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A comparative retrospective study on syphilis serology in HIV-positive and negative individuals before and after therapy

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ABSTRACT

Syphilis serological tests are crucial for diagnosing and evaluating syphilis therapy. Human immunodeficiency virus (HIV) infection can alter syphilis serologies, making manifestations more atypical and increasing complications. This study aims to compare treponemal and nontreponemal titers before and after therapy between HIV-positive and negative patients. From January 2018 to December 2021, this study retrospectively evaluated patients diagnosed with early and latent syphilis using quantitative nontreponemal and treponemal serologies (VDRL and TPHA) and categorized them as HIV-positive or negative. Baseline and post-therapy (1 month and last follow-up within 2 years) VDRL and TPHA titers were recorded. Twenty-nine HIV-negative and 28 HIV-positive patients met the inclusion criteria. Baseline VDRL and TPHA titers differed significantly between both groups, particularly in early syphilis, with the median baseline VDRL titer higher in the HIV-positive group. At 1-month and the last follow-up after therapy, VDRL titers continued to differ significantly, underscoring the impact of HIV coinfection on treatment response. Notably, TPHA titers exhibited significant differences between the two groups only at the last follow-up in overall syphilis. The HIV-positive group showed a higher percentage of patients failing to achieve a serological cure (60.7% vs. 58.6%). HIV coinfection in syphilis patients affects both nontreponemal and treponemal titers and elevates the treatment failure risk. This study highlights the importance of periodic syphilis serology tests in coinfected individuals to ensure treatment effectiveness, detect reinfection promptly, and prevent complications.

INTRODUCTION

Syphilis, caused by *Treponema pallidum* subspecies *pallidum*, is a chronic and systemic sexually transmitted infection (STI) primarily transmitted through direct contact with lesions, notably via unprotected sexual intercourse [1, 2]. Global surveillance data from 1990 to 2019 indicate a concerning rise in syphilis prevalence, with the World Health Organization (WHO) estimating approximately 6 million new cases annually [3,4]. Syphilis encompasses multiple stages (primary, secondary, early latent, late latent, and tertiary), characterized by diverse clinical presentations, earning syphilis the monikers of "The Great Masquerader" or "The Great Mimicker" [5]. If left untreated, syphilis can precipitate severe complications affecting various organs, including the neurological, cardiovascular, ocular, and hepatic systems. Moreover, vertical transmission from mother to child transplacentally poses significant risks, manifesting as fetal deaths and stillbirths, preterm or low-birth-weight infants, neonatal death, and syphilis infections in infants, underscoring the urgent need for timely and appropriate treatment during pregnancy. Maternal syphilis further escalates the risk of mother-to-child transmission

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(MTCT) of the human immunodeficiency virus (HIV), contributing to the substantial burden of STIs on maternal and neonatal health [4].

Syphilis exhibits a pronounced association with HIV infections, presenting as a significant synergistic infection for HIV acquisition [6]. The prevalence of syphilis-HIV coinfection is reported to be higher among key populations, particularly men who have sex with men (MSM) and female sex workers (FSW) [7]. HIV exerts notable effects on syphilis serological responses, including elevated serological titers, false negatives (prozone phenomenon), and delayed seroreactivity. Additionally, individuals co-infected with syphilis and HIV often exhibit poorer serological responses post-treatment, characterized by prolonged time to achieve serological cure, increased likelihood of serofast status, treatment failure, and reinfection compared to HIV-negative individuals [1, 8-10].

Given the paramount importance of timely diagnosis and effective treatment, syphilis serological examination serves as a cornerstone in disease management. Recognizing the heightened vulnerability of syphilis patients with HIV coinfection to complications, the Centers for Disease Control and Prevention (CDC) advocate for intensified follow-up, particularly in monitoring syphilis serological titers post-therapy to avert adverse outcomes [1]. In light of these considerations, this retrospective study aims to comprehensively evaluate early and late syphilis cases, elucidating the disparities in treponemal and nontreponemal titers before and after therapy between HIV-positive and HIV-negative patients.

MATERIALS AND METHODS

Study location

This study was conducted at Dr. Soetomo Public Academic Teaching Hospital, located in Surabaya, East Java, Indonesia.

Ethics statement

The study was approved by the Research Ethics Committee of Dr Soetomo Public Academic Teaching Hospital, Surabaya (No. 0909/LOE/301.4.2/V/2022).

Study design and population

A retrospective case-control study design was employed, utilizing data extracted from medical records of patients diagnosed with syphilis between January 2018 and December 2021. The diagnosis was established based on quantitative venereal disease research laboratory (VDRL) and *Treponema pallidum* hemagglutination assay (TPHA) serologies. The study population comprised patients with early syphilis (primary, secondary, and early latent syphilis) and latent syphilis (including syphilis of unknown duration, late latent, and tertiary syphilis). Patients were categorized as HIV-positive if their HIV serology test was reactive at the time of syphilis diagnosis or earlier and as HIV-negative if it was non-reactive at any point following the diagnosis.

Inclusion and exclusion criteria

The case group included patients diagnosed with syphilis based on quantitative VDRL and TPHA serologies, along with reactive HIV serology. The control group comprised

syphilis patients diagnosed using quantitative TPHA and VDRL titers with non-reactive HIV serology. Exclusion criteria consisted of (1) patients diagnosed with syphilis solely based on qualitative VDRL and TPHA titers, (2) patients lacking documented follow-up VDRL and TPHA titers (including those with no follow-up at all and no 1-month follow-up), and (3) patients with incomplete medical record data.

Data collections protocols

In both the case and control groups, data were stratified based on the stage of syphilis (early or late), with non-treponemal (VDRL) and treponemal (TPHA) titers collected at three key time points: before therapy (baseline), at 1-month follow-up, and the last available measurement within two years post-therapy. If patients lacked titers beyond the 1-month follow-up, the data from this time point were utilized as the final measurement. These titers were systematically compared between HIV-positive and HIV-negative individuals across overall syphilis, early syphilis, and late syphilis stages to assess any differential responses to therapy based on HIV status.

A serological cure was defined as either a minimum 4-fold decrease in non-treponemal (VDRL) titer or seroreversion to nonreactive status within specified time frames post-therapy. Patients demonstrating a constant VDRL titer (no increase or decrease) during follow-up were categorized separately to account for potential variations in response to treatment.

Additionally, comprehensive data regarding the patient's medical history, including previous syphilis treatment, response to therapy, reinfection occurrences, comorbidities, CD4+ cell count, and viral load, were extracted from medical records to provide a holistic understanding of each participant's clinical profile and treatment outcomes.

Statistical analysis

For statistical analysis, the t-test was used for unpaired data if the data was normally distributed, or the Mann-Whitney test if the data was not, to analyze the differences in syphilis serological titers (VDRL and TPHA) of early and late syphilis patients between the HIV-negative and HIV-positive groups.

RESULTS

Clinical characteristics of the participants

Between January 2019 and December 2021, a total of 165 patients were diagnosed with syphilis, comprising 84 HIV-negative and 81 HIV-positive individuals. Within the HIV-negative group, 29 patients met the inclusion criteria — 13 (44.8%) with early syphilis and 16 (55.2%) with late syphilis patients. Fifty patients were excluded due to qualitative VDRL and TPHA titer (10 patients), no documented follow-up data (29 patients), and incomplete initial or follow-up VDRL or TPHA titer data (16 patients). In the HIV-positive group, 28 patients met the inclusion criteria, encompassing 17 (60.7%) early syphilis and 11 (39.3%) late syphilis patients. Fifty-three patients were excluded due to qualitative VDRL and TPHA titer (5 patients), no documented follow-up data (17 patients), and incomplete initial or follow-up VDRL or TPHA titer data (31 patients).

The characteristics of our study participants are detailed in Table 1. In the HIV-positive group, exclusively comprised of males (100%), the median age was 28 years. The HIV-negative group exhibited a mix, with 69% males and 31% females and a median age of

31 years. Analyzing the syphilis stages revealed that the HIV-negative group had 44.8% early syphilis and 55.2% late syphilis cases. In contrast, the HIV-positive group displayed a prevalence of 78.6% early syphilis and 21.4% late syphilis cases (Table 2). Statistical analysis unveiled significant differences in syphilis stages between the two groups (p=0.019). Late syphilis was predominant in the HIV-negative group (55.2%), whereas the HIV-positive group showcased a dominance of early syphilis (78.6%), particularly secondary syphilis (60.7%). Remarkably, no tertiary syphilis cases were observed in this study.

In each group, a higher proportion of patients failed to achieve a serological cure. Notably, only 42.8% of patients in the HIV-positive group and 41.3% of patients in the HIV-negative group achieved serological cure. In the HIV-negative group with early syphilis, 5 patients (17.2%) achieved serological cure within 6-12 months, all receiving benzathine penicillin injection therapy. However, 8 patients (27.7%) did not achieve a cure, and of these, 50% received alternative regimens. Based on the evaluation of responses to therapy in early and late syphilis, no significant differences were observed between the two groups. The median CD4 count in the HIV-positive group was 294 cells/mm3, with 25% of patients lacking documented CD4+ count data. Importantly, no significant association between CD4+ count and serological cure was identified in this study (p = 0.565).

Table 1. Baseline characteristics of participants with early and late syphilis in both groups.

Characteristics	HIV-positive, n (%)			HIV-negative, n (%)		
	Early Syphilis	Late Syphilis	Total	Early Syphilis	Late Syphilis	Total
Gender						
Male	22 (78.6)	6 (21.4)	28 (100)	11 (37.9)	9 (31.1)	20 (68)
Female	0 (0)	0 (0)	0 (0)	2 (6.9)	7 (24.1)	9 (31)
Age (Year)						
Mean ± SD	31 ± 9.3	28.2 ± 4.7	30.3 ± 8.52	32.1 ± 9.8	33.4 ± 11.3	32.9 ± 10.52
Median (range)	28 (21-57)	28.5 (22-34)	28 (21-57)	31 (19-57)	30 (19-66)	31 (19-66)
Marital Status						
Married	3 (10.7)	0 (0)	3 (10.7)	6 (20.7)	12 (41.4)	18 (62.1)
Not married	19 (67.9)	6 (21.4)	25 (89.3)	7 (24.1)	4 (13.8)	11 (37.9)
Sexually orientation						
Heterosexual	3 (10.7)	2 (7.1)	5 (17.9)	7 (24.15)	12 (41.35)	19 (65.5)
MSM	16 (57.1)	4 (14.3)	20 (71.4)	5 (17.2)	3 (10.4)	8 (27.6)
Bisexual	3 (10.7)	0 (0)	3 10.7)	1 (3.45)	1 (3.45)	2 (6.9)
Comorbidities*						
Gonorrhoeae	1 (3.6)	0 (0)	1 (3.6)	1 (3.45)	1 (3.45)	2 (6.9)
Condyloma accuminata	3 (10.7)	0 (0)	3 (10.7)	0 (0)	1 (3.45)	1 (3.45)
Vulvovaginal candidiasis	0 (0)	0 (0)	0 (0)	1 (3.45)	0 (0)	1 (3.45)
Bacterial vaginosis	0 (0)	0 (0)	0 (0)	0 (0)	1 (3.45)	1 (3.45)
Nonspecific genital infection	0 (0)	0 (0)	0 (0)	0 (0)	1 (3.45)	1 (3.45)
Lung tuberculosis	2 (7.1)	0 (0)	2 (7.1)	0 (0)	0 (0)	0 (0)
Papil edema	1 (3.6)	0 (0)	1 (3.6)	0 (0)	0 (0)	0 (0)
Uveitis	1 (3.6)	0 (0)	1 (3.6)	0 (0)	0 (0)	0 (0)
Toxoplasma cerebri	2 (7.1)	1 (3.6)	3 (10.7)	0 (0)	0 (0)	0 (0)
Pregnancy	0 (0)	0 (0)	0 (0)	2 (6.9)	2 (6.9)	5 (17.2)
History of syphilis						
Yes	1 (3.6)	1 (3.6)	2 (7.2)	2 (6.9)	2 (6.9)	4 (13.8)
No	21 (75.0)	5 (17.9)	26 (92.9)	11 (37.9)	14 (48.3)	25 86.2)
History of therapy						
Benzathine penicillin injection	0 (0)	1 (3.6)	1 (3.6)	1 (3.4)	2 (6.9)	3 (10.3)
Doxycycline	2 (7.2)	0 (0)	2 (7.2)	1 (3.4)	1 (3.4)	2 (6.8)
Erythromycin	0 (0)	0 (0)	0 (0)	1 (3.4)	0 (0)	1 (3.4)
No documented therapy	20 (71.4)	5 (17.8)	25 (89.2)	10 (34.6)	13 (44.9)	23 (79.5)
Current therapy	14 (50.0)	0 (0)	14 (50.0)	6 (20.7)	0 (0)	6 (20.7)
Benzathine penicillin 2.4 million IU single dose IM	5 (17.9)	6 (21.4)	11 (39.3)	3 (10.3)	14 (48.3)	17 (58.6)
Benzathine penicillin 2.4 million IU 3 times doses IM	2 (7.1)	0 (0)	2 (7.1)	3 (10.3)	0 (0)	3 (10.3)
Doxycycline 2x100mg PO	0 (0)	0 (0)	0 (0)	1 (3.5)	0 (0)	1 (3.5)
Erythromycin 4x500mg PO	1 (3.6)	0 (0)	1 (3.6)	0 (0)	2 (6.9)	2 (6.9)
Benzathine penicillin injection + doxycycline	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Benzathine penicillin injection + erythromycin						
Response to the therapy	10 (35.7)	2 (7.1)	12 (42.8)	5 (17.2)	7 (24.1)	12 (41.3)

Serological cure	1 (3.6)	0 (0)	1 (3.6)	1 (3.5)	3 (10.3)	4 (13.8)
Constant VDRL titer	8 (28.6)	1 (3.6)	9 (32.1)	6 (20.7)	6 (20.7)	12 (41.4)
A less 4-fold drop of VDRL	2 (7.1)	1 (3.6)	3 (10.7)	0 (0)	0 (0)	0 (0)
Initial 4-fold drop with subsequent 4-fold increase of VDRL	1 (3.6)	0 (0)	1 (3.6)	1 (3.5)	0 (0)	1 (3.5)
Fourfold increase with < 4-fold drop of VDRL	0 (0)	2 (7.1)	2 (7.1)	0 (0)	0 (0)	0 (0)
Fourfold increase of VDRL without drops	251.5 ± 142.9	320 ± 138.1	267.8 ± 141.5			
CD4⁺ value	214.5 (50-538)	333 (119-505)	294 (50-538)			
Mean ± SD	1 (3.6)	1 (3.6)	2 (7.1)			
Median (range)	9 (32.1)	3 (10.8)	12 (42.9)			
≥500	6 (21.4)	1 (3.6)	7 (25)			
200-<500	6 (21.4)	1 (3.6)	7 (25)			
<200						
No data	80	<40	<40			
Viral load	270,762	88,099	270,762			
Minimum	2 (7.1)	1 (3.6)	3 (10.7)			
Maximum	2 (7.1)	0 (0)	2 (7.1)			
0-499	0 (0)	1 (3.6)	1 (3.6)			
500-4999	1 (3.6)	1 (3.6)	2 (7.1)			
5000-49999	0 (0)	0 (0)	0 (0)			
50000-499999	12 (42.9)	8 (28.6)	20 (71.5)			
≥500000						
No data						
Total	**22 (78.6)**	**6 (21.4)**	**28 (100)**	**13 (44.8)**	**16 (55.2)**	**29 (100)**

*One patient can have ≥1 comorbidity(ies)

Table 2. Stages of syphilis patients in both groups.

Syphilis Stage	Syphilis, n (%)		p-value
	HIV-positive	HIV-negative	
Early syphilis	22 (78.6)	13 (44.8)	
Primary	1 (3.6)	2 (6.9)	
Secondary	17 (60.7)	9 (31.0)	
Early latent	4 (14.3)	2 (6.9)	0.019
Late syphilis	6 (21.4)	16 (55.2)	
Late latent	6 (21.4)	16 (55.2)	
Tertiary	0 (0)	0 (0)	
Total	**28**	**29**	

Syphilis serological differences in HIV-positive and HIV-negative before therapy (baseline)

Significant differences in baseline VDRL and TPHA titers were observed between HIV-positive and HIV-negative groups before the initiation of treatment (Table 3), with subsequent analysis revealing significant differences in both VDRL and TPHA titers, specifically in early syphilis (Table 4). However, no significant differences were found in late syphilis (Table 5).

The baseline VDRL titers in the HIV-positive group were markedly higher than those in the HIV-negative group. Specifically, for overall syphilis, the medians were 1:64 (range: 1:2 - 1:2048) for the HIV-positive group and 1:16 (range: 1:2-1:128) for the HIV-negative group. In early syphilis, the medians were 1:64 (range: 1:2 - 1:2048) for the HIV-positive group and 1:32 (range: 1:2 - 1:128) for the HIV-negative group. Similarly, in late syphilis, the medians were 1:24 (range: 1:2 - 1:256) and 1:8 (range: 1:2 - 1:128) for the HIV-positive and HIV-negative groups, respectively. Importantly, within both groups, baseline VDRL titers for early syphilis were consistently higher than those for late syphilis (1:64 vs. 1:24 in HIV-positive and 1:32 vs. 1:8 in HIV-negative).

Table 3. Comparison between VDRL and TPHA titers in syphilis patients with and without HIV.

Syphilis	VDRL		TPHA	
	HIV (+)	HIV (-)	HIV (+)	HIV (-)
Baseline				
Mean ± SD	1:151 ± 1:379	1:23 ± 1:32	1:13,254 ± 1:15,810	1:2,993 ± 1:4,287
Median (range)	1:64 (1:2-1:2,048)	1:16 (1:2-1:128)	1:5,120 (1:320-1:40,960)	1:2,560 (1:80-1:20,480)
p-value	0.001		0.002	
1 Month Follow-Up After Therapy				
Mean ± SD	1:45 ± 1:44	1:11 ± 1:14	1:6,562 ± 1:10,739	1:3,260 ± 1:5,291
Median (range)	1:32 (1:2-1:128)	1:4 (0-1:64)	1:2,560 (1:128-1:40,960)	1:1280 (0-1:20,480)
p-value	0.001		0.082	
Last Follow-Up After Therapy				
Mean ± SD	1:45 ± 1:44	1:11 ± 1:14	1:6,562 ± 1:10,739	1:3,260 ± 1:5,291
Median (range)	1:32 (1:2-1:128)	1:4 (0-1:64)	1:2,560 (1:128-1:40,960)	1:1280 (0-1:20,480)
p-value	0.001		0.018	

Table 4. Comparison between VDRL and TPHA titers in early syphilis patients with and without HIV.

Early Syphilis	VDRL		TPHA	
	HIV (+)	HIV (-)	HIV (+)	HIV (-)
Baseline				
Mean ± SD	1:175 ± 1:424	1:31 ± 1:34	1:16,185 ± 1:16,681	1:3,237 ± 1:3,410
Median (range)	1:64 (1:2-1:2,048)	1:32 (1:2-1:128)	1:7,680 (1:640-1:40,960)	1:2,560 (1:80-1:10,240)
p-value	0.002		0.016	
1 Month Follow-Up After Therapy				
Mean ± SD	1:51 ± 1:46	1:12 ± 1:10	1:8,064 ± 1:11,708	1:2745 ± 1:2,989
Median (range)	1:32 (1:2-1:128)	1:8 (1:1-1:32)	1:2,560 (1:128-1:40,960)	1:2,560 (1:80-1:10,240)
p-value	0.001		0.101	
Last Follow-Up After Therapy				
Mean ± SD	1:42 ± 1:35	1:20 ± 1:34	1:9,867 ± 1:13,692	1:3132 ± 1:2,941
Median (range)	1:32 (1:1-1:128)	1:8 (1:1-1:128)	1:3,840 (1:160-1:52,120)	1:2,560 (1:80-10,240)
p-value	0.006		0.157	

Syphilis serological differences in HIV-positive and HIV-negative after therapy

Following therapy, significant differences in VDRL titers were observed at the 1-month follow-up between HIV-positive and HIV-negative groups for overall syphilis and early syphilis, as indicated in Tables 3 and 4. However, no significant difference was found in VDRL titers for late syphilis (Table 5). Notably, the HIV-negative group exhibited a 4-fold decrease in VDRL titers for overall syphilis and early syphilis at the 1-month follow-up, while the HIV-positive group experienced a less than 4-fold decrease. Meanwhile, TPHA titers in both groups did not achieve a 4-fold decrease at the 1-month follow-up, and no differences were noted between the groups for overall syphilis, early syphilis, or late syphilis at the 1-month follow-up.

At the last follow-up after therapy, a significant difference in the VDRL titer was observed between HIV-positive and HIV-negative individuals for overall syphilis, early syphilis, and late syphilis. In contrast, significant differences in TPHA titers were only observed for overall syphilis between the HIV-positive and HIV-negative groups, with no distinctions in early or late syphilis. Notably, the HIV-positive group exhibited an increase in VDRL and TPHA titers at the last follow-up for late syphilis, potentially indicating treatment failure or reinfection.

Table 5. Comparison between VDRL and TPHA titers in late syphilis patients with and without HIV.

Late Syphilis	VDRL		TPHA	
	HIV (+)	HIV (-)	HIV (+)	HIV (-)
Baseline				
Mean ± SD	1:63 ± 1:97	1:16 ± 1:31	1:2507 ± 1:2,165	1:2,795 ± 1:4,990
Median (range)	1:24 (1:2-1:256)	1:8 (1:2-1:128)	1:1,920 (1:320-5,120)	1:1,280 (1:80-1:20,480)
p-value	0.134		0.455	
1 Month Follow-Up After Therapy				
Mean ± SD	1:24 ± 1:31	1:10 ± 1:17	1:1056 ± 1:862	1:3,680 ± 1:6,685
Median (range)	1:4 (1:2-1:64)	1:4 (0-1:64)	1:960 (1:256-2,560)	1:1,280 (0-1:20,480)
p-value	0.257		0.707	
Last Follow-Up After Therapy				
Mean ± SD	1:105 ± 1:200	1:8 ± 1:11	1:9,440 ± 1:15,861	3,600 ± 1:6,719
Median (range)	1:24 (1:4-1:512)	1:2 (0-1:32)	1:1,920 (1:320-1:40,960)	1:960 (0-1:20,480)
p-value	0.017		0.193	

DISCUSSION

The distribution of syphilis stages showed significant differences between the HIV-positive and HIV-negative groups in our study. The HIV-negative group predominantly presented with late syphilis, while the HIV-positive group exhibited a higher prevalence of early syphilis, particularly secondary syphilis. These findings align with a similar study that reported a high prevalence of secondary syphilis among individuals co-infected with HIV [11]. The majority of HIV-negative individuals in our study were asymptomatic and were diagnosed with syphilis through routine screenings, including pregnancy tests, blood donations, medical checkups, and partner-related examinations. This contributed to a higher incidence of late-stage syphilis among this group. Conversely, heightened awareness among HIV-positive individuals regarding their health status likely prompted early symptom recognition and immediate medical attention, contributing to the higher prevalence of early syphilis.

Our study revealed significantly elevated baseline VDRL and TPHA titers among HIV-positive patients. The higher baseline nontreponemal titer in the HIV-positive group is consistent with previous studies, but comparison studies of treponemal titers between HIV-positive and HIV-negative groups have been lacking. While nontreponemal titers reflect disease activity and are used to monitor therapy response, treponemal titers were used to ascertain the seroprevalence of syphilis regardless of clinical symptoms. Treponemal titers can identify current infections as well as past treated and untreated cases and can persist throughout life, making them valuable for estimating the actual seroprevalence of syphilis [12]. Previous studies reported VDRL titer ≥1:32 and a TPHA titer ≥1:20480 as predictors of asymptomatic neurosyphilis in HIV-syphilis coinfection [13, 14]. The observed differences in baseline titers between the two groups in this study may be attributed to variations in immune response, cytokine shifts, and T-regulatory responses in HIV-positive individuals. Post-therapy analysis revealed persistent differences in VDRL titers between HIV-positive and HIV-negative groups, particularly among early syphilis patients. Late syphilis patients with HIV coinfection exhibited a concerning increase in VDRL titers at the last follow-up, suggesting potential treatment failure or reinfection. These findings underscore the challenges in managing syphilis among HIV-positive individuals, with slower serologic responses and increased treatment failure rates reported in previous studies [8-10].

In our study, a higher proportion of patients in the HIV-positive group experienced an increase in VDRL titers after therapy compared to the HIV-negative group, surpassing

findings in the previous study by Lin et al., who reported 14.1% of syphilis patients with HIV-positive experienced a 4-fold increase in titer among all patients who respond poorly to therapy [9]. This increase may be associated with reinfection or therapy failure, emphasizing the importance of regular serologic follow-ups to enable timely intervention by clinicians. Routine serologic follow-up in the HIV population could identify 50.8% of asymptomatic syphilis cases, which shows the high number of syphilis cases among HIV patients, highlighting the high burden of syphilis among HIV patients [15].

However, low compliance with follow-up testing in our study, potentially due to improved patient condition after therapy or uncovered laboratory costs, poses a significant limitation to our study, impacting the analysis of post-therapy titers. The lack of routine syphilis screening in HIV populations at our center underscores the need for enhanced screening protocols to detect asymptomatic cases and mitigate transmission risks. Further research is warranted to explore optimal interventions and improve the overall management of syphilis in the context of HIV coinfection.

CONCLUSIONS

In conclusion, the present study highlights significant disparities in syphilis presentation, baseline serological titers, and treatment outcomes between HIV-positive and HIV-negative individuals. HIV coinfection in syphilis patients can affect both nontreponemal and treponemal titers before and after therapy. Enhanced screening protocols are imperative to detect asymptomatic cases and prevent transmission within this vulnerable population. Furthermore, encouraging and ensuring patients' compliance with periodic follow-ups after therapy, especially among HIV-positive patients, is crucial to mitigate the risk of treatment failure and reinfection.

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AUTHORS CONTRIBUTIONS

Study conception and design -ASR, ANH, CRSP, and BU. Data collection -ASR, ANH, DM, A, MS, SW, RIA. Data analysis and interpretation -ASR, ANH, CRSP, and BU. Drafting of the article -ASR and ANH. Critical revision of the article –MYL, D, R. All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

CONFLICTS OF INTEREST

There is no conflict of interest among the authors.

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