

A Hospital Based Study: Mortality among Patients of Pulmonary Tuberculosis

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Abstract

Tuberculosis remains a major global health problem. Tuberculosis is one of the leading cause of deaths in developing countries. The present study was conducted to assess risk factors and causes of death in pulmonary tuberculosis patients. A retrospective study was conducted in pulmonary tuberculosis patients admitted in hospital and died during treatment period from 2008 to 2012. Medical records of tuberculosis cases over the 5-year period were reviewed and death data were analyzed. Of total 2648 cases initiated on anti-TB treatment, 223 cases (8.42%) were died during treatment. Risk factors in patients who died due to pulmonary tuberculosis were: alcoholism, HIV, baseline weight < 30 kgs, smoking, diabetes, chronic renal failure and steroid use. Alcoholism was found as significant risk factor in 119 (53.36%) patients. Of the 223 deaths, 201 deaths (90.13%) due to pulmonary tuberculosis and 22 (9.86%) deaths were due to other than tuberculosis. Bilateral extensive pulmonary tuberculosis was the cause of death in 163 cases (73.09%). Out of 223 deaths, 188 (84.30%) deaths occurred within 2 months of therapy due to tuberculosis. Overall, alcoholism and late presentation both contributed substantially to the mortality in this cohort. active case finding can reduce tuberculosis mortality rate by earlier case detection and treatment.

Keywords: Pulmonary tuberculosis; Risk factor; Mortality; Cause of death.

Introduction

Tuberculosis (TB) is an airborne infectious disease that is preventable and curable. It ranks as the second leading cause of death from an infectious disease worldwide, after the human immunodeficiency virus (HIV).[1] According to latest World Health Organization (WHO) report 9 million new cases and 1.4 million TB deaths occur worldwide annually. In study of the natural history of the disease among sputum smear-positive and HIV-negative cases of pulmonary TB, around 70% died within 10 years; among culture-positive (but smear-negative) cases, 20% died within 10 years.[2]

In 2011, 2.3 million cases were estimated to have occurred in India. With the introduction of Directly Observed Treatment Short Course (DOTS) strategy in India in 1997, total burden of tuberculosis and mortality rate reduced significantly but deaths due to tuberculosis continue to occur. Treatment outcomes of pulmonary tuberculosis cases reported that death rate of 5% in new sputum-positive cases, 7% to 8% in smear positive re-treatment cases during period from 1999 to 2011 in India.[3] The aim of the present study is to evaluate mortality in pulmonary tuberculosis patients with objectives of assessment and determination of risk factors, causes of death in pulmonary tuberculosis patients. Knowing these risk factors and reducing them will decrease mortality rate of tuberculosis.

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Aims and Objectives

To assess risk factors in patients died of pulmonary tuberculosis.

To determine the causes of death in patients with pulmonary tuberculosis.

Methods

After institutional ethical committee approval, a retrospective study was conducted in department of pulmonary medicine, Dr.V M government medical college, Solapur. We have studied indoor paper record to determine the proportion of TB patients who died during therapy. Risk factors and causes of deaths in 223 patients died with pulmonary tuberculosis were determined. Medical records of all pulmonary tuberculosis patients admitted in our hospital during the period of January 2008 to December 2012 were analyzed. We have included all patients who died in hospital during treatment period with diagnosis of pulmonary tuberculosis. We have excluded patients of pulmonary tuberculosis with age < 18 years. Diagnosis of Pulmonary tuberculosis was made with clinical finding, microbiological and radiological methods. Pulmonary tuberculosis cases are divided into Smear-positive and Smear-negative cases. Smear-positive pulmonary tuberculosis is patient with one or two smears being positive for acid fast bacilli (AFB). Smear-negative pulmonary TB is patient with symptoms suggestive of TB with two smear examination negative for AFB, with evidence of pulmonary TB by microbiological methods (culture positive or by other approved molecular methods) or Chest X-ray. Cases were classified as new, relapse, treatment after default and failure case. New case is patient who has never had treatment for TB or has taken anti-TB drugs for less than one month. Treatment after default is patient, who has received treatment for TB for a month or more from any source and returns for treatment after having defaulted consecutively for two months or more and found to be smear-positive. Failure is patient who is smear-positive at 5 months or more after initiation of treatment. Relapse case is patient who was declared cured or treatment completed by a physician and who reports back to the health facility and is now found to be sputum smear positive. Patient who died during the course of treatment regardless of cause is declared as

Died case.

The following information was obtained from indoor case papers: age, sex, weight, addictions, type of case, category of treatment, other medical illness, HIV serostatus and cause of death. Data was entered into Microsoft office excel 2007 and were analyzed using SPSS.

Results

Of total 2648 cases admitted and initiated on anti-TB treatment, 223 cases (8.42%) were died during Treatment. out of 223 patients of pulmonary tuberculosis 161 (72%) were male and 62 (28%) were female. 103(46.18%) patients with age between 18-39 years, 93(41.70%) patients with age between 40-60 years and 27 (12.10%) patients with age >60 years were found. 48 (21.52%) patients with weight < 30 kgs and 175 (78.47%) patients with weight > 30 kgs were found (table 1). Risk factors in patients died due to pulmonary tuberculosis were: alcoholism, HIV, baseline weight < 30 kgs, smoking, diabetes, chronic renal failure and steroid use. 119 patients (53.36%) alcoholic, 48 patients (21.52%) with baseline weight < 30 kgs, 8 patients (5.80%) diabetic, 5 (2.24%) smokers, 1 patient (0.44%) with Chronic renal failure, 1 patient (0.44%) using steroids and 41 patients (18.30%) were human immunodeficiency virus (HIV) positive

Table 1: Sex, Age and Weight Distribution in Patients with Pulmonary Tuberculosis

		Numbers (223)	Percentage
Sex	Male	161	72%
	Female	62	28%
Age	18 - 39 yrs	103	46.18%
	40 - 60 yrs	93	41.70%
	>60 yrs	27	12.10%
Weight	<30 kg	48	21.52%
	>30 kg	175	78.47%

Table 2: Risk Factors for Mortality in Patients with Pulmonary Tuberculosis

Risk factor	Numbers (n=223)	Percentage
Alcoholism	119	53.36%
Baseline weight <30 kg	48	21.52%
HIV status	41	18.30%
Diabetes	8	5.80%
Smoking	5	2.24%
Chronic renal failure	1	0.44%
Steroid use	1	0.44%

Table 3: Classification of Patient with Pulmonary Tuberculosis

Type of case	Numbers (n=223)	Percentage
New cases	121	54.26%
Defaulters	81	36.32%
Relapse cases	18	8.07%
Failure cases	3	1.34%

(table 2). Out of 223 pulmonary tuberculosis patients, New patients were 121 (54.26%) and 102 (45.73%) patients were retreatment cases. Among 102 retreatment cases, 81 (36.32%) defaulter, 18(8.07%) relapses and 3(1.34%) cases were treatment failure (Table 3).

Of the 223 deaths, 201 deaths (90.13%) were due to tuberculosis and 22 (9.86%) deaths due to other than tuberculosis. Bilateral extensive pulmonary tuberculosis was the cause of death in 163 cases (73.09%), among them majority died due to respiratory failure. 4 cases (1.79%) died of massive hemoptysis, 9 cases (4.03%) died due miliary tuberculosis. 14 cases (6.27%) died due to drug resistant tuberculosis. 8 cases (3.58%) died of TB meningitis and 3 cases (1.34%) due to pneumothorax.

Twenty two cases (9.86%) were died of medical problems unrelated to tuberculosis. 11(4.93%) cases from congestive cardiac failure , 3 patients (1.34%) due to sepsis, 2 patients (0.89%) due to pneumonia, 2 cases (0.89%) due to hepatic encephalopathy. 1 case

Table 4: Causes of Death in Patients with Pulmonary Tuberculosis

	Cause of death	Numbers (n=223)	Percentage
Tuberculosis related death	Bilateral extensive pulmonary tuberculosis	163	73.09%
	Drug resistant tuberculosis	14	6.27%
	Miliary tuberculosis	9	4.03%
	Tuberculous meningitis	8	3.58%
	Hemoptysis	4	1.79%
	Pneumothorax	3	1.34%
Non tuberculosis related death	congestive cardiac failure	11	4.93%
	sepsis	3	1.34%
	pneumonia	2	0.89%
	diabetic ketoacidosis	1	0.44%
	hepatic encephalopathy	2	0.89%
	malignancy	1	0.44%
	pulmonary thromboembolism	1	0.44%
cerebrovascular accident	1	0.44%	

Table 5: Time Duration from Treatment Start to Death in Patients Pulmonary Tuberculosis

	Cause of death	time duration < 2 months	time duration 2- 4 months	time duration >4 months
Tuberculosis related death	Bilateral extensive pulmonary tuberculosis	159	2	2
	Drug resistant tuberculosis	8	2	4
	Miliary tuberculosis	9		
	Tuberculous meningitis	5	3	
	Hemoptysis	4		
	Pneumothorax	3		
Non tuberculosis related death	congestive cardiac failure	5	3	3
	sepsis	3		
	pneumonia	1	1	
	hepatic encephalopathy	1	1	
	diabetic ketoacidosis		1	
	malignancy		1	
	pulmonary thromboembolism		1	
cerebrovascular accident			1	

(0.44%) due to diabetic ketoacidosis, malignancy, pulmonary thromboembolism, cerebrovascular accident each (Table 4).

Out of 223 died patients, 188 (84.30%) deaths in period < 2 months, 7 (3.13%) deaths in 2- 4 months period and 6 (2.69%) deaths in period >4 months of treatment due to tuberculosis occurred. 10 (4.48%) deaths in period < 2 months, 8(3.58%) deaths in 2- 4 months period and 4 (1.79%) deaths in period >4 months due to other medical problems in TB patients occurred. Significant number of deaths (71.30%) were due to Bilateral extensive pulmonary tuberculosis in period < 2 months (Table 5).

Discussion

In this study of pulmonary tuberculosis patients, overall mortality during tuberculosis treatment was 8.42%, consistent with death rates reported in annual status report of revised national tuberculosis control programme, India.[3] 90.13% (201/223) of

deaths occurred directly due to tuberculosis and 9.86% (22/223) of deaths were not directly due to tuberculosis, but resulted from congestive cardiac failure, sepsis, pneumonia, hepatic encephalopathy, diabetic ketoacidosis, malignancy, pulmonary thromboembolism and cerebrovascular accident. About 50% (11/22) of these deaths due to other medical problems occurred due to congestive cardiac failure. In other TB cohorts worldwide, the proportion of deaths caused directly by Tuberculosis has ranged from 10.5% to 85.6%. [4,5,6,7] Risk factors for death in tuberculosis patients were alcoholism, HIV co-infection, malnutrition (baseline weight < 30 kgs), diabetes, smoking, Chronic renal failure and Steroid use in the present study. Previously reported risk factors for mortality among tuberculosis patients include alcoholism, human immunodeficiency virus (HIV) co-infection, multidrug resistance, irregular treatment and delayed care-seeking. [8,9,10,11,12]

Alcohol has been recognized as a strong risk factor for tuberculosis disease.[13] Reason for

increased risk is due to alteration in the immune system, specifically in altering the signaling molecules responsible for cytokine production.[14] It has been found that alcoholism is one of the major risk factors for treatment non-compliance and mortality in south India.[15] In our study significant number of patients (53.36%) died with pulmonary tuberculosis were alcoholic. Given the high prevalence of alcoholism among Tuberculosis patients in the present study and its contribution to mortality, establishing a systematic approach to screening and treating alcoholism may be useful among Tuberculosis patients and lead to improved treatment outcomes.

HIV co-infection is the most potent immunosuppressive risk factor for developing active TB disease. From different Studies worldwide, it has been observed that high mortality in tuberculosis patients occur in HIV co-infection.[16,17] Prevalence of HIV among estimated incident Tuberculosis patients is about 5% in Indian population.[3] HIV prevalence in pulmonary tuberculosis patients in the present study is 18.30%. This high figure of HIV patients in this study is due to evaluation of data in death patients with pulmonary tuberculosis. we have not evaluated pulmonary tuberculosis patients with HIV co-infection in relation with use of antiretroviral therapy in this study. HIV co-infection in sub-Saharan Africa is high, giving antiretroviral therapy during initial phase of tuberculosis treatment is beneficial in reducing death in HIV co-infected tuberculosis patients. [18]

Malnutrition increases the risk of tuberculosis because of an impaired immune response.[19] Tuberculosis disease can itself lead to malnourishment because of decreasing appetite and changes in metabolic processes. Moderate to severe malnutrition in patients with tuberculosis is associated with early death.[20] In the present study weight <30 kgs was seen in 48 (21.52%) patients reflecting malnutrition. Nutritional support to enhance host response could potentially have a role in reducing mortality in these severely malnourished patients. Cegielski and

McMurray reviewed the relationship between malnutrition and tuberculosis with the available ecological, epidemiological, and animal studies and mentioned that although evidence exists to relate malnutrition and TB, the risk relative to specific levels of malnutrition still needs to be defined.[21] Diabetes has been shown to be an independent risk factor for tuberculosis. In this study diabetes was found in 5.80% cases died with pulmonary tuberculosis. About 10% of tuberculosis cases are linked to diabetes. People with diabetes who are diagnosed with TB have a higher risk of death during tuberculosis treatment. It has been argued that good glycemic control in TB patients can improve treatment outcomes.[3]

Majority of tuberculosis related death in this study was due to bilateral extensive pulmonary tuberculosis consistent with the works of Kourbatova *et al* and Tocque *et al*. [10,11] This finding reflects that diagnosis and treatment of tuberculosis are made at the late stage of disease due to missed time of tuberculosis detection with alcoholism as a risk factor. Drug resistant tuberculosis related (6.27%) death was associated with retreatment cases and reflect acquired drug resistance. In the present study majority of deaths directly due to tuberculosis occurred early in the course of treatment, with 84.30% dying within the first 2 months of therapy that reflects delay in diagnosis and starting of treatment. All other patients with pneumothorax, hemoptysis and miliary tuberculosis died within 2 months of therapy reflecting high mortality in these patients. Similar reports of early deaths in tuberculosis patients during treatment period have come from various studies.[22,23] These finding suggest that active case finding is essential to reduce tuberculosis mortality rate by earlier case detection and treatment.

Conclusion

Considering these risk factors for development of tuberculosis and its contribution to death among tuberculosis patients, effective intervention strategies need

to develop for tuberculosis patients. Active case finding for earlier detection and treatment of tuberculosis should be employed so that early deaths in tuberculosis patients during treatment period can be prevented.

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