



## Original Article

## Frequency of Human Immunodeficiency Virus (HIV) Infection in Diagnosed Cases of Tuberculosis (TB) at Gulab Devi Hospital, Lahore

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### Abstract

**Objective:** To find the frequency of HIV infection in patients where Tuberculosis is the established diagnosis, at Gulab Devi Hospital, Lahore.

**Methods:** This study model is of a cross-sectional type and the study duration was 6 months spanning from 17-11-2022 to 16-05-2023 in Medicine and Pulmonology departments. Permission from the Ethical Review Board was sought and consent was taken from the participating patients.

A total of 145 patients, already diagnosed cases of tuberculosis, of both genders, were enrolled in the study through non probability consecutive sampling method. Consent about HIV screening was sought from all the patients and upon agreement, ELISA test was performed and labelled as positive as per operational definition.

**Results:** In our study group,  $38.7 \pm 12.8$  years was recorded as the patients' mean age. Out of the total 145 patients, 90 (62.1%) were males and 55 (37.9%) were of the female gender. Out of the total 145 patients, 76 (52.4%) had pulmonary TB, and 69 (47.6%) had extra-pulmonary TB. Among the total 145 patients, 8 (5.5%) were found to have co-infection with HIV, while 137 (94.5%) did not have HIV infection.

**Conclusion:** The study concluded that 5.5% of diagnosed tuberculosis patients also had coinfection with HIV. This was predominantly recorded in patients aged 18 to 40 years.

**Keywords:** Tuberculosis, HIV, ELISA

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### Introduction

Mycobacterium tuberculosis is the micro-organism responsible for Tuberculosis (TB) infection which is highly prevalent in lower-middle income countries. Other mycobacteria species like *M. pinnipedii*, *M. africanum*, etc., can also cause disease in humans but contribute very slightly.<sup>1</sup> Tuberculosis is a global health challenge due to its strong infectivity.<sup>2</sup> Tuberculosis diagnosis and treatment made a major breakthrough in the healthcare sector when drugs effective against this menace were unearthed during the twentieth century. Clinicians started using the antitubercular therapy (ATT) in their patients and observed dramatic decline in TB mortality.<sup>1</sup> Later on with the advent of the GeneXpert MTB/RIF assay test which is done for both the presence of the mycobacterium in the provided sample as well

its resistance patterns within hours, is a milestone achievement as far as TB management is concerned.<sup>3</sup> Tuberculosis is an important prognosticator of Human Immunodeficiency Virus related morbidity and mortality globally. Coinfection with HIV and mycobacterium leads to an augmented misery as both diseases are potentiated ultimately causing a multifaceted management task.<sup>1,4</sup>

In Pakistan, a study was done in Karachi and they reported the prevalence of HIV among tuberculosis patients as low as 1.4%.<sup>5</sup> A recent study reported that 41 TB cases (10.3%) were found to be HIV-positive on ELISA.<sup>6</sup> Seropositivity for HIV was reported as high as 23.8% in a study done on 151 TB survey cases where 36 patients tested positive.<sup>7</sup>

The current study is designed to find the frequency of human immunodeficiency virus infection in diagnosed

cases of TB at Gulab Devi Hospital, Lahore. As local data is not widely available and there is a huge gap in the available literature that has been obtained on local population compared to the study done on other population i.e., 1.4% 5 - 23.8% 7, this study will help us estimate the true burden in our population so that early detection may help in appropriate treatment and ultimately reduce the related morbidity and mortality.

## Methods

A total of 145 patients who met the preset inclusion criteria were taken from both the pulmonology and medicine departments at Gulab Devi Hospital, Lahore. The study started after taking permission from hospital ethical committee and data was collected after taking written informed consent from the enrolled patients. All cases were asked about consent for HIV screening, and if they agreed, their demographic information such as gender and age was also recorded. ELISA test was performed and labelled as positive as per operational definition.

Analysis of the data was done using SPSS version 26. For quantitative data like age and duration of TB diagnosis, Mean  $\pm$  SD was calculated. For categorical data like gender, type of diagnosed TB (pulmonary TB, Extra pulmonary TB) and diagnosis of HIV, frequency and percentages were used. To address effect modifiers, data was stratified for gender, age, type of TB. Chi-square test was applied, post stratification, with significance considered at a p-value  $\leq 0.05$ .

## Results

In our study group, 78 (53.8%) were in the age group of 18 to 40 years, while 67 (46.2%) were in the age group of 41 to 60 years, out of a total of 145 patients. The mean age of the patients was calculated to be  $38.7 \pm 12.8$  years. Out of the total 145 patients, 90 (62.1%) were males, while 55 (37.9%) were females.

Table-1 displays the frequency of HIV infection among diagnosed cases of tuberculosis (TB). Among the total 145 patients, 8 (5.5%) were found to have co-infection with HIV, while 137 (94.5%) did not have HIV infection.

**Table 1:** Frequency of HIV infection in diagnosed cases of tuberculosis (TB)

| HIV Diagnosed | Number | Percentage (%) |
|---------------|--------|----------------|
| Yes           | 8      | 05.5           |
| No            | 137    | 94.5           |
| Total         | 145    | 100.0          |

Table 2 presents the stratification of patients by age and their HIV status. Among patients aged (18-40), 5

patients (6.4%) came out to be positive for HIV, whereas 73 individuals (93.6%) tested negative. In the age group of (41-60), 3 individuals (4.5%) tested positive for HIV, while 64 individuals (95.5%) tested negative. The P-value for the comparison is 0.611, indicating no statistically significant difference in HIV prevalence between the two age groups.

**Table 2:** Stratification for age

| Age   | Human immunodeficiency virus (HIV) |            | Total     | P value   |
|-------|------------------------------------|------------|-----------|-----------|
|       | Yes                                | No         |           |           |
| 18-40 | 05(6.4%)                           | 73(93.6%)  | 78(100%)  | P = 0.611 |
| 41-60 | 03(4.5%)                           | 64(95.5%)  | 67(100%)  |           |
| Total | 8(5.5%)                            | 137(94.5%) | 145(100%) |           |

Table 3 shows the stratification of patients by gender and their HIV status. Among male patients, 6 individuals (6.7%) tested positive for HIV, while 84 individuals (93.3%) tested negative. Among female patients, 2 individuals (3.6%) tested positive for HIV, while 53 individuals (96.4%) tested negative. The P-value for the comparison is 0.438, indicating no statistically significant difference in HIV prevalence between male and female patients.

**Table 3:** Stratification for gender

| Gender | Human immunodeficiency virus (HIV) |            | Total     | P value   |
|--------|------------------------------------|------------|-----------|-----------|
|        | Yes                                | No         |           |           |
| Male   | 6(6.7%)                            | 84(93.3%)  | 90(100%)  | P = 0.438 |
| Female | 02(3.6%)                           | 53(96.4%)  | 55(100%)  |           |
| Total  | 8(5.5%)                            | 137(94.5%) | 145(100%) |           |

Table 4 displays the stratification of patients by the type of TB they have and their HIV status. Among patients with Pulmonary TB, 2 individuals (2.6%) tested positive for HIV, while 74 individuals (97.4%) tested negative. Among patients with Extra-pulmonary TB, 6 individuals (8.7%) tested positive for HIV, while 63 individuals

**Table 4:** Stratification for the Type of TB

| Type of TB         | Human immunodeficiency virus (HIV) |            | Total     | P value   |
|--------------------|------------------------------------|------------|-----------|-----------|
|                    | Yes                                | No         |           |           |
| Pulmonary TB       | 2(2.6%)                            | 74(97.4%)  | 76(100%)  | P = 0.110 |
| Extra-pulmonary TB | 6(8.7%)                            | 63(91.3%)  | 69(100%)  |           |
| Total              | 8(5.5%)                            | 137(94.5%) | 145(100%) |           |

(91.3%) tested negative. The P-value for the comparison is 0.110, indicating no statistically significant difference in HIV prevalence between patients with Pulmonary TB and those with Extra-pulmonary TB.

## Discussion

It has been observed that individuals residing in areas like the Sub-Saharan Africa, when diagnosed with TB, are 26 to 31 times more expected to be affected by HIV as well.<sup>8</sup> Tuberculosis diagnosis and management with declaration of disease cured is a huge task in a country like ours where resources are limited and there is a faulty follow up system. When this difficulty is amplified with HIV coinfection being linked to presence of a higher rate of extra-pulmonary TB, the results are catastrophic, for both the treating physician as well as the patient.<sup>9</sup>

The study reveals a noteworthy prevalence rate of HIV (5.5%) among patients diagnosed with tuberculosis (TB). Interestingly, none of these TB patients displayed any signs of immunodeficiency, such as acquired immunodeficiency syndrome (AIDS). Instead, the patients presented with the typical symptoms associated with Pulmonary TB. As this is a potential diagnostic challenge, the study underscores the importance of implementing comprehensive screening strategies for both TB and HIV. Our outcomes align with the findings of another study conducted by Saeed et al., which reported a total HIV incidence of 5.7% among diagnosed TB patients receiving their care at Jinnah Hospital, Lahore, Pakistan.<sup>3</sup>

Channa's study reported HIV-TB co-infection rates of 1.34% which was considerably lesser than our study results.<sup>5</sup> However, Scott et al. described a higher co-infection rate of 38.5% in his study group.<sup>10</sup> The HIV prevalence among patients in our study was found to be lower compared to previous reports. For instance, in Ogun State, Nigeria, a study reported a 34% prevalence of HIV infection middle age group amongst patients with tuberculosis.<sup>11</sup> Similarly, in India, 22% of HIV-positive cases were associated with PTB, with patients aged between 31 to 45 years being the most commonly affected.<sup>12</sup>

In another study that took place in the State of Kassala, in Eastern Sudan, which is recognized as a high-endemic TB region, the HIV prevalence among 858 TB patients was reported to be 18.3%. This rate was significantly higher than what we observed in our study. We assume that the disparity could be credited to Eastern Sudan being a highly prevalent tuberculosis region as it shares borders with Eritrea and neighboring Ethiopia.<sup>13</sup>

The coexistence of HIV and TB has significant implications on the global TB epidemic. To address this issue, the World Health Organization (WHO) recommends

that resource-scarce countries where an HIV/TB sentinel surveillance system is not fully established must commonly carry out HIV assessment for TB patients.<sup>14</sup>

## Conclusion

We concluded that HIV prevalence in diagnosed TB patients was 5.5% and the 18–40-year age group showed a higher positivity rate. Overall, this study sheds light on the intricate relationship between TB and HIV, emphasizing the need for integrated and proactive approaches in tackling these infections to improve patient care and public health outcomes. Therefore, it is imperative to evaluate all patients diagnosed with TB for a possible infection with HIV as well as for HIV risk factor. With effective communication, they should be advised to test for HIV and the other way around as well.

**Ethical Approval:** The IRB/EC approved this study via letter no.AAMC/IRB/EA162022 dated 05-09-2022.

**Conflict of Interest:** None

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**Authors' Contribution:** Role and contribution of authors followed ICMJE recommendations

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