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STUDY OF DIABETIC TUBERCULOSIS

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ABSTRACT

Introduction: Occurrence of pulmonary tuberculosis in patients of Diabetes Mellitus (DM) is almost 2-3 times more common than normal population. There is paucity of literature on comprehensive understanding of clinical presentation of pulmonary tuberculosis in diabetics and effect of short-term chemotherapy in such individuals.

Aims and Objectives: To study clinical symptoms and radiological findings in patients having both diabetes mellitus and pulmonary tuberculosis. To study effects of standard short-term chemotherapy in such individuals.

Methodology: This case control, comparative, hospital based, interventional as well as observational study was carried out in department of pulmonary medicine. 50 patients suffering from pulmonary tuberculosis were consecutively selected into study from department of Pulmonary medicine. They were further divided into 2 groups- Group 1 cases – Pulmonary tuberculosis plus diabetes mellitus and Group 2- Pulmonary tuberculosis without diabetes. Diagnosis of Pulmonary tuberculosis was done on basis of clinical symptomatology, chest X-Ray PA view and microbiological examination of sputum smears. Diabetes was diagnosed on basis of fasting blood sugar on two consecutive days and urine examination for presence of glucose. Both groups were given short term chemotherapy of antitubercular drugs. Control for diabetes was done by using insulin and oral hypoglycemic agents. All patients were hospitalized for 4 to 6 weeks and follow ups were taken every month for 4 to 6 months. Clinical examination, blood and urine glucose estimation, sputum smear examination and Chest Xrays were done on completion of treatment.

Results: Clinical symptomatology was similar in both the groups. Diabetic control was poor in Group 1 patients. Predominant lower zone involvement was seen in Group 1 patients. At the end of chemotherapy Group 1 patients showed improvement in terms of sputum conversion rates and radiological clearance of lesions, comparable to controls.

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Conclusion: For early detection of pulmonary tuberculosis in diabetic patients, screening should be done properly. Appropriate management of both the conditions should be timely done.

Keywords: Pulmonary Tuberculosis, Diabetes Mellitus, chemotherapy

1. INTRODUCTION

Association of Diabetes Mellitus (DM) in Pulmonary TB has been long back documented in Shushruta in Ayurveda in 600 AD. The term 'diabetic tuberculosis' was coined by Stiedl and Sosman [(1)] after observing peculiar radiological features prevalent in patients of pulmonary tuberculosis associated with diabetes mellitus. It has been established that diabetes mellitus reduces the body resistance due to many factors such as low opsonic index, tissue acidosis, electrolyte imbalance, hyperglycaemia, hepatic dysfunction with hypervitaminosis. etc. thus predisposing it to different local infections.

The literature shows that the prevalence of diabetes amongst TB patients ranges between 12.39 and 44%. The prevalence is highest in southern states (25.3%-44%), followed by northern states (12.8-15.8%).

Pulmonary tuberculosis when occurs in a diabetic is usually more advanced form at the time of detection. This is because the two cardinal symptoms of pulmonary tuberculosis i.e. cough and fever are attributed to some minor upper respiratory tract infection. Most of the time cough is non-productive in nature and this may not point towards the diagnosis of pulmonary tuberculosis [(2)]. Moreover, the clinical examination of these patients may not reveal any abnormality because of the deep seededness of the lesion. Most common symptoms are fever, cough, haemoptysis, weight loss etc.

Most common roentgenographic pattern of diabetic tuberculosis described so far is a "a wedge shaped opacity" in which there was cavitation spreading from hilum towards the periphery in both upper and lower zones occuring in diabetics over the age of 40 years. This was first described by Sosman and Steidl in 1927[(1)].

Literature shows that pulmonary tuberculosis in the diabetic usually appear suddenly and progresses rapidly so that at the time of its recognition the lung disease is so advanced as often to render the prognosis hopeless. Such a sudden appearance of pulmonary tuberculosis may occur because of one of the two reasons, either the diabetic is unusually liable to develop fulminant pulmonary tuberculosis; or the tuberculosis commences deep in the lung and remains undetected until it has spread to the surface and given rise to clinical signs.

When these two conditions are present together, they are inter-dependent i.e. if diabetes remains uncontrolled or poorly controlled tuberculosis gets worsened and when tuberculosis is severe diabetes may become difficult to control. Management of this condition includes treatment with antitubercular chemotherapeutic agents like isoniazid, rifampicin, pyrazinamide, streptomycin, ethambutol etc. Diabetic control is done by use of oral hypoglycemics, insulin and dietary management.

There is paucity of literature on comprehensive understanding of clinical presentation of pulmonary tuberculosis in diabetics and effect of short-term chemotherapy in such individuals. This study is to achieve the same.

AIMS AND OBJECTIVES

1. To study clinical symptoms and radiological findings in patients having both diabetes mellitus and pulmonary tuberculosis.

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2. To study effects of standard short-term chemotherapy in such individuals.

2. METHODOLOGY

This case control, comparative, hospital based, interventional as well as observational study was carried out in Pulmonary medicine. 50 admitted patients suffering from pulmonary tuberculosis were consecutively selected into study from department of Pulmonary medicine. They were further divided into 2 groups- Group 1 cases – Pulmonary tuberculosis plus diabetes mellitus (25 patients) and Group 2- Pulmonary tuberculosis without diabetes (25 patients). Diagnosis of Pulmonary tuberculosis was done on basis of clinical symptomatology, chest X-Ray PA view and microbiological examination of sputum smears. Diabetes was diagnosed on basis of fasting blood sugar on two consecutive days and urine examination for presence of glucose (Benedict's test).

INCLUSION CRITERIA

Cases of Pulmonary Tuberculosis diagnosed clinically, on chest radiographs and sputum AFB smears.

EXCLUSION CRITERIA

Patients who had taken treatment for tuberculosis in the past, for one month or more were excluded from the study.

DIAGNOSIS OF DIABETES MELLITUS

1. Fasting blood glucose estimation for two consecutive days.
2. Urine examination done for the presence of glucose using Benedicts Qualitative test (Benedicts 1911).

TREATMENT GIVEN FOR PULMONARY TUBERCULOSIS

Both the groups thus selected were given modern short course chemotherapy i.e. Isoniazid (5 mg/ kg body weight), Rifampicin (10 mg-Kg body weight) and pyrazinamide (35 mg/Kg body weight) for first two months and later on pyrazinamide was omitted and Rifampicin and isoniazid were continued for further four months as laid down by I.U.A.T.L.D., [(3)]. Majority of the patients depending upon the age were given either Streptomycin or Ethambutol in adequate doses during the intensive phase of chemotherapy.

CONTROL OF DIABETES MELLITUS

Initially all the patients of diabetic group irrespective of type of Diabetes (Whether IDDM or NIDDM) were given injections of soluble insulin in two or three doses depending upon the response of patient. The daily dosing of insulin was monitored by urine glucose testing which was done twice daily. This was continued for 2-4 weeks or till clinical improvement occurred. Later on patients with NIDDM were given oral hypoglycaemic agents. In this study, second generation sulfonylureas mainly glibenclamide was used. In obese patients phenformin was preferred. All individuals were educated about dietary modifications.

FOLLOW UP

All the patients were kept in the Hospital for a period of 4-6 weeks; then followed up every month for a period of six months. The progress of patients was recorded by General examination, recording weight, urine sugar testing, sputum for AFB and blood sugar estimation on every visit. Repeat Chest X-Ray PA view was conducted after completion of treatment.

ANALYSIS

All data was tabulated and was statistically analysed using SPSS.22.0

OBSERVATIONS

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Following observations were made after statistical analysis-

TABLE-1: CLINICAL PRESENTATION OF PATIENTS IN BOTH THE GROUPS

Symptoms	Male	Female	Total	Percentage
Group 1- Pulmonary TB+ Diabetes Mellitus (Cases)				
Fever	10	15	25	100
Cough with Expectoration	10	15	25	100
Hemoptysis	2	3	5	20
Group 2- Pulmonary TB without Diabetes Mellitus (Controls)				
Fever	17	8	25	100
Cough with Expectoration	17	8	25	100
Hemoptysis	2	4	6	24

Table 1 shows that all the patients in group I (Diabetic Group) and II had fever and cough. Haemoptysis was slightly more frequent in Group II (20% Versus 24%).

TABLE-2: COMPLICATIONS DUE TO CHEMOTHERAPY.

Complication	Group-1 (Cases)	Group- 2 (Controls)
Drug Induced Hepatitis	2 (8%)	1 (4%)
Drug rash	2 (8%)	3 (12%)
Hypoglycaemia	1 (4%)	0 (0%)
Allergy to rash	0 (0%)	0 (0%)

Table-2 shows that drug induced hepatitis and drug rash was seen in 2 (8%) cases and 1 (4%) control. Hypoglycaemia was noted in 1 (4%) cases and 0 (0%) controls.

TABLE-3: RADIOLOGICAL FINDINGS

Radiological findings	Group-1 (Cases)	Group -2(Controls)
Extent of lesion		
Mild	0 (0%)	10 (40%)
Moderate	15 (60%)	10 (40%)
Severe	10 (40%)	5 (20%)
Zones involved		
1	0 (0%)	6 (24%)
2	12 (48%)	10 (40%)
3	8 (32%)	3 (12%)
4	3 (12%)	2 (8%)
>4	2 (8%)	4 (16%)
Only lower zone involvement		
Right	2 (8%)	0 (0%)
Left	0 (0%)	0 (0%)

Table-3 shows that there were no patients in group 1 with minimal tubercular lesions on radiographs. All patients were having moderate and severe extent of lesions. Where as in group-2, 40% patients were having mild disease and 40% had moderate. Majority of patients

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in group 1 and group 2 had 2 zone involvement. Lower zone involvement was in 2 cases but no controls.

TABLE-4: DEMONSTRATION OF CAVITATION AT START OF TREATMENT

		Group-1	Group-2
Cavitation	Absent	8 (32%)	10 (40%)
	Present	17 (68%)	15 (60%)
Total diameter	<4 cms	7 (28%)	10 (40%)
	>4 cms	10 (40%	5 (20%

Table-4 shows that cavitation was present in 68% cases and 60% controls. 40 % cases had cavity diameter greater than 4 cms.

TABLE-5: RESPONSE TO CHEMOTHERAPY

Duration of treatment	Number of patients		Improvement
	Group-1	Group -2	
6 months	23	25	Improved
3 months	2	0	Improved

Table-5 shows that 92% patients in group 1 and 100% patients in group 2 showed improvement within 6 months. Treatment had to be extended to 9 months in 2 patients of group 1. These 2 patients developed intolerance to pyrazinamide.

3. DISCUSSION

In our study most of the patients in Group I were females (60%) while in Group II there was male predominance (68%). (Wiener and Kavee,[4]), (Warwick, [5]) showed the female predominance in diabetic tuberculosis.

The most common presenting symptoms were low grade fever and cough with minimal expectoration in both the groups. The average duration of symptoms was 2-3 (Weiner and Kavee, [4]) showed cough as most frequent symptom occurring in 125 patients out of 218 patients. Fever occurred only in 34 patients. This may be because, in our country patients present late to hospital and disease getting missed by the general practitioners, who do not subject the patients to radiological examination at appropriate time. By the time patient reaches hospital, the disease is found to be in advanced form.

Haemoptysis occurred in 20% patients in group 1 and 24% patients in group 2 as a presenting complaint. Our findings are concordant with study conducted by Wiener and Kavee [(4)].

As far as extent of disease is concerned none of patients in group-I were found to have minimal disease on chest X ray PA view. Whereas same was observed in 40% controls. This is imputable to the fact. that patients had either poorly controlled high blood glucose levels or they were not aware of underlying diabetes. In such cases when tuberculosis sets in, its diagnosis is delayed because of masking effect of diabetes or the symptoms are ascribed to poorly controlled diabetes or recurrent upper respiratory tract infection which diabetics usually suffer from.

Predominant lower zone involvement was seen in 2 (8%) patients of group 1 and none in group 2. This result of our study was in accordance with (Sosman and Steidle)[1], (Himsworth)[2] and (Khanna)[6]. However, many studies like (Warwick)[5], (Boucot)[7], (Banyai)[8] and (Brij Kishore et al)[9] refute this. Possible explanation behind involvement of lower lobe is because:-

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1. Difficulty in initial defence mechanisms against pulmonary tuberculosis.[10]
2. Initially mycobacterium tuberculi is implanted in lower lobes. This initial infection is controlled by body's natural defence mechanisms in healthy individuals. In diabetes mellitus it is impaired.
3. Phagocytic and chemotactic capacities of polymorphs is deficient in diabetic tubercular patients. [11].

All the patients in both the groups were given modern first line antitubercular drugs in various combinations. Because of higher prevalence of resistance (14%) to INH in locality of this hospital, all the patients were given 4 drugs in intensive phase except for two cases in group 1 who could not tolerate pyrazinamide. Rifampicin and isoniazid were continued in the maintenance phase for 4 months. As far complication of antitubercular drugs were concerned, only 8% cases and 4% controls developed hepatitis. Regarding this observation no comparison can be made because of the lack of studies carried on management of diabetic tuberculosis with modern short course chemotherapy. The risk of hepatitis increases when combination of these drugs is used.

At the end of chemotherapy patients in group 1 showed improvement in terms of clinical symptoms, sputum AFB and radiological findings, which was comparable with improvement of group 2 patients.

4. CONCLUSION

This study shows that diabetic control is poor in diabetic tubercular patients. Lower lobe involvement is common in chest roentgenograms of such patients. There is good response of antitubercular chemotherapy. Few guidelines we should follow in future while treating diabetic tubercular patients-

1. All diabetic patients should be screened regularly for pulmonary tuberculosis. Conversely all pulmonary tuberculosis patients above 40 should be screened for diabetes.
2. All such patients should be hospitalized 2 to 3 weeks. Insulin should be started. When toxaemia subsides insulin should be replaced with oral hypoglycaemic agents. Diet with 2000Kcal should given as it is sufficient to nourish the patients and keep blood glucose levels at check.
3. Most authors recommend to keep patients slightly hyperglycaemic (blood glucose levels< 200mg/dl) to buffer effects of oral hypoglycaemic agents (in case if patient misses his meals). Dose of oral hypoglycaemic drugs should be reduced after completion of chemotherapy.

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