

ORIGINAL ARTICLE

DIABETES MELLITUS AMONG TUBERCULOSIS PATIENTS IN A TERTIARY CARE HOSPITAL OF LAHORE

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Background: Diabetes is an important risk factor for Tuberculosis (TB) that might affect disease presentation and treatment response but has hitherto been neglected by the clinicians. There is inadequate data on the prevalence of diabetes mellitus (DM) among TB patients in Pakistan. This study was conducted to determine the frequency of TB patients having DM. **Methods:** In this cross-sectional study, 158 TB patients admitted in Gulab Devi hospital were selected by systematic random sampling technique and data were collected using a pretested questionnaire. All patients underwent anthropometric measurements and baseline investigations. Diabetes was confirmed by determining fasting blood sugar level using cut-off value of 126 mg/dl. Data was entered in Epi-Data-6 and analyzed using Epi-Info. **Results:** Among 158 patients of tuberculosis, 41 (25.9%) were found to be diabetic, out of which 9 (5.69%) were newly diagnosed with diabetes. Moreover 96 (60.8%) patients were 35–55 years of age. Male patients were 97 (61.4%). Most of the patients belonged to the rural area 118 (74.7%) while 115 (72.8%) patients were illiterate and 139 (88%) had monthly income less than 7000 PKR. **Conclusion:** The study concludes that among tuberculosis patients with diabetes mellitus, about 5.69% were newly diagnosed during the course of investigation. This raises the concern that importance is not being given to routine screening of tuberculosis patients for diabetes by the clinicians. Health professionals should be updated about the link between diabetes and TB.

Keywords: Diabetes mellitus, tuberculosis, socio-demographic characteristics, concomitant diabetes

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INTRODUCTION

Tuberculosis is a communicable disease which continues to be a major public health problem. It is estimated that one-third of the world's population is having TB infection, and there are 5.7 million new cases of TB per year with 1.3 million deaths in 2012.¹ On the other hand diabetes mellitus (DM) is a common chronic disease associated with impaired immune function, affecting about 350 million people globally.² Pakistan is among the 10 countries of the world with highest number of diabetes patients along with being ranked as 6th among 22 countries having highest burden for TB.³ Various cohort and case-control studies have shown an association between DM and TB.^{4–8} WHO suspects that TB Control is being undermined by the growing number of people with diabetes mellitus in the world⁹ as there is growing evidence that diabetes mellitus is an important risk factor for tuberculosis that can also delay sputum culture conversion, increase the case fatality rate during treatment, and may increase relapse rates of TB after successful completion of treatment.¹⁰ Furthermore, infections including tuberculosis, often worsen glycaemic control in diabetic patients, and poorly controlled diabetes augments the severity of infections.¹¹ According to a WHO report, about 10% of TB cases globally are linked with diabetes.² Experts have raised concerns about the merging epidemics of diabetes mellitus and tuberculosis^{12–14}, especially in low to

middle income countries that are experiencing the fastest increase in diabetes prevalence¹⁵, along with the high burden of tuberculosis.¹⁶

Diabetes has changed the whole spectrum of tuberculosis from presentation to outcome. It not only increases the risk of getting infected with tuberculosis¹⁷, but also causes atypical radiological¹⁸ and clinical presentation of the disease.¹⁹ Patients having diabetes show a resistance towards anti-tuberculosis treatment²⁰ associated with high mortality.²¹

Despite this strong association between diabetes and tuberculosis, many of the clinicians are unaware of the fact that screening for diabetes mellitus in TB patients could improve diabetes case detection, early treatment and indirectly lead to better TB specific outcomes. This study was conducted in Gulab Devi hospital which is one of the leading tertiary care hospitals in Lahore receiving major bulk of the pulmonary tuberculosis patients. The aim of this study was to determine the frequency of diabetes among patients of tuberculosis and to describe the socio-demographic characteristics of these patients as there is inadequate data on the prevalence of diabetics among TB patients in Pakistan.

MATERIAL AND METHODS

A cross sectional study was conducted among 158 tuberculosis patients above 35 years of age²², admitted during the study period, in Gulab Devi hospital, with an

occupancy rate of almost more than 90% throughout the year. The study was conducted from 1st July 2011 to 30th September 2011. Permission was obtained from the hospital administration before the collection of data. For TB diagnosis standard WHO definitions were used.²³ Patients having any concomitant disease other than diabetes and TB were excluded. Systematic sampling technique was used to select patients to be included in the study. For this purpose, a list of total 1500 patients admitted during the period of study was used as a sampling frame to select 158 patients. The first patient was selected randomly. After that every 10th patient from the list fulfilling the inclusion criteria was selected. If any patient was not willing to participate, he/she was skipped and next patient on the list was interviewed. Written consent of each patient was obtained and then they were interviewed using a pre-tested questionnaire covering all variables. The diagnosis of diabetes was made by estimating the fasting blood sugar level on two separate occasions using 126 mg/dl as a cut-off value. Information regarding socio-demographic factors was recorded on the questionnaire. Data was entered and cleaned using Epi-Data-6 and analysis was done using Epi-Info.

RESULTS

A total of 158 TB patients were included in the study. Among them 41 (25.9%) were found to have DM including 32 (20.3%) already known cases of diabetes and 9 (5.69%) patients newly diagnosed as diabetics during the course of investigation (Table-1). Socio-demographic characteristics are shown in Table-2.

Table-1: Frequency of known and newly diagnosed diabetes among tuberculosis patients

Diabetics	Frequency	%
Previously diagnosed diabetics among tuberculosis patients	32	20.30
Newly diagnosed diabetics among tuberculosis patients	9	5.69
Non diabetic tuberculosis patients	117	74.1
Total	158	100

Table-2: Socio-demographic characteristics

Characteristics	Diabetic (n=41)		Non-diabetic (n=117)		Total	%	
	n	%	N	%			
Background	Rural	30	73.2	88	75.2	118	74.68
	Urban	11	26.8	29	24.8	40	25.31
Age group	35-55 yrs	25	61.0	71	60.7	96	60.76
	55-99 yrs	16	39.0	46	39.3	62	39.24
Sex	Male	19	46.3	78	66.7	97	61.39
	Female	22	53.7	39	33.3	61	38.61
Education status	Illiterate	31	75.6	84	71.8	115	72.78
	Literate	10	24.4	33	28.2	43	27.22
Monthly income (Rs)	< 7000	37	90.2	102	87.2	139	87.97
	>7000	4	9.8	15	12.8	19	12.02

Majority of the subjects in the diabetic and non-diabetic tuberculosis patient group were illiterate, i.e., 31

(75.6%) and 84 (71.8%) respectively. Among the diabetic TB patients, 37(90.2%) were earning less than or equal to Pakistani Rupees (PKR) 7000.00 per month.

DISCUSSION

The increasing prevalence of diabetes mellitus with pulmonary tuberculosis is an important global issue associated with poverty, inadequate education, malnutrition, urbanization, and crowded living conditions.^{13,17} This study was conducted in Gulab Devi Hospital, Lahore. Among the 158 patients, about 32 (20.3%) patients were found to be known cases of diabetes while 9 (5.69%) patients were newly diagnosed as diabetics during the course of investigation. Thus the total number of diabetic patients in the study was 41 (25.9%). Studies from different parts of the world have shown that 7.3–14.8% of patients with TB present with concomitant DM and available evidence indicates that diabetes acts as a risk factor for TB.^{5,19}

A study conducted in India showed the prevalence of diabetes among TB patients to be 25.3%²⁴ which is comparable to the results of this study. The study also showed that co-infection was more prevalent among the patients of 35–55 years of age as compared to the patients above 55 years. This fact is also supported by the WHO report which states that the same age group like our study is affected with the disease in the developing countries, while in the developed countries the main age group affected is the older population.²⁵

The results of this study indicate that the disease is more common in patients belonging to the rural areas, which is probably secondary to the fact that the issue of illiteracy and poverty are major problems in the rural areas which are neglected in all regards.²⁶ This in turn reflects the high disease burden in these areas. A negative association between TB associated diabetes and urban background was also found in the World Health Survey (n=124607; 46 countries).¹⁷

As this was a descriptive study so cause effect relationship could not be established. Prospective studies at a larger scale are needed to estimate the overall magnitude of the concomitant diabetes and TB in a developing country like Pakistan.

CONCLUSION

It can be concluded from the study that the prevalence of diabetes among tuberculosis patients is 25.9% which shows the pattern of co-existence of a communicable and non-communicable disease. This is an alarming situation for a country like Pakistan where the burden of both diseases is already so high and the risk factors like rural background, illiteracy, and low income are also favouring their concurrence. There is an urgent need to create awareness among

the health personnel who are dealing with TB patients about the relationship of DM with TB. Moreover the factors related to both diseases should be addressed with strong community participation.

REFERENCES

- World Health Organization. WHO Global TB Report 2013. Geneva: WHO office. Available from: http://www.who.int/tb/publications/global_report/en
- World Health Organization. Tuberculosis Fact Sheet. Fact Sheet 2007. Available from: <http://www.who.int/mediacentre/factsheets/fs104/en/print>.
- WHO Report: Global Tuberculosis control, surveillance, planning and financing. Country profile Pakistan. Switzerland: WHO;2007;p.125–8.
- Leung CC, Lam TH, Chan WM, Yew WW, Ho KS, Leung GM, *et al.* Diabetic control and risk of tuberculosis: a cohort study. *Am J Epidemiol* 2008;167:1486–94.
- Tatar D, Senol G, Alptekin S, Karakuram C, Aydin M, Coskunol I. Tuberculosis in diabetes: features in an endemic area. *Jpn J Infect Dis* 2009;62:423–7.
- Pablos-Mendez A, Blustein J, Knirsch CA. The role of diabetes mellitus in the higher prevalence of tuberculosis among Hispanics. *Am J Public Health* 1997;87:574–9.
- Perez A, Brown HS, Restrepo BI. Association between tuberculosis and diabetes in the Mexican border and non-border regions of Texas. *Am J Trop Med Hyg* 2006;74:604–11.
- Young F, Wotton CJ, Critchley JA, Unwin NC, Goldacre MJ. Increased risk of tuberculosis disease in people with diabetes mellitus: record-linkage study in a UK population. *J Epidemiol Community Health* 2012;66:519–23.
- Restrepo BI, Camerlin AJ, Rahbar MH, Wang W, Restrepo MA, Zarate I, *et al.* Cross sectional assessment reveals high diabetes prevalence among newly diagnosed tuberculosis cases. *Bull World Health Organ* 2011;89:352–9.
- Baker MA, Harries AD, Jeon CY, Hart JE, Kapur A, Lonroth K, *et al.* The impact of diabetes on tuberculosis treatment outcomes: A systematic review. *BMC Med* 2011;9:81.
- Larsen PR, Kronenberg HM, Melmed S, Polonsky KS, editors. *Williams' textbook of endocrinology*. 10th ed. Philadelphia: WB Saunders Company; 2003.
- Restrepo BI. Convergence of the tuberculosis and diabetes epidemics: Renewal of old acquaintances. *Clin Inf Dis* 2007;45:436–8.
- Stevenson CR, Forouhi NG, Roglic G, Williams BG, Lauer JA, Dye C, *et al.* DM and tuberculosis: the impact of the DM epidemic on tuberculosis incidence. *BMC Public Health* 2007;7:234.
- Dixon B. Diabetes and tuberculosis: an unhealthy partnership. *Lancet Infect Dis* 2007;7:444.
- Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: Estimates for the year 2000 and projections for 2030. *Diabetes Care* 2004;27:1047–53.
- WHO Global tuberculosis control: surveillance, planning, financing. WHO report 2007. Available from: http://www.who.int/tb/publications/global_report/2007/en/index.html
- Goldhaber-Fiebert JD, Jeon CY, Cohen T, Murray MB. Diabetes mellitus and tuberculosis in countries with high tuberculosis burdens: individual risks and social determinants. *Int J Epidemiol* 2011;40:417–28.
- Shaikh MA, Singla R, Khan NB, Sharif NS, Saigh MO. Does diabetes alter the radiological presentation of pulmonary tuberculosis. *Saudi Med J* 2003;24:278–81.
- Alisjhabana B, Sahiratmadja E, Nelwa EJ, Purwa AM, Ahmad Y, Ottenhoff TH, *et al.* The Effect of Type 2 Diabetes Mellitus on the Presentation and Treatment Response of Pulmonary Tuberculosis. *Clin Infect Dis* 2007;45:428–35.
- Ruslami R, Nijland HM, Adhiarta IG, Kariadi SH, Alisjhabana B, Aarnoutse RE, *et al.* Pharmacokinetics of Antituberculosis Drugs in Pulmonary Tuberculosis Patients with Type 2 Diabetes. *Antimicrob Agents Chemother* 2010;54:1068–74.
- Dooley KE, Tang T, Golub JE, Dorman SE, Cronin W. Impact of diabetes mellitus on treatment outcomes of patients with active tuberculosis. *Am J Trop Med Hyg* 2009;80:634–9.
- Baghaei P, Marjani M, Javanmard P, Tabarsi P, Masjedi MR. Diabetes mellitus and tuberculosis facts and controversies. *J Diabetes Metab Disord* 2013;12(1):58.
- Treatment of Tuberculosis guidelines. 4th ed. Geneva: World Health Organization; 2010.
- Viswanathan V, Kumpatla S, Aravindalochanan V, Rajan R, Chinnasamy C, Srinivasan R, *et al.* Prevalence of diabetes and pre-diabetes and associated risk factors among tuberculosis patients in India. *PLoS ONE* 2012;7:e41367.
- Global tuberculosis control report, 2006- annex 1 profiles of high burden countries. World Health Organization; 2006.
- Lonroth K, editor. Risk factors and social determinants of TB. World health organization; 2004.

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