HIV/AIDS - Research and Palliative Care

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ORIGINAL RESEARCH

Prevalence of HIV, *Treponema pallidum* and Their Coinfection in Men Who Have Sex with Men, Medellín-Colombia

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Introduction: In Colombia, HIV and gestational syphilis are notifiable events; however, they are poorly investigated infections in men who have sex with men (MSM).

Objective: To determine the prevalence of HIV, *Treponema pallidum*, and their co-infection in MSM treated at a Health Services Provider Institution (HSPI) specialized in infectious diseases from Medellín.

Methods: Cross-sectional study with 3454 MSM. Prevalence was determined with its 95% confidence interval; associated factors were identified using Fisher's Exact test, Pearson's Chi-square, and trend Chi-square. Multivariate adjustment was performed using logistic regression. Analyses were performed using SPSS 29.0.

Results: The prevalence of HIV was 5.7%, *T. pallidum* 0.7%, and co-infection 0.6%. The prevalence of HIV was higher in MSM aged between 24–40 years (7.5%), with technical or university studies (10.0%), without health insurance affiliation (12.4%), and those who have had a sexual partner with HIV (36.2%). *T. pallidum* was higher in MSM without health insurance affiliation (3.4%), who had sexual relations with people diagnosed with an STI (5.9%), and a sexual partner with HIV (12.1%). Co-infection was higher in MSM without health insurance affiliation (2.7%), and those who had a partner with HIV (11.2%).

Conclusion: Compared with the general Colombian population, MSM have a higher risk of HIV, but are similar to *T. pallidum*. The identification of the main associated factors in each infection demonstrates the need to prioritize subgroups of MSM that show greater vulnerability to these events. This research demonstrates the urgency of implementing health education strategies in MSM who have a sexual partner with HIV or other STIs. Large gaps were also evident in the magnitude of the three events according to the health insurance affiliation regime, which demonstrates problems of social and health injustice, especially with MSM without health insurance affiliation.

Keywords: men who have sex with men, HIV, T. pallidum, syphilis, STI, coinfection, prevalence

Introduction

Every day, more than one million people contract a sexually transmitted infection (STI), with most cases being asymptomatic.[1] Over 30 sexually transmissible microorganisms have been identified, with the most prevalent in bacterial etiology being those causing syphilis, gonorrhea, and chlamydia; trichomoniasis in parasitic etiology; and Hepatitis B, Herpes simplex, Human Papillomavirus, and Human Immunodeficiency Virus (HIV) in viral etiology.[1] In Colombia, STIs constitute a significant cause of morbidity and mortality, with negative effects on individual health and high healthcare costs.[2] Among these infections, syphilis and HIV stand out due to their high prevalence, especially in the young and adult population, their risks for maternal and neonatal health, and shared risk factors and transmission mechanisms. It is worth noting that STIs causing ulcers, such as syphilis, facilitate the entry of HIV, and individuals infected with HIV have a higher risk of acquiring syphilis due to immunosuppression, creating a synergistic effect between these two STIs.[3,4]

Received: 28 November 2023
Accepted: 27 February 2024
Published: 18 April 2024

In 2022, the global number of people living with HIV was 39 million, with 1.3 million new infections reported in the same year.[5] Homosexual men and men who have sex with men (MSM) recorded a prevalence of 7.7% (10 times higher than that reported in adults from the general population in whom the prevalence was 0.7%).[5] Regarding syphilis, the World Health Organization (WHO) reported 5.6 million new cases in 2016.[6] A systematic review on *T. pallidum* covering the period from 2000 to 2020 revealed a prevalence of 7.5%, which increased to 10.6% in data from Latin America and the Caribbean.[7] In Colombia, approximately 20,000 new cases of HIV are reported annually, with an incidence of 39.2 per 100,000 inhabitants, approximately 40% of which are in MSM.[8,9] The incidence of syphilis is approximately 300 per 100,000 people, with prevention, diagnosis, and treatment efforts primarily focused on pregnant women and their children, leading to a lack of solid data on syphilis in the general population or at-risk groups.[10]

In terms of research, several studies have highlighted a high prevalence of co-infection with HIV and *Treponema pallidum*. In Asia, a systematic review in 2023 showed a prevalence of 3.0%.[11] In 2021, the Hospital in Guayaquil, Ecuador reported a syphilis prevalence of 5.2% in individuals with HIV.[12] In Venezuela in 2022, 15.6% of subjects with a recent diagnosis of HIV were co-infected with *Treponema pallidum*. In Colombia, there are also reports of this co-infection, with 2.1% coinfection found in 1698 individuals from the general population with HIV in Montería,[13] and a study in Medellín involving the general population, MSM, and vulnerable young people from a social organization reported a co-infection rate of 1.5%.[14]

Men who have sex with men (MSM) represent a significantly affected population concerning HIV and *T. pallidum*, with vulnerability stemming from a combination of biological, behavioral, and socio-structural factors. Biologically, unprotected anal sex is associated with a higher risk of STI transmission due to the exposure of the rectal mucosa, lack of lubrication, and increased vascularity of the area, factors that favor the presence of lesions and heightened susceptibility to infections.[15] Behavioral factors include the prevalence of multiple sexual partners, inconsistent condom use, and recreational drug use, all of which can increase the likelihood of infection.[16] Moreover, structural factors such as stigma, discrimination, and the criminalization of sex behavior in certain societies may limit MSM's access to sexual health services, including education on STIs, testing, and treatment.[17] In other contexts, migration and displacement have been indicated to hinder access to healthcare, making MSM vulnerable to sexual exploitation and exposure to infectious diseases due to poor living conditions.[18]

In addition to the risk of these infections in MSM, various authors have reported extensive heterogeneity in the associated factors. These may include having a higher number of sexual partners,[19,20] not using condoms,[19] engaging in receptive anal sex,[21] identifying as homosexual or bisexual,[19,22] a history of STIs,[23] alcohol consumption,[21–23] lack of a stable partner,[20,21] and educational level.[20,24]

Despite this background, research on this co-infection in MSM is scarce in Colombia, as evidenced by the limited number of studies found in PubMed, ScienceDirect, SciELO, OVID, and other multidisciplinary databases using the terms (HIV AND (Syphilis OR *T. pallidum)* AND (MSM OR men who have sex with men) AND Colombia. This scarcity hinders understanding the magnitude of the problem and associated factors, impedes the design of effective prevention and control strategies tailored to the needs of MSM, and prevents knowledge of the impact of health interventions, among other crucial aspects for mitigating health risks in this group. Therefore, the present study aimed to determine the prevalence of HIV and *Treponema pallidum*, as well as their coinfection, in MSM attending at a specialized health service provider for infectious diseases in Medellin.

Methods

Study Design and Subjects

A cross-sectional study was conducted with 3454 MSM attended at the Fundación Antioqueña de Infectología (FAI) selected with non-probabilistic sampling. FAI is an institution that attracts patients both intramurally and extramurally in public spaces frequented by MSM (saunas, steam rooms, meeting rooms of foundations, typically located in the city center), located in Medellin-Colombia (Figure 1). Men aged 14 to 75 who reported having sex with other men, regardless of their sexual orientation or identity (including heterosexuals, bisexuals, pansexuals), voluntarily agreed to be screened for HIV and *T. pallidum* at the FAI and signed informed consent.

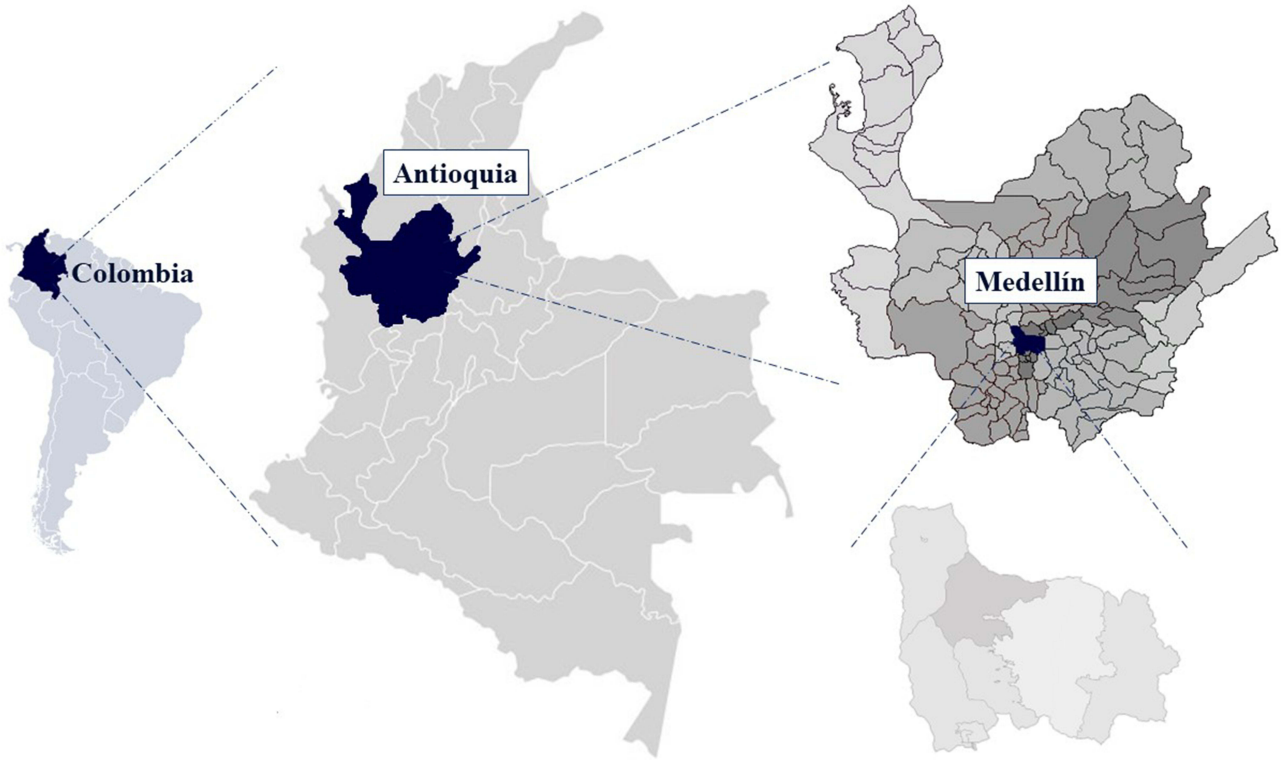

Figure 1 Study city.

Diagnostic Test

The SD BIOLINE HIV/Syphilis Duo® was used in peripheral blood samples. This test is a solid-phase chromatographic immunoassay detecting IgG, IgM, and IgA antibodies specific to *T. pallidum* using strips coated with recombinant capture antigens of 17 kDa, with a sensitivity and specificity of 99.7%. For HIV, it includes recombinant antigens gp41 and p24 specific to HIV-1, including subtypes O and gp36 for HIV-2, with a sensitivity and specificity of 99%. A second test in peripheral blood, Alere Determine TM HIV-1/2 Ag/Ab combo, was applied internally to positive cases, an immunochromatography for the qualitative detection of p24 antigen and HIV 1/2 antibodies, with a sensitivity of 100% and specificity of 99.7%.

Data Collection

Secondary information source was collected from the FAI records, in an anonymized Excel file. The FAI field team, comprising a physician, project leader, community work coordinator, and nursing assistants, conducted various workshops, playful encounters, and theatrical performances to promote STI screening. MSM expressing interest in participating were interviewed by the team's doctor, who conducted pre-test counseling. If the individual agreed to participate, the study was explained to them and they provided informed consent. Subsequently, a nursing assistant administered a survey capturing socioeconomic data and sexual risk factors, while also collecting peripheral blood samples processed at a high-complexity clinical laboratory in the city. Upon obtaining diagnostic test results, the FAI doctor delivered the results, provided post-test counseling, and, for positive cases, activated the patient's care pathway in the treating healthcare institution or provided direct care at the FAI by their infectious disease team.

Information Bias Control

Information bias was controlled through data collection by medical personnel, an extramural fieldwork manual with apparent validity, motivational campaigns for participants, pre and post-test counseling, and application of diagnostic tests with a risk of false positives (complement of specificity) or negatives (complement of sensitivity) less than 1%.

Statistical Analysis

Variables were described with absolute frequencies (#) and percentages (%). The comparison of HIV, *T. pallidum*, and coinfection with nominal variables was performed using Pearson's Chi-square or Fisher's Exact test (when at least one absolute frequency was ≤5) and Trend Chi-square for ordinal variables. Logistic regression models were used to identify confounding variables and those associated with the prevalence of each infection and coinfection, with goodness of fit determined by Wald and Hosmer-Lemeshow statistics. The presence of interaction was ruled out through multivariate logistic models, introducing independent variables (eg, variables A, B, C, and D) with interaction factors for each variable (eg, AB, AC, A*D), formulated as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_{2+} \beta_3 X_{3+} \beta_n X_{n+} \beta_1 (X_1 * X_2)_+ \beta_1 (X_1 * X_3) + \beta_1 (X_1 * X_n)$$

Statistical analyses were conducted using IBM SPSS 29.0, with p-values < 0.05 considered significant.

Results

In the study group, most of MSM were young <25 years (46.8%), had basic education (46.6%), were single (66.0%), and affiliated with the contributory health insurance system (67.6%). The most common sexual risk factors were changing sexual partners in the last six months (50.9%) and the use of hallucinogens during sexual encounters (47.2%) (Table 1).

The general prevalence of HIV was 5.7%, *T. pallidum* was 0.7%, and coinfection was 0.6%. The prevalence of HIV showed statistically significant differences based on education, marital status, health insurance affiliation, and specific sexual risks. Specifically, the prevalence was statistically higher in those who had not received psychoactive substances or money in exchange for sexual relations, those who had sexual relations with individuals diagnosed with STIs, and those who had a sexual partner with HIV. For *T. pallidum*, statistical differences were observed based on marital status, health insurance affiliation, changing sexual partners in the last six months, having sexual relations with individuals with STIs, or having had a sexual partner with HIV. Coinfection presented statistical differences with health insurance affiliation, having sexual relations with individuals with STIs, or having had a sexual partner with HIV (Table 2).

In the multivariate adjustment for HIV prevalence, marital status and sexual relations, particularly with individuals diagnosed with STIs, were identified as confounding variables (did not show statistically significant in the regression

Table 1 Socioeconomic Description and Sexual Risk Factors of the Study Group

		n	%
Age group	14–24	1618	46.8
	25–40	1440	41.7
	41–75	396	11.5
Education	None	1236	35.8
	Basic (Primary-Secundary)	1608	46.6
	Technical-University	610	17.7
Marital status	Single	2281	66.0
	Married-Consensual union	1173	34.0
Health insurance	Contributory	2336	67.6
	Subsidized	707	20.5
	None	411	11.9
Sexual risk factors[a]	New sexual partner in the last six (6) months	1184	50.9
	Uses hallucinogens during sexual relations	1096	47.2
	Received psychoactive substances or money in exchange for sexual relations	488	21.0
	Sexual relations with individuals with STI	393	16.9
	Sexual partner with HIV	116	5.0

Notes: [a]A total of 32.7% (n = 1130 MSM) did not respond to these questions, with a denominator of 2324 MSM.

Table 2 General Prevalence of HIV, T. Pallidum, Coinfection, and Specific Prevalences According to Socioeconomic Conditions and Sexual Risk Factors

		HIV	*T. pallidum*	Co-Infection
Prevalence % (n)		**5.70 (197)**	**0.72 (25)**	**0.55 (19)**
CI (95%)		**4.9–6.5**	**0.4–1.0**	**0.3–0.8**
		Specific prevalence		
Age group	14–24 25–40 41–75 *p* Chi^2-Tendencia	4.7 (76) 7.5 (108) 3.3 (13) 0.468	0.4 (6) 1.2 (17) 0.5 (2) 0.151	0.3 (5) 0.9 (13) 0.3 (1) 0.355
Education	None Basic (primary-secundary) Technical-University *p* Chi^2-Tendence	2.0 (25) 6.9 (111) 10.0 (61) <0.001**	0.3 (4) 1.1 (18) 0.5 (3) 0.317	0.3 (4) 0.9 (15) 0.0 (0) 0.815
Marital status	Single Married-Consensual union *p* Chi^2-Pearson	7.4 (168) 2.5 (29) <0.001**	0.9 (21) 0.3 (4) 0.040*[a]	0.7 (15) 0.3 (4) 0.172 [a]
Health insurance	Contributory Subsidized None *p* Chi^2-Pearson	4.3 (101) 6.4 (45) 12.4 (51) <0.001**	0.4 (9) 0.3 (2) 3.4 (14) <0.001**	0.3 (6) 0.3 (2) 2.7 (11) <0.001**
New sexual partner in the last six (6) months	No Yes *p* Chi^2-Pearson	5.8 (66) 5.0 (59) 0.389	0.6 (7) 1.5 (18) 0.034*	0.6 (7) 1.0 (12) 0.285
Uses hallucinogens during sexual relations	No Yes *p* Chi^2-Pearson	5.9 (72) 4.8 (53) 0.273	1.2 (15) 0.9 (10) 0.471	0.9 (11) 0.7 (8) 0.658
Received psychoactive substances or money in exchange for sexual relations	No Yes *p* Chi^2-Pearson	5.9 (108) 3.5 (17) 0.037*	1.1 (20) 1.0 (5) 0.902 [a]	0.9 (16) 0.6 (3) 0.412[a]
Sexual relations with individuals with STI	No Yes *p* Chi^2-Pearson	2.7 (42) 13.0 (51) <0.001**	0.1 (2) 5.9 (23) 0.006**[a]	0.1 (2) 4.3 (17) 0.023*[a]
Sexual partner with HIV	No Yes *p* Chi^2-Pearson	2.8 (49) 36.2 (42) <0.001**	0.4 (7) 12.1 (14) <0.001**	0.2 (4) 11.2 (13) 0.0091**[a]

Notes: [a]*p* Exacta de Fisher. **p*<0.05. ***p*<0.01.
Abbreviation: CI, Confidence interval.

Table 3 Explanatory Factors for the General Prevalence of HIV, T. Pallidum, and Co-Infection

Logistic Regression Models	B	Wald	*p*	OR (CI95%)
Model HIV				
Age group		13.8	0.001**	
14–24 / 41–75	0.34	0.7	0.397	0.71 (0.3–1.6)
25–40 / 41–75	0.69	0.36	0.050	2.0 (1.0–4.0)
Education		43.6	<0.001**	
Basic / None	1.66	25.1	<0.001**	5.2 (2.7–10.0)**
Superior / None	2.44	41.9	<0.001**	11.4 (5.5–23.9)**
Health insurance		15.1	0.001**	
Subsidiado / Contributivo	0.27	0.6	0.444	1.3 (0.6–2.6)
Ninguno / Contributivo	1.14	15.0	<0.001**	3.1 (1.8–5.6)**
Received psychoactive substances or money in exchange for sexual relations (No/Yes)	0.73	4.8	0.028*	2.1 (1.1–3.9)*
Sexual partner with HIV (Yes/No)	2.93	112.3	<0.001**	18.7 (10.9–32.2)**
Model *T. pallidum*				
Health insurance		14.7	0.001**	
Subsidized / Contributory	−0.84	1.1	0.296	0.4 (0.1–2.1)
None / Contributory	1.58	9.8	0.002**	4.8 (1.8–13.0)**
Sexual relations with individuals with STI (Yes/No)	2.76	10.6	0.001**	15.8 (3.0–83.0)**
Sexual partner with HIV (Yes/No)	1.76	10.3	0.001**	5.8 (2.0–16.9)**
Model coinfection				
Health insurance		12.6	0.002**	
Subsidized / Contributory	0.44	0.3	0.595	0.6 (0.1–3.3)
None / Contributory	1.74	9.3	0.002**	5.7 (1.9–17.4)**
Sexual partner with HIV (Si/No)	3.86	42.7	<0.001**	47.5 (14.9–151.4)**

Notes: *p<0.05. **p<0.01.
Abbreviations: OR, Odds ratio; CI, confidence interval.

model). According to this regression model, a higher prevalence of HIV was observed in the following groups: among MSM aged 24–40 years, the prevalence was twice that found in the group aged 41–75 years old; in MSM with basic education, it was 5.2 times the prevalence in MSM without formal education, and among those with technical or university studies, it was 11.4 times that of those without formal education; in MSM without health insurance affiliation, the prevalence was 3.1 times that recorded in those affiliated with the contributory health insurance system; in those who have not had sexual relations in exchange for psychoactive substances or money, the prevalence was 2.1 times compared to those who reported this practice, and in MSM who have had a partner with HIV, the prevalence was 18.7 times compared to those who have not had such a partner (Table 3).

The prevalence of *T. pallidum* in MSM without health insurance affiliation was 4.8 times that in MSM affiliated with the contributory health insurance system; 15 times higher in those who have had sexual relations with individuals diagnosed with an STI, and 5 times higher in MSM who have had a partner with HIV. Co-infection was 5 times higher in MSM without health insurance affiliation (compared to those affiliated with the contributory health insurance system) and 47 times higher in MSM who have had a partner with HIV (Table 3).

Discussion

Prevalence of HIV and Associated Factors

Our study showed a 5.7% HIV prevalence slightly lower than the global reports in homosexuals and MSM of 7.7%.[5] Locally, a study reported HIV prevalence in MSM from different cities, specifically in the case of Medellín, it was 21.0% in 2016 and 11.4% in 2019. This decrease could be attributed to educational and preventive efforts for HIV in this population, improved access to healthcare services, increased awareness of the importance of preventing and timely diagnosing and treating HIV to reduce transmission.[25]

Regarding age, the specific prevalence of HIV was higher in MSM aged 24–40 years, a finding similar to the UNICEF 2018 report, indicating that global infections are higher in individuals aged between 25 and 49 years. It also aligns with the Colombian National Institute of Health (Acronym in Spanish INS) report in 2020 on HIV in the general Colombian population, where the highest number of infections was between 25–34 years, followed by ages 15–24 and 35–44 years, mainly in the homosexual population.[26]

In the study population, the prevalence of HIV was 11.4 times higher in MSM with technical or university studies and 5.2 times higher in MSM with basic education compared to MSM without formal education. In a study conducted in seven cities in Colombia, the prevalence of HIV among MSM with technical or technological studies was highest in Cartagena, Cali, and Cúcuta, at 21.4%, 33.4%, and 18.2%, respectively. Some reports also indicate that a higher proportion of MSM comes from individuals with a high level of education, where most cases are concentrated.[27,28] The university environment is constantly undergoing cultural transformations regarding the acceptance of sexual diversity, openness to new sexual dynamics, and the congregation of young people who are beginning to become independent, seek new sexual experiences, and have a low perception of the risk of infection. This can increase risky sexual behaviors such as having multiple sexual partners, engaging in unprotected sexual relations, consuming drugs and alcohol before sex, and using dating apps, among other situations that warrant further study in Medellín.[29–33]

The prevalence of HIV was higher in MSM without health insurance affiliation, aligning with a previous study in Colombia that found an infection prevalence of 25% in unaffiliated individuals, 17% for individuals under the subsidized regime, and 9.8% in the contributory regime. Understanding that unaffiliated and subsidized regime individuals correspond to groups without formal employment that involve health insurance contributions, the previously described confluence indicates a higher probability of infection in groups with socioeconomic disadvantages. This should alert health authorities to implement actions that address this inequality in HIV figures based on the type of health insurance affiliation.[28]

The prevalence of HIV was also higher in MSM who had not had sexual relations in exchange for psychoactive substances or money. This contradicts the available evidence on this risk factor, as transactional sex is associated with socioeconomic vulnerability, recreational drug use, and a higher probability of reporting other HIV risk behaviors such as unprotected anal sex.[34,35] In this study population, the lower prevalence of HIV in those who reported sexual relations in exchange for psychoactive substances or money may be explained by health education efforts on these risk factors or the targeting of some health campaigns by health departments in areas of the city that concentrate transactional sex, prostitution, and drug use. However, further studies are needed to delve into the explanatory factors for this finding.

The prevalence of HIV was higher among MSM who had a HIV-positive partner, which aligns with previous data from Colombia reporting a high proportion of MSM who know that their partner has HIV, especially in those who have had a stable partner in the last year.[28] In this context, it is important to highlight several aspects: (i) having sexual relations with a person whose viral load is completely suppressed through antiretroviral therapy (ART) is safe; (ii) correct condom use is also considered an effective measure to prevent transmission; (iii) pre-exposure prophylaxis for HIV-negative individuals at high risk of contracting the virus, under proper medical supervision, has proven to be effective, indicating that sex can be considered safe even with HIV-positive individuals.[36,37] In this regard, efforts should be made to improve educational strategies on the prevention of transmission risks among HIV-positive individuals or their partners through various means, such as sharp or pointed objects, unprotected sexual relations, and low adherence to ART.[37] Finally, it is relevant to consider that adherence to ART can be affected by multiple social issues, mainly stigma, discrimination, mistreatment, rejection, drug use during sex, combined medication use, and structural barriers.[28,38]

Prevalence of T. Pallidum, Co-Infection with HIV, and Associated Factors

The prevalence of *T. pallidum* was 0.7%. In Latin America and the Caribbean, a prevalence of 10.6% has been reported.[7] This finding contrast notably with the current study, challenging the projected trend of increasing syphilis infections in the general population of the Americas.[39] The low recorded prevalence could be attributed to a combination of factors, including specific public health interventions such as "Medellín me cuida", which in 2022 conducted around 10,000 rapid HIV tests and 5000 syphilis tests; 520 educational activities in sexual and reproductive health listening centers, and 204 "city takeovers".[40] It is also necessary to explore the improvement of preventive practices, such as increased awareness

of condom use during sexual relations, decreased number of sexual partners, more frequent testing to mitigate transmission, especially in asymptomatic individuals, increased diagnostic efforts, and the supply of treatments as a result of increased affiliation with the General Social Security System in Health, among others.[6,41–44]

The prevalence of *T. pallidum* was higher in MSM without health insurance affiliation. Although Colombia lacks data on the prevalence of syphilis in MSM in different health regimes, it is clear that the absence of affiliation is one of the main barriers to access basic health promotion and prevention programs, screening, diagnosis, and treatment.[45]

The prevalence of *T. pallidum* was 15 times higher in those who had sexual relations with individuals diagnosed with an STI. Although specific information on this prevalence is limited to contrast our data, this phenomenon can be attributed to the confluence of multiple factors: greater exposure to *T. pallidum* or other agents that facilitate this infection, exposure to general risk factors for STIs such as unprotected sex or contact with multiple sexual partners, higher risk of coinfection and reinfection, especially in STIs that cause skin lesions, low risk perception, or little awareness of the importance of preventing such infections,[31,46–50] among other factors that highlight the difficulty of reducing STI morbidity in this subgroup of MSM.

The prevalence of *T. pallidum* was 5 times higher in MSM who had a partner with HIV, a finding that agrees with previous research that has established a significant association between HIV infection and an increased risk of acquiring syphilis, attributable to shared risk factors and the microbiological convergence of these two infections.[3,4,15,16,51] In this context, the prevalence of co-infection was 0.6%. Although the magnitude of this co-infection in MSM is not well known in Colombia, other authors have reported a higher magnitude. For instance, in Paraguay, the prevalence of HIV-syphilis co-infection in 315 MSM was 6%,[47,52] in Ecuador, a study with 1002 HIV-positive individuals found a co-infection rate of 4.8%,[18] and in Brazil, it was 10%.[23] All of this is attributable to the biological, behavioral, and social risks shared by these two STIs.[3,15–17,48] As discussed previously for each infection, coinfection was higher in those without health insurance and those who had a partner with HIV, demonstrating structural healthcare system gaps, as well as low awareness of the importance of breaking the STI transmission chain.

Limitations and Strengths

The primary limitations lie in the fact that the statistical associations are not of a causal nature, and there was not a comprehensive record of the main sexual risk factors. Among the strengths, it is worth highlighting that this is one of the few Colombian studies with a substantial sample size of men who have sex with men (MSM). The assessment of coinfection as an independent outcome and the identification of social inequities in a group inherently stigmatized are notable strengths.

Conclusion

In comparison to the general Colombian population, MSM face a higher risk of HIV but a similar risk for *T. pallidum*. The identification of key factors associated with each infection underscores the need to prioritize specific subgroups of MSM that exhibit greater vulnerability to these events. This research highlights the urgency of implementing health education strategies for MSM who have had a sexual partner with HIV, given its strong association with HIV, *T. pallidum*, and coinfection. Furthermore, significant disparities were observed in the prevalence of the three events based on health insurance affiliation, indicating issues of social and healthcare injustice, particularly for MSM without health insurance.

Data Sharing Statement

Data has not been deposited in a public repository. Anonymized data is available on reasonable request to the authors.

Ethics Approval and Consent to Participate

The study complies with the Declaration of Helsinki. The study received approval from the scientific committee of the FAI and adhered to the guidelines of Colombia's Ministry of Health Resolution 8430, categorizing it as a risk-free study. Additionally, Resolution 1995 of 1999, governing the handling of medical records and access to this information by the

healthcare team, was followed. Compliance with National Decree 1377 of 2013, partially regulating Law 1581 of 2012 for the protection of personal data, was ensured. Recommendations from the World Health Organization regarding informed consent, confidentiality, counseling, result quality, and referral to health services for treatment were implemented. The database information was coded to guarantee the confidentiality of information and not jeopardize the identity or privacy of individuals (non-linked or anonymized information). All participants signed informed consent forms before participation. In cases where possible, parental consent was obtained; however, according to sentence C-246/17 and T-675-17 about the Self-determination of minors; the Constitutional Court of the Republic of Colombia in 2017 determined that parental consent is not necessary in these cases given that the age of 14 has been established that minors may have the maturity to begin to assume obligations and responsibilities in society, such as marriage, consent of sexual relations, and the right to privacy in the family environment.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Disclosure

The authors report no conflicts of interest in relation to this work and declared no potential conflicts of interest with respect to the research and publication of this article.

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