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Original Research Article

A STUDY ON CLINICO-SEROLOGICAL PREVALENCE OF SYPHILIS IN PATIENTS WITH HIV/AIDS

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ABSTRACT

Background: Syphilis and HIV are major public health problems because of their combined impact. Syphilis, caused by Treponema pallidum, shows varied clinical features, while HIV weakens the immune system, affecting the course of syphilis. Understanding these co-infection patterns is important for improving patient care. The objective is to assess the sociodemographic factors, risk behaviours, clinical features, and serological prevalence of syphilis among people with HIV/AIDS. **Materials and Methods:** This prospective study was conducted over one year at the Department of Dermatology, Venereology, and Leprosy, Madras Medical College, Chennai, with 14,463 STD clinic attendees. Detailed history, sexual behaviour, and risk factors were recorded. Clinical examination and laboratory testing were performed, including VDRL and TPHA for syphilis and ELISA for HIV. Data were analysed using frequencies and percentages. **Result:** Among 14,463 attendees, HIV was detected in 1.5% (220/14,463) of the attendees. The prevalence of syphilis among HIV-negative patients was 1.29%, whereas the prevalence of syphilis coinfection among HIV-positive individuals was 16.8%. Males had a higher co-infection rate (18.1%) than females (14.6%). Early stage syphilis, particularly secondary syphilis, was the most common. Lower CD4 counts were observed in patients with more advanced syphilis stages. Most coinfected patients were young urban males, with occupational and sexual behaviours contributing to disease spread. **Conclusion:** HIV-syphilis coinfection is a significant burden with different clinical patterns and serological findings. Integrated screening, early detection, and prevention strategies are required to reduce transmission and improve health outcomes in high-risk groups.

INTRODUCTION

Syphilis is a sexually transmitted infection caused by the spirochete Treponema pallidum, known for its ability to affect multiple organ systems and present with a wide range of clinical manifestations. It is primarily transmitted through sexual contact, with genital ulcers facilitating the entry of other pathogens. Without appropriate treatment, syphilis progresses through distinct stages primary, secondary, latent, and tertiary each associated with characteristic signs, symptoms, and potential complications.[1]

In recent years, the rising incidence of syphilis has emerged as a global public health concern, particularly due to its interaction with human immunodeficiency virus (HIV) infection. HIV, the causative agent of acquired immunodeficiency syndrome (AIDS), weakens host immunity by depleting CD4+ T lymphocytes and macrophages, thereby increasing susceptibility to co-infections such as syphilis.[2]

The co-occurrence of HIV and syphilis poses a considerable public health challenge due to their synergistic effects on transmission and disease progression. Genital ulcers caused by Treponema pallidum disrupt mucosal barriers, thereby facilitating the transmission of HIV.[3] In turn, HIV-induced immunosuppression alters host defences against T. pallidum, often resulting in more severe, recurrent, or atypical manifestations of syphilis.[4] Evidence indicates that syphilis prevalence is higher among individuals living with HIV, particularly in high-risk populations such as men who have sex with men (MSM) and sex workers.[5]

HIV-positive individuals are also more likely to develop neurosyphilis and may exhibit suboptimal responses to standard treatment regimens.[6] Studies have demonstrated that syphilis co-infection can increase HIV viral loads and accelerate the

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progression of HIV disease.[7] Globally, syphilis remains prevalent among people living with HIV, with factors such as inconsistent condom use, the use of digital platforms for casual sexual encounters, and insufficient routine screening contributing to its persistence.[7] Integrated testing strategies for both infections, especially in antenatal care settings and among high-risk groups, have been shown to enhance early detection and reduce the likelihood of missed diagnoses.[8]

Diagnosing syphilis in people with HIV can be more difficult because their immune responses may differ, sometimes causing negative or delayed blood test results. This may lead to underdiagnosis and delayed treatment.[9] Regular clinical and laboratory follow-up is essential to prevent severe complications such as neurosyphilis, cardiovascular disease, and ongoing transmission.[10]

This study aimed to examine the clinical features and serological prevalence of syphilis in patients with HIV infection. Understanding these patterns will help improve diagnosis, management, and prevention efforts, thereby supporting better public health control of these important infections.

Objective

To assess the socio-demographic patterns and risk factors associated with the transmission of syphilis, along with analysing its clinical presentation and serological variations in individuals with HIV/AIDS.

MATERIALS AND METHODS

This prospective study included 14,463 individuals who attended self-screening for sexually transmitted diseases at the Outpatient Department of Dermatology, Venereology, and Leprosy, Institute of Venereology, Madras Medical College/RGGGH, Chennai, for one year, from June 2017 to May 2018. Written informed consent was obtained from all participants, and the Institutional Ethics Committee approved the study.

Inclusion and exclusion criteria

The study included individuals aged > 12 and < 60 years and members of high-risk groups, such as homosexuals, intravenous drug users, and recipients of blood or blood products. The exclusion criteria were individuals who declined to participate in the study and pregnant women.

Methods

A detailed clinical history was obtained from all participants, including presenting complaints, sexual history, history of ano-genital diseases, and any prior treatment. All participants underwent complete general and genital examinations.

In male and female patients presenting with genital ulcers, smears were examined using dark field microscopy, Gram staining, Leishman staining, Tzanck smear, and tissue smear techniques. In cases of genital discharge, male patients underwent gram staining for gonococci and wet mount preparations using normal saline and potassium hydroxide.

In female patients, an endocervical swab was collected for gonococcal culture, and an endocervical smear was obtained for gram staining. Additional vaginal smears were collected for Gram staining and wet mount examination using normal saline and potassium hydroxide.

All participants underwent routine laboratory and serological tests. Syphilis screening was performed using the Venereal Disease Research Laboratory (VDRL) test and confirmed by the Treponema pallidum haemagglutination assay (TPHA). HIV-1 and HIV-2 antibody testing was conducted using ELISA following informed consent and after providing both pre- and post-test counselling, and the data were presented as frequencies and percentages.

RESULTS

Out of a total of 14,463 STD clinic attendees, 1.5% (n=220) were diagnosed with HIV. The prevalence among males was higher at 1.6% (138/8870) than that among females (1.5%; 82/5593). The overall prevalence of syphilis (without HIV) among STD attendees was 1.29% (187/14463).

Among the 220 HIV-positive individuals, 37 (16.8%) were coinfected with syphilis. When stratified by sex, males had a higher coinfection rate of 18.11% (25/138) compared to 14.63% (12/82) in females. HIV and syphilis coinfection was higher in males (18.1%) than in females (14.6%) and much higher in HIV-positive individuals (16.8%) than in general STD attendees (1.29%) [Table 1].

Table 1: Prevalence of HIV, syphilis, and coinfection by sex

	Sex		Total
	Male	Female	
Total STD attendees	8870	5593	14463
HIV positive	138 (1.6%)	82 (1.5%)	220 (1.5%)
Syphilis alone positive	0	0	187 (1.29%)
HIV and syphilis coinfection	25 (18.11%)	12 (14.63%)	37 (16.8%)
Prevalence of syphilis among HIV positive	25/138 (18.11%)	12/82 (14.63%)	37/220 (16.8%)

Among HIV-positive males without syphilis (n=113), 35% were aged 31–40 years and 28% were 21–30 years; among coinfected males (n=25), 40% were aged 21–30 years, 32% were 31–40 years, and 20% were 41–50 years. Among HIV-positive females without syphilis (n=70), 48% were 31–40 years, 29% were 41–50 years, and 13% were 21–30 years; among coinfected females (n=12), 50% were 31–40 years, 25% were 21–30 years, and 17% were 41–50 years of age. Among coinfected males, 52% were married

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and 48% were single; among females, 50% were married, 33% were separated, 8% were single, and 8% were widowed. Homosexual behaviour was reported by 48% of males, heterosexual by 36%, and bisexual by 16%; all females were heterosexual.

Among HIV-positive males, 58% were urban and 42% were rural; among coinfected males, 64% were urban and 36% were rural; among HIV-positive females, 64% were urban and 36% were rural; among coinfected females, 66% were urban and 33% were rural. Among coinfected males, 36% worked in private companies, 20% were coolies, 12% were electricians, 8% each worked in agriculture, barbering, or driving, and 4% each were MSM sex workers or painters. Among the coinfected women, 33% worked in private companies, 17% each worked in agriculture, coolie work, or as housewives, and 8% each worked in housekeeping or as commercial sex workers [Table 2].

Table 2: Demographic profile of HIV-positive individuals with and without syphilis (n=220).

Parameter		Males		Females	
		HIV+ Syphilis– (n=113)	HIV+ Syphilis+ (n=25)	HIV+ Syphilis– (n=70)	HIV+ Syphilis+ (n=12)
Age Group (Years)	11–20	3 (3%)	1 (4%)	2 (3%)	1 (8%)
	21–30	32 (28%)	10 (40%)	9 (13%)	3 (25%)
	31–40	40 (35%)	8 (32%)	34 (48%)	6 (50%)
	41–50	20 (17%)	5 (20%)	20 (29%)	2 (17%)
	>50	18 (15%)	1 (4%)	5 (7%)	0 (0%)
Marital Status	Married	–	13 (52%)	–	6 (50%)
	Single	–	12 (48%)	–	1 (8%)
	Widowed	–	–	–	1 (8%)
	Separated	–	–	–	4 (33%)
Sexual Behaviour	Heterosexual	–	9 (36%)	–	12 (100%)
	Bisexual	–	4 (16%)	–	–
	Homosexual	–	12 (48%)	–	–
Domicile	Rural	48 (42%)	9 (36%)	25 (36%)	4 (33%)
	Urban	65 (58%)	16 (64%)	45 (64%)	8 (66%)
Occupation	Agriculture	–	2 (8%)	–	2 (17%)
	Coolie	–	5 (20%)	–	2 (17%)
	Private Company	–	9 (36%)	–	4 (33%)
	Electrician	–	3 (12%)	–	–
	Barber	–	2 (8%)	–	–
	Driver	–	2 (8%)	–	–
	MSM Sex Worker	–	1 (4%)	–	–
	Painter	–	1 (4%)	–	–
	Housewife	–	–	–	2 (17%)
	Housekeeping	–	–	–	1 (8%)
	Commercial Sex Worker	–	–	–	1 (8%)

Among males coinfected with HIV and syphilis, the most common complaint was self-screening (32%), followed by skin rash (20%), genital ulcer, and constitutional symptoms such as fever, cough, or weight loss (16% each). Genital warts (8%), urethral discharge, and genital itching (4% each) were reported less frequently. Among the coinfected women, self-screening was the most common (42%), followed by constitutional symptoms (25%), genital discharge (17%), and genital ulcers and skin rashes (8% each).

In males, associated conditions included genital herpes and dermatophytosis (16% each), genital warts and oral candidiasis (12% each), gonorrhoea (8%), and genital scabies, molluscum contagiosum, and tuberculosis (4% each), while 24% had no other disease. Among women, vulvovaginal candidiasis was the most frequent (25%), followed by dermatophytosis (17%). Bacterial vaginosis, trichomonas vaginitis, genital warts, and tuberculosis were reported in 8% of the patients each, and 25% had no other associated disease [Table 3].

Table 3: Complaints/Diseases by sex

Complaints/Diseases		Male (n=25)	Female (n=12)
Complaints	Self screening	8 (32%)	5 (42%)
	Urethral discharge / Genital discharge	1 (4%)	2 (17%)
	Genital ulcer	4 (16%)	1 (8%)
	Genital wart	2 (8%)	—
	Skin rash	5 (20%)	1 (8%)
	Constitutional symptoms (fever, cough, weight/appetite loss)	4 (16%)	3 (25%)
	Genital itching	1 (4%)	—
Diseases	Gonorrhoea	2 (8%)	—
	Genital herpes	4 (16%)	—
	Genital wart	3 (12%)	1 (8%)
	Genital scabies	1 (4%)	—
	Genital molluscum contagiosum	1 (4%)	—

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	Oral candidiasis	3 (12%)	—
	Dermatophytosis	4 (16%)	2 (17%)
	Tuberculosis	1 (4%)	1 (8%)
	Bacterial vaginosis	—	1 (8%)
	Vulvovaginal candidiasis	—	3 (25%)
	Trichomonas vaginitis	—	1 (8%)
	No other associated diseases	6 (24%)	3 (25%)

Among male patients (n=25), 12% presented with primary syphilis, 32% with secondary syphilis, 24% with early latent syphilis, 28% with late latent syphilis, and 4% with cardiovascular syphilis. No cases of neurosyphilis were detected.

Among the female patients (n=12), 50% were diagnosed with secondary syphilis, 33% with early latent syphilis, and 16% with late latent syphilis. No cases of primary, cardiovascular, or neurosyphilis were reported.

The average CD4 count corresponding to each syphilis stage was 420 cells/mm³ in primary syphilis, 246 cells/mm³ in secondary syphilis, 512 cells/mm³ in early latent syphilis, 633 cells/mm³ in late latent syphilis, and 589 cells/mm³ in cardiovascular syphilis [Table 4].

Table 4: Syphilis stages and CD4 counts in HIV coinfected patients

Stage of Syphilis	Male (n=25)	Female (n=12)	Average CD4 Count
Primary syphilis	3 (12%)	0 (0%)	420
Secondary syphilis	8 (32%)	6 (50%)	246
Early latent syphilis	6 (24%)	4 (33%)	512
Late latent syphilis	7 (28%)	2 (16%)	633
Cardiovascular syphilis	1 (4%)	0 (0%)	589
Neurosyphilis	0 (0%)	0 (0%)	—

Among patients with primary syphilis (n=3), two exhibited VDRL titres of <1:8, and one had a titre between >1:8 and <1:64, with an average titre of 9.33. In secondary syphilis (n=14), one patient had a titre <1:8, six had titres between >1:8 and <1:64, and seven had titres >1:64, with the highest average VDRL titre of 74. Among early latent syphilis cases (n=11), four patients had titres <1:8, and seven had titres between >1:8 and <1:64, with an average titre of 27.27. In late syphilis (n=8), seven patients had titres <1:8, and one had a titre between >1:8 and <1:64, with an average titre of 2.75. The single case of cardiovascular syphilis showed a titre <1:8, with an average titre of 1 [Table 5].

Table 5: VDRL titre and average values across stages of syphilis

Stage	VDRL Titre			Average VDRL Titre
	<1:8	>1:8 to <1:64	>1:64	
Primary	2	1	-	9.33(N-3)
Secondary	1	6	7	74(N-14)
Early latent syphilis	4	7	-	27.27(N-11)
Late syphilis	7	1	-	2.75(N-8)
Cardiovascular syphilis	1	-	-	1 (N-1)

DISCUSSION

In our study, regarding marital status, 50% of the coinfected individuals were married; among the females, 33% were separated, and 8% were widowed. Pimple et al. reported that among 291 HIV-positive women, 49.1% were married, 46% were widowed, and 4.8% were separated. All coinfected females reported heterosexual contact, while males reported homosexual (48%), heterosexual (36%), and bisexual (16%) behaviour.[11] Similarly, Varshney et al. described 87% of coinfected individuals as MSM and 12.4% as heterosexual.[12] Palakkal et al. found that in a tertiary care setting, 58% of male syphilis patients were MSM, with many reporting bisexual behaviour.[13]

The co-infection rate in our study was higher in males (18.1%) than in females (14.6%). Urban residency predominated among coinfected individuals (58–66%), suggesting higher transmission rates due to urban mobility and population density. Similarly, Pan X et al. noted 75% of coinfection cases from urban settings, though 35% of rural cases highlighted the infections' spread into rural areas.[14]

In our study, among the coinfected males, the major occupations included private sector jobs (36%), coolie labour (20%), and electricians (12%). Similarly, Yuindartanto et al. found 28% of coinfected individuals worked in the private sector and 12% as drivers, with some being students or unemployed.[15] Jeevanandham et al. observed that among 66 syphilis cases, 36.4% of males were manual labourers and 19.7% clerks or drivers.[16]

In our study, among the coinfected females, common occupations included private employment (33%), agriculture, housekeeping, and unskilled labour (17% each). Hussain et al. reported the highest proportion of coinfected females among agriculture/unskilled workers (8 cases), followed by housewives (4 cases) and commerce workers (2 cases).[17]

Self-screening was the most frequent presentation in our study (32% of men and 42% of women). Wang et

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al. found that 24.9% of MSM in a Chinese survey had self-tested for syphilis.[18] Jones et al. reported that 46% of women returned mailed STI self-sampling kits in a community trial, indicating a strong preference for self-screening.[19] Our study showed that among males, 20% presented with skin rash and 16% with genital ulcers. Kumar et al. reported genital ulcers as the most common symptom among HIV-infected STD patients, seen in 60%, followed by genital lesions in 56%.[20]

In our study, among females, 17% presented with genital discharge, 11% with vulvovaginal candidiasis, and 25% with constitutional symptoms. Some patients were asymptomatic or had unrelated dermatoses, such as scabies or dermatophytosis. Chopra et al. reported among 50 HIV-positive women with STIs, 32% had vulvovaginal candidiasis and 16% genital ulcers, with vaginal discharge as a frequent symptom.[21] Goel et al. found bacterial vaginosis in 50% and vulvovaginal candidiasis in 45% of HIV-positive women, often with mild or asymptomatic skin findings.[22]

Stage-wise, syphilis in coinfected patients showed secondary syphilis (32%), early latent (24%), and late latent (28%) predominance, while primary was less frequent (3%). Similarly, Salado-Rasmussen et al. found higher early-stage syphilis among HIV-positive patients.[23] Simões et al. reported unspecified syphilis (45%), latent/late latent (26.6%), secondary (14.3%), tertiary (12.1%), and primary (2%).[24]

The lowest mean CD4 count in our study (246 cells/μL) was in secondary syphilis, supporting Salado-Rasmussen et al., who observed syphilis correlated with lower CD4 counts and higher HIV viral loads.[8] Higher CD4 counts were seen in late latent (633) and early latent (512) stages.[23] Behara et al. found that TPHA-positive females, suggesting latent syphilis, had higher CD4 counts (774 cells/μL) than males (417 cells/μL).[24,25]

Secondary syphilis showed the highest mean VDRL titre (74), with half exceeding 1:64. Early latent had moderate titres (27.27), while late latent and cardiovascular syphilis had lower titres (2.75 and 1.0, respectively). Similarly, Rahmatika et al. reported elevated baseline VDRL titres in HIV-positive patients, high enough to predict asymptomatic neurosyphilis (≥1:32).[26] Knaute et al. noted secondary and latent syphilis showed a slower decline in VDRL titres compared to primary ($P = 0.092$ and $P < 0.001$) and delayed Pathozyme-IgM test response ($P < 0.001$ and $P = 0.012$).[27]

Our study showed a higher HIV prevalence and significant HIV–syphilis coinfection among predominantly young, urban, male populations with diverse sexual behaviours. Early stage syphilis was the most common, often linked with lower CD4 counts and higher VDRL titres. These findings highlight the need for targeted screening, prevention, and educational strategies for high-risk groups.

Limitations: This study had a single-centre design, which limited generalisability; potential selection bias among STD clinic attendees; reliance on self-reported sexual history; lack of follow-up to assess treatment outcomes; and exclusion of pregnant women, which restricted broader applicability.

CONCLUSION

Our study demonstrated a significant prevalence of syphilis among HIV-positive individuals, particularly among young urban males. Syphilis coinfection presents with varied clinical forms, with early stage syphilis being the most frequent and often linked to reduced CD4 counts. These findings emphasise the importance of routine integrated screening for HIV and syphilis, along with focused education and prevention efforts, especially in high-risk groups. Addressing these coexisting infections through timely diagnosis and effective management is essential to reduce complications, interrupt transmission and improve patient outcomes.

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