



Retrospective Study on Tuberculosis (TB) and Human Immunodeficiency Virus (HIV) Co-infection among Patients Attending University of Abuja Teaching Hospital Gwagwalada and Gwarimpa General Hospital

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Authors' contributions

This work was carried out in collaboration among all authors. Author BB designed the study, wrote the protocol, author RHM wrote the first draft of the manuscript and performed the statistical analysis. Authors HM and LL managed the data collection and of the managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

The study was carried out to determine rate of co-infection between tuberculosis infection and HIV infection in the study population. Record books on tuberculosis (TB) and Human Immunodeficiency Virus (HIV) tests for 15years from year 2002 to 2017 were obtained; data includes the sex and age of the patients at two General Hospitals in Abuja Nigeria to investigate co-infection of the two lethal diseases. A total of 1,412 cases were obtained from University of Abuja Teaching Hospital (UATH) and 392 cases from Gwarimpa General Hospitals. At UATH 536 were positive for both TB and HIV showing a co-infection rate of 37.9%. Among them 275(42.64%) were males and 261(34.03%) were females. Majority 253(48.75) belong to the age group Of 31-45 years. While at GGH 115 were

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positive for both TB and HIV, thus showing a co-infection rate of 29.34%, among them 52(32.10) were males and 63(27.40) were females, majority 55(37.93) also belong to the age group of 31-45 years. The high rate of co-infection between Tuberculosis and HIV infections recorded in this study calls for urgent actions to check the lethal combination, especially through the implementation of the WHO's policy on collaborative TB/HIV activities to reduce the burden of TB among HIV infected individuals.

Keywords: HIV; TB; Co-infection; retrospective and Abuja.

1. INTRODUCTION

Tuberculosis is an infectious and transmissible disease that is caused predominantly by *Mycobacterium tuberculosis* and occasionally by *Mycobacterium bovis*. These causative organisms can otherwise be referred to as acid-fast bacilli (AFB) or tubercle bacilli, this is because they cause lesions called tubercles. TB usually affects the lungs, but TB-causing bacteria can attack any part of the body, including the kidneys, spine, or brain, if not treated, TB can cause death [1]. The medium of transfer of these bacilli from one person to the other is via air with patients who have active pulmonary disease as the transmitters. The patient expels TB bacilli in small "droplet nuclei" with a size less than 5 μm in diameter. This droplet nuclei containing 1-3 bacilli can remain suspended in the air for a long period of time and following inhalation, are able to reach deep into the lungs thus producing infection. The risk of infection is dependent on the infectiousness of the source, the environment; as inadequate ventilation and overcrowding promotes transmission of droplets and vice-versa. The susceptibility of the patients as well as the duration and intensity of exposure are also determinant factors of the risk of infection [1,2].

The infectiousness of the patient may also be dependent on how often the person (who have TB of the lung or pulmonary TB (PTB) coughs. This is because coughing is a good mechanism for producing droplet nuclei and a higher prevalence of Tuberculin reactivity has been reported among contacts of frequent coughers i.e. individuals who cough less than forty times per night than among contacts of infrequent coughers; which are people who cough less than twelve times a night. Droplet nuclei can also be spread into the air by talking, sneezing, spitting, and singing and can remain suspended in the air for long periods [3].

There is a vaccine for tuberculosis called Bacillus Calmette-Guerin (BCG), first developed in the

1920s. But it makes only a small contribution to tuberculosis prevention, as it does little to interrupt the transmission of tuberculosis among adults. Tuberculosis is a treatable disease having drugs and injections to that effect, however, in tuberculosis on an HIV patient, the outcome is usually unpredictable [4].

Human Immunodeficiency Virus (HIV) is a viral infection that attacks the human immune system. It is a deadly disease that infects vital cells in the immune system such as helper T cells, macrophages and dendritic cells. This infection leads to low levels of the helper T cells through various mechanisms, such as pyroptosis of abortively infected T cells, apoptosis of uninfected bystander cells, direct viral killing of infected cells Et cetera. When these helper T cells decline, below a critical level, cell mediated immunity is lost, and the body becomes progressively more susceptible to opportunistic infections including tuberculosis [5].

Tuberculosis and the Human Immunodeficiency Virus are closely inter-linked. Untreated HIV infection leads to progressive immune deficiency and increased susceptibility to infections including tuberculosis. This can be clearly seen in the fact that a vast majority (90%) of people without HIV infection who are infected with *Mycobacterium Tuberculosis* do not develop tuberculosis. Various physical or emotional stress may trigger progression of infection to disease, the most important trigger however, is the weakening of the immune resistance, especially by the Human Immunodeficiency Virus infection. Tuberculosis is the leading cause of HIV related morbidity and mortality and simultaneously, HIV is driving the tuberculosis epidemic in many countries, Nigeria inclusive. The Human Immunodeficiency Virus is the most important factor fueling the tuberculosis epidemic in populations with a high HIV prevalence [6]. Therefore, this study was carried to determine rate of co-infection between tuberculosis infection and HIV infection in the study population.

2. MATERIALS AND METHOD

2.1 Study Area

This study was carried out at two general hospitals in Abuja Nigeria, namely; the University of Abuja Teaching Hospital (UATH) and Gwarimpa General Hospital. The city falls on latitude 9°2'N and longitude 7°0'E, elevation of 322.6m above the sea level, with a temperature ranging from 36°C - 40°C and the annual total of rainfall of 45 mm – 110 mm, located in the Southern Guinea Savannah agro ecological zone of Nigeria.

2.2 Ethical Clearance

Ethical clearance was obtained from Federal Ministry of Health and the ethical Committee of the two hospitals.

2.3 Limitations of the Study

The records only gave information on the patient's sex and age, limiting the number of variables.

2.4 Data Collection

The study employed the secondary method of data collection, record books on tuberculosis and HIV tests from year 2002 to 2017 was obtained

including the sex and age of the patient's hospital.

2.5 Data Analysis

The association between sex and age with the prevalence of tuberculosis and HIV co-infection was determined using the Chi-square and the T-test was used to show if there was a significant difference in the average number of patients examined in both Hospital.

3. RESULTS

This study revealed the association between TB and HIV infections among patients at the UATH and the Gwarimpa general hospital Abuja Nigeria from 2002 to 2017. At UATH 536 were positive for both TB and HIV showing an association rate of 37.9%. Among them 275(42.64 %) were males and 261(34.03%) were females. Majority 253(48.75) belong to the age group Of 31-45 years, there was a significant association (P<0.05) between TB and HIV association at the hospital (Table 1).

At the Gwarimpa General hospital, 115 were positive for both TB and HIV, thus showing a co-infection rate of 29.34%. Among them 52(32.10) were males and 63(27.40) were females, majority 55(37.93) also belong to the age group of 31-45. There was also a significant association (P<0.00) between TB and HIV in patients the Gwarimpa General Hospital (Table 2).

Table 1. Distribution HIV/ Tuberculosis co-infected patients based on gender and age group at UATH Gwagwalada

Age group	Male	Female	Total
0 - 15 years	40	38	78
16 - 30 years	33	82	115
31 - 45 years	131	122	253
46 - 60 years	61	17	78
61 - 75 years	10	1	11
76 and above	0	1	1
Total	275	261	536

*Chi-Square 54.105; Df 5; P value 0.000**

Table 2. HIV/ Tuberculosis co infected patients distribution based on gender and age group at gwarimpa general hospital

Age group	Male	Female	Total
0 - 15 years	2	2	4
16 - 30 years	4	34	38
31 - 45 years	30	25	55
46 - 60 years	14	2	16
61 - 75 years	2	0	2
Total	52	63	115

*Chi-Square 34.401; Df 4; P value 0.000**

4. DISCUSSION

The results of the study have revealed that TB infection was significantly associated with HIV in patients that attended the UATH and Gwarimpa General Hospital. This association is probably as a result of the viral infection that attack and destroy the immune system of the patient which makes the patient prone to TB and HIV/AIDS can be worsened by each other. TB is the most common opportunistic disease and cause of the death for those infected with HIV. Similarly, HIV infection is one of the most important risk factors associated with an increased risk of latent TB infection progressing into active TB diseases. According to Perriens in [8], HIV/AIDS pandemic has caused a resurgence of tuberculosis, bringing about an increased morbidity and mortality rate worldwide. The Human Immunodeficiency Virus and *Mycobacterium tuberculosis* have a synergistic interaction; each accentuates progression of the other clinical presentation of tuberculosis in early HIV infection resembles that observed in immune-competent persons. In late HIV infection, however, tuberculosis is often atypical in presentation, frequently causing extra-pulmonary disease. These factors coupled with low sputum smear-positivity, often result in a delayed diagnosis.

Generally, there is an increase in the prevalence of tuberculosis (TB) globally particularly in Africa which has been attributed to the increase in the number of Human Immunodeficiency Virus (HIV)-infected patients. There by rising incidence of tuberculosis especially pulmonary Tuberculosis (PTB) in HIV-infected patients as well as a high rate of HIV in patients suffering from tuberculosis in Nigeria and other parts of the world [9].

Although the prevalence was higher in men 275(42.64) than the females 261(34.03) at UATH, while at the Gwarimpa General Hospital, the females were more infected 63(27.40) than the males 52(32.10), this could be due to lower immunity of some of the females especially during pregnancy consequently higher prevalence of HIV infection in females being a predisposing factor to TB as the former is known to activate dormant TB [10]. Women, may have a higher susceptibility to HIV infection, usually due their exposure to sexual activities earlier than men mainly for economic reasons [11]. Furthermore, most African women being subservient subordinated to their husbands have little or no say in issues relating to sexual relationships. This result is in agreement with

previous reports of Nwabuko et al. [11] and Tadesse and Tadesse [10].

The age distribution shows that the highest prevalence of HIV and TB coinfection was age of 31-45years (37.93%) both at Gwarimpa General Hospital, and the UATH (48.75%) followed by 16-30years (36.89%) and 35.28% respectively, this may be related to patients' being in a sexually active age group in which both TB and HIV prevails. Another explanation for this may be their increased family, organizational and societal responsibilities as people in this age group involve themselves in various extraneous daily activities in order to win the socio-economic hardship which increases the frequency of their contact with other patients in the society. The higher prevalence of co-infection observed among the middle age group in this study is also in consistent with a research of Mukadi [12] who showed a high prevalence HIV and TB within the age group of 31-40years and in agreement with other study [13,14]. However, some studies found that no age is exempted from the risk of acquiring tuberculosis, people of younger age are often more outgoing and thus more likely to have contact with a person with tuberculosis. Older persons may perhaps be more willing to adhere to Anti-Retroviral Treatment (ART) medications, and thus achieve faster immune stability. Nevertheless, older persons might have a fragile immune system due to aging. In line with this, higher incidence of tuberculosis was seen in a cohort of HIV positive patients above 50 years of age in USA and Europe [15].

5. CONCLUSION

There is a significantly high rate of co-infection between TB and HIV and also a corresponding association between age and sex and the prevalence of the co-infection in patients attending the UATH and Gwarimpa General Hospital.

6. RECOMMENDATION

There is need for the implementation of the WHO's policy on collaborative TB/HIV activities to reduce the burden of TB among HIV infected individuals. These measures include intensified case finding, isoniazid preventive therapy and infection control and antiretroviral therapy. Support for women socially and economically is critical.

CONSENT

It is not applicable.

ETHICAL APPROVAL

Ethical clearance was obtained from Federal Ministry of Health and the ethical Committee of the two hospitals.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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