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Prevalence of syphilis and sexual behavior and practices among adolescents MSM and TrTGW in a Brazilian multi-center cohort for daily use of PrEP

Prevalência de sífilis e comportamento e práticas sexuais entre adolescentes HSH e travestis e mulheres transgênero em um estudo de coorte multicêntrico brasileiro sobre uso diário de PrEP

Prevalencia de sífilis, comportamiento sexual y prácticas entre adolescentes HSH y TrTGW en una cohorte multicéntrica brasileña para el uso diario de PrEP

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Abstract

Syphilis has reemerged as a serious public health problem in Brazil and worldwide, disproportionately affecting men who have sex with men (MSM) and travestis *and transgender women (TrTGW). Studies on sexually transmitted infections (STI) in adolescents from these key populations are relatively scarce. This is a Brazilian multi-center, cross study with prevalence analysis, using as baseline the PrEP1519 cohort of sexually active MSM and TrTGW adolescents, recruited from April 2019 to December 2020. Analyses were made using the dimensions of vulnerability to STI/HIV and logistic regression models were conducted to estimate the odds ratios of the association between the predictor variables and positive treponemal test for syphilis at the moment of entry in the study. In total, 677 participants were analyzed; participants' median age was 18.9 years (IQR: 18.1-19.5); 70.5% (477) self-declared as black; 70.5% (474), as homosexuals/gays; and 48 (7.1%), as trans women or* travestis*. The baseline prevalence of syphilis was 21.3%. In the final logistic regression model, higher chance of syphilis was associated with: self-reported episode of STI in the last 12 months (OR = 5.92; 95%CI: 3.74-9.37), sex worker (OR = 3.39; 95%CI: 1.32-8.78), and < 11 years of schooling (OR = 1.76; 95%CI: 1.13-2.74). The prevalence of syphilis among MSM/TrTGW adolescents aged from 15 to 19 years was alarming, much higher than the described for the general population within this age range and associated with vulnerability factors. This reinforces the urgent need to strengthen public health programs to debate about race, gender, sexuality, and prevention.*

Syphilis; Pre-Exposure Prophylaxis; Adolescent; Health Vulnerability; Disease Prevention

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Introduction

Syphilis, caused by the *Treponema pallidum* bacterium, has reemerged in the last years as a serious public health problem worldwide [1]. The World Health Organization (WHO) has estimated the 6 million new cases of syphilis per year; the majority of which are in developing countries, where the infection is considered endemic and represents a substantial source of morbidity, including adverse pregnancy outcomes, congenital syphilis, and increased risk of HIV transmission [1,2,3].

In Brazil, congenital syphilis was considered a disease of compulsory notification as of 1998, followed by syphilis acquired by pregnant women, in 2003, and acquired syphilis, in 2010. In 2019, 152,915 new cases of acquired syphilis in the general population were reported in Brazil, and the historical records indicate consistent growth in the last 10 years. The detection rates of acquired syphilis cases per 100,000 inhabitants increased significantly from 2, in 2010, to 34.1, in 2015, and 72.8, in 2019. This increase can be partially attributed to the improvement in the notification systems and the expansion of rapid tests in the primary care services (PCS), but also to the difficulties of access to timely treatment of individuals and sexual partner, in addition to the worldwide shortage of penicillin in 2015 and 2016 [4].

New cases are diagnosed at increasing frequency among adolescents and young adults of all ages, gender identities, and sexual orientations. However, the syphilis epidemic disproportionately affects men who have sex with men (MSM), *travestis* and transgender women (TrTGW), and sex workers worldwide, who are considered key populations for health actions [3,4,5,6,7,8]. Despite the recorded high prevalence and morbidity, the data on sexually transmitted infections (STIs) in adolescents and key populations is relatively scarce. In Brazil, the syphilis epidemic reveals racial, generational, and geographical disparities. Although the completion of ethno-racial information is partially neglected in the notifications, it can be noted that syphilis affects the black population at higher proportion. In 2018, 15% of the ethno-racial identification was not filled in the syphilis notifications, 47.1% of the notified people were black (mixed-race and black population), followed by 36.2% white, and less than 1% indigenous and Asian descendent. Currently, the highest rates of acquired syphilis are found among young people aged 20-29 years; from 2010 to 2020, the detection rate of acquired syphilis among young people aged 13-19 years increased by 1,654%. In the last years, acquired syphilis has increased disproportionately in the North (59.3%) and the Northeast (71.1%) regions compared to the Southeast and the South regions, where cases increased 12.2% and 24%, respectively, from 2017 to 2018 [4].

The increase of STIs in adolescents and young adults – which is related to behavioral, biological, and social factors – is worrying despite this group representing only a quarter of the sexually active population [9,10,11]. Adolescence has its own characteristics and it is possible to associate the increase in STIs in this population with the psychosocial dynamics involving the desire for autonomy, the increase of risky practices – which includes having multiple and older sexual partners – less frequent use of condoms, and the use of alcohol and drugs during intercourse [12,13,14]. In addition to the adolescents own practices, other factor that contribute to the increase of STIs are the complex structures of sexual networks, difficulties in accessing the health system – which include the lack of adequate reception and counseling in these services – poor knowledge of the adolescents rights, time incompatibility, concerns about discrimination, and insecurities over their anonymity and the confidentiality of the service [10,15].

In addition to the described factors, the syphilis epidemic among the key populations has been attributed to current individual and group factors. In the modern times, the decrease in safe sexual practices stands out secondarily related to the HIV prevention fatigue, the optimism toward and the increased coverage of the antiretroviral treatment (ART); the increased use of recreational drugs; the expansion of the use of the Internet and relationship apps leading to an increase in the number of sexual partnerships; the use of antiretroviral drugs by people not infected with HIV for pre-exposure prophylaxis (PrEP), with possible risk compensation; and the practice of "serosorting" – unprotected selective sex with partners of the same HIV serological status – has become increasingly common [5,16,17,18,19,20,21,22,23,24,25].

In areas of the world where the epidemic is concentrated among the key populations, being a teenager in these groups means facing even bigger challenges regarding the risk and the vulnerabil-

ity to HIV and others STIs. This study aims to estimate the prevalence of syphilis and to assess its association with sociodemographic factors, sexual behaviors, and practices in a Brazilian multicenter cohort for combined HIV prevention with daily use of PrEP among MSM and TrTGW adolescents aged 15-19 years.

Methods

The PrEP1519 study is an ongoing demonstration cohort study to evaluate the effectiveness, safety, acceptability, retention, and adherence of the daily use of TDF/FTC as a PrEP for HIV, in a combination prevention strategy, and also to assess the baseline prevalence and the incidence of HIV, and other STIs, among MSM and TrTGW adolescents, aged 15-19 years, in three Brazilian capitals (Belo Horizonte/Minas Gerais State, Salvador/Bahia State, and São Paulo), from February 2019 to December 2021. In this investigation we present data up to May 2021. Methodological informations also can be found in Dourado et al. [26].

Recruitment for the study was carried out by different strategies, including educational approaches with peer educators in schools and LGBTQ+ sociability sites, social media networks – such as Facebook, Instagram, WhatsApp – relationship apps, and an artificial intelligence tool (chatbot) conceived as a trans woman, Amanda Selfie. During recruitment, virtual or in person, information on sexual behavior related to the inclusion criteria was collected, and an appointment was then scheduled for face-to-face evaluation along with the collection of clinical exams, including rapid tests for HIV, syphilis, and viral hepatitis. General inclusion criteria were adolescents MSM and TrTGW aged 15-19 years, who had at least one sexual intercourse with another cisgender man or transgender woman in the past 12 months and reported spending most of their time at the study site (i.e., living, studying, or working in one of the study sites). The exclusion criterion was consumption of alcohol or other drugs at the time of the interview. Those eligible for the PrEP branch had to test anti-HIV negative and meet at least one of the following criteria: unprotected anal sex in the last six months, episode of STI in the last 12 months, use of post-exposure prophylaxis (PEP) in the last 12 months, frequent use of alcohol or drugs before or during sexual intercourse (chemsex), exchanging money or favor for sex, and any specific situation shared between adolescent and interviewer that is considered vulnerable to HIV and other STIs or reported experiences of violence and discrimination due to gender identity/sexual orientation.

The recruitment preceded the informed consent process in which the participants choose to be followed-up with or without use of PrEP, always with a multifaceted approach, with offerings of condoms, lubricating gel, and regular testing for HIV and other STIs. Participants were temporarily or permanently excluded from the PrEP-using group if they reported any of the following conditions at entry: had renal impairment (defined by glomerular filtration rate < 60mL/min/1.75m^2, using the Cockcroft-Galt formula for people aged over 17 years and the Schwartz formula for people aged under 17 years), history of spontaneous bone fracture, clinical condition suggesting acute retroviral syndrome in the last 30 days or risky sexual intercourse in the last 72 hours – in the latter case, they were immediately referred for the use of PEP. Those who agreed to participate signed an informed consent and, at the initial visit, were tested for HIV with 4th generation rapid test, and for other STIs, including syphilis, using the treponemal rapid test (RT) and venereal disease research laboratory (VDRL).

The outcome variable for this study was the prevalence of syphilis at the moment of entry – defined by the RT positivity at the first visit – which comprised the results of participants included between February 2019 and May 2021. The explanatory variables analyzed for the description of the study population, as well as any association with the presence of positive serology for syphilis at the entry, were: age, self-reported race/skin color, schooling level, gender identity, sexual orientation, living or not with family members, own monthly income, unprotected anal or vaginal sex in the last six months, self-reported past episode of any STI and previous use of PEP in the last 12 months, use of alcohol or drugs during sexual intercourse, being a sex worker, exchanging sex for money or favors, and age of the first sexual intercourse, in addition to the type and the number of sexual partners in the last three months.

Initially, an exploratory analysis of the data was conducted by means and medians of the summary of measurements and proportions. The chi-square test was used for proportions. The analysis was made using the conditional logistic regression model. The association strength was determined by the odds ratio (OR) with 95% confidence interval (95%CI). A bivariate analysis was made among the aforementioned sociodemographic and sexual practice data with the outcome variable of whether or not there has been positive serology for syphilis at the entry in the study. The variable presenting $p \leq 0.20$ in the univariate analysis were selected for the multivariate models. Intermediate models were built for each group of variables and those with $p \leq 0.10$ were selected for the final model. A step-by-step backward selection process was used to build the intermediate and the final model. Correlation matrix was used to assess the collinearity at each stage of the analysis. When collinearity was detected, the variables with the best explanatory power were chosen. Only adjusted variables with significant association ($p < 0.05$) with the occurrence of syphilis infection remained in the final model. For the model definitions, the Hosmer-Lemeshow goodness-of-fit test was used. The statistical analysis was made using the software IBM SPSS Statistics, version 24 (https://www.ibm.com/).

This research was carried out in accordance with the guidelines in *Resolution n. 466/2012* of the Brazilian National Health Council (CNS), which establishes the rules for research involving human beings. The research also follows the provisions of *Resolution n. 510/2016*, which regulates the respect for human dignity and special protection for participants in scientific research involving human beings. This study was approved by the WHO Ethics Review Committee (protocol ID: Fiotec-PrEP Adolescent study), and by the Ethics Review Committee from the study coordinating universities: Federal University of Minas Gerais (number 2,027,889), Federal University of Bahia (number 038/18), and University of São Paulo (number 3,082,360). The introduction, discussion, and clarification about the project was individually conducted and those who agreed to participate signed the informed consent form. The parents or legal guardians of individuals younger than 18 years signed the informed consent form. In only one of the study centers (Belo Horizonte), there was a requirement by the Public Ministry for parents or legal guardians of children under 18 to sign the free and informed consent form.

Results

Out of the 677 participants assessed from February 2019 to December 2020, 41.6% (282) dwelled in São Paulo, 36.4% (246) in Salvador, and 22% (149) in Belo Horizonte. The median age was 18.9 years (interquartile range – IQR: 18.1-19.5), 70.5% (477) self-declared as black (black and mixed-race), 51.6% (349) had more than 11 years of schooling and complete high school, 40% (271) declared to have their own income, and 20.7% (140) did not live with their parents or family. Regarding sexual orientation, 70.5% (474) were homosexual/gay and 24.4% (165) bisexual; the 38 (5.6%) who declared themselves heterosexual were among the 48 (7.1%) who identified themselves as TrTGW, in contrast to most cis men, 627 (92.6%). Among the eligibility criteria for the study, 80.4% (544) had unprotected anal sex in the last six months, 22.2% (150) self-reported any episode of STI in the last 12 months, 9.5% (64) used PEP in the last 12 months, and 33.1% (224) reported using alcohol or drugs during sexual intercourse. Although only 4.1% (28) identified themselves as sex workers, 15.1% (102) – almost four times more – reported to have had sexual intercourse in exchange for money (Table 1).

The prevalence of syphilis at the entry of the study was 21.3% (144/677). The bivariate analysis showed that the following variables were statistically associated with greater chance of positive syphilis rapid test at entry: self-reported episode of any STI in the last 12 months (OR = 6.93; 95%CI: 4.61-10.43), being a sex worker (OR = 4.02; 95%CI: 1.86-8.65), exchanging sex for money (OR = 1.68; 95%CI: 1.03-2.74), not living with parents (OR = 1.83; 95%CI: 1.20-2.78), less than 11 years of schooling (OR = 1.66; 95%CI: 1.14-2.41), and beginning of sexual life at the age of 14 or younger (OR = 1.49; 95%CI: 1.01-2.22). Regarding gender identity, there was also more chance of syphilis being prevalent among TrTGW compared to cis men (OR = 1.95; 95%CI: 1.04-3.66), as well as being homosexual (OR = 1.65; 95%CI: 1.03-2.66) and heterosexual (OR = 2.28; 95%CI: 1.01-5.18), when compared to bisexuals. All participants who self-declared heterosexual were either *travestis* or transgender women.

Table 1

Characteristics of participants at the moment of entry in the study (N = 677).

Characteristics	Median	IQR
Age (years)	18.9	18.1-19.5
	n	**%**
Gender identity		
Cisgender men	627	92.6
TrTGW	48	7.1
Others	2	0.3
Sexuality		
Bisexual	165	24.4
Homosexual/Gay	474	70.0
Heterosexual	38	5.6
Race/Skin color		
White	178	26.3
Black	477	70.5
Indigenous	4	0.6
Unknown/Not answered	18	2.7
Schooling > 11 years	349	51.6
No monthly income	406	60.0
Religion		
Catholic	76	11.2
Evangelical	69	10.2
Spiritist (Kardecist)	21	3.1
African matrix (*Umbanda*, *Camdomblé*)	34	5.0
Atheist/Agnostic	60	8.9
None	163	24.1
Unknown/Not answered	254	37.5
Not living with parents	140	20.7
Anal sex (past 6 months)	544	80.4
Vaginal sex (past 6 months)	17	2.5
Self-reported diagnosis of any STI (past 12 months)	150	22.2
PEP use (last 12 months)	64	9.5
Drugs or alcohol use during sex	224	33.1
Sex for money, ever	102	15.1
Sex worker	28	4.1

IQR: interquartile range; PEP: post-exposure prophylaxis; STI: sexually transmitted infections; TrTGW: *travestis* and transgender women.

The syphilis prevalence was higher among black (22.4%) than among white (18.5%), but there was no statistical difference (Table 2).

In the final logistic regression model, the following variables were associated with higher chance of syphilis at the entry of the study: self-reported episode of STI in the last 12 months (OR = 5.92; 95%CI: 3.74-9.37), being a sex worker (OR = 3.39; 95%CI: 1.32-8.78), and low schooling level – 11 years or less (OR = 1.76; 95%CI: 1.13-2.74) (Table 3).

Table 2

Adjusted odds ratios (OR) for factors associated with syphilis diagnosis at entry among participants (N = 677) – bivariable analysis.

Characteristics	Syphilis				OR	95%CI	p-value
	Negative		Positive				
	n	%	n	%			
Gender identity *							
Cisgender men	499	79.6	128	20.4	1.00		
TrTGW	32	66.7	16	33.3	1.95	1.04-3.66	0.035
Sexuality							
Bisexual	140	84.8	25	15.2	1.00		
Homosexual/Gay	366	77.2	108	22.8	1.65	1.03-2.66	0.038
Heterosexual **	27	71.1	11	28.9	2.28	1.01-5.18	0.045
Race/Skin color							
White	145	81.5	33	18.5	1.00		
Black	370	77.6	107	22.4	1.27	0.82-1.96	0.280
Indigenous	2	50.0	2	50.0	4.39	0.59-32.34	0.114
Others/Unknown	16	88.9	2	11.1	0.55	0.12-2.51	0.433
Schooling (years)							
> 11	289	82.8	60	17.2	1.00		
< 11	244	74.4	84	25.6	1.66	1.14-2.41	0.007
Live with parents							
Yes	435	81.0	102	19.0	1.00		
No	98	70.0	42	30.0	1.83	1.20-2.78	0.005
Monthly income							
No	320	78.8	86	21.2	1.00		
Yes	213	78.6	58	21.4	1.01	0.69-1.47	0.945
Any religion *							
No	181	81.2	42	18.8	1.00		
Yes	179	78.5	49	21.5	1.18	0.74-1.87	0.482
Anal sex (past 6 months)							
No	112	84.2	21	15.8	1.00		
Yes	421	77.4	123	22.6	1.56	0.94-2.59	0.085
Vaginal sex (past 6 months)							
No	520	78.8	140	21.2	1.00		
Yes	13	76.5	4	23.5	1.14	0.37-3.56	0.818
Self-reported STI (past 12 months)							
No	459	87.1	68	12.9	1.00		
Yes	74	49.3	76	50.7	6.93	4.61-10.44	< 0.001
PEP use (past 12 months)							
No	485	79.1	128	20.9	1.00		
Yes	48	75.0	16	25.0	1.26	0.69-2.29	0.444
Drugs or alcohol use during sex							
No	365	80.6	88	19.4	1.00		
Yes	168	75.0	56	25.0	1.38	0.94-1.02	0.095
Sex for money, ever *							
No	460	79.9	116	20.1	1.00		
Yes	66	70.2	28	29.8	1.68	1.03-2.74	0.035
Sex worker *							
No	474	80.1	118	19.9	1.00		
Yes	14	50.0	14	50.0	4.02	1.86-8.65	< 0.001

(continues)

Table 2 (continued)

Characteristics	Syphilis				OR	95%CI	p-value
	Negative		Positive				
	n	%	n	%			
Age at first sexual intercourse (years) *							
> 14	187	75.7	60	24.3	1.00		
< 14	298	82.3	64	17.7	1.49	1.01-2.22	0.047
Sex partners (past 3 months) ***							
Cisgender women *							
No	165	81.3	38	18.7	1.00		
Yes	22	75.9	7	24.1	1.38	0.55-3.47	0.490
Transgender men *							
No	173	81.6	39	18.4	1.00		
Yes	2	40.0	3	60.0	6.65	1.07-41.17	0.020
Cisgender men *							
No	120	81.1	28	18.9	1.00		
Yes	163	78.7	44	21.3	1.16	0.68-1.96	0.589
TrTGW *							
No	160	78.4	44	21.6	1.00		
Yes	8	80.0	2	20.0	0.91	0.18-4.43	0.906

95%CI: 95% confidence interval; PEP: post-exposure prophylaxis; STI: sexually transmitted infections; TrTGW: *travestis* and transgender women.

* Sample n totaled less than 677 due to some participants preferred not to answer these questions; for gender identity, 2 participants self-declared as "other" than TrTGW or cisgender men;

** All participants who self-declared heterosexual were TrTGW;

*** If the participant had at least one sexual partner of each category mentioned in the past 3 month.

Table 3

Adjusted odds ratios (OR) for factors associated with syphilis diagnosis at entry among participants – multivariable analysis.

Characteristics	OR	95%CI	p-value
Self-reported STI (past 12 months)			
No	1.00		
Yes	5.92	3.74-9.37	< 0.001
Sex worker			
No	1.00		
Yes	3.39	1.32-8.78	0.012
Schooling (years)			
> 11	1.00		
< 11	1.76	1.13-2.74	0.013

95%CI: 95% confidence interval: STI: sexually transmitted infections.

Discussion

Syphilis remains a worldwide concern and stands out as a serious public health issue in Brazil. The acquired syphilis rate in Brazil increased substantially from 12.3 cases per 100,000 inhabitants, in 2011, to 81.4 in 2017, with a gross growth rate of 561% [4,27]. The worsening of this epidemic with the significant increase in acquired syphilis worldwide, fundamentally associated with unprotected sex, has alarmed public health. In our study, we found high prevalence of syphilis (21.3%) in this population. When this data is stratified, the prevalence among young MSM is 20.4%, which is very worrying when compared with other studies involving the same population, in which the grouped prevalence varied from 4.7 to 6.8% [11,28,29]. In Brazil, a study carried out with young people from the Brazilian Armed Forces found a 1.6% general prevalence of syphilis infection. However, when analyzing exclusively young MSM, the prevalence increased to 5.2% [6]. Sentís et al. [30] observed a general increase in the incidence of syphilis in young people from 2003 to 2015, as well as significant numbers in the rates among young MSM from 18.1 to 116.9/10,000. Studies with outcomes similar to ours are observed in MSM sex workers and is associated with unprotected sex and high number of sexual partners [31,32].

By analyzing exclusively the TrTGW population in our study, the prevalence of syphilis increases to 33.3%. Recent meta-analysis reported prevalence of syphilis among TrTGW ranging from 1.4% to 50.4% [33]. The TrTGW population has the highest rates of HIV and STIs among young people of sexual and gender minorities [34]. The search for the main associated risk factors is very important for prevention and control of the disease. The increased risk of STIs among transsexual women can be associated with several factors, such as commercial sex work, transactional sex, survival sex, unemployment, use of psychoactive substances, history of incarceration, homelessness, non-consensual sex, difficulty to access health services, number of partners, stigma and discrimination, and anal sex without condom [35]. Moreover, this heterogeneous distribution of the disease may also be related to regional differences, marked by economic and environmental disparity among countries; the same is true for the Brazilian regions and municipalities with different health investments, which significantly influence the prevalence of any disease, mainly infectious ones [27]. Zhou et al. [36], in a systematic study of the prevalence of syphilis in Chinese MSM, observed that the lower the city development, the higher the prevalence rates. Pan American Health Organization (PAHO) [37] emphasizes that syphilis prevalence rates above 1% represent yet another disease burden for the population, requiring intervention through expansion of offer of services for point of care testing and treatment in the primary health care units. Countries must assure the quality of such services, bring them closer to the population, and make them more efficient to reach the most vulnerable groups.

The analyses showed significant association of higher prevalence of syphilis cases among sex workers, low schooling level, and prior history of self-reported STI. Previous studies indicate low coverage of testing for syphilis in sex workers [38,39] and structural and individual limitations for access to the health service [40], hampering early diagnosis and treatment. The intersectionality of gender, race, and socioeconomic class in the adolescents' daily lives results in stigma and discrimination. Such vulnerabilities are strongly related to sex work, which is the cause and the consequence of difficulties to access schooling and formal employment, resulting in school dropout and socioeconomic marginalization [40]. It is noteworthy that such exclusion factors affect the TrTGW population more intensely. Studies indicate that TrTGW sex workers – with difficulty to access the formal labor market and education – have more frequent sexual intercourses than the rest of the population and find it more difficult to negotiate use of condom, resulting in unsafe sexual practices and, consequently, higher occurrence of STIs [41,42,43].

Regarding ethno-racial issues, although we found no statistical significance to enable association of syphilis with a particular race or ethnicity, it is possible to notice a trend of higher probability of syphilis among black and indigenous (little represented in our sample), when compared to white. This data is similar to the previous evidence for the Brazilian population and refers to the country's historical processes, when syphilis – considered as a factor of racial degeneration – became justification for eugenicist policies [4,5,44]. In Brazil, the inequities experienced by the black population, in general, coexist with those of class and gender in the social determination of the health-disease process.

This study has some limitations. As this is a demonstrative study of the effectiveness of PrEP use in a real-life scenario, the sample analyzed was not primarily calculated to estimate the prevalence of

syphilis in this population. In this sense, the study used a convenience, and not a probabilistic, sample to describe the baseline prevalence and incidence of STIs documented at baseline and throughout the follow-up. Furthermore, among MSM and TrTGW adolescents, only those who were at increased risk for HIV infection and other STIs were recruited, being eligible to use PrEP. Thus, the documented prevalence of syphilis may be overestimated in relation to what could be expected in this segment of the population.

Nevertheless, this study indicates an alarming prevalence of syphilis among MSM and TrTGW adolescents associated with factors of evident individual, social, and structural vulnerability. Systematic assessment of the different dimensions of the vulnerabilities to STI among MSM and TrTGW adolescents is essential, in a national and global context of increased cases, in order to strengthen the combined prevention strategy for HIV – the fundamental elements of which are point of care diagnosis and treatment of STI. It is also worth reflecting on the importance of the recognition of gender, race, and socioeconomic class markers in the production and maintenance of stigma, discrimination and also the relationship with behaviors and practices of higher risk for STIs and HIV infection. Broader policies to face the social determinants of this and other health conditions are urgent and could contribute to eliminate the role of such oppressions in the maximization of the unacceptable violence experienced by the young people, including violations of social rights, such as barriers for access to health care [45].

It is essential to dissociate ours and other studies results (based on sexual rights and sexual freedom) from moral and cultural conservatism; such prejudice faced by the studied population confirms the need for sexual education and STI and HIV prevention, for all segments of the population, especially for the most vulnerable adolescents, MSM and TrTGW. In Brazil, as a consequence of the rise in conservative politicians and policies, there is a setback in public actions and policies in the health and education area hindering a broad and objective discussion of measures for HIV combined prevention. In this context, programs such as the Health on School [Programa Saúde na Escola] should be strengthen, discussing aspects of race/skin color, gender, sexuality, and prevention, as well as strengthening an accessible and receptive primary health care for MSM and TrTGW adolescents, fundamental steps to control the epidemic of syphilis, HIV, and other STIs in this population.

Contributors

M. R. Westin contributed to the study conception and design, data acquisition, analysis, and interpretation, writing, and review; and approved the final version of the manuscript. Y. F. Martinez contributed to the study conception and design, data acquisition, analysis, and interpretation, writing, and review; and approved the final version of the manuscript. A. P. Silva contributed to the study conception and design, data acquisition, analysis, and interpretation, writing, and review; and approved the final version of the manuscript. M. Greco contributed to the study conception and design, data acquisition, analysis, and interpretation, writing, and review; and approved the final version of the manuscript. L. M. Marques contributed to the study conception and design, data acquisition, analysis, and interpretation, writing, and review; and approved the final version of the manuscript. G. Barreto contributed to the study conception and design, data acquisition, analysis, and interpretation, writing, and review; and approved the final version of the manuscript. M. P. Alves contributed to the study conception and design, data acquisition, analysis, and interpretation, writing, and review; and approved the final version of the manuscript. A. Mancuzzo contributed to the study conception and design, data acquisition, analysis, and interpretation, writing, and review; and approved the final version of the manuscript. U. Tupinambás contributed to the study conception and design, data acquisition, analysis, and interpretation, writing, and review; and approved the final version of the manuscript. D. B. Greco contributed to the study conception and design, data acquisition, analysis, and interpretation, writing, and review; and approved the final version of the manuscript.

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References

1. Hook EW. Syphilis. Lancet 2017; 389:1550-7.
2. World Health Organization. Report on global sexually transmitted infection surveillance, 2018. Geneva: World Health Organization; 2018.
3. Kojima N, Klausner JD. An update on the global epidemiology of syphilis. Curr Epidemiol Rep 2018; 5:24-38.
4. Secretaria de Vigilância em Saúde, Ministério da Saúde. Boletim Epidemiológico Sífilis 2020; (número especial). http://www.aids.gov.br/pt-br/pub/2020/boletim-sifilis-2020.
5. Brignol S, Dourado I, Amorim LD, Kerr LRFS. Vulnerability in the context of HIV and syphilis infection in a population of men who have sex with men (MSM) in Salvador, Bahia State, Brazil. Cad Saúde Pública 2015; 31:1035-48.
6. da Motta LR, Sperhacke RD, Adami AG, Kato SK, Vanni AC, Paganella MP, et al. Syphilis prevalence and risk factors among young men presenting to the Brazilian Army in 2016. Medicine (Baltimore) 2018; 97:e13309.
7. Chow EPF, Callander D, Fairley CK, Zhang L, Donovan B, Guy R, et al. Increased syphilis testing of men who have sex with men: greater detection of asymptomatic early syphilis and relative reduction in secondary syphilis. Clin Infect Dis 2017; 65:389-95.
8. Fernandes FRP, Zanini PB, Rezende GR, Castro LS, Bandeira LM, Puga MA, et al. Syphilis infection, sexual practices and bisexual behaviour among men who have sex with men and transgender women: a cross-sectional study. Sex Transm Infect 2015; 91:142-9.
9. Departamento de Doenças de Condições Crônicas e Infecções Sexualmente Transmissíveis, Secretaria de Vigilância em Saúde, Ministério da Saúde. Pesquisa de conhecimentos, atitudes e práticas na população brasileira. Brasília: Ministério da Saúde; 2016.
10. Gannon-Loew KE, Holland-Hall C. A review of current guidelines and research on the management of sexually transmitted infections in adolescents and young adults. Ther Adv Infect Dis 2020; 7:2049936120960664.
11. Shannon CL, Klausner JD. The growing epidemic of sexually transmitted infections in adolescents: a neglected population. Curr Opin Pediatr 2018; 30:137-43.
12. Aguirrebengoa OA, Garcia MV, Sanchez MR, D'Elia G, Méndez BC, Arrancudiaga MA, et al. Risk factors associated with sexually transmitted infections and HIV among adolescents in a reference clinic in Madrid. PLoS One 2020; 15:e0228998.
13. Spear LP. Adolescent neurodevelopment. J Adolesc Health 2013; 52(2 Suppl 2):S7-13.
14. Wangu Z, Burstein GR. Adolescent sexuality: updates to the sexually transmitted infection guidelines. Pediatr Clin North Am 2017; 64:389-411.
15. O'Connor CA, Shubkin CD. Adolescent STIs for primary care providers. Curr Opin Pediatr 2012; 24:647-55.

16. Chang YH, Liu WC, Chang SY, Wu BR, Wu PY, Tsai MS, et al. Associated factors with syphilis among human immunodeficiency virus-infected men who have sex with men in Taiwan in the era of combination antiretroviral therapy. J Microbiol Immunol Infect 2014; 47:533-41.
17. Chow EPF, Cornelisse VJ, Read TRH, Hocking JS, Walker S, Chen MY, et al. Risk practices in the era of smartphone apps for meeting partners: a cross-sectional study among men who have sex with men in Melbourne, Australia. AIDS Patient Care STIS 2016; 30:151-4.
18. Diclemente RJ, Wingood GM, Sionéan C, Crosby R, Harrington K, Davies S, et al. Association of adolescents' history of sexually transmitted disease (STD) and their current high-risk behavior and STD status: a case for intensifying clinic-based prevention efforts. Sex Transm Dis 2002; 29:503-9.
19. Imrie J, Lambert N, Mercer CH, Copas AJ, Phillips A, Dean G, et al. Refocusing health promotion for syphilis prevention: results of a case-control study of men who have sex with men on England's south coast. Sex Transm Infect 2006; 82:80-3.
20. Jin F, Prestage GP, Kippax SC, Pell CM, Donovan BJ, Kaldor JM, et al. Epidemic syphilis among homosexually active men in Sydney. Med J Aust 2005; 183:179-83.
21. Khosropour CM, Dombrowski JC, Swanson F, Kerani RP, Katz DA, Barbee LA, et al. Trends in serosorting and the association with HIV/STI risk over time among men who have sex with men. J Acquir Immune Defic Syndr 2016; 72:189-97.
22. Kojima N, Davey DJ, Klausner JD. Pre-exposure prophylaxis for HIV infection and new sexually transmitted infections among men who have sex with men. Aids 2016; 30:2251-2.
23. McFarlane M, Bull SS, Rietmeijer CA. The Internet as a newly emerging risk environment for sexually transmitted diseases. JAMA 2000; 284:443-6.
24. Simon Rosser BR, Oakes JM, Horvath KJ, Konstan JA, Danilenko GP, Peterson JL. HIV sexual risk behavior by men who use the internet to seek sex with men: results of the Men's Internet Sex Study-II (MINTS-II). AIDS Behav 2009; 13:488-98.
25. Wong W, Chaw JK, Kent CK, Klausner JD. Risk factors for early syphilis among gay and bisexual men seen in an STI clinic: San Francisco, 2002-2003. Sex Transm Dis 2005; 32:458-63.
26. Dourado I, Magno L, Greco DB, Zucchi EM, Ferraz D, Westin MR, et al. Interdisciplinarity in HIV prevention research: the experience of the PrEP1519 study protocol among adolescent MSM and TGW in Brazil. Cad Saúde Pública 2023; 39 Suppl 1:e00143221.
27. Marques dos Santos M, Lopes AKB, Roncalli AG, Lima KC. Trends of syphilis in Brazil: a growth portrait of the treponemic epidemic. PLoS One 2020; 15:e0231029.
28. Li Y, Xu J, Reilly KH, Zhang J, Wei H, Jiang Y, et al. Prevalence of HIV and syphilis infection among high school and college student MSM in China: a systematic review and meta-analysis. PLoS One 2013; 8:e69137.
29. Fan S, Yang Z, Hou F, Yu M, Luo Z, Liao M, et al. HIV and syphilis and sexual risk behaviours among men who have sex with men attending university in China: a systematic review and meta-analysis. Sex Health 2019; 16:554-65.
30. Sentís A, Martin-Sanchez M, Arando M, Vall M, Barbera MJ, Ocaña I, et al. Sexually transmitted infections in young people and factors associated with HIV coinfection: an observational study in a large city. BMJ Open 2019; 9:e027245.
31. Cáceres CF, Konda KA, Salazar X, Leon SR, Klausner JD, Lescano AG, et al. New populations at high risk of HIV/STIs in low-income, urban coastal Peru. AIDS Behav 2008; 12:544-51.
32. Grandi JL, Goihman S, Ueda M, Rutherford GW. HIV infection, syphilis, and behavioral risks in Brazilian male sex workers. AIDS Behav 2000; 4:129-35.
33. Van Gerwen OT, Jani A, Long DM, Austin EL, Musgrove K, Muzny CA. Prevalence of sexually transmitted infections and human immunodeficiency virus in transgender persons: a systematic review. Transgend Health 2020; 5:90-103.
34. Agwu A. Sexuality, sexual health, and sexually transmitted infections in adolescents and young adults. Top Antivir Med 2020; 28:459-62.
35. Rowniak S, Chesla C, Rose CD, Holzemer WL. Transmen: the HIV risk of gay identity. AIDS Educ Prev 2011; 23:508-20.
36. Zhou Y, Li D, Lu D, Ruan Y, Qi X, Gao G. Prevalence of HIV and syphilis infection among men who have sex with men in China: a meta-analysis. Biomed Res Int 2014; 2014:620431.
37. Organización Panamericana de la Salud. Eliminación de la transmisión maternoinfantil del VIH y la sífilis en las Américas. Actualización 2016. Washington DC: Organización Panamericana de la Salud; 2017.
38. Silveira MF, Teixeira AMFB, Stephan LS, Rosenthal RM, Alves CL, Brum VMA, et al. Conhecimento sobre sorologia para sífilis e HIV entre profissionais do sexo de Pelotas, Brasil. DST J Bras Doenças Sex Transm 2009; 21:27-33.
39. Muhindo R, Mujugira A, Castelnuovo B, Sewankambo NK, Parkes-Ratanshi R, Kiguli J, et al. HIV and syphilis testing behaviors among heterosexual male and female sex workers in Uganda. AIDS Res Ther 2020; 17:48.
40. dos Ramos Farías MS, Garcia MN, Reynaga E, Romero M, Vaulet MLG, Fermepín MR, et al. First report on sexually transmitted infections among trans (male to female transvestites, transsexuals, or transgender) and male sex workers in Argentina: high HIV, HPV, HBV, and syphilis prevalence. Int J Infect Dis 2011; 15:7-9.

41. Hung P, Osias E, Konda KA, Calvo GM, Reyes-Díaz EM, Vargas SK, et al. High lifetime prevalence of syphilis in men who have sex with men and transgender women versus low lifetime prevalence in female sex workers in Lima, Peru. Sex Transm Dis 2020; 47:549-55.
42. Storm M, Deuba K, Damas J, Shrestha U, Rawal B, Bhattarai R, et al. Prevalence of HIV, syphilis, and assessment of the social and structural determinants of sexual risk behaviour and health service utilisation among MSM and transgender women in Terai highway districts of Nepal: findings based on an integrated biological and behavioural surveillance survey using respondent driven sampling. BMC Infect Dis 2020; 20:402.
43. Poteat T, Wirtz AL, Radix A, Borquez A, Silva-Santisteban A, Deutsch MB, et al. HIV risk and preventive interventions in transgender women sex workers. Lancet 2015; 385:274-86.
44. Carrara S. Estratégias anticoloniais: sífilis, raça e identidade nacional no Brasil do entre-guerras. In: Hochman G, Armus D, editors. Cuidar, controlar, curar: ensaios históricos sobre saúde e doença na América Latina e Caribe. Rio de Janeiro: Editora Fiocruz; 2004. p. 426-53.
45. Oliveira E, Couto MT, Separavich MAA, Luiz OC. Contribuição da interseccionalidade na compreensão da saúde-doença-cuidado de homens jovens em contextos de pobreza urbana. Interface (Botucatu) 2020; 24:e180736.

Resumo

A sífilis reemergiu enquanto problema sério de saúde pública no Brasil e no mundo, afetando de maneira desproporcional homens que fazem sexo com homens (HSH), travestis e mulheres transgênero. São relativamente escassos os estudos sobre infecções sexualmente transmissíveis (IST) entre adolescentes pertencentes a essas populações-chave. O estudo transversal multicêntrico brasileiro analisou a prevalência de sífilis na linha de base da coorte PrEP15-19 de HSH, travestis e mulheres transgênero adolescentes, sexualmente ativos, recrutados entre abril de 2019 e dezembro de 2020. As análises foram realizadas com as dimensões de vulnerabilidade a ISTs/HIV, e modelos de regressão logística foram construídos para estimar as razões de chances da associação entre as variáveis preditoras e um teste treponêmico positivo para sífilis na entrada do estudo. Foram analisados 677 participantes. A idade mediana era 18,9 anos (IIQ: 18,1-19,5), 70,5% (477) se autoidentificaram como pretos, 70,5% (474) como homossexuais/gays e 48 (7,1%) como mulheres trans ou travestis. A prevalência de sífilis na linha de base era 21,3%. No modelo final de regressão logística, as seguintes variáveis estiveram associadas com chances maiores de sífilis: autorrelato de episódio de IST nos últimos 12 meses (OR = 5,92; IC95%: 3,74-9,37), profissional do sexo (OR = 3,39; IC95%: 1,32-8,78) e menos de 11 anos de escolaridade (OR = 1,76; IC95%: 1,13-2,74). A prevalência de sífilis entre HSH, travestis e mulheres transgênero adolescentes entre 15 e 19 anos de idade foi alarmante, muito acima da taxa relatada na população geral nesta faixa etária, e esteve associada a fatores de vulnerabilidade. Os achados reforçam a necessidade urgente de fortalecer os programas de saúde pública com a discussão sobre raça, gênero, sexualidade e prevenção.

Sífilis; Profilaxia Pré-Exposição; Adolescente; Vulnerabilidade em Saúde; Prevenção de Doenças

Resumen

La sífilis ha resurgido como un problema serio de salud pública en Brasil y en todo el mundo, afectando desproporcionadamente a hombres que tienen sexo con hombres (HSH), travestis y mujeres transgénero (TrTGW). Los estudios de las enfermedades trasmitidas sexualmente (ETS) en adolescentes de estas poblaciones clase son relativamente escasos. Se trata de un estudio transversal brasileño multicéntrico, con análisis de prevalencia de la base de referencia de la cohorte PrEP1519 de hombres activos sexualmente que mantienen sexo con hombres y adolescentes TrTGW, reclutados desde abril de 2019 a diciembre de 2020. Se hicieron análisis, usando las dimensiones de vulnerabilidad a las ETS/VIH, y se realizaron modelos de regresión logística para estimar las odds ratios *de la asociación entre las variables predictoras y la prueba treponémica positiva para la sífilis al comenzar el estudio. Se analizaron a 677 participantes. La media de edad fue 18,9 años (IQR: 18,1-19,5), 70,5% (477) se autodeclararon como negros, 70,5% (474) como homosexuales/gays y 48 (7,1%) como mujeres trans o travestis. La base de referencia de prevalencia de sífilis fue 21,3%. En el modelo final de regresión logística, se asociaron con una posibilidad más alta de sífilis: un episodio autoinformado de ETS en los últimos 12 meses (OR = 5,92; IC95%: 3,74-9,37), trabajadores sexuales (OR = 3,39; IC95%: 1,32-8,78) y < 11 años de estudio (OR = 1,76; IC95%: 1,13-2,74). La prevalencia de sífilis entre adolescentes HSH/TrTGW con edades de 15 a 19 años fue alarmante, mucho más que lo descrito para la población general en este rango de edad y asociado con factores de vulnerabilidad. Esto refuerza la urgente necesidad de fortalecer los programas de salud pública, discutiendo cuestiones de raza, género, sexualidad y prevención.*

Sífilis; Profilaxis Pre-Exposición; Adolescente; Vulnerabilidad en Salud; Prevención de Enfermedades

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