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REPORT

Lifetime prevalence of syphilis infection among predominantly Black sexual and gender minorities living with HIV in Atlanta, Georgia: a cross-sectional analysis

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ABSTRACT

Objectives: Syphilis infection disproportionately impacts Black sexual and gender minorities (SGM) in the United States. The extent of this impact among those living with HIV has been minimally examined. This study sought to examine lifetime syphilis prevalence and associated factors in a community sample of predominantly Black SGM living with HIV in the Southeastern US.

Design: Participants (N = 174) enrolled in a stigma-mitigation trial for people living with HIV in Atlanta, Georgia, completed a sub-study involving testing for *Treponema pallidum* antibodies, indicative of lifetime syphilis infection. We performed chi-square and Fisher's exact tests to assess sociodemographic and healthcare differences by presence/absence of lifetime syphilis infection.

Results: Most participants identified as non-Hispanic Black (n = 142/174; 81.6%) and cisgender male (n = 146/174; 83.9%). More than two thirds (n = 120/174) identified as gay/homosexual. We documented a 55.7% (n = 97/174) lifetime prevalence of syphilis infection and observed differences by sexual identity, with 77.3% (n = 75/97) of those screening positive reporting gay/homosexual identity relative to 58.4% (n = 45/77) of those screening negative (chi-square[1] = 7.8, $p < 0.010$).

Conclusion: Findings underscore how syphilis prevention efforts have missed the most marginalized, warranting a renewed, comprehensive strategy for improving the sexual health of Black SGM. Embedding targeted, respectful community engagement, expanded testing access, and healthcare provider training into broader sexual health and psychosocial wellness efforts is needed.

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Syphilis; Black sexual and gender minorities; living with HIV

Introduction

Syphilis infections have been surging among cisgender gay, bisexual, and other men who have sex with men (GBMSM) in the United States (US) over the past two decades (Peterman et al. 2015; Schmidt, Carson, and Jansen 2019), despite implementation of

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nationwide syphilis elimination campaigns in 1999 and 2006 by the Centers for Disease Control & Prevention (CDC) (CDC 1999; CDC 2006). The syphilis resurgence threatens initiatives to meet the sexual health needs of GBMSM, particularly Black GBMSM, who are also disproportionately impacted by HIV infection (CDC 2020; Kidd et al. 2018; Abara et al. 2016; Mayer 2018; Su et al. 2011). This resurgence is underpinned and exacerbated by socio-structural conditions (e.g. stigma/racism) that marginalize and adversely impact Black GBMSM (Bernstein et al. 2018; Ferlatte et al. 2018; Hogben and Leichliter 2008; Pérez et al. 2020; Pouget 2017; Trinh et al. 2017).

Additionally, syphilis-HIV coinfections, fueled by biological (e.g. syphilitic ulcers/lesions increase HIV shedding among people living with HIV [PLHIV] and provide portals of entry for HIV among HIV-negative persons), behavioral (e.g. condomless anal sex, serosorting), and community factors (e.g. dense, interconnected sexual networks) (Roberts and Klausner 2016; Mayer 2018; Refugio and Klausner 2018; Billock et al. 2020), have been observed among Black and other GBMSM (Kidd et al. 2018; Billock et al. 2020; Roberts and Klausner 2016). This is alarming given syphilis' link to increased HIV viral load in PLHIV, including those on treatment, which not only compromises the health of PLHIV but also potentiates HIV transmission to uninfected persons (Roberts and Klausner 2016; Taylor et al. 2015; Buchacz et al. 2004). Despite minimal research on the impact of the syphilis resurgence on gender minorities, some evidence suggests that transgender women (TW), especially Black TW, who are even more disproportionately impacted by HIV than Black GBMSM, may be similarly impacted by syphilis (Van Gerwen et al. 2020; Solomon et al. 2014; Chen et al. 2018; Becasen et al. 2018; Reback et al. 2018; Nuttbrock and Hwahng 2017), putting Black TW at increased risk of syphilis-HIV coinfection.

CDC guidelines recommend annual syphilis screening for all GBMSM and every three to six months for high-risk GBMSM (e.g. has condomless anal sex or is living with HIV) (CDC 2015). Similarly, TW deemed high-risk (e.g. has condomless sex or participates in sex work) should be screened every three months (CDC 2015, 1–137; Poteat 2016). However, screening remains low (Barbee et al. 2015; Mattson et al. 2017; Flagg et al. 2015; Landovitz, Gildner, and Leibowitz 2018), driven by patient-level (e.g. stigma), provider-level (e.g. limited sexual health knowledge/comfort), and healthcare system-level barriers (e.g. no policies) (Turpin, Rosario, and Dyer 2020; Refugio and Klausner 2018; Ong et al. 2018; Quilter, Dhanireddy, and Marrazzo 2017; Balán et al. 2019; Hixson et al. 2019; Leichliter et al. 2020; Leichliter et al. 2017; Himmelstein and Woolhandler 2016; Pearson et al. 2016), and the lack of a collaborative, comprehensive national strategy (Valentine and Bolan 2018). This study examines lifetime syphilis prevalence and associated factors in a community sample of predominantly Black GBMSM and TW living with HIV in the Southeastern US.

Materials and methods

Data come from the 2018–2019 baseline assessment of an intervention trial (N = 592) to address stigma as a barrier to HIV-care linkage and retention in Atlanta, Georgia. Participants in this trial, who were living with HIV and aged 18–35 years, received linkage to wraparound support services to access care; problem-solving-focused counseling to address logistical barriers to medical care access; and stigma-related counseling to

support HIV treatment medication adherence. A subset of 174 participants who identified as cisgender GBMSM or a gender minority assigned male sex at birth provided informed consent to participate in a sub-study that included syphilis testing.

A computerized interview included questions on sociodemographic (age, race/ethnicity, gender identity, sexual identity, education, employment, income) and HIV/healthcare characteristics (insurance status, year of HIV diagnosis, presence of HIV care provider, recent HIV care, currently taking ART). Due to small cell sizes, we dichotomized the race/ethnicity, gender identity, and sexual identity variables: non-Hispanic Black versus not non-Hispanic Black; cisgender male versus not cisgender male; gay/homosexual versus not gay/homosexual. Participants earning an income > $31,000 were collapsed into one category. Participants provided finger-stick blood-spot samples via HemaSpot HF devices for HIV viral load testing or a recent (< 90 days old) medical chart abstraction report documenting HIV viral load.

Testing for syphilis was completed via the Syphilis Health Check, which required two drops of whole blood and included a rapid membrane immunochromatographic assay for detecting *Treponema pallidum* antibodies (Trinity Biotech 2021), the presence of which we considered evidence of lifetime syphilis infection. This point-of-care screener has demonstrated an overall 97.6% agreement with other treponemal tests (Trinity Biotech 2021; Diagnostic Direct 2015), has a sensitivity of 87.7%-98.5% and specificity of 95.9%-96.7% (Bristow, Klausner, and Tran 2020), and is considered reliable for detecting past, treated syphilis or current untreated infection (Diagnostic Direct 2015; Trinity Biotech 2021). Though it cannot indicate syphilis disease staging, this test remains a convenient, accessible method of screening, particularly useful for marginalized populations experiencing barriers in clinical settings (Ong et al. 2018). This study was approved by the University of Connecticut Institutional Review Board (H16-130).

We calculated descriptive statistics for all variables and performed chi-square and Fisher's exact tests to assess differences in sociodemographic and HIV/healthcare characteristics by those screening positive and negative for syphilis antibodies. All analyses were performed in Stata Version 15 (StatCorp LLC 2017).

Results

Median age was 30 years. More than 80% of participants identified as non-Hispanic Black (n = 142) and as a cisgender male (n = 146); 16.1% (n = 28) identified as a gender minority. More than two thirds (n = 120) identified as gay/homosexual. Roughly 56% (n = 97) of participants screened positive for syphilis antibodies. Those screening positive significantly differed from those screening negative by sexual identity (chi-square[1] = 7.8, $p < 0.010$), with 77.3% (n = 75) of those screening positive reporting gay/homosexual identity relative to 58.4% (n = 45) of those screening negative (Table 1).

Discussion

We documented a high prevalence of lifetime syphilis infection among predominantly Black GBMSM and gender minorities living with HIV in Atlanta, Georgia, a region that has been among the most impacted areas by the syphilis resurgence (Sullivan et al. 2018; CDC 2018). Specifically, we found that over half of our sample had had

Table 1. Characteristics of predominantly Black sexual and gender minorities living with HIV in Atlanta, Georgia, stratified by screening positive or negative for syphilis antibodies, 2018–2019 (N = 174).

	Syphilis + (n = 97, 55.7%)	Syphilis – (n = 77, 44.3%)	Chi-square *p*-value	Total (N = 174)
	n (col. %)	n (col. %)		n (col. %)
Sociodemographic characteristics				
Age in years			0.315	
18-29	49 (50.5)	33 (42.9)		82 (47.1)
30-35	48 (49.5)	44 (57.1)		92 (52.9)
Race/ethnicity			0.469	
Non-Hispanic Black	81 (83.5)	61 (79.2)		142 (81.6)
Not non-Hispanic Black	16 (16.5)	16 (20.8)		32 (18.4)
Non-Hispanic White	*3 (3.1)*	*2 (2.6)*		*5 (2.9)*
Non-Hispanic Multiracial	*4 (4.1)*	*5 (6.5)*		*9 (5.2)*
Non-Hispanic Other	*5 (5.2)*	*6 (7.8)*		*11 (6.3)*
Hispanic/Latino	*4 (4.1)*	*3 (3.9)*		*7 (4.0)*
Gender identity			0.134	
Cisgender male	85 (87.6)	61 (79.2)		146 (83.9)
Not cisgender male	12 (12.4)	16 (20.8)		28 (16.1)
Female/transgender female	*7 (7.2)*	*8 (10.4)*		*15 (8.6)*
Genderqueer, GNC	*2 (2.1)*	*1 (1.3)*		*3 (1.7)*
Other,[A] unlisted identity	*3 (3.1)*	*7 (9.1)*		*10 (5.7)*
Sexual orientation			**0.005**	
Gay/homosexual	75 (77.3)	45 (58.4)		120 (69.0)
Not gay/homosexual	21 (21.6)	32 (41.6)		53 (30.5)
Same gender-loving	*7 (7.2)*	*8 (10.4)*		*15 (8.6)*
Bisexual	*10 (10.3)*	*13 (16.9)*		*23 (13.2)*
Heterosexual	*1 (1.0)*	*5 (6.5)*		*6 (3.4)*
Other	*3 (3.1)*	*6 (7.8)*		*9 (5.2)*
Missing/unknown	1 (1.0)	0 (0.0)		1 (0.6)
Education			0.126	
< High school	9 (9.3)	12 (15.6)		21 (12.1)
High school or equivalent	17 (17.5)	22 (28.6)		39 (22.4)
Some college	48 (49.5)	29 (37.7)		77 (44.3)
College degree	23 (23.7)	14 (18.2)		37 (21.3)
Employment			0.363	
Employed, non-student	45 (46.4)	27 (35.1)		72 (41.4)
Unemployed, non-student	25 (25.8)	24 (31.2)		49 (28.2)
Student[B]	17 (17.5)	14 (18.2)		31 (17.8)
Disabled, other	9 (9.3)	12 (15.6)		21 (12.1)
Missing/unknown	1 (1.0)	0 (0.0)		1 (0.6)
Income			0.193	
≤ $10,000	40 (41.2)	34 (44.2)		74 (42.5)
$11-20,000	16 (16.5)	15 (19.5)		31 (17.8)
$21-30,000	17 (17.5)	19 (24.7)		36 (20.7)
$31,000 +	23 (23.7)	9 (11.7)		32 (18.4)
Missing/unknown	1 (1.0)	0 (0.0)		1 (0.6)
HIV/healthcare characteristics				
Health insurance			0.830	
Uninsured	40 (41.2)	33 (42.9)		73 (42.0)
Insured	57 (58.8)	44 (57.1)		101 (58.0)
Time of HIV diagnosis			0.709	
1999-2005	5 (5.2)	4 (5.2)		9 (5.2)
2006-2010	15 (15.5)	17 (22.1)		32 (18.4)
2011-2015	42 (43.3)	32 (41.6)		74 (42.5)
2016-2019	35 (36.1)	24 (31.2)		59 (33.9)
Has an HIV care provider			1.00	
Yes	90 (92.8)	71 (92.2)		161 (92.5)
No	7 (7.2)	6 (7.8)		13 (7.5)
Had an appointment with an HIV care provider in the past four months			0.936	

(*Continued*)

Table 1. Continued.

	Syphilis + (n = 97, 55.7%)	Syphilis – (n = 77, 44.3%)	Chi-square *p*-value	Total (N = 174)
Yes	84 (86.6)	67 (87.0)		151 (86.8)
No	13 (13.4)	10 (13.0)		23 (13.2)
Taking antiretroviral treatment			0.554	
Yes	88 (90.7)	71 (92.2)		159 (91.4)
No	8 (8.2)	4 (5.2)		12 (6.9)
Missing/unknown	1 (1.0)	2 (2.6)		3 (1.7)
Viral load status			0.992	
Suppressed (< 200 copies/mL)	73 (75.3)	58 (75.3)		131 (75.3)
Not suppressed (≥ 200 copies/mL)	24 (24.7)	19 (24.7)		43 (24.7)

HIV, human immunodeficiency virus; GNC, gender non-conforming; mL, milliliter
[A]Including 9 participants who reported being assigned the male sex at birth, reported being transgender, and reported current male gender identity
[B]Including employed, unemployed, and disabled students

syphilis, demonstrating the extent to which syphilis has permeated Black sexual and gender minority communities and reflecting other research that has found a high syphilis burden in these populations (Mayer 2018; Abara et al. 2016; Zuger 2012; Heffelfinger et al. 2007; de Voux et al. 2017; Grey et al. 2017; Chen et al. 2018; Solomon et al. 2014; Sullivan et al. 2018; Kidd et al. 2018). High prevalence of an infectious agent that can facilitate HIV transmission in communities already heavily burdened by HIV necessitates urgent public health action.

That more participants who screened positive for syphilis identified as gay/homosexual may indicate the tendency for such individuals to be more likely to engage in behaviors (e.g. receptive condomless anal sex) that more easily facilitate syphilis acquisition than those who do not identify as gay/homosexual (Millett et al. 2005; Rutledge et al. 2018). However, lifetime syphilis prevalence was high (39.6%) among non-gay/homosexual-identifying participants as well, indicating the need for intervention regardless of sexual identity.

Given that the median age was 30 years and the maximum age 35 years, a large majority of participants would have had their sexual debut during an active syphilis elimination campaign (i.e. the oldest participants, age 35, would have been approximately age 16 in 1999, when the first syphilis elimination campaign was launched), assuming that participants were residing in the US at the time of infection (though this cannot be determined from the data). Despite the presence of such a campaign, over half of our participants acquired syphilis at a young age, illustrating the extent to which young Black GBMSM and gender minorities are being affected by syphilis and are being underserved by public health and healthcare efforts.

As prior campaigns have illustrated (CDC 1999; CDC 2006; Valentine and Bolan 2018), eliminating syphilis is challenging. However, several avenues for intervention are immediately evident, some of which have been proposed elsewhere (Valentine and Bolan 2018; Sullivan 2018; CDC 2017). Routine syphilis screening (i.e. every three to six months) for GBMSM and gender minorities at elevated risk remains urgently needed (CDC 2015; Poteat 2016), which could encourage prevention and yield earlier syphilis detection and treatment (Cantor et al. 2016). Testing as part of routine HIV care and rapid point-of-care testing could support routinized screening for those engaged in care, while home/self-testing, street-based testing, and opt-out emergency

department testing could support routinized screening for those unengaged in care or uninsured (Tucker, Bien, and Peeling 2013; Peterman et al. 2015; Leenen et al. 2020; van Loo et al. 2017; Nguyen et al. 2021; Obafemi et al. 2019; Stanford et al. 2020; Larios Venegas et al. 2020). Such non-clinic-based testing may prove especially impactful in syphilis screening uptake, given that research has long-established that men, in general, and multiply marginalized men, in particular (e.g. Black GBMSM), as well as other multiply marginalized persons (e.g. Black TW), are less likely to seek or have less access to healthcare services (Eaton et al. 2015; Springer, Hankivsky, and Bates 2012; Philbin et al. 2018; Denson et al. 2017).

Addressing multilevel barriers to testing and mandating provider training in cultural humility and sexual health could further enable testing and treatment, as well as foster patient-provider trust (Mayer 2018; Turpin, Rosario, and Dyer 2020; Refugio and Klausner 2018; Ong et al. 2018; Quilter, Dhanireddy, and Marrazzo 2017; Balán et al. 2019; Salerno et al. 2020). Trusting, affirming relationships between Black GBMSM and TW and their providers can facilitate discussion of sexual health and lead to appropriate services (Martos et al. 2016; Salerno et al. 2020). For Black GBMSM and TW living with HIV engaged in HIV care specifically, such relationships could create opportunities for education about syphilis transmission risk when having condomless sex (Mayer 2018), which may otherwise become inadvertently neglected amidst undetectable-equals-untransmissible messaging (Lee et al. 2020). Allocation of sustained funding for testing interventions and provider training remains essential (Leichliter et al. 2017; Leichliter et al. 2020; Himmelstein and Woolhandler 2016; Bernstein et al. 2018). These efforts are especially pertinent during the COVID-19 pandemic, which has further constrained sexual healthcare access (Sanchez et al. 2020; Nagendra et al. 2020; Carnevale et al. 2021).

A social determinants of health framework may be useful for informing such interventions, given the numerous socio-structural conditions that may influence syphilis transmission for Black sexual and gender minority communities (Bernstein et al. 2018; Ferlatte et al. 2018). This may be achieved by incorporating the aforementioned suggestions into broader sexual health and psychosocial wellness efforts that span public health, healthcare, social welfare, and other agencies; that respectfully engage Black sexual and gender minority communities in sexual health campaigns; and that leverage community strengths and resources (Valentine and Bolan 2018; Ferlatte et al. 2018).

There are several limitations to this study. The antibody test was unable to differentiate between current, active syphilis infection and prior syphilis infection that may have been treated (Mishra et al. 2010; Mabey et al. 2006). Consequently, we could neither determine if syphilis infection occurred prior to or after HIV infection, nor investigate the role of other factors potentially associated with contracting syphilis. Moreover, as this was a small, nonprobability sample of predominantly Black cisgender GBMSM ≤35 years of age in Atlanta, Georgia, findings may not be generalizable to other contexts/groups, particularly older GBMSM. Finally, prior syphilis infection, especially infection that could have occurred 10+ years ago, provides no indication or conclusions regarding participants' current sexual behaviors.

Renewed public health action to address syphilis among GBMSM and gender minorities is becoming more recognized and more urgent (CDC 2017; Sullivan 2018; Valentine and Bolan 2018; Gunn and Klausner 2019). Securing the necessary healthcare capacity and funding mechanisms to implement new testing and treatment interventions

in these populations alone will be insufficient – a collaborative, holistic, more culturally tailored approach will be integral for their optimization and success.

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Data availability statement

The data that support this study cannot be publicly shared due to ethical or privacy reasons and may be shared upon reasonable request to the second and fifth authors if appropriate.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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