

HIV and TB co-infection in South Sudan: a three year retrospective study

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Abstract

Objective

To determine the prevalence of HIV/TB co-infection among patients attending the HIV clinic at Juba Teaching Hospital (JTH) from 2011 to 2013.

Method and Materials

This was a retrospective study using data abstracted from the registration book in the HIV clinic. A data sheet was used to collect relevant variables. Data were entered, organized and analyzed using SPSS Version 20 Software. A p-value of 0.05 or less was considered significant.

Results

Out of 2,577 patients attending the HIV clinic in JTH from 2011 to 2013, 2,547 (99%) were included in this study. Of these, 27.4% were seen in 2011, 34.1% in 2012 and 38.5% in 2013. There were 1,010 (39.7%) males and 1,537(60.3%) females with a male to female ratio of 2:3. The mean age (x, SD, range) was 30.8 +/-10.8 (0.2-68) years which for males was 33.3+/- 12.2 (1-68) years and 29.1+/-9.5 (0.2-65) years for females. There were 2,318 (91%) HIV mono-infected patients and 229 (9%) HIV/TB co-infected patients. There were 122 HIV/TB co-infected males and 107 females. 39.3% of patients with HIV/TB were aged 25-34 years, and 9.3% were aged 0-14 years. The p-value between the groups and within the groups was statistically significant at p= 0.005. Munuki payam had the highest percentage (31.7%) of HIV/TB co-infection.

Conclusion

HIV/TB remains a major challenging health problem with a prevalence of 9%.

Introduction

The re-appearance of tuberculosis (TB) in the era of global human immunodeficiency virus (HIV) epidemic is a threat to public health in high burden countries. These two diseases are causes of high mortality among infectious diseases [1]. In people living with HIV, tuberculosis is the leading cause of mortality. Globally, out of the 35.3 million people living with HIV, 12 million (33%) are infected with tuberculosis [2].

In 2011, it was estimated that 8.7 million new cases of TB and 2.5 million new cases of HIV were recorded [1, 3]. Of these new TB infections, 1.1 million (13%) were among people living with HIV [3]. Most of the burden of the dual HIV/TB co-infection is in Africa in which one-third of the approximated 2.3 million people who developed TB were HIV positive [1]. Of those with HIV/TB co-infection, 75% live in sub-Saharan Africa. Other regions

like India and Eastern Europe are also affected [4, 5].

The HIV epidemic is the main factor in the re-emergence of TB epidemic worldwide. One in eight new cases of TB occur in HIV positive individuals. The risk of developing active TB in HIV patients increases from 5 to 15% yearly depending on the level of the immune status [6, 7]. The risk of TB doubles within one year of HIV infection [8]. Hence people who are infected with HIV have increased susceptibility to active TB. This is because HIV modifies the pathogenesis of TB by increasing the risk of developing active TB in those with latent infection as well as in those newly exposed to TB. Up to 10% of people latently infected with TB will develop active TB in a population of HIV-uninfected people. But in an HIV positive population, there is 20 to 30 fold increase in relative risk of developing TB disease from latent infection relative to an HIV negative population [9].

Table 1. Distribution (number and %) of sexes among patients attending the HIV clinic in JTH during 2011, 2012 and 2013

Age group (years)	2011			2012			2013		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
0-14	12 (5%)	23 (5%)	35	31 (8.1%)	21 (4%)	52	34 (8.6%)	30 (5.1%)	64
15-24	18 (8%)	101 (22%)	119	25 (6.5%)	91 (19%)	116	18 (4.6%)	143 (24.4%)	161
25-34	88 (38%)	219 (47%)	307	158 (41.1%)	237 (50%)	395	163 (41.4%)	271 (46.2%)	434
35-44	74 (32%)	100 (21%)	174	115 (29.9%)	93 (19%)	208	121 (30.7%)	104 (17.7%)	225
45-54	25 (11%)	19 (4%)	44	41 (10.7%)	36 (7%)	77	46 (11.7%)	33 (5.6%)	79
55-64	10 (4%)	4 (0.8%)	14	11 (2.9%)	6 (1%)	17	10 (2.5%)	3 (0.5%)	13
65-74	5 (2%)	1 (0.2%)	6	3 (0.8%)	0 (0%)	3	2 (0.5%)	2 (0.3%)	4
Total	232	467	699	384	484	868	394	586	980

Several putative factors play an important role in the epidemiology of HIV infection in South Sudan:

- With the signing of a peace agreement in 2005, there has been a lot of rural-urban movement and travel between South Sudan and neighbouring countries with high HIV and TB rates.
- A high commercial sex workers presence in the towns [10].

Through a collaboration between the National Ministry of Health and the United Nation Development Programme (UNDP), a TB/HIV collaborative programme was developed for South Sudan. The objectives are to:

1. Establish a mechanism for collaboration between TB and HIV/AIDS programmes;
2. Decrease the burden of TB in people living with HIV and AIDS;
3. Decrease the burden of HIV in TB patients; and
4. Obtain political commitment to collaborative TB/HIV activities and create partnerships for development and collaboration [11].

Because of this collaboration, 29 coordinating bodies were formed for TB/HIV activities at all levels of the country. Likewise there are 140 TB/HIV service delivery points and 124 facilities that provide HIV voluntary counseling and testing and TB screening [11].

There is a paucity of published data on HIV/TB co-infection in South Sudan. The UNDP-SS has estimated the co-infection rate to be between 10-20%. An estimate in 2010 was 9.7% for TB/HIV co-infection patients and

Table 2. Distribution of all patients according to their HIV or HIV/TB status, sex, age group and their p values

Age/sex group	All patients	HIV only		HIV/TB		p value
		n	%	n	%	
Total	2,547	2318	91	229	9	0.000
Male	1,010	888	88	122	12	
Female	1,537	1430	93	107	7	
0-14yrs	151	130	86	21	14	0.005
15-24yrs	423	369	87	27	13	
25-34yrs	1,136	1046	92	90	8	
35-44yrs	607	554	91	53	9	
45-54yrs	200	173	86	27	14	
55-64yrs	44	37	84	7	16	
65-74yrs	13	9	69	4	31	

11.4% for all forms of TB [11]. We therefore undertook this study with the aim of establishing the prevalence of HIV/TB co-infection among HIV positive patients attending the HIV clinic at the Juba Teaching Hospital (JTH).

Materials and method

This was a retrospective study that involved the collection of variables from records at the HIV clinic at the Juba

Teaching Hospital.

We collected demographic data (age, sex and residential area), and the HIV and HIV/TB status of the patients who attended from January 2011 to December 2013. Included were all cases who had all these variables. A case was excluded if one of the variables was absent. Therefore out of 2,577 patients' records examined, only 2,547 were considered.

The information was collected into data sheets, verified and entered into SPSS Version 20 (IBM). Results were displayed in form of descriptive statistics and the Chi-square test was used to compare categorical data. A p-values of $p < 0.05$ were considered to be statistically significant.

Ethical approval was obtained from the ethical committee in the National Ministry of Health.

Results

Out of 2,577 patients attending the HIV clinic in JTH from 2011 to 2013, 2,547 (99%) were included in this study. Of these, 27.4% were seen in 2011, 34.1% in 2012 and 38.5% in 2013. There were 1,010 (39.7%) males and 1,537 (60.3%) females with a male to female ratio of 2:3. The mean age (x, SD, range) was 30.8 +/-10.8 (0.2-68) years in which for males was 33.3+/- 12.2 (1-68) years and 29.1+/-9.5 (0.2-65) years for females.

Table 1 shows the distribution of sex and age among patients attending the HIV clinic in 2011, 2012 and 2013.

Of the 2,547 patients 2,318 (91%) were HIV mono-infected and 229 (9%) were HIV/TB co-infected. Of the 229 HIV/TB co-infected patients, 122 were males and 107 were females. Table 2 and 3 show the distribution (number and %) of patients attending the HIV clinic at JTH according to their HIV or HIV/TB status, sex, and age group.

Figure 1 shows that:

- The majority (39%) of patients with HIV/TB belongs to the age group 25-34 years.
- 9% were in the age group of 0-14 years.

Table 4 shows that Muniki payam had the highest percentage (31.7%) of patients with HIV/TB co-infection.

Table 3. Distribution (number and %) of the 2,547 HIV and HIV/TB patients by sex and age group

Age/sex Group	HIV +ve			HIV/TB		
	Male (n %)	Female (n %)	Total	Male (n %)	Female (n %)	Total
0-14yrs	68 (7.7%)	62 (4.3%)	130 (5.6%)	9 (7.4%)	12 (11.2%)	21(9.2%)
15-24yrs	53 (6%)	316 (22.1%)	369(15.9%)	8 (6.6%)	19 (17.8%)	27(11.8%)
25-34yrs	361 (40.7%)	685 (47.9%)	1046(45.1%)	48 (39.3%)	42 (39.3%)	90(39.3%)
35-44yrs	279 (31.4%)	275 (19.2%)	554(23.9%)	31 (25.4%)	22 (20.6%)	53(23.1%)
45-54yrs	95 (10.7%)	78 (5.5%)	173(7.5%)	17 (13.9%)	10 (9.3%)	27(11.8%)
55-64yrs	26 (2.9%)	11 (0.8%)	37(1.6%)	5 (4.1%)	2 (1.9%)	7(3.1%)
65-74yrs	6 (0.7%)	3 (0.2%)	9(0.4%)	4 (3.3%)	0 (0%)	4(1.7%)
Total	888	1430	2318	122	107	229

Discussion

Human immunodeficiency virus and tuberculosis are a major challenge in public health in many countries, where these conditions are endemic. In this study the prevalence of TB/HIV co-infection among patients who are HIV positive is 9%. This was similar to the UNDP-SS estimate of 2010 [11]. Studies in Nigeria showed a prevalence of 7.8% and in Tanzania a prevalence of 8.5% [12, 13] but lower than prevalences found in studies conducted in Northern Tanzania 30% [13], Cambodia 19.3% [14] and India 18.9% [15]. This variation may be due to the geographical and socio-economical status of the countries. It has been noted that tuberculosis is seen more in countries that are poor [16]. Our findings may not be representative of the whole of South Sudan because the data were collected from only one centre.

Among the 229 patients with HIV and TB co-infection, the proportion of co-infection according to sex was 12% (122/1010) for males and 7.5% (107/1430) for females. Studies conducted in Nigeria by Olaniran et al 2011 [17] and globally by Abeld et al 2002 [18] found similar results. Males have the tendency of migrating from one place to another searching for better work. As a result of this, they are in contact with more people increasing the chances of exposure to mycobacterium bacilli. It is worth mentioning that reactivation of TB is seen most commonly in patients with HIV/AIDS.

A statistically significant majority of the patients affected with HIV/TB co-infections belonged to the 25-34 year age group. However, the proportion of all 25-34 year old HIV-positive patients with the co-infection was 8% - the lowest of all the age groups. This result is in line with studies by Olaniran et al 2011 [17]. This age group usually has responsibilities which involve strenuous activities to meet socio-economical needs of their families. As such

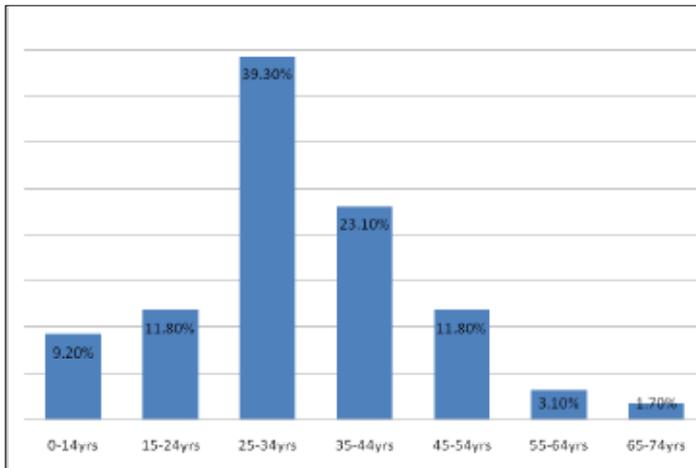


Figure 1. Distribution of HIV/TB co-infection of patients attending HIV clinic in JTH according to age group

they are more prone to associate with infected patients in one way or another. But in our study it seems they are less active and therefore they have less contact. This group reflects the reproductive and economic power of the nation. This may reflect prevalence of HIV/TB in the community since this is a sexually active group.

In our study children accounted for 9.2% of the 229 HIV/TB co-infected cases. Worldwide children contribute to 10% of HIV/TB infections although the prevalence varies from country to country. In South Africa the incidence of TB among children infected with HIV is 23% [19] and in London it is 5.5% [20]. In our study it is closely similar the global average and better than South Africa. This may be due to the fact that our study is based in one centre. Hence the results do not reflect prevalence of the whole country. It has been shown that with increase in coverage with anti-retroviral drugs, the incidence of TB decreases [21].

In our study a high proportion of HIV/TB cases were from Munuki payam (31.7%). This is because this payam is part of Juba City Council which has the largest (61%) number of inhabitants in comparison to all payams of Juba county. Furthermore urban life is associated with factors such as multiple sexual partners, sex workers, poor sanitation, overcrowding, and poor socioeconomic status, which can increase the likelihood of HIV/TB infection.

There is an increasing trend of HIV/TB co-infection over time in this study. Cases increased from 27.4% of all patients seen in the HIV clinic in 2011 to 38.5% in 2013. This is an increment of 11.1%. This may be due to socioeconomically instability as well as inter and intra tribal conflicts in the others parts of the country. So people tend to move to the capital for a better and safer life. Or it may be due to the fact that there is now a good public awareness programme that encourages the population to

Table 4. Distribution of HIV/TB co-infected patients attending the HIV clinic in JTH according to residence (states, counties and payams)

	n	%
Juba City Council		
Juba town	261	10
Kator	610	23.9
Munuki	807	31.7
Other payams in Juba county	530	20.8
Elsewhere in Central Equatoria (CES)	285	11.2
Other States	62	2.4

come forward for voluntary HIV testing.

In conclusion, HIV/TB still remains a major challenging health problem in this youngest nation with a prevalence of 9%. Males are more co-infected than females with the greatest number of co-infected patients being in the age group of 25-34 years.

Recommendations

1. Studies to document trends in HIV/TB co-infection should be implemented across the country.
2. All TB cases need to be screened for HIV so that HIV/TB is detected early and managed promptly.
3. Public awareness, community mobilization through different interventions should be encouraged and stepped up especially in areas where there is high prevalence of HIV and TB. This will help in the control and prevention of the dual co-infection which is challenging the health system.

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Conflicts of interest

There is no conflict of interest.

Contributors

All members participated and contributed equally in this research varying from literature review, questionnaire design, data collection, data entry, statistical analysis, typing, discussion and reviewing the manuscript.

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Professor John Adwok Adieng who has just been appointed Chairperson of the new 18-person South Sudan General Medical Council, and **Dr Edward Luka** who is appointed a member of the same Council.

Professor Adwok says, "It will not be an easy task to build this hitherto neglected pillar of our healthcare system. The establishment of a guiding regulatory body is the foundation of any system. It provides the base on which efficient and effective processes could be run by a dedicated and motivated team to ensure successful outcomes."

Dr Eluzai Hakim who has been nominated as **Clinical Educator of the Year for 2014** at St Mary's Hospital, Isle of Wight, UK, and whose name will be displayed on the hospital honours board.