Prevalence of human immunodeficiency virus infection in patients with pulmonary tuberculosis at the National Chest Hospital in Jamaica

Patrick E. Akpaka,[1] *Mikael Tulloch-Reid,*[2] *Angel Justiz-Vaillant,*[3] *and Monica F. Smikle*[4]

ABSTRACT

Objective.   *This study was undertaken to determine the prevalence of human immunodeficiency virus-type 1 (HIV-1) infection in patients with pulmonary tuberculosis at the National Chest Hospital in Jamaica.*

Methods.   *This retrospective study reviewed the hospital records of 537 patients admitted over a seven-year period from 1995 to 2001. We used a standardized data collection form to obtain data for sociodemographic characteristics, clinical features, signs and symptoms, laboratory diagnosis, treatment and outcome.*

Results.   *We found that 11.6% (47/406) of the patients who met the inclusion criteria and were diagnosed as having pulmonary tuberculosis were HIV-1 seropositive. Most HIV-positive patients with tuberculosis were males, and prevalence of HIV coinfection among patients with tuberculosis was highest in patients aged 30-39 years. The mortality rate in patients with tuberculosis and HIV infection was 23.4% (11/47) compared to 3.9% (14/359; P = 0.001) in HIV-negative patients. Patients were treated with standard quadruple drug therapy. No multiple drug resistance was noted in the* Mycobacterium tuberculosis *isolates.*

Conclusions.   *The prevalence of HIV in patients with tuberculosis in Jamaica is similar to that in other developing countries, but the mortality rate is higher and this warrants prompt diagnosis of HIV infection and early institution of highly active antiretroviral therapy.*

Key words   Tuberculosis; HIV; prevalence; symptoms; mortality; hospital; Jamaica.

[1] Department of Microbiology, University of the West Indies, Mona, Kingston, Jamaica. Send correspondence and reprint requests to Dr. Patrick E. Akpaka, Pathology/Microbiology Unit, Department of Para-Clinical Sciences, Faculty of Medical Sciences, St. Augustine, Trinidad and Tobago; telephone: (868) 645 2640 ext. 2332; mobile: (868) 736 0440; fax: (868) 663 3797; e-mail: peakpaka@yahoo.co.uk; pakpaka@hotmail.com
[2] National Chest Hospital, Kingston, Jamaica.
[3] Department of Basic Medical Sciences, The University of the West Indies, Mona, Kingston, Jamaica.

[4] Department of Microbiology, University of the West Indies, Mona, Kingston, Jamaica.

Infection with human immunodeficiency virus type-1 (HIV) has been noted to contribute to the resurgence of pulmonary tuberculosis (TB) in several countries, and is in fact the strongest known risk factor for the development of TB (1–3). Persons with HIV-1 infection have been estimated to be over 100 times as likely to have TB as uninfected persons (4). Among people living with HIV/AIDS worldwide, pulmonary TB is a leading cause of HIV-related morbidity and mortality (5–8). At the end of 2003 the number of

adults and children living with HIV/ AIDS in Jamaica was estimated to be 22 000 (9). However, there is a paucity of data on the prevalence of pulmonary TB, coinfection with HIV-1, and on the epidemiological links between HIV and TB in this country.

This study was undertaken to determine the seroprevalence of HIV infection in patients with TB, and the epidemiological trends, characteristics and mortality related to HIV infection in patients diagnosed with TB in a developing country with limited health care resources and a spreading HIV/ AIDS epidemic. These data will help provide accurate estimates of the prevalence of HIV-1 and TB, which are crucial for the development of policies and strategies to enhance their effective control.

METHODS

This retrospective study reviewed the records of patients admitted with a diagnosis of pulmonary TB at the National Chest Hospital in Kingston, Jamaica, from 1995 to 2001. This tertiary 100-bed facility provides specialist cardiopulmonary medical, surgical, diagnostic and therapeutic services for inpatients and outpatients, as well as active ambulatory and emergency services. The hospital is the largest of its kind in the Caribbean and serves as a reference center for respiratory diseases. As the only health care facility involved in the management of adults diagnosed as having TB in Jamaica, its admissions patterns are likely to be broadly representative of the distribution of adult TB cases in this country. Patients' hospital records were compiled manually and stored in the records department for retrieval whenever needed. The study reviewed records of 537 patients (379 men, 158 women, median age 36 years, range 3– 87 years) diagnosed as having pulmonary TB, who represented 7.7% (537/6951) of the patients admitted to the hospital during the study period. Sociodemographic, clinical and laboratory data were abstracted using a standardized data collection form. Pa-

tients were included in the study if 1) their records appeared to be complete, 2) diagnosis on admission, based on presentation with clinical signs and symptoms, was consistent with pulmonary TB, and 3) there was documented proof of isolation of *Mycobacterium tuberculosis* from at least three sputum samples analyzed in compliance with standard bacteriological procedures according to WHO guidelines (10–12). Other data extracted from the patients' records included TB treatment regimen, duration, period of follow-up and outcome of treatment. In addition, only patients whose records showed proof of informed consent and documented HIV-1 test results were included in the study.

Usually, clotted blood samples obtained from each patient were refrigerated at 4 °C at the National Chest Hospital and transported on a daily basis to the National Public Health Laboratories for testing. At the laboratory the sera were separated and stored (at –20 °C) until tested for HIV. An enzyme-linked immunosorbent assay was used for HIV screening, and positive results were verified with western blotting (Abbott Diagnostics, Chicago, IL, USA).

The data were analyzed with Epi Info 6.04 software (CDC, Atlanta, GA,

USA). The chi-squared test and Fisher's exact test were used as appropriate to compare data from different groups. The data were descriptive and were reported as comparisons of frequency distributions. A *P* value <0.05 was considered significant.

RESULTS

Of the 537 patients with pulmonary TB admitted during the study period, 75.6% (406/537) fulfilled the inclusion criteria (Table 1). During the study period, 11.5% (47/406) of patients with pulmonary TB were positive for HIV-1 coinfection. Most HIV-positive patients with TB were men (76.6%, 36/ 47). The prevalence of HIV-1 coinfection in patients with TB did not show any overall trend during the study period (Figure 1). The highest frequency of TB, both with and without HIV coinfection, was seen in the 30- to 39- year age group, and there were no significant differences in age distribution between patients with and without HIV coinfection (Figure 2).

Productive cough was not a significant clinical symptom among the HIV-positive or HIV-negative patients with TB; however, significant clinical fea-

FIGURE 1. Prevalence of HIV infection in patients with tuberculosis at the National Chest Hospital, Kingston, Jamaica, 1995–2001.
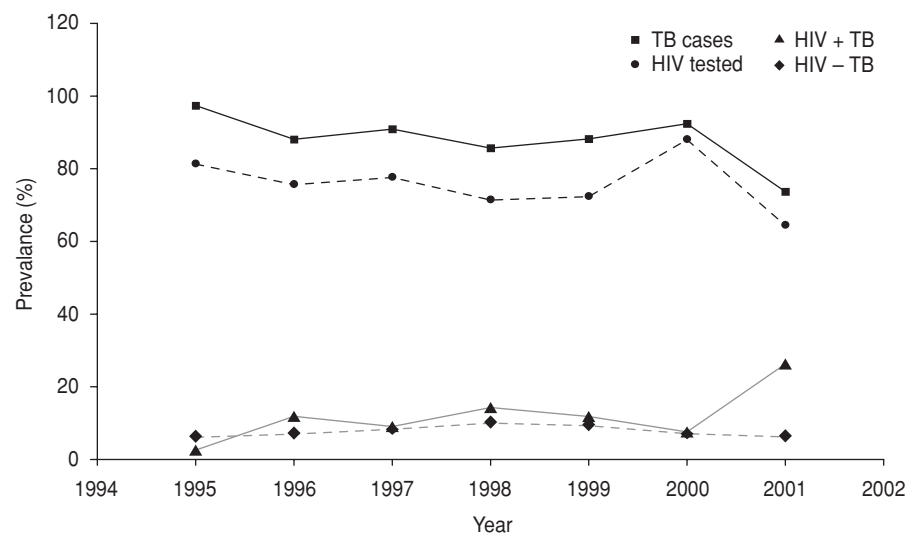
tures in the HIV-positive patients with TB included a high prevalence of diarrhea (21.3% vs. 5.8%, $P < 0.003$), fever (89.4% vs. 69.1%, $P < 0.001$), dry cough (46.8% vs. 20.1%, $P < 0.005$), and weight loss (89.4% vs. 56.0%, $P < 0.002$). Hemoptysis and night sweats were significantly more frequent in patients with TB and HIV (Table 1). The records revealed that none of the patients with HIV infection was taking antiretroviral drugs because their HIV status had not been previously determined.

The cure rate for TB was 66.0% in patients with HIV-1 coinfection and 87.5% ($P = 0.001$) in patients without HIV-1 coinfection. Almost one-fourth of the patient with HIV-1 coinfection died before they completed their treatment (23.4%, 11/47), and the outcome

FIGURE 2. Age distribution of patients with tuberculosis who were HIV-positive or HIV-negative at the National Chest Hospital, Kingston, Jamaica, 1995–2001.
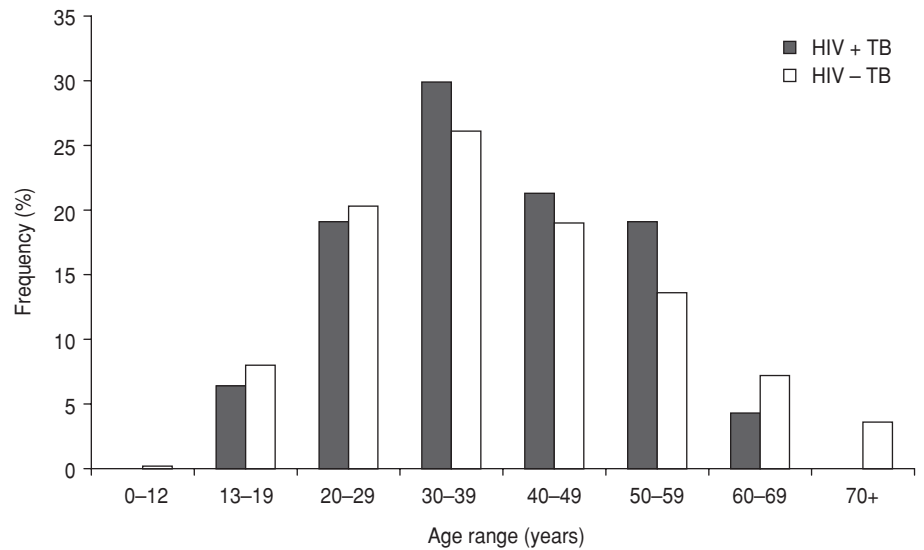

TABLE 1. Characteristics of patients with pulmonary tuberculosis (TB) with and without HIV infection at the National Chest Hospital in Kingston, Jamaica, 1995–2001

Characteristic	HIV-positive $n = 47$ No. (%)	HIV-negative $n = 359$ No. (%)	P value
Gender			
Male	36 (76.6)	254 (70.8)	
Female	11 (23.4)	105 (29.2)	<0.001
Median age (years)	39 (range 17–69)	36 (range 3–87)	
Major clinical signs and symptoms			
Productive cough	36 (76.6)	296 (82.5)	Not significant
Dry cough	22 (46.8)	72 (20.1)	<0.005
Hemoptysis	8 (17.0)	198 (55.3)	<0.001
Fever	42 (89.4)	248 (69.1)	<0.001
Night sweats	18 (38.3)	195 (54.3)	0.02
Weight loss	42 (89.4)	201 (56.0)	<0.002
Diarrhea	10 (21.3)	21 (5.8)	0.003
Drug regimen	Quadruple[a]	Quadruple[b]	
Treatment duration[c]	10.5 months (Range 9–15 months)	6 months (Range 4.3–8 months)	
Susceptibility test			
Isoniazid	1/38 (2.6)	1/40 (2.5)	
Rifampicin	1/30 (3.3)	2/50 (4.0)	
Ethambutol	0/20 (0)	0/30 (0)	
Pyrazinamide	0/25 (0)	0/30 (0)	
Outcome of TB infection			
Cured	31 (66.0)	314 (87.5)	<0.001
Died	11 (23.4)	14 (3.9)	<0.001
Unknown[d]	5 (10.6)	31 (8.6)	Not significant

[a] Includes isoniazid, rifampicin, ethambutol and pyrazinamide for two months, then isoniazid and rifampicin until cure.
[b] Includes isoniazid, rifampicin, ethambutol, pyrazinamide or streptomycin for two months, then isoniazid and rifampicin until cure.
[c] Average period of time on antituberculosis treatment to achieve cure (24).
[d] Patients for whom no records were available and who may have defaulted on treatment, or who were lost to follow-up.

of TB treatment was not known in 10.6% (5/47). Among patients without HIV-1 coinfection, 3.9% (14/359) died and the outcome of TB treatment was not known in 8.6% (31/359). The average duration of treatment to achieve cure of TB in patients with HIV-1-coinfection was 10.5 months.

During the study period, mortality was 23.4% (11/47) among patients with TB and HIV-1 coinfection, and 3.9% (14/359) among patients without HIV coinfection ($P < 0.001$). No cases of multidrug-resistant TB were observed among patients with HIV-1 coinfection. Susceptibility testing of *M. tuberculosis* isolates from patients with HIV coinfection showed that 2.6% (1/38) and 3.3% (1/30) were resistant to isoniazid and rifampicin, respectively, versus 2.5% (1/40) and 4.0% (2/50) in patients without HIV-1 coinfection. All isolates tested were sensitive to ethambutol and pyrazinamide.

DISCUSSION

According to the new UNAIDS and WHO policy released in June 2004, diagnostic HIV testing is indicated whenever a person shows signs or symptoms that are consistent with an HIV-related disease or AIDS. This means that HIV testing is advisable for patients with TB as part of their routine management, and the new policy in fact provides a mandate to expand testing among TB patients (13). This policy, however, was not in effect for the management of patients with TB at the National Chest Hospital during the study period. Patients were not routinely tested for HIV-1 infection, hence the diagnosis of HIV infection in these patients was an incidental finding. This of course meant that in clinical terms the early diagnosis of HIV infection was not made, and patients were not started on early antiretroviral therapy or highly active antiretroviral therapy (HAART), which has been shown to improve the condition of patients with HIV infection (14).

Several published reports show rates of seroprevalence of HIV among patients with TB to be highly variable (15–17). The 11.5% prevalence HIV-1 coinfection observed in this cohort of Jamaican patients with pulmonary TB at the National Chest Hospital is similar to other estimated rates of HIV positivity in patients with TB in other countries in the region, as well as in some countries with a high TB burden, as summarized in Table 2 (18–21). The prevalence of pulmonary TB in Jamaica may be lower than elsewhere. This probably is due to the effective public health program for TB that includes hospitalizing patients with active disease, instituting prompt and adequate treatment, active contact tracing, effective follow-up and an effective policy of *M. bovis* bacilli Calmette-Guérin (BCG) immunization against *M. tuberculosis*. (However, BCG provides only limited protection against TB and so cannot on its own control the disease.)

There was a relatively high prevalence of HIV+TB in the 30- to 39-year-old group, and the prevalence of TB without HIV coinfection was also highest in this age group. Previous studies have also reported the highest prevalence of HIV infection and TB in this age group (16, 22, 23). In this study of Jamaican patients, the prevalence of TB with and without HIV coinfection was higher in men than in women, and this is consistent with other studies (19, 22–24). The significantly increased mortality in patients with pulmonary TB and HIV coinfection supports previous reports that most deaths among patients who receive effective antituberculosis therapy are due to complications of HIV infection rather than to TB itself (25, 26). Productive cough, fever, weight loss and diarrhea were prevalent symptoms in patients with TB and HIV confection, and these symptoms appear to be indicators that should raise the suspicion of this clinical condition.

The rate of multidrug resistance was low among patients with TB, and this can probably be attributed to appropriate and effective practices of direct observed treatment at the hospital and after discharge. According to WHO definitions of the cure of TB, the average time to cure is longer in patients with HIV positivity than in patients without coinfection (27). The difference in cure rate between the two groups of patients we compared was indeed significant. Prompt diagnosis of HIV infection and early institution of HAART would possibly have made a larger difference.

A potential limitation of this study lies in the fact that this retrospective analysis may have been influenced by confounding factors. It is possible that not all patients diagnosed with TB

TABLE 2. Estimated rate of HIV coinfection in patients with tuberculosis in countries of the Caribbean and other developing countries, reported by WHO as of 31 May 2005[a]

Country	Percentage rate of HIV coinfection in patients with tuberculosis
Bahamas	16
Belize	14
Brazil	3.8
Ethiopia	21
Guyana	13
Haiti	29
Honduras	9.5
Jamaica (from present study)	11.6
Mexico	1.7
Nigeria	27
Trinidad and Tobago	19
Venezuela	4.1

[a] Compiled from WHO reports (20, 21).

were tested for HIV infection, and incomplete patient records might also have affected the data.

In conclusion, we note with concern the high mortality among patients with TB and HIV coinfection. Mortality could be reduced by early HIV-1 testing and prompt diagnosis, and by early antiretroviral treatment instituted along with the antituberculosis regimen. The prevalence rate of HIV coinfection in patients with TB, along with the rise in HIV infection in Jamaica and in the region as a whole,

calls for a concerted effort to implement a clear-cut plan to establish, on both a national and international level, the necessary infrastructure and resources to control the double-edged sword of TB and HIV infection. This situation is likely to be addressed by the National HIV/AIDS Prevention and Control Project, which has made both testing and treatment of HIV/AIDS in Jamaica more accessible.

We would like to point out the lack of good-quality surveillance data on TB prevalence and HIV coinfection

in most Caribbean countries like Jamaica. This may be hampering our ability to design and run potentially effective programs to expand access to antiretroviral treatment, and there is a need for prospective studies in this area.

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RESUMEN

Prevalencia del virus de la inmunodeficiencia humana en pacientes con tuberculosis pulmonar del National Chest Hospital en Jamaica

Objective. El presente estudio se efectuó para determinar la prevalencia del virus de la inmunodeficiencia humana tipo 1 (VIH-1) en pacientes con tuberculosis pulmonar del National Chest Hospital en Jamaica.

Métodos. En este estudio retrospectivo se revisaron los expedientes hospitalarios de 537 pacientes ingresados a lo largo de un período de siete años, de 1995 a 2001. Utilizamos un formulario uniformado para obtener los datos relacionados con las características sociodemográficas; los rasgos, signos y síntomas clínicos; el diagnóstico de laboratorio; el tratamiento administrado, y los resultados observados.

Resultados. Encontramos que 11,6% (47/406) de los pacientes que satisfacían los criterios de inclusión y a quienes se les había diagnosticado tuberculosis pulmonar tenían seropositividad al VIH-1. La mayoría de los pacientes tuberculosos con positividad a VIH eran de sexo masculino, y la mayor prevalencia de infección simultánea con VIH en pacientes tuberculosos se observó en personas entre los 30 y 39 años de edad. La tasa de mortalidad en pacientes con tuberculosis e infección por VIH fue de 23,4% (11/47), en comparación con 3,9% (14/359; *P* = 0,001) en pacientes sin infección por VIH. A los pacientes se les administró el tratamiento estándar con cuatro medicamentos. No se observó ninguna resistencia en las cepas aisladas de *Mycobacterium tuberculosis*.

Conclusiones. En Jamaica la prevalencia de VIH en pacientes con tuberculosis es parecida a la observada en otros países en desarrollo, pero la tasa de mortalidad en estos pacientes es mayor. Por lo tanto, es imprescindible diagnosticar la infección por VIH en etapa temprana e iniciar de inmediato el tratamiento antirretrovírico de gran actividad.

Palabras clave Tuberculosis; VIH; prevalencia; síntomas; mortalidad; hospital; Jamaica.

ERRATA

Culqui DR, Grijalva CG, Reategui SR, Cajo JM, Suárez LA. Factores pronósticos del abandono del tratamiento antituberculoso en una región endémica del Perú.
***Rev Panam Salud Publica.* 2005;18(1):14–20.**

La redacción llama la atención de los lectores a dos errores en la versión publicada del artículo señalado.

Primera nota al pie de la página 14: la dirección electrónica correcta del primer autor, Dante Roger Culqui, no es dculqui@hotmail.com, sino dculqui@oge.sld.pe

Cuadro 2, parte superior de la p. 18: se ha publicado una versión equivocada del cuadro. La versión correcta es la siguiente:

CUADRO 2. Factores e indicadores del riesgo de abandono del tratamiento antituberculoso. Ica, Perú, 1998–2000

Indicador	Análisis unifactorial			Análisis multifactorial		
	RP	IC95%	*P*	RP	IC95%	*P*
Ambiente						
Escolaridad inferior a secundaria completa	3,83	1,65–8,98	0,001	2,43	0,90–6,57	0,081
Considera excesivo el gasto para acudir al tratamiento	3,43	0,79–20,57	0,063	4,38	0,84–22,71	0,079
Refiere tener una relación conflictiva en casa	5,94	1,17–57,54	0,014	4,76	0,78–28,88	0,090
Vive lejos del establecimiento de salud	1,76	0,70–4,52	0,185	2,77	0,93–8,21	0,066
Servicios de salud						
Considera deficiente la información proporcionada	3,71	1,62–8,55	0,001	3,04	1,15–8,02	0,025
Considera inadecuados los horarios del programa	9,94	2,10–92,59	0,001	7,51	1,29–43,86	0,025
No tuvo el tiempo necesario para acudir al tratamiento	2,83	0,98–8,85	0,032	1,25	0,33–4,66	0,743
Modo de vida						
Consume alcohol	2,27	0,96–5,46	0,042	2,41	0,88–6,59	0,086
Consume drogas ilícitas	5,39	1,35–30,87	0,006	4,79	1,02–22,55	0,047