



THE STUDY OF PULMONARY TUBERCULOSIS IN DIABETES MELLITUS PATIENTS

HARIPRASAD S¹, RAMAKRISHNA M R², TRUPTI R R³, SREEKANTHA*⁴,
AVINASH S S⁵ AND VINODCHANDRAN⁶.

1-Department of Medicine,RIMS,Raichur,Karnataka.

2- Department of Medicine,NMC,Raichur,Karnataka.

3-Department of Physiology,NMC, Raichur,Karnataka.

4-Department of Biochemistry,NMC, Raichur,Karnataka.

5- Department of Biochemistry,FMMC,Mangalore,Karnataka.

6- Department of Biochemistry,KMC,Manipal University,Mangalore,Karnataka.

ABSTRACT

OBJECTIVES: Clinical and radiological study of pulmonary tuberculosis in diabetic patients. **METHODS:** 100 cases of diabetes mellitus with pulmonary tuberculosis were studied. Their clinical profile and chest radiograph results were analyzed. **RESULTS:** The predominant clinical symptoms noted were anorexia (80%), cough (73%), fever (56%). 62.5% of male patients were smokers. Clubbing was noted in 10% of our patients. Average duration of diabetes was 6.6 years. 51% of patients were anemic and 52% of patients had an erythrocyte sedimentation rate above 50mm/hr. The average FBS value was 234.4 mg/dl. 81% of patients were sputum positive for acid fast bacilli under the age of 40 years. Cavitory lesions were noted in about 53% of patients. 38% of patients had infiltration. Fibrosis was noted in 37% of patients above 40 years. Lower lung field involvement was noted in 32% of patients and was more common in patients greater than 40 years. **INTERPRETATION AND CONCLUSION:** Multiple cavities and multiple lobe involvement are more common in tuberculous diabetics and lower lung field is involved more commonly in older age group patients. Severe hyperglycemia appears to be a contributory factor to the development of pulmonary tuberculosis in diabetics. Diabetes appears to have no effect on the presenting features of pulmonary tuberculosis to a large extent.

KEYWORDS: Diabetes mellitus, pulmonary tuberculosis, hyperglycemia.



SREEKANTHA

Department of Biochemistry, NMC, Raichur, Karnataka.

INTRODUCTION

Tuberculosis, one of the major public health problems in the developing countries of the world today, has made its impact felt throughout the ages. No other disease has so much sociological, economic and health significance as tuberculosis has. Tuberculosis can be traced back to the early history of mankind. In our country it has been known since the vedic ages, that is about 5000 years ago. It is world wide in distribution and strikes both the rich and the poor, all races and both sexes. Despite all efforts to eliminate tuberculosis, it continues to be one of the most prevalent infection in the world. 90% of the infected persons do not develop disease in their life time because of immunity that they develop against it or immunization with BCG vaccination. Even with this situation, there are more than 20 million active TB cases in the world and 85% of the burden of TB cases is in the poor developing countries and of this India bearing 50% of the cases. According to WHO, an estimate of 3 million people die due to tuberculosis each year. People in the productive age group i.e. young adult in 15-45 years of age are most affected, thus badly affects the social and economic development of a country¹. The seriousness of the association of pulmonary tuberculosis and diabetes mellitus was first noted by the great Arab Physician Avicenna nearly 1000 years ago. The link between diabetes mellitus and pulmonary tuberculosis has been talked of at various fora but has never occupied the centre stage of discussions. Presently, an epidemic of diabetes is on both in developed and developing nations. With the recognition of this explosive, increase in the number of people diagnosed with diabetes mellitus all over the world, a whole new field of issues related to interaction between diabetes and pulmonary tuberculosis has been laid open. The global figure of people with diabetes is projected to rise from the current estimate of 150 million to 220 million in 2010 and 300 million in 2025. Most cases will be of type II diabetes, which is characterized by insulin resistance and/or abnormal insulin secretion. People with type II

diabetes are not dependent on exogenous insulin, but may require it for control of blood glucose levels if this is not achieved with diet alone or with oral hypoglycemic agents. The diabetic epidemic, although apparent across the world, has been most pronounced in non-European populations. The potential for increase in the number of cases of diabetes is greatest in Asia. Type II diabetes in children, teenagers and adolescents is a serious new aspect to the epidemic and is an emerging public health problem of significant proportions. Based on compilation of studies from different parts of the globe, the WHO has projected that the maximum increase in diabetes would occur in India². Considering the large population and the high prevalence, the burden of diabetes could be enormous. With an estimated 23 million today and the numbers set to increase to 57 million by 2025, the increasing prevalence of diabetes reflects the sedentary life style, excessive energy intake, reduced physical activity and obesity. Studies conducted in India in the last decade have highlighted that not only is the prevalence of type II diabetes high, but also that it is increasing rapidly in the urban population. There is also a wide urban-rural difference in the prevalence of diabetes pointing to the major role urbanization may be playing in the causation of the disease³. Patients with diabetes mellitus are also at higher risk of tuberculosis. This has been highlighted by several retrospective and prospective studies. In a study in Mumbai, tuberculosis was found to be the most common complicating illness (5.9%) in a large cohort of over 8000 patients with diabetes mellitus⁴.

The prevalence of pulmonary tuberculosis in diabetics was 8.3%⁵. Various studies show that incidence of tuberculosis in diabetic patients vary from 1.6 – 8.4%. Early diagnosis of the combination is rare. At the time of diagnosis, a large majority of cases have severe diabetes and far advanced pulmonary tuberculosis. In a recent study from the regional institute of medical sciences, Imphal, the prevalence of pulmonary tuberculosis in

diabetics was found to be 27% by radiological diagnosis and 6% by sputum positivity⁶. A rising prevalence of tuberculosis in diabetics has been seen with age. Mortality rates in these patients are reported to be several times higher than in non-diabetic pulmonary tuberculosis patients. In a study from Congo, diabetes appeared to have an induction and aggravating effect on tuberculosis. Tuberculosis was found to be more frequent in diabetics, had more pronounced radiological signs, treatment failures and deaths were also more frequent⁷. Irrespective of the triggering mechanism(s), the fact remains that an epidemic of diabetes mellitus is sweeping the country. The recent prevalence data has propelled the estimates for India upwards-32 million in 2000 and 80 million in 2030. India is also the home to the largest number of tuberculosis patients in any one country. And there is growing amount of evidence of one disease fueling the other. The interest in diabetes mellitus and tuberculosis is mounting rapidly and it promises to be an exciting time for researchers involved in the study of dual diseases⁸. The only way to counter dreadful combination is to insist on a routine blood sugar screening test in tuberculosis patients of 40 and over and carryout sputum and X-ray examination in diabetics once a year or on any occasion when cough persists for a month or the insulin requirement suddenly goes up.

METHODOLOGY

Source of data

The study was undertaken on 100 patients with diabetes mellitus and pulmonary tuberculosis of both sexes admitted to Chigateri District General Hospital and Bapuji Hospital attached to J.J.M. Medical College, Davangere.

Method of collection of data

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:

- 1) Symptom of diabetes plus random blood sugar ≥ 11.1 mmol/L (200 mg/dl) or
- 2) Fasting plasma glucose ≥ 7.0 mmol/L (126 mg/dl) or
- 3) Two hour plasma glucose ≥ 11.1 mmol/L (200 mg/dl) during an oral glucose tolerance test.
- 4) 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.

The clinical profile which was evaluated in this study include age and sex distribution, symptom of presentation, past history of tuberculosis, duration of diabetes mellitus, incidence of smoking, incidence of clubbing, hemoglobin level, erythrocyte sedimentation rate, total leukocyte count, blood sugar values, sputum AFB results and radiological pattern. The results of the above clinical profile, relevant tests and radiological findings were tabulated and analyzed.

Inclusion criteria

Adult patients with diabetes mellitus with pulmonary tuberculosis.

Exclusion criteria

- Diabetic patients with extra pulmonary tuberculosis.
- Pulmonary tuberculosis patients not having diabetes.

The following investigations were used in the present study :

- Hemoglobin
- Total leukocyte count
- Lymphocyte percentage
- Erythrocyte sedimentation rate
- Fasting blood sugar
- Post prandial blood sugar
- Sputum AFB
- Chest x-ray

RESULTS

The total number of cases studied were 100. As shown in table 1, number of males in this study group were 72 (72%) and females 28 (28%). Since type I diabetes mellitus (<30yrs)

cases were less, patients were divided into 2 groups.

First group : Age less than or equal to 40 yrs - 21 patients (21%).

Second group: Age more than 40 yrs - 79 patients (79%).

Table 1
Sex distribution

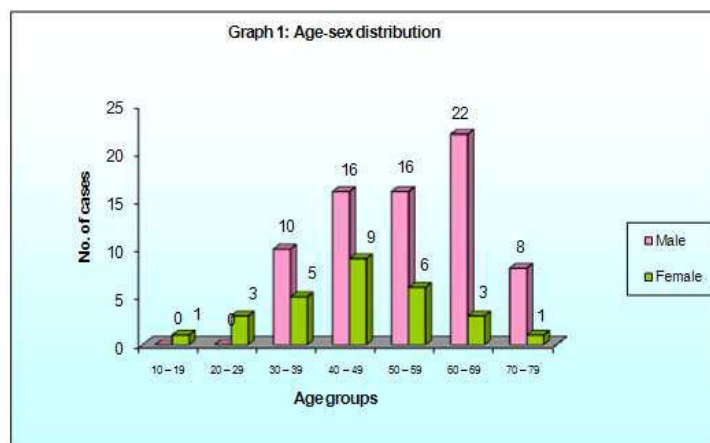
Male	Female	Total
72	28	100

M:F ratio - 2.6:1

Table 2 shows the age wise distribution of patients. The maximum incidence of pulmonary tuberculosis was noted above the age of 40 yrs. The peak incidence was in the age group of 40 – 49 and 60 – 69 yrs. The mean age for males was 54.9 yrs and females was 46.0 yrs.

Table 2
Age sex distribution

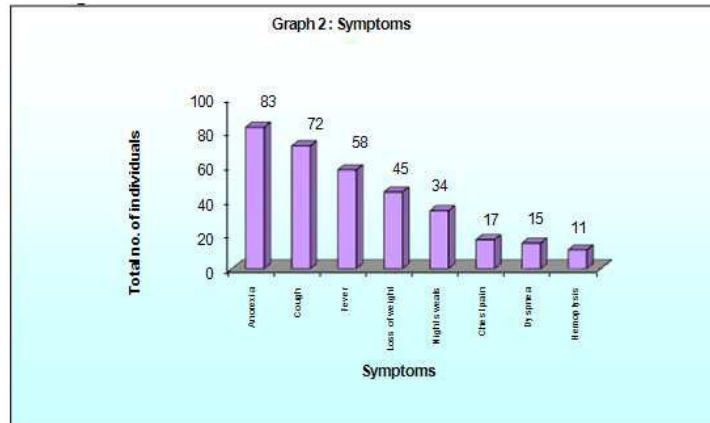
Age groups (yrs)	Male	Female	Total	Percentage
10 – 19	-	1	1	01
20 – 29	-	3	3	03
30 – 39	10	5	15	15
40 – 49	16	9	25	25
50 – 59	16	6	22	22
60 – 69	22	3	25	25
70 – 79	8	1	9	09
Total	72	28	100	100
Mean age	54.9	46.0	52.4	
±SD	± 11.4	± 13.2	± 12.5	
Range	34 – 76	19 – 70	19 – 76	



As shown in table 3, the predominant symptoms noted were cough (73%), fever (56%), anorexia (80%) in the age group > 40 yrs. Other symptoms noted were hemoptysis (11%), loss of weight (43%), dyspnea (18%), chest-pain (14%), night sweats (29%).

Table 3
Symptoms

Symptoms	Male	Female	≤ 40, n=21 (n%)	> 40, n = 79 (n%)	Total
Cough	51	21	14 (67)	58 (73)	72
Fever	43	15	14 (67)	44 (56)	58
Hemoptysis	5	6	2 (10)	9 (11)	11
Dyspnea	13	2	1 (5)	14 (18)	15
Anorexia	59	24	20 (95)	63 (80)	83
Loss of weight	33	12	11 (52)	34 (43)	45
Chest pain	14	3	6 (29)	11 (14)	17
Night sweats	22	12	11 (52)	23 (29)	34



As shown in table 4, 18% of the patients had a past history of tuberculosis. 12% of the patients had associated hypertension and 7% of the patients had associated ischemic heart disease.

Table 4
Past history

History	Male	Female	Total
Tuberculosis	15	3	18
Hypertension	10	2	12
Ischemic heart disease	5	2	7

- 10% of the patients had family history of tuberculosis.
- As shown in table 5, among the 72 males in the study group 45 patients (62.5%) were smokers.

Table 5
Incidence of smoking

Total number of patients	Male	Female
Number of patient	72	28
Number of smokers	45	0
Percentage	62.5%	0

As shown in table 6, clubbing was observed in 10 patients (10%). Of these 8 patients had severe form of tuberculosis as evidenced by multiple lobe involvement as well as bilateral tuberculosis.

Table 6
Incidence of clubbing

Total number of patients	Number of patients with clubbing	Percentage
100	10	10

- 9 % of the patients had associated cervical lymphadenopathy.
- As shown in table 7, 53% of the patients had a duration of diabetes between 6 – 10 yrs and 19% of the patients had a duration of diabetes between 2 – 5 yrs and in 8% of the patients, duration of the diabetes was less than 1yr. 20% of the patients had diabetes more than 10yrs.

Table 7
Duration of diabetes

Duration (yrs)	Number of patients	Percentage
≤ 1	8	8
2 – 5	19	19
6 – 10	53	53
>10	20	20
Total	100	100

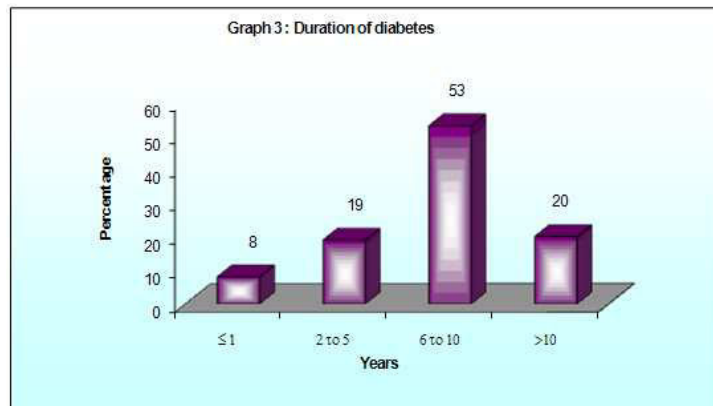
Mean 6.6
±SD ± 3.4
Range 3mon - 14yrs.

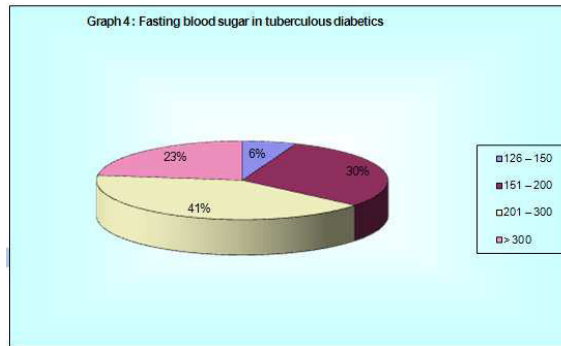
As shown is table 8, the fasting blood sugar value showed a definite co-relation with pulmonary tuberculosis. 41% of the patients had fasting blood sugar value between 201 to 300 mg/dl and 30% had value between 151 – 200 mg/dl and 23% of the patients had value above 300 mg/dl. Mean fasting blood sugar value was 234.4 mg/dl.

Table 8
Fasting blood sugar in tuberculous diabetics

Fasting blood sugar (mg/dl)	No. of patients	Percentage
126 – 150	6	6
151 – 200	30	30
201 – 300	41	41
> 300	23	23

Mean 234.4
±SD ± 64.5
Range 130 – 390





As shown in table 9, 45% of the patients had a post prandial blood sugar value above 350 mg/dl, 38% had values between 251 – 350 mg/dl and only 17% of the patients had value between 200 – 250 mg/dl. Mean post prandial blood sugar value in the study group was 341.5 mg/dl.

Table 9
Post prandial blood sugar values in tuberculous diabetics

Post prandial blood sugar (mg/dl)	No. of patients	Percentage
200 – 250	17	17
251 – 350	38	38
> 350	45	45
Mean	341.5	
± SD	± 66.9	
Range	220 – 470	

As shown in table 10, anaemia was noted in 51% of the patients. Of these 22% had mild anaemia, 23% of the patients had moderate anaemia and only 6% of the patients had severe anaemia.

Table 10
Haemoglobin

Haemoglobin value (gm%)	No. of patients	Percentage
≥ 12	49	49
10 – 12 (mild)	22	22
7 – 10 (moderate)	23	23
< 7 (severe)	6	6
Total	100	100
Range	5 – 13	

- As shown in table 11, the mean total leukocyte count in our study was 10655 with a standard deviation of ± 2398.
- The mean lymphocyte percentage was 43.5% with a standard deviation of ± 3.9.

Table 11
Total leukocyte count and lymphocyte percentage

	Mean ± SD	Range
Total leukocyte count	10655 ± 2398	3800 – 16200
Lymphocyte percentage	43.5 ± 3.9	36 – 52%

As shown in table 12, 8% of the patients had an erythrocyte sedimentation rate of more than 100 mm/hr. 44% of the patients had values between 51 – 100 mm/hr. Only 17% of the patients had value below 20 mm/hr. 83% of the study group had an elevated erythrocyte sedimentation rate.

Table 12
Erythrocyte sedimentation rate

ESR (mm/hr)	No. of patient	Percentage
< 20	17	17
20 – 50	31	31
51 – 100	44	44
> 100	8	8
Total	100	100

Mean \pm SD 48.8 \pm 25.7
Range 12 – 112

As shown in table 13, sputum AFB was demonstrated in 81% of cases \leq 40 yrs and in 52% of cases $>$ 40 yrs.

Table 13
Sputum AFB – results

Sputum AFB	\leq 40 (n = 21)	$>$ 40 (n = 79)	P value
Positive	17 (81%)	41 (52%)	$\chi^2 = 5.75$
Negative	4 (19%)	38 (48%)	P = 0.02, Sig. ($p < 0.05$)

As shown in table 14, right sided lung lesions were noted in 37% of the cases and left sided lesions in 33% of the cases. Upper lobe lesions was noted in 68% of the cases and bilateral lesion in 30% of the study group.

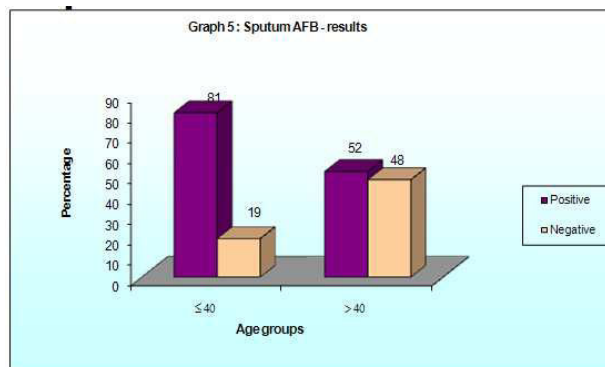
Table 14
Side of lesion (right/left/bilateral)

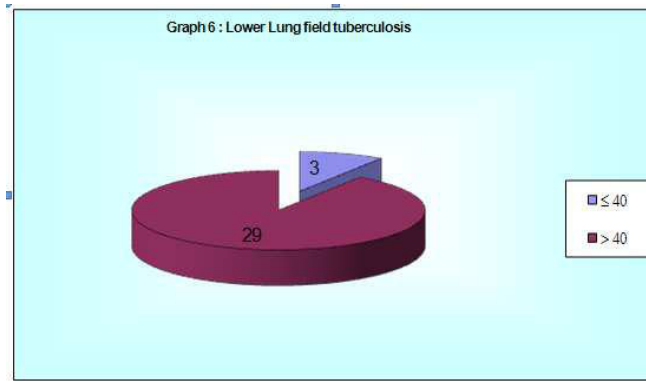
Side involved	\leq 40		$>$ 40 yrs		Total
	Male	Female	Male	Female	
Left	2	2	24	5	33
Right	4	5	21	7	37
Bilateral	5	4	15	6	30

As shown table 15, lower lung field lesions were noted in 32% of the cases. Of these 3 cases were observed in age group \leq 40 yrs and 29 cases above age of 40 yrs.

Table 15
Lower lung field tuberculosis

Age	\leq 40 (n = 21)	$>$ 40 (n = 79)	P value
No. of patients	3	29	P < 0.05 (Sig.)

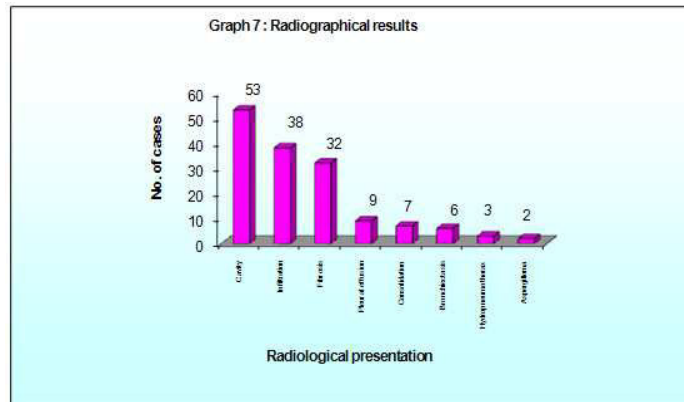




As shown in table 16, chest x-ray showed cavitary lesions in 53%, fibrosis in 39% of the patients and infiltrative lesion in 38% of the patients. Other lesions noted are consolidation (6%), pleural effusion (8%), hydropneumothorax (4%), aspergilloma (3%) and bronchiectasis (6%).

Table 16
Radiological results

Type of lesion	Male	Female	≤ 40, n=21 (n%)	> 40, n = 79 (n%)	Total	P value
Cavity	36	17	11 (52)	42 (53)	53	0.95
Fibrosis	21	11	1 (5)	31 (39)	32	0.003 (Sig).
Infiltration	21	17	8 (38)	30 (38)	38	0.99
Consolidation	5	2	2 (10)	5 (6)	7	0.61
Pleural effusion	7	2	3 (14)	6 (8)	9	0.34
Hydropneumothorax	3	0	0	3(4)	3	0.35
Aspergilloma	1	1	0	2 (3)	2	0.46
Bronchiectasis	4	2	1 (5)	5 (6)	6	0.79



DISCUSSION

A clinical and radiological evaluation of 100 cases of pulmonary tuberculosis with diabetes mellitus was done. The high incidence of tuberculosis in diabetic patients, reported by western and Indian workers suggest a significant association between these two diseases.^{9,10} In our study the total number of males were 72% and females were 28%. The male to female ratio was 2.6:1. Other studies

have shown that, the prevalence as well as incidence of tuberculosis is higher among males than among females, the ratio varying from 3:1 to 5:1. In a study of 2434 cases of pulmonary tuberculosis by Desmukh and others, 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.⁵ Patel JC showed a

similar ratio of male : female. In the 179 cases he studied, 76% were males and 24% were females.¹¹ Morris and others also in their study observed that male population outnumbered the females.¹² Tripathy and Kar reported that 78% of their patients were males.¹³ All the above studies showed an increased incidence of the disease in males as compared to females and our study also noted the same. The high incidence of disease in males is possibly due to the fact that both tuberculosis and diabetes are more common in males. Another reason could be that the number of male patients getting admitted to the hospital are more than females. In the present study, the number of patients above the age of 40 were 79% and peak incidence was in the age groups of 40 – 49 and 60 – 69. 25% of the total cases were in this age group. Desmukh reported that majority of cases of tuberculous diabetics belong to the age group of 45 yrs and above (82.6%).⁵ Brijkishore observed that 57.1% of the patients were above the age of 40 yrs. Philips noted that half of the active new cases of tuberculosis were observed in those who were at least 45 yrs and relative incidence was highest in those who had passed 65 yrs.

This study also showed a higher incidence of tuberculous diabetics in people over the age of 40 yrs. In this study the highest incidence was in the age group of 60 – 69 yrs. The predominant symptoms noted in our study were anorexia (80%), cough (73%), fever (56%) and night sweats (29%) in both patients less than 40 yrs and more than 40 yrs. Loss of weight was also more in both age group patients. In a study done in Ethiopian diabetic patients with tuberculosis, three most common symptoms of tuberculosis were fever (80.5%), sweating (80.4%) and cough (70.5%).¹⁴ In our study also percentage of cough and fever was high. 18% of our patients had past history of tuberculosis. 12% of the patients were detected to have hypertension along with diabetes mellitus and tuberculosis. 10% of patients in our study had family history of tuberculosis. 45 out of 72 males (62.5%) were smokers in our study. It has been shown that in patients of both sexes over the age of 30 with pulmonary tuberculosis,

there is a highly significant deficiency of non smokers and light smokers, and an excess of moderate and heavy smokers compared to controls of same age suffering from other diseases.¹⁵ This study shows that 62.5% of the males are smokers and smoking may be a contributing factor in developing tuberculosis in these patients. Clubbing was noted in 10% of the patients in our study. Of these 85% had far advanced tuberculosis as evidenced by clinical and radiological examination. The prevalence of clubbing noted by different workers showed wide variations. It was as low as 1% (Weirman) to 90% (Neufeld). Macfarlane showed an incidence of 21%. He also reported that finger clubbing was associated with more severe pulmonary damage. Gross clubbing occurs with long standing tuberculosis.¹⁶ Finger clubbing is of value in assessing patients with pulmonary tuberculosis because it helps to identify those with severe destructive disease. This study also showed the higher incidence of far advanced tuberculosis in those patients who had clubbing. The difference in the incidence of clubbing between our study and the other studies may be due to :

- 1) The selection of patients.
- 2) The stage of tuberculosis in the study group.
- 3) Other associated diseases which the patients may be having, which can also produce clubbing.
- 4) Chemotherapy : Most of the earlier studies were done prior to the advent of antituberculous therapy.
- 5) Inter observer variations.

51% of the patients in our study were found to be anemic. Of these 22% had mild anemia, 23% had moderate anemia and 6% had severe anemia. In a study done in Jammu region by Pavan Malhotra, it was found that 88.76% of tuberculosis patients were anemic. 13.26% had mild anemia, 17.34% had moderate and 58.16% had severe anemia. Anemia was normocytic normochromic and normocytic hypochromic type. The discrepancy between the percentages of anemic patients may be due to various factors:

- 1) The patient selection process.
- 2) Demographic characteristics.
- 3) Dietary habits

44% of patients in this study group showed an erythrocyte sedimentation rate between 51 to 100 and 31% had values between 20 – 50 mm/hr. Values above 100 were noted in 8% of patients. The ESR is a nonspecific test and it can be elevated in numerous conditions. It is not of any diagnostic value. It is the manifestation of a generalized disease or of tissue destruction. Active tuberculosis may show an elevated value of ESR and we assume 52% of the patients who had shown as ESR value above 50 mm/hr may be having active tuberculosis. Single determination of the value is of no significance and repeated tests have some practical value. The test also has some practical value in the prognosis of chronic pulmonary tuberculosis cases under treatment.¹⁶ The total white cell count in our study showed an average value of 10655. Few patient who had far advanced tuberculosis showed a normal blood count, and certain others with mild to moderately advanced tuberculosis had a higher white cell count. So there was no correlation noticed between the severity of tuberculosis and total white cell count. Knelle has proved that leukocyte picture is of no help in diagnosis of tuberculosis and our study also shows the same. In general a normal total WBC count in the presence of extensive pulmonary shadowing on a chest radiograph favours a diagnosis of tuberculosis rather than acute pneumonia or lung abscess.²⁴ The study of the duration of diabetes in relation to the onset of tuberculosis showed that in most cases, diabetes mellitus was diagnosed before the development of tuberculosis. Prior to the onset of tuberculosis, 53% patients had duration of diabetes between 6 – 10 yrs, 19% of the patients had duration of diabetes between 2 – 5 yrs and 8% of the patients less than 1yr. The average duration of diabetes in this study was 6.6 yrs with a standard deviation \pm 3.4. The interval between detection of diabetes and the onset of pulmonary tuberculosis was studied by Tripathy and others. They reported that it varied

from several months to 15 yrs, mean interval being about 6 yrs. In another study, diabetes was detected before tuberculosis in 70% of cases. 32% of patients had diabetes for 1 – 5 yrs, 32% had it for 6 – 10 yrs and 20% more than 10 yrs.¹⁸ The duration of diabetes is significant because there is an increased opportunity for infections with increased duration of diabetes. The result of the present study is comparable to other studies.

Some studies have reported that there is no correlation between the duration of diabetes and the development of pulmonary tuberculosis.^{5,19} The fasting blood sugar value of 200 – 300 mg% was noted in 41% of the patients and values above 300mg% were noted in 23% of the cases. Mean FBS was 234.4 with a standard deviation of \pm 64.5. Post prandial blood sugar value at 2 hours was above 350mg% in 45% of patients. Mean PPBS was 341.5. This showed that in most of the cases blood sugar was not controlled. In a study done by Sachdeva AK and others, it was showed that high incidence of pulmonary tuberculosis was associated with severe hyperglycemia. Deshmukh PA also had made a similar observation.⁵ In a study in 180 cases of diabetics, daily dose of more than 100 units of insulin was needed in 88.7% of tuberculous diabetics and in 25.2% of non-tuberculous diabetics. The finding in this study is consistent with the proposal that there is correlation between infection and plasma glucose levels.²⁰ 81% of patients <40 yrs and 52% of the patients >40yrs were sputum positive for acid fast bacilli. P value was 0.02 which is significant in that sputum positivity is more in patients aged <40yrs. In patients >40yrs, cavitation and fibrosis were more compared to <40yrs patients. Cavitory lesions though maintain high bacterial population, less smear positivity is noted in diabetes. This may be related to muscle weakness due to uncontrolled hyperglycemia and less effective expectoration.²⁴ In our study also in patients > 40 yrs, sputum positivity was less and the results are comparable to other studies. The examination of chest radiograph revealed that 70% of the patients had unilateral lesions and 30% of the patients had bilateral

lesions. In both these groups, predominant lesions were noted in the upper zone. In our study, right sided lesion was noted in 37% and left side in 33% and the rest of the lesions were bilateral. The increased incidence of bilateral disease is due to the rapid dissemination of tuberculosis in diabetics. 32% of patients in our study had lower lung field involvement. It was more common in age group >40 yrs. (29 out of 79 cases). P value <0.05 which is significant. In study done by Bacakoglu F and others, it was reported that in tuberculous diabetics lower lung field tuberculosis was significantly associated with female gender, and in patients older than 40 yrs. In study done by Ravindran P and others, the lower lung field tuberculosis among diabetic tuberculous patients was 13.81%.²¹ In our study also, lower lung field involvement was more in patients aged >40 yrs and female gender and results are comparable to other studies. Cavitory lesions (53%) were the most common type of lesions noted followed by fibrosis (39%), infiltration (38%) in the age group of >40 yrs. In patients \leq 40 yrs, again cavitation was more common (52%) followed by

infiltration (38%). Fibrosis was very less in this group compared to patients >40 yrs of age. Radiologically reticulonodular appearance were less in tuberculosis with diabetes mellitus than opacity, cavitation, pleural involvement. In a study done by Perez Guzman and others, it was reported that more tuberculous diabetics develop multiple cavities and also cavitations were more in lower lung field.^{22,23} As reported in many studies, tuberculosis in diabetic patients is associated with extensive caseation of lung tissue and cavitory lesions, little pleural involvement.^{22,24} In our study also, cavity and fibrosis is more compared to other lesions. Multiple cavitations were seen in many patients. Our study results are comparable to other studies. Cavitations, infiltration, fibrosis were more compared to pleural involvement. Other radiological lesions noted were bronchiectasis, hydropneumothorax, aspergilloma and consolidation. Our study correlates with most of the above radiological studies in regards to the side of lesion, site of lesion, extent of lesion as well as the nature of radiological patterns.

CONCLUSION

- In the study group, 72% were males and 28% were females and the male to female ratio was 2.6:1. 79% of the patients were above the age of 40 years.
- The predominant presenting symptoms noted were anorexia (80%), cough (73%), fever (56%), in both age groups. Significant percentage of patients had night sweats and loss of weight.
- 18% of the patients in the study group had past history of tuberculosis and 10% of the patients had family history of tuberculosis.
- 62.5% of male patients in our study were smokers and clubbing was noted in 10% of the patients. Of these 85% had far advanced tuberculosis as evidenced by clinical and radiological examination.
- In the study group, patients had an average duration of 6.6 years of diabetes. Anemia was observed in 51% of patients and 6% had severe anemia. 52% of the patients had an erythrocyte sedimentation rate above 50 mm/hr.
- The average fasting and post-prandial blood sugar values in the study group was 234.4 and 341.5 mg/dl respectively.
- 81% of the patients were sputum positive for AFB under \leq 40 yrs and 52% were positive in age group >40 yrs.
- 8% of the patients showed radiological features suggestive of upper lobe involvement and 32% had lower lung field tuberculosis and right sided lesions were noted in 37% of cases, left sided in 33% and 30% had bilateral tuberculosis.
- Cavitory lesions (53%) were the most common type of lesion noted in both age group patients followed by infiltration (38%). Fibrosis was less common in the age group \leq 40 yrs.
- Isolated lower lung field tuberculosis was noted in 32% of cases. It was more common in the age group >40 yrs and in the female gender.

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