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A Study on Recurrence Rate of Pulmonary Tuberculosis in a Tertiary Care Hospital of Pakistan

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Author`s Contribution

[1,3]Substantial contributions to the conception or design of the work; or the acquisition, analysis [2]Supervised the study, Final approval
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ABSTRACT

Objective: To determine the frequency of the recurrence rate of pulmonary tuberculosis (TB) in previously successfully treated patients.

Methodology: This cross-sectional study was conducted at Benazir Bhutto Hospital Rawalpindi. The study duration was from 01-January-2019 to 01-August-2020. During the study period, a total of ten thousands nine hundred ninety-seven (10997) patients presented in the pulmonology clinic of hospital were included. These patients were re-treatment TB patients and presented with the first-time diagnosis of TB. The frequency of recurrence was the primary study end-point.

Results: Out of 10997 patients, recurrence was diagnosed in 642 (5.83%) patients. Out of 642 recurrence cases, sputum spear (SS) positive TB was diagnosed in 533 (83.02%) cases and SS –Ve in 109 (16.98%) patients. Out of 642, there were 341 (53.1%) male and 301 (46.9%) were females. Majority of the patients were of age range 16 to 30 (49%) years, 93 (23%) in age range 31 to 45 years. Regarding recurrence timing, 372 (58%) patients presented within first year, 109 (17%) presented in 2 years, 52 (8%) presented within 3 years of primary treatment.

Conclusion: Based on our study results, frequency of recurrence of pulmonary TB was 5.83%. The recurrence rate was high in younger population of age 15-45 years. Recurrence occurred in 58% patients within first year after primary successful treatment.

Keywords: Successful treatment, Recurrence rate, Tuberculosis.

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Introduction

Tuberculosis is one of the most prominent diseases in all countries and has become a major public health concern. TB is a preventable and curable disease. Lungs are the most commonly affected organ by this disease. About 10% of the patients infected with *M. tuberculosis* develop TB.[1] According to the World Health Organization 2019 senses, 10 million people developed and fell sick with TB worldwide. Men are most prone to TB than women and children (5.6 million men, 3.2 million women, and 1.2 million children), 1.4 million people died from TB in 2019.[1] Geographically, South-East Asia region people (44%) occupy the lion share. Pakistan's contribution to TB is in the top 10 countries with 5.7%.[1] Advanced age, immunocompromised e.g. HIV/ AIDS patients and those taking immune-suppressants are at greater risk of tuberculosis.[2, 3] Recurrence is defined as instigation of TB again after initial successful treatment (patients having –Ve sputum smear at last follow-up).[4, 5] Recurrence rate is high in the country where the prevalence rate of TB is high and reactivation is low in countries where TB prevalence is low.[6, 7] If recurrence arises due to regrowth of same *M. tuberculous strains* of last TB episode then it's known as relapse. If recurrence is because of new strains of *M. Tuberculous* i.e. not previously detected during last TB episode then it is known as re-infection.[8, 9]

Different studies have published different rates of recurrence of TB from diverse regions. In Vietnam, Vree et al.[10] reported 8.6% frequency of TB recurrence within 2 years after first successful treatment. In Ethiopia, Datiko et al.[11] reported much lower only 4.1% recurrence

rate. Millet et al.[12] also reported lower rate of recurrence of TB in 1.3% patients.

Studies and statistics regarding the recurrence of TB can help in assessing the effectiveness and success of TB control programs, along with that it will give clear idea about population at risk of developing recurrence. The recurrence of TB statistics in Pakistan is scary. The study aim is to determine the frequency of recurrence of pulmonary TB after initial successful TB treatment so that we can better understand the burden of recurrence cases in our local population.

Methodology

This cross-sectional study was conducted at Benazir Bhutto Hospital Rawalpindi. The study duration was from 01-January-2019 to 01-August-2020. The study duration was from 01-January-2019 to 01-August-2020. A total of ten thousand nine hundred ninety-seven (10997) patients, who presented in pulmonology clinic of the hospital were included. While re-treated TB patients and those with the first-time diagnosis of TB were excluded. Approval for this study was obtained from institutional review board.

The recurrence rate was the primary study end-point. The recurrence rate was defined as patients presenting with pulmonary TB who have previous taken successful treatment of pul. TB and were declared as negative for Pul. TB at the end of treatment.

The present study statistical analysis was conducted by SPSS version 23.0. quantitative variables and qualitative variables are measured as mean± standard deviation and percentage/ frequency accordingly.

Results

A total of 10997 patients attended the pulmonary clinic during the study period. Of these 10997, 8357 (76%) were new cases, and 879 (8%) were retreatment cases, 1759 (16%) were having extra-pulmonary tuberculosis. Out of 8357 new cases, 4171 (49.9%) were with diagnosis of SS positive, and 4186 (50.1%) were of SS negative TB. Out of 879 (7.99%) re-treatment cases, 782 (89%) were with diagnosis of SS positive and 97 (11%) with SS negative TB (Table I).

In retreatment cases, 79 (0.72%) were treatment defaulter, 150 (1.36%) with failed primary treatment, and 642 (5.83%) cases were presented with recurrence (Table II).

Table I: Baseline Data of All Patients.

Total Number of Patients	10997
Subtypes	N (%)
New Cases	8357 (76.0%)
SS +Ve	4171 (49.9%)
SS –Ve	4186 (50.1%)
Retreatment	879 (8.0%)
SS +Ve	782 (89%)
SS –Ve	97 (11%)
EPTB	1759 (16%)

SS= sputum smear, EPTB= extra-pulmonary tuberculosis

Table II: Data of Re-Treatment Cases

Total Patients	**10997**
Re-treatment	**879 (7.99%)**
Treatment Defaulter	79 (0.72%)
Primary Treatment Failure	150 (1.36%)
Recurrence	642 (5.84%)

In 642 recurrence cases, SS-positive TB was diagnosed in 533 (83.02%) cases and SS –Ve in 109 (16.98%) patients. There were 341 (53.1%) male and 301 (46.9%) female patients. Regarding age, majority of patients, 314 (49%) were in group range 16 to 30 years, 148 (23%) age range 31 to 45 years, 109 (17%) in age range 46 to 60 years. 372 (58%) patients developed recurrence within in first year, 109 (17.0%) in second year, 52 (8.0%) in third year after first treatment (Table III).

Table III: Distribution of recurrence of cases with respect to gender, age and timing of recurrence.

Patients Characteristics	**Value**
SS +Ve	533 (83.02%)
SS –Ve	109 (16.98%)
Gender	
Male	341 (53.1%)
Female	301 (46.9%)
Age Distribution	
< 15 years	39 (6.0%)
15 to 30 years	314 (49.0%)
31 to 45 years	148 (23.0%)
46 to 60 years	109 (17.0%)
61 to 75 years	25 (4.0%)
> 75 years	07 (1.0%)
Timing of Recurrence	
≤1 Year	372 (58.0%)
1 to 2 years	109 (17.0%)
2 to 3 years	52 (8.0%)
3 to 4 years	39 (6.0%)
4 to 5 years	52 (8.0%)
5 to 6 years	06 (1.0%)
6 to 7 years	12 (2.0%)

Discussion

In this descriptive study, we assessed the frequency of recurrence rate of pulmonary TB. We also determined

patient's demographics and timing of recurrence after primary effective treatment. In our study, recurrence was diagnosed in 5.83% patients.

A study by Verver et al. from South Africa reported 18.0% frequency of recurrence after initial successful treatment.[13]

In this study, frequency of recurrence was 7.99%, out of these 83% were SS +Ve and 72% cases were of 15 to 45 years and 58% patients presented within first year. Moosazadeh et al. reported recurrence in 8.3% patients, with 55.7% patients presenting within 1 to 2 years and 30.2% within 3 to 5 years. Age at recurrence was 15 to 34 years in 9.1% cases and 35 to 54 years in 8.1% cases.[14]

Another study from Vietnam reported recurrence in 2.1% patients withinn18 months of primaryftreatment.[10] Jo et al reported a recurrence rate of 1.9% in ≤1 year after treatment in the South Korean population.[15] A study conducted in Korea by Lee et al.[16] reported a recurrence rate of 9.10% afterr5 years of successful treatment. In our study, the recurrence ratewwasd2.4% after 5 years of treatment and 3.26%aafter 07 years of treatment.

Studies conducted in European countries, reported lower prevalence of the recurrence rate in comparison to Asian and Middle East regions. A study accompanied in Spain by Millet et al.[12] found a recurrence rate of 1.3% in TB patients. A study conducted in Whales & England reported recurrence rate of onlyF0.66% in confirmed treatment successfpatients.[17]

A study conducted in Pakistan reported smoking an-independent risk factor for the recurrence of TB within 202 years after the treatment.[18] The authors concluded that smoker patients have a 2.31 times more susceptibility of re-occurrence of PTB as compared to the non-smokers within two years after successful treatment.

A study conducted in Uzbekistan by Gadoev et al. found a reduction in new cases of pulmonary tuberculosis in the National registry but they found a significant increase in the recurrence case of pulmonary TB during the same years. In their study, the recurrence rate increased from 6.5% in 2006 to 9.9% in 2008. They also found a higher proportion of patients with multi-drug resistance tuberculosis during this period.[19]

So, based on the results of our study and the previous ones, we can argue that recurrence rate of PTB in Asian countries is much higher as compared to the rest of the world. It is maybe due to the higher prevalence of pulmonary TB in Asia especially in Pakistan as compared to the modern world.

This study is not without limitations; we did not differentiate the patients presenting with re-infection or relapse of the TB because of unavailability of budget to perform further test that can help to differentiate between re-infection and relapse.

Conclusion

Based on our study results, frequency of recurrence of pulmonary TB was 5.83%. The recurrence was high in patients of age 15-45 years, recurrence occurred in 58% patients within first year after primary successful treatment.

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