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Research Article

Prevalence of human immunodeficiency virus infection among the diagnosed tuberculosis patients in Karachi, Pakistan

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ABSTRACT

Background: People living with HIV are from 26-31 times more likely to develop TB than persons without HIV. TB is the most common presenting illness among people living with HIV, including among those taking antiretroviral treatment and it is the major cause of HIV-related death. HIV/AIDS has driven TB epidemics in a number of countries including Pakistan where Tuberculosis is endemic and is a major public health challenge. People living with HIV/AIDS continue to be a group at high risk for tuberculosis (TB). National surveillance is important to indicate the magnitude and burden of both diseases. To control the problem, the WHO recommends the establishment of coordinated strategy for both diseases. In this study we aimed to determine the prevalence of HIV/AIDS among diagnosed Tuberculosis (TB) patients in Karachi, Pakistan.
Methods: A cross sectional study was conducted, in the year 2015 among the diagnosed TB patients to detect TB/HIV co-infection in the two selected sentinel sites of Karachi, Pakistan. Trained investigators used a standardized multiple-choice and open-ended questionnaire to collect the data regarding demographic profile and collected samples for HIV tests of identified cases. Written informed consent was obtained and questionnaire was completed by respondents selected through simple random sampling. 1257 TB patients underwent the rapid assay for HIV serological testing and subsequent ELISA test was done for confirmation of the HIV. The data were analyzed using IBM SPSS Statistics version 20.0 and Microsoft excel.
Results: Among the 1257 patients tested 680 (54%) were men and 577 (46%) women and largest number of patients 56% belonged to the age group 19-40 years. In our study prevalence of HIV among identified Tuberculosis patients was 1.4%.
Conclusions: The prevalence of HIV/AIDS among Tuberculosis patients is 1.4%. Future research needs to be directed toward this sensitive issue and social support programs with treatment services should be ensured for HIV positive TB patients to reduce the disparities in provision of health services for this vulnerable stratum of our society.

Keywords: Tuberculosis, Prevalence of HIV/TB co-infection, Diagnosed tuberculosis patients, Prevalence of HIV

INTRODUCTION

The interaction between HIV and TB in people co-infected with them is bidirectional and synergistic. The course of HIV infection is accelerated subsequent to the development of TB and the inverse relationship between HIV viraemia and CD4+ count gets shifted to the right.[1] Compared with CD4+ count-matched HIV-infected controls without TB, the relative risk of death and development of other Infections is higher in HIV-TB co-infected patients.[2]

At least one-third of the 37 million people living with HIV worldwide are infected with latent TB. Globally people living with HIV are 26 times (24-28) more likely to develop active TB disease than those without HIV. TB is the leading cause of death among people living with HIV, accounting for some 390,000 people who died of HIV-associated TB in 2014 (a 32% reduction since 2004). Globally the numbers of estimated HIV-associated TB deaths in 2014 were slightly higher among men (190 000) than among women (140 000). Most of these deaths were in the African region where the male to female ratio was close to one.[3]

The increased prevalence and mortality in this subset of patients is likely not to have been a result of an increase in absolute cases but a result of a greater worldwide focus on HIV testing, primarily in Africa. Among the 64 countries reporting coinfection, HIV-infected individuals are ~20 times more likely than HIV-uninfected individuals to develop TB in regions where HIV infection is endemic. In sub-Saharan Africa, where there is an HIV pandemic, most countries have reported that 130% of patients with active TB are coinfected with HIV. In areas of Lesotho, almost 90% of patients with TB have HIV infection.[4,5]

According to WHO, Three I's for HIV/TB (Intensified case finding for TB, Isoniazid preventive therapy (IPT), and Infection control) can reduce the burden of TB among people living with HIV and therefore must be urgently adopted by policy makers and implemented by all health facilities offering HIV care services. Routine HIV testing should be offered to all patients with presumptive and diagnosed TB. Globally in 2014, 51% of TB patients (3.2 million) had a documented HIV test, up from 49% (3 million in 2013).[3]

Detection of HIV infection in persons who have received a diagnosis of TB is often neglected but is critical to success. TB accounts for the majority of the mortality associated with HIV infection. Only 500,000 patients (37%) with TB in the African region knew their HIV status in 2007.[4] Identification of HIV infection provides an opportunity to initiate antiretroviral therapy and prophylaxis with trimethoprim-sulfamethoxazole. Among those coinfected with HIV and TB, trimethoprim-sulfamethoxazole prophylaxis and antiretroviral therapy were administered to only 63% and 34%, respectively.[4]

There is a paucity of research work on detection of HIV and TB coinfection in Pakistan despite of the fact that Tuberculosis (TB) and HIV/AIDS both are major public health problems of Pakistan. Pakistan ranks fifth amongst TB high-burden countries worldwide and accounts for 61% of the TB burden in the WHO Eastern Mediterranean Region. HIV prevalence in Pakistan has nearly doubled from 11% to 21% between 2005 and 2008.[6] A provincial breakdown reveals that approximately 40-45 percent of HIV infected people reside in Sindh; 80 percent of the infected found only in Karachi which is the populous metropolitan city of province Sindh, Pakistan and in 2014 the estimated population of Karachi is more than 23.7 million. Karachi is divided in 18 towns.[7] The Sindh AIDS Program has registered 3,621 HIV/AIDS positive cases since 2006 out of which 3079 were male, 408 female, 102 children and 32 transgender. In 2014, over 400 cases had been registered out of which 29 people perished from the disease.[8]

The current study was done to determine prevalence of HIV/AIDS among tuberculosis patients registered in the two selected TB sentinel sites of Karachi, under the grant of global fund fight against AIDS, Tuberculosis, and Malaria (GFATM). This study will serve as a linkage to formulate public health interventions by early diagnosis and timely treatment among people living with HIV/AIDS and TB in Pakistan.

METHODS

A cross sectional study was conducted, in the year 2015 among the diagnosed TB patients to detect TB/HIV co-infection in the two selected sentinel sites of Karachi, Pakistan. Study period was January 2015-August 2015. Sample size was calculated by using Open epi software for cross section study design. Simple random sampling was carried out to select the desired number of the respondents. Written informed consent was obtained and questionnaire was completed by total 1257 identified TB patients.

TB suspects were discerned by trained investigators through assessment of clinical symptoms through standardized questionnaire with multiple-choice and open-ended questions. Suspected TB cases were then evaluated at the two TB sentinels of Karachi. Pulmonary TB suspects underwent the sputum smear examination at respective centers' laboratory and radiographical abnormalities consistent with active tuberculosis were evaluated by the chest specialist for the smear-negative cases. The cases with strong clinical evidence consistent with active extra pulmonary tuberculosis were confirmed by histological evidence of lymph node, bone marrow and abdominal biopsy and blood culture.

Total 1257 diagnosed TB patients were selected for the current study and all of them gave consent for HIV testing. Simple rapid assay was performed on each identified TB patient for HIV serological testing. Subsequently, they underwent the ELISA testing for confirmation of the HIV diagnosis. After getting confirmed their HIV status, those patients were registered to ARV center for further evaluation, treatment and care.

The data were analyzed using IBM SPSS Statistics version 20.0 and Microsoft excel. Descriptive statistics which involves the use of mean and standard deviations, frequencies and graphs were processed to analyze the quantitative variables.

Ethical considerations

The research was approved from the Institutional Review Board of Baqai Medical University. Informed consent was obtained as a preliminary requirement. Participation was totally discretionary and no compulsion was used in the data collection process. All participants were fully informed of the nature of the study and the use of the data. Participants were also ensured of confidentiality and withdrawal at any stage of study. Participants were offered information and referral to health and social services available in the community.

RESULTS

Response rate

The Consent was given by 1257 TB patients after a lot of reassurance due to disgrace and stigma attached to HIV in our society. The investigators endeavored hard to complete the target sample because most participants were fretful of counter-accusation despite of anonymity assurance and few of them considered the study as violation of their privacy.

Socio-demographic characteristics

Socio-demographic variables including gender, age, marital status, and religion of the sample were studied. Figure 1 shows age distribution of the study participants. The age distribution of the study population showed the largest number of patients (56%) in the age group 19-40 years. The ages of all cases were ranging from minimum 9 years of age and maximum 82 years with standard deviation of 13.8. Among the 1257 patients examined, 680 (54%) were men and 577 (46%) women (Figure 2). 100 percent of the participants were married and Muslims.

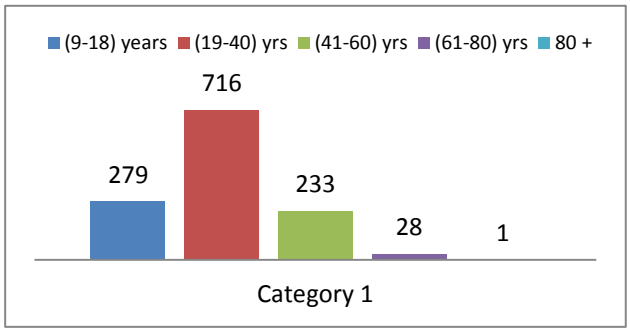

Figure 1: Age distribution.

Table 1: Age distribution.

Minimum	Maximum	Standard deviation
9	82	13.783

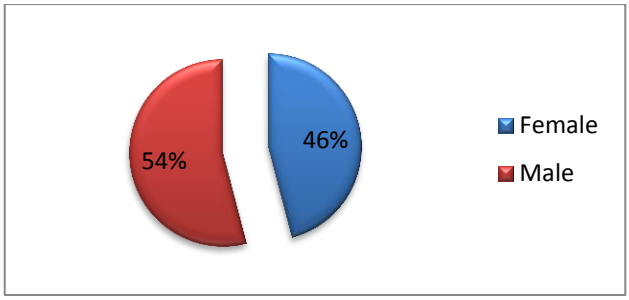

Figure 2: Gender distribution.

The pattern of disease among co-infected TB patients

TB disease classification is an important feature among the HIV and TB co-infected patients. Smear negative pulmonary tuberculosis and extra pulmonary patients are typical in immune compromised patients.

Among the 1257 patients examined and tested, 575 (46%) had AFB positive pulmonary tuberculosis and 55 (14%) had AFB negative pulmonary tuberculosis while 304 (24%) had extra pulmonary tuberculosis (EPTB) (Table 2).

Table 2: Distribution of tuberculosis patients on the basis of diagnostic modalities.

S. No.	Cases	Frequency	Percentage %
1	AFB positive	575	45.7%
2	AFB negative, diagnose on radiological ground (CXR)	172	13.67%
3	Extra pulmonary	304	24.34%
4	Post-MDR	191	15.19%
6	Gene xpert	15	1.1%
8	Total	1257	100%

Prevalence of HIV among the TB patients

The total 1257 identified Tuberculosis patients underwent the HIV testing. Among them, 18 (1.4%) were turned out to be reactive on rapid testing. Subsequently, all 18 underwent for ELISA testing for confirmation and HIV status of all 18 TB diagnosed patients was confirmed but two of them died before collecting their investigation results (Table 3).

Table 3: Prevalence of HIV among the tuberculosis patients.

HIV rapid result	HIV rapid result	ELISA test
Reactive	18	18
Non-Reactive	1239	1239
Total	1257	1257

DISCUSSION

The current study was done to determine the prevalence of HIV/AIDS among diagnosed Tuberculosis (TB) patients (IDUs) in Karachi, Pakistan. As we know that HIV/AIDS pandemic has caused a resurgence of TB, resulting in increased morbidity and mortality worldwide and Pakistan is among the five countries with the largest number of new TB cases namely India, China, South Africa, Indonesia and Pakistan, which illustrates the enormous challenges with insufficient resources and competing priorities.[9] About a third of the HIV-positive population worldwide is co-infected with Mycobacterium tuberculosis. This accounts to about 14 million people worldwide. Globally, 9% of all tuberculosis cases in adults are attributable to HIV.[10] Studies from Sub-Saharan Africa have recorded HIV seroprevalence rates of 50 to 70% in patients with tuberculosis. A HIV-positive person infected with Mycobacterium tuberculosis has a 50-60% lifetime risk of developing TB disease as compared to an HIV-negative person who has only a 10% risk. There is a paucity of data on HIV/TB co-infection in Pakistan but in India it is estimated that 40% of the adult population harbors Mycobacterium tuberculosis. Hospital based HIV seroprevalence studies amongst tuberculosis patients from different regions of India have shown a great variation–the prevalence rates varying from 0.4%-28.1% have been reported. The prevalence of HIV infection among patients of tuberculosis is rising at an alarming pace in the western parts of the country like Mumbai (2.56-10.15%), Pune (10- 25.75%) and south India (0.59-8.89%) but at a much slower pace in north India.[11,12] According to our study the prevalence of HIV/AIDS among Tuberculosis patients is 1.4% in Pakistan's metropolitan city Karachi which is surprisingly comparable with our neighbor country's data.

HIV-TB is a synergistic bidirectional interaction. HIV and Mycobacterium tuberculosis accentuate progression of the each other. Clinical presentation of TB in early HIV infection resembles that observed in immunocompetent persons. In late HIV infection, however, TB is often atypical in presentation, frequently causing extrapulmonary disease. These factors coupled with low sputum smear-positivity, often result in a delayed diagnosis.[13] Unlike other opportunistic infections which occur at CD4+ counts below 200/mm^3, active TB occurs throughout the course of HIV disease.[14] Clinical presentation of TB in HIV-infected individuals depends on the level of immunosuppression resulting from HIV infection. In patients with relatively intact immune function (CD4+ count >200/mm^3), pulmonary TB (PTB) is more frequently seen than extrapulmonary TB (EPTB).[15,16] In these patients, chest radiographic findings include upper lobe infiltrates and cavitation, similar to those in HIV negative individuals with PTB.[17] Sputum smears are often positive for acid-fast bacilli (AFB) in these patients. As immunosuppression progresses, EPTB becomes increasingly common. Our research findings segregated 46% with AFB positive pulmonary tuberculosis through sputum smear examination, 14% with AFB negative diagnosed on the radiological findings and 24% with extra pulmonary tuberculosis (EPTB) were evaluated by strong clinical evidence consistent with active extrapulmonary tuberculosis and were confirmed by histological evidence of lymph node, bone marrow and abdominal biopsy and blood culture.

Tuberculosis and HIV together are responsible for the deaths of over 4 million people annually. TB is one of the most common infections that threaten people living with HIV in the developing world.[18] Most leading international bodies, such as the World Health Organization (WHO) and the United Nations Joint Programme on AIDS (UNAIDS), agree on the importance of a collaborative approach to dealing with TB-HIV co-infection, including testing and treatment. Major barriers to address the TB-HIV co-epidemic have been identified as lack of resources, existence of inconsistent policies and inadequate programming. So, on the basis of our study findings, we recommend the emphasis on efficient diagnosis in the middle and low income countries like Pakistan to utilize the treatment options.

CONCLUSION

TB and HIV co-infection is responsible for increased deaths of the HIV seropositive patients. TB and HIV co-infection is a new public health challenge to TB control program due to increased patient care demand among HIV seropositive TB patients. The people mostly affected are young adults, which suggest higher transmission of both diseases in this age group and interventions targeting youth and young adults. There is a justification for starting TB and HIV collaboration program in TB centers. Globally, HIV/AIDS pandemic is threatening to destabilize the control of TB. Treatment of HIV-TB co-infection requires strong commitment and a focused approach.

Limitation of study

The participation in the study was voluntary so, the data gathered for this study may not be generalized.

Recommendations

More Health care facilities and Social support programs are needed for the HIV/TB co-infected patients for timely diagnosis. In addition to the screening program, effective counseling for blood born, and communicable diseases will be helpful to limit the transmission of infections in society. A strong coordination between the national TB and the AIDS control programmes is required for effective management of HIV-TB patients.

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