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The Epidemiology of HIV and AIDS Among Central American, South American, and Caribbean Immigrants to Houston, Texas

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A retrospective study with respect to demographics and clinical parameters was conducted of all HIV/AIDS patients born in Central America, South America, and the Caribbean region, presenting to the Harris County Hospital District (public facilities) between 1994 and 1998. The original case definition criteria were fulfilled by 240 patients, 168 (70.0%) of whom were from Central America (including Panama), 42 (17.5%) of whom were from the Caribbean, and 30 (12.5%) of whom were from South America. The Central America group contained the highest proportion of women (37.5% compared with 20.8% among the group from the Caribbean and South America, $P = 0.01$, chi-square). The mean age was significantly lower among those born in Central America (32.4 vs. 38.8 for those born in the other two areas). The most commonly observed opportunistic infections were toxoplasmosis (14.8%), pneumocystosis (19.9%), and tuberculosis (12.1%). These data confirm the distinct epidemiologic parameters among Central American residents compared to the non-Central American populations as the Central American patients present with HIV infection to our health care system at a younger age and are more often women. The high rate of toxoplasmosis, pneumocystosis, and tuberculosis among those immigrants from the areas assessed in this study are a reminder of the need for intensified prophylaxis against these infections when working with patients from these populations.

KEY WORDS: HIV; AIDS; immigrants; epidemiology.

INTRODUCTION

Houston, as in many large cities in the United States, is seeing increasing numbers of immigrants from many parts of the world. Because of its history and location, Houston had at its inception a large population of Mexican-born citizenry, but in the last decades it has experienced a larger influx of immigrants from Central and South America, and the Caribbean. The HIV-1 prevalence is higher for several countries of birth than it is for the United States (specifically, Belize, Honduras, and Guatemala whose rates of 2.01, 1.92, and 1.38%, respectively, are higher than the 0.61% for the United States, among adults 15–64). Thus it is anticipated that HIV and its associated opportunistic infections will be higher among certain immigrant populations, although comparisons of data do not permit easy deductions about the site of HIV acquisition among many immigrants. It is well established that the rates for several infectious diseases besides HIV are higher among immigrant populations and that the frequency of HIV-associated opportunistic infections varies greatly by geography (also see Refs. 1–5). Hence it is anticipated that a high and perhaps unique spectrum of opportunistic illnesses will be present among immigrant populations to Houston. In this analysis we use data from the county health care system in Houston, because many

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immigrants tend to utilize this system and because of the relative ease of access to these large databases. The Harris County Hospital District (HCHD) consists of two major hospitals and many clinics throughout the city of Houston. In the end, we hope to firmly delineate the epidemiology of HIV infection and AIDS among Latin American and Caribbean immigrants to Houston.

METHODS

Case-patients were ascertained through a review of computer-generated records based on birthplace of patients born in the nations of Central America, South America, and the Caribbean of all cases of HIV infection and AIDS treated in HCHD between January 1994 and December 1998. The records for all case-patients were analyzed with respect to demographic data, relevant HIV data including dates of presentation and dates of most recent follow-up, types of opportunistic infections, degree of immunosuppression (based on CD4 counts on presentation, most recent values and maximum and minimum values), and self-acknowledged residency status on presentation to hospital and clinic facility clerks. Data were compared with the data reported for Harris County when available, and analyzed using STATA, incorporating chi-square, Fisher's exact, Kruskal–Wallis tests, and the binomial test for proportions as appropriate.

Mexican patients were counted but not analyzed further for two reasons. First, the large foreign national population from Mexico in Houston does not reflect as accurately recent patterns of immigration as do the populations from other Latin American nations. Second, data on Mexican patients were not available at the time of analysis. The number of patients born in Mexico during the same time period was counted and corrected by 9%, the rate of coding errors recognized among the other studied populations.

RESULTS

A total of 240 patients in the databank fulfilled the criteria of the original definition. However, 20 patients did not have further supportive documentation toward the diagnosis or treatment. There were 220 case-patients with HIV/AIDS treated in HCHD, with origins in Central America (151), South America (41), the Caribbean region (28). The largest absolute numbers of cases were seen among immigrants from Honduras (77 or 35.0%), El Salvador (46 or 20.9%), Colombia (21 or 9.5%), and Guatemala and Puerto Rico (13 each, 5.9%). By contrast, Mexico by the same criteria provided an estimated 470 patients, 68.1% of all Latin American and Caribbean patients. An undocumented status was reported by 84 of 178 (47.2%) patients with reported data, a percentage higher among Central American immigrants in Houston (57.8%) than among other Hispanic immigrants (23.7%, $P < 0.001$, test for binomial proportions). Among Central Americans, the rate ranged from 46.2% among Salvadorans to 66.1% among Hondurans. The mean age of all cases upon clinical presentation was 34.4 (median 33, range 3–72) and the male/female sex ratio was 2.5. The mean age was lowest among Central Americans (32.4 for Central Americans [$n = 151$] vs. 38.8 [$n = 69$] for the non-Central American groups, $P < 0.0001$, Kruskal–Wallis [K.W.]), and 39.1 for South Americans. Hondurans showed the disproportionately lowest mean age on presentation (31.7 vs. 35.8 for other studied immigrants, $P < 0.001$, K.W.). Disproportionately higher mean ages on presentation were noted among Cubans (mean 40.1, $P < 0.01$, K.W.), Colombians (mean 39.7, $P = 0.01$, K.W.) and Puerto Ricans (mean 38.4, $P = 0.04$, K.W.). The male/female ratios of cases were significantly higher for Caribbean (4.13) and South American immigrants (4.6) than for Central Americans (1.96, $P < 0.03$, Fisher's exact). The sex ratio was disproportionately lower for Hondurans (1.2 vs. 4.1 for non-Hondurans, $P < 0.001$, chi-square).

On HIV acquisition, among 158 patients who willingly reported a mode of HIV transmission, the most common methods were sexual (149 patients, 95 with heterosexual activity, 49 with reported homosexual activity, 5 with bisexual activity). Only a minority reported intravenous drug usage (4), significant transfusion history (4), or vertical transmission (1). The proportion reporting homosexual behavior as the mode of HIV acquisition was lower for Hondurans compared to the immigrants from the other regions studied (13% vs. 22%, $P = 0.01$, Fisher's exact).

AIDS-defining diagnoses at presentation data are given in Table I: 115 of 193 (59.6%) of patients presented with a CD4 count of 200 cells/mL or less, using data given by the patient at time of presentation. This was consistent with 85 of the 131 patients (64.9%) where this was confirmed with HCHD laboratory results. Out of these 85, there were 63 with no additional history of opportunistic infections and 22 with other opportunistic infections. Data on opportunistic

Table I. Status of HIV Infection Upon Presentation[a]

	Number	HCHD data	P value[b]
Low CD4 count	85 (64.9%)	88.4%	<0.001
Low CD4 count without other OI	63 (48.1%)		
Low CD4 count and other OI	22 (16.8%)		
PCP	10		
Tuberculosis	4		
Toxoplasmosis	3		
Kaposi's sarcoma	2		
CMV	1		
Cryptococcosis	1		
Histoplasmosis	1		
Pneumocystosis (2 with both toxoplasmosis and tuberculosis)	16 (12.1%)	15.6%	0.36
Tuberculosis	10 (7.6%)	8.7%	0.88
Toxoplasmosis	10 (7.6%)	1.5%	<0.001

[a] AIDS-defining diagnoses among patients with available data (n = 131) compared to the overall HCHD reported data.
[b] P determined by binomial test of proportions, reporting two-tailed tests.

infections are given in Table II. There were no geographic differences for the three areas studied with respect to prevalence of pneumocystosis, tuberculosis, atypical myocbacterial infection, or toxoplasmosis. Degree of immunosuppression is shown in Table III. There were no statistical differences of level of immunosuppression on presentation by geographic area of origin.

Concerning follow-up, the median interval between the earliest and most recent CD4 counts (n = 192) was 8 months. However, 33% of the patients were seen only on one occasion, and excluding these

Table II. Opportunistic Infections During the Course of AIDS Among Latin American Immigrants to Houston, Comparing Frequency with That of the Local AIDS Population-at-Large

	Current series	HCHD data	P value[a]
Pneumocystosis	40/161 (19.9%)	34.9%	<0.001
Toxoplasmosis	34/202 (14.8%)	3.5%	<0.001
Tuberculosis	24/199 (12.1%)	7.4%	0.02
Cryptococcosis	10/200 (10.0%)	5.7%	0.87
Candida esophagitis	9/154 (5.8%)	8.1%	0.38
Mycobacterium avium-intracellulare (MAI)	9/165 (5.5%)	6.5%	0.64
Kaposi's sarcoma	11/199 (5.5%)	10.4%	0.02
Histoplasmosis	10/193 (5.2%)	1.8%	0.003
Cytomegalovirus disease	6/183 (3.2%)	7.7%	0.02
Lymphoma	6/199 (3.0%)	2.7%	0.82

[a] P determined by binomial test of proportions, reporting two-tailed tests.

Table III. Level of Immunosuppression Among Latin American Immigrants to Houston with HIV/AIDS (n = 193) for CD4 Value

	Cells/mm^3	Range
Median CD4 count on presentation	160[a]*	3–1306
Highest median CD4 count during treatment	273	5–1643
Lowest median CD4 count during treatment	110	3–784
Median CD4 count on most recent follow up	226*	4–1331

[a] 59.6% with CD4 less than 200 cells/mm^3.
*No statistical difference (using chi-square test) by geographic area of presentation.

cases (n = 128) the median interval was 23.5 months. This interval was significantly longer for patients from South America (22 months) than those from Central American or the Caribbean (6 months) (P = 0.04, K.W.). The median interval of treatment in this analysis (n = 123) was 13 months (no difference by geographic area, K.W. = 0.98).

The prophylaxis against pneumocystosis and atypical mycobacterial infections remains largely inadequate (see Table IV). However, the number of patients who received pneumocystosis prophylaxis compared to the total number eligible was not different when stratified for origin of the patient and showed no differences by geography (Central Americans, 64/96 or 66.6%; Caribbeans, 17/19 or 89.5%; and South Americans 12/17 or 70.6%, P = 0.13, Fisher's exact). Also the number of patients who received MAC prophylaxis compared to the total number eligible was not different when stratified by geographic origin.

DISCUSSION

The geographic differences in clinical manifestations of HIV and AIDS have been well described in the literature (6, 7), and reflect the different

Table IV. Adequacy of Prophylaxis Against PCP and MAC

	For PCP prophylaxis[a]		For MAC prophylaxis by origin[b]	
	Number that received	Number eligible (%)	Number that received	Number eligible (%)
Central Americans	64/96	67.7	15/48	31.2
Caribbean	17/19	89.5	2/10	20.0
South Americans	12/17	70.6	3/9	33.3

[a] Total group: 93/132. P values by Fisher's exact test = 0.13.
[b] Total group: 20/67. P value by Fisher's exact test = 0.84.

prevalence of pathogens in different geographic areas, the different immune responses among geographically diverse populations, and the enhanced transmissibility in certain environments. Distinct pathogens include the fungi (8), in particular blastomycosis (9), coccidioidomycosis, and histoplasmosis (10), typical (11) and atypical (1, 12) mycobacteria, pneumocystosis (13), and toxoplasma (14). Different immune responses are shown for different populations in response to pneumocystosis whose reported relative absence in sub-Saharan Africa is often considered bewildering (2). When noninfectious causes cluster among HIV-associated sequelae [e.g., renal failure (5)], unique HIV isolates are postulated to be the cause (16). Distinct biotypes exist for very common pathogens such as *Candida albicans* (3) or *Cryptococcus neoformans* (17). The clinical significance of geographically disparate biodiversity is not fully understood. The enhanced geographic transmissibility of coccidioidomycosis is related to environments in which it prevails, and the same might be the case for tuberculosis whose geographic spread is often exacerbated by environmental conditions predisposing toward person-to-person spread.

Some aspects of the geographic specificity of AIDS in Latin America are documented in prior articles (4, 5, 18, 19). The findings include in particular an increased predilection toward tuberculosis and toxoplasmosis. In one Peruvian series, tuberculosis accounted for nearly two thirds of all infiltrates (4). High rates of toxoplasmosis are recorded in autopsy series from both Brazil (34% of all central nervous system [CNS] diseases in AIDS, Chimelli) and Mexico (25% of a similar series) (20, 21). In one pediatric autopsy series from Argentina, however, the spectrum of pathology did not differ markedly from that noted in North America with candidiasis and pneumocystosis being seen most often (22).

In this study, the two factors found more commonly among Latin American immigrants on presentation with AIDS than among the population-at-large with AIDS were a history of CNS toxoplasmosis and low CD4 count. This difference is attributable, respectively, to the frequency of CNS toxoplasmosis among the populations in the countries of origin (4, 14) and to the high percentage of Latin American patients in our population who present with advanced disease. The three infections found more commonly in this population during the course of AIDS include, again, CNS toxoplasmosis, but also histoplasmosis and tuberculosis, while those seen less commonly were pneumocystosis, cytomegalovirus disease, and Kaposi's sarcoma. These epidemiologic findings mirror the reports of disease from Latin America (4), with the exception of histoplasmosis whose endemic zone is within the continental United States, specifically the Mississippi and Ohio River valleys. In general, however, our findings confirm the earlier study limited to Central American immigrants (18) and suggest that there exists a wide geographic area over which the predilection toward particular opportunistic infections is more common.

The most important distinctions in this study worth noting are the following. Central American immigrants with HIV infection tend to be younger, and a larger proportion of infected immigrants are women, compared to the immigrants from the South American and the Carribean region. This is especially true for Hondurans, a population with the highest self-reported undocumented status in our study. These findings suggest there are distinct immigration patterns from regions of hyperendemic foci. In Honduras such a focus exists along the northern Caribbean coast and the San Pedro Sula areas. Both United Nation AIDS data and U.S. Bureau of the Census data confirm the highest HIV prevalence rate among all Central America republics (UNAIDS, U.S. Census Bureau) (23, 24). This elevated rate is thought to be due in part to increased trade and trafficking with the nations of the Caribbean by Hondurans whose nation has a long coastline with the Gulf of Mexico.

Acquisition of HIV was reported as heterosexual for 63.2% of the entire study population who reported sexual acquisition. This is significantly higher than the value seen among the U.S. population at large, where the most recent data showed about 10% with heterosexual acquisition (CDC) (25), although locally produced data show an increase to about 30% among indigent patients treated in the county. Where this heterosexual transmission took place is largely not known. Earlier studies of Central American immigrants showed an incidence not strikingly dissimilar from that of non-Central Americans (26). Data, however, suggest that half of the Central American patients acquired the infection after arrival in the United States, some acquired it probably in transit to the United States, and fewer than half acquired infection in the homeland (18). Only a portion of this last group probably was aware of the diagnosis before arrival in the United States. From these data we assume that only a fraction of HIV-infected immigrants come to the United States for the purpose of obtaining treatment specifically for HIV infection or AIDS,

a proportion limited in large part by the economic exigencies of the immigrant population.

Access of this vulnerable population to health care in the United States is far from optimal. As noted, a third of the HIV-infected immigrant patients only have one single visit to HCHD. In addition, nearly 60% of Latin Americans present to the health care system with a diagnosis of full-blown AIDS merely on the basis of presenting CD4 count. It is unlikely that this would be explained by the possibility that the patients receive health care in other urban areas or the private system, and transfer only with advanced disease. It is more likely that this points toward access problems of this vulnerable population to a health care system. Finally, the percentages of documented patients receiving pneumocystis and atypical myocbacterial prophylaxis are suboptimal. This study did not analyze the problems related to latent tuberculosis infection in this immigrant group, but it is very conceivable that prophylaxis for tuberculosis is equally suboptimal.

The data presented in this paper show that foreign-born Latin American immigrants show a distinct profile of HIV epidemiology, in our system they present late in the course of infection, and their opportunistic infection profile is also distinct with a clear predilection for tuberculosis and toxoplasmosis. We would however like to note that generalizations based on this study alone may not be fully valid; we believe that the HCHD immigrant population is representative for the immigrant population at large, but have no firm data on this. Public health measures are needed to address the inadequate utilization of pneumocystis and atypical mycobacterial prophylaxis as well as the problems associated with early recognition of infection and access into the health care system.

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