HIV & AIDS Review 15 (2016) 69–72

Contents lists available at ScienceDirect

HIV & AIDS Review

journal homepage: www.elsevier.com/locate/hivar

Original Research Article

HIV–TB co-infection and associated risk factors among HIV positive patients at Olabisi Onabanjo University Teaching Hospital, Ogun State, South-West Nigeria

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ARTICLE INFO

Article history:
Received 16 April 2015
Received in revised form 23 February 2016
Accepted 15 March 2016
Available online 1 April 2016

Keywords:
HIV
TB
Co-infection
Nigeria

ABSTRACT

Aim: The aim of this study was to determine the prevalence of active *Mycobacterium tuberculosis* co-infection in a cohort of HIV patients enrolled in a University Teaching Hospital in Ogun state, Nigeria.
Background: Nigeria ranks the highest tuberculosis-burdened country in Africa. More worrisome is the grim prediction burden of over four million cases of tuberculosis in Nigeria of which one million HIV/TB co-infections are anticipated between 2015 and 2020.
Materials and methods: This is a retrospective assessment of 1992 HIV patients, of which 657 (33%) were males and 1335 (67%) were females. All patients were enrolled between 2008 and 2011 at Olabisi Onabanjo University Teaching Hospital in Ogun State. The main outcome was the prevalence of *Mycobacterium tuberculosis* infection. Descriptive statistics and logistic regression models were utilized in data analysis.
Results: Study findings showed that 3.5% (95% CI: 2.7% – 4.4%) of HIV patients had active tuberculosis within the study period. In addition, divorced patients had significantly four times greater odds of tuberculosis relative to single patients (OR: 4.09; 95% CI: 1.20–14.00). Highest rate of tuberculosis was observed in 2008 (9.7%) with a progressive decline to zero case of co-infection in 2011.
Conclusion: Study findings provide evidence of a decline in TB burden over time. However, given the retrospective nature of this study, there is a dire need for a more robust and expanded investigation into the true nature of active TB epidemiology in south-western Nigeria, in order to further our insight and target intervention delivery.

1. Introduction

According to the 2014 World Health Organization Global Tuberculosis Report, Nigeria ranks the highest TB-burdened country in Africa with South Africa emerging second [1]. More worrisome is the grim predicted burden of over four million cases of tuberculosis of which one million HIV/TB co-infections are anticipated, between 2015 and 2020. Nigeria has recorded a moderate steady decline in the proportion of people infected with HIV from 5.8% in 2001 to 3.2% in 2013 [2]. Tuberculosis, on the other hand, is a disease of antiquity whose morbidity and mortality impact has been known prior to the first reported cases of HIV infections in humans. Over the past four decades, a dual burden of the two continues to constitute a formidable disruptive synergy within and across fragile health systems in sub-Saharan Africa due to their intractable nature [3,4]. The overall aim of this study therefore, was to determine the prevalence of active tuberculosis (TB) among HIV patients enrolled at the Olabisi Onabanjo University Teaching Hospital (OOUTH) Sagamu, Ogun State, Nigeria between 2008 and 2011.

The remarkable synergy between HIV and TB patho-epidemiological causal pathway and disease natural history within and across various populations has been demonstrated [5,6]. On one hand, tuberculosis is a well-established opportunistic infection and a leading cause of accelerated disease progression to AIDS in HIV-infected individuals due to significantly enhanced destruction of active CD4 helper T-cells and a rapid breakdown of immune functions [6]. On the other hand, the presence of HIV in a latent TB infected individual increases the risk of reactivation and progression from latent *Mycobacterium tuberculosis* infection to active tuberculosis by 20-fold [6]. While active TB remains curable (total elimination of the multiplying bacteria) and preventable

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http://dx.doi.org/10.1016/j.hivar.2016.03.004
1730-1270/

(avoidance of primary infection), recent evidence suggests that poor case detection, ineffective laboratory diagnosis by trained personnel, weak reporting system, lack of effective treatment, extreme poverty, lack of political will, and the ever-growing threat of drug resistance TB, have rendered control efforts ineffective and less result-driven in Nigeria [7,8].

Furthermore, studies have been carried out to evaluate the disease burden of tuberculosis infection among persons living with HIV/AIDS in different parts of Nigeria. In a prospective study designed to assess curative outcome of the direct observation treatment short course (DOTS) in 1692 TB patients with HIV co-infection in Kano by Dauda [9], incidence of co-infection was 38.4% and it was found to be higher in males than females [8]. In a separate prospective study carried out in Jos, north-central Nigeria by Agbaji and others [10], a TB prevalence of 9.6% was observed among treatment-naïve HIV-1 positive adults. Similarly, the prevalence of tuberculosis was found to be 10.5% in a separate retrospective study in Aminu Kano Teaching Hospital, in the north-central part of Nigeria [11]. Most cases of TB co-infections across all these studies were pulmonary as the patients had the benefit of enrolment in a DOTS program in their respective locations.

In this regard, while a considerable body of knowledge exists on the epidemiology of TB in Nigeria, few studies exist with regard to the prevalence of *Mycobacterium tuberculosis* infection in adults and children living with HIV/AIDS in south-west Nigeria. Thus, findings from a retrospective assessment of TB burden among a cohort of HIV patients at the Olabisi Onabanjo University Teaching Hospital, is presented.

2. Methodology

2.1. Study design, setting and target population

This study was a retrospective study and analytic assessment of HIV patient records. A retrospective review of all HIV patient records enrolled at the Olabisi Onabanjo University Teaching Hospital, Sagamu, Ogun State, Nigeria from 2008 to 2011 was conducted. The primary study was conducted at the department of Virology and Directly Observed Treatment Short Course (DOTS) Clinic, of the Teaching Hospital. Sagamu is an urban area located about 50 km from the metropolitan city of Lagos with an estimated population of 253, 421 according to the 2006 Nigeria Population and Housing census. All children and adult patients (a total of 1992 patients) that were diagnosed with HIV and enrolled in the primary study were considered in the present study.

2.2. HIV test and TB diagnosis

Clinical diagnosis of HIV seropositive status was carried out among all patients attending OOUTH between 2008 and 2011. Further confirmation of initial findings was carried out with the use of Determine® and Starpac® Diagnostic kits. On the other hand, TB case diagnosis in confirmed HIV positive patients was conducted using acid fast bacilli (AFB) test, Mantoux test and X-ray chest radiography.

2.3. Data management and analysis

Two independent study personnel conducted a record review on 1992 patient registers in order to ascertain the HIV and TB status of patients. With regard to information on demographic parameters of patients, age, gender, marital status, occupation and level of education were retrieved from each patient's record. Extracted data was captured in excel spreadsheets.

Descriptive analysis was carried out to assess the distribution of HIV and TB co-infection with respect to socio-demographic variables using frequencies and proportions. Significant difference between patients who had HIV only and patients with TB co-infection with respect to socio-demographic variables (at 5% alpha level) was also reported alongside. Bivariate analysis was then conducted to determine independent associations of socio-demographic variables with the study outcome (HIV–TB co-infection). Bivariate associations significant at 10% alpha level were considered for inclusion in the multivariable binary logistic regression model. All statistical significance was reported at 5% alpha level along with the 95% confidence intervals (95% CI). All statistical analyses were implemented in STATA version 12.1.

2.4. Ethical approval

Approval for this study and the access to patient records was given by the Ethical Review Committee of Olabisi Onabanjo University Teaching Hospital in January 2012. In order to forestall a breach in patient confidentiality, record review and data extraction were conducted in a secluded compartment of the health facility.

3. Results

3.1. Descriptive analysis

The frequency distribution of HIV patients considered in the study is presented in Table 1. Overall, a prevalence of 3.5% (70/1992) [95% CI: 2.7%–4.4%] active *Mycobacterium tuberculosis* infection was observed in the four-year period among the study population. A steady decline in the prevalence rate of TB was observed over the four year period, from 9.7% in 2008 to 0% in 2011 (Table 1). While no

Table 1
Demographic distribution of study population in relation to TB status.

Variable	Total number of HIV patients (*N*)	AFB positive cases 70 (3.5%)	AFB negative control 1922 (96.5%)	*P*-value (<0.05)
Gender				0.311
Male	657	27 (4.1)	630 (95.9)	
Female	1335	43 (3.2)	1292 (96.8)	
Age				0.053
0–10	173	11 (6.4)	162 (93.6)	
11–20	43	3 (7.0)	40 (93.0)	
21–30	500	11 (2.2)	489 (97.8)	
31–40	699	26 (3.7)	673 (96.3)	
41–50	402	10 (2.5)	392 (97.5)	
≥50	175	9 (5.1)	166 (94.9)	
Marital status				**0.040**
Single	332	14 (4.2)	318 (95.8)	
Married	1177	30 (2.6)	1147 (97.5)	
Divorced	160	9 (5.6)	151 (94.4)	
Widowed	178	10 (5.6)	168 (94.4)	
Occupation				**0.040**
Unemployed	72	2 (2.8)	70 (97.2)	
Student	183	13 (7.1)	170 (92.9)	
Employed	123	6 (4.9)	117 (95.1)	
Business	1259	37 (2.9)	1222 (97.1)	
Artisan	211	5 (2.4)	206 (97.6)	
Education				0.231
None	564	22 (3.9)	542 (96.1)	
Primary	822	21 (2.6)	801 (97.5)	
Secondary	226	8 (3.5)	218 (96.5)	
Higher	235	12 (5.1)	223 (94.9)	
Year of enrolment				**<0.001**
2008	414	40 (9.7)	374 (90.3)	
2009	746	24 (3.2)	722 (96.8)	
2010	396	6 (1.5)	390 (98.5)	
2011	436	0 (0.0)	436 (00.0)	

Values in bold are probability that attained statistical significance at 5% alpha level (<0.05: statistically significant, <0.001: highly statistically significant).