Factors associated with treatment outcomes in patients with pulmonary tuberculosis

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Abstract

Objectives: The objective of this study was to determine the frequency of factors leading to poor treatment outcome in patients with pulmonary tuberculosis.

Study Design: The study design was cross sectional.

Place and Duration of the study: This study was conducted over a period of 1 year at the department of General Medicine, PAF Hospital Islamabad, Pakistan from 1st September 2021 to 31 August 2022.

Patients and Methods: A total of 100 patients with poor treatment outcome of pulmonary TB treatment registered at department for the above mentioned period were included through consecutive sampling. Record was extracted from TB treatment card and medical record registers. Patient's socio demographic, clinical investigation and treatment data were taken. Major factors associated with pulmonary TB treatment outcomes were found by applying frequency and percentage.

Results: The mean age of patients in this study was 31.98±9.55 years. Most of the patients belonged to younger age groups between 18-37 years (73%). Male gender was dominant with 63% of total population. Dominant factors in these patients with poor treatment outcome with statistical significance were poor educational status (84%), low economic status (72%), low knowledge of TB (64%), difficult accessibility to hospital (65%), being single (61%) smoking (61%) and no adherence to treatment (52%).

Conclusion: In conclusion, keeping in mind the fact that success rate of pulmonary TB in Pakistan is still lower than the target of 85%, factors that contributes most to the poor treatment outcome and are addressable by the medical community must be kept under keen focus to improve the treatment out comes.

Introduction

An infectious disease that has been coexisting with the human race since known history, caused by a species of pathogenic bacteria Mycobacterium Tuberculosis is known as Tuberculosis (TB). The approximate number of patients globally infected with TB is 1.7 billion as the disease is found to spread through air, however very few suffer from an active tuberculosis.[1,2]

TB has spread in the lower- and middle-class communities of countries mainly having lower economic status thereby taken as disease of the poor.[3] TB is fatal disease and has put immense burden of economies of these nations and therefore taken as a global health. emergency.[4] The estimated newly infected patients from TB were 10 million in 2017 and 87% of these were from

already high burdened nations. TB also declared among leading causes of death with 1.6 million deaths worldwide. This trend carried on as in 2020 global TB report by WHO shared again 10 million people got infected whereas the reported mortality was 1.4 million. The report also shares the high burden regions of the world with 44% cases of TB in Southeast Asia, 24% in Africa and 18% in Western Pacific highlighted as most concerned areas. [5,6]

The most common organ affected by this infection is the lungs. It is reported that 90-95% of the infected people remains asymptomatic and called as latent TB while approximately 10% of these infected persons develop the disease in their lifetime and in half of this can lead to death. [7] Mostly people with impaired immunities suffer from this infection. [8]

The commonly appearing symptoms of TB are cough with sputum or blood, fever, chest pain, weight loss and sweat at night. The process of disease transmission is the spreading of droplets of infected person during his cough, talking or sneezing and then inhaled by other person in contact. Meat and milk of infected cattle by mycobacterium bovis can also cause TB known as bovine TB.

For the evaluation of TB medical history of exposure to the infected persons is taken while a major risk factor for the TB infections includes HIV infections. Physical examination, chest X-ray and microbiological tests of the sputum samples are taken. The aim of the treatment is primarily to provide cure to these patients in order to prevent the mortality and prevent the spread of this deadly bacteria from infected individuals to their surrounding environment.[9]

A major challenge regarding compliance is the requirement of taking multiple drugs at least for the period of 6 months. The standard treatment included a two months' intensive period with 4 drugs (rifampicin, isoniazid, ethambutol, and pyrazinamide) and a continuation phase of four months with 2 drugs (rifampicin, isoniazid). The 1st phase helped to kill the bacteria while the 2nd phase helped to eliminate any remaining ones and for avoiding any chances of relapse.[10]

These available drugs however have faced high microbial resistance and despite these treatment strategies the control and spread of TB is still a big challenge especially the isoniazid and rifampicin.[11,12] To combat this drug resistance and improve the patient's

compliance to this long, expensive and complex treatment program, a short course with name of 'DOTS' program was introduced.[13] This WHO implemented DOTS, the treatment short course, to reduce the non-compliance and ensure positive treatment outcomes but poor outcomes are still reported globally in TB patients.[14,15] The treatment outcomes to assesses effectiveness are categorized by WHO as cured, treatment completed, treatment failed, died, lost to follow up or not evaluated. The poor treatment outcome is considered when there is missed treatment, defaulted (lost to follow up or not evaluated) or death.

The set target for success is 85% positive outcome that includes sum of cured and treatment completed.

Evaluation of factors associated with treatment outcomes is important to reduce the possibility of poor outcome. The factors influencing the treatment are both demographic and socioeconomic. Nutrition, multidrug resistance, management strategies and HIV are some important among these factors.[16] Efforts have been done in Pakistan in view of Stop TB target to reduce TB related mortality up to 50%. However, the prevalence of TB is still 341 per 100000 people and the incidence of mortality is 270 per 100000. Multi drug resistance is also an increasing problem as estimated position of Pakistan for multidrug resistant is 4th in global data.[17]

WHO has also recommended collecting and analyzing data of pulmonary TB on yearly basis for each district of Pakistan. This study is therefore planned to meet this requirement and to determine the important factors associated with the outcomes in patients with pulmonary tuberculosis in Pakistani population consulting at our hospital.

Material and Method

This study was conducted over a period of 1 year at the department of General Medicine, PAF Hospital Islamabad, Pakistan from 1st September 2021 to 31 August 2022.

The study design was cross-sectional in which 100 patients with poor treatment outcome of pulmonary TB treatment registered at department for the above-mentioned period were included through consecutive sampling. The record was extracted from TB treatment card and medical record registers. Patient's socio demographic, clinical investigation and treatment data were taken.[18]

Data was analyzed using SPSS version 26. Major factors associated with pulmonary TB treatment outcomes were found by applying frequency and percentage. Written consent was obtained from all the patients.

Results

The age range in this study was from 16-61 years with a mean age of 31.98±9.55 years, as shown in Table-I.

Out of these 100 participants, 63 (63%) were males while 37 (37%) were females as shown in Table-II.

Patients were divided into different age groups where the greatest number of the patients belonged to younger age group between 18-27 & 28-37 years as shown in Table-III.

Among these patients 70 (70%) were new cases while 30 (30%) were retreatment cases as given in table-IV.

The details of factors present in patients with pulmonary TB poor treatment outcome are given in Table-V.

Table-I: Mean±SD of patients according to age (n=100)	
Demographics	Mean±SD
Age (years)	31.98±9.55

Table-II: Frequency and percentage of patients as per gender(n=100)		
Gender	N	%age
Male	63	63%
Female	37	37%
Total	100	100%

Discussion

This study was planned to determine the factors that lead to poor outcome of treatment in pulmonary TB. The finding of this study will be helpful to improve the ratio of successful treatment by minimizing these factors if not

Table-IV: Category of Treatment failed patients.(n=100)		
Category of Patients	N	%age
New Treatment	70	70%
Retreated	30	30%
Total	100	100%

Table-III: Patients population as per their age groups. (n=100)		
Age Group	N	percentage
Below 18 years	3	3%
18-27 years	37	37%
28-37 years	36	36%
38-47 years	15	15%
48-57 years	8	8%
58 years or above	1	1%
Total	100	100%

Table-V: Major Factors Present in patients with Pulmonary TB poor Treatment outcome		
Factors	N	%age
Single (Unmarried/Divorced/Widow)	61	61%
Low Literacy Rate (Illiterate/Primary)	84	84%
Low Income (Poor/Low Middle Class)	72	72%
Smokers	61	61%
Knowledge About TB	64	64%
Difficult Access to Hospital	65	65%
No Adherence to Treatment	52	52%

possible to completely remove them. A lot of studies have been done on this topic worldwide, however, studies done in low economic countries and with less literacy rate are more important for us as we face the same challenges especially for patients coming to hospital from rural areas to these big cities for treatment purposes.

Ali MK and coworkers in their study conducted in Somalia reported that marital status, educational status, knowledge about the disease, accessibility to the hospital was major factors in poor outcome of the treatment.[19]

Atif M in their study conducted at Bahawalpur Pakistan shared that low economic status of the patients also affects their outcome as they can't purchase medicine and expanses of travelling to hospitals. Older patients were also at risk of poor treatment outcome as reported in this study.[5]

Another study conducted in Karachi Pakistan in 2015 also mentioned that older patients being fragile and relying on family for accessing to hospitals are at risk of poor outcome.[20]

Smoking is yet another risk factor that independently affects the pulmonary TB treatment outcome proved in studies not only globally but also in Pakistan.[5,20]

Rahimi BA in their study in Afghanistan in 2019 mentioned old age, male sex, comorbid illnesses, unemployment, drug abuse and previous history of TB treatment as main factors associated with TB treatment outcome.[21]

Katana GG and his coworkers in their recent study published in 2022 conducted in Kenya mentioned that poor outcome of TB treatment was seen in patients mostly belonging to age groups 18-30 and 30-41 years.[22]

The results of our study are also in line with these studies. The mean age of patients with pulmonary TB was 31.98±9.55 years. Similar mean age was reported in studies done by Ali MK et al in their study.[19]

The majority of the population in our study belonged to age group 18-27 years (37%) and age group 28-37 years (36%). Ali MK et al also reported major number of

patients from the same two age groups (72.8%).[19] Atif M et al and Katana GG in their study also mentioned higher number of patients (50.1%& 54% respectively) from two similar age groups.[5,22]

Male patients were dominant in our study (63%) as found in most of previous studies. [19,20,22] Out of these patients with poor outcome 60% of the patients were having poor response of treatment while 35% lost to follow up. The results show that being single (un-married, divorced or widow), low educational status, poor or lower middle class, low knowledge of TB, smoking, difficult access to hospital and less adherence to treatment were common factors in Pulmonary TB patients facing poor treatment response. Among 35 patients who lost to follow up, 19 out of them were having difficult access to hospital and majority were females who are dependent on family members for going to hospitals. Among the 5 patients who were reported died, most of them were from older age group, single, retreatment cases, low educational and economical level and had poor adherence to the treatment. Similar factors are already mentioned by most of the studies done in population similar to our population in Africa, Turkey, Afghanistan and Pakistan.[5,20,21,22,23]

While trying to evaluate most prominent factors among these, low educational status was found in 84% of the patients and lack of knowledge about TB was found in 64% of the patients. These two are interrelated and commonly found in our society. Moreover, poor, or lower income status was found in 72% of the patients with poor pulmonary TB treatment outcome. This is also a major problem of our society and leads to other factors like difficult accessibility to the hospital found in 65% of the patients. This factor also leads to malnutrition which is also the cause of delayed recovery. Being single was also an important factor in poor treatment outcome found in 61% of the patients as it shows the absence of care givers in the family also mentioned by other researchers as well.[5,23]

Smoking was also found to be a common factor reported in 61% of the patients which is unfortunately found very common in our society even in low income and rural class. Data also reveals that 19 patients out 30 patients, who were in the retreatment category, again faced poor response that indicates the resistance to the TB treatment in these patients.

In short, TB is a global health problem and 2nd leading cause of mortality. WHO and UNO have made commitment to reduce incidence of TB by 80% while deaths related to TB by 90% up to year 2030. Hence, there is a need to improve the treatment outcome and bring it to the targeted international milestone which is 85%. Individual factors that are causing the lower treatment outcomes and can be addressed by medical community must be focused including patient's education and counseling, facilitating the patients with easy access to the TB treatment centers, providing them the medicines and continues training of health care staff.

The limitations of our study include the low sample size. Moreover, there was no access to the patients who lost follow up to evaluate the actual cause of their poor outcome.

Conclusion

In conclusion, keeping in mind the fact that success rate of pulmonary TB in Pakistan is still lower than the target of 85%, factors that contributes most to the poor treatment outcome and are addressable by the medical community must be kept under keen focus to improve the treatment out comes.

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