Research Article

Diabetes mellitus in pulmonary tuberculosis

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Abstract

Introduction: To study a) Prevalence of Diabetes Mellitus in Pulmonary tuberculosis. b) Radiological picture in Pulmonary Tuberculosis when it is associated with diabetes Mellitus. c) Co-relation between extent of Pulmonary Tuberculosis and severity of Diabetes Mellitus. **Material and Methods:** sputum positive pulmonary tuberculosis patients admitted in medical college hospital for about one year irrespective of age and sex constituted material for this study. All 100 sputum positive tuberculosis patients were screened for diabetes mellitus. Extent of tuberculosis was decided by national tuberculosis association of USA criteria which were also adopted by national tuberculosis association of India. Severity of diabetes was decided by criteria used by Deshmukh *et al* (1966) and Nanda and Tripathi (1984). **Results:** out of 100 tuberculous patient studied 17 patients were found to have diabetes mellitus. However 5 patients were already known to have diabetes mellitus Thus, Prevalence of diabetes mellitus in pulmonary tuberculosis was 12.6 % (12 out of 95). Prevalence in Male was 13.7% and in Females was 10 %. Prevalence below age of 40 was 9.3 % and it was 15.1% above the age of 40 years of T.B. patients. Amongst 17 diabetes patients 47% had far advanced tuberculous lesions. Of those 35.53% had cavitatory lesions. Bilateral involvement of lungs was found in 70.6%. Of these patients 29.7% had far advanced tuberculosis and severe diabetes. **Conclusions:** The prevalence of diabetes mellitus is significantly high i.e. 12.6% in this study. Radiological lesions in patients of pulmonary tuberculosis complicated diabetes mellitus are bilateral, cavitatory, confluent and far advanced. The association of advanced pulmonary tuberculosis and severe diabetes millitus is far more common then association of minimal lesion pulmonary tuberculosis and mild diabetes mellitus.
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INTRODUCTION

Pulmonary Tuberculosis and Diabetes Mellitus are major killers of mankind. Pulmonary Tuberculosis is chronic infectious disease caused by mycobacterium tuberculosis whereas Diabetes Mellitus is essentially a metabolic disorder. Initially both this disease well studied separately by different workers regarding their Etiopathogenesis and Management. During extensive studies it was found that these diseases occur very frequently in association and pose serious problems for the management. In spite of large number of antituburculosis drugs being available, treatment and control of T.B. is not satisfactory. In attempts to find out causes of failure of treatment in tuberculosis and subsequent bad prognosis in some patients it was found that tuburculous patients not responding to treatment and deteriorating rapidly were found to be associated with diabetes mellitus. Nicholas (1957), Deshmukh *et al* (1966), Nanda and Tripathi (1968) in their studies found significant number of prevalence of diabetes mellitus in pulmonary tuberculosis. This study is undertaken to find out prevalence of diabetes mellitus in pulmonary tuberculosis patients, Radiological picture in pulmonary tuberculosis when associated with diabetes mellitus and to study correlation between extent of pulmonary tuberculosis and severity of diabetes mellitus.

MATERIALS AND METHODS

All sputum positive Pulmonary Tuberculosis patients irrespective of age and sex diagnosed and admitted in medical college and hospital Aurangabad for about one year constituted material for this study. Sputum positive patients diagnosed for the first time and old known

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Tuberculosis patients which flared up again and became sputum positive were included in the study. Sputum negative patients were excluded from the study. After admission in hospital detailed history was taken, clinical examination was done. Necessary investigations were done. Diagnosis of Pulmonary Tuberculosis was done by finding acid fast Mycobacterium Tuberculosis bacilli in sputum by Ziehl Neelson methods. Radiological examination (chest X-ray) was also done in each case. Extent of Tuberculous disease was decided by National Tuberculosis Association of USA criteria and National Tuberculosis of India criteria as minimal, moderately advanced and far advanced. Each sputum positive Tuberculosis patients was subjected to screening tests for Diabetes Mellitus like fasting and post prandial blood sugar level and urine sugar. Severity of diabetes Mellitus was judged by criteria used by Deshmukh *et al*(1966) and Nanda and Tripathi(1984).

OBSERVATIONS

In the present study 100 patients of Sputum Positive Pulmonary Tuburculosis were screened for Diabetes Mellitus. All Tuburculosis patients diagnosed and admitted in medical college and hospital Aurangabad of both sexes irrespective of age were included in the study.
Observations made were as follows:

Group A: Observations in 100 Tuberculous patients Amongst 100 cases studied 69 cases (69%) were Male and 31 cases (31%) were Female. It was also notice that 44 cases (44%) were below the age of 40 years and 56 cases (56%) were above the age of 40 years. It was observed that ESR was less than 30 in 7 cases (7%) and more than 30 in 93 cases (93%).

Radiological features

Table 1: Extent of Tuburculosis

Sr. No.	Extent of Tuburculosis	No. of cases
1	Minimal	34(34%)
2	Moderate	54(54%)
3	Far advanced	12(12%)
	Total	**100(100%)**

It was found that 34 patients (34%) had minimal disease, 54 patients (54%) had moderate disease and 12 cases (12%) had far advanced disease.

Table 2: Nature of Tuberculous lesion

Sr. No.	Nature of lesion	No. of cases
1	Cavitatory	15(15%)
2	Non –cavitatory	85(85%)
	Total	**100(100%)**

It was observed that 15 cases (15%) had cavitatory lesions while 85 cases (85%) had non cavitatory lesions. It was found that upper zone was involved in 49 cases (49%), middle zone in 15 cases (15%), lower zone in 17 cases (17%) where as all those were involve in 19 cases (19%). It was seen that right lobe was involved in 41 cases (41%), left side in 26 cases (26%) where as there was bilateral involvement in 33 cases (33%) thus there was predilection for right lobe involvement.

Group B: Observations in Tuberculous patients having Associated Diabetes Mellitus. It was found that amongst 17 Diabetics 13 (76.4%) were Males and 4 (23.5%) were Females. There were 5 Diabetic patients out of 17 (79.4%) who were below the age of 40 years while 12 (70.6%) patients were above the age of 40 years. It was found that 15 patients (88.2%) had ESR more than 30 while only 2 (11.8%) patients had ESR less than 30.

Table 3: Extent of Tuberculosis

Sr. No.	Extent of Tuberculosis	No. of patients	Percentage
1	Minimal	2	11.8%
2	Moderate	7	41.20%
3	Far advanced	8	47.00%
	Total	**17**	**100.00%**

It was observed that 8 cases (47%) had far advanced disease, 7 cases (41.2%) had moderate lesions where as only 2 cases (11.8%) had minimal lesions.

Table 4: Nature of lesion

Sr. No.	Nature of Lesion	No. of patients	Percentage
1	Cavitatory	6	35.3%
2	Non-cavitatory	11	64.7%
	Total	**17**	**100.00%**

It was found that 6 patients out of 17 (35.3%) had cavitatory lesions where as 11 patients (64.7%) had non cavitatory lesions. It was observed that upper zone was involved only in 1 patient (5.9%), middle zone in 4 patients (23.5%), lower zone in 3 patients (17.6%) where as all zones were involved in 9 patients (53%). It was observed that there was Bilateral involvement in 12 patients out of 17 (70.6%) while right side was involved in 3 patients (17.6%) and left side was involved only in 2 patients (11.8%).

Table 5: Severity of Diabetes Mellitus

Sr. No.	Severity of Diabetes Mellitus	No. of patients	Percentage
1	Mild	1	5.9%
2	Moderate	9	41.20%
3	Severe	7	52.90%
	Total	**17**	**100.00%**

Out of 17 patients 9 patients (52.9%) had Moderate Diabetes, 7 patients (41.2%) had severe Diabetes where as only 1 patient (5.9%) had mild Diabetes.

Table 6: Extent of Tuberculosis and severity of Diabetes

Extent of Tuberculosis	Severity of Diabetes			Total
	Mild	Moderate	Severe	
Minimal	-	2	-	2
Moderate	-	5	2	7
Far advanced	1	2	5	8
	1	9	7	17

Out of 8 patients having far advanced Tuberculosis 5 patients (62.5%) had severe Diabetes, 2 patients (25%) had moderate Diabetes and only 1 patient (12.5%) had mild Diabetes. It was found that out of total 17 patients of Tuberculosis with Diabetes, 5 patients (29.4%) had far advanced Tuberculosis and severe Diabetes Mellitus where as there was not a single patient having minimal Tuberculosis and mild Diabetes.

DISCUSSION

In the present study 100 cases of Pulmonary Tuberculosis (Positive for Mycobacterium Tuberculosis) were studied to find out the prevalence of Diabetes Mellitus in Pulmonary Tuberculosis. Age of the cases ranged from 17 years to 70 years it was found that 56 patients (56%) were above the age of 40 years whereas remaining 44 patients (44%) were below the age of 40 years. The Male to Female ratio was approximately 2:1.

Prevalence of Diabetes Mellitus in Pulmonary Tuberculosis

It was observed that out of 100 Pulmonary Tuberculosis patients studied, 17 patients had Diabetes Mellitus giving prevalence of Diabetes Mellitus of 17 % in Pulmonary Tuberculosis. Prevalence in male was 18.8% (13 out of 69) whereas it was 12.9% (4 out of 13) in females. Prevalence was 11.3% (5 out of 54) below 40 years age and 21.4% (12 out of 56) above the age of 40 years. However 5 patients (4 males and 1 female) were already known to have Diabetes before they had Pulmonary Tuberculosis. Thus in this study the actual Prevalence of Diabetes Mellitus in Pulmonary Tuberculosis was 12.6% (12 out of 95). The Prevalence in males was 13.7% (9 out of 65) and in females was 10% (3 out of 3.0). Prevalence of Diabetes Mellitus below 40 years was 9.3 % (4 out of 42) and it was 15.1% (8 out of 53) above the age of 40 years. Deshmukh *et al* (1966), Nanda and Tripathi (1968), Reaud (1936) found Prevalence of Diabetes Mellitus of 14%, 12%, 14.2% in Pulmonary Tuberculosis respectively in their studies. The Prevalence of Diabetes Mellitus in Pulmonary Tuberculosis of 12. 6% (12 out of 95) as found in present study correlates well with observations made by most of other workers. The average Prevalence of Diabetes Mellitus in general population of India is set to be 1.1% as quoted by J.C. Patel and N.G. Talwalkar Ind. Jour. Medi. Sci. (17:723, 1963). Thus it can be said that Prevalence of Diabetes Mellitus in Pulmonary Tuberculosis is quite significant and that Diabetes Mellitus does not exist in Pulmonary Tuberculosis merely by chance.

Radiological features in Pulmonary Tuberculosis complicated by Diabetes Mellitus

- **Extent of Tuberculosis**
  In the present study out of 100 TB patients studied, only 12 (12%) had far advanced Tuberculosis as shown in Table 3. However amongst 17 Tuberculous patients having Associated Diabetes Mellitus, 8 (47%) had far advanced Tuberculous lesions. After applying Chi Square test for Statistical significance to these two observations it was found that the difference between these two observations (Table 1 and 3) was statistically significant ($P < 0.01$). This means that Tuberculous lesions tend to be far advanced in patients of Pulmonary Tuberculosis when associated with Diabetes Mellitus than when not associated with Diabetes Mellitus.
- **Nature of Tuberculous lesion**
  In this study it was found that out of 17 TB patients 6 patients (35.3%) had cavitatory lesions as shown in Table 4. However in 100 Tuberculous patients studied only 15 patients (15%) had cavitatory lesions are shown in Table 2 under observations. After applying Chi Square test for statistical significance it was found that the difference between these two observations was statistically significant ($P < 0.01$). Thus it can be said from this study that incidence of cavitatory lesions is more in Tuberculous Diabetics than control Non Diabetic Tuberculous patients.
- **Site of Tuberculosis lesion**
  It was observed that all zones were involved in 9 patients out of 17 who had Pulmonary Tuberculosis complicated by Diabetes and there was no predilection for involvement of any specific zone as described by many workers. The classical Radiological pattern of exudative lesions spreading from hilus towards the periphery (butterfly lesions) was found in only two patients out of 17 (11.8%) in the present study.
- **Side of Tuberculous lesion**
  It was found that out of 17 cases of Pulmonary Tuberculosis, 12 cases (70.6%) had bilateral involvement of lungs as shown in Table 12. However out of 100 TB patients, 33 cases (33%) had Bilateral involvement. After applying Chi

Square test it was found that difference between these two observations was statistically significant (P<0.01). therefore it can be said from this study that incidence of Bilateral Tuberculous lesions is more in Pulmonary Tuberculosis patients having associated Diabetes than Non Diabetic Tuberculosis patients. It was also found that involvement of right lung was more as compared to left in Tuberculosis when there is unilateral involvement.

Corelation between Extent of Pulmonary Tuberculosis and severity of Diabetes Mellitus

Out of 17 cases of Diabetic Tuberculosis 5 patients (29.4%) had far advanced Tuberculosis and severe Diabetes but there was not a single case having minimal Tuberculosis and mild Diabetes. The reported prevalence of Diabetes Mellitus in Pulmonary Tuberculosis by different workers varies from 5 to 15 %. The difference in prevalence is mainly because of different criteria used for diagnosing Diabetes by different workers. How exactly Pulmonary Tuberculosis causes Diabetes is still not known. Some workers postulate that latent Diabetes might be getting worsened and precipitated by active Pulmonary Tuberculosis. Thus Pulmonary Tuberculosis and Diabetes Mellitus often exist in association and the prognosis is very grave when they coexist. This is due to the fact that early diagnosis of the combination is very rare. By the time diagnosis is made, both the diseases are far advanced. The main reason is that symptoms of complicating disease are masked by the originally existing disease. Further each condition causes exacerbation of the other. However as both the diseases run very chronic course patients are notoriously defaulters. To reduce the mortality of this dreaded combination, efforts should be taken to diagnose the combination as early as possible by routinely doing blood sugar level estimations in Tuberculous patients particularly above the age of 40 years and carrying out sputum and X-ray examinations in Diabetic patients and promptly treating them.

CONCLUSION

The prevalence of Diabetes Mellitus in Pulmonary Tuberculosis is significantly high. The Radiological lesions in patients of Pulmonary Tuberculosis complicated by Diabetes Mellitus are Bilateral, cavitatory, confluent and far advanced in most of the cases. The association of far advanced Pulmonary Tuberculosis and severe Diabetes Mellitus is far more common than association of minimal lesion Pulmonary Tuberculosis and mild Diabetes Mellitus. In view of significant occurrence of association of Pulmonary Tuberculosis and Diabetes Mellitus, it is strongly suggested that all the Tuberculosis patients should be screened for the presence of Diabetes Mellitus and all Diabetics should be regularly examined to diagnose association of Pulmonary Tuberculosis and promptly treated accordingly to avoid grave prognosis.

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