

## Study of Clinical Features, Laboratory Profile, Radiological Features and Risk Factors of Sputum Positive Previously Treated Pulmonary Tuberculosis Patients

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### Abstract:

**Background and Aim:** Mycobacterium Tuberculosis have played extremely important role in influencing society throughout its history. Nearly one third of global population, i.e. two billion people is infected with Mycobacterium Tuberculosis and is at risk of developing tuberculosis. More than eight million people develop active tuberculosis every year and about two million die. Post primary TB arise from endogenous reactivation of latent foci or exogenous re-infection.

**Material and Methods:** The present study carried out in the Department of Pulmonary Medicine, C.U. Shah Medical College and Hospital, Surendranagr, Gujarat, India. In this study total 132 patients of adult age and either sex were included, admitted in department of pulmonary medicine ward or attended OPD during period of March 2021 to August 2022.

**Results:** In This Study Most common symptom of previously treated pulmonary TB is cough. Patients with comorbidities like diabetes and HIV had more chances of recurrence. Most of the patient had anemia and raised ESR. Cavitations and Fibrosis were common radiological findings.

**Conclusion:** Male preponderance with peak age of disease was noted in 40 to 60 years age group. Majority of patients had symptoms of Cough with or without expectoration, followed by fever and Breathlessness. Comorbidities like diabetes mellitus and HIV are most commonly associated with the recurrence. Cavitations and fibrosis were most common radiological findings associated with right sided preponderance. More than half of the patient had anemia and raised ESR.

**Keywords:** Anemia, Diabetes Mellitus, Mycobacterium Tuberculosis, Pulmonary Medicine.

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### Introduction

Tuberculosis remains one of the most significant public health challenges globally, despite significant advances in TB control. Approximately one-third of the world's population is estimated to harbor latent forms of mycobacterium tuberculosis creating a reservoir for future disease [1].

Co-morbidity like diabetes mellitus also played important role in development of recurrent of tuberculosis [2]. The interplay between the TB and HIV has resulted in ten times greater risk of TB reactivation [3]. Recurrence of TB disease occurs when patients who were previously treated for TB develops a new disease episode, due to either relapse or reinfection. It is associated with poor treatment outcomes and higher mortality rates compared to primary TB infection. Clinical, epidemiological and microbiological data cannot be

used to differentiate relapse and reinfection. Rate of recurrence of TB reflects long term efficacy of TB treatment, the effectiveness of the TB control strategy, the underlying incidence of the TB in community and immune status of the community. Chest x-ray is very helpful in diagnosis of primary pulmonary tuberculosis. Sometime it is difficult to diagnose recurrence of pulmonary tuberculosis by chest x-ray so role of sputum microscopy and rapid molecular tests are very important [4].

Rates of recurrent TB in settings with low to intermediate incidence of TB are reported to range 2-7%. Recurrence of TB in previously treated patients may occur due to endogenous reactivation of the same strain or exogenous infection with the different strain. In countries with low to intermediate incidence of TB, recurrence is mostly

occurring due to reactivation rather than reinfection. In contrast, in high incidence countries, reinfection seems to be a major cause of the reactivation of the disease [5].

### Material and Methods

The study was undertaken after approval from the institutional ethics committee. An informed consent was taken before enrolling the patient in the study. Recent Pulmonary tuberculosis was diagnosed on the basis of detailed history, clinical examination, sputum examination for acid fast bacilli and chest radiography.

Adult patients who full filled above criteria were included in the study. Patient were examined thoroughly and subjected to relevant laboratory and radiological investigations. The Clinical profile evaluated in this study include age and sex distribution, symptoms of presentations, past history of tuberculosis treatment completed or not,

presence of co-morbidities like diabetes, hypertension and ischemic heart disease, habit like smoking, hemoglobin level, Erythrocyte sedimentation rate, sputum for Acid fast bacilli results, sputum GeneXpert results, HIV status and radiological features. The results of above clinical profile, relevant tests, risk factors and radiological findings were tabulated.

**Statistical analysis:** The recorded data was compiled and entered in a spread sheet computer program (Microsoft Excel 2007) and then exported to data editor page of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA). Quantitative variables were described as means and standard deviations or median and interquartile range based on their distribution. Qualitative variables were presented as count and percentages. For all tests, confidence level and level of significance were set at 95% and 5% respectively.

### Results and Discussion

**Table 1: Age and Gender wise distribution**

Age groups (in years)	Number of patients			Percentage of total cases (%)
	Male	Female	Total	
<40	11	6	17	14
40-60	56	24	80	60
>60	23	12	35	26
Total	90	42	132	100

**Table 2: Symptoms among Participants**

Symptoms	Male(n=90)	Female(n=42)	Total	Percentage (%)
Cough	87	39	126	96
Fever	69	32	101	77
Dyspnea	49	23	72	54
Hemoptysis	18	9	27	21
Loss of appetite	49	25	27	56
Loss of weight	23	11	34	25

**Table 3: Haemoglobin level among Participants**

Hemoglobin Level (%)	No. of patients	Percentage (%)
>12	48	36
10-12	60	46
7-10	18	14
<7	6	4
Total	132	100

**Table 4: Erythrocyte Sedimentation Rate**

ESR(mm/hr)	No. of patients	Percentage (%)
<50	13	10
51-100	64	48
>100	55	42
Total	132	100

**Table 5: Site of lesion on Chest-X-ray**

Site	No. of Patients	Percentage (%)
Right	68	52
Left	30	22
Bilateral	34	26
Total	132	100

**Table 6: Zone wise distribution**

Zone	No. of patients	Percentage (%)
Upper Zone	56	42
Mid Zone	10	8
Lower Zone	48	36
Multiple Zone	18	14
Total	132	100

**Table 7: Nature of Lesions**

Type of lesion	No. of patients	Percentage (%)
Cavity	56	42
Fibrosis	39	30
Infiltration	21	16
Consolidation	8	6
Miliary	3	2
Abscess	5	4

TB is the most common communicable disease in the world and is a major health problem in India. In 1993, WHO declared TB as a global emergency. It is estimated that 40% of Indian population is infected by TB bacteria. Socioeconomic development and access to quality of health services appear to be at least as important as any specific TB control measure.

The likelihood of success of TB control efforts is likely related to socioeconomic indicators, including gross domestic product per capita, mortality of children. Primary tuberculosis is an airborne infection. The site of primary tuberculosis in the lungs reflects areas of greatest ventilation; the most common sites are the middle or lower lung zones or the anterior segment of an upper lobe. The regional multiplication of organisms is followed by hilar and/ or mediastinal lymphadenopathy and the lymphohematogenous dissemination of organisms diffusely to the lungs and to numerous extrapulmonary sites.

During this time, most patients are either asymptomatic or develop mild to moderate systemic symptoms. Tuberculin conversion occurs in 4- 8 weeks, at which time the patient will demonstrate a positive PPD skin test. This corresponds to an activation of macrophage responsiveness, when activated macrophages become capable of containing the primary infection. [6,7] In 2%-6% of cases, the lymphohematogenous dissemination of massive numbers of viable organisms results in clinical and radiographic evidence of miliary tuberculosis. [8,9] This event is life-threatening and is characterized clinically by fever, weight loss, prostration, and, if untreated, death from respiratory failure and disseminated intravascular coagulation. [8] In about 10% of primary infections, acquired immunity is inadequate to contain the primary infection, and regional multiplication is followed by chronic, progressive parenchymal disease. This phenomenon is distinguishable from postprimary

disease only by documentation of a recent conversion of the PPD skin test. In the remainder of cases the primary infection is contained but remains a significant risk for postprimary tuberculosis unless preventive treatment is given; memory lymphocytes become immunologically committed, and patients with primary infection generally retain both tuberculin reactivity and immunity from primary reinfection for life. [10,11]

132 patients are studied in this clinic based observational study. Out of 132 patients 90 (68%) were male while 42 (32%) were females. Shruti Kulkarni et al [12] noted that males (60%) were more than the females (40%) with M:F ratio being 3:2, with a mean age of 44.08 years. In study by Yaranal PJ et al.[13] there were 71 males and 29 females with mean age of 41 years. 61% of patients were in age group of 20 – 50 years. These findings were comparable to our study. Kurup R et al. [14] studied 316 patients with newly diagnosed pulmonary TB, 235 were males and 81 were females. This possibility is due to fact that male patients are more involved in outside work than females. Another reason could be that the male patients attending health care facilities in there early stages of symptoms are more than females. 60% (80/132) of patients were between the age group of 40-60 years followed by age 60 years and above were 26% (35/132) & 14% (17/132) were below 40 years of age.

Prominent symptom was cough (96%) followed by fever (77%), loss of appetite (56%) and dyspnea (54%). Other symptoms were also noted like hemoptysis (21%) and loss of weight (25%). Out of all patients, 26% (34/132) patients have had history of diabetes mellitus while 14% (18/132) patients have had history of hypertension. Only 5% (6/132) patients have had history of ischemic heart disease.

Diabetes mellitus was independently associated with relapse or reinfection in previously treated pulmonary tuberculosis patients.

Possible reason may be immune modulation and hyperglycemia in diabetic patients provides a suitable environment for mycobacterium bacilli to thrive & multiply. Although the screening for DM in patients with tuberculosis at the beginning of treatment is internationally recommended, the test to be used (fasting glucose, glucose tolerance test, or HbA1c) and the timing of repeat testing may vary according to local conditions. [15-17] Symptoms of tuberculosis in patients with DM appear to be more common and severe than do those described in patients with tuberculosis without DM. [18,19]

Out of total male patients, 64.4% (58/90) were smokers while none of female patient was smoker. Smoking could be an independent risk factor for relapse or reinfection of tuberculosis. 64% (84/132) patients were found to be anemic out of all patients.

Among 132 patients, 46% patients were mildly anemic, 14% were moderately anemic and 4% were severely anemic. The anemia largely due to chronic inflammatory nature of the disease but loss of appetite also plays role in malnutrition and anemia in some patients. Parasappa J Y et al [20] noted anaemia in 74 % patients before antitubercular therapy. Manjunath MR et al [21] reported that most common type of anaemia being Normocytic Normochromic anaemia and second common anaemia was Microcytic Hypochromic anaemia [33.3%], rest having macrocytic normochromic anaemia. This was comparable to our study. Shidram K et al [22] noted that commonest type of anaemia was Normocytic Normochromic anaemia in 84% of their cases before antitubercular therapy.

Most of the patients of tuberculosis had raised Erythrocyte sedimentation rate. 48% (64/132) patients had an ESR between 51-100 mm/hr, 42% (55/132) had ESR more than 100 mm/hr. Only around 10% (13/132) patients had ESR value less than 50 mm/hr. Among all patients, 65% patients had completed their entire course of tuberculosis treatment while 35% patients had left the treatment before completion.

In earlier studies the elevated ESR is also reported by different scientists in tuberculosis patients. These findings are in agreement with previous studies by Chakraborti et al [23] Doedhare et al [24] and Hungund et al [25] the hematological changes observed in our study may be attributed to cytokines secreted by macrophages active against tubercle bacilli resulting in decreased erythropoietic production leading to blockage in the reticuloendothelial transfer of iron in the developing RBC. The decrease in haemoglobin count might also be due to effects of antituberculosis drugs during the course of treatment.

Out of 132, 8 patients were detected as drug resistance tuberculosis. Only 3% patients was HIV reactive in this study while 97% patients were non-reactive. Out of all, 52% (68/132) patients had right sided lesions on chest x-ray and 22% (30/132) patients had left sided lesions. 26% patients had bilateral lesions. 42% (56/132) of patients had upper lung zone involvement, 36% (48/132) of patients had lower zone involvement while only 8% (10/132) patients had mid zone involvement. Multiple zone involvement was noted in 14% (18/132) of patients. 42% (56/132) patients had cavitary lesions on chest x-ray followed by 30% (39/132) had fibrosis and 16% (21/132) had infiltration on chest x-ray. Consolidation, Abscess and Miliary lesions were noted in 6%, 4% and 2% of patients respectively.

Limitation of the study is sample size is too small for generalization of the study findings. Since the study was conducted in a single institute, care should be taken while inferring the result to the general population.

### Conclusion

In this observational study in a tertiary care center, 132 patients were included. Male predominance of disease was noted and peak incidence of disease was noted in age group of 40 to 60 years. Majority of patients had symptoms of cough followed by fever and dyspnea. Patients with co-morbidity like diabetes mellitus had more chances of recurrence. Some patients of recurrent pulmonary tuberculosis also had hypertension and HIV as co-morbidity. Smoking is also associated with relapse or reinfection of the tuberculosis. Right sided lesions were common than left sided lesions. Cavitations and fibrosis were common radiological findings among others. Upper lung zone involvement was common but lower lung field tuberculosis was noted in significant portion of the patients. More than half of the patients were anemic and raised ESR was noted in the most of the patients.

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