

The Pattern of Presentation and Incidence of Tuberculosis in Patients on Chronic Hemodialysis

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Abstract

Original Research Article

Objective: The incidence of tuberculosis (TB) among dialysis population is much higher than general population. Immunosuppression induced by end-stage renal disease (ESRD) modified the clinical presentation of TB, resulting in atypical signs and symptoms, and a more frequent extrapulmonary presentation. This study was undertaken to determine the pattern of presentation and incidence of TB in ESRD patients. **Methods:** This was a prospective observational study done using 200 ESRD patients who are on chronic maintenance hemodialysis (HD) at Adichunchanagiri Institute of Medical Sciences, BG nagara, India. TB was diagnosed using clinical, radiological, biochemical, microbiological, and histological findings. **Results:** The incidence of TB was found to be 12%. It was found to be commoner in females, commonest in the age group 40–34 years. Pleural effusion was the commonest type of TB found (50%). The incidence of extrapulmonary TB was 87.5%. There was a high incidence of TB during the early years of initiation of HD. Patients with TB had a statistically significant low BMI compared to non-TB patients (18.42 kg/m² Vs. 22.63 kg/m². $P < 0.001$). TB had a significant impact on mortality among HD patients. **Conclusion:** Patients with ESRD, on chronic maintenance HD are at increased risk for pulmonary and extra pulmonary tuberculosis and should be diagnosed with high index of suspicion. The TB infected patients generally presented worse mortality rates than the non-TB infected patients.

Keywords: End-stage renal disease, hemodialysis, mortality, tuberculosis.

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INTRODUCTION

Tuberculosis (TB) is a widespread infectious disease, most of which occurring in developing countries. People in the developing world contract tuberculosis because of a poor immune system [1]. End-stage renal disease patients who are on chronic maintenance hemodialysis will have poor cell mediated immunity. This has led to increased TB rates in dialysis population [2]. An individual who is on hemodialysis has 6.9 to 52.5 times increased risk of developing TB compared to healthy individual [3].

The presentation of TB in dialysis patients varies from the normal, both in clinical features and investigation findings. Also there is a rise in the extrapulmonary presentation of TB [3]. Data on the incidence and prevalence of TB in dialysis patients in India is scanty. We undertook this study to determine the pattern of presentation of TB in dialysis population and to ascertain the incidence of TB in dialysis patients.

PATIENTS AND METHODS

Study Setting: The study was done simultaneously at Adichunchanagiri Institute of Medical Sciences, B.G. nagar between January 2016 and December 2018. The patients for the study were recruited from the dialysis unit of both the hospitals.

Sample Size: 100 patients who are on chronic maintenance hemodialysis were studied. **Sampling Method:** All consecutive ESRD patients who are on maintenance HD aged 18 years and above, who presented to the dialysis department within the study period and who met the selection criteria, were recruited into this study.

SELECTION CRITERIA

Inclusion Criteria

(1) All patients who are on maintenance HD aged 18 years and above who presented to the dialysis department within the study period.

(2) All patients who consented to participate in the study.

Exclusion Criteria

- (1) All chronic kidney disease patients who are not on dialysis.
- (2) Patients who did not consent to join the study.
- (3) All ESRD patients below age 18 years.

Method of Data Collection

All subjects that met the inclusion criteria were clinically assessed. That involved detailed history taking and a physical examination. A designed questionnaire was used as the study instrument. All subjects gave informed consent for participation in the study, which was approved by the human ethics committee. All of the procedures were in accordance with the Helsinki Declaration of 1975.

The above information with the subject's biodata and the results of the following investigations were entered into the questionnaire.

- (a) Full blood count and Erythrocyte Sedimentation Rate (FBC + ESR).
- (b) Chest radiograph.
- (c) Sputum acid and alcohol fast bacilli (AAFB).
- (d) Smear and culture specimens from sputum, peritoneal, pleural, pericardial or cerebrospinal (CSF) fluid.
- (e) Related tissue biopsy sampling (lymph node, peritoneal, pleural or any other tissue involved)

Method of Data Analysis

The Microsoft excel computer software was used to record the data. The statistical package for social sciences (SPSS) version 13.0 was used to analyse them. Frequency tables were drawn to show the distribution of data within variables. Contingency tables were drawn to compare two discrete variables.

RESULTS

A total of 200 patients were recruited in the study. The ages of the respondents ranged between 19 and 74 years. The mean age was 57.2 years. Of all the 200 patients studied, 123 (37.3%) were males. The remaining 77 patients (62.7%) were females. Twenty-four (12%) of the 200-dialysis patients were diagnosed with TB. Among the patients diagnosed with TB, 14 of them were females while the remaining 10 are males, giving a male to female sex ratio of 1: 1.4 (Table 1). The incidence of TB is highest among the age group 40–49 years (9 cases), followed by the age group 50–59 years (6 cases). The lowest incidence is seen in age groups less than 20 years (1 case) and more than 60 years (2 cases) (Figure 1).

The commonest presentation was tubercular pleural effusion, with 12 patients (50%) out of the 24

patients with TB infections. The least common was disseminated TB (1 patients (4.1%)). Six patients (25%) were found to have tubercular adenitis, while 3 patients (12.5%) had pulmonary tuberculosis and 2 patients (8.3%) had abdominal TB (Figure 2).

The most common symptom presented by the TB infected respondents was weight loss with 23 respondents (95.8%). This was followed by fever, which occurred in 20 respondents (83.3%). Difficulty in breathing was found in 18 respondents (75%). Cough was found in 15 respondents (62.5%). A total of 11 patients had night sweat (45.8%). Sputum production occurred in 4 respondents (16.6%), while hemoptysis was found in 2 respondents (8.3%) (Table 2).

There was a significant relationship between low body mass index (BMI) and TB in dialysis population (Figure 3). The mean BMI of patients without TB was 22.63 kg/m², while the mean BMI of patients with TB was 18.42 kg/m², *P* value <0.001. Duration on dialysis had a bearing on the incidence of TB. When patients were on dialysis for <1 year, we had 12 patients out of 24 (50%) with diagnosis of TB. TB was diagnosed in 8 patients between 1-3 years of HD and in 4 patients with >4 years of HD (Table 3). No statistically significant association was found between the TB and non-TB groups with respect to other predisposing factors for TB such as diabetes, retroviral disease, smoking and occupational exposure.

Furthermore, TB contributed significantly to the mortality among hemodialysis patients. On applying Kaplan Meyer survival analysis between status of TB and days of mortality, a significant survival benefit was observed (*p*<0.001) in non-TB patients (Figure 4).

DISCUSSION

ESRD patients who are on chronic maintenance HD are prone to many infections including TB because of poor cell mediated immune response [4]. In our study the incidence of TB among HD patients was 12%. This agrees with the study by Ghulam Hassan Malik *et al.* who demonstrated that 14.5% of the cases were found to have TB [5]. Diagnosing TB in dialysis population is challenging because of its varied presentation, non-specific symptoms and high incidence of extrapulmonary involvement [6]. Extrapulmonary involvement has been reported between 38-80% among dialysis population, whereas in general population extrapulmonary TB is reported to account for only 4.5% of the total cases of TB [7]. In our study, the incidence of extrapulmonary TB was 87.5%. We found tuberculous pleural effusion as the most common type of extrapulmonary TB. Classical TB symptoms (cough & hemoptysis) in general population are less frequently reported in dialysis patients [8]. These symptoms are reported in an average 22% of dialysis TB patients [9]. In our study, both of these symptoms were reported in only 8.3% of patients. The most

common presenting symptom of TB in our study was weight loss, accounting for 95.8% of all TB patients. This may probably due to TB, which is a chronic debilitating disease, is coexisting with another chronic inflammatory condition (chronic kidney disease).

The mean body mass index (BMI) of TB infected patients (20.42 kg/m²), was found to be less than that of the non TB infected patients (22.63 kg/m²). This is expected as the coexistence of the TB with end stage renal disease will ultimately affect the BMI negatively. In our study, most of the TB cases were diagnosed (50%) within first year of dialysis. These results are similar to what was found in the studies done by Erkoc *et al.* [10]. This may be due to the generalized debility and profoundly depressed cell mediated immunity during the early months of initiation of dialysis. Several studies reported a high mortality of 17% to 75% in CKD patients with TB [11, 12]. In our

study, significantly high mortality rate (70%) was observed in TB infected patients. Poor nutritional status, delay in diagnosis because of varied presentation, drug toxicity and poor compliance might have led to this increased mortality in these patients.

Limitations of our study includes: a) small number of the study population, b) delay in diagnosing TB due to its varied presentation in HD population and c) ours is only an observational study.

CONCLUSION

In conclusion, TB is common in hemodialysis patients, and this worsens their clinical status. The presentation of TB in dialysis patients is mostly atypical making diagnosis difficult. The TB infected patients generally presented worse mortality rates than the non-TB infected patients.

Table-1: Clinical characteristics and laboratory findings of the study population

Parameters	Mean ± SD
Age	57.2±6.4
Sex (Male/Female)	123/77
Laboratory Findings	
Hemoglobin (g/dL)	10.6±0.42
Creatinine (mg/dL)	8.62±4.26
WBC (/mm ³)	9400±1600
Total Protein (g/dl)	6.5±3.7
Serum Albumin (g/dl)	3.02±0.6
ESR (mm/hr)	74.2±24.6

Table-2: Distribution of presenting symptoms of TB among all the study population

Symptom	Frequency	Percentage
Weight Loss	23	95.8 (%)
Fever	20	83.3 (%)
Difficulty in Breathing	18	75 (%)
Cough	15	62.5 (%)
Night Sweat	11	45.8 (%)
Sputum	4	16.6 (%)
Hemoptysis	2	8.3 (%)

Table-3: Relationship between duration on dialysis and time of diagnosis of TB among study population

Duration on Dialysis (years)	Diagnosis of TB (Percentage)
<1	12 (50%)
1-3	8 (33.33%)
>3	4 (16.66%)

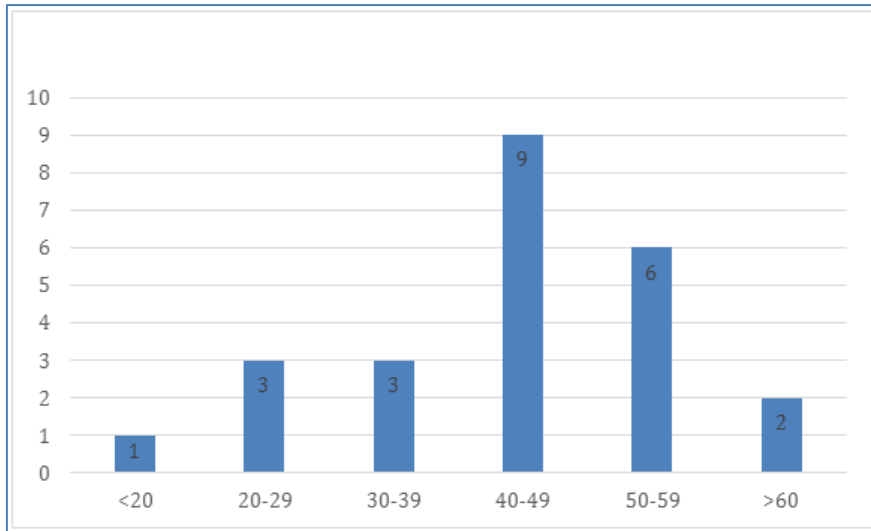


Fig-1: Incidence of TB among different age groups

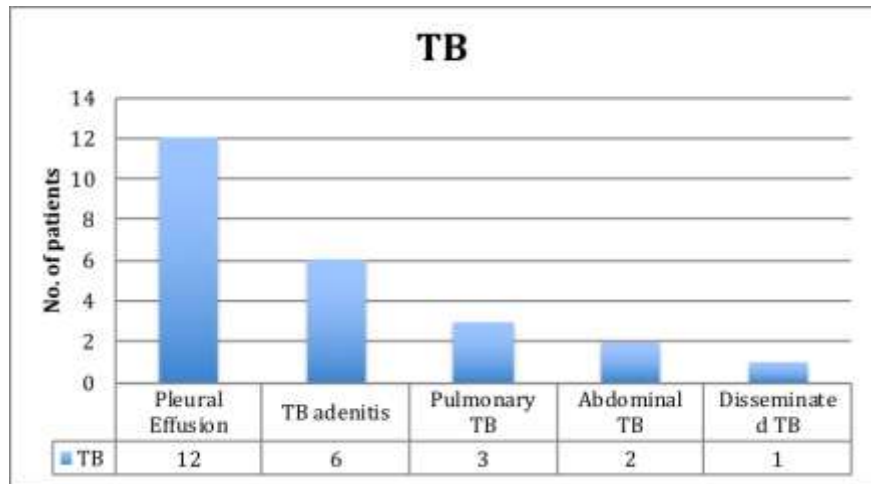


Fig-2: Distribution of the types of TB found in the study population

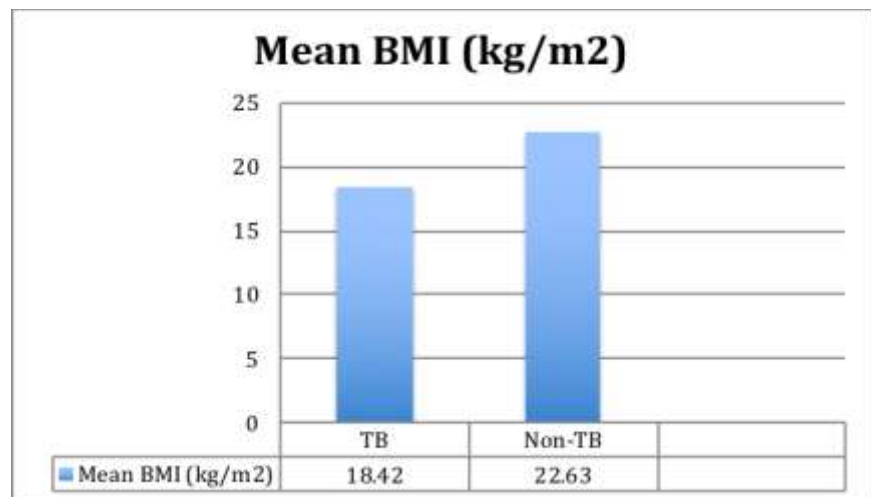


Fig-3: Comparison of BMI between TB and non-TB patients

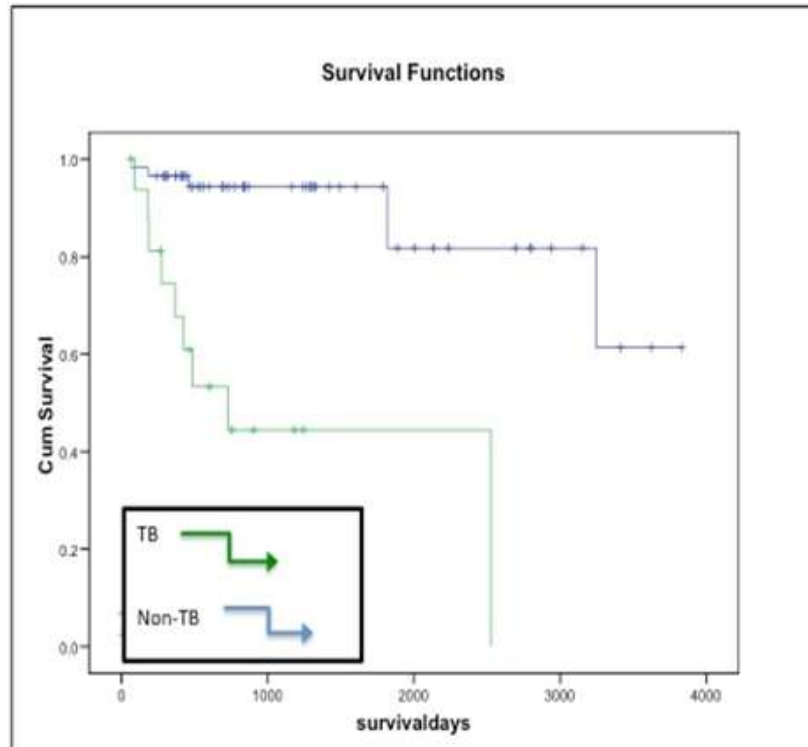


Fig-4: Relationship between TB and Mortality among dialysis patients

IMPLICATION FOR HEALTH POLICY

Makers/Practice/Research/Medical Education

Nephrologists should be aware of the pattern of presentation and the atypical findings of tuberculosis for early diagnosis and treatment among hemodialysis population.

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