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Research Article

Prevalence and Associated Factors of TB/HIV Co-Infection in Kassala State, Eastern Sudan

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Abstract

Background: TB/HIV co-infection is the leading cause of death from AIDS and TB was the cause of death in one-third of the estimated deaths from HIV/AIDS. In Sudan, studies showed that 18.3% of TB patients have HIV infection. The objectives of the current study were to determine the prevalence of HIV infection among TB patients attending Tuberculosis Management Units (TBMUs) in Kassala Teaching Hospital, Sudan and to determine the social and clinical characteristics of TB/HIV co-infected patients.

Methods: This study was cross-sectional, conducted at Kassala General Hospital in the Eastern Sudan. Fifteen Tuberculosis Management Units (TBMUs) formed the sampling frame of the study from which eleven were selected by stratified random sampling. A total of 389 patients were selected by simple random sampling. Data was collected by a pre-tested questionnaire after obtaining ethics approval. Analysis of data was performed by SPSS- Version 21. Chi-square test was employed to compare qualitative data.

Results: Twenty-four (7.3%) TB patients were found to have positive HIV infection. The most age group affected by TB/HIV was 21 - 30 years (45.8%). Males were predominant affected constituting 75% of patients. Twenty-three (53.5%) retreated TB cases had HIV infection compared to one (0.2%) new case (p = < 001).

Conclusion: The study concluded that TB/HIV co-infection in the Eastern part of Sudan is low. The disease is common among young adults (20 - 29) years, male gender and married population. TB/HIV co-infection is common among retreated patients compared to new TB cases.

Keywords: *Tuberculosis (TB); HIV/AIDS; TB/HIV Co-Infection*

Introduction

Tuberculosis (TB) is the ninth leading cause of death worldwide and the leading cause of death from a single infectious agent more than HIV/AIDS. The burden of tuberculosis and human immunodeficiency virus (HIV) is one of the major global health challenges of the 21st century [1].

In 2016, there were an estimated 1.3 million TB deaths an additional 374 000 deaths among HIV negative and positive patients respectively. In 2015, the estimated deaths from TB/HIV co-infection was 0.4 million out of 1.4 million TB deaths [2]. TB/HIV co-infection is the leading cause of death from AIDS and TB was the cause of death in one-third of the estimated deaths from HIV/AIDS [3,4]. Individuals who are newly diagnosed as TB are almost 19 times more likely to develop HIV infection than those without TB (HIV prevalence in adults aged 15 - 49 years is 0.8% and 15% in incident TB cases) [5,6].

HIV infection can accelerate the progression of TB within short period through worsening the immune system leading to diagnosis of TB in its two most common types: Smear Negative Pulmonary Tuberculosis (SNPTB) and Extra-Pulmonary Tuberculosis (EPTB). The effect of HIV on treatment outcome of TB patients is reflected as low cure rate, increase in mortality rate, defaults from adverse reaction to the combination therapy, recurrence of TB infection and development of drug resistant (DR-TB) [7].

TB is the most common presenting disease among people living with HIV and it is the major cause of HIV-related death. Sub-Saharan Africa bears the brunt of the dual epidemic, accounting for approximately 86% of all deaths from HIV-associated TB in 2016 [8].

In Sudan, TB incidence and prevalence rate is 88:100000 population and 151:100000 population respectively while the rate of TB/HIV co-infection is 7.7% [9]. HIV prevalence among age groups 15 - 49 years was 0.42%. HIV-positive TB incidence is 2.3:100000 population while patients with known HIV status who are HIV-positive were 2% [10]. The prevalence of TB/ HIV co-infection among Sudanese is 18.3% [11].

Objective of the Study

The objectives of the current study were to determine the prevalence of HIV infection among TB patients attending Tuberculosis Management Units (TBMUs) in Kassala Teaching Hospital, Sudan and to determine the social and clinical characteristics of TB/HIV co-infected patients.

Methods

This study was cross-sectional, conducted at Kassala General Hospital in the Eastern Sudan. Fifteen Tuberculosis Management Units (TBMUs) formed the sampling frame of the study from which eleven were selected by stratified random sampling. Stratification was based on the rate of TB notification. At the level of patients, a total of 389 patients were selected by simple random sampling. Data analysis was performed by SPSS- Version 21. Chi-square test was employed to compare qualitative data and p value less than 0.5 was considered as significant. Ethics approval was obtained from Ministry of Health, Kassala State. Informed consents were obtained from all patients. Confidentiality, respect and all rights of patients were realized in this study.

Results

Table 1 shows the rate of HIV infection among TB patients. Twenty-four (7.3%) of TB patients had HIV infection.

HIV status	No.	Percent
Positive	24	7.3
Negative	303	92.7
Total	327	100.0

Table 1: *Rate of HIV/TB co-infection.*

Table 2 shows the social characteristics of patients with TB-HIV co-infection. The most age group affected by TB/HIV was 21-30 years (45.8%). Males were predominant constituting 75% of patients. Most of the patients were married and illiterates constituted 58.3% and 45.8% respectively.

Social characteristics	No.	%
Age		
11 - 20	1	4.2
21 - 30	11	45.8
31 - 40	5	20.8
41 - 50	3	12.5
51 - 60	4	16.7
Gender		
Male	18	75
Female	6	25
Education		
Illiterate	11	45.8
Primary/Religious	10	41.7
Secondary	3	12.5
Marital status		
Married	14	58.3
Divorced	3	12.5
Single	7	29.2
Occupation		
Housewife	6	25
Employee	1	4.2
Farmer/worker	7	29.1
Free work	10	41.7

Table 2: *Social characteristics of TB-HIV patients.*

Table 3 shows the relation between TB clinical Characteristics and TB/HIV co-infection. Eighteen (6%) of pulmonary TB (PTB) patients had HIV infection while six (4.1%) of patients with extra-pulmonary tuberculosis (EPTB) had the disease, the relation is insignificant (p = 0.54). Four (3.1%) and 11(6.9%) of patients with positive and negative pulmonary TB had HIV infection respectively, the relation is not significant (p = 0.22). Twenty-three (53.5%) retreated TB cases had HIV infection compared to one (0.2%) new case. (p = < 001).

Discussion

The study revealed HIV prevalence of 7.3% among TB patients. This prevalence is higher than HIV prevalence of 0.5% reported by Liyan Wang from Guangxi, China [12], but lower than the finding of 44.2% and 17.5% in Nigeria, and 18.2% in Ghana [13-15].

Our study found a prevalence of 0.2% of HIV among new TB patients. This finding is less than previously reported that HIV among new TB cases in Sudan, Somalia, Djibouti and Lebanon ranged from 8% to14% [16].

Our findings showed that 75% of TB/HIV co-infected patients were males. This finding is consistent with studies done elsewhere [12,13,17-19]. In Sudan the disease is also common among male gender [20]. In contrast to our finding the disease is most common among females compared to males in Nigeria [13].

Our study found that TB-HIV coinfection was common (58.3%) among married patients. This finding is consistent with another study [18] but contradicts a study conducted in Nigeria and Ethiopia where the disease is common among singles [17,21].

Clinical characteristics	HIV		Total	p
	Positive No. (%)	Negative No. (%)		
Type of TB Disease				
Extra pulmonary	6 (4.1)	141 (95.9)	147 (32.9)	0.54
Pulmonary	18 (6.0)	282 (94.0)	300 (67.1)	
Total	24 (5.4)	423 (94.6)	447 (100.0)	
Sputum Results				
Positive	4 (3.1)	130 (96.9)	134 (46.7)	
Negative	11 (6.9)	155 (93.1)	166 (53.3)	0.22
Total	15 (5.0)	285 (95.0)	300 (100.0)	
History of TB				
Retreated	23 (53.5)	20 (46.5)	43 (9.6)	
New case	1 (0.2)	403 (99.8)	404 (90.4)	< 0.001
Total	24 (5.4)	423 (94.6)	447 (100.0)	

Table 3: *Relation between TB clinical characteristics and TB/HIV co-infection.*

Our results showed that 45.8% of TB-HIV co-infection occurred within age group 21 - 30 years of age. This finding is consistent with other studies [12,13,17,18,22]. TBLHIV co-infection is associated with illiteracy in 45.8% and primary/religious schools in 41.7% of patients. This finding is in line with a study conducted by Mitku AA., *et al*. in Ethiopia [17].

Clinical data, according to our study, showed that 7.5% of Smear Negative TB patients were having HIV infection compared to 2.9% of smear positive TB patients but the relation is not significant (p = 0.14). This higher rates of HIV among smear negative TB patients were reported in studies from Ethiopia and Malawi [23,24]. Results showed that HIV infection is more among pulmonary compared to extrapulmonary tuberculosis patients (6% vs 4.1%). This finding is consistent with Sharma SK., *et al.* who stated that at an early stage of HIV infection, the ratio of PTB to EPTB is 80:20 and at late stage will be 50:50 [25]. Our findings showed significant association between HIV status and history of TB (p = < 0.001). Twenty three (53.5%) of retreated TB patients were HIV positive compared to one new case (0.2%). Mary G. Nabukenya-Mudiope., *et al.* in Uganda found that 45.5% of retreated TB patients contracted HIV while no one from the new cases contracted the infection [26].

Conclusion

The study concluded that TB/HIV co-infection in the Eastern part of Sudan is low. The disease is common among young adults (20 - 29) years, male gender and married population. TB/HIV is common among retreated patients compared to the new TB cases.

Bibliography

1. Swaminathan S and Narendran G. "HIV and tuberculosis in India". *Journal of Biosciences* 33.4 (2008): 527-537.
2. WHO. "Global Tuberculosis Report" (2017).
3. International Union Against Tuberculosis and Lung, UNION. Implementing Collaborative TB-HIV Activities. A program guide (2012).
4. UNAIDS. "Get on the Fast-Track: The life-cycle approach to HIV" (2016).
5. UNAIDS. "AIDS epidemic update: November 2009". UNAIDS, Geneva, Switzerland (2009).

6. UNAIDS. "UNAIDS report on the global AIDS epidemic 2008". UNAIDS, Geneva, Switzerland (2008).

7. Harries Anthony D., *et al*. "TB/HIV: a clinical manual for South East Asia". Anthony D. Harries and Dermot Maher with contributions from Mario C Raviglione., [*et al*.] and a foreword by John Crofton. World Health Organization (1997).

8. WHO. TB and HIV (2019).

9. FMOH, Sudan. Disease Control Directorate. Sudan Epidemiology of TB (2016).

10. WHO. TB/HIV in Sudan. TB country profile (2019).

11. Tajeldin M Abdallaha., *et al*. "Provider-initiated HIV testing and counseling among tuberculosis patients in Kassala, Eastern Sudan". *Journal of Infection and Public Health* 5.1 (2012): 63-66.

12. Wang L., *et al*. "HIV prevalence among pulmonary tuberculosis patients in Guangxi, China". *Journal of Acquired Immune Deficiency Syndromes* 53.1 (2010): S61-S65.

13. Pennap G., *et al*. "Sero-prevalence of HIV infection among tuberculosis patients in a rural tuberculosis referral clinic in northern Nigeria". *Pan African Medical Journal* 5 (2010): 22.

14. Babatunde OI., *et al*. "Five years retrospective cohort analysis of treatment outcomes of TB-HIV patients at a PEPFAR/DOTS Centre in South Eastern Nigeria". *African Health Sciences* 16.3 (2016): 655-662.

15. Osei E., *et al*. "The burden of HIV on Tuberculosis patients in the Volta region of Ghana from 2012 to 2015: implication for Tuberculosis control". *BMC Infectious Diseases* 17.1 (2017): 504.

16. WHO. Stop tuberculosis. Epidemiological situation. WHO EMRO (2019).

17. Mitku AA., *et al*. "Prevalence and associated factors of TB/HIV co-infection among HIV Infected patients in Amhara region, Ethiopia". *African Health Sciences* 16.2 (2016): 588-595.

18. Oliveira NF and Gonçalves MJ. "Fatores sociais e ambientais associados à hospitalização de pacientes com tuberculose". *Revista Latino-Americana de Enfermagem* 21.2 (2013): 507-514.

19. Hasnain J., *et al*. "Screening for HIV among tuberculosis patients: a cross-sectional study in Sindh, Pakistan". *British Medical Journal* 2.5 (2012): e001677.

20. Abdallah TM and Ali AA. "Epidemiology of tuberculosis in Eastern Sudan". *Asian Pacific Journal of Tropical Biomedicine* 2.12 (2012): 999-1001.

21. Erhabor O., *et al*. "The prevalence of human immunodeficiency virus infection among TB patients in Port Harcourt Nigeria". *HIV AIDS (Auckland)* 2 (2010): 1-5.

22. Prado TN., *et al*. "Clinical and epidemiological characteristics associated with unfavorable tuberculosis treatment outcomes in TB-HIV co-infected patients in Brazil: a hierarchical polytomous analysis". *Brazilian Journal of Infectious Diseases* 21.2 (2017): 162-170.

23. Zeleke Z., *et al*. "Tuberculosis-HIV Co-infection Rate among Smear Positive Pulmonary Tuberculosis Patients and Associated Risk Factors in Southern Ethiopia". *Science, Technology and Arts Research Journal* 3.3 (2014): 87.

24. Hargreaves NJ., *et al*. "What causes smear-negative pulmonary tuberculosis in Malawi, an area of high HIV seroprevalence?" *International Journal of Tuberculosis and Lung Disease* 5.2 (2001): 113-122.

25. Sharma SK., *et al*. "HIV-TB co-infection: epidemiology, diagnosis & management". *Indian Journal of Medical Research* 121.4 (2005): 550-567.

26. Mary G Nabukenya-Mudiope., *et al*. "Tuberculosis retreatment 'others' in comparison with classical retreatment cases a retrospective cohort review". *BMC Public Health* 15 (2015): 840.

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