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Impact of human immunodeficiency virus type-1 infection on the initial bacteriologic and radiographic manifestations of pulmonary tuberculosis in Uganda

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SUMMARY

SETTING: TB Treatment Centre, Kampala, Uganda.

OBJECTIVE: To evaluate the impact of human immunodeficiency virus (HIV) co-infection on the bacteriologic and radiographic presentation of pulmonary tuberculosis (TB) in Uganda, a nation with high rates of *Mycobacterium tuberculosis* and HIV infection.

DESIGN: To compare baseline characteristics among HIV-infected and non-HIV-infected adults with initial newly-diagnosed episodes of culture-confirmed pulmonary TB screened for participation in a randomized prospective TB treatment trial.

RESULTS: Negative and paucibacillary (very scanty or scanty) sputum acid fast bacilli (AFB) smears were more frequent in HIV-infected patients presenting with pulmonary TB ($P = 0.007$). More HIV-infected individuals also had sputum cultures that required 7–8 weeks incubation until positivity than non-HIV-infected patients ($P < 0.01$). Lower lung field and diffuse pulmonary infiltrates were more frequent among HIV-infected patients. Rates of atypical X-ray presentations and cavitary disease were comparable between HIV-seropositive and -seronegative patients; however, atypical disease was more frequent in HIV-infected patients with small tuberculin reactions or tuberculin anergy (PPD = 0 mm).

CONCLUSION: HIV co-infection was associated with a higher frequency of negative and paucibacillary sputum AFB smears. The differences in the diagnostic yields of microscopy and culture between HIV-infected and non-HIV-infected individuals were small and do not, in our opinion, significantly affect the utility of these important diagnostic tests in developing countries. Examining more than one sputum specimen and monitoring cultured specimens for a full 8 weeks may assist in optimizing the diagnostic yield. Upper lobe infiltrates and cavitary disease are still the most frequent radiographic presentations of pulmonary TB in HIV-infected and non-HIV-infected adults in countries with a high prevalence of TB.

KEY WORDS: HIV; AIDS; tuberculosis; diagnosis; microscopy; radiography

THE INTERACTION of *Mycobacterium tuberculosis* and human immunodeficiency virus type 1 (HIV-1) infection has resulted in a rapid escalation in the number of tuberculosis (TB) cases in sub-Saharan Africa. The profound immunosuppression resulting from HIV infection confers the greatest risk known for the reactivation of latent tuberculous infection and the progression of recent tuberculous infection to active TB.[1] In recent studies from Uganda, the prevalence of HIV infection among newly diagnosed TB patients has ranged from 58–67%.[2,3]

In developing countries, sputum microscopy and chest radiography are the most inexpensive and widely used methods for the diagnosis of TB. Several investigators have reported decreased rates of sputum acid fast bacilli (AFB) smear positivity in HIV-infected patients with TB.[4–10] Atypical chest radiographic manifestations such as lower lobe infiltrates, non-cavitary disease, and intrathoracic lymphadenopathy were more frequent among HIV-infected individuals with TB.[5,11–15] Patients with these findings are often treated empirically with multiple courses of broad spectrum antibiotics for pyogenic pneumonia, and the correct diagnosis of TB is delayed.

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Lowered sensitivity of sputum AFB smears and decreased specificity of chest X-ray findings for TB among HIV-infected persons may adversely affect TB control programmes, especially those in developing countries where the primary emphasis is the rapid detection and treatment of new infectious smear positive cases. In this study we examined the impact of HIV co-infection on the initial radiographic and microbiologic presentation of pulmonary TB in Uganda, a nation with high rates of HIV and TB infection.

MATERIALS AND METHODS

Subjects and recruitment

Four hundred and ten adults with suspected active pulmonary TB presenting to the National Tuberculosis Treatment Centre at Mulago Hospital in Kampala, Uganda, between May 1990 and September 1991, were evaluated for enrollment into a prospective randomized clinical trial comparing the safety and efficacy of rifampicin and thiacetazone-containing regimens for the treatment of pulmonary TB in HIV-infected adults.[16] The TB Treatment Centre is the principal facility providing in-patient and out-patient TB care in Kampala. This report describes the bacteriological and radiographic presentations of pulmonary TB among non-HIV-infected and HIV-infected individuals screened for this study.

The study protocol was approved by the institutional review boards of Makerere University, Case Western Reserve University, and University Hospitals of Cleveland. Informed consent was obtained from all subjects.

Measurements

Recruitment and follow-up procedures for the study have been described earlier.[16] HIV infection status was assessed by enzyme immunoassay (EIA) (Recombigen HIV-1 EIA, Cambridge BioScience, Cambridge, MA, USA) with confirmatory Western immunoblot testing (Novapath, BioRad Laboratories, Hercules, CA, USA). Hemoglobin was measured by colorimetry and manual total and differential white blood cell counts were performed. All subjects underwent Mantoux skin testing using five tuberculin units of purified protein derivative (PPD) (Tubersol, Connaught Laboratories, Willowdale, Ontario, Canada).

Sputum microscopy and culture

Sputum AFB smear grade, the number of colonies of *M. tuberculosis* and time until positive culture were used as measures of the bacillary burden of each patient. At least three sputum specimens (preferably early morning spot collections) were requested from each TB suspect. Sputum specimens were digested with 4% NaOH and concentrated by centrifugation. The sedimented pellet was stained for AFB by Ziehl-Neelsen and auramine methods and inoculated onto Löwenstein-Jensen slants. AFB smears were graded on a scale from zero to 4+ by the number of AFB visible on light microscopy (1000×).[17] Cultures were incubated at 37°C in air and examined weekly until positive or for a maximum of eight weeks. Growth was quantified according to the number of visible colonies: 1+ (0–20 colonies; reported as the number of colonies); 2+ (21–100 visible colonies); 3+ (>100 colonies; individual distinguishable colonies); and 4+ (confluent growth). Isolates were confirmed as *M. tuberculosis* if the organism was nitrate (+), niacin (+), had typical colonial morphology, and growth on Middlebrook 7-H10 agar was not inhibited by 5% thiophencarboxylic acid hydrazide. When results from multiple sputum specimens for an individual patient were available, the highest grade AFB smear and culture and the shortest period of time after inoculation of the specimen until visible colonies were present for any positive culture were used in the analysis.

Drug susceptibility testing

Sensitivity tests to isoniazid (INH), streptomycin, thiacetazone, rifampicin, and ethambutol were performed using standard methods[18] on Löwenstein-Jensen medium slopes containing INH 0.2 μg/mL and 1.0 μg/mL, streptomycin 10 μg/mL, rifampicin 40 μg/mL, ethambutol 5.0 μg/mL, and thiacetazone 4.0 μg/mL. Control slopes using the standard sensitive strain H37RV were set up for each batch of tests. Slopes were incubated at 37°C for 3–4 weeks before final reading. The definition of resistance was obtained by comparing the cumulative distributions for strains from the study patients with distributions of the sensitive and resistant control strains.[18]

Chest radiography

Posteroanterior chest X-rays were interpreted using a standard protocol to record the pattern of involvement, extent of disease, and specific findings. The extent of disease was graded as normal, minimal, moderately advanced or far advanced disease.[19] The extent of disease was also assessed by a total zone score representing the number of intrathoracic regions (out of six) involved by any lesion. Lower lung field involvement was defined as the presence of disease below a line drawn between the pulmonary hili. Cavitation was defined as the presence of radiolucent areas greater than 1 cm in diameter surrounded by infiltrate or fibrosis. The pattern of disease was classified as typical TB if upper lung field infiltrates or cavities were present with or without lower lung field infiltrates or pleural effusion. Chest X-rays were classified as atypical if infiltrates, including cavities, were present predominantly in the lower lung fields, if there was intrathoracic adenopathy, if miliary disease was present, or if the chest X-ray was normal.

Statistical analysis

Patients were stratified into groups by HIV infection status. Reactivity to PPD, the presence of BCG vaccination scars, and bacteriologic and radiographic findings were compared between the two groups. Data were analyzed using Epi Info 5.0 and SAS version 6.11 statistical software packages. Comparisons between groups were made using the χ^2 and Fisher's exact tests. A level of significance of 5% was used to reject the null hypothesis in all analyses. All statistical tests were two-tailed.

RESULTS

Exclusions

Of 410 patients screened for the randomized drug efficacy study, 253 (67%) were HIV-1-infected and 125 (33%) were non-HIV-infected. Eighty-seven subjects with unavailable (n = 31) or indeterminate (n = 1) HIV infection status, or for whom all sputum cultures were negative (n = 41), contaminated (n = 6) or results were unavailable (n = 8), were excluded from further analysis.

Demographic, clinical, and laboratory characteristics

Baseline demographic and clinical characteristics of the 323 patients with culture-confirmed pulmonary TB and known HIV serostatus are presented in Table 1. The mean age of the subjects (30.0 ± 9 years) did not differ by HIV serostatus (30.3 ± 8 years—HIV-infected vs. 29.4 ± 10 years—non-HIV-infected); 70% of HIV-infected and 69% of non-HIV-infected subjects were males.

The clinical presentation of HIV-infected and non-HIV-infected individuals was similar. The majority of TB suspects had symptoms for two or more months before seeking medical attention. Chronic cough with sputum production, pleuritic chest pain, night sweats, weight loss, and fever were the most frequent presenting complaints. Total white blood cell and absolute lymphocyte counts were decreased in HIV-infected patients compared to non-HIV-infected individuals (Table 1).

In total 95% of non-HIV-infected and HIV-infected patients completed PPD skin testing; 96 % of the non-HIV-infected patients had tuberculin reactions greater than 5 mm, compared to 70% of HIV-infected individuals (odds ratio [OR] = 10.9; 95% confidence interval [CI] 4.6–26.3). Cutaneous anergy (PPD = 0 mm) also was more frequent among HIV-infected TB patients (Table 1) (OR = 10.3; 95% CI 4.3–24.8).

Sputum microscopy and culture

A total of 858 AFB smear and culture results were available for review (mean 2.7 specimens per subject). Eight, 22, 65, and 5% of subjects had one, two, three or four pre-treatment specimens examined, respectively. There were no differences between the proportions of HIV-infected and non-HIV-infected individuals with one, two, three or four sputum specimens examined. All isolates were identified as *M. tuberculosis*. Fifty-nine (6.9%) cultures from 52 patients were contaminated.

Table 1 Baseline characteristics of 212 HIV-infected and 111 non-HIV-infected patients with initial episodes of culture-confirmed pulmonary tuberculosis

	HIV-infected (n = 212) n (%)	Non-HIV-infected (n = 111) n (%)	P value
Age (years)			
15–30	131/212 (62)	67/111 (60)	0.80*
31–59	81/212 (38)	44/111 (40)	
Male sex	149/212 (70)	77/111 (69)	0.86
PPD (mm. induration)†			
0	59/208 (28)	4/107 (4)	<0.001*
1–4	3/208 (1)	0/107 (0)	
5–14	51/208 (25)	32/107 (30)	
≥5	146/208 (70)	103/107 (96)	
≥15	95/208 (46)	71/107 (66)	
BCG scar present‡	94/209 (45)	37/107 (35)	0.06
Total WBC count ($\times 10^9$/L)§	7.0 ± 3.1	8.5 ± 3.5	<0.001
Absolute lymphocyte count ($\times 10^9$/L)	1.9 ± 1.1	2.6 ± 1.1	<0.001
Hemoglobin (gm/dL)	11.1 ± 2.2	11.5 ± 2.5	0.25

* χ^2 for trend.
† PPD skin tests were recorded for 107 non-HIV-infected and 208 HIV-infected patients.
‡ BCG scar status was recorded for 107 non-HIV-infected and 209 HIV-infected patients.
§ Complete blood count and differential white blood cell counts were available for 196 HIV-infected and 90 non-HIV-infected patients.

Negative and paucibacillary (very scanty or scanty) sputum AFB smears were more frequent among HIV-infected patients (P = 0.007; χ^2 for trend = 7.2) (Table 2). These findings were unchanged if the data were analyzed using the results of the first sputum smear rather than the highest sputum smear grade for each patient. 174/197 (88%), 172/180 (96%) and 135/136 (99%) of HIV-infected patients with at least one positive smear were smear positive on the first, first or second, or first, second, and third sputum specimens examined, respectively, compared to smear positivity rates of 102/109 (94%), 98/99 (99%), and 76/76 (100%) for the first, first or second, or first, second, and third specimen, respectively, among non-HIV-infected individuals.

The number of visible colonies (including paucibacillary cases with less than 20 colonies) on culture also was lower among HIV-infected than non-HIV-infected individuals (P = 0.02; χ^2 for trend = 5.5) (Table 2). More HIV-infected individuals had sputum cultures requiring 7–8 weeks incubation until positivity than non-HIV-infected patients (10 [5%] vs. 0, respectively; P = 0.001; Fisher's exact test); however, the

Table 2 Presenting microbiological findings in 212 HIV-infected and 111 non-HIV-infected patients with initial episodes of culture-confirmed pulmonary tuberculosis

	HIV-infected (n = 212) n (%)	Non-HIV-infected (n = 111) n (%)
Highest sputum smear grade for all patients with at least one sputum culture positive for *M. tuberculosis*		
Negative	5 (2)	2 (2)
Very scanty	4 (2)	0
Scanty	6 (3)	0
Negative, v. scanty or scanty*	15 (7)	2 (2)
1+	36 (17)	9 (8)
2+	39 (18)	26 (23)
3+	122 (58)	74 (67)
Number of visible colonies on Löwenstein-Jensen medium†		
1–19 colonies	19 (9)	3 (3)
20–100 colonies	26 (12)	12 (11)
Innumerable colonies	70 (33)	33 (30)
Confluent growth	97 (46)	63 (57)
Time until visible colonies present on Löwenstein-Jensen medium		
1–2 weeks	25 (12)	12 (11)
2–4 weeks	158 (75)	90 (81)
5–6 weeks	19 (9)	9 (8)
7–8 weeks	10 (5)	0

* χ^2 for trend = 7.2, P = 0.007 using negative, v. scanty and scanty as reference group.
† χ^2 for trend = 5.5, P = 0.02.

median time until positive culture (3 weeks) was comparable between HIV-infected and non-HIV-infected subjects. These trends were still present but no longer statistically significant when the associations between HIV infection, sputum smear grade, number of colonies and time till positive culture were stratified for the presence of cavitary disease on initial chest X-ray (data not shown).

Drug susceptibility testing

Drug susceptibility testing to isoniazid, streptomycin, rifampicin, ethambutol and thiacetazone was performed on initial pretreatment sputum isolates or isolates obtained during the first month of anti-TB chemotherapy for 60 non-HIV-infected and 191 HIV-infected subjects (Table 3). Of the 251 patients, 167 (67%) had isolates that were susceptible to all drugs tested, and 51 patients had isolates with resistance to one (27 [20%]) or more than one drug (24 [10%]). Rates of resistance to one or more than one drug did not differ between HIV-infected and non-HIV-infected individuals.

Chest radiography

The initial chest X-ray findings in all patients with culture-confirmed pulmonary disease who had a chest X-ray available taken within 30 days of the onset of TB treatment (178 HIV-infected and 84 non-HIV-infected individuals) were analyzed (Table 4). The majority of patients presented with moderately advanced or far advanced disease. The number of lung zones involved by disease on chest X-ray (4.1 ± 1.5 vs. 3.6 ± 1.3 lung zones, respectively), and the proportion of individuals with less than two or three or more lung zones involved by disease were comparable between HIV-infected and non-HIV-infected subjects.

Atypical radiographic patterns were more frequent among HIV-infected than non-HIV-infected individuals (34% vs. 23%, respectively) (Table 4); however, the difference was not statistically significant. The likelihood of presenting with an atypical X-ray pattern decreased with increasing size of the PPD reaction among HIV-infected (P = 0.007; χ^2 for trend = 7.2) and non-HIV-infected individuals (P = 0.046; χ^2 for trend = 4.0) (data not shown). Diffuse pulmonary infiltrates involving all lung fields were present in 24% of HIV-infected individuals compared to 8% of non-HIV-infected patients (P = 0.008) (Table 4) and were more frequent among HIV-infected TB patients with PPD reactions less than 5 mm (data not shown). Lower lung field infiltrates were the only specific radiographic finding that was significantly

Table 3 Resistance to isoniazid, streptomycin, rifampicin, ethambutol or thiacetazone among 251 patients with pulmonary tuberculosis

Resistance pattern	HIV-infected patients (n = 191) n (%)	Non-HIV-infected patients (n = 60) n (%)	Total patients (n = 251) n (%)	P value*
Resistant to isoniazid	11 (6)	2 (3)	13 (5)	0.62
Resistant to streptomycin	27 (14)	3 (5)	30 (12)	0.04
Resistant to rifampicin	7 (4)	2 (3)	9 (4)	0.55
Resistant to ethambutol	3 (2)	0	3 (1)	0.36
Resistant to thiacetazone	48 (25)	10 (17)	58 (23)	0.20
Sensitive to all drugs tested	123 (64)	44 (73)	167 (67)	0.20
Resistant to one drug	39 (20)	12 (20)	51 (20)	0.94
Resistant to more than one drug	22 (12)	2 (3)	24 (10)	0.06
Resistant to isoniazid and streptomycin	9 (5)	2 (3)	11 (4)	0.65
Resistant to isoniazid and rifampicin	3 (2)	1 (2)	4 (2)	0.96

* χ^2 or Fisher's exact text; HIV-infected vs. non-HIV-infected patients.

Table 4 Initial radiographic pattern and extent of disease among 262 patients with culture-confirmed pulmonary tuberculosis

	HIV-infected (n = 178) n (%)	Non-HIV-infected (n = 84) n (%)	P value
Pattern of disease			
Typical	118 (66)	65 (77)	0.07*
Atypical	60 (34)	19 (23)	
Extent of disease			
Mild	4 (2)	3 (4)	0.03†
Moderately advanced	42 (24)	30 (36)	
Far advanced	132 (74)	51 (61)	
Lung zones involved by lesions			
0–2 zones	33 (19)	16 (19)	0.05†
3–5 zones	100 (56)	61 (73)	
All zones	42 (24)	7 (8)	

* χ^2 compared to non-HIV-infected patients.
† χ^2 for trend compared to non-HIV-infected patients.

more frequent among HIV-infected TB patients (P = 0.02) (Table 5).

DISCUSSION

TB is currently among the most frequent serious manifestations of HIV infection in Uganda, and constitutes a major public health problem because HIV-infected persons with active TB transmit TB to both non-HIV-infected and HIV-infected members of the community. Tuberculosis case rates have increased rapidly in Uganda and other sub-Saharan countries with high rates of HIV and tuberculosis infection.[20]

Discordant results have been reported concerning the sensitivity of sputum AFB smears among HIV-infected individuals with active TB. In studies from the USA, Haiti, Zambia, and Zaire,[4–10] the overall rate of sputum AFB smear positivity was significantly lower among HIV-infected than non-HIV-infected patients. Other investigators[11,21–23] were unable to confirm these findings. In this study we found that negative and paucibacillary smears were significantly more frequent among HIV-infected individuals; however, the difference between the groups was small.

In the pre-HIV era sputum smear positivity was correlated with the radiographic extent of disease and presence of cavitary disease. Cavity formation is the end result of local granuloma formation and necrosis with subsequent liquefaction and drainage of caseous material into the bronchial tree, and occurs only in the presence of reasonably intact specific delayed type hypersensitivity. Extracellular growth of tubercle bacilli is greatest in the liquefied material in cavitary lesions. Pulmonary TB in patients with advanced HIV-associated immunosuppression is characterized by diffuse infiltrates, a high tissue burden of mycobacteria in the lung, and poorly formed or absent granuloma formation and a lower frequency of cavitary disease.[11,12,24] Despite the decreased frequency of cavitary disease in patients with advanced AIDS and TB, it appears that sufficient numbers of AFB are shed into deep respiratory secretions to be detected by routine microscopy in the majority of HIV-infected adults with active TB.

We also found that atypical radiographic presentations of TB were more frequent in HIV-infected patients with lower tuberculin reactivity. Lower lobe non-cavitary infiltrates, findings likely to be confused with common bacterial pneumonia, were more frequent in HIV-infected individuals in our study population. Other findings reported to be more frequent in HIV-infected TB patients include non-cavitary

Table 5 Specific radiographic findings among patients with culture-confirmed pulmonary tuberculosis

Finding	HIV-infected (n = 178) n (%)	Non-HIV-infected (n = 84) n (%)	OR	95% CI	P value*
Upper lung field infiltrates†	156 (88)	78 (93)	0.6	0.2–1.4	0.20
Lower lung field infiltrates	167 (94)	71 (85)	2.8	1.2–6.3	0.02
Any cavitation	140 (79)	71 (85)	0.7	0.3–1.3	0.26
Hilar or mediastinal lymphadenopathy	92 (52)	53 (63)	0.6	0.4–1.1	0.08
Pleural effusion	35 (20)	9 (11)	2.0	0.9–4.4	0.07
Pleural thickening	16 (9)	26 (31)	0.2	0.1–0.4	0.001
Miliary disease	2 (1)	0	—	—	—

* χ^2 or Fisher's exact text; HIV-infected vs. non-HIV-infected patients.
† Categories not exclusive.

Table 6 Initial radiographic manifestations of pulmonary TB in HIV-infected individuals

Radiographic finding	Frequency (%)	Reference
Upper lung field infiltrates	16–59	(5, 13)
Mid and lower lung field infiltrates	15–49	(15, 27)
Cavitary disease	4–58	(6, 25)
Miliary disease	5–25	(15, 28)
Intrathoracic lymphadenopathy	25–48	(28, 29)
Pleural effusion	10–41	(26, 28)
Normal chest X-ray	5–14	(30, 11)
Atypical disease*	31–73	(11, 26)

* Definitions vary; predominantly mid and lower lung field infiltrates with and without cavitary disease and normal chest X-rays.

disease,[11,12,14,15,24] intrathoracic lymphadenopathy,[5,12,13,15,25,26] miliary disease,[26] pleural disease,[13,15,24] pericardial disease,[24] and normal chest X-ray.[15] In the current study, we found that the frequency of hilar or mediastinal lymphadenopathy was higher among non-HIV-infected than HIV-infected patients; however, the difference between the groups was not statistically significant.

The frequency of 'atypical' presenting findings reported has varied greatly between studies (Table 6).[11,26] The radiographic manifestations of pulmonary TB in HIV-infected individuals are highly correlated with the degree of immunosuppression related to the stage of HIV infection.[31,32] HIV-infected adults residing in or immigrating from areas with a high prevalence of TB usually become infected with TB in childhood prior to becoming HIV-infected. In high TB prevalence areas such as Uganda, where *M. tuberculosis* infection frequently precedes HIV infection, many individuals with active TB present earlier in the course of HIV infection with upper lobe fibrocavitary lesions typical of reactivation TB and intact tuberculin reactivity. This is in contrast to industrialized nations, where the prevalence of *M. tuberculosis* infection before HIV infection is low and atypical presentations of TB are more frequent. Most of the differences between reports of the presentations of pulmonary TB in HIV-co-infected adults can be explained by these three factors: the local prevalence of TB infection, which infection (TB or HIV) occurred first, and the degree of HIV-associated immunosuppression at the time active TB develops. As noted by Pitchenik and Fertel, prospective studies select individuals at the time of TB diagnosis and are, therefore, more likely to include TB cases occurring in less immunosuppressed patients in the earlier stages of HIV infection.[33] Exogenous reinfection of HIV-infected adults with progressive primary TB may also be a contributing factor in the presenting features of tuberculosis, especially in areas of high TB transmission.

Our study has several important limitations. First, while the TB clinic from which our patients were screened is a large public TB clinic, the patients who present or are referred there may not be representative of all TB patients in Uganda. Our data were obtained during the screening phase of a large prospective TB treatment trial. The patients screened for the parent study were ambulatory and less likely to be severely immunosuppressed. Whereas the selection of individuals for screening for the parent drug efficacy trial was targeted towards more symptomatic individuals with productive cough, who were more likely to be sputum AFB smear positive and have radiographically advanced disease, individuals were selected for screening without prior knowledge of HIV serostatus or radiographic and microbiologic status. The HIV seroprevalence rate among patients screened for this study (66%) was comparable to the 67% HIV-1 seroprevalence rate among consecutive individuals with pulmonary TB examined in an earlier cross-sectional study performed at the same site.[3]

We found small but statistically significant differences in the frequency of negative and paucibacillary sputum smears and lower lung field infiltrates between HIV-infected and non-HIV-infected Ugandan adults; however, the majority of the patients we studied presented with positive sputum smears and upper lobe infiltrates. Eighty percent of our patients, regardless of HIV infection status, had visible pulmonary cavitation. Although this finding may reflect a more preserved immune response in many of the study subjects, without CD4 lymphocyte counts it is not possible to further assess the degree of immunosuppression in these subjects.

Differences in the bacteriologic presentation of TB between HIV-infected and non-HIV-infected individuals in our study were minor. We concur with Long et al. that HIV co-infection does not significantly compromise the value of sputum microscopy for the diagnosis of TB in developing countries with a high prevalence of TB.[7] Sputum microscopy is the recommended initial laboratory evaluation for the diagnosis of TB due to its high specificity and positive predictive value,[34] and ability to identify infectious smear positive cases. Chest X-ray findings may be less specific in HIV-infected adults, especially those with advanced immunosuppression; however, typical features consistent with reactivation TB are frequent in HIV-infected patients in high TB prevalence areas and are useful supportive findings. Examination of multiple specimens significantly enhances the yield of sputum microscopy for the diagnosis of TB,[6,35,36] and should be performed whenever the clinical suspicion of tuberculosis is high, regardless of the radiographic findings.

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RÉSUMÉ

CADRE : Le Centre de Traitement de la Tuberculose à Kampala, Ouganda.

OBJECTIF : Evaluer l'impact de la co-infection par le virus de l'immunodéficience humaine (VIH) sur la présentation bactériologique et radiologique de la tuberculose en Ouganda, un pays où les taux d'infection par *Mycobacterium tuberculosis* et par VIH sont élevés.

SCHÉMA : Comparer les caractéristiques de base des adultes, infectés ou non par le VIH, et présentant une tuberculose pulmonaire de première atteinte récemment diagnostiquée et confirmée par la culture ; ces adultes étaient examinés en vue de leur participation à un essai prospectif et randomisé de traitement de la tuberculose.

RÉSULTATS : Les examens directs de l'expectoration négatifs ou paucibacillaires (bacilles très rares ou rares) s'avèrent plus fréquents chez les patients infectés par le VIH et se présentant avec une tuberculose pulmonaire ($P = 0{,}007$). Les cultures d'expectorations nécessitant une incubation de 7 à 8 semaines avant la positivité s'avèrent plus fréquentes chez les sujets infectés par le VIH que chez les non-infectés ($P < 0{,}01$). Les infiltrats affectant les champs pulmonaires inférieurs et les infiltrats pulmonaires diffus sont plus fréquents chez les sujets infectés par le VIH. Les taux de présentation radiologique atypique et de maladie cavitaire sont comparables entre les sujets VIH (+) et VIH (−) ; toutefois, les maladies atypiques sont rencontrées plus fréquemment chez les sujets VIH (+) dont le test tuberculinique est faiblement positif ou même négatif (PPD = 0 mm).

CONCLUSION : La co-infection par le VIH va de pair avec une fréquence plus élevée d'examens directs de l'expectoration négatifs ou paucibacillaires. Les différences dans les rendements diagnostiques de la microscopie et de la culture entre les sujets VIH (+) et VIH (−) sont faibles et n'influencent pas à notre avis de façon significative l'intérêt de ces tests importants de diagnostic dans les pays en développement. Le rendement diagnostique peut être optimisé par l'examen de plus d'un échantillon de crachat et par le suivi des cultures pendant 8 semaines entières. Les infiltrats des lobes supérieurs et les cavités sont toujours les présentations radiologiques les plus fréquentes de la tuberculose pulmonaire chez les adultes des pays à haute prévalence de tuberculose, qu'ils soient ou non infectés par le VIH.

RESUMEN

MARCO DE REFERENCIA : Centro de tratamiento de la tuberculosis (TB), Kampala, Uganda.

OBJETIVO : Evaluar el impacto de la coinfección con el virus de la inmunodeficiencia humana (VIH) en la bacteriología y la presentación radiográfica de la tuberculosis pulmonar en Uganda, un país con índices altos de *Mycobacterium tuberculosis* e infección por VIH.

MÉTODO : Comparar las características de base de los adultos con y sin infección por VIH que presentan episodios de tuberculosis pulmonar reciente, con cultivo positivo, seleccionados para participar en un ensayo terapéutico al azar y prospectivo.

RESULTADOS : Los pacientes con TB pulmonar infectados por VIH tenían con más frecuencia exámenes microscópicos directos negativos o paucibacilares (bacilos muy escasos o escasos) ($P = 0{,}007$). Los pacientes positivos al VIH tenían con mayor frecuencia esputos que requerían de 7 a 8 semanas de incubación para la positividad de los cultivos en comparación con los pacientes negativos al VIH ($P < 0{,}01$). Las lesiones pulmonares de la base e infiltrados difusos eran más frecuentes entre los pacientes infectados por VIH. Los índices de presentación radiológica atípica y las cavidades eran comparables entre los pacientes VIH-positivos y -negativos ; sin embargo, la enfermedad atípica era más frecuente en los pacientes VIH-positivos con reacciones tuberculínicas pequeñas o con anergia (PPD = 0 mm).

CONCLUSIÓN : La coinfección con VIH estaba asociada con una mayor frecuencia de esputos negativos o paucibacilares. Las diferencias en el rendimiento diagnóstico de la baciloscopía directa y del cultivo entre los infectados por VIH y los no infectados eran pequeñas, y según nuestra opinión no afectan significativamente la utilidad de estos medios diagnósticos en los países en desarrollo. El examen de más de una muestra de esputos y el control del cultivo durante 8 semanas pueden ayudar para mejorar el diagnóstico. Los infiltrados en los lóbulos superiores y las cavidades siguen siendo las presentaciones radiográficas más frecuentes en la TB pulmonar en los pacientes adultos VIH-positivos y VIH-negativos en los países con alta prevalencia de TB.