Original Research Article

Study of the incidence of different types of tuberculous lesion in association with diabetes mellitus in Indian patients

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Abstract

Background: Tuberculosis (TB) is one of the most common infectious diseases worldwide. It is well known that diabetes mellitus (DM) impairs the immunity of patients and therefore is an independent risk factor for infections such as TB. Hence keeping all above things in mind we had undertaken this study with following aims and objectives: to find out the incidence of different types of tuberculosis in patients suffering from diabetes mellitus; to prevent early mortality and morbidity caused by tuberculosis and early diagnosis and treatment of diabetes mellitus in patients of tuberculosis and vice-versa. **Materials & Methods:** In the present work a total number of 100 (hundred) patient were selected in which patients had history of diabetes mellitus and having complaints of cough with productive sputum for more than four weeks. Sputum examination for A.F.B, sputum culture examination, Skiagram of the chest PA view, tuberculin skin test, ELISA for mycobacterium tuberculosis, biochemical, cytological examination and culture of ascitic, pleural, pericardial and cerebrospinal fluid. Others supportive investigations were complete blood examination, ESR, USG of abdomen, echocardiography, C.T. Scan of Brain, Spine, Abdomen etc. and tissue biopsy – by fine needle aspiration of affected side was taken and cultured. **Results:** About 100 cases of diabetes mellitus were taken from indoor and outdoors in Rajendra Institute of Medical Sciences, Ranchi of these patients 20 were found with tuberculous lesion. In 20 diabetic tuberculosis patients, 11 were male and 9 were female. In these patients, 16 were belonging to rural area and 4 were from urban area. Extra pulmonary tuberculosis was found in 14 patients and pulmonary tuberculosis in 6 patients. The incidence of tuberculous infection is associated with more in type 2 diabetes mellitus than type 1 diabetes mellitus, 17 & 3 cases respectively. The most common clinical feature was cough with or without expectoration, than fever and weakness. Pleural effusion is the most common extra pulmonary tuberculous lesion. Most of the tuberculous lesions are diagnosed by Chest X-Ray PA-view. In diabetic pulmonary tuberculous lesion, 45% cases are found in advanced stage. **Conclusion:** This study shows the incidence of tubercolous infection in diabetes mellitus in gradually increasing. Extra pulmonary types of tuberculosis are more in diabetic patients. Rural populations are more prone to be infected with tuberculosis. The future studies will within corborate or contradict the present finding and thereby strengthen the observation made in the present study.

Keywords: Pulmonary and extra pulmonary tuberculosis, diabetes mellitus, association, incidence, diagnostic tests, mortality

Introduction

With the continued advancement of civilization and further achievement in medical sciences, diseases like AIDS, Myocardial infarction, cerebrovascular accidents and Malignacies are attracting more or our attention. But an ancient disease of man "Tuberculosis" still remains one of the most wide spread diseases in the world occurring mostly in the developing and underdeveloped countries. The disease had rapidly dimnishing proportion in western world due to rapid socio-economical improvement and effective control programme, for the disease [1, 2].Tuberculosis has already beeen declared a "global emergency" by W.H.O. in 1992 with an estimated one third of the world population infected with mycobacterium tuberculosis. But tuberculosis continues to be India's biggest health problem and responsible for every year, approximately, 1.8 million persons develop tuberculosis of which about 0.8 million are new smear positive highly infectious cases. About 4.17 lakh people die every year, one person dies every minute and about 1000 people die every day. Every day in India, more than 20,000 people become infected with the tuberculous bacillus and more than 5,000 people develop the disease [3, 4].Tuberculosis is a gradually progressive debilitating disease; it is a narcotizing bacterial infection with protean manifestations and wide distribution. The lungs are most commonly affected but lesions may also occur in bones, lymph nodes, meninges, and kidneys or disseminated throughout the body.

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Tuberculosus is mainly caused by Mycobacterium tuberculosis, but also caused by M. bovis, M. xenopi, M. Kansasii, M. malmoense, M. fortuitum, M. Chelonei, M. mornium, M. haemophulum, MAC, etc. Robet Koch described mycobacterium tuberculosis in 1882. Mycobacterium has unique thick wall, composed of glycolipids and lipids. The lipid coat rich of the mycobacterium are resistant to decolourisation following Carbolfuschin staining so called "Acid Fast Bacilli" [5, 6].In the course of disease process, tuberculosis appears as pleurisy, empyema or pyopneumothorax, pneumothorex, tuberculous entrities or laryngitis, tuberculous peritonitis, tuberculous lymphaden-itis, tuberculous spine or osteomyelitis, tuberculous meningitis etc. The word Diabetes derived from the Greek meaning Siphon an obvious reference to the polyurea and polydypsia that are cardinal manifestation of this disorder. Diabetes mellitus is the most common of the serious metabolic disease [7, 8].Diabetes mellitus is a clinical syndrome characterized by hyperglycemia due to relative or absolute deficiency of insulin. Lack of insulin affects metabolism of carbohydrate, protein, fact, water and electrolytes. The longstanding metabolic derangements are frequently associated with permanent and functional irreversible and structural damage in the cells of the body, those of the vascular system being particularly susceptible [9].

Chronic hyperglycemia is strongly associated with the severity of microvascular and neurologic complications. The presence of these complications add to the risk of infections. The predisposition for infection may also be based on conditions that interfere with normal clearance mechanisms and disturbance of immue cell function. Elevated blood sugars affect the cell mediated humoral immunity and the complement system. All aspects of neutrophil function i.e. adherence, chemotaxis, phagocytosis and intracellular lysis of the phygocytosed organisms that are critical in limiting invasion by microorganisms have been shown to be adversely affected by hyperglycemia. In diabetic patients many types of infections occur. In above infections, tuberculous infection is major health problem. The appreciation regarding association of both the disease in respect of incidence and prevalence in our part is however inadequate [9, 10]. The frequent association of diabetes mellitus and tuberculosis has been observed since long. The prevalance of tuberculosis in diabetics is 2–4 times higher than in the non-diabetic population. Extra pulmonary tuberculosis is more common in diabetic subjects. Pulmonary tuberculosis in diabetics tend to involve the lower lobes more commonly with higher rates of cavitatory lesions. Pleural effusions can be unilateral or bilateral. Immune response is impaired and cells functions are gradually altered in diabetic patients. Hyperglycemia aids the colonization and growth of tuberculous bacilli. Hyperglycemia impairs pulmonary function by following ways : impaired host immune response, impared ciliary motility, reduced lung function, reduced bronchial reactivity, reduced diffusion capacity and reduced ventilatory response to hypoxemia and hyperglycemia [11, 12].Hence keeping all above things in mind we had undertaken this study with following aims and objectives: to find out the incidence of different types of tuberculosis in patients suffering from diabetes mellitus; to prevent early mortality and morbidity caused by tuberculosis and early diagnosis and treatment of diabetes mellitus in patients of tuberculosis and vice-versa.

Materials & Methods

In the present work a total number of 100 (hundred) patient were selected in which patients had history of diabetes mellitus and having complaints of cough with productive sputum for more than four weeks, loss of weight, loss of appetite, low grade fever, haemoptysis etc. Patients were either attending out door department or admitted in different wards of Medicine Department and T.B. & Chest Unit, Rajendra Institute of Medical Sciences, Ranchi. Clinical symptoms and signs were noted. History of presetting illness, history of past illness – like diabetes, tuberculosis etc, personal history, family history and menstrual & obstetric history if female patient were noted.

Investigations Methods for Diagnosis of Diabetes Mellitus

Urine sugar examination and routine examination of urine

Appearance of yellow or red deposit on performing Benedict's Test Indicates presence of reducing substance (i.e. sugar) in urine. Presence of sugar in urine known as glycosuria is suggestive of diabetes but is insufficient evidence on which to base a diagnosis. As Benedict's test for urine surgar has many fallacies hence urine sugar examination was done by DIASTIX. This test is based on a double sequential enzyme reaction. One enzyme, glucose oxydase, catalyses the formation of gluconic acid and hydrogen perosixde from the oxidation of glucose.Second enzyme catalyses the reaction of hydrogen peroxide with a potassium iodine chromogen to colors ranging from green to brown. A fresh urine sample was collected in a clean container. After taking a test strip from Diastix bottle, the test area of the Diastix strip was dipped in the container containing urine sample. While removing edge of strip was drown/wiped against the rim of urine container to remove excess urine. Excess urine was also removed by shaking. The colour of test area of Diastix was compared with colour chart at exactly 30 seconds after wetting, in good lighting. The results were then recorded as 1+, 2+, 3+ and 4+.

Fasting and random plasma glucose estimation

As per ADA criteria fasting plasma glucose is more or equal to 126 mg./dl. or random plasma glucose more or eqal to 200 mg/dl. is diagnostic of diabetes mellitus. Plasma glucose was estimated by GOD/POD method, which is available at Department of Biochemistry, RIMS, Ranchi. Glucose is oxidized by glucose oxidase (GOD) into Gluconic Acid and Hydrogen Peroxide in the presnece of Peroxides (POD) oxidizes the chromogen 4-Amino Antipyrine/ Phenolic compound to a red colored compound. The intensity of the red colored compound is proportional to the glucose concentration and is measured at 505 nm (490–530 nm). The final colour is stable for 2 hours. About 2 ml. of venous blood is collected and kept in a vial with fluoride-oxalate mixture, that acts as an anticoagulant and fluoride inhibits glycolysis. In this the samples are stable for 24 hours at room temperature and for one week at 2–8 degree centigrade. Hemolysed or grossly contaminated samples are not used. About 2 ml. of venous blood collected is centrifuged in a test tube, and the plasma obtained. The samples and the reconstituted reagent are brought to room temperature prior to use. The following general parameters are to be used with this kit.

Oral glucose tolerance test

Patient should be encouraged to travel to clinic by transport (minimal exercise) & to arrive any least 30 minutes before the test to allow time to relax and receive information about the test. Patient should seat quietly throughout the test. About 75 gm. of anhydrous glucose is dissolved in 250 ml. water; flavoring with sugar free fruit essence chilling increase palatability and may help to reduce associated nausea. A venous line may be inserted if preferred & kept patient by flushing with 1.5–2.0 ml. sterile isotonic saline. The line should be withdrawn and discarded immediately before subsequent sampling. Venous blood is sampled before (time 0) & 120 minutes after ingestion of the drink (which should be completed within 5 minutes). Plasma (preferred) or whole blood glucose samples are taken. Urinalysis may also be performed every 30 minutes (but is only undertaken if a significant alteration in renal threshold for glucose is suspected. Collected samples were treated as in fasting plasma glucose test and reading were taken from biochemical analyzer.

Methods of the diagnosis of tuberculosis

Sputum examination for A.F.B, sputum culture examination, Skiagram of the chest PA view, tuberculin skin test, ELISA for mycobacterium tuberculosis, biochemical, cytological examination and culture of ascitic, pleural, pericardial and cerebrospinal fluid. Others supportive investigations were complete blood examination, ESR,USG of abdomen, echocardiography, C.T. Scan of Brain, Spine, Abdomen etc. and tissue biopsy – by fine needle aspiration of affected side was taken and cultured.

Biochemical, cytological examination and culture of ascitic, pleural, pericardial and cerebrospinal fluid

Body fluids (ascitic, pleural and pericardial) were collected aseptically in at least two test tubes for physical, chemical and cytological examination and for culture.In a standard bore test tube 0.5 ml. of clear fluid supernatant after centrifugation added to 3.0 ml. of sulphosalicylic acid reagent. Then it mixed gently and left for 5 minutes. The content of test tube was mixed & test was compared in a visual colorimeter with a set of turbidity standards. About 1 ml. of CSF taken in a test tube containing 2–3 ml. of distilled water. 1–2 drops of 10% potassium chromate solution added. Then this tirated with silver nitrate solution by adding drop by drop fro a 25 ml. burette. When the end point was reached, silver nitrate volume was noted.Undiluted fluid was examined; but if it grossly bloody a part of the fluid might be diluted within 3% acetic acid to haemolyse red cells. For different count, centrifuged deposit used whch provides concentration of leucocytes. Film was stained by 1% aqueous methylene blue or by Leishman stain.

Mesothelial Cells

The Mesothelial cells were reported as percentage of leucocytes, which has clinical significance in pleural fluid. The underlying disease stimulates hyperplasia of mesothelium. The cells were larger than normal and vary in size and some show binucleatio [13].

Tumour Cells

Metastatic maligant cells vary in size, shape and number enormously. The background was bloody in at least one-third of cases. The cells may be found signly, in sheets and in acini or papillary formation. Nuclear cytoplasmic ratio of the cells was increased and the enlarged nuclei show malignant features [13]

Results

Table 1: Age distribution of study particpiants

Age in Years	No. of Cases	Percentage
11–25	10	10%
26–40	19	19%
41–55	30	30%
56–70	34	34%
70 & Above	07	07%
Total	100	100%

The above table 1 shows most of the studies groups were found in sixth & seventh decades of lib fe commonly, which probably signifies poor physical immunity in that age group.

Table 2: Age and sex distribuion of the cases studies

Age in Years	Male	Female	Total
11–25	6	4	10
26–40	11	8	19
41–55	20	10	30
56–70	22	12	34
70 & Above	5	2	7
Total	**64**	**36**	**100**

The above table 2 shows that out of 100 cases 64% were male & 36% were female. The age varied from 15 to 80 years. Male are more affected than female, this might be because of their constant exposure to the community during working hours, where open cases are roaming about ungourded.

Table 3: Types of tuberculosis among male & females subjects

Age in Years	Male	Female	Total
Pulmonary tuberculosis	5	1	6
Extra pulmonary tuberculosis	6	8	14
Total	**11**	**9**	**20**

This table 3/Fig. 1 shows the incidence of different types of tuberculosis in 100 diabetic patients had 20%. In different types, extra pulmonary tuberculosis cases were 14 (70%) & pulmonary tuberculosis was 6 (30%). The table also shows that the incidence of tuberculosis were more in male 11 (55%) than female 9 (45%).

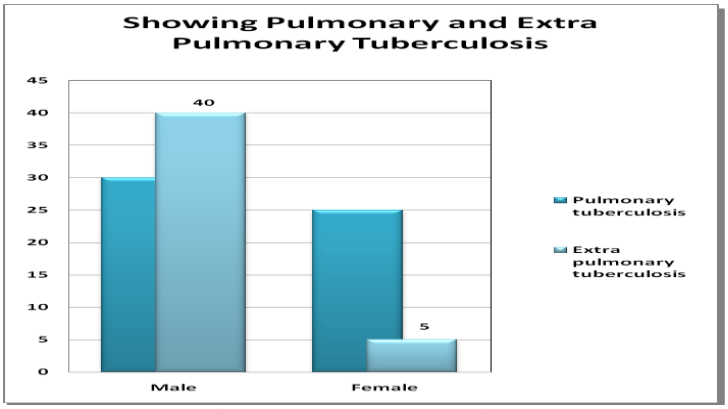

Fig 1: Types of tuberculosis among male & females subjects

Table 4: Incidence of types of diabetes mellitus among tuberculosis patients

Types	No. of Tuberculosis Patients		Total
	Male	Female	
Type–1 Diabetes Mellitus	2	1	3
Type–2 Diabetes Mellitus	9	8	17
Total	**11**	**9**	**20**

The above table 4 shows that out of 20 diabetic tuberculosis cases, 3 (15%) cases were type 1 diabetes mellitus & 17 (85%) cases were type 2 diabetes mellitus. In type 1 diabetes mellitus patients, 2 (10%) were male & 1 (5%) was female. In type 2 diabetes mellitus patients, 9 (45%) were male & 8 (40%) were female. Here also the male prepondrence is obvious.

Table 5: Incidence of tuberculosis infection with respect to socio-economic status

Socio-Economic Status	Low	Middle	High	Total
Pulmonary Tuberculosis	3	2	1	6
Extra Pulmonary Tuberculosis	6	5	3	14
Total	**9**	**7**	**4**	**20**

This table 5 shows that the low socio–economic class patients had more incidence of tuberculosis 9 (45%). The incidence of tuberculosis in high socio–economic class had lower 4 (20%) than the middle class families 7 (35%). The incidence of extra pulmonary tuberculosis is higher than pulmonary tuberculosis.

Table 6: Percentage of cases in rural and urban area affected by pulmonary and extra pulmonary tuberculosis

Area	Urban		Rural	
	Male	Female	Male	Female
Pulmonary Tuberculosis	1	0	4	1
Extra Pulmonary Tuberculosis	1	2	5	6
Total	2	2	9	7
	4 = 20%		16 = 80%	

In this table 6, the incidence of tuberculosis in diabetes mellitus were found more in rural area 16 (80%) cases than the urban area 4 (20%). Rural male were more affected 9 (45%) than the urban male 2 (10%). Rural female were more 7 (35%) where as rural male were 9 (45%).

Table 7: Percentage of clinical manifestations in cases of tuberculosis in DM

Sl. No.	Clinical Features	No. of Patients	Percentage
1.	Cough with or without expectoration	19	95%
2.	Fever	17	85%
3.	Weakness & malaise	17	85%
4.	Loss of weight	15	75%
5.	Loss of appetite	13	65%
6.	Breathlessness	11	55%
7.	Haemoptysis	9	45%
8.	Chest pain	7	35%
9.	Swelling of legs	6	30%
10.	Distesion of abdomen	4	20%
11.	Uncounsciousness	2	10%
12.	Swelling of gland	1	5%
13.	Others Features (like Paraparesis, Polyurea, Polydipsia, Headache etc.)	10	50%

The above table 7 shows that out of 20 cases of diabetes mellitus and tuberculosis, 95% had cough with or without expectoration, 85% had fever & 85% had weakness & malaise. 75% patients presented with loss of weight & 65% with loss of appetite symptoms like breathlessness, haemotysis& chest pain manifested as 55%, 45% & 35% respectively.

Table 8: Different types of tuberculosis lesion in patients with DM according to the Chest X–Ray, U.S.G. of Abdomen, Echo-Cardiography& C.T. of Brain

	Types of Lesion	No. of Patients	Percentage of Cases
1.	Pleurisy with effusion	6	30%
2.	Fibrocavitatory lesion	4	20%
3.	Fibroinfiltrative lesion	3	15%
4.	Abdominal & intestinal tuberculosis	2	10%
5.	Tuberculous meningitis	2	10%
6.	Tuberculous pericardial effusion	1	5%
7.	Miliary tuberculosis	1	5%
8.	Tuberculous lymphadenitis	1	5%
9.	Other types of tuberculosis (like genito-urinary T.B., adrenal T.B., T.B. spine etc.)	0	0%

Above table 8 shows that the maximum incidence of pleural effusion 6 (30%) cases were found. Other types of lesion, fibro cavitatory lesions were 4 (20%) cases &fibro infiltrative lesions were 3 (15%) cases, they were fond to be relatively less.

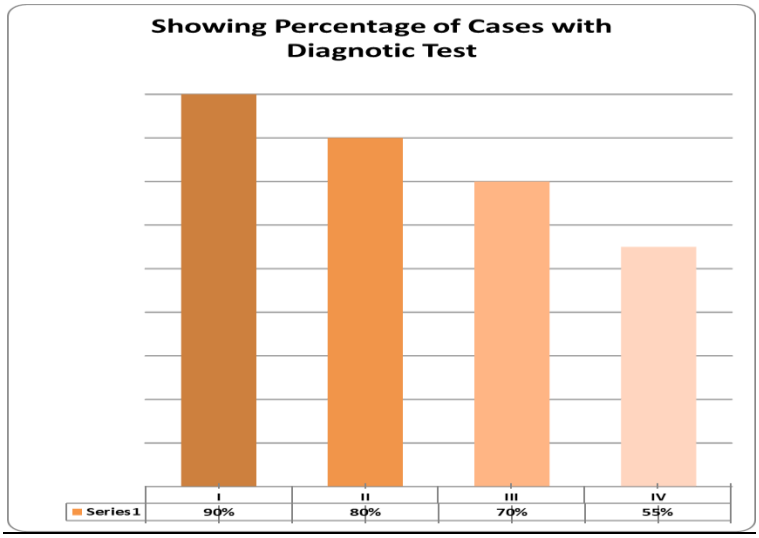

Fig 2: Showing percentage of cases with diagnositc tests

I. Chest X-Ray evidence suggestive of T.B. = 90%
II. ELISA Test-Positive = 80%
III. Mantoux Test Positive = 70%
IV. Sputum Test Positive for AFB = 55%

Table 9: Percentage of cases with sputum postive for AFB, Mantoux test positive, ELISA test positive or chest X-Ray evidence suggestive of tuberculosis

Sl. No.	Group of Patients	No. of Cases	% of Cases
1.	Sputum Culture Positive for AFB	09	45%
2.	Sputum Test Positive for AFB	11	55%
3.	Mantoux Test Positive	14	70%
4.	ELISA Test Positive	16	80%
5.	Chest X–Ray Suggestive of Tuberculosis	18	90%

Above table 9 shows that the chest x-ray evidence for tuberculosis were found in 90% cases. ELISA for mycobacterium tuberculosis was positive in 80% of cases. Mantoux test was positive in 70% of cases. Thus contributing the importance of chest x-ray over other contemporary test.

Table 10: Severity of lesion according to Chest X–Ray (National T.B. Association of India 1969) with their percentage of 20 tuberculosis patients

Sl. No.	Chest X-Ray Lesion finding	No. of Cases	% of Cases
1.	Minimal Lesion	5	25%
2.	Moderately Advanced Lesion	6	30%
3.	Far Advanced Lesion	9	45%

Table 10 showing that the far advanced lesion in Chest X–Ray were more common 45% cases in diabetic patients. Moderate & minimal lesions were identified in 30% & 25% of cases respectively.

Table 11: Percentage of mortality in diabetic tuberculosis patients.

Sl. No.	Types of Tuberculosis	No. of Cases	No. of Mortality	%
1.	Pulmonary Tuberculosis	6	2	10%
2.	Extra Pulmonary Tubercuslosis			
	a. Pleural effusion	6	3	15%
	b. Abdominal tuberculosis	3	1	5%
	c. Tuberculosis meningitis	2	1	5%
	d. Pericardial effusion	1	1	5%
	e. Miliary tuberculosis	1	0	0%
	f. Tuberculosis meningitis	1	0	0%

Table 11 shows that the mortality of tuberculosis patients with diabetes mellitus was 45% & more by tuberculous pleural effusion. Other lesions also contributed mortality but their incidence was insignificant.

Discussion

The present study was undertaken to establish the incidence of different types of tuberculous lesion in patients with diabetes mellitus at RIMS, Ranchi. It also will decide its relation with age, sex, socio-economic status types of diabetes mellitus, relation with rural and urban population, diagnostic investigations of tuberculous lesion and severity of the lesion. In this study 100 diabetic patients were taken in which both types of diabetes mellitus included. Patients age groups started from 15 years to 80 years.

Incidence of tuberculous lesion in diabetes mellitus

There were 20 cases of tuberculous infection found in 100 diabetic patients. Of 20 tuberculous cases, 14 cases (70%) were extra pulmonary tuberculosis & 6 (30%) cases were pulmonary tuberculosis. Sridhar C.B. at al also got the 89 (7.41%) patients had tuberculosis out of 1200 type 2 diabetes (in 2002) [14]. Root H.H. in 1934 noted that the development of tuberculosis followed the onset of diabetes in 85% of cases [15]. Alfredo (2004) at al noted that rate of tuberculosis increased 6–8 fold in patients with diabetic [16].

Tuberculosis more commonly associated with diabetes mellitus type 2, than type 1 diabetes mellitus, 17 cases (85%) and 3 cases (15%) respectively. Among type 2 diabetes mellitus, 9 patients (45%) were male & 8 patients (40%) were female. Zhu H (2002) et al studied 87 pulmonary tuberculosis patients with type 2 diabetes mellitus and found 31 variables was associated with diabetic pulmonary tuberculosis patients [17]. D.C. Lahiri and P.K. Sen (1971–72) studied in 875 patients in which tuberculosis were associated with diabetes among them 88% were male and 12% were female [18].

The incidence of tuberculosis varies with patients socio -economic status and rural versus urban area distribution. Tuberculosis was more common in low and middle socio-economic class 45% & 35% respectively. Similarly the incidence of diabetes tuberculosis in rural area was more, 16 cases (80%) than the urban area 4 cases (20%).

Table 7 shows the different types of clinical manifes-tations by which patients admitted. Among them most common feature was cough with or without expectoration in 95% cases. Fever and weakness with malaise were present in 85% of cases. There was no such study in the past to compare this.

Table 8 shows different types of tuberculous lesion. In these tuberculous lesions, tuberculous pleural effusion was found in 6 cases (30%) of extra pulmonary tuberculous lesion. In 6 cases of pulmonary tuberculosis, fibrocavitatory lesion was found in 4 cases (20%). Abdominal tuberculosis and tuberculous meningitis were found in 3 (15%) and 2 (10%) of cases respectively. Sridhar CB (2000) found 89 tuberculosis patients out of 1200 diabetics. There presentations were pulmonary parenchymal, pleural effusion, meningitis, lymphadenitis and brain tuberculoma. 3 (3.3% patient had miliary presentation. SkodricTrifunovic (2004) analysed that the 50% of patients had a moderately-disseminated form of the disease with bilateral changes while the other 50% had a dissemninated form.

Among investigations, Chest X–Ray evidence was more suggestive and more commonly found in 90% of the studied cases. ELISA test was found positive in 16 (80%) cases. In 14 cases (70%), Mantoux test was found positive. Sputum for AFB test was positive in 11 cases (55%). Sridhar et.al.(2000) found 39 (43.9%) cases of sputum positive for AFB. Thus differing from the above workers [14].

Table 10 showing that in diabetic patients, tuberculous lesion was appeared as more severe form in Chest X–Ray. 9 (45%) cases were found as far advanced lesion. Moderate lesion was present in 6 (30%) cases. Ezung T (2002) showed that out of 27 radiological diagnosis of tuberculosis patients 11 patients had minimal lesion, 7 had moderate lesion and 9 patients had advanced lesion [19]. Shaikh MA described that among diabetic patients, lesions present on lower lung field or cavities found to which present studies also agree. Table 11 shows the mortality among diabetic tuberculosis patients. Mortality by extra pulmonary tuberculosis was more (6 cases) than pulmnary tuberculosis (2 cases) out of 8 cases [20].

Schmitt WG et al (1983) observed that in post-primary tuberculosis, the most common form of the disease in the adult, the patient usually presents with an infiltration with or without cavitation involving the posterior segment of the upper lobes. Less commonly the superior segment of the lower lobe is first to be involved. The middle or lingular lobe involvement classically follows involvement of upper lobe.

Root HH in 1934 studied 245 cases of tuberculosis associated with diabetes and made the following observations: development of tuberculosis in juvenile diabetics occurred 10 times more frequently than amongst non-diabetics patients and development of tuberculosis followed the onset of diabetes in 85% cases [15].

Sridhar C.B. et.al.(2000) studied in South Indian Hospital during the period 1993 to 1999 on 1200 type 2 diabetic patients for infection as a cause for their morbidity & mortality [14]. He found that 89 (7.41%) patients had evidence of tuberculosis. Their presentations were pulmonary parenchymal, pleural effusion, meningitis, lymphadenitis and brain tuberculoma. The parenchymal lesions were affecting the mid, lower zones, in addition to being bilateral 3 (3.3%) patients had a milliary presentation. In 39 (43.9%) cases AFB could be isolated from the sputum. There were 5 (5.6%) death in this study. 3 (3.3%) had meningitis and other 2 (2.2%) had extensive bilateral parenchymal involvement.

Bacakoglu et.al. (2001) in Turkey, done a retrospective review study of all tuberculosis and diabetic patients seen during his 14 years study period and an age and sex matched nondiabetic control group with tuberculosis also taken. The duration of symptoms, tuberculin reaction, bacteriologic and radiographic findings of two groups were compared. These data show that diabetes does not affect the presenting features of pulmonary tuberculosis to a large extend and is only associated with lower lung field disease in older patients [22].

Ezung T. et.al.in 2002, selected one hundred diabetes mellitus patients attending or admitted in the medical wards of the Regional Institute of Medical Scicnes, Imphal. These patients were studied for prevalence of tuberculosis with age &sexwise distribution. The prevalence of pulmonary tuberculosis in diabetes was 27% by radiological diagnosis & 6% by sputum positivity. Out of 27 patients with radiological findings 11 had minimal lesions, 7 had moderate lesions and 9 patients were found to have far advanced lesions; cavitation was found in 3 patients, fibrosis in 4, homogenous ocacities in 6, heterogeneous opacities in 10, pleural effusion in 3 and consolidation & fibrosis in only in patients [19].

Mboussa J et.al.(2003) done a retrospective study at Brazzaville University Hospital, Congo. He selected 32 diabetic patients with tuberculosis from January 1994 to December 1998. This group was compared with a control group of 100 non-diabetic patients with tuberculosis. Diabetes appeared to have an induction and aggravating effect on tuberculosis. Tuberculosis is more frequent in diabetics than non-diabetics. Radiological signs of tuberculosis are more pronounced in diabetics. Treatment failure and death are also more frequent [23].

Shaikh MA et.al.(2003) in Saudi Arabia studied in between January 1998 to December 1999, in 692 consecutive smear positive pulmonary tuberculosis patients. In these 187 (27%) patients had an associated diabetes mellitus. The radiographic findings of pulmonary tuberculosis patients with diabetes mellitus where compared to those without diabetes mellitus. The patients of pulmonary tuberculosis with diabetes mellitus group are more likely to present with a typical radiological images. Among diabetic patients presenting with lower lung field lesions or cavities possibility of tuberculosis should always be considered for prompt diagnosis and management [20].

Skodric–Trifunovic V. et al (2004) in Serbia studied over three years period 2000–2002 to analyze the incidence and association between tuberculosis and diabetes mellitus. Analysis of clinical forms of tuberculosis at the time of detection revealed that 50% of patients had a moderately disseminated form of the disease with bilateral changes while the other 50% had a disseminated form. Radiological

findings of tuberculosis in diabetics was manifested atypically in the lower pulmonary fields with bronchopneumonic shadows found in 11.1% of patients [24].

Alfredo et.al. (2004) studied between 1995 march to 2005 march and 581 patients with mycobacterium tuberculosis culture and finger print were diagnosed, in which 29.6% where previously diagnosed as diabetics. The estimated rates of tuberculosis for the study area were greater for patients with diabetics than for nondiabetic individuals. Thus the rate of tuberculosis was increased 6–8 fold patients with diabetes due to increase in both reactivated and recently transmitted infection. SpomenkaLjubic et.al.(2005) at Croatia in 2004 stutied the association between diabetes and tuberculosis. He found many patients had pulmonary tuberculosis in diabetic population. Similarly, the incidence of diabetes amongst tuberculosis patients was much higher compared to normal population [16].

At three hospitals in Tianjin during October 2001 to October 2002 Zhu H. (2006) conducted a case-control study to explore risk factors for pulmonary tuberculosis among type 2 diabetes mellitus patients. 87 newly diagnosed pulmonary tuberculosis with type 2 diabetes mellitus were recruited as cases and 129 type 2 diabetes mellitus patients were chosen as controls. He found 31 variables were associated with diabetic pulmonary tuberculosis patients. The modified multivariate logistic regression analysis found that bad contact factor, severe state of diabetes mellitus, bad habits factor and low intake of salt were generally associated with increased risk of diabetic pulmonary tuberculosis [17].

Conclusion

Mortality occurred in 40% of studied cases and mainly from extra pulmonary tuberculous types of lesion. The present study has pointed out many similarities as described previously by other workers in this topic. This study shows the incidence of tubercolous infection in diabetes mellitus in gradually increasing. Extra pulmonary types of tuberculosis are more in diabetic patients. Rural populations are more prone to be infected with tuberculosis. The future studies will within corborate or contradict the present finding and thereby strengthen the observation made in the present study.

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