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Psychiatric Correlates of HAART Utilization and Viral Load Among HIV-Positive Impoverished Persons

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Abstract

Objective—Research on the role psychiatric factors in HIV disease management has yielded discrepant findings, possibly because prior studies did not include comprehensive psychiatric screeners. This study administered a validated screener to examine psychiatric correlates of highly active anti-retroviral therapy (HAART) utilization and viral load.

Design—Community-recruited, HIV-positive impoverished persons provided sociodemographic information, completed a Diagnostic Interview Schedule that screened for psychiatric disorders, and provided a blood sample to measure HIV disease markers.

Methods—In this cross-sectional investigation with 227 participants, a multiple logistic regression model examined correlates of HAART utilization compared to a reference group that was eligible for (i.e., CD4+ count > 350 cells/μl) but not taking HAART. A multiple linear regression model examined correlates of HIV viral load among 147 participants on HAART.

Results—Sleeping on the street (Adjusted OR [AOR] = 0.06; 95% CI = 0.01 – 0.26) and screening positive for a stimulant use disorder (AOR = 0.29; 95% CI = 0.13 – 0.65) were independently associated with lower odds of HAART utilization. Conversely, enrollment in the AIDS Drug Assistance Program (AOR = 3.94; 95% CI = 1.45 – 10.73) and receipt of mental health treatment (AOR = 4.78; 95% CI = 1.77 – 12.87) were independently associated with increased odds of HAART utilization. Among those on HAART, screening positive for a severe mental illness was independently associated with a 6-fold higher viral load.

Conclusions—Providing psychiatric treatment could optimize health outcomes among HIV-positive impoverished persons and boost the effectiveness of “Test and Treat” approaches to HIV prevention.

Keywords

Cocaine; HAART; HIV; Methamphetamine; Mental Health; & Severe Mental Illness

Introduction

Although the mortality rate among HIV-positive persons declined markedly in the era of highly active anti-retroviral therapy (HAART), HIV-related health disparities have been observed in various groups including the urban poor [1–5]. Structural factors like unstable housing are linked to hastened mortality among individuals living with AIDS [6], but the mortality rate among homeless and marginally housed HIV-positive persons is substantially attenuated among those that consistently utilize HAART [7]. Homeless or marginally housed persons experience difficulties with accessing and utilizing healthcare services, which contributes to the more rapid progression of prevalent infectious diseases such as HIV/AIDS [8]. Difficulties with engaging in healthcare and utilizing HAART represent a lost opportunity for reducing community HIV viral load, which has been linked to HIV incidence [9, 10].

The structural barriers that HIV-positive impoverished persons encounter to accessing and utilizing HIV medical care may be further exacerbated by co-morbid mental health and substance use disorders. Prior research examining the implications of psychiatric co-morbidities for HIV disease management has focused extensively on individuals engaged in HIV medical care. Cross-sectional studies with participants enrolled in HIV medical clinics observed that co-occurring mental health disorders and substance use as well as substance use alone were associated with decreased odds of HAART utilization [11, 12]. Among those on HAART, co-occurring mental health and substance use disorders as well as substance use disorders alone were associated with decreased odds of HIV viral suppression [12]. In contrast, Himelhoch and colleagues report divergent findings in two HIV clinic-based cohort studies. One investigation observed that the odds of discontinuing HAART in the two years following initiation were lower among those with a severe mental illness (SMI) or a depressive disorder [13]. The other indicated that those with a psychiatric disorder (i.e., any mental health or substance use disorder) were more likely to initiate HAART, had greater odds of remaining on HAART for at least 6 months, and were 40% more likely to survive [14]. Because studies conducted with HIV clinic-based samples utilized chart review to assess psychiatric diagnoses [11–14], it is difficult to disentangle the effect of the psychiatric diagnosis from the receipt of integrated treatment that often included psychiatric care [15]. In contrast, studies that recruited HIV-positive persons from the community have consistently observed that depression and substance use are linked to impaired HAART utilization and higher HIV viral load [16–18]. It is noteworthy, however, that community-recruited, HIV-positive cohorts have relied on self-report measures of depression and substance use that did not screen other relevant psychiatric diagnoses (e.g., psychotic spectrum disorders and bipolar I/II disorders) that could be associated with HAART utilization and viral load. The present study administered a well-validated screening measure for psychiatric disorders to a sample of community-recruited, HIV-positive impoverished persons in order to examine whether specific mental health and substance use disorders were differentially associated with HAART utilization and HIV viral load. We hypothesized that mental health and substance use disorders would be associated with decreased odds of HAART utilization and elevated HIV viral load after controlling for demographic and structural factors.

Methods

From July 2004 to May 2006, a mobile outreach team recruited a sample of homeless and marginally housed adults from San Francisco homeless shelters, free food programs, and a probability sample of low-income hotels where the probability of selection was proportional to the number of hotel residents [19]. All individuals who tested HIV-positive were invited to participate in a study visit that included an interviewer-administered questionnaire

assessing demographic and structural factors as well as self-reported HIV regimen. At this study visit, participants also completed a computerized Diagnostic Interview Schedule (DIS) to screen for psychiatric disorders. Peripheral venous blood samples were obtained during separately scheduled, quarterly visits to a community field site. All participants provided blood samples within 90 days of the study visit that included the computerized DIS (Median = 22 days).

Measures

Demographic and Structural Factors—gender, ethnicity, age, education, income, percentage of income from subsidies, current insurance status, enrollment in the California AIDS Drug Assistance Program (ADAP; established in 1987 to help ensure that HIV-positive uninsured and under-insured individuals have access to medication), nights spent on the street, and nights spent in a shelter were assessed.

Self-Reported Utilization of Mental Health and Substance Abuse Treatment

Utilization of mental health treatment included any outpatient or inpatient services during the past 90 days. Utilization of substance abuse treatment included any outpatient or residential services, detoxification, or 12-step self-help group attendance during the past 90 days.

Computerized DIS—The computerized DIS is a reliable and valid measure that screens for current mental health and substance use disorders [20, 21]. The computerized DIS was administered to determine whether participants reported symptoms consistent with a current: 1) major depressive episode; 2) diagnosis of post-traumatic stress disorder (PTSD); 3) SMI (i.e., manic/hypomanic episode – Bipolar I/II Disorders or Schizophrenia); 4) alcohol use disorder; 5) opiate use disorder; and 6) stimulant (i.e., cocaine or amphetamines) use disorder.

HAART Utilization—Regimens were classified as HAART if they included at least three anti-retroviral medications where one medication was a non-nucleoside reverse transcriptase inhibitor or a Ritonavir-boosted protease inhibitor. Individuals using any other regimen were classified as not on HAART.

HIV Disease Markers—HIV-1 viral load was determined using the AMPLICOR ultrasensitive method for the *in vitro* reverse transcriptase polymerase chain reaction assay (Roche Laboratories, US # 83088), which has a valid range of 50 to 750,000 copies/ml. T-helper (CD4+) count was determined using direct immunofluorescence.

Statistical Analyses

Individuals on HAART (n = 154) were compared to a reference group that was eligible for HAART (i.e., CD4+ count ≥ 350 cells/μl) based on the World Health Organization guidelines at the time of the study [22] but not currently taking it (n = 73). Using multiple logistic regression, the adjusted odds ratio (AOR) reflects the independent association of each variable with HAART utilization, controlling for all other variables in the model. Similarly, independent correlates of log₁₀ HIV viral load were examined using multiple linear regression among participants that were on HAART and had viral load data available (n = 147). Using a simple formula [$100(10^{\text{Beta}} - 1)$], unstandardized parameter estimates were converted to determine the percent increase in mean viral load that was associated with each significant correlate. Because HAART adherence is in the causal pathway between psychiatric factors and viral load, it was not included in current analyses.

Results

Participant Characteristics

The mean age of the 227 participants included in these analyses was 42 years (range 27–66). Most participants were men (68%); 40% were Caucasian, 47% were African American, and 13% were other ethnic minorities; 71% completed high school. Thirty-four percent of participants had an undetectable HIV viral load and the mean CD4+ count was 351 (SD = 268) cells/ μ l. Of the 157 participants currently taking anti-retroviral medications, 98% (n = 154) were on HAART regimens and half (52%) of those on HAART had an undetectable viral load. Using the DIS, estimated prevalence of the following current psychiatric disorders was: 31% for a major depression episode, 17% for PTSD, 15% for a SMI (of which 14% reported hypomanic episode(s); 77% manic episode(s); 9% symptoms consistent with Schizophrenia), 8% for an alcohol use disorder, 8% for an opiate use disorder, and 32% for a stimulant use disorder. Taken together, 56% of participants screened positive for at least one current mental health or substance use disorder.

Correlates of HAART Utilization

As shown in Table 1, being enrolled in ADAP (82% vs. 64%) and receipt of any mental health treatment in the past 90 days (82% vs. 62%) were associated with more than three times greater odds of HAART utilization. Having slept on the street in the past 90 days was associated with substantially lower odds of HAART utilization (22% vs. 72%). Independent of these demographic and structural factors, screening positive for a stimulant use disorder was associated with substantially lower odds of HAART utilization (53% vs. 75%).

Correlates of HIV Viral Load among those on HAART

As shown in Table 2, compared to Caucasian participants, African American (2.20 vs. 2.65 $\log_{10}$ copies/ml) and other ethnic minority (1.79 vs. 2.65 $\log_{10}$ copies/ml) individuals had a significantly lower viral load. After controlling for demographic and structural factors, screening positive for a SMI was associated with a 6 times higher viral load (3.00 vs. 2.22 $\log_{10}$ copies/ml).

Discussion

To our knowledge, this study is among the first to observe that specific mental health and substance use disorders are differentially associated with HAART utilization and HIV viral load. Building on prior research which observed that stimulant users experience difficulties with HIV disease management [5, 18, 23], screening positive for a stimulant use disorder was independently associated with impaired HAART utilization after controlling for demographic and structural factors as well as other co-morbid psychiatric disorders. Findings also indicated that receipt of mental health treatment was independently associated with enhanced HAART utilization, which is consistent with previous studies [13, 16, 24]. In contrast to previous research [18, 25–28], the present study did not observe that screening positive for a stimulant use disorder was associated with elevated HIV viral load among those on HAART. It is noteworthy, however, that screening positive for a SMI was independently associated with a 6 times higher HIV viral load. There is growing recognition that substance users often experience co-occurring social, structural and psychiatric barriers to HAART adherence [29]. Findings from the present investigation indicate that the presence of a SMI is an important barrier to reducing viral load among HIV-positive impoverished persons. Taken together, it appears that structural and psychiatric barriers compromise HIV treatment success, even in a resource-rich environment where integrated care and antiretroviral medications are more accessible than most areas of the world.

Although the present cross-sectional investigation provides some of the first data regarding the association between specific psychiatric diagnoses and HIV disease management, longitudinal studies are needed to examine whether and how specific psychiatric diagnoses independently predict more rapid HIV disease progression. Further research is also needed to replicate these findings and determine if impaired HAART adherence mediates the association between SMI and elevated HIV viral load. Irrespective of whether elevated viral load among those with SMI is due to stress-induced immune suppression, impaired HAART adherence or other mechanisms, findings from this study have important clinical implications. Adjuvant interventions that address social and structural barriers as well as target prevalent psychiatric co-morbidities in this population could promote HAART utilization and reduce viral load among HIV-positive impoverished persons. Optimizing individual-level health outcomes among HIV-positive impoverished persons may lead to greater reductions in community HIV viral load, which is critical to the success of “Test and Treat” approaches to HIV prevention [30].

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AWC developed study hypotheses and was the primary individual responsible for data analysis and manuscript preparation. DRB coordinated collection of peripheral venous blood samples, oversaw the management of HIV disease marker data, and assisted with manuscript preparation. SDW and MC provided comments on the data analysis plan as well as assisted with interpretation of preliminary analyses and manuscript preparation. SD oversaw computer-based study assessment programming, managed study data, and assisted with manuscript preparation. EDR assisted in the development of study hypotheses, oversaw collection of computer-based assessment data, provided comments on the data analysis plan, and assisted with the interpretation of preliminary analyses and manuscript preparation.

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Table 1

Correlates of HAART Utilization among Clinically Eligible Individuals (CD4+ 350 for those not on HAART); (N = 227)

	OR (95% CI)	AOR (95% CI)
Male (Reference)	1.00	1.00
Female	0.87 (0.47 – 1.61)	0.66 (0.30 – 1.46)
Transgender	0.48 (0.17 – 1.33)	0.49 (0.15 – 1.67)
Caucasian (Reference)	1.00	1.00
African American	0.71 (0.38 – 1.30)	0.48 (0.22 – 1.04)
Other ethnic minority	0.65 (0.27 – 1.57)	0.65 (0.22 – 1.93)
Age (decade)	1.48 (0.99 – 2.21)	1.67 (0.97 – 2.88)
Less than high school	1.06 (0.57 – 1.95)	1.29 (0.58 – 2.85)
Median monthly income or greater	1.04 (0.60 – 1.83)	0.96 (0.47 – 1.96)
50% of income from subsidies	1.46 (0.57 – 3.73)	0.66 (0.19 – 2.28)
Continuously insured (past 90 days)	1.64 (0.71 – 3.78)	2.49 (0.69 – 9.02)
Enrolled in ADAP	2.50 (1.14 – 5.47) **	3.94 (1.45 – 10.73) **
Any nights spent on the street (past 90 days)	0.11 (0.04 – 0.36) **	0.06 (0.01 – 0.26) **
Any nights spent in a shelter (past 90 days)	0.44 (0.17 – 1.16)	0.79 (0.22 – 2.85)
Any mental health treatment (past 90 days)	2.79 (1.35 – 5.76) **	4.78 (1.77 – 12.87) **
Any substance abuse treatment (past 90 days)	1.05 (0.58 – 1.90)	1.06 (0.49 – 2.30)
Current major depressive episode	0.72 (0.40 – 1.31)	0.66 (0.29 – 1.53)
Current PTSD	1.72 (0.77 – 2.84)	2.14 (0.70 – 6.50)
Current SMI	1.11 (0.50 – 2.46)	1.29 (0.47 – 3.53)
Current alcohol use disorder	0.66 (0.24 – 1.80)	0.92 (0.26 – 3.27)
Current opiate use disorder	0.73 (0.27 – 1.96)	2.52 (0.63 – 10.11)
Current stimulant use disorder	0.38 (0.21 – 0.68) **	0.29 (0.13 – 0.65) **

*
p < .05;

**
p .01

ADAP = AIDS Drug Assistance Program; PTSD = Post-Traumatic Stress Disorder; SMI = Severe Mental Illness

Table 2Correlates of Log₁₀ HIV viral load among those on HAART (n = 147)

	Simple Linear Regression β	Multiple Linear Regression β
Male (Reference)		
Female	-.08	-.05
Transgender	.02	-.01
Caucasian (Reference)		
African American	-.17 [†]	-.19 [*]
Other ethnic minority	-.22 [*]	-.24 ^{**}
Age (decade)	.01	.01
Less than high school	-.04	-.04
Median monthly income or greater	-.06	-.08
50% of income from subsidies	-.10	-.07
Continuously insured (past 90 days)	-.08	-.07
Enrolled in ADAP	-.01	-.01
Any nights spent on the street (past 90 days)	-.04	-.07
Any nights spent in a shelter (past 90 days)	.01	.02
Any mental health treatment (past 90 days)	-.13	-.14
Any substance abuse treatment (past 90 days)	.07	.09
Current major depressive episode	.07	.01
Current PTSD	.03	-.01
Current SMI	.21 [*]	.24 ^{**}
Current alcohol use disorder	.09	.08
Current opiate use disorder	-.01	-.05
Current stimulant use disorder	.08	.11

[†]
 $p = .053$;^{*}
 $p < .05$;^{**}
 $p < .01$

ADAP = AIDS Drug Assistance Program; PTSD = Post-Traumatic Stress Disorder; SMI = Severe Mental Illness