

# Health point prevalence of human immunodeficiency virus and pulmonary tuberculosis among patients in various parts of Delta State, Nigeria

Johnson D. Jemikalajah, MMLS, PhD, Godwin-Ray A. Okogun, MSc, PhD.

## ABSTRACT

**الأهداف:** تقييم انتشار فيروس نقص المناعة (HIV) والدرن الرئوي (PTB) بين سكان ولاية دلتا بنيجيريا.

**الطريقة:** أجريت الدراسة على إجمالي عدد 205 مريضاً يشتبه بإصابتهم بفيروس نقص المناعة المكتسبة HIV والدرن الرئوي TB، في كويل – أجبور وإيكو – ولاية دلتا – نيجيريا، خلال الفترة ما بين فبراير 2006م وحتى فبراير 2008م. تم تحديد حالة الإصابة بفيروس نقص المناعة المكتسبة HIV باستعمال أنظمة منظمة الصحة العالمية WHO، وتم استخدام تقنية زيهيل نيلسون الصبغية لفحص الدرن الرئوي TB.

**النتائج:** تم الحصول على معدل انتشار نقطة الصحة لنسبة 53.2% من فيروس نقص المناعة المكتسبة HIV، 49.3% و 49.3% والدرن الرئوي TB، و 16.6% فيروس نقص المناعة المكتسبة HIV /الدرن الرئوي TB. كان السكان المصابين بفيروس نقص المناعة المكتسبة HIV والدرن الرئوي TB ملحوظين من الناحية الإحصائية ( $p=0.135$ ,  $p=0.0003$ , و ( $p=0.890$ ,  $p=0.011$ ,  $p=0.006$ ) بين المشتبه بإصابتهم، بينما الحالات المصابة بفيروس نقص المناعة المكتسبة HIV الدرن الرئوي TB لم يكن ملحوظاً من الناحية الإحصائية ( $p=0.987$ ,  $p=0.685$ ),  $p=0.731$ .

**خاتمة:** أظهرت دراستنا أن العدوى بفيروس نقص المناعة المكتسبة HIV والدرن الرئوي PTB تبقى عالية في أجزاء من ولاية دلتا بنيجيريا.

**Objectives:** To assess the prevalence of human immunodeficiency virus (HIV) and pulmonary tuberculosis (PTB) in the study population in Delta State of Nigeria.

**Methods:** Two hundred and five patients suspected of HIV and TB were prospectively studied in Kwale, Agbor and Eku in Delta State of Nigeria from February 2006 to February 2008. Human immunodeficiency virus status was determined using World Health Organization

systems II, and Zeihl Nelson staining technique was used for TB screening.

**Results:** A health point prevalence rate of 53.2%, was obtained for HIV, 49.3% for TB, and 16.6% for HIV/TB. The population of HIV positive ( $p=0.890$ ,  $p=0.011$ ,  $p=0.006$ ) and TB positive ( $p=0.135$ ,  $p=0.0003$ ,  $p=0.0001$ ) subjects were statistically significant among the suspected subjects while the HIV/TB positive cases were not statistically significant ( $p=0.987$ ,  $p=0.685$ ,  $p=0.731$ ).

**Conclusion.** Our study showed that HIV and PTB infections remains high in parts of Delta State in Nigeria.

*Saudi Med J 2009; Vol. 30 (3): 387-391*

*From the Medical Laboratory Department (Jemikalajah), Central Hospital, Kwale and the Department of Medical Laboratory Science (Okogun), Ambrose Alli University, Ekpoma, Nigeria.*

*Received 16th August 2008. Accepted 3rd December 2008.*

*Address correspondence and reprint request to: Dr. Godwin-Ray A. Okogun, Medical Entomology & Parasitology Laboratories, College of Medicine, Ambrose Alli University, Ekpoma, Nigeria. Tel. +234 8058815346. E-mail: graokogun@yahoo.com*

The prevalence of immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS) varies considerably between cities, countries, and regions of the world especially sub-Saharan Africa, where the greatest burden of the disease is currently being borne.<sup>1</sup> Some countries in sub-Saharan Africa reports national prevalence rates of up to 30% especially in urban areas. In some cities and countries, HIV prevalence still remains low. However, low national prevalence rate can be misleading since this is often based on national sentinel surveys.<sup>1</sup> Human immunodeficiency virus and its associated AIDS remains a major public health problem, social economic burden, and a serious threat to development.<sup>2</sup> Over 95% of those infected live in developing countries and approximately 70% of this

number live in sub-Saharan Africa. The highest loss of life and severe disease are among young adults, increasingly among those aged 15-24 years.<sup>2</sup> Tuberculosis (TB) has become the leading cause of death among people with HIV infection, accounting for approximately a third of AIDS deaths worldwide.<sup>3</sup> Today, TB is the most important disease in the world due to its global prevalence rate of 14.4 million cases approximately 20% with an estimated 9.2 million new cases (139 per 100,000 population), including 4.1 million new smear-positive cases (44% of the total), and 0.7 million HIV-positive cases (8% of the total) in 2006. This is an increase from 9.1 million cases in 2005, due to population growth. India, China, Indonesia, South-Africa and Nigeria rank first to fifth respectively in terms of absolute numbers of cases. However, African region has the highest incidence rate per capita (363 per 100,000 population).<sup>4,5</sup> Tuberculosis has a greater impact worldwide on morbidity and mortality in HIV infected individuals than all other opportunistic infections (OIs).<sup>6</sup> Approximately one-third of the 40 millions people infected with HIV are co-infected with TB. In some countries of sub-Saharan Africa, two-third of HIV-infected subjects are co-infected with TB.<sup>7</sup> The rising incidence of TB in many regions of the world is closely related to the HIV epidemic.<sup>8,9</sup> Recently, co-infection of the 2 pathogens has become more noticeable in Eastern Europe and in Asia,<sup>10-13</sup> and there is increasing concern that HIV will enhance the spread of multi drug resistant TB in these regions<sup>14</sup> as multi drug resistant-TB is approximately 10 times more prevalent in Eastern Europe than in Africa.<sup>15,16</sup> This study was undertaken to ascertain the health point prevalence of HIV and TB so as to reduce TB transmission morbidity and mortality as part of overall effect to reduce HIV-related death in Nigeria.

**Methods.** A prospective study was conducted in 3 foci of Delta State with voluntary testing and counseling facilities namely Central Hospital Kwale, Central Hospital Agbor, Tuberculosis and Leprosy Referral Centre Eku in Delta State from February 2006 to February 2008. The study areas of Agbor, Eku and Kwale lies approximately between longitude 5°00' and 6°45' East and latitude 5°00' and 6°30' North of Delta State. The population of the study area are: Agbor: 109,204; Eku: 113,929 and Kwale: 114,117.<sup>17</sup> We believed that this study will be of immense benefit to Delta state in Nigeria and

**Disclosure.** This study was partially funded by the Academic Planning Unit, Ambrose Alli University, Ekpoma, Nigeria through Grant No. 7/299.

the global world. Ethical consideration for permission/ approval was obtained from the ethical committee of the Delta State, Ministry of Health, and the hospitals located in the 3 foci where the study was carried out. Venous blood and sputum samples were collected from 205 patients suspected of HIV and/or TB by random sampling into ethylenediaminetetraacetic acid (EDTA) containers and clean universal containers respectively after informed consent. During the study, subjects of <10 years of age were not presented for sampling, and all samples were analyzed daily upon collection. Human immunodeficiency virus and its associated acquired immune deficiency screening was carried out using 2 enzyme linked immunosorbent assay rapid screening kits based on the WHO systems II.<sup>18</sup> All subjects recruited into the study have not been diagnosed HIV or TB prior to the study. Known HIV and TB positive patients were not recruited into the study. Determine rapid screening kits (Abbott Laboratories, Tokyo, Japan) and immunocomb II (Organics, France) were used in this study. Test was carried out according to the manufacturers instructions. Sputum were examined for TB using Zeihl Nelson staining methods.<sup>19</sup> All the data generated were presented in tables and analyzed statistically using Chi square for comparing significant variables at 95% confidence limit.

**Results.** Out of 205 suspected subjects tested, 109 were positive for HIV, representing a health point prevalence rate of 53.2%. The prevalence of HIV cases was statistically significant ( $p=0.890$ ,  $p=0.011$ ,  $p=0.006$ ) among suspected subjects (Table 1). A health point prevalence rate was obtained for TB infection (49.3%) and HIV (16.6%) co-infected with TB subjects. The TB positive cases was statistically significant ( $p=0.135$ ,  $p=0.0003$ ,  $p=0.0001$ ) among suspected subjects (Table 1), while the HIV co-infected with TB positive cases was not statistically significant ( $p=0.987$ ,  $p=0.685$ ,  $p=0.731$ ) in the study area. The health point prevalence rate for HIV, TB and their mixed infections for the 3 foci studied were; Kwale 19.5%, 22.9% and 10.7%; Agbor 14.6%, 6.3% and 28.3%; while that of Eku were 6.3%, 3.9% and 6.3%, respectively.

Table 2 showed a health point prevalence rate of 51.4% for TB infection. The TB positive cases were statistically significant ( $p=0.0016$ ,  $p=0.010$ ,  $p=0.669$ ) among HIV infected subjects. A health point prevalence rate of 27.5% was obtained for TB in Kwale, 11.9% in Agbor and 11.9% in Eku among HIV infected subjects. The age related distribution of infections in the study area showed the highest health point prevalence rate of 21.5% for HIV, 19.5% for TB and 7.8% for HIV/TB in 21-30 years age group. Human immunodeficiency virus, TB, and HIV/TB positive among the different age groups were shown in Figure 1.

**Table 1** - Health point prevalence of HIV, TB and HIV/TB infections among suspected subjects in the study.

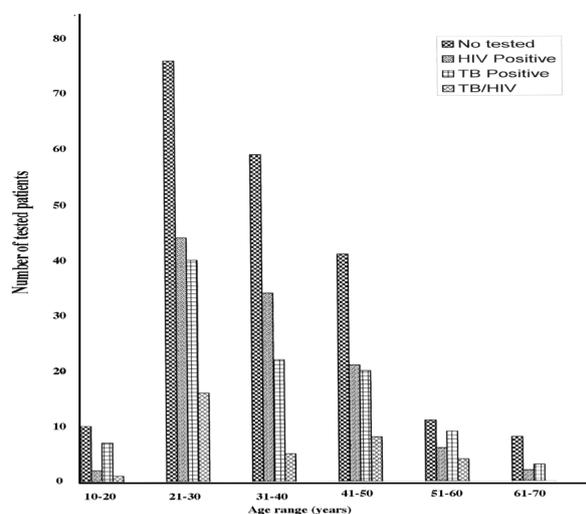
Infections/Foci	No. of tested (n)	No. of infected (%)	No. of not infected (%)	Prevalence rate (%)	$\chi^2$	P-value
<i>HIV infection</i>						
Kwale	78	40 (51.3)	38 (48.7)	19.5	0.023	0.89
Agbor	60	47 (78.3)	13 (21.7)	22.9	11.120	0.01
Ekue	67	22 (32.8)	45 (67.2)	10.7	7.569	0.01
<b>Total</b>	<b>205</b>	<b>109 (53.2)</b>	<b>96 (46.8)</b>	<b>53.2</b>		
<i>Tuberculosis infection</i>						
Kwale	78	30 (38.5)	48 (71.6)	14.6	2.237	0.14
Agbor	60	13 (21.7)	47 (78.3)	6.3	13.322	0.0003
Ekue	67	58 (86.7)	9 (13.4)	28.3	27.412	0.0001
<b>Total</b>	<b>205</b>	<b>101 (49.3)</b>	<b>104 (50.7)</b>	<b>49.3</b>		
<i>HIV/TB infection</i>						
Kwale	78	13 (16.7)	65 (83.3)	6.3	0.0002	0.99
Agbor	60	8 (13.3)	52 (86.7)	3.9	0.165	0.69
Ekue	67	13 (19.4)	54 (80.6)	6.3	0.118	0.73
<b>Total</b>	<b>205</b>	<b>34 (16.6)</b>	<b>171 (83.4)</b>	<b>16.6</b>		

HIV - human immunodeficiency virus, TB - tuberculosis

**Table 2** - Health point prevalence of TB among HIV infected subjects in the study.

Foci	No. of HIV infected subjects (n)	No. of TB positive subjects (%)	No. of TB negative subjects (%)	Percentage prevalence rate	$\chi^2$	P-value
Kwale	40	30 (75.0)	10 (25.0)	27.5	5.759	0.02
Agbor	47	13 (27.7)	34 (72.3)	11.9	6.558	0.01
Ekue	22	13 (59.1)	9 (40.9)	11.9	0.182	0.67
<b>Total</b>	<b>109</b>	<b>56 (51.4)</b>	<b>53 (48.6)</b>	<b>51.4</b>		

HIV - human immunodeficiency virus, TB - tuberculosis

**Figure 1** - Age related distribution of human immunodeficiency virus (HIV), tuberculosis (TB) and HIV/TB subjects in the study.

**Discussion.** Tuberculosis has been reported as the leading cause of death among people with HIV infection, accounting for 1.5 million death in HIV negative and 0.2 million AIDS deaths worldwide.<sup>5</sup> This study showed a health point prevalence rate of 53.2% for HIV, 49.3% for TB and 16.6% for HIV/TB. These prevalence rate cannot be compared with the national prevalence rate of 30% reported in some countries of sub-Saharan Africa by UNAIDS.<sup>1</sup> This may be attributed to the fact that their reports were based on the national sentinel survey often using antenatal subjects, whereas ours is a health point prevalence based on random sampling of subjects reporting at the selected medical facilities for medical attention. However, the high percentages obtained for HIV and TB infection may be attributed to enabling behavioral factors, ignorance, and poverty. The culture of polygamy as a way of life among men in the study area is not helpful

**Table 3** - Age and gender related distribution of HIV/TB co-infected patients in the study

Age (years)	No tested (n)	No. of HIV/TB positive (%)		Total	Prevalence %	$\chi^2$	P-value
		Male	Female				
10-20	10	0 (0.0)	1 (10.0)	1 (10.0)	0.5		
21-30	76	2 (2.6)	14 (18.4)	16 (21.1)	7.8		
31-40	59	5 (8.5)	0 (0.0)	5 (8.5)	2.4	10.95	0.0009
41-50	41	6 (14.6)	2 (4.9)	8 (19.5)	3.9		
51-60	11	3 (27.3)	1 (9.1)	4 (36.4)	2.0		
61-70	8	0 (0.0)	0 (0.0)	0 (0.0)	-		
Total	205	16 (7.8)	18 (8.8)	34 (16.6)	16.6		

HIV - human immunodeficiency virus, TB - tuberculosis

in this matter. Possession of multiple gender partners and attitude of visiting traditional birth attendant by subjects in the study area, in addition to poor unsanitary and over crowded environment provides a suitable ecological environment for HIV and TB infections. The findings of 49.3% health point prevalence rate for TB infection is higher than the 20% global prevalence rate,<sup>4,5</sup> and suggest need for urgent intervention. This may include methods at the community levels that will target a self-reported and community mobilization of sufferers for treatment. The only known way for the elimination of TB in any community is treatment of infected persons. Environmental factors such as unsanitary health attitude, over crowding, and poverty are the major cause related factors as they provide a vehicle for mycobacterium spread. The health point prevalence rate of 51.4% recorded for TB in this study among the HIV infected subjects was found to be significant ( $p=0.016,0.010,0.669$ ). Although the 51.4% rate was lower than the 60% rate reported earlier,<sup>7</sup> the rising incidence of TB in many regions of the world is still closely related to HIV epidemics<sup>8,9</sup> since TB has a greater impact on morbidity and mortality of HIV infected individual than all other opportunistic infections.<sup>6</sup> The differences in these findings might not be unconnected with the availability of anti-retroviral therapy and prophylaxis treatment for TB in some regions, whereas prophylactic treatment is also constrained in resource poor countries as obtained in sub-Saharan Africa; co-infection of these 2 pathogens has become more noticeable in Eastern Europe and in Asia.<sup>11-14</sup> There is increasing concern now than ever that HIV will enhance the spread of multi-drug resistant MTB in endemic areas.<sup>15</sup> The highest health point prevalence rate obtained for HIV, TB, and HIV/TB is in 21-30 years age group this agrees with the findings of UNAIDS<sup>2</sup> who reported 15-24 years age group, and 15-49 years age group in some parts of South Africa.

This might result to socio-economic burden, and a threat to development in heavily infected HIV and TB areas. Resource constrains were a major limitation of this study, in addition to ability to persuade the patients to accept testing and counselling. Therefore, in order to reduce the morbidity and mortality rate associated with HIV and TB infections; there is also need to intensify TB case finding among people presenting with symptoms to general health services, in addition to awareness on HIV/TB through campaigns, rallies, workshops, and voluntary counseling to rural and semi-urban areas with the aim of gradually reducing prevalence of the disease in parts of Nigeria.

## References

1. The Joint United Nations Programme on HIV/AIDS. Epidemic update 2004; cited 2007 July 3). Available from URL: <http://hivnet/link.php?id=227>
2. The Joint United Nations Programme on HIV/AIDS. Global summary of the HIV/AIDS epidemic. AIDS. Geneva: UNAIDS; 1998.
3. The Joint United Nations Programme on HIV/AIDS. Report on the global HIV/AIDS epidemic. Geneva: UNAIDS; 2000.
4. Pfyffer GE, Brown-Elliott BA, Wallace RJ. Mycobacterium: Manual of Clinical Microbiology. 8th ed. Washington (DC): American Society for Microbiology; 2003. p. 532.
5. World Health Organization. Global TB control. Geneva: WHO; 2008.
6. The Joint United Nations Programme on HIV/AIDS. Most deaths and new infection over, some good news. Geneva: UNAIDS; 2003.
7. Colebunders R, Lambert ML. Management of coinfection with HIV and TB. *BMJ* 2002; 324: 802-803.
8. Corbett EL, Watt CJ, Walker N, Maher D, Williams BG, Raviglione MC, et al. The growing burden of tuberculosis: global trends and interactions with the HIV epidemic. *Arch Intern Med* 2003; 163: 1009-1021.
9. Raviglione MC, Harries AD, Msiska R. Tuberculosis and HIV: current states in Africa. *AIDS* 1997; 11 (Suppl B): S115-S123.

10. Field MG. HIV and AIDS in the Former Soviet Bloc. *N Engl J Med* 2004; 351: 117-120.
11. Sonnenberg P, Glynn JR, Fielding K, Murray J, Godfrey-Faussett P, Shearer S. How soon after infection with HIV does the risk of tuberculosis start to increase? A retrospective cohort study in South African gold miners. *J Infect Dis* 2005; 191: 150-158.
12. Steinbrook R. The AIDS epidemic in 2004. *N Engl J Med* 2004; 351: 115-117.
13. Surendran A. AIDS, TB hit Eastern Europe. *Nat Med* 2004; 10: 323.
14. Kriüner A, Hoffner SE, Sillastu H, Danilovits M, Levina K, Svenson SB, et al. Spread of drug-resistant pulmonary tuberculosis in Estonia. *J Clin Microbiol* 2001; 39: 3339-3345.
15. Dye C, Espinal MA, Watt CJ, Mbiaga C, Williams BG. Worldwide incidence of multidrug-resistant tuberculosis. *J Infect Dis* 2002; 185: 1197-1202.
16. Morozova I, Riekstina V, Sture G, Wells C, Leimane V. Impact of the growing HIV-1 epidemic on multidrug-resistant tuberculosis control in Latvia. *Int J Tuberc Lung Dis* 2003; 7: 903-906.
17. World Gazetteer. Nigeria: largest cities and towns and statistics of their population: (update 20/09/2007, cited 2007 July 3). Available from URL: <http://world-gazetteer.com/>
18. Kassler WJ, Alwano-Edyegu MG, Marum E, Biryahwaho B, Kataaha P, Dillon B. Rapid HIV testing with same-day results: a field trial in Uganda. *Int J STD AIDS* 1998; 9: 134-138.
19. Chesbrough M. District Laboratory Practice in Tropical countries. 2nd ed. USA: Cambridge University Press; 2000. p. 434.

#### Related topics

Jemikalajah JD, Okogun GA. Hematological indices in human immunodeficiency virus and pulmonary tuberculosis infections in parts of Delta State, Nigeria. *Saudi Med J* 2009; 30: 253-256.

Alzahrani AJ. Analysis of HIV subtypes and the phylogenetic tree in HIV-positive samples from Saudi Arabia. *Saudi Med J* 2008; 29(10): 1394-1396.

Al-Jabri AA, Al-Shukaili AK, Al-Rashdi ZT, Ganguly SS. Reference ranges for lymphocyte subsets in healthy adult male Omanis. *Saudi Med J* 2008; 29(3): 409-412.

Halloush RA, Arabi H, Al-Abbadi MA. Primary testicular non-Hodgkin's lymphoma with atrial mass as an initial presentation of acquired immunodeficiency syndrome. *Saudi Med J* 2007; 28(8): 1278-1280.