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ORIGINAL ARTICLE

Screening of HIV Infection in Patients with Pulmonary Tuberculosis at a Tertiary Care Hospital

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ABSTRACT

Objective: To determine the frequency of HIV infections in patients with pulmonary tuberculosis.

Patients and methods: This cross-sectional study, was conducted at the Department of Medicine, Ghulam Muhammad Mehar Medical College, Sukkur, from October 2019 to 2020. All the patients had pulmonary TB of any duration; their ages ranged from 15 years to 45 years, and both genders were included. Sputum analysis for the patients with known pulmonary tuberculosis was done for AFB (Positive/Negative). Sputum was also sent for a GeneXpert test for the diagnosis of MDR TB. The patient's sputum culture and sensitivity were checked from the record and the XDR TB, if present in that record, was noted. In all patients with PTB, blood was taken and sent for serology. HIV was assessed by serology. All of the data was taken and recorded into the proforma at its completion, and was then analyzed by SPSS version 26 for the research purpose.

RESULTS: The average age of the patients was 34.2±10.3 years, and the average duration of TB was 8.1±3.9 months. Out of all, 90 (64.3%) were males and 50 (35.7%) were females. In distribution for types of pulmonary tuberculosis, 1st line drug response was found in 41 (29.4%) patients, MDR TB in 60 (42.8%), while XDR TB was found in 39 (27.8%) patients. HIV infection serology was found to be positive in 53 (37.9%) patients. As per stratification, the HIV serological infection was significantly higher among males (p-0.004), while it was statistically insignificant according to the patients' age and disease status (p->0.05).

CONCLUSION: It was to be concluded that the prevalence of HIV infection was documented as considerably high in patients with pulmonary tuberculosis. Therefore, all individuals having tuberculosis should be evaluated for HIV risk factors and advised to get tested.

Keywords: HIV, Pulmonary Tuberculosis, Co-Infection

INTRODUCTION

Tuberculosis (TB) is a chronic bacterial infection caused by Mycobacterium tuberculosis, which mostly affects the lungs (pulmonary TB), but it can affect other organs as well, which is considered extrapulmonary TB. Tuberculosis (TB) is an extremely contagious disease that can spread easily and sometimes be difficult to treat. In 2016, 10.4 million new cases of tuberculosis were discovered throughout the world.[1] It has been documented and shown by WHO that in 2014, 9.6 million individuals got tuberculosis (TB) and 1.5 million people died as a result of the disease.[2,3] In 2016, Pakistan, China, Indonesia, India, and the Philippines accounted for 56% of all incident instances worldwide. Pakistan reported 518,000 tuberculosis cases in 2016, accounting for around a quarter of the total estimated incidence. Pakistan is among the six nations with the highest number of reported cases in 2014.[2] Human Immunodeficiency virus (HIV) infection causes an attack on the immune system of the body (T-Cells), rendering an immune response. HIV is an important risk factor for the development of pulmonary tuberculosis (PTB) and the emergence of multidrug-resistant strains 1/3 of M. tuberculosis. PTB co-infection with HIV has been shown in epidemiological studies to increase the probability of latent TB reactivation by 20-fold, and it is the most significant risk factor for the progression of M. tuberculosis infection to active illness.[3,4] In a South African rural area, 44 of 53 individuals having XDR TB reported HIV positive.5 Approximately 50% of India's 5.1 million HIV-positive persons are also infected with Mycobacterium tuberculosis.[6] HIV infection, along with the PTB, has been the most significant cause of morbidity and mortality since the emergence of the HIV pandemic.[2,7,8] According to the World Health Organization, tuberculosis is the most fatal infectious illness worldwide, alongside HIV. Both illnesses were identified as effective joint top killers in 2014, accounting for around 1.5 million fatalities.[2,3] During 2014, 0.4 million people living with HIV died as a result of tuberculosis (TB).[2] A study in Spain identified The prevalence of adverse outcomes in TB individuals is linked to HIV infection as a specific independent risk.[7] Post-mortem studies in resource-constrained settings in South Asia, the Americas, and Sub-Saharan Africa suggest that TB is responsible for over 40% of Aids HIV associated adult fatalities.[8] This resulted in a concurrent TB pandemic in several Sub-Saharan African communities. Pakistan has been one of the eleven nations with a high TB prevalence, and one of the six countries with the highest number of infections in 2014.[2] Most patients presented with or diagnosed with pulmonary tuberculosis neither do not know about their HIV infection status nor they are usually screen for.[9] One study showed that 38.3% of the co-infected patients responded that they had TB before learning of their HIV seropositivity.[9] Although there is a greater prevalence of tuberculosis in Pakistan, there is no proper recent study in adults available to denote the exact prevalence of HIV infections in TB patients. In a study in India, the prevalence of HIV infection among individuals having pulmonary tuberculosis is 10%.[10] This study has been done to evaluate the HIV infection prevalence among individuals presented with pulmonary tuberculosis. As HIV is growing in our society, and an HIV patient may be affected by pulmonary TB or vice versa due to decreased immunity. So, the result of this study can be used to predict such patients and in time management of such patients to decrease mortality and morbidity.

MATERIAL AND METHODS

This cross-sectional study was conducted at the Department of Medicine, Ghulam Muhammad Mehar Medical College, Sukkur, from October 2019 to 2020. All the patients had pulmonary TB of any duration, ages ranged from 15 years to 45 years, and both genders were included. All the known immune-compromised patient, patients with connective tissue disorder or other related disorder in which serology test became invalid were excluded. After explaining the technique, hazards, and advantages of the study, verbal informed consent was obtained from the patients or their caretakers. The approach of non-probability, consecutive sampling was employed. Sputum analysis was done for AFB (Positive/Negative). Also, sputum was sent for a GeneXpert test for the diagnosis of MDR TB. Patient sputum culture and sensitivity were checked from record and the XDR TB if presented in that record was noted. In all patients with PTB, blood was taken and

was sent for serology. HIV was assessed by serology as per operational definition under the supervision of a consultant physician with 3 years of post-fellowship experience. All of the data was taken and recorded into the proforma at its completion, and was then analyzed by SPSS version 26 for the research purpose.

RESULTS

The average age of the patients was 34.2±10.3 years, and the average duration of TB was 8.1±3.9 months. Out of all, 90 (64.3%) were males and 50 (35.7%) were females. In distribution for types of pulmonary tuberculosis, 1st line drug response was found in 41 (29.4%) patients, MDR TB in 60 (42.8%), while XDR TB was found in 39 (27.8%) patients. Of all 85 (60.7%) patients were newly diagnosed while 55 (39.3%) were old patients. Table 1.

HIV infection serology was found to be positive in 53 (37.9%) patients as shown in figure 1. As per stratification, the HIV serological infection was significantly higher among males (p-0.004), while it was statistically insignificant according to the patients' age and disease status (p->0.05). Table.2

Table 1: Demographic characteristics of the patients n=140

Variables		Statistics
Age (years)	Average	34.2+10.3 years
	Minimum	15 years
	Maximum	45 years
Duration of TB	Average	8.1+3.9 months
	Minimum	3 months
	Maximum	12 months
Gender	Males	90(64.3%)
	Females	50(35.7%)
Types of pulmonary tuberculosis	1st LINE drugs responsive	41(29.4%)
	MDR TB	60(42.8%)
	XDR TB	39(7.8%)
Status of disease	Newly diagnosed	85(60.7%)
	Old patients	55(39.3%)

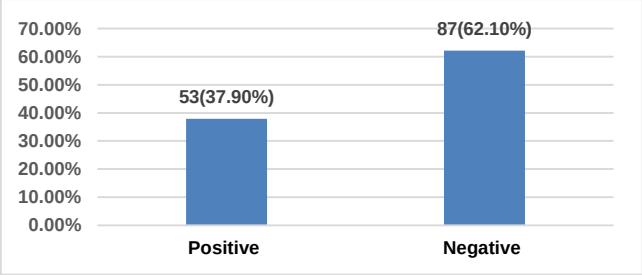

Figure 1: Frequency of HIV infection serologyn=140

Table 2: Stratification with respect to the age, gender and disease status n=140

Variables		HIV infection serology		P-value
		Positive	Negative	
Age groups	15 – 35 years	37 (26.4%)	47(33.6%)	0.064
	> 35 years	16(11.4%)	40(28.6%)	
Gender	Males	42(30.0%)	48(34.3%)	0.004
	Females	11(7.9%)	39(27.9%)	
Status of disease	Newly diagnosed	35(25.0%)	50(35.7%)	0.314
	Old patients	18(12.9%)	37(26.4%)	

DISCUSSION

Recently, there has been a rise in occurrences of pulmonary tuberculosis all over the world, which is partly related to the increasing prevalence of TB in the AIDS population. Public health problems like HIV and TB interact with one another in a positive way. Despite the fact that the burden of these two illnesses is reducing, they still contribute significantly to mortality.[11] When a patient has HIV and pulmonary tuberculosis, the typical radiographic findings may not appear. The atypical presentation of pulmonary tuberculosis in individuals with late stages of HIV infection has been documented in studies.[12] This is because of a change in cell-mediated immunity, which is the most important part of immunity in HIV-infected individuals. In this study, the mean age was 34.2±10.[3] years. In the study of Manjareeka M, et al[10] the average age of the participants was 46.7 years. In another study done by San KE, et al[12], mean age was noted to be 34.5 years. Wang L, et al[13] reported the mean age as 41.8 years. Ji YJ, et al[14] noted the mean age as 39 years. Another study conducted by Garcia GF, et al[15] noted the mean age as 32.68±7.65 years. In the current study, the mean duration of TB was 8.1±3.9 months. In the present study, 90 (64.3%) were male and 50 (35.7%) were female. The study by Manjareeka M, et al10 reported that there were 76 (75.24%) males and 25 (24.76%) females. San KE, et al[12] in their study stated that there were 75 (93.75%) males and 05 (6.25%) females. Wang L, et al13 also reported that 68.7% were males as compared to 31.3% of females in their study. Ji YJ, et al[14] also reported that the 90.53% were males in their study. Garcia GF, et al[15] also noted the prevalence of male patients as 29 (76.3%). In this study, in the distribution of types of pulmonary tuberculosis, 1st line drug response was found in 41 (29.4%) patients, MDR TB in 60 (42.8%), while XDR TB was found in 39 (27.8%) patients. In the current study, in the frequency distribution of HIV infection status, 45 (32.1%) patients knew about infection while 95 (67.9%) patients did not know. In the present study, HIV infection serology was found to be in 53 (37.9%) of patients. San KE, et al[12], noted that 18 (22.5%) patients presented with HIV infection. In this study, stratification of age, gender, status of disease, types of pulmonary tuberculosis, and duration of TB was done with respect to HIV infection serology. Because of the difficulties in clinical TB diagnosis, a great deal of work has gone into the creation of speedy and sensitive diagnostic tests, yet severe issues have arisen.[16] Microscopical evidence of acid-fast bacilli in biological materials and in vitro growth of tubercle bacilli have traditionally been used to diagnose tuberculosis. Neither strategy is perfect, so researchers have increasingly focused on molecular diagnostic tools.[16] The study's limitations have included a small sample size, a high proportion of hospitalized patients, and the removal of a large number of individuals due to strict inclusion criteria. Furthermore, retrospective data gathering reduces the information's accessibility and reliability. Many investigators had attempted to predict the onset of presentation of opportunistic infection and tuberculosis in HIV seropositive patients on the basis of CD4+ T lymphocyte count. This correlation study of CD4 T-lymphocyte count and radiographic findings is important for early recognition of the pathogen and early institution of treatment, as TB is a potentially hazardous but treatable disease. Immuno-suppression caused by HIV increases the frequency and speed with which latent tuberculosis (TB) infection progresses to active tuberculosis (TB).[17,18] According to the World Health Organization, tuberculosis (TB) is one of the leading causes of mortality among HIV-positive persons, and TB/HIV coinfection has been shown to impair the efficacy of TB treatment using directly monitored therapy.[17,19] Concerns about the spread of TB epidemics caused by HIV have sparked global agreement on the issue. Nonetheless, large-scale execution of a public health plan to jointly manage HIV/TB coinfection remains a challenge.[17,20] Tuberculosis identification has never been straightforward due to the large range of clinical characteristics. The emergence of HIV-related TB, which has a variety of atypical presenting characteristics, has contributed to the diagnostic challenges. Developing feasible, quicker, and more sensitive molecular diagnostic assays to detect subclinical HIV co-infection is an important step toward ending the TB pandemic.[21,22] Despite an increase in the usage of novel diagnostic tests for TB diagnosis over the last decade, existing molecular diagnostic methods are not fast enough or reliable enough to manage HIV co-infected individuals. To address this, the molecular approach Xpert MTB/RIF Ultra, which has better sensitivity owing to additional multicopy DNA targets and uses a larger amount of extracted DNA, is presently being evaluated in clinical trials.[21,23]

This approach has the benefit of retaining its capacity to identify RIF resistance. There has been significant improvement in the identification of multidrug resistance in MTB in recent years. Due to the fact that drug resistance in MTB arises in various areas of the genome, novel multiplexed drug susceptibility tests have been applied in this respect.[21]

CONCLUSION

It was to be concluded that the prevalence of HIV infection was documented as considerably high in patients with pulmonary tuberculosis. Therefore, all individuals having tuberculosis should be evaluated for HIV risk factors and advised to get tested. More epidemiological studies are necessary to evaluate the prevalence of HIV infection. Early recognition and treatment of human immunodeficiency virus (HIV) can reduce the number of cases and complications of the disease.

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