



Tuberculosis among HIV Patients: A review of Prevalence and Associated Factors

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Abstract

Tuberculosis (TB) is a chronic infectious disease that has represented a major health problem over the centuries and it has accounted for more human misery, suffering and loss of earning and failure of economic and social development than any other disease. The human immune deficiency virus (HIV)/AIDS has substantially altered the epidemiology of TB by increasing the risk of reactivating latent TB, increasing chance of TB infection once exposed to tubercle bacilli (re-infection) and by increasing the risk of rapid progression soon after infection. One-third of the world's population has latent tuberculosis (TB), increasing the risk of developing tuberculosis. This infectious disease is the leading cause of death in people infected with the human immunodeficiency virus (HIV), and at least a quarter of deaths in people with HIV can be attributed to tuberculosis. People with HIV are also approximately 20 to 30 times more likely to develop active tuberculosis than people without HIV.

Keywords: prevalence, tuberculosis, HIV, associated factors

Introduction

Globally, about 2 million deaths due to tuberculosis occur annually throughout the world [1]. According to WHO, about 1/3 of the world population is infected by TB half of which are in sub – Sahara Africa. 5 -10% of these will show symptoms and they become sick or infectious at some point, more so if they are HIV positive. Recent data estimates show that 3-7 million HIV

patients develop TB per year and up to 5 million people develop acute pulmonary TB [1-4].

Tuberculosis cases have doubled or trebled in the past 10 years in several African countries owing to the HIV epidemic and Tuberculosis is responsible for about 13 percent of all AIDS death worldwide [1,5-6].

Africa is facing the worst tuberculosis epidemic since the advent of the antibiotics era [7-9]. Driven by a generalized human immune deficiency virus (HIV) epidemic and compounded by weak health care systems, inadequate diagnostic laboratories and conditions that promote transmission of infectious agents, the devastating situation has become exacerbated by the emergence of drug-resistant strains of mycobacterium tuberculosis [11-14].

In Uganda, the HIV/AIDS epidemic has been accompanied by a severe epidemic of tuberculosis. Available data suggests that this increase in TB infection rate is mainly as a result of the burden of HIV infection primarily because HIV induces immune suppression. HIV is the most patient risk factor for the progression of TB infection to acute disease [15-16]. Individuals infected with tuberculosis alone have an approximately 10% life time risk of developing acute TB compared to 10% annual risk among HIV-infected patients with a life time risk of developing TB which approaches 50% or more among them [17-19].

Prevalence of tuberculosis among HIV patients

Tuberculosis (TB) is a chronic infectious disease that has represented a major health problem over the centuries and it has accounted for more human misery, suffering and loss of earning and failure of economic and social development than any other disease [20].

According to the World Health Organization estimation, about one third of the world's population is infected with tuberculosis bacteria, about ten million cases of active disease are estimated to occur each year, and annually three million people die of tuberculosis [1].

The human immune deficiency virus (HIV)/AIDS has substantially altered the epidemiology of TB by increasing the risk of reactivating latent TB, increasing chance of TB infection once exposed to tubercle bacilli (re-infection) and by increasing the risk of rapid progression soon after infection

from below 10% to about 25% in a spell of 10 years from 2000 to 2010 [21].

Several studies documented that the person infected with Mycobacterium tuberculosis (MTB) only has a 10% risk of developing TB during life time but for persons co-infected with both TB and HIV the annual risk of developing active TB disease exceeds 30% [21].

A study in Kenya indicated that 525 of the total 951 HIV/TB cases were between 50 to 60 years of age, in the same study, the complication of treatment outcomes of both diseases due to the TB-HIV co-infection results particularly from the concomitant use of anti-retroviral treatment (ART) and intensive phase of TB treatment; additionally, it leads to drug-drug interaction, side effects of multiple drugs, increased pill burden, decreased adherence and development of higher rate of drug resistant organisms due to the combination of the above factors. HIV also causes difficulties in diagnosis and treatment of TB due to unusual clinical picture with increased smear negative Acid Fast Bacilli (AFB) pulmonary TB, atypical finding on chest radiography and increased prevalence of extra pulmonary TB [22].

One third of the world's population has latent Tuberculosis (TB) infection, which increases the risk of becoming ill with TB. This infectious disease is a leading killer among people living with human immunodeficiency virus (HIV), and at least one in four deaths among people living with HIV can be attributed to TB. Many of these deaths occur in resource limited settings, (Blumberg HM 2015). People living with HIV also have an estimated 20 to 30 times greater risk of developing active TB than people without HIV infection [23].

The estimated total number of incident cases of tuberculosis worldwide rose to 9.4 million in 2009, more than at any other time in history. The worldwide tuberculosis incidence rates are estimated to have peaked in 2014 and since then decreased at a rate of less than 1% per year.

Tuberculosis is still a disease of poverty that is associated with overcrowding and under-nutrition [24].

In 2019, there were an estimated 2.6 million people who became newly infected with HIV. That is more than one fifth fewer than in 2011 when there was an estimated 3.2 million newly infected people of which atleast a third were co-infected with tuberculosis [25].

There were an estimated 0.5 million HIV positive TB patients in East Africa in 2019. Around 80% of them live in sub-Saharan Africa. WHO has identified goals for TB/HIV (Isoniazid preventive therapy, intensified case finding for TB, and Infection control) [1].

Risk factors that expose HIV patients to tuberculosis.

Several studies have cited various risk factors implicated in TB and spread of the disease in order to assist in proper utilization of public healthcare resources and prioritize targets for TB control. In this connection, the most significant independent risk factor in association with active pulmonary or extra-pulmonary TB is HIV infection contributing to ongoing transmission among individuals [26].

Gender

A study in Eastern Uganda by Cahn in 2019, indicated that Gender had also been shown as a risk factor in increasing HIV/TB incidence; HIV positive women were found to be more susceptible to TB than HIV positive men probably due to the effect of female hormones or underreporting of TB cases [27].

Age

A cross sectional community survey done in East Africa discovered that old age contributed 23,000 cases because of the deteriorating immunity among the elderly. He finally concluded that a person with HIV/AIDS who becomes infected with tuberculosis has 50% chances of developing active TB within 2 months [28].

Animal products

A study in the dairy producing central region of Botswana showed that, consumption of unpasteurized milk was observed in association with TB caused by *M. bovis* among HIV patients, 70% of all HIV patients who took un-boiled milk or half cooked milk developed a form of TB during a 10-year period spell. In the same report an association between tuberculosis (TB) and body wasting was long recognized [29].

Exposure to TB patient

In research which was carried out in Pakistan among HIV patients, It was found out that the highest risk of HIV patients becoming infected with TB was 3.5 times much more with people who live with people with infectious tuberculosis, these people include, friends, roommates, prisoners or than those staying with health individuals, It was found that heavy drug users and HIV infection are the most predisposing factors that lead to high percentages of tuberculosis in patients with HIV [30].

Malnutrition

Malnutrition impairs host immunity and predisposes HIV patients to TB while TB itself can cause malnutrition. Malnutrition or poor diet and food low in calories, puts a person at greater risk of TB and it may impair survival in TB patients. It is thought that chronic lack of appetite in HIV patients can be one of the causes of malnutrition which lowers immunity and therefore may be a potential independent risk factor for latent TB. Studies have shown that supplementation with vitamins and Zinc (mineral) during treatment of pulmonary TB may reduce mortality in those co-infected with HIV.

Furthermore, malnutrition and intestinal parasites cause immune-suppression, which in turn may cause false-negative tuberculin skin tests (TST) and failure to identify TB infection [31].

Smoking

HIV and lifestyle usually go hand in hand; the association between HIV, smoking and TB has been investigated for several decades. At least 30% of HIV positive patients who are exposed to either passive or active exposure to tobacco smoke has shown to be associated with TB infection and with the transition from being infected to developing active TB disease. There may be several reasons for the association between HIV smoking patients and TB. Smoking in HIV patients compromise immune response and damage the protective effect of tiny hair-like structures called cilia in the airways, resulting in increased TB risk. It has been shown that HIV infected smokers are 25% more likely to have cough, dyspnea, chest radiograph appearances of upper zone involvement, cavity and miliary appearance, and positive sputum culture than non-HIV smokers [32].

In HIV patients, Smoking has greatly been found to be associated with both relapse of TB and TB mortality. There appears to be enough evidence to conclude that HIV escalates development of TB disease amongst the smokers [33].

A meta-analysis study on HIV positive patients who were smokers as well reported a 73 percent likelihood to become infected with TB and more than twice as likely to develop active TB than in non-HIV patients, and Overall, HIV positive smokers were 40 to 60 percent more likely to develop active TB after being infected with TB bacteria than non-HIV patients [29].

Knowledge on clinical presentation of tuberculosis and its prevention

In a study in Eastern Uganda among HIV patients, indicated that only 37% of the participants knew the causative agent of tuberculosis, only 200 of the total 900, could mention more than two clinical presentations of tuberculosis, and only 5% associated development of tuberculosis with the reduced immunity of the patients, the organ systems(s) involved, all influence the clinical manifestations of tuberculosis [27].

In another related study, less than 20% of the respondents were able to identify that Patients with HIV and tuberculosis often developed the symptoms insidiously and presented with constitutional symptoms of tuberculosis toxemia and with symptoms and signs related to the organ/system(s) involved.

While assessing for knowledge on HIV/TB co-infection among patients in Kasese district in western Uganda, it was found out that, only 12 in every 75 cohort groups knew that Clinical presentation of tuberculosis in patients with HIV infection depended on the severity of immune-suppression in the same study, they indicated that When the immune-suppression is more marked (CD4 count <200ml³), the features of tuberculosis are atypical with a much greater frequency of extra-pulmonary involvement, especially of the lymph nodes [20].

According to Van R et al, 2015, HIV/TB patients are only aware of superficial signs and symptoms of TB and not gross or systemic signs, in their study results at least 55% of the participants knew that TB presented with cough though only 2% could mention that TB could be disseminated and forms miliary disease. Fitzgerald D in 2016 also cited that HIV patients with tuberculosis presented more with persistent fever lasting for more than 13 days, which often developed in the late afternoon or evening, however none of the patients could correlate the occurrence of the two [34].

A study indicated that 60 of the 190 HIV/TB patients had already noticed a reduction in weight, skin and bonny appearance. Majority 59% had identified one or a combination of tiredness, lassitude, fatigue, night sweats, with tuberculosis. They identified that extra pulmonary TB occurs more frequently among HIV sero-positive individuals than among sero-negative. The symptoms of active TB were often non-specific and mainly pulmonary; the patients also mentioned fever, chronic persistent cough with or without blood, lack of appetite, night sweats and severe thoracic pain in 9%, 12%, 7%, 3%, 10% respectively [34].

A study population done in West Africa in 2015 by WHO revealed that 130,000 adults and children who were infected with HIV/AIDS also developed pulmonary TB, less than 15% of them had ensured preventive measures against TB infection [1]

According to the survey which was carried out in Dodoma hospital revealed that the percentage of people hospitalized for tuberculosis that also tested positive for HIV rose from 1.2% in 2011 to 9.3% in 2018, the greatest challenge however was that the majority of the patients knew little or nothing about TB prevention, in the same study it was revealed that only 40% of the HIV patients knew different preventive measures (Gunda et al., 2018).

Conclusion

In conclusion, active pulmonary TB is a problem among patients who receive ART. Male patients, those with advanced HIV disease, and those who do not receive IPT are at an increase risk of developing active TB while on ART. A timely HIV diagnosis and treatment could potentially reduce the incidence of tuberculosis while on ART.

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