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Sexual behaviours and sexually transmitted infections among MSM living with HIV followed at a university hospital in Istanbul, Turkey

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Abstract

Background: Men sex with men (MSM) are accepted as a hidden key population in the dissemination of HIV in Turkey. Understanding sexual behaviours and Sexually Transmitted Infections (STI) frequency in MSM living with HIV is important to provide appropriate health and control policies.

Methods: Sexual anamnesis including 5Ps were taken with triple-site (urine, pharyngeal and rectal swab) screening tests, which were performed according to the recommendations in the HIV follow up guidelines, from 45 MSM living with HIV, who were followed and consecutively attended to their control visit Marmara University Pendik Education and Training Hospital, in Istanbul, in 2018.

Results: 24.4 % and 26.7 % of participants tested positive for *Chlamydia trachomatis* (CT) and *Neisseria gonorrhoeae* (NG), respectively. This ratio decreased to 6.7% if urine was the only sample taken to be tested. Syphilis seropositivity increased from 18% to 34% during the HIV diagnosis to triple testing time, which is a median period of 28 months.

Conclusion: The data obtained emphasizes the screening and reimbursement of triple testing in key population groups.

Keywords

HIV (Human immunodeficiency virus) < viral disease, sexual behaviour < other, Chlamydia (Chlamydia trachomatis) < bacterial disease, gonorrhea (Neisseria gonorrhoeae) < bacterial disease, screening < other

Introduction

In Turkey, Human Immunodeficiency Virus (HIV), syphilis, *Neisseria gonorrhoeae* (NG), and *Chlamydia trachomatis* (CT) infections are notifiable diseases under national legislation. Due to the increasing case numbers, these sexually transmitted infections (STIs) have become a major public health concern in last few decades.

From 2010 to 2021, the number of new HIV infections declined in sub-Saharan Africa but increased in Eastern Europe, Central Asia, the Middle East, North Africa, and Latin America, as well as in Turkey.[1] Epidemiologically, Turkey is classified within the World Health Organization (WHO) Central Europe region due to its geographic and demographic characteristics, while also being in close proximity to the Middle East and North Africa. In 2023, Poland and Turkey together accounted for 70% of all HIV diagnoses reported in the Central Europe region. Moreover, these two countries reported the highest proportions of HIV diagnoses with an unknown transmission mode—78% in Poland and 71% in Turkey.[2] According to official records from the Turkish Ministry of Health, 45,835 HIV cases were reported between 1985 and November 2024.[3] The annual number of new diagnoses has been rising rapidly, nearly

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doubling from 3213 cases in 2020 to 6329 cases in 2023.[3,4] In Turkey, several key HIV prevention measures remain under-implemented, including the identification of key populations, indicator condition–guided testing, condom distribution, sexual education for youth, and access to pre-exposure prophylaxis (PrEP), as documented in existing national policy reports.[3,5,6]

Globally, men who have sex with men (MSM) are recognized as a key population for both HIV and syphilis, with HIV acquisition rates estimated to be 26 times higher than in the general population and syphilis prevalence reaching up to 19.6% in certain countries.[7] MSM are disproportionately affected by STIs due to multiple risk factors, including having multiple sexual partners, condomless intercourse reported in up to 61% of encounters, engagement in chemsex in up to 15% of individuals, and a high frequency of sexual activity.[5,8–10] Male sex workers constitute a hidden key population in STI transmission and are diagnosed with STIs approximately 6.5 times more frequently than female sex workers.[11]

Among individuals with high-risk sexual behaviors and frequent STI episodes, there is strong interest in, and willingness to use, HIV PrEP and doxycycline prophylaxis—both of which should be integral components of a comprehensive HIV and STI prevention strategy. Although awareness of, and willingness to use, PrEP are high among MSM in Turkey, actual access remains limited, with only 2.5% reporting PrEP use in the past 12 months, primarily due to lack of reimbursement.[12–14]

Triple-site testing (urogenital/urine, rectal, and pharyngeal) is a key component of asymptomatic STI screening among MSM, enabling early detection and treatment prior to symptom onset or the development of complications. This approach also helps interrupt transmission chains, thereby reducing STI incidence and prevalence at the population level.[15] Taking a detailed sexual history to identify all anatomical sites at risk, followed by routine screening of these sites, is also cost-effective in high-risk populations.[16] Studies have shown that urogenital-only screening can miss the majority of rectal and pharyngeal NG and CT infections, with up to two-thirds of cases remaining undetected in the absence of extragenital testing.[17]

International guidelines emphasize the importance of regular STI screening among MSM, particularly those at elevated risk.[15,16,18] While these guidelines strongly advocate for comprehensive screening, there is ongoing debate regarding the lack of clear evidence for individual- or public health–level benefits from screening for CT and NG. Although urogenital CT and NG infections can cause serious complications—including pelvic inflammatory disease, perihepatitis, and adverse pregnancy outcomes—the clinical significance of asymptomatic oropharyngeal and rectal infections remains uncertain.[19] Unlike systemic infections such as syphilis and HIV, CT and NG are frequently asymptomatic, self-limiting mucosal infections capable of spontaneous clearance, with similar host–pathogen interaction patterns.[20,21] Intensive screening may interrupt the development of protective immune responses, thereby increasing susceptibility to re-infection—a concept known as the "arrested immunity hypothesis," supported by animal, clinical, and epidemiological evidence for CT.[21–23] Observations of higher rates of symptomatic disease in settings with more frequent screening for asymptomatic infection are consistent with this hypothesis.[23,24]

Regarding screening frequency, UK guidelines recommend annual testing for asymptomatic individuals and following any change in sexual partner, with a maximum frequency of every 3 months for sexually active individuals. Triple-site testing is advised for all sexually active MSM. For those at higher risk—such as PrEP users, individuals reporting more than 10 partners in the past year, those with multiple or anonymous partners since their last test, individuals engaging in sexualized drug use (including chemsex), or those diagnosed with a bacterial STI within the previous year—testing every 3 months is recommended.[18]

The U.S. Centers for Disease Control and Prevention (CDC) recommends quarterly screening for NG, CT, and syphilis in sexually active MSM.[16] The World Health Organization (WHO) advises periodic testing for urethral and rectal NG and CT, as well as serologic testing for syphilis, in asymptomatic MSM who access health-care services at least annually or every 6 months. Screening frequency should balance cost, case detection yield, and the potential consequences of not screening, taking into account rates of partner change and sexual exposure.[15]

In Turkey, there is no guideline specifically addressing MSM and no national guideline dedicated solely to STIs. Two documents provide recommendations relevant to HIV follow-up and STI screening: *the HIV/AIDS Diagnosis, Monitoring, and Treatment Handbook*—an official publication of the Turkish HIV/AIDS Platform—and the Ministry of Health's HIV/AIDS Diagnosis and Treatment Guide. One document recommends specimen-specific collection strategies, such as rectal swabs for CT in MSM, urine samples for heterosexual men, and site-specific sampling for NG based on clinical suspicion. The other emphasizes the high risk of reinfection and advises retesting for NG or CT three months after a positive diagnosis.[25,26]

In Turkey, multiplex PCR testing for CT and NG has been primarily available in tertiary hospitals and laboratories in major urban centers since 2022. However, reimbursement has recently been restricted to a single specimen type, and comprehensive national data on overall test utilization are lacking.[27]

Among new HIV diagnoses in Turkey, the proportion attributed to MSM has been increasing significantly, and this group is considered the most hidden key population in the country.[3,28,29]

In Turkey, infectious diseases outpatient clinics function de facto as sexual health services. The HIV outpatient clinic

at Marmara University Pendik Training and Research Hospital—where 35.7% of people living with HIV under follow-up have self-identified as MSM—is one of the oldest patient-centered, friendly environment clinics in the country. Since the beginning of the HIV epidemic, it has strived to provide care in accordance with international standards.[2,30,31]

According to the European AIDS Clinical Society (EACS) guidelines, STI screening should be offered to all sexually active individuals at the time of HIV diagnosis, annually thereafter, whenever STI symptoms are reported, and during pregnancy. More frequent screening at 3-month intervals is recommended for individuals at particularly high risk of STIs, including those with multiple or anonymous partners. Frequent HIV screening is also essential for individuals on PrEP.[32] The British Association for Sexual Health and HIV further recommends three-monthly testing for individuals engaging in sexualized drug use, including chemsex, and for those within 1 year of a bacterial STI diagnosis.[18]

Although antiretroviral therapy is reimbursed in Turkey, triple-site testing is not covered by the national insurance system.[16,27,32] To our knowledge, only one study from Turkey has evaluated STI screening in people living with HIV, and this was limited to urine samples; no studies have examined MSM or MSM living with HIV using the recommended triple-site approach.[33]

The present study aimed to describe the sociodemographic characteristics, sexual behaviors, and associated STIs—detected through triple-site testing—among MSM living with HIV followed in our clinic, representing a small segment of the key HIV population in İstanbul.

Methods

Data collection

Among MSM living with HIV who consecutively attended our clinic and had been followed by a single physician since diagnosis, those reporting multiple sexual partners underwent triple-site testing for CT, NG, and *Trichomonas vaginalis* (TV) after providing a comprehensive sexual history. The history was obtained using the "5 Ps" framework—Partners, Practices, Protection from STIs, Past history of STIs, and Prevention of Pregnancy—as outlined in the STI guidelines, and was incorporated as a routine component of follow-up from March 2018 to February 2019.[16,34] In addition, open-ended questions were used, in accordance with guideline recommendations, to allow participants to describe their experiences and perspectives more freely. The sexual behaviors assessed included partner-finding methods, condom use habits, rectal irrigation practices, alcohol consumption, chemsex and other drug use, engagement in transactional sex, having multiple sexual partners, and preferred sexual role identity (receptive, insertive, or versatile).

Urine samples were also tested for *Ureaplasma urealyticum* (UU), *Ureaplasma parvum* (UP), *Mycoplasma hominis* (MH), and *Mycoplasma genitalium* (MG).

Urine, rectal, and pharyngeal swab samples were collected using the BD MAX™ UVE Specimen Collection Kit and transported to the laboratory under appropriate conditions. For rectal and pharyngeal samples, initial testing was performed by pooling the two specimens in equal proportions; if a pooled sample tested positive, a second round of testing was conducted separately for each site. DNA extraction and real-time polymerase chain reaction (PCR) for CT, NG, and TV were performed on the BD MAX™ System using the BD MAX™ CT/GC/TV kit, following the manufacturer's instructions. First-void urine specimens were used for the detection of MG, MH, UU, and UP DNA. Testing was performed by multiplex PCR using the BioGX Sample-Ready™ kit on the BD MAX™ System, following the manufacturer's instructions. At our center, syphilis screening is performed using a treponemal test–based reverse sequence algorithm. When a positive result is obtained on the initial treponemal screening test, the laboratory reflexively performs a standard quantitative non-treponemal test with titer to guide management decisions. If the non-treponemal test is negative, a second treponemal test—based on different antigens from the initial test—is conducted to adjudicate the initial result. If the second treponemal test is positive but the non-treponemal test remains negative, the patient is managed for latent syphilis. If the second treponemal test is negative, no further evaluation or treatment is indicated.[16]

In this study, syphilis screening was performed using a chemiluminescence immunoassay (CLIA) as the initial treponemal test, *Treponema pallidum* hemagglutination assay (TPHA) as the second treponemal test, and rapid plasma reagin (RPR) as the non-treponemal test. Participants in the cohort were screened for syphilis at the time of HIV diagnosis as baseline. Thereafter, syphilis screening was performed annually during HIV follow-up visits, irrespective of participants' number of sexual partners or engagement in unprotected sexual activity. While triple-site PCR testing was included in this study, syphilis screening was also performed to identify new syphilis cases among participants after their HIV diagnosis.

Although the commercial multiplex PCR assays used in this study were capable of detecting TV, MH, UU, and UP, routine screening for MH, UU, and UP is not recommended; therefore, results for these organisms are not presented. Similarly, because there is no current recommendation for screening MSM for TV due to uncertain benefit, these data are also not reported.[35,36]

Statistical analysis

Categorical data were summarized as frequencies and percentages. The Chi-square test was used to evaluate

associations between categorical variables. For continuous variables, descriptive statistics (median, minimum, and maximum values) were calculated, and normality was assessed using the Kolmogorov–Smirnov test. As the data were not normally distributed, non-parametric tests were applied. A p value of <.05 was considered statistically significant.

Results

Forty-five asymptomatic MSM living with HIV attending routine follow-up visits were included in this study. The mean age of participants was 38.2 ± 11.1 years (median: 35.0 years; range: 22–68 years). Sociodemographic characteristics are presented in Table 1. Of all participants, 44.3% (n = 20) resided on the Asian side of İstanbul, while 33.3% (n = 15) lived on the European side.

Laboratory results

Rectal samples. Among the 45 rectal samples, 15.6% (n = 7) tested positive for CT and 17.8% (n = 8) for NG (Figure-1). Of the seven patients with rectal CT positivity, two also had concurrent pharyngeal CT positivity, while none had concurrent urinary CT positivity. Among the eight patients with rectal NG positivity, four had concurrent pharyngeal NG positivity, and two had concurrent urinary NG positivity (Table 2).

Pharyngeal samples. Among the 45 pharyngeal samples, 6.7% (n = 3) were positive for CT and 11.1% (n = 5) for NG (Figure-1).

Urinary samples. Similarly, among the 45 urinary samples, 6.7% (n = 3) tested positive for CT and 6.7% (n = 3) for NG (Figure-1).

Overall positivity across sample types. Considering urine, rectal, and pharyngeal samples collectively, 24.4% (n = 11) were positive for NG and 26.7% (n = 12) for CT. Overall, 35.7% (n = 16) of participants tested positive for at least one of the infections screened. MG was investigated only in first-void urine, with PCR positivity detected in 2.2% (n = 1) of participants.

At the time triple-site PCR testing was requested, syphilis serology was positive in 15 participants (34.1%), compared with eight individuals (18.2%) who had tested positive at the time of HIV diagnosis.

No statistically significant associations were observed between NG or CT PCR positivity and age, educational level, place of residence, marital or parental status, occupation, monthly income, cigarette, alcohol, drug, or sildenafil use, presence of comorbidities, history of any STI, travel within the past 12 months, or type of sexual partnership (steady, casual, or commercial) in the past 3 months (p > .05).

Because the number of uncircumcised and non-Turkish participants was only two, and only four MSM living with HIV had received HPV vaccination and two reported testosterone use, no statistical analysis was performed for these variables.

Antibiotic use within the past 3 months was significantly associated with lower rectal and pharyngeal NG PCR positivity (4.5% vs 30.4%, p = .047; 5.4% vs 21.7%, p = .049), but showed no significant association with rectal or pharyngeal CT PCR positivity (p = .728 and p = .608, respectively) or with urinary NG and CT PCR positivity (p = .947 and p = .489, respectively).There was no significant association between the number of sexual partners in the past 3 months and rectal NG (p = .694), rectal CT (p = .867), pharyngeal CT (p = .329), pharyngeal NG (p = .978) PCR positivity, or syphilis seropositivity (p = .131). Among MSM living with HIV in this study, 60.0% (27/45) reported enema or rectal douching prior to receptive anal intercourse. This practice was significantly associated with a higher rate of CT/NG PCR positivity compared with non-users (55.6% vs 25.9%, p = .045). Rectal and pharyngeal CT and NG PCR positivity rates by sexual practices in the past 3 months are presented in Tables 2 and 3. Rectal CT and NG positivity rates were higher among individuals engaging in receptive and insertive anal sex without condom use (21.0% and 23.5%, and 26.0% and 29.4%, respectively) compared with those reporting condom use (16.7% and 11.1%, and 20.0% and 22.0%, respectively), although these differences were not statistically significant. Pharyngeal NG positivity was significantly associated with insertive oral sex without condom use, whereas CT positivity did not demonstrate a similar association. At the time of HIV diagnosis, individuals with positive syphilis serology (tested a median of 28 months earlier) had a significantly higher prevalence of rectal NG PCR positivity on current testing compared with those with negative syphilis serology (50.0% vs 8.3%; p = .004). Similarly, individuals with current positive syphilis serology also had a significantly higher prevalence of rectal NG positivity compared with those with negative serology (33.3% vs 6.9%; p = .023).

Open-ended questions

About STI prevention. When participants were asked about measures they took to prevent STIs, 25 reported using condoms. Additional measures mentioned by individual participants included avoiding anal sex, using an antibacterial oral spray, having a single partner, washing after intercourse, abstaining from intercourse if there was an open wound, and avoiding ejaculation in the mouth during oral sex.

About condom use. Only three participants reported always using condoms. When asked about reasons for not using condoms, the responses included: trusting their partners (n = 5), inability to find or think of a condom at the time of

Table 1. Socio-demographic and sexual behavioural characteristics of participants.

Characteristics	*N*	%
Age (median, min-max)	35 years, (22–68 years)	
Sexual orientation		
Bisexual	12	26.7
Homosexual	33	73.3
Origin		
Turkey	43	95.6
Other (China, USA)	2	4.4
Education level		
Primary school	2	4.4
Secondary school	3	6.7
High school	6	13.3
Vocational school	3	6.7
University	24	53.3
Master's degree	4	8.9
PhD degree	3	6.7
City of residence		
İstanbul	35	77.8
Anatolian (Asia) side	20	57.1
European side	15	42.9
Kocaeli	7	15.6
Yalova	2	4.4
Tekirdağ	1	2.2
Marital status		
Single	34	75.6
Married with a woman	5	11.1
Divorced from a woman	5	11.1
Living with a same gender partner	1	2.2
Parental status		
1 child	4	8.9
2 children	2	4.4
3 children	1	2.2
No child	38	84.5
Professional activity		
White-collar	23	51.1
Blue-collar	11	24.4
Retired	5	11.2
Medical doctor	3	6.7
Student	2	4.4
Unemployed	1	2.2
Monthly income (median, min-max)	931.0$, (0–10.000$)	
Circumcision status		
Yes	43	95.6
No	2	4.4
HPV vaccination		
Yes	4	8.9
No	41	91.1
Smoking		
Yes	24	53.3
No	21	46.7
Alcohol consumption		
Yes	25	55.6
No	20	44.4

(continued)

Table 1. (continued)

Characteristics	*N*	%
Drug/chemsex use[a]		
No	27	60.0
Amphetamine	3	6.7
Ecstasy (MDMA)	8	17.8
Heroin	1	2.2
Cocaine	2	4.4
Marijuana	10	22.2
Poppers	13	28.9
GHB (Gamma-Hydroxybutyrate)	1	2.2
The last drug usage time, months ago (median, min-max)	2.5 months, (1–24 months)	
Sildenafil use		
Yes	6	13.3
No	39	86.7
Testosterone use		
Yes	2	4.4
No	43	95.6
Antibiotic consumption in the last 3 months		
Yes	22	48.9
No	23	51.1
Antibiotics		
Beta lactam	15	33.3
Macrolide	3	6.7
Doxycycline	2	4.4
Quinolone	3	6.7
Fosfomycin	1	2.2
Metronidazole	2	4.4
Trimethoprim-sulfamethoxazole	1	2.2
The duration of antibiotic usage in the last 3 months (median, min-max)[b]	3 days, (1–30 days)	
Months of HIV diagnosis (median, min-max)	28 months, (1–276 months)	
ART duration (median, min-max)	3 months, (1–254 months)	
Co-morbidity		
Yes[c]	19	42.2
No	26	57.8
Medications/supplements used regularly other than ART		
Yes	18	40.0
No	27	60.0
Medications/supplements[a]		
Vitamin D	7	15.6
Selective Serotonin Reuptake Inhibitor	4	8.9
Antiplatelet	4	8.9
Antihypertensive	6	13.3
Antihistamine	1	2.2
Oral Antidiabetic	1	2.2
Alpha blocker	2	4.4
STI history		
Yes	27	60.0
No	18	40.0
Travel history in the last 12 months		
Yes	24	53.3
No	21	46.7

(continued)

Table 1. (continued)

Characteristics	*N*	%
Travelled locations		
Domestic	13	
International	14	
International locations[a]		
Asia	6	
Europe	7	
Africa	1	
Number of lifetime sexual partners		
≤20 partners	9	20.0
≥21 partners	36	80.0
Total number of lifetime sexual partners (median, range)	100 partners, (8–1000 partners)	
Number of sexual partners in the last 3 months		
≤5 partners	27	60.0
≥6 partners	18	40.0
Number of sexual partners in last 3 months (median, min-max)	4 partners, (0–30 partners)	
Venues where sexual partners met		
Mobile application	33	73.3
Internet	10	22.2
Through friends	2	4.4
Beaches/ parks	3	6.7
Gay bars	3	6.7
Turkish bath	1	2.2
Roadside	1	2.2
HIV status of the sexual partners		
Unknown	39	86.7
Negative	1	2.2
Positive	5	11.1
Having multi partners		
Yes	39	86.7
No	6	13.3
Partners' STI status		
Yes	5	11.1
No	8	17.8
Unknown	32	71.1
Transactional sex		
Yes	10	22.2
No	35	77.8
Type of sexual partner relationship in last 3 months		
Steady (median, range)	0, 0–10	
Anonymous[d] (median, range)	3, 0–30	
Commercial (median, range)	0, 0–6	
Casual[e] (median, range)	1, 0–20	
Group sex (median, range)	0, 0–6	
Sexual role in oral intercourse		
None	3	6.7
Receptive	3	6.7
Insertive	5	11.1
Both receptive and insertive	34	75.5
Sexual role in anal intercourse		
None	3	6.7
Receptive	13	28.9

(continued)

Table 1. (continued)

Characteristics	N	%
Insertive	4	8.9
Both receptive and insertive	25	55.6
Use of enemas in anal sex		
Yes	27	60.0
No	18	40.0
Alcohol use during sex		
Yes	16	35.6
No	29	64.4
Drug use during sex		
Yes	13	28.9
No	32	71.1

[a]Multiple responses were given.
[b]The antibiotic used for the longest duration by participants was doxycycline (max: 30 days), while the shortest duration was for beta-lactam antibiotics (1 day).
[c]4 hypertension, 2 diabetes mellitus, 2 asthma, 2 depression, 2 osteoporosis, 2 anal fissure, 1 Kaposi's sarcoma, 1 peptic ulcer, 1 kidney disease, 4 cardiovascular disease, 1 retinitis pigmentosa, 1 chronic sinusitis, 1 leukocytoclastic vasculitis.
[d]An anonymous sex partner was defined as a person who "you do not know, or you just got to know".[66–68].
[e]A casual sex partner was described as a person with whom "you have regular sex but not a steady relationship, but who is not anonymous".[66–68].

intercourse (n = 5), belief that oral sex is not risky (n = 5), partner's unwillingness to use condoms (n = 5), belief that condoms do not prevent STIs (n = 4), dislike of condoms (n = 3), perception that condoms diminish sexual experience (n = 1), lack of habit (n = 1), belief that condom materials are harmful (n = 1), belief that HIV transmission is not possible due to HIV RNA negativity (n = 1), and concern that condom use would hinder erection (n = 1). When asked about reasons for occasional condom use, participants reported using them with new or unfamiliar partners (n = 11), during anal sex when requested by their partner (n = 14), and when they believed there was a risk of STI transmission (n = 3).

Discussion

This is the first study in Turkey to investigate sexual behaviors and triple-site STI screening among asymptomatic MSM living with HIV. Turkey is a secular country with a predominantly Muslim population.[37,38] While same-gender marriages are not legally recognized, same-sex sexual activity is not criminalized—unlike in many other Muslim-majority countries.[39]

In this study, 22% of MSM living with HIV were currently or previously married to women, with a median of one child, and 80% of these individuals held a university degree or higher. Except for one participant from China, none of the female spouses were aware of their husbands' sexual orientation, although they had been informed of their HIV diagnosis. Despite a cultural tradition of tolerance rooted in the humanist philosophies of Mevlana and Yunus Emre, widespread social intolerance in Turkey makes it difficult to openly express same-sex relationships.[40,41] Even among well-educated men, some marry women to avoid stigma and conform to social norms—a pattern also reported in China, India, and other Muslim-majority countries, consistent with our findings.[4,42–44]

Recent epidemiological analyses have shown a significant rise in HIV incidence among younger males in Turkey, primarily driven by MSM populations.[4] This trend is consistent with our findings of high rates of syphilis and rectal gonorrhea among MSM living with HIV, suggesting that ongoing bacterial STI transmission may be contributing to the trajectory of the HIV epidemic. These observations underscore the urgent need for targeted STI screening and prevention strategies in this key population.

In this study, only 6.7% of participants sought partners in physical locations such as gay bars, parks, bathhouses, or roadside areas, whereas 95% used geosocial networking applications. These findings are consistent with previous studies demonstrating the limited public visibility and hidden status of MSM in Turkey.[29] Given that mobile application use is common worldwide, HIV and STI interventions should be adapted for digital platforms to effectively reach this hard-to-access population.[45,46]

NG and CT PCR positivity at any anatomical site (pharyngeal, rectal, or urine) was detected in 24% and 27% of participants, respectively, whereas urine samples alone accounted for only 6.7% of detections. This highlights the importance of triple-site testing in asymptomatic MSM living with HIV. In previous triple-site sampling studies among MSM living with HIV, CT/NG positivity rates of 20% in Israel and 19.8%/21.7% in Portugal were reported, which are comparable to our findings.[47,48]

A study from Ankara, Turkey, investigated behavioral risk factors and STI PCR positivity among heterosexual and homosexual men living with HIV using urine samples

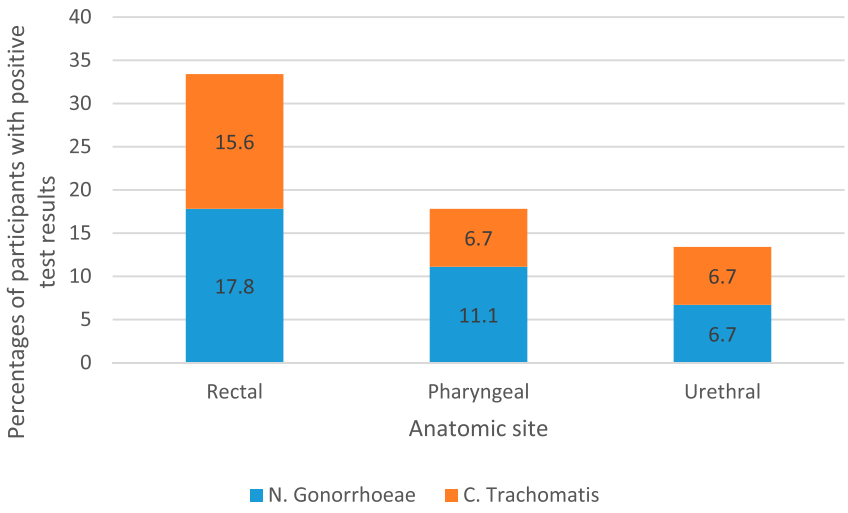

Figure 1. PCR positivities according to anatomic sites.

Table 2. Rectal CT/NG PCR test results and sexual activities in the last 3 months.

	Rectal CT PCR			Rectal NG PCR		
	+ (*n*, %)	- (*n*, %)	*p* value	+ (*n*, %)	- (*n*, %)	*p* value
Receptive anal sex with condom use	5 (16.7)	25 (83.3)	.771	6 (20.0)	24 (80.0)	.581
Receptive anal sex without condom use	5 (21.7)	18 (78.3)	.242	6 (26.1)	17 (73.9)	.136
Insertive anal sex with condom use	3 (11.1)	24 (89.9)	.314	6 (22.2)	21 (77.8)	.340
Insertive anal sex without condom use	4 (23.5)	13 (76.5)	.250	5 (29.4)	12 (70.6)	.112

Table 3. Pharyngeal CT/NG PCR test results and sexual activities in last 3 months.

	Pharyngeal CT PCR			Pharyngeal NG PCR		
	+ (*n*, %)	- (*n*, %)	*p* value	+ (*n*, %)	- (*n*, %)	*p* value
Receptive oral sex with condom use	1 (12.5)	7 (87.5)	.466	1 (12.5)	7 (87.5)	.890
Receptive oral sex without condom use	3 (8.1)	34 (91.9)	.404	3 (8.1)	34 (91.9)	.168
Insertive oral sex with condom use	0 (0.0)	7 (100.0)	[a]	2 (28.6)	5 (71.4)	.110
Insertive oral sex without condom use	2 (5.7)	33 (94.3)	.632	2 (5.7)	33 (94.3)	.031

[a]Chi-square test could not be performed due to zero values in the data.

only.[33] NG and CT were detected in 3.1% and 2.5% of participants, respectively. In comparison, in our study, positivity rates for both pathogens were 6.7%. This difference may be explained by the fact that our study population consisted exclusively of MSM living with HIV, a group considered at higher risk for CT and NG colonization.[33] Our findings are also consistent with previous reports showing that reliance on urine testing alone, compared with triple-site screening, may result in missed diagnoses in up to 84% of cases.[47,48]

In our study, among 35 participants who reported insertive oral sex without condom use, two tested positive for NG, whereas among 37 participants engaging in receptive oral sex without a condom, three were NG positive (Table 3). Although this difference appeared statistically significant, separating exposures is challenging because multiple oral sites are often involved simultaneously during the same sexual encounter. Previous research has shown that sexual behavior combinations are diverse and not limited to penile insertion.[49] Indeed, some studies have reported that oropharyngeal gonorrhea incidence among casual sexual partners may be nearly significantly associated with kissing alone and increases with the number of kissing partners.[50,51] These findings suggest that different

sexual practices may confer varying transmission risks for pharyngeal gonorrhea.

In our study, although a statistically significant difference in pharyngeal NG positivity was observed among participants practicing insertive oral sex, the small number of positive cases warrants cautious interpretation. Further studies with larger sample sizes are needed to clarify these associations.

The single participant who tested positive for MG was bisexual, reported condomless vaginal, oral, and anal sex, had used beta-lactam antibiotics in the preceding 3 months, and was seronegative for syphilis. Antibiotic use may have masked NG detection in this case. MG has also been reported among asymptomatic MSM in countries such as China, Japan, and Portugal, with prevalence rates varying across studies.[47,52]

In a study conducted in Australia between 2016 and 2017 that included 1001 asymptomatic MSM, the prevalence of NG, CT, and MG was reported as 6.7%, 9.6%, and 9.5%, respectively; however, MG prevalence decreased to 2.7% when only urine samples were tested.[53] In a 2022 study from Vietnam, MG prevalence was 12.8%, with detection rates of 9.2% in the rectum, 2.8% in the pharynx, and 3.1% in the urethra.[54] In our study, MG testing was performed solely on urine samples, whereas CT and NG testing included urine as well as pharyngeal and rectal swabs. This difference in sampling strategy may explain the higher detection rates for CT and NG. Of the 45 urine samples tested for MG, only one was positive, a rate consistent with those reported in the Australian and Vietnamese studies when considering urine-only testing.[53,54]

In our study, rectal douching prior to receptive anal intercourse was reported by 60.0% (27/45) of participants and was significantly associated with higher CT/NG PCR positivity compared with non-users (55.6% vs 25.9%, p = .045), consistent with previous evidence of its independent association with rectal NG/CT infection.[55–57] Rectal douching and the use of saliva have also been identified as STI risk behaviors among MSM due to their associations with mucosal disruption and condomless receptive anal intercourse.[55–58] Taken together, these data emphasize the role of rectal douching in STI transmission dynamics and suggest that avoiding enema use during anal sex may be associated with a lower risk of STI, potentially serving as a protective factor.

In this study, syphilis serology was positive in 18.2% of participants at HIV diagnosis, increasing to 34.1% during follow-up, indicating ongoing syphilis transmission over a median follow-up of 28 months. Rectal NG positivity was significantly more common among individuals with syphilis seropositivity. These findings are consistent with previous studies reporting high syphilis rates among people living with HIV, including data from Turkey showing seropositivity of 24.9% among people living with HIV and up to 30.1% among MSM living with HIV.[31,32] International studies have also demonstrated similar increases in syphilis seropositivity over time, with rates ranging from 25% to 60%.[59–61] The frequent co-occurrence of bacterial STIs, particularly rectal NG, in syphilis-seropositive individuals is also in line with previous research highlighting the overlapping nature of these infections in MSM populations.[62]

Antibiotic use within the past 3 months (median duration: 3 days) was significantly associated with lower rectal and pharyngeal NG PCR positivity, possibly reflecting the high overall antibiotic consumption—particularly beta-lactam use—among participants.

In a comparable study conducted in South Africa, the prevalence of NG and CT in rectal samples was reported as 42% and 72%, respectively, whereas in our study these rates were 17.8% and 15.6%. One possible explanation for this discrepancy is the high frequency of antibiotic use in Turkey for various indications.[63]

High daily antibiotic consumption in Turkey, combined with the WHO's classification of NG resistance to cephalosporins and quinolones as a high-priority public health concern, underscores the urgent need for resistance surveillance of circulating NG strains among high-risk MSM populations in the country.[64,65]

Responses to the open-ended questions indicated gaps in sexual health knowledge: 14 participants reported using condoms only if requested by their partner, while four did not believe in their protective efficacy. These findings highlight the need to provide sexual health education at every clinical follow-up visit for people living with HIV.

A major strength of this study is that it represents the first collection of detailed sexual behavior data—including residence location, partner characteristics, sexual practices, prevention methods, and STI history—integrated with triple-site STI screening among MSM living with HIV in Turkey. Limitations include its single-center design, small sample size, and the absence of HPV PCR screening. Another limitation was the inability to perform lymphogranuloma venereum testing on CT–positive samples due to limited diagnostic capacity.

Conclusions

This study demonstrates, for the first time in Turkey, that adding rectal and pharyngeal samples to urine-based screening substantially improves STI detection among asymptomatic MSM living with HIV. Given that national health insurance reimburses only one PCR test, pooled triple-site sampling—as applied in this study—may represent a practical and cost-effective approach consistent with international guidelines.

Our findings—including the high detection rates of CT/NG through triple-site testing, the increased STI risk associated with rectal douching, and the concentration of MSM in specific urban districts—underscore the need for targeted,

behavior-informed, and location-specific strategies to prevent HIV and STI transmission among MSM in Turkey. Such strategies could inform policy development and guide public health interventions by national authorities.

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Author Contributions

Designed the study: DYC, RC, GS, VK, MBA.
Collected and synthesized the data: DYC, RC, DME, FBD.
Interpreted the data: DYC, FBD, RC, LMD, US, GS, VK, Aİ.
Prepared the first draft of this manuscript: DYC.
All authors read and approved the first and final drafts of this manuscript.

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Ethical approval

Ethical approval was obtained from the Marmara University Faculty of Medicine Clinical Research Ethics Committee [09.2023.1389].

Ethical considerations

The study was conducted in accordance with the Declaration of Helsinki and was approved by the Ethics Committee of Marmara University Faculty of Medicine (09.2023.1389) on November 3rd, 2023 with the need for written informed consent waived.

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