)	89 (65.92)
Sputum –ve	18(18.75)	10(25.64)	28 (20.74)
Extra pulmonary tuberculosis	11(11.45)	7(17.94)	18 (13.33)

Table 4: Sputum Status In Diabetic- Tubercular Patients

DISCUSSION: Diabetes mellitus is progressing as an epidemic, in India its overall prevalence is 9.09%[3] but incidence of diabetes is different in different regions of country. Incidence of diabetes in central India is not known. Diabetic patients are more prone for acquired secondary infections. Large number of studies in past shown important association between diabetes and tuberculosis and diabetes is an important risk factor for the development of tuberculosis.[13, 14]

In present study we planned to see the prevalence of diabetes in tubercular patients. In our study we found 15 percent of cases of tuberculosis were already having diabetes and after screening we diagnosed 17 percent new cases in the study group. So in our study overall prevalence of diabetes was 32.2 percent in tuberculosis patient and it was much higher than the prevalence of diabetes in general population.

The similar high prevalence of diabetes in tuberculosis patient was also reported in studies from southern region of India and abroad. Study from Tamil-Nadu reported diabetes prevalence of 25% in tubercular patients[15]. A study from Kerala reported diabetes prevalence of 44% in tubercular patients.[16] The prevalence of diabetes in both the studies was much higher than the prevalence of diabetes in general population. Recently published study from Pondicherry also showed higher diabetic prevalence of 29% in tubercular patients.[17]

In Study by Jimenez- corona et al they found a high prevalence of diabetes of 29.63% in tubercular patients, they also reported that dual disease (diabetes+ tuberculosis) was associated with increased morbidity, more pulmonary cavities, delayed sputum conversion, high rate of treatment failure and high recurrence and relapse rate.[18]

In our study we found that 19% of tubercular patients were having impaired glucose tolerance. Similar high prevalence of impaired glucose tolerance of 16.98% was also reported by Jain et al. But they have used oral glucose tolerance test for diagnosis[19].

In our study most of the tubercular patients were from younger age group i.e. age < 40 years where as majority patient of dual disease were from 40 plus age, which may be explained by the fact that younger population is more likely to receive medical attention in this region because of poor healthcare infrastructure and malnutrition and low birth weight may be the other important reason.

The majority of patients with dual disease were more than 40 years as the incidence of diabetes increases with age. This finding was partially contradictory to some previous studies done in Korea, Pakistan and India[20, 21, 22] in which the incidence of both tuberculosis and diabetes increases with age.

In our study group sputum positive patient (non-diabetic + diabetic group) was 54.6% while sputum positive rate was 65.92% in diabetic tubercular group. It shows high number of sputum positivity in diabetic patient. This finding was consistent with study done by Stevenson CR et al, in which the prevalence of sputum positive tuberculosis was 69.2%.[23]

Prevalence of diabetes in tubercular patients is very high and diabetes adversely affects the management of tuberculosis so it should be mandatory to screen all the tubercular patients for diabetes. So timely detection and management of diabetes leads to decrease morbidity and improve the treatment outcome in tubercular patients.

CONCLUSION: Overall prevalence of diabetes in tubercular patients is 32.2% in our study and impaired glucose tolerance was seen in 19% tubercular patients. This shows high burden of diabetes in tubercular patients in this region of country. Diabetic patient also have high number of sputum positive cases. So we recommend that the entire tubercular patient should be screened for diabetes at the time of diagnosis and effective management of both diseases will leads to improve treatment outcome.

We also recommend further multi-centric studies with large sample size to know the true prevalence of diabetes in tubercular patients in India. Also as the number of diabetic population is growing it is anticipated that the disease burden with dual disease will grow and hence specific guidelines for management of the dual disease may help in improving the overall success of treatment. More focused research in this domain is required to deal with deadly combination of diseases.

REFERENCES:

1. Harries AD, Murray MB, Jeon CY, Ottmani SE, Lonnroth K, Barreto ML. Defining the research agenda to reduce the joint burden of disease from diabetes mellitus and tuberculosis. Trop Med Int Health. 2010; 15: 659-63.
2. Sen T, Joshi SR, Udwadia ZF. Tuberculosis and Diabetes Mellitus: merging epidemics. J Assoc Physicians India. 2009; 57: 399-404.
3. World Health Organization. Global tuberculosis report 2013. http://www.who.int/tb/publications/global_report/en/
4. TB India 2013, annual status report, RNTCP. CTD, MOH & FW, New Delhi, 2013. (tbcindia.nic.in/pdfs/TB%20India%202013).
5. IDF Diabetes Atlas, 6th edn. Brussels, Belgium: International Diabetes Federation, 2013. http://www.idf.org/diabetesatlas
6. TB India 2012: Annual Status Report, RNTCP. CTD, MOH&FW, New Delhi, 2012 (tbcindia.nic.in/pdfs/TB%20India%202012-%20Annual%20 Report.pdf).
7. Jeon CY, Murray MB: Diabetes mellitus increases the risk of active tuberculosis: a systematic review of 13 observational studies. PLoS Med 2008, 5(7):1091–1101.
8. Mboussa J, Monabeka H, Kombo M, Yokolo D, Yoka-Mbio A, Yala F: Course of tuberculosis in diabetics. Rev Pneumol Clin 2003, 59(1):39–44.
9. Dooley KE, Tang T, Golub JE, Dorman SE, Cronin W: Impact of diabetes mellitus on treatment outcomes of patients with active tuberculosis. AmJTrop Med Hyg. 2009, 80(4):634–639.
10. Stop TB Initiative (World Health Organization); World Health Organization, Department of Chronic Diseases and Health Promotion; International Union against Tuberculosis and Lung Disease. Collaborative framework for care and control of tuberculosis and diabetes. Geneva: World Health Organization; 2011.

11. World Health Organization. Treatment of tuberculosis guidelines, 4th edition. Available from: http://whqlibdoc.who.int/publications/2010/9789241547833_eng.pdf (updated 2013 Mar 10).
12. Definition and diagnosis of diabetes mellitus and intermediate hyperglycemia: report of a WHO/IDF consultation. Geneva: WHO; 2006. Page no 3 (http:// www.idf.org/webdata/docs/WHO_IDF_definition_diagnosis_of_diabetes.pdf
13. Baker MA, Anthony D, Harries AD, Jeon CY, Hart JC, Kapur A, Lönnroth K, Ottmani SE, Goonesekera SD, Murray MB: The impact of diabetes on tuberculosis treatment outcomes: a systematic review. BMC Med 2011, 9:81.
14. Pérez A, Brown HS, Restrepo BI: Association between tuberculosis and diabetes in the Mexican border and non-border regions of Texas. AmJTrop Med Hyg 2006, 74 (4): 604–611.
15. Screening of Tuberculosis Patients for Diabetes Mellitus: Pilot Project-, Module for RNTCP staff Central TB Division, MOH & FW, New Delhi.2009,page no 6.
16. Balakrishnan S, Vijayan S, Nair S, Subramoniapillai J, Mrithyunjayan S, Wilson N, et al. High diabetes prevalence among tuberculosis cases in Kerala, India. PLoS One 2012; 7: e46502.
17. Raghuraman S, Vasudevan KP, Govindarajan S, Chinnakali P, Panigrahi KC. Prevalence of diabetes mellitus among tuberculosis patients in Urban Puducherry. North Am J Med Sci 2014; 6: 30-4.
18. Jimenez-Corona ME, Cruz-Hervert LP, Garcia-Garcia L, Ferreyra-Reyes L, Delgado-Sanchez G, Bobadilla-Del-Valle M, Canizales-Quintero S, Ferreira- Guerrero E, Baez-Saldana R, Tellez-Vazquez N, Montero-Campos R, Mongua-Rodriguez N, Martinez-Gamboa RA, Sifuentes-Osornio J, Ponce-de-Leon A. Association of diabetes and tuberculosis: impact on treatment and post-treatment outcomes. Thorax 2013; 68: 214-20.
19. Jain MK, Baghel PK, Agrawal R. Study of impaired glucose tolerance in pulmonary tuberculosis. Indian J Community Med 2006; 31(3): 137-9.
20. Patel JC: Complications in 8793 cases of diabetes mellitus 14 years study in Bombay Hospital, Bombay, India. Indian J Med Sci 1989, 43 (7): 177–183
21. Amin S, Khattak IM, Shabbier G, Wazir M: Frequency of pulmonary Tuberculosis in patients with diabetes mellitus. Gomal J Med Scie 2011, 9 (2): 163–165.
22. Qayyum M, Shafiq M, Farogh A: Prevalence of pulmonary tuberculosis among diabetics. Biomedica 2004, 20 (1): 74–78.
23. Stevenson CR, Forouhi NG, Roglic G, Williams BG, Lauer JA, Dye C, Unwin N. Diabetes and tuberculosis: the impact of the diabetes epidemic on tuberculosis incidence. BMC Publ Health 2007; 7: 234.

DOI: 10.14260/jemds/2014/3026

ORIGINAL ARTICLE

AUTHORS:

1. Bhupendra Kumar Ratre
2. Arun Kumar Shrivastava
3. Narmada Prasad Patel
4. Roopesh Jain
5. Pranav Raghuvanshi
6. D. P. Singh
7. Umesh Patel

PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of Medicine, L. N. Medical College, Bhopal.
2. Assistant Professor, Department of TB and Chest, L. N. Medical College, Bhopal.
3. Assistant Professor, Department of Medicine, L. N. Medical College, Bhopal.
4. Associate Professor, Department of Anaesthesiology, L. N. Medical College, Bhopal.
5. Assistant Professor, Department of Medicine, L. N. Medical College, Bhopal.
6. Associate Professor, Department of Medicine, L. N. Medical College, Bhopal.
7. Associated Professor, Department of Paediatrics, L. N. Medical College, Bhopal.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Bhupendra Kumar Ratre,
B-4, J K Hospital Campus,
Kolar Road,
Bhopal-462042.
Email: bkratre@gmail.com

Date of Submission: 23/06/2014.
Date of Peer Review: 24/06/2014.
Date of Acceptance: 14/07/2014.
Date of Publishing: 18/07/2014.