Original Research Article

Clinical profile of tuberculosis with diabetes mellitus

Pooja Gautam[1], Neelima Sharma[2], Bishal Gautam[3], Preksha Sharma[4], Neha Sharma[5]*

[1]Department of Cardiology, Eternal Heart Care Centre, Jawahar Circle, Jaipur, Rajasthan, India
[2]Department of Community Medicine, Shri Aurobindo Medical College and Postgraduate Institute, Indore, Madhya Pradesh, India
[3]Eternal Heart Care Centre, Jawahar Circle, Jaipur, Rajasthan, India
[4]Department of Anatomy, [5]Department of Pharmacology, SMS Medical College & Attached Hospitals, J. L. N. Marg, Jaipur, Rajasthan, India

*Correspondence:
Dr. Neha Sharma,
E-mail: nsharma226@gmail.com

ABSTRACT

Background: There is now good evidence that people with diabetes mellitus (DM) have 2–3 times the risk of developing active tuberculosis (TB) compared with those who do not have DM. The aim of the study was to analyze typical / atypical presentation of pulmonary tuberculosis with diabetes mellitus.
Methods: This study was carried out in the Department of Respiratory Medicine and General Medicine, SAIMS, Indore during the period of July 2012 to June 2014. A prospective study including 100 microscopically proven cases of sputum smear positive pulmonary tuberculosis. Among these, 50 are diabetic patients with sputum positive tuberculosis and 50 are non-diabetic patients with sputum positive tuberculosis.
Results: The mean age in diabetic group was 51.92±9.96 years. The mean age in non-diabetic group was 39.58±15.19 years. In the diabetic group, there were 38 (76.00%) male and 12 (24.00%) females, while in the non-diabetic group there were 40 (80.00%) males and 10 (20.00%) females. Fever, cough and weakness were the three most common symptoms seen in patients with tuberculosis in both the groups.
Conclusions: There was a preponderance of male in both the groups over the female patients. There is no significant difference in the symptoms in both the groups.

Keywords: Tuberculosis, Diabetes mellitus, Immune suppression

INTRODUCTION

The incidence of tuberculosis (TB) is keenest among patients with vitiated immunity. India is receiving a double epidemic of HIV and Diabetes Mellitus (DM), both of which are strongly consociated with immune suppression.[1]

Although the definite pathophysiological mechanism of the effect of DM as a predisposing risk factor for TB is unknown, some hypotheses are suggested: depressed cellular immunity, dysfunction of alveolar macrophages, low levels of interferon gamma, pulmonary microangiopathy, and micronutrient deficiency. [2,3] There is now good evidence that people with DM have 2–3 times the risk of developing active TB compared with those who do not have DM.[4,5] Not only may this lead to an increase in the TB burden, but patients with dual disease appear to have an increased frequency of adverse TB treatment outcomes, with delayed sputum culture conversion, an increased risk of death during anti-tuberculosis treatment and an increased risk of recurrent disease after successful completion of treatment.[6]

The aim of the study was to analyze typical/atypical presentation of pulmonary tuberculosis with diabetes mellitus.

METHODS

This study was carried out in the Department of Respiratory Medicine and General Medicine, SAIMS, Indore during the period of July 2012 to June 2014. The study was carried out after taking permission from the Institutional Ethics Committee of the college. A prospective study including 100 microscopically proven cases of sputum smear positive pulmonary tuberculosis. Among these, 50 are diabetic patients with sputum positive tuberculosis and 50 are non-diabetic patients with sputum positive tuberculosis. Pulmonary tuberculosis was diagnosed by detailed history, clinical examination, sputum examination for acid fast bacilli, chest radiography.

Diabetes mellitus was diagnosed using the national diabetes data group and WHO diagnostic criteria:

Symptom of diabetes plus random blood sugar ≥11.1 mmol/L (200 mg/dl) or fasting plasma glucose ≥7.0 mmol/L (126 mg/dl) or two hour plasma glucose ≥11.1 mmol/L (200 mg/dl) during an oral glucose tolerance test.

Adult patients who fulfilled the above criteria were included in the study. After taking consent, patients were examined in detail and subjected to relevant laboratory and radiological investigations.

A pro-forma was filled by interviewing the patients and clinical examination was done. Once baseline data from patients is collected, then, subsequent follow up was done.

The patients who were willing to participate in the study, who were diabetic with sputum positive pulmonary TB and who have co- morbid conditions such as HTN, IHD, COPD etc, were included in the study. While, unwilling patients, non-cooperative patients, seriously ill patients, known case of HIV/AIDS, patients who are on long term systemic steroid therapy and patients with other non-tubercular infectious diseases of lungs and extrapulmonary Tuberculosis (including tubercular pleural effusion) were excluded from the study. Simple random sampling was used in the study.

Sample size

Sample size was calculated as 81 participants as per previous study showing the prevalence of tubercular infection and disease in children with type 1 diabetes as 29.8% for 80% power, 0.05 α error, and 10% relative error. It was further rounded off to 100 study participants.[2]

Statistical analysis

Statistical evaluation of the data obtained was done on Statistical package for social sciences (SPSS) software, version 16.0 (SPSS Inc., Chicago, IL, USA). Descriptive analysis (mean±standard deviation) of the data was done.

Chi-square test was applied and the level of significance was set at $p<0.05$(highly significant).

RESULTS

Table 1 shows the distribution of patients according to age in both the diabetic and non-diabetic groups. It can be clearly seen that patients with tuberculosis in the diabetic group were 2 (4.00%) in the age group 21-30 years, 5 (10.00%) in the age group 31-40 years, 19 (38.00%) in the age group 41-50 years, 15 (30.00%) in the age group 51-60 years and 9 (18.00%) in the age group more than 60 years. The mean age in diabetic group was 51.92±9.96 years.

Table 1: Distribution of patients according to age (n=100).

Age group (years)	Diabetic group (N=50)		Non-diabetic group (N=50)	
	Number	%	Number	%
< 20	0	0.00	5	10.00
21-30	2	4.00	11	22.00
31-40	5	10.00	13	26.00
41-50	19	38.00	9	18.00
51-60	15	30.00	7	14.00
> 60	9	18.00	5	10.00
Total	50	100	50	100

't' value (< 40 years) = 2.81, p value = 0.015, Significant. 't' value (> 40 years) = 0.33, p value = 0.746, Not significant.

Table 2: Distribution of patients according to gender (n=100).

Gender	Diabetic group (N=50)		Non-diabetic group (N=50)	
	Number	%	Number	%
Male	38	76.00	40	80.00
Female	12	24.00	10	20.00
Total	50	100.00	50	100.00

Z value (male) = 0.48, p value = 0.629, Not significant. Z value (female) = 0.48, p value = 0.629, Not significant.

Table 3: Distribution of patients according to presenting complaints (n=100).

Presenting Complaints	Diabetic Group (N=50)		Non-Diabetic Group (N=50)	
	Number	%	Number	%
Fever	40	80	39	78.00
Cough	45	90	45	90.00
Hemoptysis	5	10	4	8.00
Weakness	47	94	41	82.00
Chest pain	10	20	6	12.00
Weight loss	18	36	27	54.00

While in the non-diabetic group, there were 5 (10.00%) in the age group less than or equal to 20 years, 11 (22.00%)

in the age group 21-30 years, 13 (26.00%) in the age group 31-40 years, 9 (18.00%) in the age group 41-40 years, 7 (14.00%) in the age group 51-60 years, 5 (10.00%) in the age group more than 60 years. The mean age in non-diabetic group was 39.58±15.19 years.

Table 4: Distribution of patients according to duration of diabetes (n=100).

Presenting complaints	Z value	P value	Significance
Fever	0.25	0.81	Not significant
Cough	0.00	1.00	Not significant
Hemoptysis	0.35	0.73	Not significant
Weakness	1.88	0.06	Not significant
Chest pain	1.10	0.272	Not significant
Weight loss	1.84	0.06	Not significant

Thus, it was observed that the majority of the patients in the diabetic group were in the age group more than 40 years, while in the non-diabetic group, majority of the patients were in the age group less than 40 years.

Table 2 depicts the distribution of tuberculosis patients according to gender in both the diabetic and non-diabetic groups. In the diabetic group, there were 38 (76.00%) male and 12 (24.00%) females, while in the non-diabetic group there were 40 (80.00%) males and 10 (20.00%) females. There was a preponderance of male in both the groups over the female patients who had tuberculosis.

The distribution of tuberculosis patients according to their presenting complaints in both the diabetic and non-diabetic groups has been portrayed in table-3 and 4. In the diabetic group, fever was present in 40 (80.00%), cough in 45 (90.00%), hemoptysis in 5 (10.00%), weakness in 47 (94.00%), chest pain in 10 (20.00%) and weight loss in 18 (36.00%).

In the non-diabetic group, fever was present in 39 (78.00%), cough in 45 (90.00%), hemoptysis in 4 (8.00%), weakness in 35 (70.00%), chest pain in 6 (12.00%) and weight loss in 27 (54.00%).

It was concluded that fever, cough and weakness were the three most common symptoms seen in patients with tuberculosis in both the groups.

Table 5 demonstrates the distribution of patients according to duration of diabetes in the diabetic group. There were 16 (32%) patients who had diabetes for a duration less than or equal to 1 year (out of the 50 diabetic patients, 7 are freshly detected in our institution only), 19 (38%) who had diabetes for 2-5 years, 6 (12%) had diabetes between 6-10 years and 9 (18%) had diabetes for more than 10 years duration. The mean duration of diabetes in our study group was found to be 37.30 months (approximately 3 years).

DISCUSSION

In our study, mean age of diabetic group (51.92±9.96 years) was higher than non-diabetic group (39.58±15.19 years), but no significant relationship was seen (p>0.05). This data was supported by other studies like Tatar et al, Bacakoglu et al and Nissapatorn et al.[7-9] It could be explained by the summation of accumulative effects of age and DM on decreasing the function of immune system.

Desmukh reported that majority of cases of tuberculous diabetics belong to the age group of 45 years and above (82.6%).[10]

Majority of the patients in both TB-DM and TB without DM are males. 76% of the subjects under TB-DM category are males. 24% are females. While TB without DM patient's category comprises about 80% of males and about 20% females.

In a study of 2434 cases of pulmonary tuberculosis by Desmukh et al, it was reported that 62.9% were males and 37.1% were females. Among the 138 cases of diabetes with pulmonary tuberculosis, 72.4% were males and 27.53% were females.10 Tripathy et al reported that 78% of their patients were males.[11] The high incidence of disease in males is possibly due to the fact that both tuberculosis and diabetes are more common in males.

We found that in the diabetic group, fever was present in 80.00%, cough in 90.00%, hemoptysis in 10.00%, weakness in 94.00%, chest pain in 20.00% and weight loss in 36.00%.

In the non-diabetic group, fever was present in 78.00%, cough in 90.00%, hemoptysis in 8.00%, weakness in 70.00%, chest pain in 12.00% and weight loss in 54.00%. in our study, we observed that there is no difference in the symptomatology between diabetic and nondiabetic patients which was also observed in other studies.[8,9,12]

There were 32% patients who had diabetes for a duration less than or equal to 1 year (out of the 50 diabetic patients, 7 are detected in our institution only, so these are the freshly detected diabetics), 38% who had diabetes for 2-5 years, 12% had diabetes between 6-10 years and 18% had diabetes for more than 10 years duration. So, we found that majority of patients have duration of diabetes from 1-5 years.

The interval between detection of diabetes and the onset of pulmonary tuberculosis was studied by Tripathy et al. They reported that it varied from several months to 15 years, mean interval being about 6 years.[11,13] Some studies have reported that there is no correlation between the

duration of diabetes and the development of pulmonary tuberculosis.[11,14]

The duration of diabetes is significant because there is an increased opportunity for infections with increased duration of diabetes.

CONCLUSION

The mean age in diabetic group was 51.92±9.96 years, while that in non-diabetic group was 39.58±15.19 years. There was a preponderance of male in both the groups over the female patients. There is no significant difference in the symptoms in both the groups.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Ruslami R, Aarnoutse RE, Alisjahbana B. Implications of the global increase of diabetes for tuberculosis control and patient care. Trop Med Int Health. 2010;15(11):1289-99.
2. Webb EA, Hesseling AC, Schaaf HS, Gie RP, Lombard CJ, Spitaels A et al. High prevalence of mycobacterium tuberculosis infection and disease in children and adolescents with type 1 diabetes mellitus. Int J Tuberc Lung Dis. 2009;13(7):868-74.
3. Ottmani SE, Murray MB, Jeon CY, Baker MA, Kapur A, Lonnroth K et al. Consultation meeting on tuberculosis and diabetes mellitus: meeting summary and recommendations. Int J Tuberc Lung Dis. 2010;14(12):1513-7.
4. Stevenson C R, Critchley J A, Forouhi N G. Diabetes and the risk of tuberculosis: a neglected threat to public health. Chronic Illn. 2007;3:228-45.
5. Jeon C Y, Murray M B. Diabetes mellitus increases the risk of active tuberculosis: a systematic review of 13 observational studies. PLOS Med. 2008;5:e152.
6. Baker M A, Harries A D, Jeon C Y. The impact of diabetes on tuberculosis treatment outcomes: a systematic review. BMC Med. 2011;9:81.
7. Tatar D, Senol G, Alptekin S, Karakurum C, Aydin M, Coskunol I. Tuberculosis in Diabetics: Features in an Endemic Area. Jpn J Infect Dis. 2009;62(6):423-7.
8. Nissapatorn V, Kuppusamy I, Jamaiah I, Fong My, Rohela M, Anuar AK. Tuberculosis in diabetic patients A clinical perspective. Southeast Asian J Trop Med Public Health. 2005;36(Suppl 4):213-20.
9. Bacakoglu F, Basoglu OK, Cok G, Sayiner A, Ates M. Pulmonary tuberculosis in patients with diabetes mellitus. Respiration. 2001;68(6):595-600.
10. Deshmukh PA, Shaw T. Pulmonary tuberculosis and diabetes mellitus. Ind J Tub. 1984;31:114.
11. Tripathy SR, Kar KP, Chakraborthy DC, Majumdar AK. Diabetes mellitus and pulmonary tuberculosis – A prospective study. Ind J Tub. 1984;31:122.
12. Al-Wabel AH, Teklu B, Mahfouz AA, Al-Ghamdi AS, El-Amin OB, Khan AS. Symptomatology and chest roentgenographic changes of pulmonary tuberculosis among diabetics. East Afr Med. J.1997;74:62-4.
13. Nihalani KD, Menon P. Diabetes association with pulmonary tuberculosis. J Diabetes Assoc India. 1978;18:79.
14. Sachdeva AK, Arora RC, Misra DN. Clinicoradiological study of pulmonary tuberculosis in diabetics. J Assoc Physicians India. 1984;32:30.